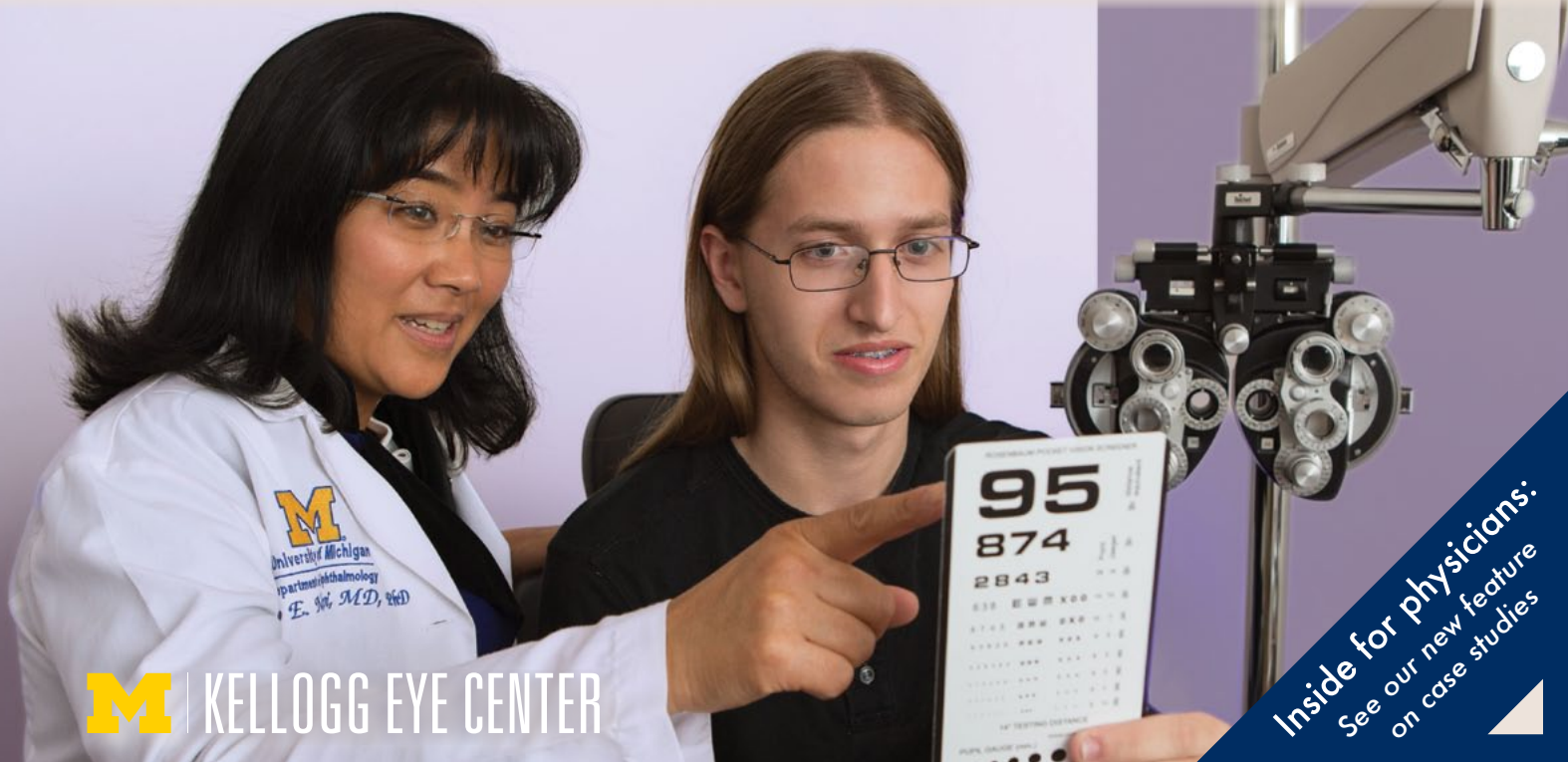


# THE UNIVERSITY OF MICHIGAN KELLOGG EYE CENTER ADVANCES IN OPHTHALMOLOGY



**M** | KELLOGG EYE CENTER

Inside for physicians:  
See our new feature  
on case studies

## Using New Tools for Glaucoma Treatment

**Canaloplasty is an innovative alternative to traditional surgeries for patients with open-angle glaucoma**

Christian Albers, of Sterling Heights, Michigan, was 14 years old when he was diagnosed with juvenile open-angle glaucoma (OAG) during a routine eye exam. “The exam showed that Christian’s pressure was elevated in the left eye,” says Jeff Albers, Christian’s father. “And, he wasn’t seeing many of the blips of light during the visual field test.”

While his right eye was healthy, the pressure in Christian’s left eye was a concern. “My thoughts were, how does this happen with someone so young, and how do we stop this pressure from destroying what is left of the sight he has,” says Mr. Albers.

When vision is lost from OAG, it is because the optic nerve, which carries visual signals from the eye to the brain, becomes damaged. Because glaucoma

appears gradually with no warning signs, by the time individuals are aware of compromised sight, the disease is usually at advanced stages.

In the form of OAG that Christian has, the disease affected the eye’s natural drainage route—known as Schlemm’s canal—so that fluid could not drain out of the eye in a normal fashion. As a result, his eye pressure increased.

In the months that followed, Christian saw an area ophthalmologist who treated him aggressively with medication and laser therapy in his left eye—neither of which consistently lowered his eye pressure. Christian was referred to Kellogg glaucoma specialist, Sayoko E. Moroi, M.D., Ph.D. Examination confirmed a dangerously high pressure in the left eye.

Dr. Moroi recommended that Christian undergo an innovative surgical approach called canaloplasty. Approved by the FDA in 2008, canaloplasty utilizes a microcatheter, or small, flexible tube, placed in a portion of the eye’s natural drainage system—Schlemm’s canal—to help reduce eye pressure by improving flow

*continued inside*



## From the Chair

Dear Colleagues,

We are committed to bringing surgical advances and innovative technologies to help our patients achieve the best vision possible. Dr. Sayoko Moroi is a skilled surgeon who has found that a relatively new procedure, canaloplasty, can provide better outcomes for certain patients

with glaucoma. We report on one such case in this issue.

For patients with degenerative eye disease, Kellogg surgeons can now offer a technology that is life-changing. The retinal implant—or bionic eye—has attracted nationwide attention for its ability to restore light perception to our patients with retinitis pigmentosa. Kellogg is one of only 13 centers in the country able to offer this device to patients in the end stage of the disease.

Continuing our series of case studies for physicians, Dr. Cagri Besirli, a specialist in pediatric retina disease, presents a complicated case involving a nine-year-old patient. Dr. Thomas Gardner, who also runs a research program on diabetes and eye disease, describes the somewhat surprising insights gained through visual field testing with frequency doubling technology perimetry (FDT).

Our residency and fellows programs attract bright individuals whose curiosity drives their clinical and research training. A new program offers career development awards to support their exceptional projects—and our faculty stand by to support them as they develop these projects and their careers. We'll tell you more about these awards in our annual report.

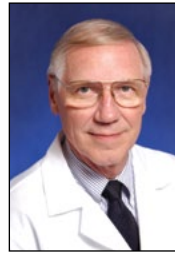
We are also fortunate to have a talented group of new faculty join the department. They come to us with a range of subspecialties and research interests, and all are passionate about their dedication to our patients.

I hope you'll have a chance to meet them on your next visit to the Kellogg Eye Center.

Paul P. Lee, M.D., J.D.

F. Bruce Fralick Professor and Chair  
Ophthalmology and Visual Sciences  
Director, W.K. Kellogg Eye Center

## HONORS & AWARDS



**Terry J. Bergstrom, M.D.**, professor emeritus, ophthalmology and visual sciences, has been awarded the University of Michigan Medical School Lifetime Achievement Award in Medical Education. This award recognizes outstanding faculty educators for lifetime achievement in Medical School educational programs.



**Alan Sugar, M.D.**, professor and vice chair, ophthalmology and visual sciences, was awarded the University of Michigan Medical School Outstanding Clinician Award. This award recognizes the exemplary performance of a practicing clinician or program leader of innovation in clinical care.



**Jonathan D. Trobe, M.D.**, professor, ophthalmology and visual sciences, and of neurology, has been awarded the 2013 Kaiser Permanente Award for Excellence in Teaching in clinical sciences. The most prestigious clinical teaching award granted by the U-M Medical School, this honor recognizes exemplary commitment to the education of medical students.

## Residents Earn Career Development Awards

To encourage residents and trainees to pursue projects that spark their passion, the department provides grants through the Michigan Ophthalmology Trainee Career Development Award. These residents (with the titles of their winning projects) are our newest awardees:

**Ryan J. Fante, M.D.**

*Vitreous Cytokine and Chemokine Profile in Macular Edema Secondary to Diabetes and Central Retinal Vein Occlusion*

**Monica Michellotti, M.D.**

*Analysis of Healthcare Delivery Systems in the US and UK through the Prism of Ophthalmology*

**Ira H. Schachar, M.D., M.Sc.**

*Laser Retinectomy for the Treatment of Glaucoma*

## A Novel Protein Could Form the Basis for New Treatments in Diabetic Retinopathy

### Kellogg scientists and Novo Nordisk collaborate on drug development

Diabetic retinopathy, a leading cause of blindness in the United States, is characterized by changes in the blood vessels of the retina. In some patients, blood vessels leak fluid leading to retinal swelling and, in others, new blood vessels grow on the surface of the retina.

To combat the decline in vision that inevitably follows, Kellogg scientists Steven F. Abcouwer, Ph.D., and David A. Antonetti, Ph.D., have received a grant from Novo Nordisk, a global healthcare company focusing on diabetes care, to develop new treatments for diabetic retinopathy.

The grant supports studies on the role that a novel protein plays in the development of diabetic retinopathy. The Kellogg scientists have observed that patients with leaking vessels tend to have high levels of this particular protein in the eye. They also note that the protein can attract inflammatory immune cells to diseased or damaged tissue and can act directly on blood vessels to cause leakage.

*Cover story, continued*

## *Treating Glaucoma with Canaloplasty*

of fluid from the eye. The goal is to maintain low eye pressure and to reduce further pressure-related damage to the optic nerve. A less invasive alternative to conventional surgeries for patients with OAG—which involve making an incision in the eye or inserting a drainage tube or implant—canaloplasty can provide exceptional views of the eye’s natural drainage system, and can be considered for the appropriate candidate.

“During the introduction of the microcatheter in Schlemm’s canal, I inject a dye called fluorescein, which illuminates the eye’s natural drainage system and provides clues to the location of the blockage,” says Dr. Moroi, one of just a few physicians in Michigan who perform this innovative procedure. “In Christian’s case, I was able to identify a significant blockage in the

**Dr. Moroi is one of just a few physicians in Michigan who perform this innovative procedure.**



Drs. David Antonetti and Steven Abcouwer

Drs. Abcouwer and Antonetti are working to produce new drugs that will block the action of this protein and reduce leakage, swelling, and inflammation.

A significant twist is the plan to engineer so-called humanized mice to produce a human rather than mouse form of the protein. Thus, the safety and effectiveness of protein-targeting drugs can be tested in mice, paving the way for clinical trials for patients. In this manner, the scientists hope to improve chances that the preclinical drugs translate to human cures.

“To keep working toward better treatments for diabetic retinopathy, we need to find multiple means of support,” says Dr. Abcouwer. “This grant represents a new trend in which industry supports academic science to help move along discoveries that can lead to better health care.”

entry site or beginning part of the outflow drainage pathway into Schlemm’s canal.”

Today, and throughout the past year’s careful follow up, Christian, now 16, is doing exceedingly well, with pressure in his left eye at normal levels without medical treatment. “I feel really great about the outcome, since my pressure has remained extremely low,” says Christian, a straight-A student who hopes one day to become an engineer.

“I have nothing but high praise for Dr. Moroi and the staff at the Kellogg Eye Center,” says Mr. Albers.

“She has explained every procedure with great detail, and we are overjoyed with the results.”

*You can reach Dr. Moroi through M-LINE at 800.962.3555.*



## CASE STUDY: *Diabetic Retinopathy*

Thomas W. Gardner, M.D., M.S.  
Associate Chair of Research  
Professor, Ophthalmology and  
Visual Sciences

### *Visual field testing may provide insights into the mechanisms underlying early neuroretinal dysfunction in patients with diabetes mellitus*

#### **Presentation**

A 49-year-old woman with a 19-year history of type 1 diabetes mellitus (T1DM) presented to the W.K. Kellogg Eye Center Retina Clinic for her yearly diabetic eye exam. She had no visual complaints.

#### **History**

The patient's past medical history was significant only for T1DM. She did not have hypertension. Her T1DM was moderately controlled with insulin pump therapy, and her HbA1c one month prior to presentation was 7.9 percent. Her past ocular history was significant only for myopia. She did not have glaucoma and had no history of undergoing eye surgery or any treatment for diabetic retinopathy (DR).

#### **Examination**

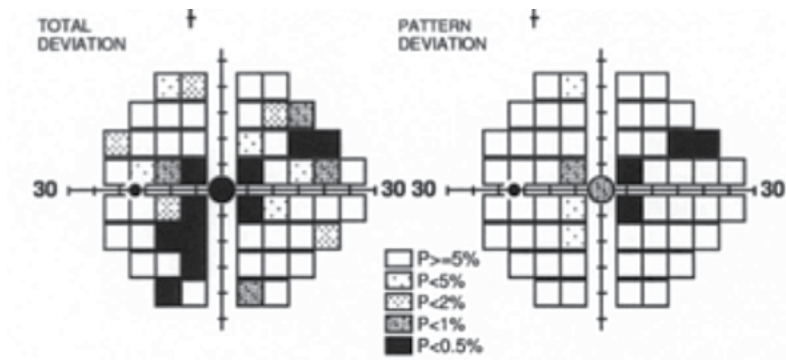
Best-corrected visual acuity was 20/20 in the right eye and 20/25 in the left eye with normal intraocular pressures. Slit lamp exam of the anterior segment was normal in both eyes, and dilated fundus exam was significant for mild non-proliferative DR in the right eye but no signs of DR in the left eye. She underwent visual field testing with frequency doubling technology perimetry (FDT), which showed a significant reduction in sensitivity in both eyes, as shown in the figure above.

#### **Treatment**

There are currently no eye-specific treatment options for early stage DR. The patient was referred back to her endocrinologist for diabetes management and told to return for another eye examination in one year.

#### **Follow up**

On her one-year return visit to the retina clinic, the patient was found to have 20/20 vision in both eyes but still had evidence of mild non-proliferative DR in her right eye. Her HbA1c was unchanged at 8.1 percent. Her FDT again showed a bilateral reduction in sensitivity relative to age-matched patients without diabetes, but it was stable compared to last year's test.

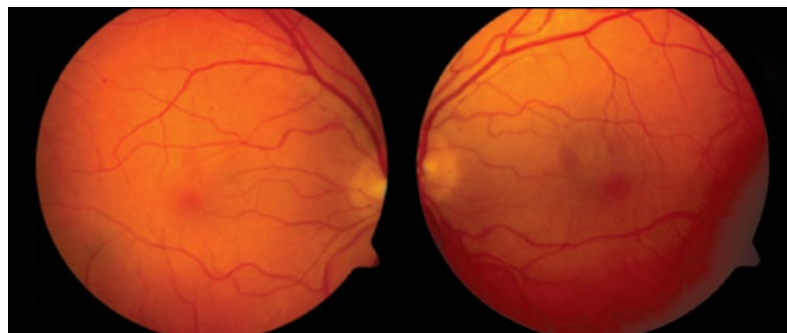


Frequency Doubling Technology (FDT) perimetry result showing reduced areas of retinal sensitivity (black squares) centrally.

#### **Discussion**

Despite the relatively mild DR in the patient's right eye, she was found to have marked neuroretinal dysfunction on visual field testing in both eyes. The FDT is thought to assess the function of the inner retinal layers, which may be damaged early in the course of diabetes. Tests such as the FDT may allow physicians to detect neuroretinal dysfunction in patients with diabetes who have little to no signs of the classic vascular lesions associated with DR, which could permit earlier interventions to preserve vision. Furthermore, the FDT may have value as a functional endpoint in clinical trials assessing the efficacy of various treatments for patients with early stage DR. Prospective, observational studies of patients with T1DM and little to no DR are currently underway at the W.K. Kellogg Eye Center to determine which tests of retinal structure and function can be used to track the progression of diabetes-induced retinal damage.

**You can reach Dr. Gardner through M-LINE at 800.962.3555**



Fundus photographs of the right and left eyes. The patient had minimal diabetic retinopathy but significant visual field defects on FDT perimetry testing.



## CASE STUDY: *Ocular Toxoplasmosis*

Cagri G. Besirli, M.D., Ph.D.  
Assistant Professor,  
Department of Ophthalmology  
and Visual Sciences

### *A young girl is treated at Kellogg for a macular lesion caused by a common parasite*

#### **Presentation**

A 9-year-old girl presented with decreased vision in the right eye for several weeks.

#### **History**

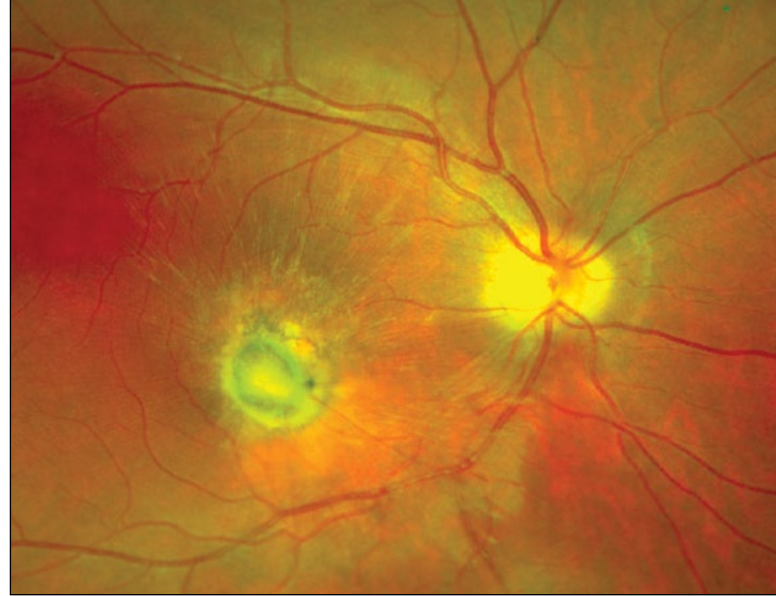
The patient was diagnosed with vitritis and optic neuritis in the right eye and underwent a short course of systemic steroid therapy prior to her presentation to Kellogg.

#### **Examination**

Visual acuity was 20/100 in the right eye and 20/20 in the left eye. Pupils were equally round and reactive to light without an afferent pupillary defect. Confrontation visual fields were full in both eyes. Intraocular pressures measured 15 mmHg on the right and 18 mmHg on the left. Slit lamp examination showed 2+ anterior vitreous cells in the right eye. The left eye was quiet anteriorly. Dilated fundus examination revealed an elevated, yellow-white central macular lesion with fluffy borders and pigmentation. An epiretinal membrane with wrinkling of the retina was noted, most prominent at the apex of the lesion. SD-OCT examination of the right eye showed a hyperreflective foveal mass with loss of RPE/Bruchs membrane complex and destruction of overlying retinal layers. There were surrounding intraretinal cystic changes. A prominent epiretinal membrane was confirmed. There were numerous hyperreflective spots in the posterior vitreous, consistent with inflammatory cells. Laboratory evaluation showed elevated toxoplasma IgG levels and non-detectable toxoplasma IgM levels.

#### **Diagnosis**

The patient's presentation was consistent with macular toxoplasmosis, one of the most common causes of infectious uveitis affecting the posterior segment of the eye. Differential diagnosis included choroidal neovascularization associated with an old toxoplasmosis scar. Before coming to Kellogg, the patient was evaluated by a pediatric infectious disease specialist, who saw no signs of active systemic disease. Her only known risk factor for exposure was a family cat.



Macular Toxoplasmosis

#### **Treatment**

In consultation with the pediatric infectious disease specialist, systemic anti-parasitic therapy for toxoplasmosis—which typically consists of pyrimethamine, folinic acid, and sulfadiazine—was initiated. Oral prednisone was added to this regimen after 24 hours. It was decided to monitor response to anti-parasitic treatment before considering concomitant therapy for a possible choroidal neovascular membrane.

#### **Follow up**

Frequent follow-up examinations ensured that the patient was responding to systemic therapy. Visual acuity improved to 20/70 in the right eye two months after treatment with near complete resolution of vitreous inflammation. The macular lesion showed consolidation with increased pigmentation, which was confirmed by decreased lesion size on the infrared-reflectance image and SD-OCT. Since the patient responded well to anti-parasitic treatment, further evaluation and treatment for secondary choroidal neovascular membrane was not required.

#### **Discussion**

Although reactivation of congenital toxoplasmosis was traditionally thought to be the most common cause of infection, acquired toxoplasmosis is now considered more common. Postnatal infection is most commonly acquired via ingestion of unwashed vegetables contaminated by cat feces or ingestion of poorly cooked meat.

Further damage to the retina and permanent vision loss can occur with recurrent infection or secondary choroidal neovascular membrane caused by macular toxoplasmosis; thus, prompt recognition and treatment is critical. In this case, our considerable expertise in pediatric retinal disorders facilitated diagnosis and treatment. This case also highlights the importance of multidisciplinary care and close collaboration with other subspecialists.

**You can reach Dr. Besirli through M-LINE at  
800.962.3555.**

# Advances in Vision Technology

**The bionic eye:** A retinal implant for people with RP

**The IMT:** A tiny telescope for people with AMD



Camera-equipped glasses and video processing unit for the retina implant

## The Retinal Implant brings light to people with RP

Patients with end-stage retinitis pigmentosa (RP) may benefit from an innovative device known as the bionic eye. The Kellogg Eye Center is one of 13 centers nationwide to offer the Argus® II Retinal Prosthesis System, an FDA-approved retinal implant that allows patients to perceive light and shapes.

Retinitis pigmentosa is a degenerative eye disease that causes slow but progressive vision loss—and, ultimately, blindness.

The device is a retinal prosthesis surgically implanted in one eye. After surgery, the patient wears glasses equipped with a camera system that transmits images to the prosthesis, which uses electrodes to relay images to the optic nerve and on to the brain.

“This is a breakthrough for patients with advanced RP,” says Kellogg retina surgeon Thiran Jayasundera, M.D. “The implant will bring light back into these patients’ worlds, allowing them to detect shapes of people and objects in their environment.”

Recent clinical studies captured national attention when the system allowed previously blind participants to locate lights and windows, follow lines in a crosswalk, and avoid running into objects while walking. Some could sort laundry, and about half of the subjects were able to read 9-inch letters.

## The Implantable Miniature Telescope: Magnifying vision for people with advanced AMD

Patients with advanced age-related macular degeneration (AMD) could regain some vision with a tiny telescope implanted in one eye. The telescope magnifies images onto the healthy areas of the retina to improve central—straight ahead—vision that is lost with AMD. The device, developed by VisionCare, was approved by the FDA in 2010.

Paul R. Lichter, M.D., immediate past chair of the department, led the Kellogg arm of an earlier clinical study to evaluate the Implantable Miniature Telescope (IMT). Nearly ten years later, one of his patients, Briana Daudert, is still pleased with the vision she gained from the device.

Though Ms. Daudert was initially afraid of having pain from the procedure, her fears were diminished when Dr. Lichter explained that the IMT is the size of a pea and the procedure is similar

to cataract surgery.

“I breezed right through it all,” she says.

Ms. Daudert still has some double vision, the result of having highly magnified vision in one eye and using the other eye for distance. But she has adapted to her new vision and is perhaps happiest that she can see the faces of her 17 grandchildren and 2 great-grandchildren.

Kellogg retina surgeon, Grant M. Comer, M.D., M.S., is evaluating patients for the IMT. “The device is not a cure for AMD, but it can improve vision and quality of life for individuals with the condition,” he says. Following the procedure, patients will work with Kellogg’s low vision specialists to learn how to adapt to their new vision.

Dr. Comer advises candidates to have realistic expectations about the level of vision they can achieve. “You won’t be able to drive, but you might be able to read, watch television, and pursue hobbies,” he says.

And, if Ms. Daudert had it to do over, would she agree to have the telescope implant? “Yes,” she says. “I would do it again in a second.”



Briana Daudert

**“The implant will bring light back into these patients’ worlds, allowing them to detect shapes of people and objects in their environment.”**

—Thiran Jayasundera, M.D.

*To learn whether you are eligible for the IMT or the retinal implant, please visit [www.kellogg.umich.edu](http://www.kellogg.umich.edu)*

# Welcome to Kellogg's **New Faculty**



**César A. Briceño, M.D.**, assistant professor, has joined the faculty of the Eye Plastic, Orbital and Facial Cosmetic Surgery section. Dr. Briceño received his medical degree from Johns Hopkins University and then completed his residency at the Doheny Eye Institute at the University of Southern California. In 2013, Dr. Briceño completed a

fellowship in oculoplastics at Kellogg. He sees patients in our Ann Arbor and Canton offices.



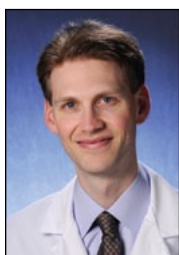
**Lindsey B. De Lott, M.D.**, clinical lecturer, has joined the faculty of the Neuro-Ophthalmology section. She earned her medical degree from Ohio State University and completed her residency in neurology at the University of Michigan. In 2013, Dr. De Lott completed a two-year fellowship in neuro-ophthalmology at Kellogg. She is the recipient of a Department of

Neurology Training Grant. Dr. De Lott sees patients in Kellogg's Ann Arbor office and in the Neuro-Ophthalmology suite at U-M Hospital.



**Blake V. Fausett, M.D., Ph.D.**, clinical lecturer, has joined the faculty of the Comprehensive Ophthalmology and Cataract Surgery section and sees patients in Kellogg's Ann Arbor office. Dr. Fausett earned his medical degree and a Ph.D. in biochemistry from the University of Michigan and completed his residency at Kellogg. In addition to seeing patients,

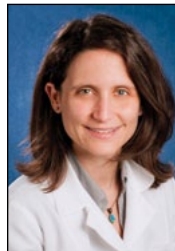
Dr. Fausett serves as the residency program's first Graduate Chief Resident.



**Jonathan B. Greene, M.D.**, assistant professor, has joined the faculty of the Comprehensive Ophthalmology and Cornea sections. Dr. Greene earned his medical degree from the University of Michigan and completed his residency at the University of California, San Francisco. In 2013, Dr. Greene completed a fellowship in cornea and refractive surgery at Kellogg. He sees patients in Ann Arbor.



**Vanitha I. Jeyaraj, M.D.**, clinical instructor, has joined the faculty of the Comprehensive Ophthalmology and Cataract Surgery section and sees patients in Kellogg's Milford office. Dr. Jeyaraj earned her medical degree from the University of Chicago in 2009 and completed her residency at the Baylor College of Medicine in 2013.



**Paula Anne Newman-Casey, M.D.**, assistant professor, has joined the faculty of the Glaucoma, Cataract, and Anterior Segment Disease section and sees patients in Kellogg's Canton office. Dr. Newman-Casey earned her medical degree at the University of Michigan and went on to complete her residency and a fellowship in glaucoma at Kellogg. She is a recipient of the department's National Eye Institute grant, which

provides support for training clinician-scientists. Dr. Newman-Casey's research focuses on patient decision-making, health behavior change, and patient education.

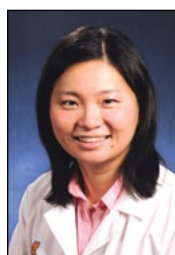


**Rajesh C. Rao, M.D.**, assistant professor, has joined the faculty of the Retina and Uveitis section and sees patients in Kellogg's Ann Arbor office. Dr. Rao earned his medical degree at Yale University and completed his residency at the Massachusetts Eye and Ear Infirmary. While completing a fellowship in vitreo-retinal surgery at Washington University

in St. Louis, he was one of 10 scientists nationwide to win an award from the National Eye Institute for "Audacious Goals in Vision Research." He is also a recipient of the Department's National Eye Institute grant, which provides support for training clinician-scientists. Dr. Rao's research is based on reprogramming skin or blood cells to be transplanted into the retina to battle degenerative retinal diseases.



**Anjali Shah, M.D.**, clinical instructor, has joined the faculty of the Retina and Uveitis section and sees patients in Kellogg's Ann Arbor and Brighton offices. Dr. Shah earned her medical degree from the University of Michigan and completed her residency at the Baylor College of Medicine. She then completed a medical retina fellowship at the Tufts/New England Eye Center.



**Linda Zhang, M.D.**, clinical lecturer, has joined the faculty of the Glaucoma, Cataract, and Anterior Segment Disease section and sees patients in Kellogg's Ann Arbor and Brighton offices. Dr. Zhang earned her medical degree at the University of Michigan and then went on to complete her residency and a fellowship in glaucoma at Kellogg.

*To request an appointment with our new clinicians, please call 734.763.8122. Referring physicians can reach these clinicians through M-LINE at 800.962.3555.*

## Blake V. Fausett, M.D., Ph.D. Appointed First Kellogg Graduate Chief Resident



**Blake V. Fausett, M.D., Ph.D.,** who completed his residency at the University of Michigan Kellogg Eye Center in June 2013, has been appointed Kellogg's first Graduate Chief Resident. "As the graduate chief, I have administrative responsibilities such as organizing resident lectures, scheduling

conferences, and acting as a liaison between the faculty and residents. But what I really enjoy is the opportunity to teach and mentor," says Dr. Fausett.

Dr. Fausett also spends two days a week at Ann Arbor's VA Hospital working with residents, in addition to providing resident staffing for the Kellogg Comprehensive Ophthalmology Clinic. "I think the real advantage to having a graduate chief resident is that the residents have another dedicated advocate on the faculty, in addition to our program director, Shahzad I. Mian, M.D.," says Dr. Fausett. "I have protected time to work with faculty and residents to improve our didactic curriculum, collect and analyze resident surgical outcomes, and work on other projects—all in an effort to improve the residency program."



*Kellogg's purpose is to improve lives through curing, preventing, and treating eye disease.*

If you would like to receive Kellogg's newsletter, *Advances in Ophthalmology*, please call 734.763.4660.

**The Regents of the University of Michigan**

Mark J. Bernstein, Julia Donovan Darlow, Laurence B. Deitch, Shauna Ryder Diggs, Denise Ilitch, Andrea Fischer Newman, Andrew C. Richner, Katherine E. White, Mary Sue Coleman (ex officio)