Cutting-edge Advancements

By Fred Gebhart; Reviewed by Vikas Chopra, MD

Ophthalmologists could have a new tool to assess progression in glaucoma by measuring vascular damage in the retina and optical nerve head. Optical coherence tomography angiography (OCTA) can directly measure retinal vessel densities in a non-invasive, reliable, and reproducible manner, and provide indirect measurements of ocular perfusion and blood flow.

"We know that retinal blood flow is reduced with increasing glaucoma severity," said Vikas Chopra, MD. "We have not had an easily performed, reliable, noninvasive method to assess retinal blood flow or changes in retinal blood flow before OCTA," said Dr. Chopra, associate professor of clinical ophthalmology, David Geffen School of Medicine, University of California Los Angeles, associate medical director, Doheny Image Reading Center, and medical director, UCLA Doheny Eye Centers.

"Retinal specialists already use OCTA to assess retinal vascular in various diseases, and glaucoma specialists should soon be able to do the same after some software tweaking to eliminate measurement artifacts and derive quantitative measures of blood flow," he added.

Dr. Chopra was senior author on a proof-of-concept study that used swept-source OCTA (DRI OCT Triton, Topcon) to distinguish between normal eyes versus eyes with pre-perimetric glaucoma versus eyes with early primary open-angle glaucoma (POAG).

Suprachoroidal hemorrhage can often be managed effectively with a conservative approach. If surgical intervention becomes necessary, timing is critical for optimizing the outcome and minimally invasive techniques can be considered, said John W. Kitchens, MD. To allow for complete drainage through surgery, it is ideal to wait until the suprachoroidal hemorrhage is maximally "liquified." If it develops as an intraoperative complication, do not attempt drainage immediately, he said.

(See story on page 14: Minimalist)

(Continues on page 31: OCTA)

Go ahead, look inside
CHECK IT OUT at Xiidra-ECP.com
LESS IS MORE FOR SUPRACHOROIDAL HEMORRHAGE

SUPRACHOROIDAL hemorrhage can often be managed effectively with a conservative approach. If surgical intervention becomes necessary, timing is critical for optimizing the outcome and minimally invasive techniques can be considered, said John W. Kitchens, MD. To allow for complete drainage through surgery, it is ideal to wait until the suprachoroidal hemorrhage is maximally “liquified.” If it develops as an intraoperative complication, do not attempt drainage immediately, he said.

(See story on page 14: Minimalist)

WEIGHING BENEFITS OF BEVACIZUMAB FOR DME THERAPY

THE EFFICACY of intravitreal bevaciuzumab for improving vision in patients with center-involving diabetic macular edema (DME) has been demonstrated in several clinical trials. In this point-counterpoint, ophthalmologists Sergio Rojas, MD, and Jean-François Korbelenik, MD, provide differing perspectives on whether the functional gain associated with bevacizumab injections is less than or as good as that achieved with aflibercept or ranibizumab for DME therapy.

(See story on page 44: DME therapy)

ENGAGING OCTA IN GLAUCOMA IMAGING

Proof of concept uses swept-source OCTA to discern normal, pre-perimetric glaucoma, early POAG

By Fred Gebhart;
Reviewed by Vikas Chopra, MD

OPHTHALMOLOGISTS could have a new tool to assess progression in glaucoma by measuring vascular damage in the retina and optic nerve head. Optical coherence tomography angiography (OCTA) can directly measure retinal vessel densities in a non-invasive, reliable, and reproducible manner, and provide indirect measurements of ocular perfusion and blood flow.

“We know that retinal blood flow is reduced with increasing glaucoma severity,” said Vikas Chopra, MD. “We have not had an easily performed, reliable, noninvasive method to assess retinal blood flow or changes in retinal blood flow before OCTA,” said Dr. Chopra, associate professor of clinical ophthalmology, David Geffen School of Medicine, University of California Los Angeles, associate medical director, Doheny Image Reading Center, and medical director, UCLA Doheny Eye Centers.

“Retinal specialists already use OCTA to assess retinal vascular in various diseases, and glaucoma specialists should soon be able do the same after some software tweaking to eliminate measurement artifacts and derive quantitative measures of blood flow,” he added.

Dr. Chopra was senior author on a proof-of-concept study that used swept-source OCTA (DRI OCT Triton, Topcon) to distinguish between normal eyes versus eyes with pre-perimetric glaucoma versus eyes with early primary open-angle glaucoma (POAG).

Ophthalmologists recognize that ischemia plays

(Continues on page 31: OCTA)

IN VIEW: Examples of optical coherence tomography angiography (OCTA) scans from normal versus early primary open-angle glaucoma (POAG). (Images courtesy of Vikas Chopra, MD)

Vessel Density Attenuation: Early POAG

VESSEL DENSITY ATTENUATION: EARLY POAG

IN VIEW: Examples of optical coherence tomography angiography (OCTA) scans from normal versus early primary open-angle glaucoma (POAG). (Images courtesy of Vikas Chopra, MD)
CHOOSE A SYSTEM THAT EMPOWERS YOUR EVERY MOVE.

Technique is more than just the motions. Designed for flexibility in and beyond the surgical suite, the WHITESTAR SIGNATURE® PRO Phacoemulsification System helps to free your focus so you can confidently activate your expertise in each moment.

Let’s talk.

Contact your phaco specialist today.
WHITESTARSIGNATUREPRO.COM

Rx Only
INDICATIONS: The WHITESTAR SIGNATURE® PRO System is a modular ophthalmic microsurgical system that facilitates anterior segment (cataract) surgery. The modular design allows the users to configure the system to meet their surgical requirements. IMPORTANT SAFETY INFORMATION: Risks and complications of cataract surgery may include broken ocular capsule or corneal burn. This device is only to be used by a trained, licensed physician. ATTENTION: Reference the labeling for a complete listing of Indications and Important Safety Information.

WHITESTAR SIGNATURE is a trademark owned by or licensed to Abbott Medical Optics Inc., its subsidiaries or affiliates.
© 2017 Abbott Medical Optics Inc. | www.WhitestarSignaturePRO.com | PP2017CT1584
**Ophthalmology Times EDITORIAL ADVISORY BOARD**

**Chief Medical Editor**
Peter J. McDonnell, MD
Wills Eye Institute
Johns Hopkins University
Baltimore, MD

**Associate Medical Editors**
Dimitri Azar, MD
University of Illinois, Chicago
Chicago, IL

Anne L. Coleman, MD
Jules Stein Eye Institute, UCLA
Los Angeles, CA

Ernest W. Kemmehl, MD
Harvard & Tufts Universities
Boston, MA

Robert K. Maloney, MD
Los Angeles, CA

Joan Miller, MD
Massachusetts Eye & Ear Infirmary
Harvard University
Boston, MA

Randall Olson, MD
University of Utah
Salt Lake City, UT

Robert Osher, MD
University of Cincinnati
Cincinnati, OH

Jonathan H. Talamo, MD
Harvard University
Boston, MA

Kazu Tsubota, MD
Kanto University School of Medicine
Tokyo, Japan

**Retina/Vitreous**

- Stanley Chang, MD
  Columbia University
  New York, NY

- David Chow, MD
  University of Toronto
  Toronto, Canada

- Pravin U. Dugel, MD
  Phoenix, AZ

- Sharon Fekrat, MD
  Duke University
  Durham, NC

- Julia Haller, MD
  Wilmer Eye Institute, Thomas Jefferson University
  Philadelphia, PA

- Tarek S. Hassan, MD
  Oakland University
  Rochester, MI

- Michael Ip, MD
  Los Angeles Eye Institute
  Los Angeles, CA

- Cari D. Regillo, MD
  Wilmer Eye Institute, Thomas Jefferson University
  Philadelphia, PA

- Lawrence J. Singerman, MD
  Case Western Reserve University
  Cleveland, OH

**Glaucoma**

- Robert D. Fechter, MD
  SUNY Upstate Medical University
  Syracuse, NY

- Meera Gupta, MD
  University of Toronto
  Toronto, Canada

- Richard K. Parrish II, MD
  Bascom Palmer Eye Institute
  University of Miami
  Miami, FL

- Robert Ritch, MD
  New York Eye & Ear Infirmary
  New York, NY

- Joel Schuman, MD
  NYU Langone Medical Center
  New York, NY

- Shanna L. Merbs, MD
  Wills Eye Institute
  University of Pennsylvania
  Philadelphia, PA

**Ophthalmic Pathology**

- Joel Schuman, MD
  NYU Langone Medical Center
  New York, NY

- Richard S. Hoffman, MD
  CMU Health & Science University
  Portland, OR

- Samuel Masket, MD
  Jules Stein Eye Institute, UCLA
  Los Angeles, CA

- Bartley J. Mondino, MD
  New York Eye & Ear Infirmary
  Beth Israel Medical Center
  Albert Einstein College of Medicine
  New York, NY

- Michael Raizman, MD
  Eye Institute
  University of California, Los Angeles (UCLA)

- Joel Schuman, MD
  NYU Langone Medical Center
  New York, NY

- Robert K. Maloney, MD
  Wills Eye Institute
  Thomas Jefferson University
  Philadelphia, PA

- Aziz Mottiwala
  Allergan
  Vice President of Marketing, U.S. Eye Care

**ORIENTATION**

- Asher Behrens, MD
  WLW Eye Institute
  Johns Hopkins University
  Baltimore, MD

- Elizabeth A. Davis, MD
  University of Minnesota
  Minneapolis, MN

- Uday Devgan, MD
  Jules Stein Eye Institute, UCLA
  Los Angeles, CA

- Richard S. Hoffman, MD
  CMU Health & Science University
  Portland, OR

- Samuel Masket, MD
  Jules Stein Eye Institute, UCLA
  Los Angeles, CA

- Bartley J. Mondino, MD
  New York Eye & Ear Infirmary
  Beth Israel Medical Center
  Albert Einstein College of Medicine
  New York, NY

- Michael Raizman, MD
  Eye Institute
  University of California, Los Angeles (UCLA)

- Joel Schuman, MD
  NYU Langone Medical Center
  New York, NY

- Robert K. Maloney, MD
  Wills Eye Institute
  Thomas Jefferson University
  Philadelphia, PA

- Aziz Mottiwala
  Allergan
  Vice President of Marketing, U.S. Eye Care

**How to Contact Ophthalmology Times**

- Editorial:
  4950 Country Club Blvd., Suite 210
  North Olmsted, OH 44070-5351
  440/262-2800
  FAX: 440/756-5227

- Subscription Services:
  Toll Free: 888/527-7008 or
  216/740-6747
  FAX: 216/740-6417

- Advertising:
  4450 Route 1 South
  Building F, Suite 210,
  Iselin, NJ 08830-3009
  732/596-0276
  FAX: 732/596-0003

- Production:
  131 W. First St.
  Duluth, MN 55802-2065
  800/346-3098
  FAX: 218/740-7223, 218/740-6576

Ophthalmology Times ©2017

To receive Ophthalmology Times or issue information, please contact:
Ophthalmology Times
218/740-6576
www.OphthalmologyTimes.com

**Anterior Segment/Cornea/Exterior Disease**

- Asher Behrens, MD
  WLW Eye Institute
  Johns Hopkins University
  Baltimore, MD

- Elizabeth A. Davis, MD
  University of Minnesota
  Minneapolis, MN

- Uday Devgan, MD
  Jules Stein Eye Institute, UCLA
  Los Angeles, CA

- Richard S. Hoffman, MD
  CMU Health & Science University
  Portland, OR

- Samuel Masket, MD
  Jules Stein Eye Institute, UCLA
  Los Angeles, CA

- Bartley J. Mondino, MD
  New York Eye & Ear Infirmary
  Beth Israel Medical Center
  Albert Einstein College of Medicine
  New York, NY

- Michael Raizman, MD
  Eye Institute
  University of California, Los Angeles (UCLA)

- Joel Schuman, MD
  NYU Langone Medical Center
  New York, NY

- Robert K. Maloney, MD
  Wills Eye Institute
  Thomas Jefferson University
  Philadelphia, PA

- Aziz Mottiwala
  Allergan
  Vice President of Marketing, U.S. Eye Care

**Pediatric Ophthalmology**

- Robert D. Fechter, MD
  SUNY Upstate Medical University
  Syracuse, NY

- Meera Gupta, MD
  University of Toronto
  Toronto, Canada

- Richard K. Parrish II, MD
  Bascom Palmer Eye Institute
  University of Miami
  Miami, FL

- Robert Ritch, MD
  New York Eye & Ear Infirmary
  New York, NY

- Joel Schuman, MD
  NYU Langone Medical Center
  New York, NY

- Shanna L. Merbs, MD
  Wills Eye Institute
  University of Pennsylvania
  Philadelphia, PA

- Aziz Mottiwala
  Allergan
  Vice President of Marketing, U.S. Eye Care

**Practice Management**

- Joseph C. Noreika, MD
  Medica, OH

- Frank Weinstein, MD
  Boca Raton, FL

- Aziz Mottiwala
  Allergan
  Vice President of Marketing, U.S. Eye Care

**Sample Images**

- Ophthalmology Times
  Ophthalmology Times
  Ophthalmology Times

**Digital Photography Solutions for Slit Lamp Imaging**

- All-In-One Digital SLR Camera Adaptor

- Universal Smart Phone Adapter for Slit Lamp Imaging

- Transamerica Technologies International
  Toll free: 800-322-7373
  email: info@ttimedical.com
  www.ttimedical.com

- TTI Medical
  Official publication sponsor of
Clinical Diagnosis

16 UTILIZING ERG VISION TESTING IN GLAUCOMA
Cataract, glaucoma specialists explain the cross-specialty benefits of system

Special Report

22 AQUEOUS ANGIOGRAPHY FOR CONTROLLING IOP
Technology enables deeper understanding of aqueous humor outflow

Practice Management

46 CLINIC LESSONS FROM STRANGE PATIENTS
Three key takeaways from instances of ‘life’ inevitably showing up in the clinic

What’s Trending

See what the ophthalmic community is reading on OphthalmologyTimes.com

1 Top 5 stories of 2017 (so far)
OphthalmologyTimes.com/Top5Stories

2 Reactivating cones for retinitis pigmentosa
OphthalmologyTimes.com/Reactivate

3 What to do when the clinic has taken you hostage
OphthalmologyTimes.com/Hostage

4 Did you know these 20 famous people have impaired vision?
OphthalmologyTimes.com/Celebrity

5 Managing surgery in HSV cases
OphthalmologyTimes.comHSV

Digital App

Introducing the Ophthalmology Times app for iPad and iPhone. Download it for free today at OphthalmologyTimes.com/OTapp

Video

Watch as Michael Jumper, MD, explains which antibiotics he would want used in his own eyes if he needed surgery. Go to OphthalmologyTimes.com/OcularAntibiotics

eReport

Sign up for Ophthalmology Times’ weekly eReport at Ophthalmologytimes.com/eReport

Facebook

Like Ophthalmology Times at Facebook.com/OphthalmologyTimes

Find us on
OPD wavefront captures a large amount of diagnostic data--rapidly. It allows us to make more confident clinical decisions, delivering improved outcomes, efficiencies and profitability.

Prior to cataract surgery I depend on the OPD's placido disc map to assess my patients' level of dry eye and to show them irregularities of their tear film and ocular surface.

The OPD provides spherical aberration data with angle alpha and kappa metrics, to better determine the most appropriate Wavefront enhanced PCIOls.

The ease of use and wealth of clinical information the OPD-Scan III provides is simply astonishing. It is our “go to” preoperative cataract evaluation tool.
Evidence-based ophthalmology

Comparing notes over practice variations for global physicians

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

He can be reached at 727 Maumenee Building 600 N. Wolfe St. Baltimore, MD 21287-9278 Phone: 443/287-1511 Fax: 443/287-1514 E-mail: pmcdonn1@jhmi.edu

DURING A RECENT conference, I had the chance to get together with three colleagues from around the world. It was after 5 p.m. The lectures were over. We were sitting in a café enjoying the fruity adult beverage for which the host country is justly famous.

I don’t like to brag, but my ophthalmologist friends are fabulously successful (by any measure) and extremely intelligent and respected physicians. They live thousands of miles apart. Among the four of us seated at the table, six languages were spoken. All of them read and publish in the English language ophthalmology journals. We alternated back and forth between two languages as we sipped our cocktails and this truth serum began to flow through our veins.

THREE DIFFERENT REGIMENS

Somehow the topic of adenovirus conjunctivitis came up. I asked each of my colleagues how they treated patients with this feared infection. Each gave a different approach.

One colleague told an amusing story; his professor forbade the use of steroids by residents and reserves topical steroids for only the very severely affected patients.

My third colleague gives supportive therapy only, recommends transmission precautions, and reserves topical steroids for only the very severely affected patients.

Over a second delicious beverage, we discussed why it is that ophthalmologists who read the same papers in the same journals have such widely varying approaches to the management of a very common eye problem.

Not everyone gives the same credence to the same publications. Some ophthalmologists train with professors who are vehemently opposed to the use of corticosteroids while others had professors who used steroids frequently.

One colleague told an amusing story; his professor forbade the use of steroids by residents for patients in the university clinic but used them liberally in his private practice.

Why it is that ophthalmologists who read the same papers in the same journals have such widely varying approaches?

“I have to keep my private patients comfortable and happy,” he confided to his junior colleague.

The variation in practice among very well trained ophthalmologists frequently surprises me, given that we all acknowledge the importance of scientific evidence to guide our practice and read the same journals.

I dream of a future time when every patient with a certain problem receives the same effective treatment based upon the most current scientific knowledge, no matter which doctor he or she happens to see.

By Peter J. McDonnell, MD
director of the Wilmer Eye Institute,
Johns Hopkins University School of Medicine, Baltimore, and chief medical editor of Ophthalmology Times.
An elegant procedure.
A predictable outcome.
A satisfied patient and a thriving practice.

iStent—first and foremost.

INDICATION FOR USE. The iStent® Trabecular Micro-Bypass Stent (Models GTS100R and GTS100L) is indicated for use in conjunction with cataract surgery for the reduction of intraocular pressure (IOP) in adult patients with mild to moderate open-angle glaucoma currently treated with ocular hypotensive medication. CONTRAINDICATIONS. The iStent® is contraindicated in eyes with primary or secondary angle closure glaucoma, including neovascular glaucoma, as well as in patients with retrobulbar tumor, Shunkei-Weber Syndrome or any other type of condition that may cause elevated episcleral venous pressure. WARNINGS. Gonioscopy should be performed prior to surgery to exclude PAS, rubeosis, and other angle abnormalities or conditions that would prohibit adequate visualization of the angle that could lead to improper placement of the stent and pose a hazard. The iStent® is MR-Conditional meaning that the device is safe for use in a specified MR environment under specified conditions, please see label for details. PRECAUTIONS. The surgeon should monitor the patient postoperatively for proper maintenance of intraocular pressure. The safety and effectiveness of the iStent® has not been established as an alternative to the primary treatment of glaucoma with medications, in children, in eyes with significant prior trauma, chronic inflammation, or an abnormal anterior segment, in pseudophakic patients with glaucoma, in patients with pseudoexfoliative glaucoma, pigmentary, and uveitic glaucoma, in patients with unmedicated IOP less than 22 mmHg or greater than 36 mmHg after “washout” of medications, or in patients with prior glaucoma surgery of any type including argon laser trabeculoplasty, for implantation of more than a single stent, after complications during cataract surgery, and when implantation has been without concomitant cataract surgery with IOL implantation for visually significant cataract. ADVERSE EVENTS. The most common post-operative adverse events reported in the randomized pivotal trial included early post-operative corneal edema (9%), BCVA loss of ≥1 line at or after the 3 month visit (7%), posterior capsular opacification (6%), stent obstruction (4%), early post-operative anterior chamber cells (3%), and early post-operative corneal abrasion (3%). Please refer to Directions for Use for additional adverse event information. CAUTION: Federal law restricts this device to sale by, or on the order of, a physician. Please reference the Directions for Use labeling for a complete list of contraindications, warnings, precautions, and adverse events.

©2017 Glaukos Corporation. Glaukos and iStent are registered trademarks of Glaukos Corporation. 400-0596-2017-US Rev. 0
Transepithelial topography-guided photorefractive keratectomy (TG-PRK) to correct irregular astigmatism after penetrating keratoplasty (PK) is safe and efficacious, according to early study results, said Simon P. Holland, MD, Pacific Laser Eye Care Centre, Vancouver, British Columbia. David Lin, MD, was a study co-author.

It is common that astigmatism is high and irregular after PK, Dr. Holland said.

**CASE SERIES**

In this retrospective, nonrandomized consecutive series, researchers focused on contact lens-intolerant eyes that had irregular astigmatism after PK and transepithelial TG-PRK performed with an excimer laser (Schwind Amaris Excimer Laser, Schwind). Mitomycin 0.02% also was applied. Of 41 eyes treated, 20 had enough data at 1 year for analysis.

Efficacy and safety were analyzed along with preoperative and postoperative uncorrected distance visual acuity (UCDVA), corrected distance visual acuity (CDVA), manifest refraction, topographic cylinder, and the number of Snellen lines gained or lost.

At 12 months, 30% of eyes (6 of 20 eyes) had UCDVA ≥ 20/40; None had UCDVA ≥ 20/40 preoperatively.

Ten percent (2 eyes) lost 2 lines or more; Mean change in CDVA: + 0.6 ± 1.2 lines, p = 0.02.

“Transepithelial topography-guided PRK can help correct irregular astigmatism after penetrating keratoplasty,” Dr. Holland noted.

**TAKE-HOME**

- Transepithelial topography-guided PRK can help correct irregular astigmatism after penetrating keratoplasty.

---

**Figure 1**

- 20 of 41 eyes treated had sufficient data at 12 months for analysis; 6/20 (30%) showed UCDVA ≥ 20/40; None had UCDVA ≥ 20/40 preoperatively.

**Figure 2**

- 10/20 (50%) had improved CDVA; 6 (30%) had improved 2 or more lines; 2 (10%) lost 2 lines or more; Mean change in CDVA: + 0.6 ± 1.2 lines, p = 0.02. (Figures courtesy of Simon P. Holland, MD)

---

Simon P. Holland, MD
E: simon_holland@telus.net
This article was adapted from a presentation at the 2017 meeting of the American Society of Cataract and Refractive Surgery. Dr. Holland has financial interests with Alcon Laboratories, Allergan, and Schwind.
MAKE XIIDRA YOUR FIRST CHOICE

When artificial tears aren’t enough, consider prescribing Xiidra for symptomatic Dry Eye patients.

Proven to treat the signs of inferior corneal staining in 12 weeks and symptoms of eye dryness in 12, 6, and as little as 2.

Xiidra helped provide symptom relief from eye dryness in some patients at week 2—and a measurable reduction in signs of inferior corneal staining in just 12 weeks. Consider Xiidra to help your Dry Eye patients find the relief they’ve been waiting for.

Check it out at Xiidra-ECP.com

Four randomized, double-masked, 12-week trials evaluated the efficacy and safety of Xiidra versus vehicle as assessed by improvement in the signs (measured by Inferior Corneal Staining Score) and symptoms (measured by Eye Dryness Score) of Dry Eye Disease (N=2133).

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

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

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

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

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

For additional safety information, see accompanying Brief Summary of Safety Information and Full Prescribing Information on Xiidra-ECP.com.
BRIEF SUMMARY:
Consult the Full Prescribing Information for complete product information.

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

DOSAGE AND ADMINISTRATION
Instill one drop of Xiidra twice daily (approximately 12 hours apart) into each eye using a single use container. Discard the single use container immediately after using in each eye. Contact lenses should be removed prior to the administration of Xiidra and may be reinserted 15 minutes following administration.

ADVERSE REACTIONS
Clinical Trials Experience
Because clinical studies are conducted under widely varying conditions, adverse reaction rates observed in clinical studies of a drug cannot be directly compared to rates in the clinical trials of another drug and may not reflect the rates observed in practice. In five clinical studies of dry eye disease conducted with lifitegrast ophthalmic solution, 1401 patients received at least 1 dose of lifitegrast (1287 of which received lifitegrast 5%). The majority of patients (84%) had ≤3 months of treatment exposure. 170 patients were exposed to lifitegrast for approximately 12 months. The majority of the treated patients were female (79%). The most common adverse reactions reported in 5-25% of patients were instillation site irritation, dryness, and reduced visual acuity. Other adverse reactions reported in 1% to 5% of the patients were blurred vision, conjunctival hyperemia, eye irritation, headache, increased lacrimation, eye discharge, eye discomfort, eye pruritus and sinusitis.

USE IN SPECIFIC POPULATIONS
Pregnancy
There are no available data on Xiidra use in pregnant women to inform any drug associated risks. Intravenous (IV) administration of lifitegrast to pregnant rats, from pre-mating through gestation day 17, did not produce teratogenicity at clinically relevant systemic exposures. Intravenous administration of lifitegrast to pregnant rabbits during organogenesis produced an increased incidence of omphalocle at the lowest dose tested, 3 mg/kg/day (400-fold the human plasma exposure at the recommended human ophthalmic dose [RHOD], based on the area under the curve [AUC] level). Since human systemic exposure to lifitegrast following ocular administration of Xiidra at the RHOD is low, the applicability of animal findings to the risk of Xiidra use in humans during pregnancy is unclear.

Animal Data
Lifitegrast administered daily by intravenous (IV) injection to rats, from pre-mating through gestation day 17, caused an increase in mean preimplantation loss and an increased incidence of several minor skeletal anomalies at 30 mg/kg/day, representing 5,400-fold the human plasma exposure at the RHOD of Xiidra, based on AUC. No teratogenicity was observed in the rat at 10 mg/kg/day (460-fold the human plasma exposure at the RHOD, based on AUC). In the rabbit, an increased incidence of omphalocle was observed at the lowest dose tested, 3 mg/kg/day (400-fold the human plasma exposure at the RHOD, based on AUC), when administered by IV injection daily from gestation days 7 through 19. A fetal No Observed Adverse Effect Level (NOAEL) was not identified in the rabbit.

Lactation
There are no data on the presence of lifitegrast in human milk, the effects on the breastfed infant, or the effects on milk production. However, systemic exposure to lifitegrast from ocular administration is low. The developmental and health benefits of breastfeeding should be considered, along with the mother’s clinical need for Xiidra and any potential adverse effects on the breastfed child from Xiidra.

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

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

NONCLINICAL TOXICOLOGY
Carcinogenesis, Mutagenesis, Impairment of Fertility
Carcinogenesis: Animal studies have not been conducted to determine the carcinogenic potential of lifitegrast. Mutagenesis: Lifitegrast was not mutagenic in the in vitro Ames assay. Lifitegrast was not clastogenic in the in vivo mouse micronucleus assay. In an in vitro chromosomal aberration assay using mammalian cells (Chinese hamster ovary cells), lifitegrast was positive at the highest concentration tested, without metabolic activation. Impairment of fertility: Lifitegrast administered at intravenous (IV) doses of up to 30 mg/kg/day (5400-fold the human plasma exposure at the recommended human ophthalmic dose [RHOD] of lifitegrast ophthalmic solution, 5%) had no effect on fertility and reproductive performance in male and female treated rats.

For more information, go to www.Xiidra.com or call 1-800-828-2088.
Marks designated ® and ™ are owned by Shire or an affiliated company.
©2016 Shire US Inc.
US Patents: 8367701; 9353088; 7314938; 7745460; 7790743; 7928122; 9216174; 8168655; 8084047; 8592450; 9085553; 8927574; 9447077; 9353088 and pending patent applications.
Last Modified: 12/2016 526218
How to evaluate the guidelines of antibiotic reactions in surgery

Surgeons should use intracameral antibiotics in select situations; avoid aminoglycosides

By Laird Harrison

**EYE SURGEONS SHOULD** use intracameral antibiotics only in select situations; they should avoid aminoglycosides, and they should not use vancomycin as prophylaxis.

Those are the guidelines J. Michael Jumper, MD, West Coast Retina, San Francisco, would prefer if he were having eye surgery. Dr. Jumper offered his perspective as an overview of antibiotics used in intraocular surgery.

The rate of endophthalmitis is about 1/2,000 in intraocular surgery, Dr. Jumper said. The common sources of infection are the lids, the adnexa, and the respiratory flora in patients receiving injections in the office. According to one estimate, 6 million intraocular injections were given in U.S. clinics in 2016.

The most common organisms are gram-positive bacteria: coagulase-negative *Staphylococci, Staphylococcus aureus,* and *Streptococcus* species, he said.

According to one study, Dr. Jumper cited that on endophthalmitis vitrectomy, about 50% of patients ended up with 20/40 or better vision and 75% had 20/100 or better vision, but 5% had no light perception

**PROBLEM FACTORS**

Factors for the development of postoperative endophthalmitis include immunosuppression, commonly diabetes. “Eyelid or surface disease is easy to pick up,” said Dr. Jumper. “The altered flora of things like a prosthesis or a contact lens, or even a punctal plug can have an impact on what flora are on the eye and what might be getting into the eye with an injection.”

“Surgeon factors include the use of providone iodine,” he added. “The use of lidocaine jelly before the providone preparation can increase the risk.”

Vitreous lost during cataract surgery increases the risk of infection by four- or five-fold.

“A patient who has a wound leak, especially if they don’t get patched at the time of surgery, can have an increased risk,” Dr. Jumper said. “ Inferior wound location and silicone intraocular lens have been implicated as an increased risk factor for developing infection.”

**TAKE-HOME**

J. Michael Jumper, MD, describes his experiences with the use of intracameral antibiotics and the complications associated with them. He also explains why some antibiotics should be avoided completely in ophthalmology and when certain antibiotics are useful.

*Continues on page 12: Antibiotics*

---

**OCULAR ANTIBIOTICS**

**VIDEO** Watch as J. Michael Jumper, MD, outlines his experience in using certain intraoperative antibiotics and the complications that may arise. He also points out the reasons why some antibiotics should be avoided completely. Go to OphthalmologyTimes.com/OcularAntibiotics

---

**I love my bulb projector!**

- Said no one ever

**Don’t be a bulber... switch to Acuity Pro and think outside the bulb!**

**Acuity Pro**

**VisionScience Software**

**Go from this to THIS!**

Never changing a projector bulb again is just one of the benefits of upgrading to Acuity Pro digital acuity systems! Plus, faster and more accurate refractions. #notabulber

Call: 580.243.1301
Toll-Free: 1.877.228.4890     AcuityPro.com

---

**AAO**

Booth #2419

OCTOBER 1, 2017 :: Ophthalmology Times
One recent study showed that anti-vascular endothelial growth factor (anti-VEGF) injections increase the risk of endophthalmitis (delayed or acute) two- or three-fold.

“It’s something I would consider when talking about antibiotics prophylaxis with a patient having cataract surgery,” said Dr. Jumper.

**PROVIDONE ENDORSEMENT**

Dr. Jumper gave a strong endorsement of providone iodine. He cited a study in which providone reduced the risk of endophthalmitis by 75% to 80% compared to a silver compound.

“Patients will try to talk you out of using providone on their eye,” Dr. Jumper explained. “They will say they have an iodine allergy. Iodine is an element. They’ve got a lot of it in their body and they really can’t have an allergy to it.”

Patients might have a reaction and an intolerance to the betadine solution, but surgeons can get around that problem, he added.

Aminoglycosides can prove particularly dangerous, Dr. Jumper warned, with irreversible infarction one of the potential adverse reactions.

Dr. Jumper cited the case of a patient with severe intraretinal hemorrhages and no perfusion in the posterior pole. The patient had reported a penicillin allergy, but probably didn’t really have one.

Because of this concern, instead of using postoperative, subconjunctival cephalosporin, the patient received subconjunctival tobramycin. The patient suffered a toxic reaction from the tobramycin, probably because of a trabeculectomy, he said.

“Aminoglycoside toxicity is a severe thing,” Dr. Jumper said. It can occur with intravitreal injection as well as subconjunctival injections. Aminoglycoside can make its way to the back of the eye even without a trabeculectomy.

**FLUOROQUINOLONES SLIPPING**

Fluoroquinolones kill bacteria much faster than cefuroxime, Dr. Jumper said. But they are losing their coverage as gram positive organisms develop resistance. He cited one study showing that half as many bacterial isolates are susceptible than were susceptible in the 1990s.

Cefuroxime shows more promise. A large randomized clinical trial of intracameral cefuroxime prophylaxis, conducted by the European Society of Cornea and Refractive Surgeons, showed a five-fold reduction in endophthalmitis.

“The study had to be stopped because of this big difference between the patients receiving the antibiotics and control,” Dr. Jumper said.

He noted that the rate of endophthalmitis was 1/300 in the control group.

“That’s extremely high,” Dr. Jumper said. “If that was happening at the surgery center around you, that would cause a lot of concern.”

Some retrospective studies have also supported the use of the intracameral antibiotics. One study conducted at Kaiser Permanente in Northern California compared 2007 (when most patients were receiving topical antibiotics) to 2011 (when the system had switched to intracameral antibiotics).

“In that period of time, there was a 22-fold reduction in endophthalmitis in that system,” he said.

By contrast, Dr. Jumper quoted a report from the Bascom Palmer Eye Institute at the University of Miami that rates of endophthalmitis were 10-fold lower without the use of intracameral antibiotics.

**ANTIBIOTICS DOUBLED**

Use of antibiotics as prophylaxis has doubled among U.S. cataract and refractive surgeons since the European study, Dr. Jumper reported. Most U.S. doctors are using moxifloxacin or vancomycin off label because, in contrast to Europe, there is no approved drug for this purpose.

“That’s holding us back,” he said. “There would be even more intracameral use if there was an approved drug like there is in Europe.”

Because the only antibiotics for this purpose are available off label, patients in the United States run the risk of compounding errors. Dr. Jumper cited the example of a patient who received 60 mg of intracameral cefuroxime instead of the normal dose of 1 mg.

“That led to severe corneal, retinal, and optic nerve damage,” he said.

Compounding errors can create hazards with the use of vancomycin as well, and a new problem has been associated with the use of this drug in recent years: hemorrhagic occlusive retinal vasculitis (HORV).

A study of 11 such cases showed 8 eyes with 22/100 vision or worse and no light perception in 4 cases. Seven of the eyes went on to develop neovascular glaucoma.

**GOOD PREP RECOMMENDED**

Summarizing, Dr. Jumper said if he was having intraocular surgery, he would want “a really good providone iodine prep.” In addition, “I would make sure my lids were nice and clean.”

As for intracameral antibiotics: “If I was immune-suppressed or had diabetes, if I had been receiving anti-VEGF injections for macular degeneration or other problems, or if there was a complication during the surgery, especially vitreous loss, I would consider having an intraocular antibiotic at that time.”

He would avoid aminoglycosides in general and would not want vancomycin for prophylaxis. “But if I had a patient with endophthalmitis,” he said, “I would use it then.”

J. MICHAEL JUMPER, MD

This article was adapted from a presentation that Dr. Jumper delivered at the Glaucoma Symposium during the 2017 Glaucoma 360 meeting. Dr. Jumper has no financial interest in the subject matter.

**NEW MEASURE OF CELL METABOLISM MAY SPEED THERAPY PROGRESS**

RESEARCH INTO biomarkers for glaucoma is starting to raise hope for new therapies, according to Jeffrey L. Goldberg, MD, PhD.

“We’re turning to the therapeutic side, sort of addressing the stem-cell side,” said Dr. Goldberg, professor and chairman, Byers Eye Institute, Stanford University, Stanford, CA.

In a phase I trial, 11 eyes receiving ciliary neurotrophic factor scored more highly on visual field index and in the retinal nerve fiber layer thickness than untreated fellow eyes, according to Dr. Goldberg.

Go to OphthalmologyTimes.com/CellMetabolism
STILL TESTING 2017 PATIENTS WITH 1997 TECHNOLOGY?

Believe what you see, not what you hear.

Octopus 900. Reach threshold in just 2.5 minutes with the fast, accurate TOP strategy.

Novel technology has made the Octopus 900 the most accurate perimeter on the market. Testing targets more grid points, including important rim points that other perimeters forego. Our exclusive TOP strategy is far easier on patients, with thresholds reached in a blazing 2.5 minutes. And as the only true successor to Goldmann kinetic perimetry, the Octopus 900 offers reliable all-in-one glaucoma testing from onset to progression to end stage disease.

The Octopus 900. See the difference as early as today. Call Haag Streit for an online demo now at 800-787-5426.
Suprachoroidal hemorrhage can be managed effectively with a conservative approach, but if surgical intervention becomes necessary, timing is critical for optimizing the outcome and minimizing invasive techniques can be considered, said John W. Kitchens, MD. “To allow for complete drainage through surgery, it is ideal to wait until the suprachoroidal hemorrhage is maximally ‘liquified,’” said Dr. Kitchens. “If it develops as an intraoperative complication, don’t attempt drainage immediately because the blood will coagulate very quickly and it is possible to do more harm than good.”

Dr. Kitchens pointed out that surgeons should wait two to three weeks for the choroidal to resolve itself before attempting drainage. In the meantime, he recommended the use of medical therapy, which is key for success.

Dr. Kitchens is in private practice, Retina Associates of Kentucky, Lexington, and voluntary faculty, Department of Ophthalmology, University of Kentucky, Lexington.

**MEDICAL MANAGEMENT**

The regimen for medical management of suprachoroidal hemorrhage should include gabapentin and prednisone. Gabapentin controls neuropathic pain and is administered at a dose of 300 mg three times daily initially with titration up to 900 mg three times daily as needed. Prednisone is started at a dose of 40 mg daily that is tapered over two to three weeks.

“Combining these two medications with atropine and topical anti-inflammatory medications will keep patients comfortable and give them the best chance for resolution of the suprachoroidal hemorrhage with medical management,” Dr. Kitchens said.

If surgery becomes necessary for drainage, it can be done with a traditional scleral-cutdown approach or with a minimally invasive transconjunctival technique that causes less trauma to the conjunctiva. The technique also allows for total control of the drainage along with direct visualization that will permit maximal drainage. “Because the transconjunctival technique is less traumatic to the conjunctiva, it is particularly advantageous in cases of suprachoroidal hemorrhage related to glaucoma-filtering surgery,” Dr. Kitchens added.

**THE TECHNIQUE**

The transconjunctival technique is performed using a 26-gauge, 3/8-inch needle covered with a 270 scleral buckling sleeve for needle guarding, preventing inadvertent penetration beyond the suprachoroidal space. The sleeve is attached to the extrusion line for aspiration, and this set-up enables transition to vitrectomy after completing the drainage step.

The needle is removed when the flattening choroidal comes close to the tip, leaving some residual. “This article was adapted from a presentation delivered by Dr. Kitchens at the Retina Subspecialty Day held prior to the 2016 American Academy of Ophthalmology meeting. Dr. Kitchens has no relevant financial interests to disclose.”

**TAKE-HOME**

- Suprachoroidal hemorrhage can be a difficult complication to address. Achieving a great outcome in such patients depends on solid preoperative management and a strong surgical approach. Here are tips for successful management.

---

**FIGURES**

A. Image displays a patient with choroidals that did not resolve after a month with an IOP of 17 mm Hg. It was decided to drain the choroidals (without suturing down the glaucoma flap). The patient drained well and looked good for a week, then the choroidals reformatted at an IOP of 17 to 18 mm Hg. B. The choroidals persisted for several weeks and were re-drained. The patient’s flap also was sutured down. IOP went into the low 20s mm Hg and the patient has experienced no issues. (Images courtesy of John W. Kitchens, MD)
SPECTRALIS® with OCT2
The Platform for Advanced Imaging

Now available as a module upgrade for existing SPECTRALIS systems!*

Faster Scan Speed (85 kHz)
More than twice the scan speed, allowing for:
- Reduced acquisition time
- Higher diagnostic potential

Enhanced Image Quality
Improved image contrast across a larger depth from vitreous through choroid

SPECTRALIS with OCT2 provides the platform for future advanced applications such as OCT angiography.*

Find out more at AAO — Booth 1029

*Advanced models only.
*OCT angiography is under development and not for sale.

www.HeidelbergEngineering.com
Editor’s note: Advancements in electrophysiological technology can help ophthalmologists to discover vision-related diseases in their earliest stages. In this article, Blake K. Williamson, MD, shares how use of a vision testing system has made a difference in his practice as a cataract specialist, whereas William E. Sponsel, MD, shares his perspective as a glaucoma specialist.

**USING PERG IN PATIENTS WITH CATARACTS ELECTROPHYSIOLOGY** sounds a little like Frankenstein in a mad laboratory; it’s not nearly as sexy as femtosecond lasers or real-time aberrometry. In addition, it has historically been a time-consuming test that required an electrophysiologist to interpret results.

However, pattern electroretinography (PERG) has been around much longer than optical coherence tomography (OCT) images and the literature leaves little doubt as to its accuracy. The development of new sensors and advanced algorithms has made it a compact diagnostic machine which is easy to have in the office, and a test that a technician can comfortably perform with well-interpreted results.

The vision testing system (Diopsys NOVA Vision Test System, Diopsys) we use can be compared with my smartphone: its uses are limitless, and I use it for early diagnosis of glaucoma and gauging treatment efficacy.

As a cataract specialist, I regularly see patients with some indications of glaucoma, but no definitive diagnosis. Maybe they have ocular hypertension (OHT) but no sign of disc cupping or visual field loss, or maybe they have a suspicious disc, but their IOP does not draw attention.

**EVALUATING CELL FUNCTION**

PERG provides an objective evaluation of the function of the retinal ganglion cells, permitting the diagnosis of glaucoma up to 8 years earlier than with other methods of diagnosis.

An even better scenario is when PERG results indicate that I can take a patient off hypotensive drops. In some cases, the pressure seemed to be so high that a patient was put on drops. However, after observing their excellent cell function, I am able to take them off their drops and clear up any dryness or ocular surface disease.

My partners and I believe that PERG evaluation is a significant enough advantage for our patients that we have purchased units and perform testing in all four of our offices.

**PATIENTS WITH CATARACT AND GLAUCOMA**

With most diseases, early diagnosis is advantageous. This has unique significance for cataract patients. Several of the micro-invasive glaucoma surgery (MIGS) options now available can only be performed in conjunction with cataract surgery. If we suspect glaucoma in a cataract patient but take a “wait-and-watch” approach, not only is it possible that the patient will lose visual field before adequate treatment is achieved, they will also lose their one opportunity to receive a MIGS approach to therapy.

My other primary use of PERG is to follow glaucoma patients. PERG is a dynamic test, so if we catch dysfunction of the retinal ganglion cells prior to loss of visual field, there is the possibility of improvement in cell function. By making this a part of routine follow-up, we know if we are treating sufficiently.

For example, a patient presents with IOP of 24 mm Hg, characteristic visual field loss, and retinal nerve fiber layer thinning, so you confidently diagnose glaucoma and start them on a topical prostaglandin. Three months later, the pressure is down to 18 mm Hg, and the visual field test and OCT look the same.

How do you know whether an adequate IOP for this patient has been reached? You do not—unless you use PERG.”

— Blake K. Williamson, MD

**TAKE-HOME**

- Pattern electroretinography (PERG) and visually evoked potential (VEP) tests can objectively evaluate the function of axon and retinal ganglion cells. These test results can add another component in successfully treating patients with cataract and/or glaucoma.

**“How do you know whether an adequate IOP for this patient has been reached? You do not—unless you use PERG.”**

— Blake K. Williamson, MD

**USING PERG IN PATIENTS WITH GLAUCOMA**

There is substantial focus on IOP in glaucoma as the only modifiable risk factor for disease.
VISIONARY INVISION

icare HOME
ANYWHERE, ANYTIME

icare ic100
THE INTELLIGENT CHOICE

Learn more: info@icare-usa.com or www.icare-usa.com
Study explores influence of ocular blood flow in course of glaucoma

New techniques shed light on roles of blood, perfusion pressure in ocular blood flow

By Cheryl Guttman Krader; Reviewed by Alon Harris, PhD

ALTHOUGH results of multiple studies demonstrate the importance of ocular perfusion pressure and ocular blood flow as risk factors for glaucoma and its progression, there is insufficient evidence to conclude that vascular insults are a primary instigator to the disease process, said Alon Harris, PhD.

“More longitudinal studies are needed to gain insight in this area; OCT angiography is emerging as a tool that will allow dual-purpose assessment of structure and function. Clinical research, however, has limitations, including limitations of measurements that can be obtained in patients and the complexity of the anatomy and vascular supply of the optic nerve head. These limitations make specific determination of its relevance to glaucoma challenging,” said Dr. Harris, Letzer Endowed Professor of Ophthalmology, professor of cellular and integrative physiology, and director of clinical research, Glick Eye Center, Indiana University School of Medicine, Indianapolis.

“The use of physically-based mathematical models, however, might provide a virtual laboratory that would allow for better understanding of the importance of risk factors in isolation and their synergistic actions.”

Discussing research that is relevant to understanding how ocular blood flow might affect the course of glaucoma, Dr. Harris noted that studies clearly show ocular blood flow is altered in multiple ocular structures in patients with glaucoma, including in the optic nerve head, retina, choroid, and retrobulbar vessels.

In addition, there is an understanding that there are multiple underlying causes for the changes, including autoregulation mechanisms, vasospasm, aging, genetics, and racial influences.

Further support for the idea that vascular abnormalities are important in glaucoma pathophysiology comes from evidence of extracocular vascular abnormalities/disease in patients with glaucoma.

Vascular abnormalities have been described in the nailfold capillary bed and cerebral vasculature of patients with glaucoma, reduced renal function was found to correlate with glaucoma prevalence in one study, and patients with open angle glaucoma have also been shown to have increased risks of cardiovascular disease and stroke.

“The idea that altered blood flow may be a contributing factor for the racial disparity in glaucoma is supported by findings of a longitudinal study we recently reported. It showed that among glaucoma patients, reductions in retinal capillary and retrobulbar blood flow much more strongly correlated with changes over time in the optic nerve head and macular thickness in people of African descent compared with patients having European ancestry.”

Patients with African descent

“Glaucoma patients of African descent represent an interesting subgroup in relation to the topic of vascular abnormalities in glaucoma considering they are at increased risk for ischemic heart disease, diabetes, hypertension, cardiovascular disease, and stroke along with earlier onset of glaucoma, faster progression, and more severe visual field loss,” Dr. Harris said.

“The idea that altered blood flow may be a contributing factor for the racial disparity in glaucoma considering it allows detailed visualization of the vasculature, calculation of vessel density and flow index, and visualization of the full optic disc vascular tissue layer networks in the peripapillary and prelaminar regions, optic nerve head, and lamina cribrosa.

In addition, OCT angiography allows for simultaneous evaluation of structure and function, and when used in studies of patients with glaucoma, it has generated some interesting findings.

For example, one recent study reported that OCT angiography-measured vessel density has similar diagnostic accuracy compared with retinal nerve fiber layer measurements for differentiating between glaucoma patients and controls on page 20: Ocular blood flow

Take-home

» Ocular blood flow has been associated with the incidence, prevalence and progression of glaucoma, but its potential causative role remains a subject for debate. Better insights may be on the horizon using OCT angiography and sophisticated mathematical modeling techniques.

Fill the Gaps

Among the obstacles limiting clinical research has been the absence of any imaging modality that is capable of simultaneously quantify-
IMPORTANT SAFETY INFORMATION

OMIDRIA (phenylephrine and ketorolac injection) 1% / 0.3% must be added to irrigation solution prior to intraocular use.

OMIDRIA is contraindicated in patients with a known hypersensitivity to any of its ingredients. Systemic exposure of phenylephrine may cause elevations in blood pressure.

Use OMIDRIA with caution in individuals who have previously exhibited sensitivities to acetylsalicylic acid, phenylacetic acid derivatives, and other nonsteroidal anti-inflammatory drugs (NSAIDs), or have a past medical history of asthma.

The most commonly reported adverse reactions at 2-24% are eye irritation, posterior capsule opacification, increased intraocular pressure, and anterior chamber inflammation.

Use of OMIDRIA in children has not been established.

INDICATIONS AND USAGE

OMIDRIA is added to ophthalmic irrigation solution used during cataract surgery or intraocular lens replacement and is indicated for maintaining pupil size by preventing intraoperative miosis and reducing postoperative ocular pain.


Please see the Full Prescribing Information at www.omidria.com/prescribinginformation.

*Individual insurance coverage and policies may vary, and Omeros does not guarantee insurance coverage or payment. Omeros offers payments under the OMIDRIAssure “We Pay the Difference” program on behalf of qualifying patients. OMIDRIAssure is subject to change without notice.

Visit www.omidria.com
OCULAR BLOOD FLOW

(Continued from page 18)

healthy controls. However, OCT angiography still has limitations, Dr. Harris said. “There are still a lot of artifacts in the images that are related to the superficial vessels, especially when imaging the deeper layers. In addition, flow index may include retinal microvasculature when measuring the optic disc vasculature, and most importantly, we do not have any longitudinal data related to glaucoma patients and do not know the prognostic ability of this technology,” he explained.

VIRTUAL LABORATORIES

Many other factors, including demographic influences and individual susceptibilities, also make it challenging to study relationships between ocular blood flow and glaucoma. To overcome the multiple confounders, Dr. Harris and colleagues have proposed using a mathematical model to leverage the analogy between blood flow in a network of vessels and current flow in a circuit.

The model calculates ocular blood flow taking into account vascular regulation, cerebrospinal fluid pressure, blood pressure, venous blood pressure, and IOP. He illustrated its performance by describing its application for determining how changes in IOP and blood pressure affect retinal blood flow. Inputs for the model included three theoretical patients with different blood pressures (low, normal, and high) and IOP values ranging from 15 to 45 mm Hg.

According to the model, retinal blood flow was unchanged for IOP values < 26 mm Hg in the theoretical patients with high or normal blood pressure.

The plateau was explained by autoregulation. However, retinal blood flow continued to increase with decreasing IOP in the patient with low blood pressure. The calculations also showed that when IOP was > 36 mm Hg, the predicted decrease in retinal blood flow decreased at a steeper slope compared with lower IOP levels as a result of partial venous collapse.

The venous collapse started earlier (at a lower IOP) in the theoretical patient with low blood pressure compared with the normal and high blood pressure patients. “These data explain the findings of population-based studies showing that decreased blood pressure and decreased perfusion pressure are independent risk factors for glaucoma,” Dr. Harris said.

PERG, VEP UTILITY

(Continued from page 16)

progression. However, significant epidemiologic evidence from around the world shows that the majority of individuals with pathologic POAG have normal eye pressures. This leaves a disconnection in practice patterns.

TRACKING PROGRESSION WITH VEP, PERG TESTS

We do have excellent structural and functional tests with OCT and visual field tests, and while we rely extensively upon these, neither is able to provide information in a single visit that tells if a patient is getting better, worse, or staying the same. A patient with extensive vision loss could be stabilized already and not need highly invasive surgery.

On the other extreme, a young patient with very mild nerve fiber layer loss and normal pressure in the clinic may have intermittent angle closure that manifests with headaches when he is reading on the computer and belies a fast progressing glaucoma.

I have used visually evoked potential (VEP) and PERG tests for years with my patients and have found that they have the detective capacity to determine disease trend in a single visit. The latest OCT technology with automated fields provides an excellent symmetry analysis that will pick up disease well.

However, it tells how many wires are left, not how many are currently dying, and six separate tests over a period are needed to attempt to predict a trend.

On the other hand, electroretinography dynamic function tests can tell if axion cells are functioning well or if ganglion cell bodies are impaired.

A poor PERG result gives an excellent indication that something is going on, and the patient is likely going to get worse.

If a patient has severe disease but the VEP test result is normal, I do not start additional treatment because this patient is not likely to get worse. I have found it to be much more valuable than IOP to determine treatment.

The reliability and value of VEP and PERG tests have been studied extensively, and their high specificity and sensitivity has been known for many years. However, the electrodes previously required to administer the tests left them relegated to research laboratories rather than in busy glaucoma practices.

The advent of adhesive electrodes has made it possible for companies to bring this valuable technology to the clinic, and all glaucoma specialists could benefit from using it regularly to determine the best treatment for their patients.
TURNING RESEARCH INTO RECOVERY — FASTER. THAT'S THE DIFFERENCE BETWEEN PRACTICING MEDICINE AND LEADING IT.

At Houston Methodist, we focus on innovative research that directly benefits our patients. Through more than 700 clinical studies across the Houston Methodist system and many national studies we exclusively offer in Texas, we are discovering new technologies and treatments for some of medicine’s toughest challenges, and getting them to our patients — faster.

Visit houstonmethodist.org/research and explore all the ways we’re leading medicine.
Aqueous angiography was performed with indocyanine green in the right eye of a 74-year-old Indian man undergoing cataract surgery. The anterior chamber maintainer delivering the tracer was placed temporally (white asterisk). Most aqueous angiographic signal was seen nasal (green asterisk) with less signal seen elsewhere (red asterisk). S = superior, N = nasal, I = inferior, and T = temporal.

(Image courtesy of Alex Huang, MD, PhD)

A n important step forward in ophthalmic technologies has been taken in the potential ability to better control and predict intraocular pressure (IOP) lowering in minimally invasive trabecular bypass/ablation procedures for glaucoma. Aqueous angiography, which visualizes the anterior segment, provides images that facilitate an increased understanding of aqueous humor outflow in individual patients.

The technology was used previously to study segmental aqueous humor outflow in enucleated eyes as well as in whole eyes of non-human primates. Now, however, surgeons are able to do the same in human patients, according to Alex Huang, MD, PhD.

**Study Details**

Dr. Huang and colleagues obtained these images in eight patients (four men, four women) who ranged in age from 54 to 77 years and were undergoing phacoemulsification. The investigators used indocyanine green (ICG) as an anterior chamber tracer for aqueous angiographic imaging.

The tracer also simultaneously served as a capsular stain to facilitate the phacoemulsification, explained Dr. Huang, assistant professor of ophthalmology, Doheny Eye Center of Pasadena, Doheny and Stein Eye Institutes, David Geffen School of Medicine, University of California, Los Angeles.

In a report published in *Ophthalmology* (2017; Apr 28. pii: S0161-6420(17)30949-1. doi: 10.1016/j.optha.2017.03.058. [Epub ahead of print]), Dr. Huang explained that a 1-mm side port paracentesis was created in right eyes in a superotemporal position and in left eyes inferotemporally, and an anterior chamber maintainer was inserted through the paracentesis.

A syringe was used to evacuate aqueous humor and a tracer was added. After imaging was completed, the anterior chamber maintainer was removed, the tracer was irrigated, and lidocaine and viscoelastic were used before the phacoemulsification procedure began.

The creation of additional wounds beyond that of standard phacoemulsification was avoided because tracer exchange occurred through the anterior chamber maintainer, which was converted into the second instrument port.

An imaging device platform (Spectralis HRA + OCT Flex module, Heidelberg Engineering) was used to image the tracer movement.

The camera head of the instrument was positioned over the eye, and a 55-degree lens was used to obtain confocal scanning laser ophthalmoscopic infrared (cSLO-IR) or angiographic images and an anterior segment lens used if optical coherence tomography (OCT) imaging was simultaneously done, he noted.

The surgeons obtained fluorescent images in the ICG capture mode to establish the preinjection background. After the ICG was injected, fluorescent images, cSLO-IR images, or videos were obtained with the patients instructed to look in different directions.

“Similar to postmortem eyes and living eyes from non-human primates, aqueous angiographic imaging may provide increased understanding of aqueous humor outflow in individual patients.”
MANAGING BIOBURDEN

AVENOVA IS THE MISSING PIECE IN ANY MGD DRY EYE OR BLEPHARITIS REGIMEN

Avenova. Essential for all chronic management regimens.

- Avenova has patient study results demonstrating bacteria load reduction on the skin around the eyes.
- Avenova is pure hypochlorous acid for lid hygiene without bleach impurities.
- Avenova is designed to complement all daily management regimens for patients with MGD Dry Eye and Blepharitis.

AVENOVA.COM | RX ONLY

Visit NovaBay at American Academy of Ophthalmology 2017 – Booth #4429
OCTA brings deeper understanding to diabetic eye disease treatment

Approach enables monitoring of neovascular network before retinopathy becomes apparent

By Cheryl Guttman Krader

OPTICAL COHERENCE tomography angiography (OCTA) is a promising new approach for visualizing retinal vascular pathology in eyes with diabetic eye disease that can be expected to have even greater utility in the future pending further enhancements, said Nadia K. Waheed, MD, MPH.

“Compared with fluorescein angiography, OCTA is a faster and noninvasive imaging technique performed without the need for injecting dye, and it allows for correlation of structure to vasculature. However, enhancements are needed to allow for better evaluation of blood flow and true widefield imaging,” said Dr. Waheed, associate professor of ophthalmology, New England Eye Center, Tufts Medical Center, Boston.

Discussing the use of OCTA for the evaluation of patients with diabetic eye disease, Dr. Waheed explained that the fully mature retinal circulation at the macula is probably comprised of four different plexuses that are typically subdivided as being superficial and deep based on their location relevant to the inner plexiform layer.

Fluorescein angiography primarily images only the superficial retinal plexus whereas the deep vasculature can also be visualized using OCTA. “Because OCTA is a depth-resolved imaging technique, it has the advantage compared with fluorescein angiography of separating the superficial and the deep vasculature. This feature has relevance in patients with diabetes because the deep vasculature tends to be affected earlier in patients who develop diabetic eye disease,” she said.

In the few years since OCTA was introduced, it has proven to enable better visualization of capillary abnormalities in eyes with diabetic retinopathy (DR), allowing identification of changes in the deep plexus that are not evident on fluorescein angiography.

“Diabetic vasculopathy typically develops much sooner than DR becomes clinically apparent. Using OCTA in patients with diabetes and clinical evidence of DR, we found that they not only had changes in their retinal vasculature but also had a diabetic choroidopathy,” Dr. Waheed said.

The vascular abnormalities can also be mapped and quantified using OCTA. By doing so, researchers have described changes in the foveal avascular zone, perfusion, and arborization of the vascular network at the macula that are commensurate with the severity of DR.

“In the future, commercially available OCTA systems will have software modules for monitoring patients over time based on quantification of these deteriorations,” Dr. Waheed said.

CLINICAL APPLICATION

In routine practice, the focus of follow-up by the retina specialist in patients with diabetes includes evaluation for worsening of DR and for the development of macular edema, macular ischemia, and neovascularization. In addition, widefield imaging may be used to identify nonperfusion in the periphery.

OCTA enables very early visualization of diabetic vascular changes in the eye and their quantification, thereby allowing better follow-up over time, she said.

Continues on page 25: Diabetic
**DIABETIC**

(Continued from page 24)

In addition, its ability to characterize the deep capillary plexus has ramifications for patient care since changes in the deep vasculature have been shown to be associated with the evolution of diabetic macular edema (DME).

“Increasing development of microaneurysms in the deep capillary plexus has been shown to be predictive of DME development and potentially of recurrence after response to anti-VEGF treatment for DME,” Dr. Waheed said.

OCTA also allows very precise monitoring of proliferative DR as it can be used to map out the size of the neovascular network. However, OCTA has a limited field of view.

“The central images with OCTA are of much higher resolution than those obtained with fluorescein angiography, but OCTA does not allow for evaluation of peripheral areas of nonperfusion as can fluorescein angiography,” Dr. Waheed said.

“OCTA showed the presence of ischemia that provided an explanation for the vision outcome that could not be determined with the structural OCT alone,” Dr. Waheed said.

In addition, OCTA allows very precise monitoring of proliferative DR as it can be used to map out the size of the neovascular network. However, OCTA has a limited field of view.

The investigators pointed that the anesthesia could have influenced aqueous humor outflow, the pupillary dilation resulted in changes in the trabecular meshwork as the result of the parasympathetic blockade, and the required use of a lid speculum might have affected the ocular surface pressure.

The investigators plan to test the use of fluorescein in addition to ICG in the future as well as study the cause of pulsatile flow, such as the cardiac cycle, and quantify the dynamic changes.

“Aqueous angiography is possible in eyes of living human subjects and compatible with successful phacoemulsification without surgical complications,” Dr. Huang concluded. “Segmental aqueous outflow was observed as in the enucleated eyes and the living eyes of non-human primates. Real-time aqueous humor outflow may improve basic knowledge of outflow biology as well as potentially guide glaucoma therapeutics.”

**AQUEOUS**

(Continued from page 22)

phy in living human subjects undergoing phacoemulsification showed segmental patterns,” Dr. Huang reported. “The initial angiographic signal was seen by 40.5 ± 9.4 seconds with a range from 18 to 70 seconds in the eight subjects. In all cases, the nasal signal was the strongest.”

**NOVEL FINDINGS**

In some cases, the investigators saw pulsatile angiographic aqueous flow. Also, as a novel finding, if images were obtained one location over a longer period of time, they could observe dynamic changes. In areas in which there was no initial angiographic signal, a signal sometimes developed and vice versa, i.e., in areas in which there was a signal initially the signal intensity could be lost.

The results obtained by aqueous angiography were compatible with the findings on anterior-segment OCT and cSLO-IR, validating the signal as representing aqueous humor outflow.

The investigators pointed that the study had some limitations in that the anesthesia could have influenced aqueous humor outflow, the pupillary dilation resulted in changes in the trabecular meshwork as the result of the parasympathetic blockade, and the required use of a lid speculum might have affected the ocular surface pressure.

The investigators plan to test the use of fluorescein in addition to ICG in the future as well as study the cause of pulsatile flow, such as the cardiac cycle, and quantify the dynamic changes.

“Aqueous angiography is possible in eyes of living human subjects and compatible with successful phacoemulsification without surgical complications,” Dr. Huang concluded. “Segmental aqueous outflow was observed as in the enucleated eyes and the living eyes of non-human primates. Real-time aqueous humor outflow may improve basic knowledge of outflow biology as well as potentially guide glaucoma therapeutics.”

**STATEMENT OF OWNERSHIP, MANAGEMENT, AND CIRCULATION**

(Requester Publications Only)

(Required by 39 USC 3685)

1. Publication Title: Ophthalmology Times
2. Publication Number: 0193-032X
3. Filing Date: 9/30/17
4. Issue Frequency: Semi-monthly except for one issue in Jan, May, Aug and Dec
5. Number of Issues Published Annually: 20
6. Annual Subscription Price (if any): $200.00
7. Complete Mailing Address of Known Office of Publication:
   131 West First Street, Duluth, St. Louis County, Minnesota 55802-2065
8. Complete Mailing Address of Headquarters or General Business Office of Publisher:
   2 Penn Plaza, 15th Floor, New York, NY 10121
9. Full Names and Complete Mailing Addresses of Group Publisher:
   Leonardo Avila, 485F US Highway 1 South, Berlin, NJ 08830
10. Group Content Director:
    Mark L. Diugloss, 24950 Country Club Blvd., No Olmsted, OH 44070
11. Known Bondholders, Mortgagors, and Other Security Holders Owning or Holding 1 Percent or More of Total Amounts of Bonds, Mortgages, or Other Securities. If none, check box.
12. Does Not Apply
13. Publication Title: Ophthalmology Times
14. Issue Date for Circulation Data Below:
   August 1, 2017
15. Extent and Nature of Circulation

<table>
<thead>
<tr>
<th>Category</th>
<th>Average No. Copies of Each Issue During Preceding 12 Months</th>
<th>No. Copies Single Issue Published Nearest to Filing Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Total Number of Copies</td>
<td>16,155</td>
<td>19,840</td>
</tr>
<tr>
<td>B. Legitimate Paid and/or Requested Distribution</td>
<td>9,231</td>
<td>9,720</td>
</tr>
<tr>
<td>1. Outside County Paid/Requested Mail Subscriptions Stated on PS Form 3541</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2. In-County Paid/Requested Mail Subscriptions Stated on PS Form 3541</td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td>3. Sales Through Dealers and Carriers, Street Vendors, Counter Sales, and Other Paid or Requested Distribution Outside USPS</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>4. Requested Copies Distributed by Other Mail Classes Through the USPS</td>
<td>9,238</td>
<td>9,728</td>
</tr>
<tr>
<td>C. Total Paid and/or Requested Circulation (Sum of 15d (1), (2), (3), and (4))</td>
<td>6,482</td>
<td>9,680</td>
</tr>
<tr>
<td>D. Non-requested Distribution</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1. Outside County Non-requested copies Stated on PS Form 3541</td>
<td>419</td>
<td>415</td>
</tr>
<tr>
<td>2. In-County Non-requested Copies Stated on PS Form 3541</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>3. Non-requested Copies Distributed Through the USPS by Other Clases of Mail</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>4. Non-requested Copies Distributed Outside the Mail</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>E. Total Non-requested Distribution (Sum of 15e (1), (2), (3) and (4))</td>
<td>6,901</td>
<td>10,095</td>
</tr>
<tr>
<td>F. Total Distribution</td>
<td>16,155</td>
<td>19,840</td>
</tr>
<tr>
<td>G. Copies not Distributed</td>
<td>16</td>
<td>17</td>
</tr>
<tr>
<td>H. Total (Sum of 15f and g)</td>
<td>16,155</td>
<td>19,840</td>
</tr>
<tr>
<td>I. Percent Paid and/or Requested Circulation</td>
<td>57.24%</td>
<td>49.07%</td>
</tr>
<tr>
<td>16. Electronic Copy Circulation</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>17. Publication of Statement of Ownership for a Requester Publication is required and will be printed in the October 1 issue of this publication. Name and Title of Editor, Publisher, Business Manager, or Owner: Kristina Bildeaux, Audience Development Director</td>
<td>Signature: Kristina Bildeaux</td>
<td></td>
</tr>
</tbody>
</table>
| Date: 9/30/17 | I certify that the statements made by me above are correct and complete.
AAO, PAAO create relief fund to support hurricane survivors

THE AMERICAN Academy of Ophthalmology (AAO) and the Pan-American Association of Ophthalmology (PAAO) announced that they are establishing a Hurricane Relief Fund in response to the devastation caused by Hurricanes Harvey, Irma, and Katia.

The organizations are seeking contributions from their combined 35,000 members, with 100% of donations going to Americares, according to a prepared statement.

Americares is a non-profit disaster relief and global health organization providing immediate response to emergency medical needs and supporting long-term health care initiatives for people in the United States and around the world.

Americares was chosen because more than 97% of all donations directly improve the health of people in need, while less than 3% are used for administration and overhead.

For every $10 donated, Americares can provide $200 in aid, according to the organization in the statement.

“We extend our thoughts and prayers to the people who have been affected by the catastrophic winds and rain associated with Hurricanes Harvey and Irma,” said David W. Parke II, MD, chief executive officer of the AAO. “We are eager to help and support the work of Americares.”
A NEWLY RELEASED high-definition (HD) ultra-widefield fundus imaging system (CLARUS 500, Carl Zeiss Meditec) enables clinicians to capture images of higher quality and resolution from a significantly larger area than traditional fundus cameras.

The approach in designing the system was to provide the clinician the widest field of view with excellent clarity and color.

One of the most important features of the new camera is that it captures images in natural color, closely resembling the color seen when examining the patient.

It uses the full spectrum of light, incorporating three broad-spectrum LEDs—red, green, and blue—which makes it possible to get true color imaging. This true color allows for more clear views of the retina and retinal pathology.

Another important feature is the resolution at any point on the image. The camera captures a high-resolution image down to 7 μm, which allows a user to zoom in anywhere on an image without losing quality.

The system allows clinicians to zoom into any area and expand the entire screen to display it. The images are non-pixelated and can be compared with the quality of a traditional non-widefield fundus camera.

Clinicians also benefit from having one device that provides ultra-widefield imaging for evaluating a broad range of patients, and to have one device provide high resolution—to track the progression of their glaucoma patients, as an example.

“You can zoom in, and you’ve got a true-color, high-resolution photo of the macula, the optic nerve, a nevus, or whatever it is you’re trying to document,” said Roger Goldberg, MD, Bay Area Retina Associates, Walnut Creek, CA.

DIFFERENT FROM FUNDUS CAMERA

Dr. Goldberg has compared the images from the new system to those taken with traditional fundus cameras, and said he found that the quality is as good as, or even better than, traditional fundus photos.

Continues on page 34: Ultra-widefield
The OCULUS Pentacam® AXL
Always an Axial Length Ahead

Pre-Order Now!

The gold standard, now with axial length measurement – versatile, profitable, indispensable!

Once again, the Pentacam® defines the "measure of all things." The AXL version, featuring integrated optical biometry, makes it a comprehensive, indispensable instrument for cataract surgery. As a full-scale system, the Pentacam® AXL also provides for safe and swift IOL calculation – even in difficult cases.

Visit the OCULUS booth #1728 at AAO 2017 or go to www.pentacam.com for more information.

Tel. 1 888-519-5375
ads@oculususa.com
www.oculususa.com

facebook.com/OCULUSusa
“You’re not compromising anything on your traditional fundus photography in order to get the widefield view,” he said.

The camera produces a 133° HD widefield image with one click. Two HD widefield images are automatically merged to achieve a 200° ultra-widefield view. The system’s internal fixation can be placed anywhere within the patient’s field of view to target specific parts of the retina.

**PATIENT EXPERIENCE**

The design of the system was aimed at making things easier and more comfortable for the patient, and more convenient for a photographer or technician than previous ultra-widefield imaging systems.

Previously released imaging systems involved a stationary camera and a patient would need to be moved into the optics, with the operator adjusting the patient’s head to move the eye into the focal point of the camera.

With the ultra-widefield camera, the patient sits down and puts their chin against a chin rest, and their forehead against the bar at the top, and the operator aligns the camera to the patient to focus and acquire the image.

Another feature of the camera involves a live infrared preview of the fundus before the picture is taken to show what is about to be captured. Since the image is infrared, it is not uncomfortable for the patient.

This allows the photographer to confirm the image will be captured as desired, and avoid artifacts or poor quality images, which results in fewer re-captures or attempts to photograph each eye.

Because this system incorporates ultra-widefield imaging with true color and high resolution fundus imaging, it may eliminate the need to have a different camera for each of those purposes, saving on space and costs, and improving efficiency.

The images from the system are also fully supported by the company’s management system for integrating the device in a practice.

The system doesn’t currently have capabilities for fluorescein angiography or ICG, but these are planned as future upgrades.

---

**ULTRA-WIDEFIELD**

(Continued from page 32)

**FIGURE 3** Ultra-widefield image in true color of branch retinal vein occlusion (BRVO).

**FIGURE 4** Widefield image displays fundus autofluorescence blue (FAF-B) showing geographic atrophy.

**FIGURE 5** The newly released camera (CLARUS 500, Carl Zeiss Meditec) offers a live infrared preview of the fundus before the picture is taken, resulting in fewer re-captures. (Photos courtesy of Carl Zeiss Meditec)

**Special Report** NEXT FRONTIER IN **DIAGNOSTIC TECHNOLOGY**
OCTA system offers exquisite views

New technology provides elegant look at retinal microvasculature without fluorescein dye

By Lynda Charters; Reviewed by Daniel D. Esmaili, MD

THE LATEST advancement in optical coherence tomography (OCT) technology, a high-density OCT angiography (OCTA) system (AngioVueHD, OptoVue) provides benefits for both surgeons and patients.

Perhaps the greatest advantage is that the technology facilitates improved evaluation of the retinal microvasculature without the patient having to undergo injection of fluorescein dye. The time required for patient evaluations is also decreased substantially.

The new system is a boon for ophthalmologists, said Daniel D. Esmaili, MD.

“The technology has done several things for us, the first of which is that we can now evaluate the retinal microvasculature without having to administer a dye as is required when performing fluorescein angiography,” said Dr. Esmaili, private practice at Retina-Vitreous Associates Medical Group, Los Angeles. “In addition, the system allows us to evaluate patients much more conveniently and rapidly.”

For example, in a patient with wet age-related macular degeneration (AMD), the clinician can easily evaluate the choroidal neovascular lesions periodically in a matter of seconds and as often as desired. OCTA images are obtained concurrently with the standard structural OCT images, which eliminates extra time that would be added to a different method of evaluation.

CLOSER FOLLOW-UP

“Clinicians can evaluate the choroidal neovascular lesion at every follow-up visit if they so desire, which has given us a way to evaluate and follow these patients a bit more closely and in a way that increases the convenience to the patients by requiring less time,” Dr. Esmaili said.

The safety profile is also improved due to the non-invasive nature of OCTA. Any risk of a dye reaction is eliminated, he pointed out.

A limitation of this technology is that the range of view of the retina has not been increased in contrast to the view available when using widefield fluorescein angiography, Dr. Esmaili commented.

“In its current form, OCTA provides a view of the macula and the optic nerve and not the peripheral retina,” he noted.

When using OCTA, the clinician has the freedom to choose a particular size image, large or small. The clinician can obtain the maximum density of b-scans in, for example, a 3-mm × 3-mm box, versus an 8-mm × 8-mm box in which the b-scans will provide a larger area of view albeit with less definition, according to Dr. Esmaili.

The company has provided an update to the technology and has introduced a 6-mm × 6-mm HD algorithm that gives both excellent definition and a useful area of evaluation. Software updates also allow for a montage composite view to be obtained by combining optic nerve and macula images.

Patients with AMD who are being followed have a substantial treatment burden. These patients may be asked to undergo monthly evaluations that include imaging, dilated eye examinations, and perhaps an injection if needed. An important consideration is that many patients are elderly and many require that they be transported to these evaluations by family members who may have other obligations.

“The feedback from our patients is that the non-invasive and rapid acquisition time of OCTA is creating shorter visits that are safer and more comfortable. Our patients are appreciative of this and have really embraced this technology,” he said.

DETAILED IMAGING

From the standpoint of the practitioners, the details of the retinal microvasculature provided by OCTA are “absolutely exquisite.”

For example, in patients with diabetic retinopathy or retinal vein occlusion, the perfusion status of the macula is easily recognized as are areas of capillary dropout.

“This ability is highly useful when managing these patients,” Dr. Esmaili said.

Use of OCTA compared with fluorescein angiography is also managing to streamline ophthalmology practices, he pointed out.

When performing fluorescein angiograms, the technicians are engaged with the patients for 20 to 30 minutes because of the need to access veins, take and process photographs, and transmit large data sets through a network.

MORE EFFICIENT OFFICES

“Using OCTA, we have noticed that our practice is running more efficiently. Patients are evaluated faster and we are staying on time in the clinic,” he noted.

“OCTA is the next step in the evolution of OCT, and like all new technologies, there is a learning curve,” he said. “In the case of OCTA, it takes some practice for the ophthalmologist to appreciate normal versus abnormal findings and to identify artifacts. For our technicians and patients, it takes some practice to be able to acquire good images. Once a level of comfort is achieved, the benefits can be powerful.”

DANIEL D. ESMAILI, MD
12: desmaili@yahoo.com
Dr. Esmaili is a speaker for OptoVue.
Is dry eye a complication of ocular surgery?

It’s not complicated.

Your cataract or refractive surgery patient didn’t present with dry eye or other symptoms of ocular surface disease, then perioperatively complains of moderate to severe dry eye. They think there have been complications.

If elevated MMP-9, a key inflammatory biomarker for dry eye, is tested for and detected prior to surgery you have an opportunity to customize your treatment plan, which may improve post-surgical outcomes and reduce complications.

InflammaDry is the only rapid, CLIA-waived, in-office, point-of-care test that detects MMP-9. InflammaDry provides results in minutes, is easily performed in 4 simple steps, is minimally invasive, is reimbursable and requires no special equipment.

To find out how testing for MMP-9 with InflammaDry can take the complication out of your anti-inflammatory treatment therapies before there are complications, visit us at OSN Booth 44, EastWest Eye Booth 403 or AAO New Orleans Booth 4558 or contact your Quidel Account Manager at 800.874.1517.
Tracking growth of ultra-widefield imaging in disease management

Technology may alter risk assessments, but does not replace need for dilated eye exam

By Vanessa Caceres; Reviewed by Charles C. Wykoff, MD, PhD

AS THE POPULARITY of ultra-widefield imaging grows and the technology becomes more commonplace, retinal specialists can use it to help with diagnosis and management decisions, said Charles C. Wykoff, MD, PhD.

“It’s a more complete view of the back of the eye,” said Dr. Wykoff, Retina Consultants of Houston, Houston. However, he added, it doesn’t replace a thorough clinical examination.

The advantage of using ultra-widefield imaging is its ability to capture more of the posterior segment than has been possible with traditional fundus photography.

The latest imaging technology (OptosAdvance, Optos) captures 200°, or 82%, of the retina in one image. The device has six imaging modes, including three-in-one color depth imaging, angiography, and autofluorescence. The device is also on a HIPAA-compliant, cloud-enabled platform so users can see images from any networked device.

“By definition, ultra-widefield images show a minimum of 80% of the retina and include key peripheral landmarks, such as the vortex ampullae,” said Carole McCallum, director of ophthalmology marketing, Optos.

Dr. Wykoff, who has used ultra-widefield imaging for more than six years, sees key advantages for the incorporation of ultra-widefield imaging into clinical practice. It can help guide the management of retinal vascular diseases including retinal venous occlusive disease and diabetic retinopathy (DR).

With ultra-widefield imaging, more pathology is often visible peripherally, Dr. Wykoff said.

GUIDING TREATMENT DECISIONS

The technology may help guide treatment decisions. For example, a retina specialist may perform a clinical exam in a patient with DR, but then ultra-widefield angiography may detect a greater burden of disease.

“That can change prognosis and how one may manage the condition, such as with anti-vascular endothelial growth factor agents or retinal photocoagulation,” he said.

Dr. Wykoff also uses ultra-widefield imaging to document and track pathology, including retinal tears, retinal detachments, ocular tumors, and areas of inflammation.

“It’s helpful to objectively document areas of pathology with a single capture,” he said.

“Peripheral information seen in ultra-widefield color and fluorescein angiography have been shown to alter risk assessment and treatment plans in conditions such as diabetes and uveitis,” McCallum said.

Researchers are exploring ways to use ultra-widefield imaging, including for telemedicine screening, aging eye trends, and even for potential signs of Alzheimer’s disease.

“Peripheral information seen in ultra-widefield imaging has become an important component of a thorough eye exam and is taking on a larger role in retina and comprehensive ophthalmology,” McCallum said.

Ultra-widefield imaging can be particularly limited in the inferior quadrants, he added.

Dr. Wykoff’s research involvement with ultra-widefield imaging includes work towards accounting for the warping inherent to ultra-widefield imaging as well as its application to clinical trials such as the WAVE trial.

Going forward, Dr. Wykoff would like to see ultra-widefield imaging extend even further peripherally, particular to the ora serrata in all directions, and believes that integration of software algorithms for image interpretation will be used to quantify levels of pathology including DR severity levels in the near future.

Reference


CHARLES C. WYKOFF, MD, PhD

ccwmd@houstonretina.com

Dr. Wykoff does not have any relevant financial interests to disclose.
Indication
LOTEMAX® GEL (loteprednol etabonate ophthalmic gel) 0.5% is indicated for the treatment of post-operative inflammation and pain following ocular surgery.

Important Safety Information about LOTEMAX® GEL
- LOTEMAX® GEL is contraindicated in most viral diseases of the cornea and conjunctiva including epithelial herpes simplex keratitis (dendritic keratitis), vaccinia, and varicella, and also in mycobacterial infection of the eye and fungal diseases of ocular structures.
- Prolonged use of corticosteroids may result in glaucoma with damage to the optic nerve, defects in visual acuity and fields of vision. If this product is used for 10 days or longer, IOP should be monitored.
- Use of corticosteroids may result in posterior subcapsular cataract formation.
- Use of steroids after cataract surgery may delay healing and increase the incidence of bleb formation and occurrence of perforations in those with diseases causing corneal and scleral thinning. The initial prescription and renewal of the medication order should be made by a physician only after examination of the patient with the aid of magnification, and where appropriate, fluorescein staining.
- Prolonged use of corticosteroids may suppress the host response and thus increase the hazard of secondary ocular infection. In acute purulent conditions, steroids may mask infection or enhance existing infections.
- Use of corticosteroid medication in the treatment of patients with a history of herpes simplex requires great caution. Use of ocular steroids may prolong the course and exacerbate the severity of many viral infections of the eye (including herpes simplex).
- Fungal infections of the cornea are particularly prone to develop coincidentally with long-term local steroid application. Fungus invasion must be considered in any persistent corneal ulceration where a steroid has been used or is in use.
- Patients should not wear contact lenses when using LOTEMAX® GEL.
- The most common ocular adverse drug reactions were anterior chamber inflammation (5%), eye pain (2%) and foreign body sensation (2%).

Please see brief summary of Prescribing Information on adjacent page.

This resource is brought to you by Ophthalmology Times and sponsored by Bausch + Lomb. It may contain promotional material. LOTEMAX is a trademark of Bausch & Lomb Incorporated or its affiliates. ©Bausch & Lomb Incorporated. All rights reserved. Printed in USA. LGX.0093.USA.17
BRIEF SUMMARY OF PRESCRIBING INFORMATION
This Brief Summary does not include all the information needed to prescribe Lotemax Gel safely and effectively. See full prescribing information for Lotemax Gel.

Lotemax (loteprednol etabonate ophthalmic gel) 0.5%
Rx only
Initial Rx Approval: 1998

INDICATIONS AND USAGE
LOTEmAX is a corticosteroid indicated for the treatment of post-operative inflammation and pain following ocular surgery.

DOSEAGE AND ADMINISTRATION
Invert closed bottle and shake once to fill tip before instilling drops.
Apply one to two drops of LOTEmAX into the conjunctival sac of the affected eye four times daily beginning the day after surgery and continuing throughout the first 2 weeks of the post-operative period.

CONTRAINDICATIONS
LOTEmAX, as with other ophthalmic corticosteroids, is contraindicated in most viral diseases of the cornea and conjunctiva including epithelial herpes simplex keratitis (dendritic keratitis), vaccinia, and varicella, and also in mycobacterial infection of the eye and fungal diseases of ocular structures.

WARNINGS AND PRECAUTIONS
Intraocular Pressure (IOP) Increase
Prolonged use of corticosteroids may result in glaucoma with damage to the optic nerve, defects in visual acuity and fields of vision. Steroids should be used with caution in the presence of glaucoma. If this product is used for 10 days or longer, intraocular pressure should be monitored.

Cataracts
Use of corticosteroids may result in posterior subcapsular cataract formation.

Delayed Healing
The use of steroids after cataract surgery may delay healing and increase the incidence of bleb formation. In those diseases causing thinning of the cornea or sclera, perforations have been known to occur with the use of topical steroids. The initial prescription and renewal of the medication should be made by a physician only after examination of the patient with the aid of magnification such as slit lamp biomicroscopy and, where appropriate, fluorescein staining.

Bacterial Infections
Prolonged use of corticosteroids may suppress the host response and thus increase the hazard of secondary ocular infections. In acute purulent conditions of the eye, steroids may mask infection or enhance existing infection.

Viral Infections
Employment of a corticosteroid medication in the treatment of patients with a history of herpes simplex requires great caution. Use of oculer steroids may prolong the course and may exacerbate the severity of many viral infections of the eye (including herpes simplex).

Fungal Infections
Fungal infections of the cornea are commonly prone to develop coincidentally with long-term local steroid application. Fungus invasion must be considered in any persistent corneal ulceration where a steroid has been used or is in use. Fungal cultures should be taken when appropriate.

Contact Lens Wear
Patients should not wear contact lenses during their course of therapy with LOTEmAX.

ADVERSE REACTIONS
Adverse reactions associated with ophthalmic steroids include elevated intraocular pressure, which may be associated with infrequent optic nerve damage, visual acuity and field defects, posterior subcapsular cataract formation, delayed wound healing and secondary ocular infection from pathogens including herpes simplex, and perforation of the globe where there is thinning of the cornea or sclera.
The most common adverse drug reactions reported were anterior chamber inflammation (5%), eye pain (2%), and foreign body sensation (2%).

USE IN SPECIFIC POPULATIONS
Pregnancy
Teratogenic Effects
Loteprednol etabonate has been shown to be embryotoxic (delayed ossification) and teratogenic (increased incidence of meningocoele, abnormal left common carotid artery, and limb flexures) when administered orally to rabbits during organogenesis at a dose of 3 mg/kg/day (35 times the maximum daily clinical dose), a dose which caused no maternal toxicity. The no-observed-effect-level (NOEL) for these effects was 0.5 mg/kg/day (6 times the maximum daily clinical dose). Oral treatment of rats during organogenesis resulted in teratogenicity (absent innominate artery at ≥5 mg/kg/day doses, and cleft palate and umbilical hernia at ≥50 mg/kg/day) and embryotoxicity (increased post-implantation losses at 100 mg/kg/day and decreased fetal body weight and skeletal ossification with ≥50 mg/kg/day). Treatment of rats with 0.5 mg/kg/day (6 times the maximum clinical dose) during organogenesis did not result in any reproductive toxicity. Loteprednol etabonate was maternally toxic (significantly reduced body weight gain during treatment) when administered to pregnant rats during organogenesis at doses of ≥5 mg/kg/day.

Oral exposure of female rats to 50 mg/kg/day of loteprednol etabonate from the start of the fetop period through the end of lactation, a maternally toxic treatment regimen (significantly decreased body weight gain), gave rise to decreased growth and survival, and retarded development in the offspring during lactation; the NOEL for these effects was 5 mg/kg/day. Loteprednol etabonate had no effect on the duration of gestation or parturition when administered orally to pregnant rats at doses up to 50 mg/kg/day during the fetop period.

There are no adequate and well controlled studies in pregnant women. LOTEmAX should be used during pregnancy only if the potential benefit justifies the potential risk to the fetus.

Nursing Mothers
It is not known whether topical ophthalmic administration of corticosteroids could result in sufficient systemic absorption to produce detectable quantities in human milk. Systemic steroids appear in human milk and could suppress growth, interfere with endogenous corticosteroid production, or cause other untoward effects. Caution should be exercised when LOTEmAX is administered to a nursing woman.

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

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

NONCLINICAL TOXICOLOGY
Carcinogenesis, Mutagenesis, Impairment Of Fertility
Long-term animal studies have not been conducted to evaluate the carcinogenic potential of loteprednol etabonate. Loteprednol etabonate was not genotoxic in vitro in the Ames test, the mouse lymphoma tk assay, or in a chromosome aberration test in human lymphocytes, or in vivo in the single dose mouse micronucleus assay. Treatment of male and female rats with up to 50 mg/kg/day and 25 mg/kg/day of loteprednol etabonate, respectively, (600 and 300 times the maximum clinical dose, respectively) prior to and during mating did not impair fertility in either gender.

PATIENT COUNSELING INFORMATION
Administration
Invert closed bottle and shake once to fill tip before instilling drops.

Risk of Contamination
Patients should be advised not to allow the dropper tip to touch any surface, as this may contaminate the gel.

Contact Lens Wear
Patients should be advised not to wear contact lenses when using LOTEmAX.

Risk of Secondary Infection
If pain develops, redness, itching or inflammation becomes aggravated, the patient should be advised to consult a physician.

Bausch + Lomb, a division of Valeant Pharmaceuticals North America LLC
Bridgewater, NJ 08807 USA
US Patent No. 5,800,807
©Bausch & Lomb Incorporated
Lotemax is a registered trademark of Bausch & Lomb Incorporated or its affiliates.

LGX.0114.USA.16
Based on 9269101/9269201 Revised: 08/2016
The latest ocular allergy treatments worth watching

New therapies focus around kinase inhibitors, mast-cell stabilizers, immunotherapies

By Paul J. Gomes, Special to Ophthalmology Times

Progress of ocular allergy treatment in 2017 starts with the fact that this is a mature therapeutic space, with a range of existing choices for clinicians and patients. Progression in therapies from artificial tears to antihistamines and mast cell stabilizers to topical steroids provides a suitable choice for most patients with ocular allergies.1

Despite this diversity of treatment options, there is still an unmet therapeutic need for non-responders and patients with severe conditions, such as vernal or atopic keratoconjunctivitis. For these patients, a need for new treatments persists.

Newer treatments will focus on chronic allergy and allergic inflammation, the latter disease target being particularly important for drug developers seeking multiple indications for their therapies. Here are some therapy candidates that eye care professionals should be watching for in the future.

DISRUPTING KINASE CASCADES Immune reactions, such as allergic conjunctivitis, occur as a series of cellular events, all of which represent points of therapeutic intervention. One of these is the IgE receptor-triggered, mast-cell degranulation and histamine release that is catalyzed by spleen tyrosine kinase (Syk).2

Syk inhibitors have been touted as potential therapies for blood cell cancers, allergic asthma, and allergies in general. There are a number of small-molecule, Syk-targeted compounds in clinical stage testing, and trials involving allergic disorders are expected in the future.

Kinases are key metabolic regulators and it is not surprising that many kinase inhibitors have therapeutic potential. Drugs—such as imatinib (Gleevec, Novartis), an important therapy for chronic leukemias and stromal tumors—were shown to be an effective inhibitor of mast-cell growth—and a potential treatment for allergic asthma and other allergic conditions.3

Another kinase in the crosshairs is IKK-beta, a key player in pro-inflammatory signaling. Inhibitors of this kinase, such as SAR113945 (Sanofi), have been tested as treatments for osteoarthritis. Similar compounds may have a role in chronic allergy therapy.

Lastly, there is the potential for ROCK kinases inhibitors and the MAP kinases. Both are therapies for different disorders from glaucoma to various neoplasias. The focus of these molecular compounds are best suited to an empirical assessment of efficacy in ocular allergy and inflammation.

On a different front, efforts to unravel the mechanisms of action for compounds derived from natural products used as allergy treatments (such as flavonoids, stilbenes, and curcuminoids)4 have narrowed the focus to a common, mast-cell stabilization effect. This was demonstrated by in vitro studies in basophilic cell lines.

One anticipated therapeutic arrival in ocular allergy treatments came in 2013 and 2014, with approvals of sublingual timothy grass antigen extracts as a desensitizing approach to seasonal allergies. These approvals received a first-ever FDA indication for “allergic rhinitis with or without conjunctivitis,” opening the door to future treatments for rhino-conjunctivitis.

WHO WILL PROVIDE THERAPY Despite this umbrella term, patients are likely to ask eye care professionals about ocular allergies and primary care practitioners (or allergists) about nasal allergies. It was unclear who would be delivering this therapy from the start.

This may be part of the problem these therapies face, as after fewer than three years on the market, sales of Timothy grass pollen allergen extract (Grastek, Merck) and Sweet Ver- nal, Orchard, Perennial Rye, Timothy, and Kentucky Blue grass mixed pollens allergen extract (Oralair, Stallergenes) have been much lower than anticipated. With slower than expected sales, Merck returned marketing rights to its development partner, Alk-Albello, in July 2016.

Despite the setback, another Merck/ALK-Albello immunotherapy that targeted the perennial allergen dust mite5 was approved by the FDA in March 2017. It will be interesting to see if the demand from patients with perennial allergies for this treatment alternative will be different than that seen with the seasonal immunotherapies.

Trials of other treatments are ongoing. Novocea initiated a phase II study of its paracrine modulating compound, ST266, in late 2016 (NCT02978183) and Aldeyra Therapeutics completed a phase II study of the “aldehyde trap” compound NS2 (NCT02578914) in June 2017.

The pace of development may have slowed, but this is likely a reflection of the cyclical nature of the drug discovery process. Despite the maturity of the market, there is still an unmet need for ocular allergy therapies.

TAKE-HOME

Despite the mature allergy market, there is still an unmet need for ocular allergy therapies. Pace of development is slow, but newer treatments will focus on chronic allergy and allergic inflammation.

References

Paul J. Gomes is vice president for allergy at Ora Inc., a full-service ophthalmic clinical research and product development firm with offices in the United States and Japan.
Advances in techniques and technology have enabled cataract surgeons to consistently achieve excellent outcomes. As well, with a growing array of presbyopia-correcting intraocular lenses (IOLs), we are able to offer premium cataract surgery to more patients who are interested in wearing glasses less postoperatively and address their functional goals. Compared with previous generations, cataract surgery patients today have different visual needs because they are more active, work later in life, and are using computers and other digital devices (Figure).

Careful selection of patients and comprehensive counseling to establish appropriate expectations about the surgical result are vital elements for success with premium cataract surgery.

Getting to know the patient
Questioning patients about their lifestyle and vision goals gives me information I use to suggest an IOL that is likely to meet an individual’s needs. Through this exchange, I also get some insight about personality type that is another factor influencing the likelihood patients may be satisfied with their vision after premium cataract surgery.

Not all patients are aware of the potential to wear glasses less after cataract surgery through a premium procedure. To identify patients who would be interested, I ask, “How do you feel in general about wearing glasses?” Because the functional performance of available presbyopia-correcting IOLs varies at different distances, I then determine a patient’s desire to wear glasses less for specific tasks through further questioning.

I also ask about vision needs at night, considering the risks for night vision symptoms with some presbyopia-correcting IOLs. I want to know whether patients are willing to accept seeing glare, halos, or starbursts around light at night as a tradeoff for a fuller range of vision. In my experience, patients are fairly certain about their tolerance or intolerance for these visual phenomena, and I can generally predict who is who based on my perceptions about personality.

Counseling for IOL selection
I present the benefits and tradeoffs of all implant choices on the basis of a continuum that I have found is conceptually easy for patients to understand. I explain that the traditional monofocal IOLs are at one end of the spectrum. These lenses can give crisp vision at far distances if there is no significant astigmatism and do not routinely cause problems with vision at night. They do not, however, give good near or intermediate vision.

Diffractive multifocal IOLs with a high add are at the other end of the spectrum. These implants provide the best near vision outcomes but may have a “dip” in visual acuity in the intermediate range. In addition, they can have some elements of night vision issues such as halos, glare, and starbursts.

The TECNIS Symfony® extended-depth-of-focus IOL represents an option that lies in the middle of the continuum, because it delivers what I consider to be a good balance of the pros and cons of available IOL options. As shown in clinical trials and in my experience, the TECNIS Symfony® IOL provides excellent uncorrected vision at far and intermediate distances and reasonably good uncorrected near vision. Data from clinical trials also show that the TECNIS Symfony® IOL has been associated with a low incidence of halo and glare and has not demonstrated clinically significant reduction in contrast sensitivity compared with a monofocal lens. Further, with the TECNIS Symfony® Toric IOL, I am now able to offer a presbyopia-correcting IOL to patients with significant preexisting astigmatism.

Setting expectations with the TECNIS Symfony® IOL
Because it is always better to underpromise and overdeliver, I never suggest that patients will be able to discard their glasses after cataract
surgery. In the TECNIS Symfony® clinical trials, 85% of patients reported that they wore glasses none or a little bit of the time after surgery, and my experience is consistent with that. Therefore, I tell patients that they will wear glasses less often but should expect to wear them for some tasks. In particular, they may find themselves reaching for glasses to read at close range for small print.

All patients are informed that they will probably notice some new visual phenomena when it is dark. I caution that they may find the symptoms bothersome initially, but these will generally diminish with time because the brain begins to adapt and patients become less sensitive to such issues. I never tell patients, however, that the halos, glare, or starbursts will disappear completely.

Postoperatively, surgeons can work with patients to understand if their expectations have been met and if any further steps are needed to increase patient satisfaction. The vast majority of patients implanted with the TECNIS Symfony® IOL have been satisfied with their outcomes. Data from studies indicate 94% to 98% of patients are willing to recommend the IOL to others, and this high level of patient satisfaction encourages me to recommend the lens.

The value conversation
Patients who are motivated to wear glasses less are good candidates for premium cataract surgery, but cost may still emerge as an issue. When talking to patients about the out-of-pocket costs for a presbyopia-correcting IOL, I use a value proposition that I think establishes premium cataract surgery as one of the best value choices they can make in their lifetime. I say to patients that if they were to buy a new car, they would likely spend a minimum of $20,000 and may plan to drive the vehicle for 5 to 10 years. Premium cataract surgery with a presbyopia-correcting IOL costs less than half that amount and provides visual benefits they can enjoy for the rest of their life, through all waking hours.

Anatomical considerations
In addition to looking for patients who are motivated to reduce spectacle wear postoperatively and who I believe have realistic expectations, I want to be sure when performing premium cataract surgery that the patient has no ocular conditions that will preclude a premium outcome. Therefore, I conduct a thorough examination preoperatively, looking particularly for ocular surface conditions and pathology affecting the cornea, zonules, macula, and optic nerve.

Existing dry eye disease must be treated before I will perform the surgery, because an irregular tear film limits the ability to obtain accurate preoperative measurements. I also like to know that I am operating on a patient who is compliant with the recommended treatment, because dry eye disease affects visual quality and will need to be managed postoperatively for patients to remain satisfied with their vision.

Topography is performed in all patients to evaluate astigmatism. Patients with irregular astigmatism are not good candidates for a presbyopia-correcting toric IOL. Patients with significant regular astigmatism will need to have that addressed to achieve reduced spectacle wear with a presbyopia-correcting toric IOL. When planning to implant a toric IOL, I perform keratometry with multiple instruments and look for consistency in the magnitude and axis of astigmatism. This gives me confidence that I will be able to select the correct IOL power and achieve the targeted refractive outcome.

I use double-pass technology to assess vision quality and measure higher-order aberrations using ray-tracing technology that distinguishes between corneal and lenticular aberrations. Significant corneal higher-order aberrations may exclude patients from a presbyopia-correcting IOL, with the exception of an accommodating IOL.

Because it can be difficult to identify some posterior segment pathologies when looking through an opacified lens, the preoperative examination also includes imaging with optical coherence tomography to look for macular conditions (eg, epiretinal membrane, age-related macular degeneration) that will limit quality of vision with presbyopia-correcting IOLs. I also consider the presence of diabetes and glaucoma. Patients with well-controlled diabetes without evidence of retinopathy and those with mild stable glaucoma can be offered a presbyopia-correcting IOL. Nevertheless, I caution them that their visual outcome will worsen should their disease progress and affect the retina or optic nerve. I avoid placing a multifocal IOL or a TECNIS Symfony® IOL in patients with any frank macular pathology.

Conclusion
As more people continue to work and stay active later in life, there seems to be a growing interest among cataract surgery patients in presbyopia-correcting IOLs that can lessen how often they wear glasses for a range of activities. Further, because of our reliance on digital devices, these patients seem to have a particular desire for good uncorrected vision at intermediate distances.

The TECNIS Symfony® IOL has been a valuable addition to presbyopia-correcting IOL surgery and addressing the vision needs of today’s cataract surgery population. The outcomes I am achieving using this technology are excellent. Combining my positive experience with continued meticulous attention to patient selection and comprehensive preoperative counseling to set realistic outcomes expectations, I feel confident that when I recommend the TECNIS Symfony® IOL to appropriate patients, they will benefit with improved vision for many activities.
Bevacizumab stacks up for DME?
Clinicians debate role, benefits of anti-VEGF therapy in treating diabetic macular edema

PROS. ACCESS, COSTS OF BEVACIZUMAB KEY FACTORS FOR DME THERAPY

By Cheryl Guttman Krader;
Reviewed by Sergio Rojas, MD, and Mario Saravia, MD

THE EFFICACY of intravitreal bevacizumab (Avastin, Genentech) for improving vision in patients with center-involving diabetic macular edema (DME) has been demonstrated in several clinical trials.

Available evidence also shows that the functional gain associated with bevacizumab injections is less than that achieved with aflibercept (Eylea, Regeneron) or ranibizumab (Lucentis, Genentech). Nevertheless, bevacizumab is the best choice for anti-vascular endothelial growth factor (anti-VEGF) treatment of DME taking cost into account, said Sergio Rojas, MD.

Providing the pro position in a debate on the topic, “Bevacizumab is as Good as Ranibizumab and Aflibercept for DME,” Dr. Rojas presented the argument he developed in collaboration with Mario Saravia, MD, Austral University Hospital, Buenos Aires, Argentina.

“Treatment with any of the anti-VEGF agents will on average lead to improved vision,” said Dr. Rojas, private practice, Cuernavaca, Mexico. “The keyword for treating DME, however, is access.

COST AND INCOME

“Access is related to cost and income, income is low in many countries throughout the world,” Dr. Rojas added. “The cost of every extra letter gained using an anti-VEGF agent other than bevacizumab is a heavy burden that compromises access.”

Reviewing studies investigating the anti-VEGF agents for the treatment of DME, Dr. Rojas cited the report from the Pan-American Collaborative Retina Study group that showed 51.8% of patients treated with bevacizumab gained 2 or more lines of best corrected visual acuity (BCVA) after 2 years.

At 2 years in the BOLT study, patients treated with bevacizumab were 5.1 times more likely to have a 2-line or greater improvement from baseline BCVA compared with the control group treated with macular laser.

Pooled results from the RISE and RIDE studies, the pivotal trials investigating ranibizumab treatment for DME, showed that patients receiving ranibizumab 0.3 mg or 0.5 mg had an average gain of about 12 letters from their baseline visual acuity after 2 years.

In the VISTA and VIVID pivotal trials for aflibercept, patients receiving treatment every 4 or every 8 weeks had an average gain of ~12 letters in the bevacizumab group, he added.'
ACCESS, COSTS

(Continued from page 44)

had mean BCVA gains ranging from about 9.5 to 11.5 letters after 2 years.

Reviewing data from the Diabetic Retinopathy Clinical Research Network Protocol T that compared all three anti-VEGF agents head-to-head, Dr. Rojas noted there was a statistically significant difference favoring aflibercept over bevacizumab for greater mean BCVA gain at 2 years.

The between-group difference, however, was only 2.8 letters. Patients treated with ranibizumab gained an average of 2.3 more letters compared with the bevacizumab group, but the superiority of ranibizumab was not statistically significant.

“There was no significant difference between treatment groups in the average number of injections administered over 2 years,” Dr. Rojas said.

ASSURING ACCESS

Noting that income is one of the factors determining access to health care, Dr. Rojas presented data from the World Bank to highlight global variation in gross national income per capita and the low level in many countries throughout the world.

Information on the cost of treatment for DME using the different anti-VEGF agents was calculated using data from Protocol T. Those analyses showed that the 2-year costs for bevacizumab, ranibizumab, and aflibercept were $960, $15,550, and $27,750, respectively.

“Considered from another perspective, it would cost $7,200 for every extra letter gained using ranibizumab instead of bevacizumab and $9,500 for every extra letter gained using aflibercept instead of bevacizumab,” Dr. Rojas said.

INFERIORITY

(Continued from page 44)

When data from the 2-year visit were analyzed, aflibercept maintained its numerical superiority for greater improvement from baseline visual acuity compared with ranibizumab and bevacizumab in the cohort of eyes with baseline visual acuity worse than 20/40 (+ 18.3 versus + 16.1 and + 13.3 letters, respectively). The difference between aflibercept and bevacizumab remained statistically significant, but there was no significant difference comparing aflibercept with ranibizumab or ranibizumab with bevacizumab.

Aflibercept had the best drying effect on the macula—mean change from baseline CST in the aflibercept, ranibizumab, and bevacizumab groups was −211 μm, −174 μm, and −185 μm, respectively, and the difference between aflibercept and bevacizumab remained statistically significant.

POST HOC DATA

A subsequently published report of additional efficacy post hoc analyses of data from Protocol T presented results from an evaluation of change in visual acuity area under the curve (AUC). It also showed statistically significant differences favoring aflibercept over both ranibizumab and bevacizumab.

For patients with baseline visual acuity worse than 20/40, the mean change in visual acuity over 2 years (AUC) was + 17.1 letters for aflibercept, + 13.6 letters for ranibizumab, and + 12.1 letters in the bevacizumab group.

Further highlighting the difference in functional outcomes between groups, Dr. Korobelnik offered graphical depictions of the AUC data.

“Comparing aflibercept and bevacizumab, a difference between treatments is seen already after two injections,” Dr. Korobelnik said. “The benefit of aflibercept over bevacizumab is maintained until 2 years! I ask, which treatment would you prefer?”

Jean-François Korobelnik, MD

This article was adapted from a presentation that Jean-François Korobelnik, MD, delivered at the 2017 Retina World Congress. Dr. Korobelnik is a consultant to and investigator for Bayer, Novartis, and Roche.

Sergio Rojas, MD

Mario Saravia, MD

This article was adapted from a presentation that Drs. Rojas and Saravia, MD, delivered at the 2017 Retina World Congress. Dr. Rojas is a consultant to Novartis and Bayer. Dr. Saravia has no relevant financial interests to disclose.

Treat anterior and posterior eye diseases with one laser device!

Visit us at
E: srojas11@yahoo.com
M: mario.saravia@gmail.com

E: srojas11@yahoo.com
M: mario.saravia@gmail.com

E: srojas11@yahoo.com
M: mario.saravia@gmail.com
When you think all is well with the world—when there's not a ripple on the pond and the elevator music is playing in the background—what you really have done is jinx the rest of the day so that at any moment the wheels will fall off the bus!

I was having a peaceful afternoon and actually catching up on e-mails when my phone rang.

The lead technician started: “Well, I am going to tattle on myself before this patient calls you and actually complains.”

This is never a good beginning to a conversation. I had flashes that the technician dropped a bottle of yellow dye onto the patient’s white shirt, or better yet, while they were pulling the phoropter into position, it loosened and fell off the arm, skinning the patient’s nose and landing in his or her lap!

She continued: “I just had a patient point out to me that the letters on the chart were offensive to him. The letters were GDFUA.”

I tried to ask what in particular offended him when I was accused of being culturally insensitive. He hung up as he threatened to review us on Angie’s List!

I spent the next half hour looking online for any references of GDFUA—all I found was “Generic Drug Fee User Amendments.”

Driving home, I began to think of the instances when life entered the clinic and changed the course of the day in ways I never imagined could have happened.

After being in the field for 35 years, I still wonder, “What is it with these people?” Here are a few other examples of what I learned from those instances:

1. **THINGS ARE NOT ALWAYS AS THEY SEEM!**

   While at the VA Eye Clinic, I had a day that was really starting to grind me down ... and it was only 10:30 A.M.

   I put away the surgery scheduling book and wandered into the clinic to take a little respite and see some patients. Clinic was bustling so I went to the waiting area to retrieve the next patient.

   When I called his name, this jaunty, smiling gentleman, sitting tall in his wheelchair and wearing his Vietnam Booney hat waved his hand and said: “How about a ride Sarge??” (The veterans called me that due to my sunny personality.)
I wheeled him into a cubicle to begin his exam. As I started his intake, I noticed he had a plaid blanket on his lap and his polished boots were pointing towards me. He was smiling, I was smiling, and all seemed right in the world.

I asked if he needed help transferring to the exam chair and he said, “Nope. Done it a million times.” I turned to write in the chart when I saw him start to fall from his wheelchair. I reached my arm over to keep him upright when he frantically grabbed my hand and twisted my right thumb over by my pinky.

I awoke on the ground 10 minutes later with one of my technicians saying: “Director, get up. This is no time to be taking your break!”

I spent the rest of the summer in an arm cast extending to my elbow!

That day, while his feet were pointing forward, his upper legs were not in his prosthetic devices. He was more comfortable leaving them out and forgot to put them back. I was not paying attention because I believed he had “done it a million times,” not realizing those other times his legs were attached.

Moral: Don’t be lulled by what appears normal—that’s when you are in for some big surprises.

I am happy to report in my current role as clinical operations manager, I have never been on the floor; I do not lead any exam or discussion with someone’s age and, all ficus plants have been removed from the clinics. It has been smooth sailing ever since!

3

WHAT DOES “NORMAL” REALLY LOOK LIKE?

One day, our cornea clinic was hectic so I jumped in to help with the ever-growing mass of patients.

When you work at a hospital, you tend to keep your eyes open and remain aware of your surroundings.

The next patient I called had a familiar name, but I couldn’t place it. She was in her mid-forties, dressed for success, and had a pleasant smile. I had high hopes this would be a smooth exam.

We went into an exam room and she said she was having headaches and thought maybe her eye glasses were getting weaker.

The conversation was lovely until I asked her how old she was. My technician heard a thud from the next room, entered my room, and hit me in the head with the oak door—I was lying in front of it!

“Maddy Hayes” had hit me with a right hook that I never saw coming.

As I was clearing the cobwebs, I angrily asked her what was going on. She calmly replied she found it rude of me to be so forward in asking her age when I hardly knew her.

Then it dawned on me: Maddy Hayes was the Cybill Shepherd role from the TV show “Moonlighting,” and this woman looked like a clone of Cybill Shepherd.

Moral: Keep your eyes on the patient—especially the ones that appear “normal.” They are the ones who take you by surprise.

When people ask me what I miss most about being a floor technician, my first response is: “Not the floor!”

The conversation was lovely until I asked her how old she was. My technician heard a thud from the next room, entered my room, and hit me in the head with the oak door—I was lying in front of it!

“Maddy Hayes” had hit me with a right hook that I never saw coming.

As I was clearing the cobwebs, I angrily asked her what was going on. She calmly replied she found it rude of me to be so forward in asking her age when I hardly knew her.

Then it dawned on me: Maddy Hayes was the Cybill Shepherd role from the TV show “Moonlighting,” and this woman looked like a clone of Cybill Shepherd.

Moral: Keep your eyes on the patient—especially the ones that appear “normal.” They are the ones who take you by surprise.

When people ask me what I miss most about being a floor technician, my first response is: “Not the floor!”

I am happy to report in my current role as clinical operations manager, I have never been on the floor; I do not lead any exam or discussion with someone’s age and, all ficus plants have been removed from the clinics. It has been smooth sailing ever since!

2

THERE REALLY IS A REASON FOR EVERYTHING—YOU JUST DON’T KNOW WHAT IT IS YET.

We had a gentleman who I will call Mr. Johnson who came to the retina clinic once a month for diabetes follow-ups. He prided himself on his visit to the clinic once a month for diabetes follow-ups. He prided himself on his age when I hardly knew her.

One day, the receptionist raced back to the clinic and frantically announced Mr. Johnson who came to the retina clinic once a month for diabetes follow-ups. He prided himself on his age when I hardly knew her.

As I was clearing the cobwebs, I angrily asked her what was going on. She calmly replied she found it rude of me to be so forward in asking her age when I hardly knew her.

Then it dawned on me: Maddy Hayes was the Cybill Shepherd role from the TV show “Moonlighting,” and this woman looked like a clone of Cybill Shepherd.

Moral: Keep your eyes on the patient—especially the ones that appear “normal.” They are the ones who take you by surprise.

When people ask me what I miss most about being a floor technician, my first response is: “Not the floor!”

I am happy to report in my current role as clinical operations manager, I have never been on the floor; I do not lead any exam or discussion with someone’s age and, all ficus plants have been removed from the clinics. It has been smooth sailing ever since!

3

WHAT DOES “NORMAL” REALLY LOOK LIKE?

One day, our cornea clinic was hectic so I jumped in to help with the ever-growing mass of patients.

When you work at a hospital, you tend to keep your eyes open and remain aware of your surroundings.

The next patient I called had a familiar name, but I couldn’t place it. She was in her mid-forties, dressed for success, and had a pleasant smile. I had high hopes this would be a smooth exam.

We went into an exam room and she said she was having headaches and thought maybe her eye glasses were getting weaker.

The conversation was lovely until I asked her how old she was. My technician heard a thud from the next room, entered my room, and hit me in the head with the oak door—I was lying in front of it!

“Maddy Hayes” had hit me with a right hook that I never saw coming.

As I was clearing the cobwebs, I angrily asked her what was going on. She calmly replied she found it rude of me to be so forward in asking her age when I hardly knew her.

Then it dawned on me: Maddy Hayes was the Cybill Shepherd role from the TV show “Moonlighting,” and this woman looked like a clone of Cybill Shepherd.

Moral: Keep your eyes on the patient—especially the ones that appear “normal.” They are the ones who take you by surprise.

When people ask me what I miss most about being a floor technician, my first response is: “Not the floor!”

I am happy to report in my current role as clinical operations manager, I have never been on the floor; I do not lead any exam or discussion with someone’s age and, all ficus plants have been removed from the clinics. It has been smooth sailing ever since!

2

THERE REALLY IS A REASON FOR EVERYTHING—YOU JUST DON’T KNOW WHAT IT IS YET.

We had a gentleman who I will call Mr. Johnson who came to the retina clinic once a month for diabetes follow-ups. He prided himself on his routine and attention to detail.

One day, the receptionist raced back to the clinic and frantically announced Mr. Johnson who had just relieved himself in the waiting room’s ficus plant. She was aghast. Strangely, I thought it was funny.

We removed the plant and I had housekeeping find another one. It was still rather amusing until he did it again the following month.

Realizing we had an unsettling pattern occurring, I pulled Mr. Johnson into a room and asked him why he felt it necessary to do this every time he came to the clinic.

He stated his job at home was to water the plants. His wife was always reminding him to water the plants, but she would admonish him not to water the ficus too much.

He explained she recently passed away and he was missing her terribly. When he came to the clinic and saw the ficus, it reminded him to “water the plants.” So, he did.

Moral: After shedding a tear with him, we changed the ficus plant to a large potted fern. We never had another recurrence. We sent the ficus home in a cab with him.
Focused Medical Billing is a full service medical billing firm servicing all specialties of Ophthalmology. With our firm our focus is to maximize our client’s revenue and dramatically decrease denials by utilizing 20 years of Ophthalmology billing/coding experience and expertise. Our firm provides accurate clean claim submissions on first submissions with relentless A/R follow up to obtain a 98% collection rate that so many of our clients enjoy.

Services Include:
- Expert Coders: Billing to Primary, Secondary & Tertiary insurance companies
- A/R Clean Up and analysis
- Patient Billing
- Posting of all Explanation of benefits
- Credentialing & Re-Credentialing
- Eligibility
- Fee Schedule Analysis
- Monthly Reports
- No long term commitment or contract required
- 100% HIPPA Compliant
- Stellar letters of reference

Call us today for your free, no obligation consultation to evaluate your practice.

Ph: 855-EYE-BILL ext. 802
Email: amay@focusedmedicalbilling.com
Web: www.focusedmedicalbilling.com

*You’re focused on your patients, we’re focused on you*
CAREERS

PRODUCTS & SERVICES

FELLOWSHIP

BASSIN CENTER
FOR PLASTIC SURGERY

OCULOPLASTIC FELLOWSHIP for July ’18 – ORLANDO, FLORIDA

Offered by Dr. Roger E. Bassin of The Bassin Center For Plastic Surgery. One year fellowship. Learn about face lift, blepharoplasty, brow lift, cheek lift, laser resurfacing, fat transfer and body liposuction as well as basic oculoplastic surgery.

Please submit resumes to:
valerie@drbassin.com

Repeating an ad ENSURES it will be seen and remembered!

VERMONT

COMPREHENSIVE OPHTHALMOLOGIST

The Department of Surgery at the Robert Larner, M.D. College of Medicine at The University of Vermont is seeking a Comprehensive Ophthalmologist in the Division of Ophthalmology to join the University of Vermont Medical Center in Burlington, Vermont. This position offers a highly competitive income guarantee, incentives, and comprehensive benefits package with academic appointment at the Assistant or Associate Professor Level, commensurate with qualifications and experience. This is a full-time, salaried, non-tenure Clinical Scholar Pathway appointment. All applicants must be board certified or board eligible, and eligible for medical licensure in the State of Vermont.

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

The University is especially interested in candidates who can contribute to the diversity and excellence of the academic community through their research, teaching, and/or service. Applicants are requested to include in their cover letter information about how they will further this goal. The University of Vermont is an Affirmative Action/Equal Opportunity Employer. Applications from women, people with disabilities, veterans and people of diverse racial, ethnic and cultural backgrounds are encouraged. Applications will be accepted until the positions are filled.

Interested individuals should apply online at https://www.uvmjobs.com/postings/21307 (position number 013105). Inquiries may be sent to Dr. Brian Kim via Emily Nuse at Emily.Nuse@uvmhealth.org or via Christa Konstantinopoulos at Christa.Konstantinopoulos@uvmhealth.org.
Why content is king—even in eye care

Regularly adding ‘fresh’ blog content, following SEO tips can improve search engine ranking

By David Evans, MBA, PhD

ONE THING HAS remained constant since the inception of Google: the importance of unique and compelling content.

ROLE OF SEO
Search engine optimization (SEO) is a multi-faceted endeavor that, when carried out properly, addresses a wide array of online factors. The goal of SEO is to make your website appear to be the best online resource for specific topics relating to eye care that consumers search for on Google.

Over the last three or four years, SEO has become very technical. Website code, load times, mobile versus desktop, index bloat, Google MyBusiness claiming and maintenance, citations, reviews, and social media have all become very important factors. However, one thing has remained constant since the inception of Google: the importance of unique and compelling content.

So, the answer seems to be just keep adding content to your website—right? Unfortunately, no. The reason this strategy is ill-advised is because there are two types of content: long-term, or evergreen, content, such as your procedure pages; and short-term, or current, content such as your blog posts.

‘The answer seems to be just keep adding content to your website—right? Unfortunately, no.’

—David Evans, MBA, PhD

The type and placement of your content greatly affects its impact. Google’s ranking algorithm favors sites that have unique and freshly updated content. This poses a bit of a challenge in eye care because the details of procedures don’t change every month. Of course, any time surgical technology is significantly updated or improved, your procedure content should be updated on your website, but that might occur only once a year.

In general, the same content that was important a few months ago for topics like LASIK or PRK is still relevant today. Fortunately, Google recognizes that evergreen content, such as procedure information, is—and is intended to be—relevant for long periods of time.

Therefore, the occasional update or addition of new information is more than sufficient to ensure this content is still valued. However, this doesn’t answer the question of, “How do you keep your content fresh?”

IMPORTANCE OF BLOGS

The answer is blogging. Blog content is intended to be current, and keeping it “fresh” means new posts on timely topics at regular intervals. Your website is the best place to add this new and unique content. Not only will this refinement make your website appear “newer” and boost your rankings when Google crawls your site, it will also make your content more engaging to potential patients. Keep in mind, though, that your blog needs to be different from your website’s procedure content.

A lot of practices make the mistake of trying to “repurpose” content, that is, double- or triple-using the same content by placing it on their website, blog, and social media. This is a big mistake because Google and the other search engines do not “see” this content as fresh or unique. The best blog content is timely, seasonal, general education, or newsworthy.

An article about the best procedures for Valentine’s Day or about health care news related to your specialty goes a long way toward making your site a unique resource in the eyes of Google. And, if written properly, the content will engage with prospective patients and keep them on your site longer, which helps SEO, rankings, and conversion.

The bottom line: Content is king for SEO, conversion, and it’s what attracts users to your site.
Conventional slit lamp imagery requires that you have a separate fundus camera to capture the range and depth of non-mydriatic retina imaging. But not only are you physically storing a separate piece of equipment, you’re also using a separate technician, or room, and have to navigate patients back and forth from slit lamp to fundus camera. The Fundus Module 300 is a single slit lamp attachment that delivers efficient retinal imagery in one place, and even surpasses the image quality of most separate fundus screening cameras.

Are you ready to outperform conventional? Learn more about how Haag-Streit is driven to excellence. Visit HSDriven.com/fundus.
Cataract procedures using the ORA SYSTEM® with VerifEye®+ Technology have been proven to help deliver better outcomes for your astigmatic and post-LASIK patients.¹,²

- Provides IOL sphere, cylinder and alignment suggestions
- Dynamic variable optimization and robust reporting powered by AnalyzOR™ Technology

Contact your local Alcon rep or visit www.GuideandVerify.com for more information.
