

UNIVERSITY OF MICHIGAN W.K. KELLOGG EYE CENTER

*Making an Impact on Vision*

Enriched 3D Iris reconstruction



**KELLOGG EYE CENTER**  
MICHIGAN MEDICINE

~ Our Purpose ~

*To improve lives through  
curing, preventing and  
treating eye disease*

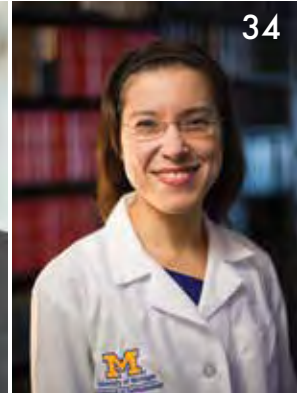


**ANNUAL REPORT**  
**2017**



# Making an Impact on Vision

University of Michigan Kellogg Eye Center Annual Report 2017



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Front cover from top to bottom:

Maria Woodward, M.D., M.S.; Krystal Harrison; Lindsey De Lott, M.D.; Anthony Adamis, M.D.

This report covers the time period of July 1, 2016, through September 30, 2017.

## The Chair's Perspective

Dear Friends,

I'm pleased to update you on the achievements of the faculty, trainees and staff of the University of Michigan Kellogg Eye Center, as we continue to work together to successfully treat, cure and prevent eye disease. In this year's report, we highlight not only the laboratory and clinical research of individual faculty and future leaders but also the important contributions of our clinical and research teams.

Among the advances of this past year is a promising new treatment for Graves' eye disease. Based on years of laboratory research into its root causes, Dr. Terry Smith led the clinical trial that offers hope for the first targeted, non-surgical treatment for thyroid eye disease. A follow-up trial is underway to further test the effectiveness of teprotumumab, which had been designated by the FDA as a "breakthrough" drug.

The commitment of Michigan Medicine to growing clinical trials support has helped enhance our Kellogg clinical trials unit. Our ophthalmology biostatistical support unit—one of the largest in the world—designs, coordinates and analyzes the results of clinical studies.

Recent approval of the first gene therapy for an inherited form of blindness—attained after years of clinical research by Spark Therapeutics—signals a new era in the field of gene therapy. Our retinal dystrophy group is actively pursuing their own innovative approaches in this area—teaming up with colleagues from institutions here and abroad.

Before patients can enter a trial or benefit from breakthrough treatment, they need an accurate diagnosis. Our ophthalmic ultrasound team, led by Dr. Bernadete Ayres, can provide invaluable insights for challenging clinical presentations. Dr. Yannis Paulus and colleagues in Michigan Engineering are combining sound and light energy for early disease detection and enhanced treatment of diseases such as diabetic retinopathy or macular degeneration.

A major challenge in assessing the benefits of new treatments is the need for measures that better track patient success. The work of two K23 awardees, Drs. Thiran Jayasundera and Joshua Ehrlich, each working with mentoring teams, are developing new tools to achieve this end.



Front row: Roni Shtein, M.D., medical director of the Kellogg ORs; Denise John, M.D., director of VA Hospital Eye Care; Back row: Thiran Jayasundera, M.D., director of strategic planning; Michael Smith-Wheelock, M.D., associate chair for clinical affairs; Paul Lee, M.D., J.D., chair; Thomas Gardner, M.D., M.S., associate chair for research; and Shahzad Mian, M.D. associate chair for education (Not pictured: Alan Sugar, M.D. vice chair)

Often young investigators create the basis for therapies to be tested in the future. In this report, you'll learn more about the distinct experiences of a residency alumnus, Dr. Anthony Adams, and a current faculty member, Dr. David Zacks.

The leadership of teams is critical to the success of our endeavors to address the challenges we face in eye care. Among our faculty and alumni are recipients of national awards for their contributions to patient care, research and education as well as leaders of important state and national societies, such as the Michigan Society of Eye Physicians and Surgeons, the American Academy of Ophthalmology, and the Costenbader Society.

Our accomplishments reflect the dedication and perseverance of our faculty, staff and trainees. Without the support of our donors—patients of Kellogg and patients of Kellogg alumni among them—we could not achieve our goals. All of us working together as a team will lead to more amazing progress and discoveries.

Paul P. Lee, M.D., J.D.  
F. Bruce Fralick Professor and  
Chair, Ophthalmology and Visual Sciences  
Director, W.K. Kellogg Eye Center



## Begins Gene Therapy



Adrienne Chen, Ph.D., Naheed Khan, Ph.D., Abigail Fahim, M.D., Ph.D., Debra Thompson, Ph.D., Dana Schlegel, M.S., M.P.H., C.G.C., Thiran Jayasundera, M.D. and Kari Branham, M.S., C.G.C.  
(Not pictured: John Heckenlively, M.D., David Zacks, M.D., Ph.D., Cagri Besirli, M.D., Ph.D., Robin Ali, Ph.D.)

The Kellogg Eye Center has one of the world's largest clinical and research teams devoted to retinal dystrophies—blinding eye disorders caused by genetic errors in rods and cones and their support structures. Until recently, doctors could do no more than make a tentative diagnosis and suggest visual aids.

Now that many culprit genes have been identified, things are about to change. Diagnoses have become more definitive, and promising gene-replacement treatments are on the way, including the first FDA-approved gene therapy for RPE65 defects. This exciting development opens the door for what will hopefully be many more products to help patients with other eye diseases in the future.

To get there, clinical trials of safety and effectiveness need to continue. Some may come from the work of our Kellogg team members:

**John Heckenlively, M.D.**, is the senior member of our retinal dystrophies team. The Paul R. Lichter Professor of Human Genetics, Heckenlively came to Kellogg from a professorship at the University of California-Los Angeles. A medical graduate of the University of Colorado, he completed an ophthalmology residency at the University of Kentucky, a vitreoretinal fellowship at UCLA and a retinal dystrophy fellowship at Johns Hopkins University.

Dr. Heckenlively is an eminent research scientist in the field of retinal dystrophies and autoimmune retinopathy. He has identified more than 110 different genetic mouse-eye models for human retinal diseases. For many of those diseases, he later found the same defective gene in humans.

**Thiran Jayasundera, M.D.**, a native of Sri Lanka, immigrated to New Zealand at age 13. Completing medical studies at the University of Auckland in 2000, he briefly

considered neurosurgery, but an exciting rotation in Australia persuaded him to study ophthalmology. He decided to devote his career to retinal dystrophies. He later took a fellowship at Kellogg under the mentorship of John Heckenlively, followed by a two-year medical and surgical retinal fellowship at McGill University in Montreal. He joined the Kellogg faculty in 2011.

At Kellogg, “Dr. J” uses a National Institutes of Health K23 grant to study patient-reported outcomes as a measure of treatment efficacy. He directs the Argus II program, in which 10 patients blind from retinal dystrophy have undergone surgery for a visual prosthesis that provides them with rudimentary vision. He has edited a forthcoming atlas that provides clinical exam and photographic data about diseases caused by 80 different abnormal genes associated with retinal dystrophies. Dr. Jayasundera is a co-investigator in the natural history studies and gene therapy trials that are underway at Kellogg.

**Abigail Fahim, M.D., Ph.D.**, received an M.D. and a Ph.D. in genetics from U-M. She completed a postdoctoral year in retinal genetics at the University of Texas-Houston. Returning to Ann Arbor, she completed an ophthalmology residency and undertook fellowships in retinal dystrophy and in medical retinal diseases at Kellogg. Appointed to the Kellogg faculty in 2017, Dr. Fahim is preparing in vitro stem cells induced to become retinal pigment epithelial cells containing the abnormal genetic imprint of choroideremia, a vision-threatening disorder. Her research seeks to discover and block the abnormal products of this cell line to prevent blindness.

**David Zacks, M.D., Ph.D.**, joined the team in 2002. He holds an M.D. and Ph.D. from the Albert Einstein College of

## Gene Therapy *(cont.)*

Medicine, Yeshiva University. He finished his ophthalmology residency in 2000 and his vitreoretinal fellowship in 2002, both at the Massachusetts Eye and Ear Infirmary, Harvard University.

At Kellogg, he implanted the Argus II device. Dr. Zacks' research centers on retinal cell death following retinal detachment.

**Cagri Besirli, M.D., Ph.D.**, specializes in retinal illnesses of children. He emigrated from Turkey at age 17 to enter U-M as an undergraduate. He went on to obtain an M.D. and Ph.D. from Washington University in St. Louis, and returned to Michigan for his residency in ophthalmology and fellowship in retinal diseases. He also had additional pediatric retinal training with Mike Trese, M.D., and colleagues at Associated Retinal Consultants.

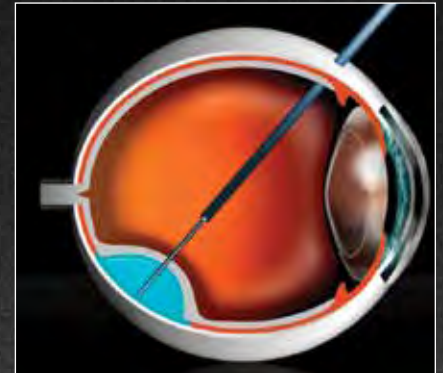
Dr. Besirli's research focuses on using imaging tools to study retinal blood vessels and factors that lead to apoptosis, a programmed cell death that is common in many body tissues. His laboratory has developed an inhibitor that he hopes will protect the retina from blinding childhood disorders.

**Debra Thompson, Ph.D.**, is a professor of ophthalmology and visual sciences and professor of biological chemistry at U-M. Her laboratory has helped to identify gene mutations in retinal dystrophies that disrupt the conversion of light energy into signals that the brain can interpret as vision. Professor Thompson and her colleagues are using this information to develop treatments that can be submitted to clinical trials, including gene therapy approaches in collaboration with Robin Ali, Ph.D.

**Naheed Khan, Ph.D.**, is the team's electrophysiologist. Born in Hyderabad, India, she holds a Ph.D. in biomedical engineering from Ohio State University. At scientific meetings, she encountered Paul Sieving, M.D., Ph.D., then a professor at Kellogg (and now director of the National Eye Institute), who was so impressed with her work that he offered her a position at Kellogg. She became involved with diagnostic electrophysiological and psychophysical studies for Kellogg physicians, and has traveled to Pondicherry, India, to monitor Aravind Eye Hospital's new retinal dystrophy service. She is designing the retinal testing protocols for the upcoming natural history and gene therapy trials.

**Kari Branham, M.S.**, is one of the team's two genetic counselors. She holds a master's degree in genetic counseling from U-M. Intrigued by medical genetics, she studied genetic damage in individuals who cleaned up the Chernobyl nuclear reactor accident at Lawrence Livermore National Laboratory. As a genetics counselor at Kellogg, she has witnessed the discovery of 281 genes related to retinal dystrophies. "Those discoveries have completely changed our role as counselors," she said. "Although we have more genetic information now, we do not always know if it is relevant to the patient's condition. Part of my job is to interpret this information."

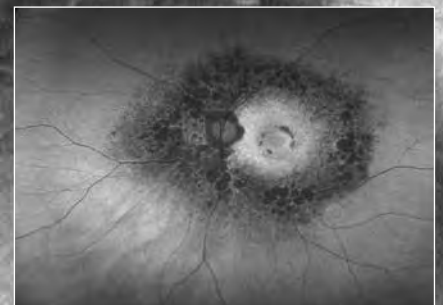
**Dana Schlegel, M.S., M.P.H.**, who joined the team in 2014, is its second genetic counselor. Following graduation from Harvard University, she joined the Peace Corps, where she served as a high school biology teacher in Mozambique. Fluent in Portuguese, she was an interpreter at Boston's Dana-Farber Cancer Institute before she came to U-M for a dual master's degree in genetic counseling and public health (health behavior and health education). She has a passion for genetics education and, in addition to her clinical work with dystrophy patients, has been designing the genetics training curriculum for Kellogg's retinal dystrophy fellowship program.



The missing gene is injected under the retina in gene therapy trials



Patients in gene therapy trials will navigate this maze



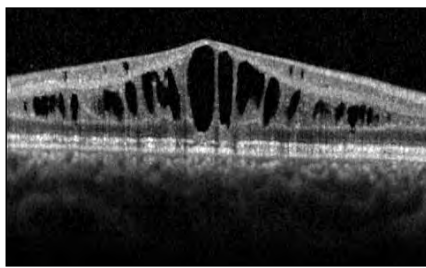
Retinal dystrophy affects the light-sensitive cells of the retina

**Robin Ali, Ph.D.**, is a visiting professor of ophthalmology and a leader in the field of retinal gene therapy. His primary academic position is at University College London, where he pioneered an efficient way to deliver replacement genes to the retina by incorporating them into viruses. His laboratory showed that gene therapy works in several mouse models of retinal dystrophy and can be performed safely in humans. He has established a pipeline of therapies that are being tested in clinical trials.

Kellogg will participate in several of these trials, testing treatments for Leber congenital amaurosis, a blinding disease of young children; achromatopsia, a childhood disorder of retinal cone photoreceptors; and X-linked retinitis pigmentosa.

Professor Ali is also developing photoreceptor cell transplantation as a strategy for treating patients who have lost such cells due to retinal disease. Having shown that transplanted stem cell-derived photoreceptors can improve vision in mice, his laboratory continues to work toward developing a cellular therapy that can be tested in clinical trials. At Kellogg, he collaborates with **Rajesh Rao, M.D.**, to establish clinical trials of stem cell-derived photoreceptor transplantation.

**Adrienne Chen, Ph.D.**, is a research specialist at Kellogg working under the direction of Professor Robin Ali. A native of Taiwan, she holds a Ph.D. in virology from Harvard University and did postdoctoral work at Northwestern University.



Color fundus photograph (top) and spectral domain optical coherence tomography (OCT) images of a patient with X-linked retinoschisis due to a pathogenic variant in the RSI gene

In 2014, she came to Kellogg to work with Professor Ali on establishing natural history studies and gene therapy trials for retinal dystrophies. “Our whole team is really excited about initiating these trials,” she said. A special challenge is developing a maze test that will be used to judge how well patients can navigate after receiving gene therapy. The maze is located at the U-M Transportation Research Institute in space generously shared by U-M professor **Michael Flannagan, Ph.D.**

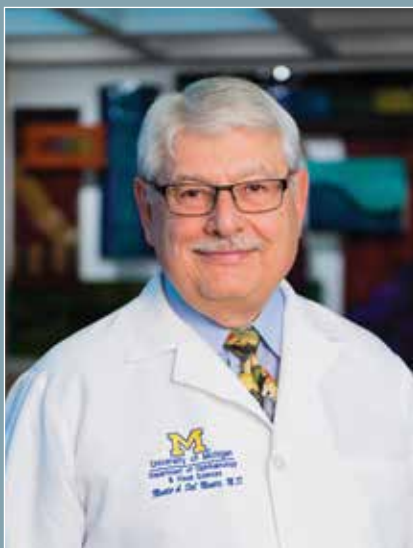
The retinal dystrophy team also has two visiting scholars: Fernanda Abalem de Sa Carricondo, M.D., and Badr Alahmadi, M.D.

**Dr. Abalem**, a native of Brazil, completed her medical and ophthalmology studies in Rio de Janeiro. After obtaining a master’s degree in ocular inflammation, she moved to the University of São Paulo for a four-year fellowship in retinal diseases. Realizing that the care of retinal dystrophies was an unmet need in Brazil, she decided to dedicate her career to that field. She will found a retinal dystrophies program at University of São Paulo and link it to the work at Kellogg.

**Dr. Alahmadi**, who is from Saudi Arabia, has been working on measures of contrast sensitivity in patients with retinal dystrophies.

The team is dedicated to accelerating progress for treating and curing inherited retinal diseases.

## Monte Del Monte Elected President of Costenbader Society



Kellogg professor Monte Del Monte, M.D., a specialist in pediatric ophthalmology, was elected the 22nd president of the Costenbader Society. His two-year term ends in late 2018.

The society was founded in 1967 by Frank Costenbader, M.D., the first ophthalmologist in this country to restrict his practice to children, together with illustrious teachers Marshall Parks, M.D., and David Friendly, M.D., and pediatric ophthalmology fellows of the Children’s National Medical Center in Washington D.C. It was the first American society devoted to pediatric ophthalmology.

The Costenbader Society hosts educational, practice and research meetings and activities. Dr. Del Monte oversees the program, finance, membership and nominating committees, and helps select the speakers for the annual Marshall Parks and David Friendly Lectures and the recipient of the David Friendly Award. These lectures and award are presented at the American Academy of Ophthalmology annual meeting.

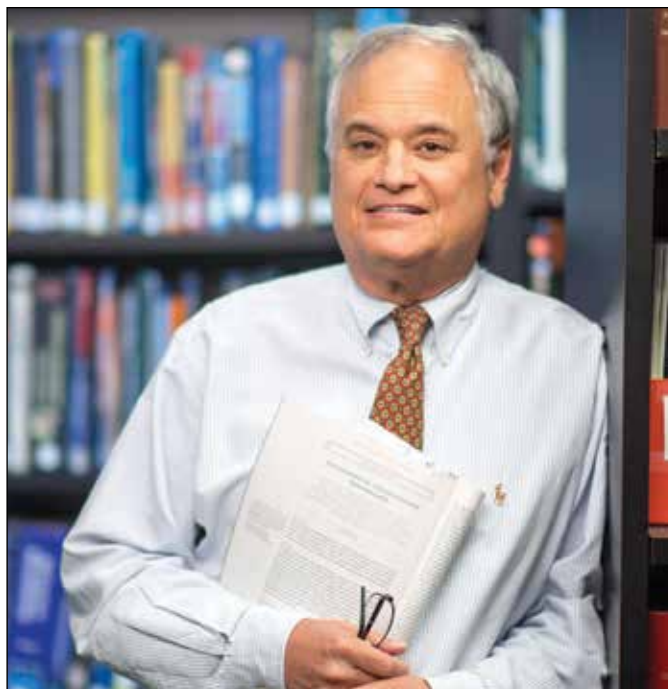
## Breakthrough Drug Targets Graves' Disease

The work of Kellogg professor Terry Smith, M.D., has led to a successful multicenter clinical trial of a novel medication that benefits patients with Graves' disease. The results of the trial were published in *The New England Journal of Medicine* in May 2017.

Physicians have long searched for a more effective remedy for the threat to vision and other manifestations of Graves' disease, an autoimmune disorder that leads to overactivity of the thyroid gland. It causes enlarged eye muscles, protruding eyes, double vision and damage to the optic nerve, potentially leading to blindness. Traditional treatment with corticosteroids has limited efficacy and many side effects. Removal of orbital bones to allow more room for the enlarged muscles is an alternative, but it demands surgical skill and can cause complications even under the best of circumstances.

Dr. Smith has been interested in the causes and treatment of Graves' disease since his days in medical school at the University of Missouri. His research at UCLA and Kellogg disclosed that a protein called insulin-like growth factor receptor (IGF1R) is intimately involved in the ophthalmic manifestations. Teprotumumab, a monoclonal antibody, binds to IGF1R and inhibits its activity.

On the basis of his research, Smith, an endocrinologist, was named the lead investigator in a multicenter trial of teprotumumab. He recruited his longtime colleague Raymond Douglas, M.D., Ph.D., a former Kellogg professor, to help him design the trial.



In the placebo-controlled trial, in which Kellogg was one of 15 participating international sites, 69 percent of the patients treated with teprotumumab improved and many showed therapeutic effects after only six weeks. These results are dramatically better than those with any other previously used medications and equivalent to the very best surgical outcomes.

On the basis of this trial, the Food and Drug Administration has designated teprotumumab as a "breakthrough drug." A confirmatory trial is underway.

"This drug appears to be resetting the immune system," Dr. Smith says. He anticipates similar benefits in other autoimmune diseases, such as rheumatoid arthritis and Crohn's disease.



### Edward Feinberg Receives Leonard Tow Humanism in Medicine Award

Edward Feinberg, M.D., M.P.H., professor and emeritus chair of ophthalmology at the Boston University School of Medicine (BUSM), received the 2017 Leonard Tow Humanism in Medicine Award.

Dr. Feinberg completed a Kellogg ophthalmology residency in 1977 and a fellowship in retina in 1978 under the tutelage of Morton Cox, M.D., who was then chief of the Retina Service.

The award is sponsored by the Gold Foundation. In a message after accepting the award, which was presented at the BUSM's commencement, Dr. Feinberg said, "I give Mort Cox full credit for turning me into a skilled retina surgeon. He taught me so much more over those years in Ann Arbor. He never completed an encounter with a patient without assuring that the patient understood the diagnosis and prognosis. To the extent that I have been a good doctor, it is because I always stop to ask myself, 'what would Mort Cox have done here?'"

Dr. Feinberg gave the Distinguished Alumnus Lecture at the Kellogg Fall Reunion in 2012.



# Kellogg's 2017 K Award Recipients

Three Kellogg physician-scientists received National Institutes of Health (NIH) Research Career Development ("K") awards this year, joining many other clinician-scientists with such career development awards. The prestigious K awards are designed to propel career development in young investigators.



## Lindsey De Lott, M.D.

Dr. De Lott, whose specialty is neuro-ophthalmology, will draw on a K12 grant awarded to Kellogg for distribution to physicians with meritorious projects. She will study decision-making by physicians.

"We spend a lot of money on clinical trials and determine a lot of evidence," De Lott says, "but the evidence doesn't always get translated into use."

Her research will attempt to find out why doctors sometimes ignore scientific findings in their day-to-day practice. She is focusing on optic neuritis, for which a study in the 1990s determined that routine steroid treatment was not effective. Yet many physicians continue to prescribe steroids. "We want to find out the factors in those decisions—both with doctors and patients," she says.

In piloting an interview guide, she found that when referring patients with optic neuritis to experts, emergency department doctors often tell them to expect steroid treatment. "Patient expectations can affect physician behavior," she says.

Dr. De Lott hopes that her research will allow her to team with U-M colleagues in neurology and health behavior to build a definitive survey for nationwide research into physician practices.



## Joshua Ehrlich, M.D., M.P.H.

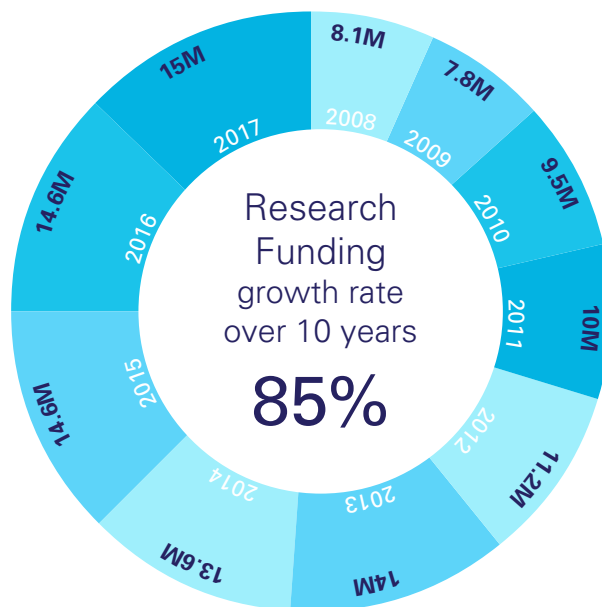
Dr. Ehrlich, whose specialty is glaucoma, has a K23 award, among only 29 currently awarded in the United States. The K23 award is designated for scientists committed to patient-oriented research. Ehrlich will apply his award to vision rehabilitation.

"There is a dearth of research in patients with peripheral vision loss," he says. "Most of the research is in macular disease, but around 20 to 25 percent of patients seeing low vision specialists are believed to have a component of peripheral vision loss."

Dr. Ehrlich is developing a survey to measure patient-reported outcomes, using a mixed-methods approach that relies on qualitative and quantitative research techniques. With this approach, he hopes to produce a valid and reliable tool.

"There is very little evidence right now on which rehabilitation strategies work," he says.

Subjecting therapies to more rigorous testing is important to correct disparities in patient care. For instance, in most cases Medicare and private insurers do not pay for low-vision devices. Dr. Ehrlich anticipates that stronger scientific evidence will help improve access to high-quality low-vision care by proving to payers the value of such devices.





Visual outcomes in macular degeneration are correlated with early detection. Without treatment, there can be significant visual loss.



—Yannis Paulus, M.D.

**Yannis Paulus, M.D.**

Dr. Paulus, a retinal specialist, also has K12 funding. With his joint appointment in biomedical engineering, his goal is to improve molecular imaging of retinal diseases.

He is studying photoacoustic microscopy, in which a nanosecond laser light is absorbed by tissue that then emits ultrasound waves to create high-resolution images of the retina and choroid. The advantages of this noninvasive procedure are early disease detection and improved monitoring of treatment.

“Visual outcomes in macular degeneration are correlated with early detection,” Dr. Paulus explains. “Without treatment, there can be significant visual loss.”



He anticipates that in macular degeneration, laser-activated chemical treatment may become “the new wave of precision medicine.” The idea is that molecular changes will show disease before the appearance of usual symptoms such as bleeding and swelling, which indicate anatomic changes. Dr. Paulus expects that better imaging will improve “how we follow patients with dry macular degeneration.”

To extend his research in photoacoustic microscopy, he has applied for a K08 grant, designed for basic science and to help a young scientist transition to independent laboratory research.

## Shahzad Mian Receives 2017 Straatsma Award

Shahzad Mian, M.D., director of Kellogg’s ophthalmology residency program, received the 2017 Straatsma Award for Excellence in Resident Education from the American Academy of Ophthalmology and the Association of University Professors of Ophthalmology.

Established in 2003, the Straatsma Award is the highest honor the American ophthalmology community bestows on its educational leaders. It recognizes a combination of commitment, academic contributions to education and innovation on a national level.

Dr. Mian, who also holds the Terry J. Bergstrom Collegiate Professorship for Resident Education in Ophthalmology and Visual Sciences, joined the Kellogg faculty in 2002. He completed an ophthalmology residency at the Wills Eye Institute of Thomas Jefferson University and a fellowship in cornea and refractive surgery at the Massachusetts Eye and Ear Infirmary, Harvard Medical School.

He has served as Kellogg’s residency director since 2004. Here he received the Bergstrom Faculty Teaching Award in 2003 and 2012 and the Anthony Adamis Award for Outstanding Research. From the American Academy



Shahzad Mian, M.D. (right) teaching 2nd year resident Stephen Armenti, M.D., Ph.D.

of Ophthalmology, he has earned the 2007 Leadership Development Program Award, a 2009 Achievement Award and a 2016 Senior Achievement Award.

He is senior medical director of Eversight Michigan (formerly Michigan Eye Bank), co-chair of the accreditation board of the Eye Bank Association of America, a member of the Residency Review Committee for Ophthalmology and president of the Program Director’s Council for the Association of University Professors of Ophthalmology.

Widely respected for his views on the objectives of residency training and his concern for the welfare of residents, Dr. Mian said he is “deeply humbled and honored to have received this award.”

# NIH Core Grant and R01 Awarded

## **Core Grant Award**

The Vision Research Core offers shared state-of-the-art instrumentation, services and training, providing vision researchers at Kellogg and elsewhere at the University of Michigan with the necessary resources to pursue cutting-edge research. The Vision Research Core also acts as a central conduit for the exchange of information within the community of scientists at the University, thereby promoting collaboration and multidisciplinary approaches to vision research.

The \$2.95 million NIH Core Grant for Vision Research at Kellogg—under the direction of **Bret Hughes, Ph.D.**—was renewed for five years on Sept. 1, 2017.

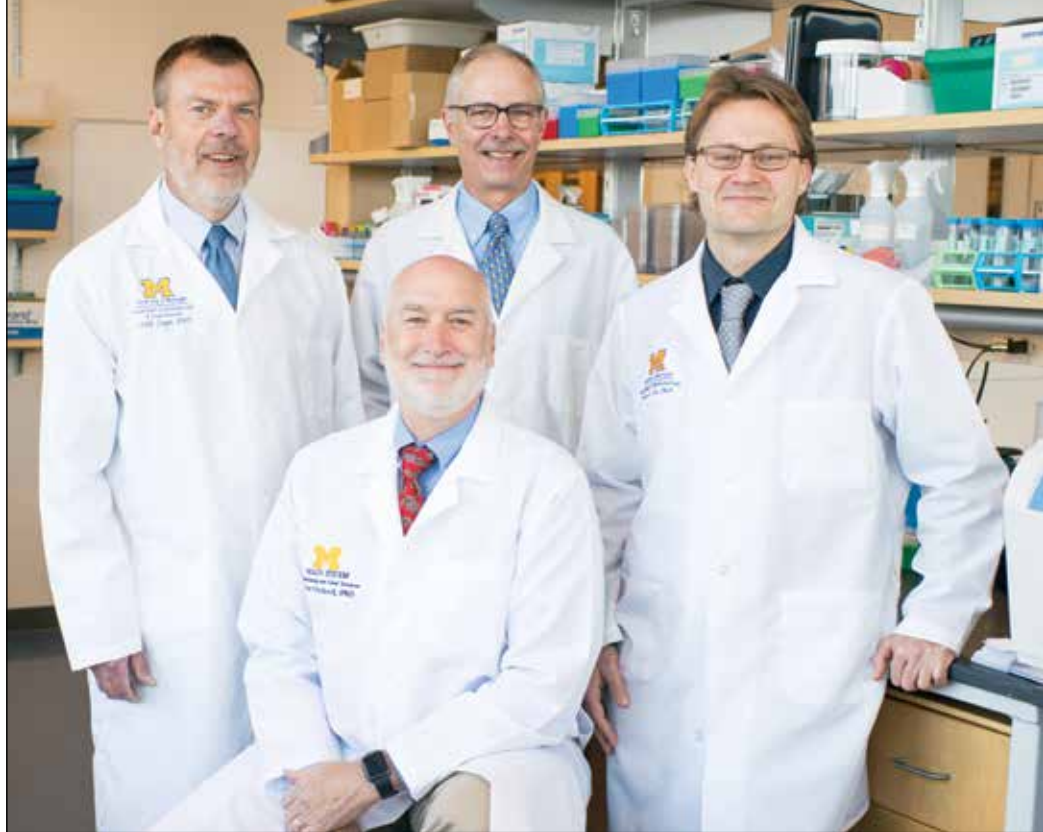
## **R01 Awards**

Four Kellogg NIH Research Project (R01) grants were also awarded. R01 grants support a discrete project representing the investigator's interest and competency. It is peer-reviewed for merit and conformity with the mission of the NIH.

## **R01 Awards went to:**

### **Patrice Fort, Ph.D., M.S.**

*Progressive impact of diabetes on retinal neuroprotection by alpha-crystallins.* Professor Fort's laboratory focuses on existing mechanisms of retinal cell protection and how they are impaired during chronic neurodegenerative diseases. Past investigations have identified a novel mechanism of regulation of one of those systems, involving a protein called alpha-crystallin. The next step is to manipulate that protein so that it remains effective or even enhanced. Dr. Fort and colleagues will test the protein's potential to prevent retinal cell death and functional loss in acute and chronic retinal neurodegeneration.



Philip Gage, Ph.D., Peter Hitchcock, Ph.D., Bret Hughes, Ph.D., and Patrice Fort, Ph.D., M.S. (Not pictured: Terry Smith, M.D.)

### **Philip Gage, Ph.D.**

*Identification of PITX2-dependent mechanisms in the development and mature cornea.* Professor Gage's laboratory uses genetically engineered mice to identify the molecular pathways regulated by the PITX2 transcription factor during corneal development, maintenance and wound healing following injury. The long-term goal is to advance the development of new approaches for treating vision loss due to corneal disease.

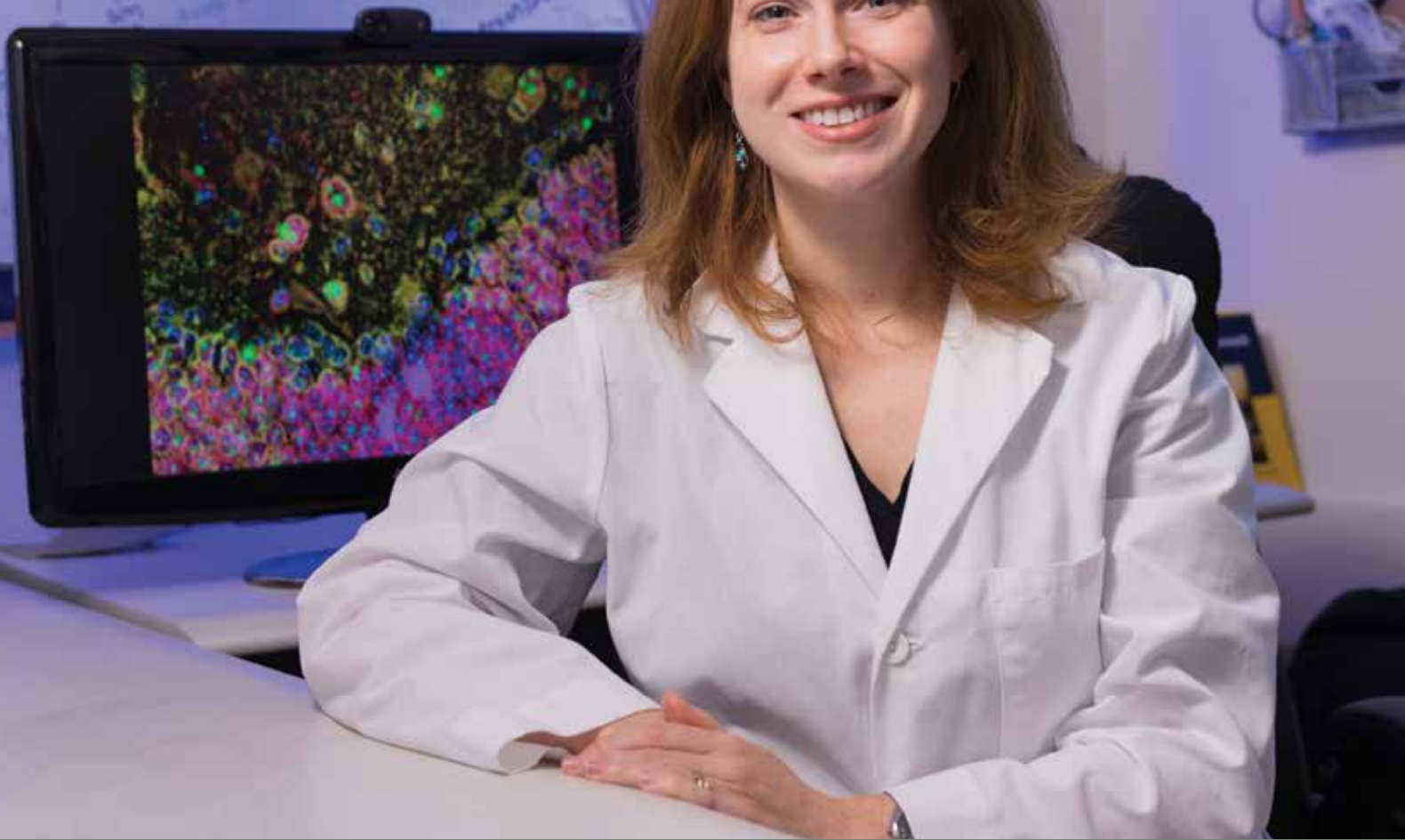
### **Peter Hitchcock, Ph.D.**

*Neuronal development, injury and repair in retina.* Professor Hitchcock's laboratory investigates the molecular mechanisms that regulate the birth, death and regeneration of neurons and photoreceptors in the vertebrate retina. It utilizes an animal model in which intrinsic retinal stem cells can selectively regenerate rod and cone photoreceptors, which integrate into existing synaptic circuits thereby restoring vision or regenerating all cell types and restoring original tissue.

### **Terry Smith, M.D.**

*Regulation of retroocular connective tissue.* Dr. Smith's laboratory investigates the molecular factors within the human orbit that influence cells that promote bone marrow disease. Previous work has disclosed that these cells are highly specialized monocyte progenitors that fuel the autoimmune response. Dr. Smith and his colleagues propose that these cells determine whether patients with Graves' disease develop clinically important ophthalmopathy.

# Investigating Amblyopia



**Sara Aton, M.D.**, is a U-M assistant professor of molecular, cellular and developmental biology who is doing groundbreaking research on amblyopia. Her investigation is considered so promising that she was awarded a \$100,000 grant from Research to Prevent Blindness. The funding comes from the Walt Disney family.

She earned a Ph.D. from Washington University in St. Louis, where she studied how the brain regulates the mammalian “biological clock.” She discovered that a neuropeptide called vasoactive intestinal polypeptide was responsible for maintaining harmony among the cells of the suprachiasmatic nucleus, leading to coordinated daily rhythms in behavior.

During post-doctoral research at the University of Pennsylvania, she began investigating the effects of sleep on the visual cortex. She used an experimental model of amblyopia developed decades ago. After the vision in one eye is blocked, and

is later unblocked, that eye does not see properly. Neurons in the binocular zone of the visual cortex no longer respond to stimulation of the formerly occluded eye. This model mimics the process in young children who have amblyopia, or persistently reduced vision in a crossed eye, an eye with a large uncorrected refractive error, or an eye with congenital ptosis or cataract.

Dr. Aton has extended her studies at U-M, finding beneficial effects of sleep in promoting sight. The Disney-family funded award will allow her to build on her work.

She describes her research as “exciting but labor-intensive.” From it, she hopes to provide insights into the amblyopic process and evidence to decide whether “taking a well-timed nap and patching the nonamblyopic eye is helpful in restoring sight.”

# Researching Retinal Regeneration



**Nicholas Silva** is a Ph.D. candidate in the laboratory of Kellogg professor Peter Hitchcock, Ph.D. He earned a master's degree in biology and animal behavior from San Francisco State University. He arrived at U-M in 2012 and eventually selected Dr. Hitchcock as his mentor.

Silva is using zebrafish to investigate the role of matrix metalloproteinase-9 (MMP-9), an enzyme produced in high levels when the central nervous system has been injured. Zebrafish are choice experimental animals because their retinas regenerate briskly after injury. Scientists are realizing that inflammation is critical to this regeneration, and MMP-9 may be an important regulator of inflammation. Produced by damaged Müller cells, MMP-9 seems to act as a brake on inflammation. Tissues that have mutant MMP-9 regenerate excessively after injury and eventually die.

To test the role of inflammation in retinal neuronal regeneration, and the role of MMP-9, Silva produces zebrafish with genetically altered nonfunctional MMP-9 and injures them with excessive light. He measures their cytokine levels as an expression of inflammation.

Where does this work lead? Silva points out that regeneration of retinal neurons is not limited to zebrafish, having been recently demonstrated in mice as well. Noting that mutant MMP-9 has been recently identified in human wet age-related macular degeneration, in which excessive vascular and fibrous proliferation contribute to blindness, he sees a direct relevance of his work to human disease.

# Doctoral Candidate Studies Retinal Signaling

**Krystal Harrison** is a Ph.D. candidate in the laboratory of Kellogg Professor Kwoon Wong, Ph.D. Her work focuses the ability of intrinsically photosensitive retinal ganglion cells (ipRGCs) to contribute to visual perception.

While ipRGCs govern pupil constriction to light and synchronization of sleep-wake cycles to night-day cycles, they also function in pattern recognition. Because ipRGCs remain light-sensitive in many blind patients suffering rod and cone degeneration, a better understanding of the signaling of ipRGCs could lead to novel strategies to restore sight in such patients.

Harrison was awarded a coveted Rackham Merit Scholarship to join the Ph.D. program of the U-M Department of Molecular, Cellular and Developmental Biology.



# Improving Photoreceptor Survival



**Thomas Wubben, M.D., Ph.D.,** a fellow in vitreoretinal diseases, is interested in what “stresses” retinal photoreceptors when the retina detaches and why the cells often die. He hopes his research will interrupt that process. He is examining the energy production pathway known as glycolysis in these essential photoreceptor cells, which require large amounts of energy to keep up with the retina’s demands for constant visual activity throughout the day.

In his work, Dr. Wubben uses a model of retinal detachment to determine how reprogramming glycolysis through specific proteins can improve the survival of stressed photoreceptor cells. He hopes that creating novel therapeutic agents will help increase photoreceptor survival and preserve vision.

Wubben came to Kellogg as an ophthalmology resident. He has worked with his mentor, Kellogg professor Cagri Besirli, M.D., Ph.D., since then. Having completed a Ph.D. in drug discovery and design and in enzymology at the University of Illinois at Chicago, he was well prepared.

He has already received the Vitreo-Retinal Surgery Foundation Research Award and the Michigan Ophthalmology Trainee Career Development Award. He is a two-time recipient of Kellogg’s Slocum Resident Research Award and a fellow in the prestigious Society of Heed Fellows.

Dr. Wubben plans to pursue a career in academic medicine as a clinician-scientist with a basic science laboratory.



## Supports Widening Research

In today's data-driven world, the ability to appropriately design and conduct analyses is crucial for success, particularly in research. To help Kellogg prosper in the era of "big data," there are seven full-time specialists in biostatistics, making up one of the largest ophthalmology biostatistical support units in the world. David Musch, Ph.D., M.P.H., professor of ophthalmology and epidemiology—and the unit's director—recalls how it happened.

It began in 1979, when Paul Lichter, M.D., then chair of the U-M Department of Ophthalmology, was principal investigator of a National Eye Institute-sponsored trial comparing acetazolamide to neptazane in lowering intraocular pressure. Dr. Lichter's secretary at the time, Jan Musch, introduced him to her husband, David, who was completing a doctoral program in epidemiology at the U-M School of Public Health.

Starting in June 1981, Dr. Musch became the department's go-to person for biostatistical assistance. Soon afterward, he provided critical input to Roy Beck, M.D., Ph.D., the former

Kellogg faculty neuro-ophthalmologist, who was launching the landmark Optic Neuritis Treatment Trial.

Dr. Beck established the Jaeb Center for Health Research in Tampa, Florida, one of the most important national coordinating centers for ophthalmic trials.

Dr. Musch's most enduring role has been as the director of the statistical coordinating center for the Collaborative Initial Glaucoma Treatment Study (CIGTS), which followed 607 patients in 14 national centers to compare medical treatment against early surgery. With continued grant support from the National Institutes of Health, analyses of CIGTS data are still ongoing 25 years later, generating more than 35 publications in respected medical journals and enabling the expansion of Kellogg's biostatistical support unit.

### **Other team members are:**

**Leslie Niziol, M.S.**, joined Kellogg in 2004 as statistical consultant on the CIGTS project. "We have collected an incredible wealth of data on the study's patients," she said, "and we keep finding out more and more about them."

An author on many of the CIGTS publications, she is also designing and analyzing studies of telemedicine diagnosis,



## Biostatistical Unit (cont.)

medication adherence in glaucoma patients and genetic typing in ocular melanoma.

**Nidhi Talwar, M.B.A., M.S.**, obtained a master's degree in applied statistics from U-M and joined the Kellogg biostatistics team in 2009. She analyzes "large data" from insurance and electronic medical records, working in collaboration with Kellogg professor Joshua Stein, M.D., M.S.

**Chris Andrews, Ph.D.**, joined the team in 2012. He holds mathematics degrees from Oberlin College and the University of California-Berkeley, and a doctorate in statistics from Carnegie Mellon University. He has been the statistician on more than 60 publications, including analyses of national insurance-claims data related to screening and risk factors for diabetic retinopathy. Other projects include visual screening of preschool-age children, correlation of fundus imagery and clinical course in retinal dystrophies and accuracy of radiologic interpretation of MRI of brain tumors.

**Moshiur Rahman, Ph.D.**, joined the Kellogg biostatistical unit in January 2017. Born in Dhaka, Bangladesh, he holds

a doctorate in statistical sciences from the Graduate University for Advanced Studies in Hayama, Japan. At Kellogg he collaborates on claims-data studies, quality assurance and electronic medical record data analysis.

**Prabha Narayanaswamy, M.S.**, moved to the unit in 2017 from the U-M Transportation Research Institute, where she analyzed crash-data sets and driver behavior data. At Kellogg, she studies angle-closure glaucoma, optic neuritis, idiopathic intracranial hypertension, telemedicine and prevalence of pediatric low vision in South India. She also supports studies of data management of electronic medical records for natural language processing.

**Chiu-Mei Chen, M.A., M.S.**, joined the team in late 2017. She earned a master's degree in economics from National Taiwan University and a master's degree in information systems from Eastern Michigan University. She held various data systems-related positions at U-M before coming to Kellogg, where she specializes in extracting and integrating ophthalmic clinical data from electronic medical records.



## Ophthalmology Residents Earn Knights Templar Research Awards

**Tapan Patel, M.D., Ph.D.**, a second-year resident, is developing a portable, smartphone-based device for taking fundus photographs of the eyes of young children. Guided by his research mentors, Kellogg professor Yannis Paulus, M.D. and third-year resident Tyson Kim, M.D., Ph.D., Dr. Patel has already adapted a novel mobile ophthalmoscope, called CellScope Retina, that uses a smartphone's camera, Bluetooth connectivity and computational abilities to perform multi-image acquisition and wide-field montaging of the retina.

**Lev Prasov, M.D., Ph.D.**, a third-year resident, is studying the genetics of nanophthalmos, a condition in which the eyes are abnormally small. Patients with nanophthalmos have high hyperopic refractive errors and are prone to a form of sight-threatening glaucoma. Dr. Prasov is studying a new gene mutation that he and Kellogg professor and geneticist Julia Richards, Ph.D., identified. He hopes to gain insights into the mechanisms that cause common refractive errors.



# David Zacks Seeks To Preserve Retinal Function Through Innovative Therapy



David Zacks, M.D., Ph.D., is converting an idea that emerged from his research laboratory into a therapy that he hopes will improve vision.

He has studied why photoreceptors die in retinal detachment. If there is a delay in surgical treatment, the detachment may extend into the macula. Once that happens, even the most expert surgery often does not restore fine vision. Because patients live far from hospitals, or do not notice vision loss until it is severe, they may not arrive in time. Dr. Zacks asks, “Is there anything we can do in these cases to keep the central retina alive?”

Ten years ago, he was experimenting in his laboratory with a peptide inhibitor called Met12. It affects Fas receptors, which induce apoptosis, a molecular cascade that leads to cell death. Met12 had previously been tried unsuccessfully as a therapy for liver toxicity, but Dr. Zacks found that it prevented apoptosis in the retina of experimental animals. He wondered if it could be used in humans.

Thus began the laborious process of turning a chemical reagent into a therapy. With the help of the U-M Office of Technology Transfer, the unit responsible for commercialization

of research, Dr. Zacks tried to interest pharmaceutical companies in his idea. But they were not yet ready to take it on.

So he turned to outside scientists, and together they founded ONL Therapeutics. The U-M and Harvard University’s Massachusetts Eye and Ear Infirmary—where Dr. Zacks began his research—co-own the patents on the technology.

ONL Therapeutics has since developed a potent derivative of Met12 that is more suitable for intravitreal injection. Dr. Zacks’ work attracted Novartis as an equity shareholder and will help get ONL Therapeutics to the point of obtaining investigational new drug approval from the Food and Drug Administration.

Once that is achieved, ONL will launch clinical trials. If the Phase I safety trial is successful, the investigators will move on to Phase II and Phase III trials to determine if the drug is effective in keeping retinal cells alive before reattachment surgery.

“We hope to extend the window of opportunity to treat patients and improve vision,” Dr. Zacks says.

## Theresa Cooney Guides Michigan Society of Eye Physicians and Surgeons



Founded 50 years ago, the Michigan Society of Eye Physicians and Surgeons (MiSEPS) represents Michigan ophthalmologists and their patients. Its priorities include legislative advocacy, interaction with third-party payers about reimbursement and coverage issues, public education about eye care, continuing medical education for ophthalmologists and their staffs, and public service to the underserved.

As president, Theresa Cooney, M.D., hopes to increase free eye screening programs for Michigan citizens who do not have access to care. She also plans to “bring in more ophthalmologists-in-training.”

“I will do my best to acquaint trainees with the practice issues we face in Michigan and around the country,” she adds.

Kellogg faculty participates extensively in the MiSEPS organization. Jerry Finkelstein, M.D., is the MiSEPS delegate to the AMA House of Delegates. Christopher Hood, M.D., is a regional director. Denise Kim, M.D., was a program co-chair for the 2017 annual MiSEPS meeting in Grand Rapids.

She and Manjool Shah, M.D., will be co-chairs of the program at the 2018 meeting on Mackinac Island.

# Counseling Program Brings Preventive Approach To Diabetic Retinopathy

Patients with diabetes often see their retina specialists more often than they do their primary care doctors or endocrinologists, which gives retina specialists a unique role in caring for people with ophthalmic complications of diabetes. Large studies have shown that the risk of developing diabetic retinopathy and its progression is associated with elevated hemoglobin A1C (a marker of diabetes control over the preceding three months), blood pressure and cholesterol level. Yet ophthalmologists are often unaware of how well their patients are controlling these risk factors.

With guidance from Michigan Medicine endocrinologist Jennifer Wyckoff, M.D., Kellogg ophthalmologist Anjali Shah, M.D., a retinal specialist, has developed a plan to introduce more preventive aspects into diabetes eye care. Technicians receive training on how to determine the duration of the diagnosis of diabetes, hemoglobin A1C levels, blood pressure and a known diagnosis of kidney disease. A hemoglobin A1C level greater than nine, diabetes

**“We are committed to understanding diabetic retinopathy as a manifestation of a larger systemic metabolic disease.”**

—Anjali Shah, M.D.

duration greater than 10 years, presence of kidney disease or blood pressure higher than 140/90 places patients in a high-risk group. Those who have two or more of these risk factors are offered education and counseling about resources available from the state, county and U-M.

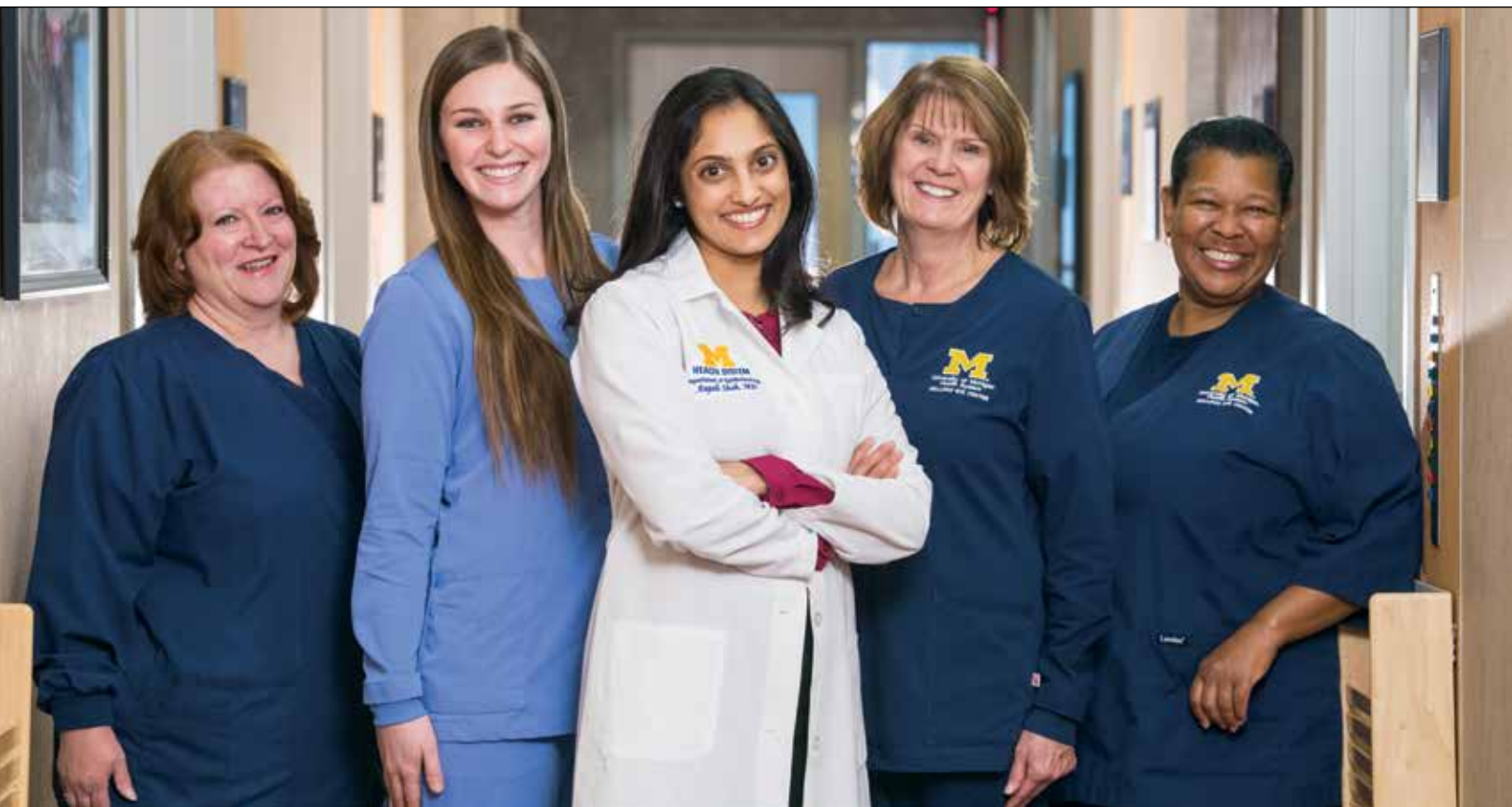
Three technicians have been trained to perform this additional counseling: Londa Reid-Sanders, Moella Hesselgrave and Madison Boss. They make patients aware of treatment goals, discuss resources available to them and inquire about barriers to care. Patients are given a test prior to this counseling to determine their level of diabetes knowledge.

Operating for one year and already helping more than 2,000 patients, the program is evolving as lessons are learned about how to better care for patients within a busy retina clinic. For example, the team has found that depression and anxiety often interfere with self-care.

A critical goal of the program is to help predict which patients will develop complicated retinopathy and those who will need many or only a few treatments. Dr. Shah and her team are using the electronic medical record system to build a registry with longitudinal data.

“We are committed to understanding diabetic retinopathy as a manifestation of a larger, systemic metabolic disease,” she says.

Moella Hesselgrave, COA, Madison Boss, MA, Anjali Shah, M.D., Marianne Sanzenbacher, COT, and Londa Reid-Sanders, COT





Laura Rozek, COA, Lindsay Godsey, M.S., COA, CCRP, Grant Comer, M.D., M.S., Laura Trebesh, CRA, and Rebecca Hughes, CCRC

## CLINICAL RESEARCH CENTER EXPANDS WITH MICHIGAN MEDICINE'S INITIATIVE

**With the U-M Medical School's recent placement of all Michigan Medicine clinical trials under the Clinical Trial Support Unit, the Kellogg Clinical Research Center has benefited from important enhancements.**

The shift provides a uniform infrastructure across Michigan Medicine to improve efficiency and effectiveness, facilitate patient involvement, and enhance responsiveness to opportunities. In overseeing important aspects of finance, contracting and project management, the new structure allows investigators to focus on the scientific merits of their studies.

The KCRC now has two managers. Rebecca Hughes, research compliance specialist, comes to Kellogg from the Michigan Medicine Institutional Review Board, where she

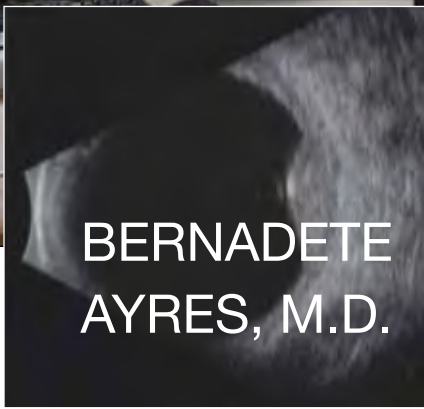
served as education coordinator. She assists with the regulatory portion of studies and some of the feasibility and design, aiding in the planning stages of studies and ensuring compliance with research regulations. She helps busy scientists navigate the complex landscape of research regulations.

Lindsay Godsey, who has been with the center since its inception, is lead clinical research coordinator. She coordinates the operation of sponsored studies that require major up-front work. "With our new organization," she notes, "we have expanded the number and types of trials we are able to perform at Kellogg."

Laura Rozek, research technician at the center, takes over the responsibilities generally performed by clinic managers in other parts of Kellogg. She helps ensure that visits to the center are run efficiently and that patients receive a top-notch experience.

The center has also hired a dedicated research imaging specialist, Laura Trebesh, who is certified in all studies and helps provide quality images for clinical research.

According to Kellogg professor Grant Comer, M.D., M.S., medical director of the Kellogg Clinical Research Center and associate medical director of the Clinical Trial Support Unit, the center is "an example of excellent quality in clinical research, that has attracted others who want to learn from Kellogg's model."



## Leads Team in Ophthalmic Ultrasound

There is a special aspect to Kellogg’s ophthalmic ultrasound services; they are overseen by a physician.

Director Bernadete Ayres, M.D., is an ophthalmologist whose fascination with ultrasound inspired a career. It was “the seduction of the image—it attracts you,” she says.

Dr. Ayres, a native of Brazil, undertook a fellowship in ophthalmic ultrasound after her ophthalmology residency training. In Brazil, physicians perform their own ancillary testing, such as fluorescein angiography and ultrasonography. It was there that she became immersed in ultrasound technology.

She had been practicing ophthalmology for several years in Brazil when an opportunity arose for a fellowship in oculoplastics at the Wilmer Eye Institute at Johns Hopkins Hospital in Baltimore. Dr. Ayres’ skill in ophthalmic ultrasound became apparent at Wilmer, and she was soon drafted to help with ophthalmic ultrasound there.

Following a return to Brazil to practice oculoplastics for eight years, she was subsequently enticed back to Wilmer to become its senior ophthalmic ultrasound specialist. Later she moved to the Bascom Palmer Eye Institute at the University of Miami before coming to Kellogg in 2013 to lead our

ultrasound department.

During her four years at Kellogg, Dr. Ayres has authored several papers and become a national leader in ophthalmic ultrasound, teaching at national and local meetings of the American Academy of Ophthalmology, the Joint Commission on Allied Health Personnel in Ophthalmology and the Ophthalmic Photographers’ Society. She introduces our first-year ophthalmology residents to ultrasound in their first few weeks of residency training, and continues to instruct them throughout their three years at Kellogg. She recently traveled to Ethiopia to spend a week teaching in the ophthalmology residency training program at St. Paul’s Hospital Millennium Medical College in Addis Ababa.

At Kellogg, Dr. Ayres is joined by two talented ophthalmic ultrasonographers—Tanya McClendon-Hubbard and Elizabeth Parrish—who also have several years of clinical experience in ultrasound. This dynamic team performs more than 2,000 ultrasound examinations each year.

Dr. Ayres says she relishes ultrasound’s ultimate challenge: “For treatment we have a lot of tools,” she points out, “but diagnosis is the beginning of the process.”

**“For treatment we have a lot of tools, but diagnosis is the beginning of the process.”**

—Bernadete Ayres, M.D.

# 23rd Fall Alumni Reunion Highlights

Kellogg's 23rd annual fall reunion celebration featured two keynote addresses, a research update from the Brehm Center, a reprise of an outstanding Grand Rounds case, stimulating alumni presentations and a new favorite—Expert's Corner—in which Kellogg faculty answered pressing clinical questions.

Katherine High, M.D., co-founder and president of Spark Therapeutics, delivered the third annual Qais Farjo Memorial Lecture. The lecture honors former Kellogg resident, faculty member and brilliant corneal specialist, Qais Farjo, M.D., who passed away in 2014.

Dr. High described the challenges of introducing a replacement gene into the eyes of patients with Leber congenital amaurosis, which is caused by defects in the RPE65 gene. Her team's successful efforts in improving vision won FDA approval of the treatment.

Edward O'Malley, M.D., who completed an ophthalmology residency at Kellogg in 1979, gave the Distinguished Alumnus Lecture, titled "The Asymmetry of History: Rare Bird or Black Swan?" While its title may have been somewhat mysterious, there was general agreement that it was a brilliant lecture from a witty and compelling speaker.

Rodica Busui, M.D., Ph.D., gave a stirring update on work at the Brehm Center for Diabetes Research. She discussed the enormous gains being made in the understanding of diabetes mellitus, and emphasized that collaborations with Kellogg investigators are essential to such progress.



Katherine High, M.D., delivers third annual Qais Farjo Memorial Lecture



Edward O'Malley, M.D., delivers Distinguished Alumnus Lecture

## Among the other highlights:

- Four alumni of the Kellogg residency and fellowship programs presented intriguing lectures. Kristen Harris Nwanyanwu, M.D., M.B.A., who completed her residency in 2013 and is a member of the faculty of Yale University, spoke of the need to provide more equal access to ophthalmic care across all socio-economic classes. Michael Burnstine, M.D., who completed his residency in 1996 and practices in Los Angeles, described his analysis of the pros and cons of various orbital implants. Alexander Aizman, M.D., who finished a vitreoretinal fellowship in 2006 and practices in Brooklyn, gave a progress report on the use of robots in ophthalmic surgery. Everton Arrindell, M.D., who finished his residency in 1990 and practices in Nashville, delivered a thorough review of the evolution of medical and surgical treatments for age-related macular degeneration.
- Merina Thomas, M.D., who will finish a vitreoretinal fellowship in 2018, reproduced her fine Ophthalmology Grand Rounds presentation on a curious case of retinal infection by *Mycobacterium chimaera*. The organism entered



Kristen Harris Nwanyanwu, M.D., M.B.A., is congratulated by her father after her podium presentation





**Rodica Busuj, M.D., Ph.D., Brehm Center for Diabetes Research, describes how collaboration between ophthalmology and endocrinology enhances discovery**

the patient’s body through a contaminated heater-cooler unit used in cardiovascular surgery, and appeared in the eye as yellow sub-retinal and choroidal clusters. Other sites have reported such infections, so the heater-cooler units have been recalled.

- Kellogg professors Yannis Paulus, M.D., and Joshua Stein, M.D., M.S., presented updates on their research. Dr. Paulus described how he is using photoacoustic microscopy to produce high-resolution pictures of the retina and to ablate retinal blood vessels. Dr. Stein reported on his efforts to convert health information from the electronic medical record into a language useful in research.



**Carol Standardi, R.N.**

*Lifetime Service Award to Carol Standardi*

In an emotional presentation, Carol Standardi, R.N., administrative specialist at Kellogg, received the 2017 Lifetime Service Award for 41 years of dedication to patient care and administration. She began her career at U-M in 1966 in a medical-surgical ward of the Old Main Hospital.

In 1976, she accepted a position at Kellogg, where she designed training manuals and taught visual field testing to ophthalmic technicians at Kellogg and for community practices. Standardi

coordinated and wrote the manual of operations for the giant Collaborative Initial Glaucoma Treatment Study, based at Kellogg, which included 607 patients in 14 national centers. She directed infection control surveillance at Kellogg and supervised the staff in the move to the Brehm Tower. She received the U-M Medical School’s Professional Staff of the Year Award in 2008.

“We would not be here without our alumni”  
— Paul Lee, M.D., J.D.



**2017 Fall Alumni Reunion presenters: Michael Burnstine, M.D., Everton Arrindell, M.D., Kristen Harris Nwanyanwu, M.D., M.B.A., and Alexander Aizman, M.D.**

In presenting the Kellogg Lifetime Service Award, Paul Lichter, M.D., M.S., former chair of the Department of Ophthalmology, said Standardi “gives herself to patients with extraordinary kindness. Patients’ family members correspond with her long afterward. She accepts every task with grace and leads by example.”

Department chair Paul Lee, M.D., J.D., closed the celebration with the declaration that Michigan alums are not only the leaders and best, but the most supportive of their alma mater. “We would not be here without our alumni,” he stressed.



**Richard Garfinkel, M.D., and Michael Smith-Wheelock, M.D.**

# Kellogg Faculty Pitches Ideas at “Think Tank”

**Kellogg’s faculty retreat took on a radically different look in 2017.**

Embracing a model introduced by the business community, Thiran Jayasundera, M.D., and genetics counselor Kari Branham, M.S., went to U-M’s Fast Forward Medical Innovation (FFMI) team for help in organizing a think tank.

The FFMI’s David Olson, Ph.D., and Jon Servoss, M.S., guided an organizing group of 10 faculty members in setting out the main issues in patient care, training, research and administration. One faculty member was chosen to lead in each area. In a convocation of 103 Kellogg clinical and research faculty members, the four leaders laid out the issues with the goal of drawing faculty members to their teams.

The four large teams that formed met to debate which issues in their areas ought to be tackled. Multiple small units of four members from each team went to work preparing short oral presentations to be rehearsed in front of the FFMI’s judges and faculty peers. Once the presentations were refined and considered ready for prime time, the “pitch day” was set for Feb. 25.



Manjool Shah, M.D., and Anjali Shah, M.D., pitch ideas

A panel of experts drawn from U-M faculty, alumni and industry leaders listened and critiqued the five-minute pitches. The audience then voted on the relative importance of addressing each issue and whether the suggested solutions were viable. The department’s executive leadership later evaluated each presentation and determined funding priorities.

Kellogg faculty members look back on this innovative experiment as a transformative and powerful experience. “Think Tank brought us together. It forced us to hone in on the key issues. Having the help of FFMI coaches and the feedback of business executives and leaders from other U-M entities was critical,” noted Shahzad Mian, M.D.

“It will make a big difference in determining what we must do to improve further on our mission.”



Expert panelists Michael Mulholland, M.D., chief of surgery, and Connie Chang, M.B.A., director of Fast Forward Medical Innovation, listen and comment on pitches



Think tank leadership and panelists evaluate ideas for moving forward the Kellogg mission



## Anthony Adamis Receives Michigan Medicine Alumni Society's 2017 Distinguished Achievement Award

Anthony Adamis, M.D., received the Michigan Medicine Alumni Society's 2017 Distinguished Achievement Award for his remarkable role in developing new treatments for blinding eye diseases.

After graduating from the University of Chicago Pritzker School of Medicine, Dr. Adamis completed his residency in ophthalmology at Kellogg in 1989. "At Michigan, I was trained to ask how things work," he told a Grand Rounds audience at Kellogg in October, "so I decided to try my hand at research."

During his residency, Dr. Adamis was intrigued by the fact that abnormal growth of leaky retinal blood vessels was a major cause of macular degeneration and diabetic retinopathy, two common blinding eye diseases. Scientists had suggested that these leaky vessels were a failed response to a deficient oxygen supply to the retina.

At the same time, he was aware that in the late 1960s, Judah Folkman, M.D., a pediatric surgeon at Harvard University, had shown that experimental tumors in the anterior chamber of rabbits would grow only if they were nourished by blood vessels. Dr. Folkman had suggested that growing tumors produced a tumor angiogenesis factor that attracted these blood vessels. Very few scientists believed him. But in 1989, Napoleone Ferrara, M.D., and colleagues at Genentech discovered a protein that caused blood vessel growth; they called it vascular endothelial growth factor (VEGF). Soon afterward, Dr. Ferrara's laboratory generated an antibody to VEGF.

Shortly after the discovery of VEGF and its antibody, Dr. Adamis accepted a fellowship in corneal diseases at Harvard and entered Dr. Folkman's laboratory. He wondered if the oxygen-deprived retinal cells in macular degeneration and diabetic retinopathy would produce high amounts of VEGF. Sure enough, he found that they did. Would blocking VEGF stop that vessel growth?

He placed a cold call to Dr. Ferrara, who agreed to ship the



**"At Michigan, I was trained to ask how things work, so I decided to try my hand at research."**

—Anthony Adamis, M.D.

VEGF antibody to Boston. Dr. Adamis and his colleagues then inserted the antibody into monkey eyes; new blood vessels did not grow. The same effect occurred in humans. More experiments confirmed that VEGF created new ocular blood vessels and anti-VEGF agents stopped them from leaking in humans.

These experiments laid the foundation for FDA approval of several anti-VEGF medications now widely used in intravitreal injections for wet macular degeneration, diabetic retinopathy and retinal vein occlusion. Adamis explains that anti-VEGF treatment of patients in underserved regions is much less successful because patients do not arrive soon enough to benefit from the medication.

Can telemedicine identify them earlier? Dr. Adamis and his colleagues are looking at "machine learning" to interpret features that predict who needs treatment and how often. He is also seeking a way to get the medication into the eye without repeated injections. Under his direction, scientists are conducting a trial of a refillable implant that can be safely placed in the eye to slowly deliver the medication.

As vice president and global head of ophthalmology, immunology and infectious diseases at Genentech/Roche, which has a research budget of more than \$10 billion, Dr. Adamis is in good position to face such challenges. Looking back at the start of his ophthalmic career, he credited U-M and Kellogg with "providing me with the kind of guidance and support that a very junior scientist can only wish for."

# Kellogg Alumnus **Keith Carter** Heads AUPO and AAO

Keith Carter, M.D., who completed a Kellogg ophthalmology residency in 1987, serves as both president of the American University Professors of Ophthalmology (AUPO) and president of the American Academy of Ophthalmology (AAO). These organizations are two of the most important in ophthalmology.

Dr. Carter's commitment to service began at Kellogg, where, he recalls, trainees were instilled with a sense of purpose beyond their future career in patient care. "There was an understanding that you could not head out to community practice never to be heard from again," he says. "You must find ways to give back to the profession."

As he leads the AAO, the largest association of eye physicians and surgeons, Carter envisions new solutions and new aspirations in eye care delivery. They include greater exposure to ophthalmology in the early years of medical school to inspire the next generation of vision specialists—a group that should be as diverse as the patients they care for. Another priority is engaging with lawmakers in Washington, who are shaping health care coverage and policies.

Such endeavors are part of the American Academy of Ophthalmology's tradition of setting standards for ophthalmic education, and advocating for patients and the public.

"It's important for medical professionals of all kinds to engage in conversations about how dramatic changes in health care affect people," Dr. Carter says. "As curbing health care spending is discussed, who better than physicians to outline cost-effective ways to provide testing and care?"

Innovations in care make it a pioneering time in ophthalmology, he says, from intravitreal injections that can protect vision to the promise of gene therapy and stem cells to restore sight. Artificial intelligence may enhance the ability of eye doctors to provide remote eye exams for people with diabetes and predict eye disease progression.



Dr. Carter, an oculoplastic surgeon, is chair of the Department of Ophthalmology and Visual Sciences at the University of Iowa. After his residency at U-M, he completed a fellowship in oculoplastics and orbital surgery at the University of Iowa Hospitals and Clinics. A dedication to teaching inspired his connection to academic medical care.

He has been a faculty member at the University of Iowa Hospitals and Clinics since 1988 and holds a joint appointment as professor of otolaryngology in the University of Iowa Carver College of Medicine. He contributes to global teaching through Orbis International and other organizations.

Dr. Carter has received numerous honors from the American Academy of Ophthalmology, including the Honor Award, Senior Achievement Award, Secretariat Award and the 2013 Special Recognition Award recognizing the academy's Leadership Development Program, as well as a special commemoration on the 30th anniversary of his membership. He's helped set the direction for ethics, advocacy and surgical training as he served on several of the academy's committees.

Dr. Carter delivered the Fralick Lecture during the 2013 Kellogg Spring Postgraduate Conference, and describes his time at U-M as "a wonderful experience."

"My experience with Kellogg was 30 years ago," he says, "but to this day I speak highly of the way it prepared me to take care of patients as well as get involved in the national landscape of ophthalmology."

**"It's important for medical professionals of all kinds to engage in conversations about how dramatic changes in health care affect people."**

—Keith Carter, M.D.

# Annual Gifts Promote Broad Impact in Research

Alumni and friends of Kellogg made great strides this year in developing more effective treatments and cures for eye diseases. Gifts to the Annual Fund and the Alumni and Faculty Annual Fund support programs that are in important stages of discovery.



**Brenda Bohnsack, M.D., Ph.D.**, is developing new approaches to preventing blindness in children with congenital eye diseases.



**Philip Gage, Ph.D.**, studies the genes and regulatory networks that govern normal eye development and function to identify targets for new therapies.



**Alon Kahana, M.D., Ph.D.**, is translating laboratory discoveries toward new treatments for eye disease and cancer.



**David Musch, Ph.D., M.P.H.**, is studying the positive impact of telemedicine in increasing access to specialized eye care for children and using big data to improve care.



**Yannis Paulus, M.D.**, is combining ultrasound and light to create a new way of diagnosing and treating retinal diseases like age-related macular generation and diabetic eye disease.

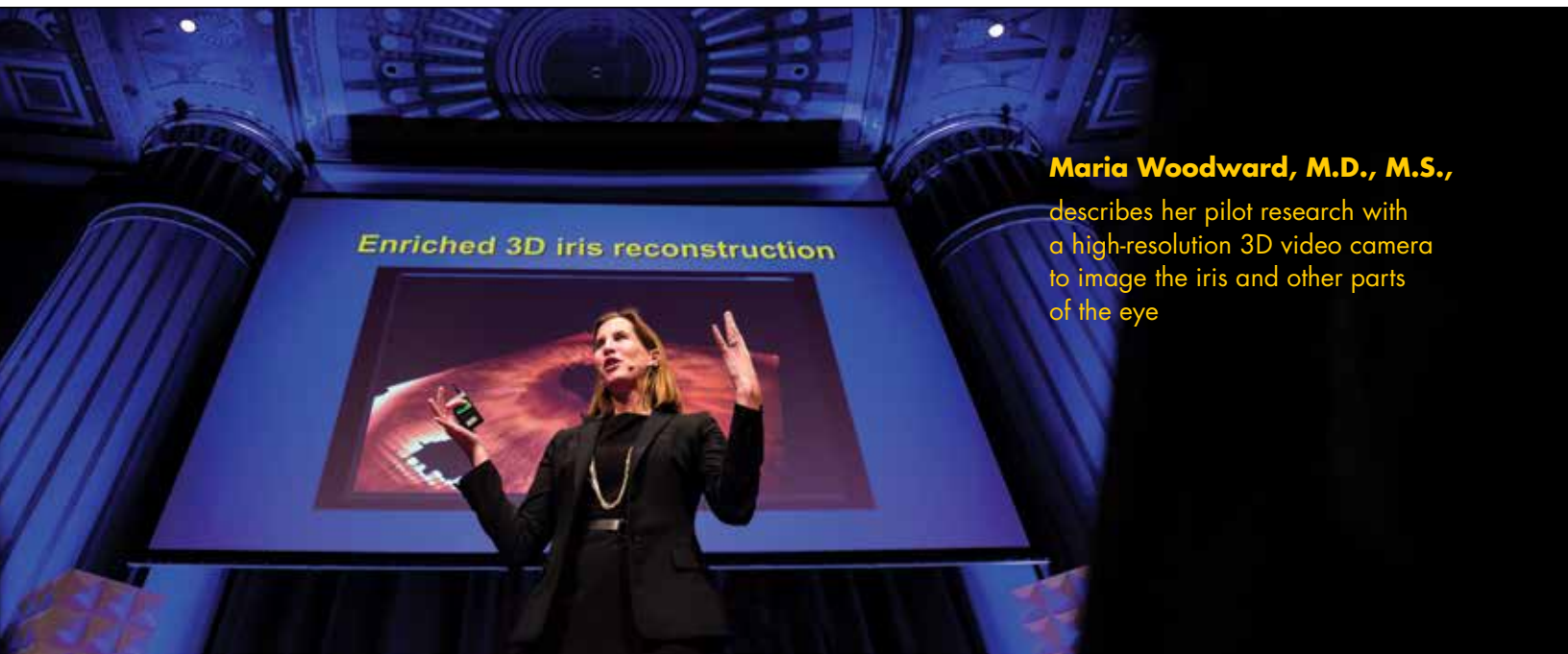


**Debra Thompson, Ph.D.**, is investigating the genetics and epigenetics of congenital eye diseases as well as refining approaches for gene therapy for retinal dystrophies.

“The research funded with donor contributions spans the spectrum of eye diseases, from age-related macular degeneration and glaucoma to pediatric eye conditions,” says Thomas Gardner, M.D., M.S., associate chair for research.

“We are grateful that with their contributions to the annual funds, our patients, families and alumni join together to provide us with the flexible resources to support the work of some of Kellogg's leading investigators.”

*For more information or to discuss how you can become a part of our annual giving community, please contact our development officers at (734) 763-5735.*



**Maria Woodward, M.D., M.S.**, describes her pilot research with a high-resolution 3D video camera to image the iris and other parts of the eye



Hakan Demirci, M.D., Marilyn Witham, Richard Witham and Paul Lee, M.D., J.D.



Carol Bradford, M.D., M.S., U-M Executive Vice Dean for Academic Affairs, presents Witham Professorship medal to Dr. Demirci

## Witham Family Establishes Ocular Oncology Professorship

Kellogg Professor Hakan Demirci, M.D., was named the Richard N. and Marilyn K. Witham Professor of Ophthalmology and Visual Sciences during an inauguration and installation ceremony in August. The Withams' gift of \$2.5 million established this ocular oncology professorship. Their family members attended the installation ceremony.

Marilyn Witham was diagnosed with ocular cancer 11 years ago, and while she no longer has sight in the affected eye, Dr. Demirci and fellow Kellogg professors Grant Comer, M.D., M.S., and Andrew Vine, M.D. (now retired), were able to preserve her vision for as long as possible—and to save her life.

"The care he (Dr. Demirci) provided Marilyn was cutting-edge—and compassionate," Richard Witham said at the event. "His high standards and personal dedication to medicine are evident in every conversation we have. We are thrilled that his work and his leadership in the field of ocular oncology will benefit from this gift."

Ocular cancers are rare, but they affect thousands of children and adults in the U.S. each year. The main tumors are retinoblastoma, which accounts for 4 percent of pediatric cancer cases, and ocular melanoma, the most common primary ocular cancer in adults.

**"This professorship will enable our ocular oncology program to grow and thrive with the goal of helping patients in Michigan and around the world through research and education."**

—Hakan Demirci, M.D.

Dr. Demirci partners with faculty at Kellogg and the U-M Comprehensive Cancer Center to ensure patients receive top-tier care. He also has built a robust and diverse research program with colleagues across campus as well as nationally and internationally. Projects include an innovative imaging system for eye tumors, targeted approaches to treating intraocular tumors with

few side effects and development of a mobile phone application that helps in the early detection of eye cancers in children.

"This professorship will enable our ocular oncology program to grow and thrive, with the goal of helping patients in Michigan and around the world through research and education," Dr. Demirci said.

The Withams, who are from Muskegon, Michigan, said they are grateful to have partnered with Kellogg and the University of Michigan to make a difference in the lives of people facing ocular cancer.

"We have met other patients from around the country and around the world at Kellogg, and we are not surprised that so many seek care here," Richard Witham said. "We have learned a great deal about the faculty's goals for the Kellogg Eye Center, and their success is widely recognized."

"At this point in our lives," he said, "it is time to act on our gratitude—to give back as much as we are able."



VICTORS FOR  
MICHIGAN

## Donald R. Sherman Bequest Advances Macular Degeneration Research

When retired executive Donald Sherman asked Richard Garfinkel, M.D., his retina specialist in the Washington area, how he could support age-related macular degeneration (AMD) research, neither knew they shared a history at the University of Michigan.

“He told me that the Kellogg Eye Center is doing great work and suggested I learn more,” Sherman says. “As we discussed it, he found out that I was a U-M graduate, and I found that he was, too.”

Sherman earned bachelor’s and master’s degrees in business administration at U-M and was a member of the marching band. Dr. Garfinkel completed his bachelor’s degree at U-M and his ophthalmology residency at Kellogg in 1987.

Once the Michigan connection was made, Garfinkel invited Sherman to attend Kellogg’s annual alumni ophthalmology reunion. Sherman and his daughter toured Kellogg with Dr. Garfinkel as guide. “Things are happening pretty fast in macular degeneration,” Sherman says. “The faculty talked about what hopes they have for improving treatments.”

Those hopes match his. Diagnosed in 2000 with AMD, Donald Sherman has lost most of his central vision. It has limited his ability to drive and travel, and he needs magnifying equipment to read.

A certified public accountant who retired in 1992 as chief financial officer at Champion, a sports apparel company, he recognized the tax advantages of donating part of his estate to charity, especially from tax-deferred funds. So he asked Dr. Garfinkel for a recommendation.

“I believe in the work being done at Kellogg,” Dr. Garfinkel says. “The faculty and staff are dedicated to advancing science and clinical therapies, and as an alumnus, I am glad to be a partner in those efforts.”



Donald R. Sherman and his wife Laura

### Planned Gift Establishes Donald R. Sherman AMD Research Fund

Sherman has set up a planned gift to establish the Donald R. Sherman AMD Research Fund at Kellogg. He also made arrangements to create the Laura M. Sherman Alzheimer’s

Research Fund at U-M. While on campus, he and his daughter had visited the Michigan Alzheimer’s Disease Center. Laura Sherman, Mr. Sherman’s wife of 62 years, suffered with Alzheimer’s disease for many years and died in June 2016. Both endowed funds will support research in perpetuity.

“Losing one’s eyesight makes life difficult,” he says. “Alzheimer’s disease destroys the brain. My gift isn’t going to come close to curing those diseases, but if it goes together with others to make a difference, that would be wonderful.”

*To learn more, please call the Kellogg Eye Center development office at (734) 763-0875.*



# Kellogg International

Our medical students, ophthalmology residents and faculty engaged in a wide array of international health activities in the past year. Kellogg hosted 41 ophthalmologists, optometrists and ophthalmic scientists from 30 foreign countries as observers in our clinics and laboratories, as researchers and as participants in courses.



**Joseph Grubbs, M.D., M.P.H.**, a third-year ophthalmology resident at Kellogg, traveled to Jamaica with optometrists and ophthalmologists under the auspices of the Eye Health Institute (EHI). EHI had joined with the U-M School of Architecture to design an "eye clinic in a container" that can be loaded onto a ship, transported across the seas and assembled on the spot. Dr. Grubbs performed eye surgery and conducted a survey to find out how the container clinic compared to a more traditional clinic nearby. Although Jamaicans appreciated the container clinic, they told him it was too small and did not provide enough shade from Jamaica's blazing sun. The container clinic is being enlarged and will receive an extended roof.

**Manjool Shah, M.D., and Zvi Kresch, M.D.**, Kellogg faculty ophthalmologists, spent a week at the Regional Institute of Ophthalmology in Trujillo, Peru, as part of the World Eye Mission. The doctors gave lectures to the hospital's ophthalmology faculty and residents. They teamed with Peruvian cataract surgeons, teaching each other new skills in handling complex cases. Dr. Kresch reported that "local ophthalmologists acquired surgical skills that will benefit their patients, resident trainees and the overall quality of eye care in Peru. On the way, I think we learned as much as they did!"

**Nita Valikodath, M.D.**, traveled to Paris, France as a fourth-year U-M medical student for a four-week elective rotation to study visual perception in aging at the Institut de la Vision, the largest ophthalmic research facility in Europe. To discover how elderly patients navigate in different environments, she used wearable sensors and recorded their movements on computers.



**Carol George, R.N.**, director of Kellogg operating rooms, lectured on Kellogg's pre-operative clinic to eye hospital administrators at the 2017 meeting of the World Association of Eye Hospitals (WAEH) in Tianjin, China. That Kellogg innovation has successfully reduced same-day operative cancellations. Kellogg will host the 2018 WAEH meeting, the first time this meeting has been held in the U.S.

**Olivia Killeen, M.D.**, went to the Aravind Eye Hospital in Madurai, India, as a fourth-year U-M medical student under the mentorship of Kellogg professor Paula Anne Newman-Casey, M.D., M.S. She surveyed how often patients adhere to glaucoma treatment and field-tested Dr. Newman-Casey's eyeGuide, which prompts patients about care of glaucoma.

**Nithya Vijayakumar**, a second-year U-M medical student, traveled to India to conduct a telemedicine study of corneal ulcers under the direction of Kellogg professor Maria Woodward, M.D., M.S.

**Philip Lieu, M.D.**, Kellogg retinal specialist, and **Bernadete Ayres, M.D.**, Kellogg ultrasound specialist, went to Addis Ababa, Ethiopia, to teach ophthalmology residents at St. Paul's Hospital. That training program began three years ago with strong input from Kellogg professors Christine Nelson, M.D., and Monte Del Monte, M.D. They confer monthly by Skype with ophthalmology chair Bezawit Tadegagne, M.D., and program director Lemlem Tamrat, M.D. Eight Kellogg professors have taught in that program.

**Chelsea Reighard**, a current fourth-year U-M medical student, traveled to the Tenwek Eye Clinic in Kenya, where she assisted in examining patients, many of them nearly blind. She accompanied an outreach team to Mfangano Island on Lake Victoria to examine patients who otherwise receive no eye care.

## Visiting Scholars at Kellogg

**Po-Yan Pang and Sheng-wei Chang** were the 7th and 8th medical students to come from National Taiwan University

**Ashiqur Rahman, M.D.**, from Bangladesh, **Mohammedreza Peyman, M.D.**, from Iran, and **Anton Vurdaft, M.D.**, from Zambia came to Kellogg as International Council of Ophthalmology-sponsored fellows.

Optometrist **Eileen Ngun** from Singapore came to Kellogg to attend the Specialty Contact Lens Fitting and Low Vision Rehabilitation Course, now in its third year.

# Carter Center's Dean Sienko

## International Night Keynote Speaker



This year's International Night drew more than 100 U-M medical students as well as Kellogg ophthalmology residents, fellows, faculty and other members of our medical community for a program that highlighted Kellogg activities abroad. Dean Sienko, M.D., M.S., vice president for health programs at the Carter Center, delivered the keynote address.

The Carter Center was founded in 1982 by former President Jimmy Carter and his wife, Rosalyn, to address health problems and conflicts around the world. Notably, the center targets neglected tropical diseases, mostly in Africa, Central America and South America. Onchocerciasis, or river blindness, and trachoma are the two tropical eye diseases that have received the center's attention.

Onchocerciasis is the second leading infectious cause of world blindness after trachoma. In his keynote, Dr. Sienko pointed out that more than 15 million people are infected and a million of those are blind.

Eradicating onchocerciasis has been an enormous challenge; the center has organized repeated massive drug treatment campaigns using ivermectin. In 2016, the center treated 18 million people with ivermectin twice a year, and aims to increase that number to 30 million.

"We have now eradicated onchocerciasis from Central America," Dr. Sienko reported.

Trachoma, the number one infectious cause of world blindness, is another major target for the Carter Center. More than 200 million people are infected with this disease, which is caused by the *Chlamydia trachomatis* organism and carried

by flies. The infection leaves the eyelids scarred, causing them to turn inward.

Dr. Sienko explained that trachoma is combated using "the SAFE method": surgery, antibiotics, facial cleanliness and environmental improvement.

The Carter Center has supported more than 700,000 surgeries that reverse the direction of scarred eyelids so that they do not scrape the cornea and cause it to become cloudy—the cause of blindness in those with trachoma. In 2016, a trachoma operation occurred every five minutes somewhere in the world under Carter Center auspices.

More than 150 million doses of Chlamydia-killing azithromycin have been distributed in infected villages. The center has trained more than 300,000 villagers in proper hygiene and installed nearly 4 million latrines.

Asked if the Carter Center encounters resistance from villagers, Dr. Sienko replied, "not at all. They welcome us. But we do not go in unless we are asked, and we are careful to lay the groundwork. Sadly, there are many countries where it is just too risky."

At the end of his address, Dr. Sienko was surrounded by U-M medical students anxious to learn more. One student asked him why he chose this job.

"I told President Carter that in my current job as a public health officer in the United States, I can prevent disease in dozens of people," he replied. "But at the Carter Center, I could do it for millions of people."

**"In my current job, I can prevent disease in dozens of people. But at the Carter Center I could do it for millions of people."**

—Dean Sienko, M.D., M.S.

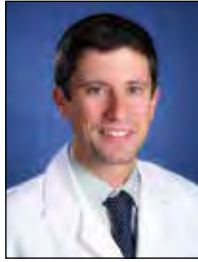




# KELLOGG'S NEW FACULTY



**John Cropsey, M.D.**  
*Clinical Instructor*  
Comprehensive Ophthalmology



**Joshua Ehrlich, M.D., M.P.H.**  
*Assistant Professor*  
Glaucoma



**Abigail Fahim, M.D., Ph.D.**  
*Clinical Lecturer*  
Retina



**Shannon Joseph, M.D., M.Sc.**  
*Assistant Professor*  
Oculoplastics



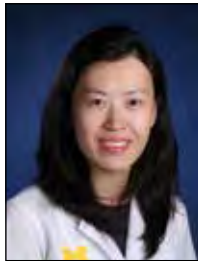
**Mikiko Nagashima, Ph.D.**  
*Research Investigator*



**Jillian Pearing, Ph.D.**  
*Research Assistant Professor*



**Bradford Tannen, M.D., J.D.**  
*Clinical Associate Professor*  
Cornea



**Grace Wang, M.D., Ph.D.**  
*Clinical Assistant Professor*  
Pediatric Ophthalmology



**James Weiland, Ph.D.**  
*Professor, Biomedical Engineering*  
*Professor, Ophthalmology and Visual Sciences*

## Upcoming CME Programs

Each year, Kellogg offers an informative series of continuing medical education (CME) programs designed to share new approaches to the diagnosis and management of eye disease across subspecialties. These are our upcoming programs:

Saturday, June 2, 2018  
90th Annual Spring Postgraduate Conference  
Neuro-Ophthalmology  
8 a.m. – 5 p.m.  
Kellogg Eye Center  
Ann Arbor, Michigan

Tuesday, June 12, 2018  
34th Annual Research Day

Friday, September 21, 2018  
Fall Alumni Day



For more information or to register for these programs, visit: [medicine.umich.edu/dept/ophthalmology/education-training/continuing-medical-education-kellogg-eye-center](http://medicine.umich.edu/dept/ophthalmology/education-training/continuing-medical-education-kellogg-eye-center)

For questions, contact Jennifer Burkheiser, CME Coordinator, at (734) 763-2357 or [kelloggCME@umich.edu](mailto:kelloggCME@umich.edu).

## 2017 GRADUATING RESIDENTS



**Daniel Albertus, M.D.**  
Community Practice  
Virginia Eye Institute  
Richmond, VA



**Karen Christopher, M.D.**  
Cornea Fellow  
University of Colorado  
Denver, CO



**Daniel Kasprick, M.D.**  
Graduate Chief Resident  
Kellogg Eye Center  
Ann Arbor, MI



**Krista Stewart, M.D.**  
Oculoplastics Fellow  
University of Minnesota/Mayo Clinic  
Minneapolis/Rochester, MN



**Marius Tijunelis, M.D., M.B.A.**  
Community Practice  
Livonia Ophthalmologists  
Livonia, MI



**Sophia Wang, M.D.**  
Glaucoma Fellow  
Stanford University  
Palo Alto, CA



**Thomas Wubben, M.D., Ph.D.**  
Retina Fellow  
Kellogg Eye Center  
Ann Arbor, MI

## 2017 GRADUATING CLINICAL FELLOWS



**Rami Al-Omari, M.D.**  
Pediatric Ophthalmology  
King Abdullah University Hospital  
Irbid, Jordan



**Erica Archer, M.D.**  
Neuro-Ophthalmology  
Kennedy Ophthalmic Associates  
Schenectady, NY



**Vaidehi Dedania, M.D.**  
Retina, Uveitis and Ocular Oncology  
NYU Langone Medical Center  
New York, NY



**Joshua Ehrlich, M.D., M.P.H.**  
Glaucoma  
Kellogg Eye Center  
Ann Arbor, MI



**Abigail Fahim, M.D., Ph.D.**  
Retina, Uveitis, and Ocular Oncology  
Kellogg Eye Center  
Ann Arbor, MI



**Pimkwan Jaru-Ampornpan, M.D.**  
Ocular Plastics and Orbital Surgery  
Bangkok, Thailand



**Jordan Masters, M.D.**  
Cornea  
University of Tennessee  
Knoxville, TN



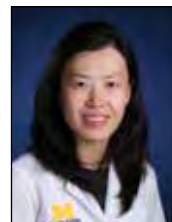
**Purak Parikh, M.D.**  
Cornea  
Nashua Eye Associates  
Nashua, NH



**Joanna Queen, M.D.**  
Glaucoma  
Blanton Eye Institute  
Houston, TX



**Sujata Singh, M.D.**  
Pediatric Ophthalmology  
University of Vermont  
Burlington, VT



**Grace Wang, M.D., Ph.D.**  
Pediatric Ophthalmology  
Kellogg Eye Center  
Ann Arbor, MI



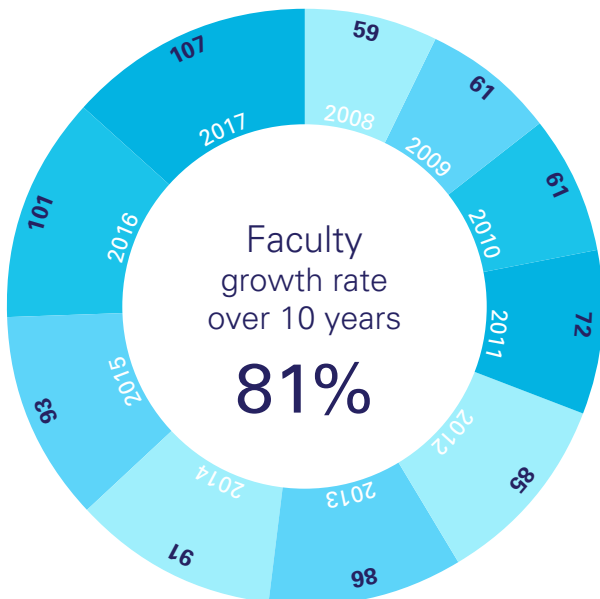
## PAUL LEE ELECTED TO NATIONAL ACADEMY OF MEDICINE

Paul Lee, M.D., J.D., chair of the Department of Ophthalmology and Visual Sciences, was elected in 2017 to the National Academy of Medicine.

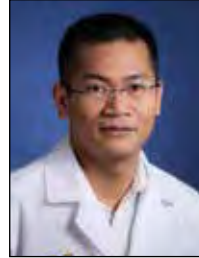
Dr. Lee was honored for his contributions to patient-centered eye care and improving eye care delivery.

Established in 1970 as the Institute of Medicine, the academy is an independent organization of eminent professionals from medicine and the natural, social and behavioral sciences. It serves alongside the National Academy of Sciences and the National Academy of Engineering as a source of respected position statements on the critical issues of our times.

Lee is completing his term as chair of the American Board of Ophthalmology and is a member of the board of directors of the American University Professors of Ophthalmology and the American Glaucoma Society.



## 2017 FIRST YEAR POST-DOCTORAL FELLOWS



### Van Phuc Nguyen, Ph.D.

Dr. Nyugen is from Vietnam. He is working in the laboratory of Yannis Paulus, M.D., on molecular imaging, photoacoustic microscopy, and laser-activated nanoparticles.



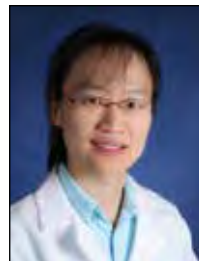
### Amanda Travis, Ph.D.

Dr. Travis is from Denver, CO. She is working in the laboratory of Jillian Pearing, Ph.D., on a project to understand intracellular trafficking mechanisms for proteins destined to reside in the light-sensitive outer segment compartment of photoreceptor cells.



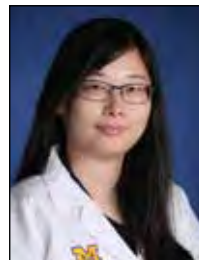
### Eric Weh, Ph.D.

Dr. Weh is from Madison, WI. He is working in the laboratory of Cagri Besirli, M.D., Ph.D., on photoreceptor metabolism and survival.



### Zhenhua Zou, Ph.D.

Dr. Zou is from China. She is working on retinoblastoma in the laboratory of Rajesh Rao, M.D.



### Yi Zhao, Ph.D.

Dr. Zhao is from Xinxiang, China. She works in the laboratory of Alon Kahana, M.D., Ph.D., on the biology of stem cells, cancer, and regeneration. She has a particular interest in the role of nutrition and nutrient utilization in stem cell biology.

## JENNIFER WEIZER EXPANDS PATIENT SAFETY PROGRAM



Under the leadership of Jennifer S. Weizer, M.D., director of the Kellogg Quality Improvement Team, the patient safety program has undergone a major expansion, including a new internal website focusing on protocols, checklists, and the development of safety systems.

The website encourages staff to submit their own suggestions for patient safety, which Dr. Weizer considers a crucial contribution “because people working in the field usually have the best ideas for optimizing the system.”

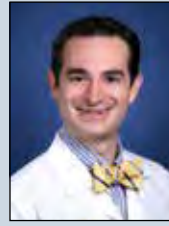
The patient safety committee, composed of physicians, ophthalmic technicians and other Kellogg staff, meets regularly to discuss implementing new safety measures. One of the group’s initiatives is to implement widely root cause analysis (RCA), a method commonly used in business and industry to identify the source of problems. Committee members are trained to serve as RCA team leaders, and each ophthalmology resident physician undertakes RCA exercises several times during training.

Expanded computer capabilities now allow the Kellogg Quality Improvement Team to review much more complete data from the electronic medical record system to assess and improve the department’s safety performance. In the past, such information was randomly sampled.

“I’m excited that Kellogg is embracing the expanded safety program,” Weizer says. “We are fortunate to have such a positive safety culture here—it makes it possible for us to continue to lead the way for patient safety, which rightfully is at the forefront of our efforts to provide the best quality care for our patients.”

*The quality and safety data can be found at:  
[www.uofmhealth.org/quality-safety/ophthalmology](http://www.uofmhealth.org/quality-safety/ophthalmology)*

## 2017 FIRST-YEAR RESIDENTS



**Philip Garza, M.D., M.Sc.**

B.S. – Neuroscience, University of Miami  
M.D. – Emory University School of Medicine



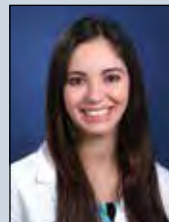
**Rohan Jalalizadeh, M.D.**

B.S. – Biomedical Engineering,  
Washington University  
M.D. – Washington University School of Medicine



**Ryan Lange, M.D.**

B.S. – Biological Sciences, Northwestern University  
M.D. – Johns Hopkins School of Medicine



**Sarah Michelson, M.D.**

B.S. – Biological Sciences, Drexel University  
M.D. – University of Pittsburgh School of Medicine



**Erik Sweet, M.D.**

B.S. – Biochemistry, State University of New York  
M.D. – William Beaumont School of Medicine  
Oakland University



**Megan Tuohy, M.D.**

B.S. – Neuroscience, Brown University  
M.D. – Indiana University School of Medicine



**Eric Weinlander, M.D.**

B.A. – Philosophy and Biology, Lawrence University  
M.D. – School of Medicine and Public Health  
University of Wisconsin

## Steven Abcouwer, Ph.D.

Commercial Relations Committee, Association for Research in Vision and Ophthalmology  
 Grant Reviewer, Career Development (Fellowship) Award, United Kingdom Medical Research Council  
 Grant Reviewer, Fight for Sight, United Kingdom  
 Grant Reviewer, Netherlands Organisation for Scientific Research  
 Grant Reviewer, Singapore Ministry of Health National Medical Research Council  
 Grant Reviewer, Utah Science Technology and Research initiative Technology Acceleration Program  
 Late Breaking Abstract Reviewer, Annual Meeting, American Diabetes Association  
 Study Section, Pathogenesis and Treatments of Eye Diseases, National Institutes of Health

## Steven Archer, M.D.

Castle Connolly Top Doctor  
 Frank Costenbader Lecture, American Association for Pediatric Ophthalmology and Strabismus

## Cagri Besirli, M.D., Ph.D.

Best Doctors in America  
 Commercial Relationship Committee, Association for Research in Vision and Ophthalmology

## Brenda Bohnsack, M.D., Ph.D.

Castle Connolly Top Doctor

## Kari Branham, M.S., C.G.C.

Ad Hoc Grant Reviewer, Foundation Fighting Blindness

## Theresa Cooney, M.D.

Best Doctors in America  
 Castle Connolly Top Doctor  
 President-elect, Michigan Society for Eye Physicians and Surgeons

## Wayne Cornblath, M.D.

Prechter Lecture, Department of Ophthalmology, Wayne State University

## Sherry H. Day, O.D., F.A.A.O.

Board Member, Academic Medical Center Optometrists, American Academy of Optometry

## Monte Del Monte, M.D.

Castle Connolly Top Doctor  
 President, Costenbader Society  
 Selection Committee, Marshall Parks Lecture, American Academy of Ophthalmology  
 Grant Reviewer, Member of Scientific Advisory Board, Knights Templar Eye Research Foundation

## Joshua Ehrlich, M.D., M.P.H.

K23 Mentored Career Development Award, National Eye Institute

## Victor Elner, M.D., Ph.D.

Castle Connolly Top Doctor

## Jerome Finkelstein, M.D., F.A.C.S.

Best Doctors in America  
 Alternate Delegate, Michigan State Medical Society, Michigan Society for Eye Physicians and Surgeons

## Patrice Fort, Ph.D., M.S.

Grant Reviewer, American Diabetes Association  
 Grant Reviewer, Fight for Sight  
 Study Section, Diseases and Pathophysiology of the Visual System, National Institutes of Health

## Chris Gappy, M.D.

Castle Connolly Top Doctor  
 Best Doctors in America

## Thomas Gardner, M.D., M.S.

Best Doctors in America

## John Heckenlively, M.D.

Castle Connolly Top Doctor  
 Grant Reviewer, Fight for Sight UK

## K. Thiran Jayasundera, M.D.

Patent Issued, Systems and Methods for Diagnosing Inherited Retinal Diseases  
 Robert and Gerry Ligon Research Center of Vision Lectureship, Kresge Eye Institute, Wayne State University

## Mark Johnson, M.D.

Best Doctors in America  
 Castle Connolly Top Doctor  
 Retina 150, Ocular Surgery News  
 Lifetime Achievement Honor Award, American Academy of Ophthalmology  
 Credentials Committee, Macula Society  
 Editorial board, *Retina*  
 Editorial board, *American Journal of Ophthalmology*  
 President, The Retina Society

## Alon Kahana, M.D., Ph.D.

Best Doctors in America  
 Achievement Award, American Academy of Ophthalmology  
 Chair, Scientific Advisory Committee, American Society of Ophthalmic Plastic and Reconstructive Surgery  
 Editorial Board, *Ocular Surgery News*  
 President, North American Society of Academic Orbital Surgeons  
 Study Section, Career Development Awards, National Institutes of Health

## Harjeet Kaur, M.D.

Castle Connolly Top Doctor

## Naheed Khan, Ph.D.

Guest Editor, "Inherited Retinal Degeneration: Genetics, Disease Characterization, and Outcome Measures", *Journal of Ophthalmology*

**Paul Lee, M.D., J.D.**

Castle Connolly Top Doctor  
 Elected Member, National Academy of Medicine  
 Lifetime Achievement Honor Award, American Academy of Ophthalmology  
 Advisory Committee, *JAMA Ophthalmology*  
 Board of Directors, American Glaucoma Society  
 Board of Directors, American University Professors of Ophthalmology  
 Board of Trustees, Society of Heed Fellows  
 Chair, American Board of Ophthalmology  
 Vision Health Initiative, Centers for Disease Control

**Paul Lichter, M.D., M.S.**

Best Doctors in America  
 Castle Connolly Top Doctors  
 Bernardo Streiff Medal, Academia Ophthalmologica Internationalis  
 Hogan-Ferguson Ethics Lecture, Alamo City Clinical Conference

**Shahzad Mian, M.D.**

Castle Connolly Top Doctors  
 Straatsma Award for Excellence in Resident Education, American Academy of Ophthalmology  
 Co-chair, Accreditation Board, Eye Bank Association of America  
 Editorial Board, *Cornea*  
 President, Program Director's Council, Association of University Professors in Ophthalmology  
 Program Committee, American Academy of Ophthalmology

**Sayoko Moroi, M.D., Ph.D.**

Co-chair, Surgery Day, American Glaucoma Society  
 Program Planning Committee, American Glaucoma Society  
 Study Section, Bioengineering of Neuroscience, Vision and Low Vision Technologies, National Institutes of Health

**David Musch, Ph.D., M.P.H.**

Review Committee, 2017 Joanne Angle Investigator Award, Prevent Blindness

**Christine Nelson, M.D., F.A.C.S.**

Board and Meeting Chair, World Association of Eye Hospitals

**Yannis Paulus, M.D., F.A.C.S.**

Grant reviewer, Great Ormond Street Hospital Children's Charity, United Kingdom

**Donald Puro, M.D., Ph.D.**

Best Doctors in America

**Rajesh Rao, M.D.**

Elected Member, The Retina Society  
 Young Physician-Scientist Award, American Society for Clinical Investigation  
 Selection Committee, Howard Hughes Medical Institute Medical Research Fellows Program

**Rajesh Rao, M.D. (cont.)**

Early Career Reviewer, Biology of the Visual System Study Section, Center for Scientific Review, National Institutes of Health  
 Grant Reviewer, Merit Review Program, Clinical Science Research & Development Service, Office of Research and Development, Department of Veterans Affairs

**Manjool Shah, M.D.**

Mentoring for the Advancement of Physician Scientists Award, American Glaucoma Society

**Alan Sugar, M.D.**

Grant Reviewer, National Medical Research Council of Singapore, California Institute for Regenerative Medicine

**Joshua Stein, M.D., M.S.**

Secretariat Award, American Academy of Ophthalmology  
 Chair, CARES Program, American Glaucoma Society  
 Chair, Health Care Policy and Reimbursement Policy Subcommittee, American Glaucoma Society  
 Editorial Board, *JAMA Ophthalmology*  
 IRIS Registry Task Force, American Academy of Ophthalmology  
 National Quality Forum, Standing Committee for Eye, Ear, Nose, and Throat  
 Pyott Glaucoma Education Center Leadership Team, American Academy of Ophthalmology  
 Strategic Planning Committee, American Glaucoma Society  
 Vice Chair, Patient Care Committee, American Glaucoma Society

**Debra Thompson, Ph.D.**

Macular Degeneration Research Scientific Review Committee, BrightFocus

**Jonathan Trobe, M.D.**

Castle Connolly Top Doctors

**Joshua Vrabec, M.D.**

Partner Committee, Combat Blindness International

**Jennifer Weizer, M.D.**

Best Doctors in America

**Kwoon Wong, Ph.D.**

Grant Reviewer, Netherlands Organisation for Scientific Research  
 Grant reviewer, UK Biotechnology and Biological Sciences Research Council

**Sarah Wood, O.D., M.S., F.A.A.O., Diplomate A.B.O.**

Secretary/Treasurer, Glaucoma Section, American Academy of Optometry

**Maria Woodward, M.D., M.S.**

Program Committee, American Academy of Ophthalmology  
 Associate Editor, Cataract and Refractive Surgery, *BMC Ophthalmology*

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**Collaborating Faculty**

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FACULTY NAME	PROJECT TITLE	SOURCE
S. Abcouwer, Ph.D.	Integrated Systems Biology Approach to Diabetic Microvascular Complications; multi-PI Subaccount with Eve Feldman, M.D., Ph.D., Neurology, U-M	NIH
	Testing Neuroprotective Effect of ONL-1204 Ocular Formulation Dose Response in Mouse Retinal Ischemia Injury Model	ONL Therapeutics
	Examining the Effect of a Senolytic Drug Compound on Retinal Ganglion Cell Senescence and Retinal Pathology Following Ischemia-Reperfusion Injury	Unity Biotechnology
D. Antonetti, Ph.D.	Discovering Novel Atypical PKC Inhibitors as in vivo Chemical Probes	NIH
	Immune Mediated Regeneration of Retinal Ganglion Cell Axons Following Optic Nerve Trauma; Subaccount Benjamin Segal, M.D., Neurology, U-M	NIH
	Mechanisms of Retinal Vascular Permeability in Diabetes	NIH
	Michigan Mouse Metabolic Phenotyping Center	NIH
	Subaccount with Malcolm Low, M.D., Ph.D., Molecular and Integrative Physiology, U-M	
	Novel Therapies to Inhibit Diabetic Retinopathy	NIH
	Subcontract to Case Western University	
	Structural Studies of Tight Junction Proteins	NIH
	Subcontract to Pennsylvania State University	
Norrin as a Potential Therapy for Diabetic Retinopathy	American Diabetes Association, Inc.	
Protective Effects of ATXi in IR Mouse Model	F. Hoffman-La Roche	
Testing in mDia1 Knockout for Retinal Pathology in Diabetes and Ischemia Reperfusion	New York University	
Subcontract to New York University		
Jules and Doris Stein RPB Professorship	RPB	
S. Aton, Ph.D.	Testing the Role of Sleep in Promoting Recovery from Amblyopia	RPB
C. Besirli, M.D., Ph.D.	Neuroprotection in Pediatric Retinal Detachment	NIH
	An Open-label, Multicenter Phase I/II Dose Escalation Trial of an Adeno-Associated Virus Vector (AAV2/5-OPTIRPE65) for Gene Therapy of Adults and Children with Retinal Dystrophy Associated with Defects in RPE65 (LCA2)	MeiraGTx
	A Randomized, Open-Label, Controlled, Multicenter Study to Compare the Efficacy and Safety of Intravitreal Ranibizumab with Laser Therapy in Patients with Retinopathy of Prematurity	Novartis
	An Extension Study to Evaluate the Long Term Efficacy and Safety of Ranibizumab Compared with Laser Therapy for the Treatment of Infants Born Prematurely with Retinopathy of Prematurity	Novartis Pharmaceuticals, Inc.
	Stress-Induced Neuroprotection in the Retina	RPB
B. Bohnsack, M.D., Ph.D.	Regulation of Ocular Neural Crest and Its Implications in Congenital Eye Diseases	NIH
	Retinoic Acid Regulation of Anterior Segment Maintenance in a Zebrafish Model of Glaucoma	Alcon Laboratories, Inc.
	Identifying Neural Crest Stem Cells for Corneal Stroma and Endothelium	Eversight
K. Branham, M.S., C.G.C.	My Retina Tracker Genetic Testing Study	FFB
G. Comer, M.D., M.S.	Treatment for Central-Involved Diabetic Macular Edema in Eyes	NIH
	Safety and Efficacy of Abicipar Pegol (AGN-150998) in Patients with Neovascular Age-Related Macular Degeneration	Allergan Pharmaceuticals
	A Phase 1b/2a, Randomized, Double-Blinded, Placebo-Controlled, Multicenter Study to Evaluate the Safety, Tolerability, Pharmacodynamics of BMS-936559 in Subjects with Severe Sepsis	Bristol-Myers Squibb
An Open-Label, Multicenter, Global Phase 2 Basket Study of Entrectinib for the Treatment of Patients with Locally Advanced or Metastatic Solid Tumors that Harbor NTRK1/2/3, ROS1, or ALK Gene Rearrangements	Ignyta	

# EXTERNAL GRANTS AND FUNDING

JULY 1, 2016 — SEPTEMBER 30, 2017

FACULTY NAME	PROJECT TITLE	SOURCE
G. Comer, M.D., M.S. (cont.)	A Phase 2/3, Multi-Center, Randomized, Double-Blind study with Selinexor (KPT-330) Versus Placebo in Patients with Advanced Unresectable Dedifferentiated Liposarcoma (DDLs)	Karyopham Therapeutics
	A Natural History Study of Macular Telangiectasia—The MacTel Study Extension Study of NT-501 Ciliary Neurotrophic Factor (CNTF) Implant for Macular Telangiectasia (MacTel)	LMRI LMRI
W. Cornblath, M.D.	A Randomized, Placebo-Controlled, Parallel-Group, Double-Blind Efficacy and Safety Trial of MK-8931 in Subjects with Mild to Moderate Alzheimer's Disease	Merck Research Labs
L. De Lott, M.D.	Michigan Vision Clinician Scientist Development Program	NIH
	A Phase 2/3, Randomized, Double-Masked, Sham-Controlled Trial of QPI-1007 Delivered by Single or Multi-Dose Intravitreal Injection(s) to Subjects with Acute Nonarteritic Anterior Ischemic Optic Neuropathy	Quark Pharmaceuticals, Inc.
M. Del Monte, M.D.	Study of Adult Strabismus (SAS1)-A Prospective Observational Study	NIH
	An Observational, Multicenter Study of the Prevalence of Cerebrotendinous Xanthomatosis in Patient Populations Diagnosed with Early-Onset Idiopathic Bilateral Cataracts	Retrophin, LLC
R. Douglas, M.D., Ph.D.	Using Digital Photography in Telemedicine for External Ophthalmic Diseases	Alliance for Vision Research
J. Ehrlich, M.D., M.P.H.	Addressing Low Vision Due to Severe Peripheral Field Loss: Development and Validation of a Patient-Centered Outcome Measure	NIH
S. Elner, M.D.	Macular Edema Treatment Trials Associated with MUST (META-MUST) Subcontract to Johns Hopkins University	NIH
	MUST FS Project Subcontract to Johns Hopkins University	NIH
P. Fort, Ph.D., M.S.	Progressive Impact of Diabetes on Retinal Neuroprotection by $\alpha$ -Crystallins Regional Alterations of the Human Retinal Transcriptome During Diabetes	NIH Eversight
P. Gage, Ph.D.	Identification of PITX2-Dependent Mechanisms in the Developing and Mature Cornea	NIH
T. Gardner, M.D., M.S.	Diabetic Retinopathy Clinical Research Network Coordinating Center: Jaeb Center for Health Research	NIH
	Genes in Diabetic Retinopathy Coordinating Center: Jaeb Center for Health Research	NIH
	Intravitreal Anti-VEGF vs. Prompt Vitrectomy for Vitreous Hemorrhage from Proliferative Diabetic Retinopathy Coordinating Center: Jaeb Center for Health Research	NIH
	Michigan Vision Clinician Scientist Development Program	NIH
	Regulation of Retinal Cell Death in Diabetes	NIH
	Application of an Unbiased Proteomics Approach to Identify Therapeutic Targets for the Treatment of Anti-VEGF Resistant Diabetic Macular Edema	Novo Nordisk A/S
	Retina Research Foundation Award Improving the Diagnosis and Treatment of Early Stage Diabetic Retinopathy	Retina Research Foundation Tel Aviv University
J. Heckenlively, M.D.	A Multiple-Site, Phase 1/2, Safety and Efficacy Trial of a Recombinant Adeno-Associated Virus Vector Expressing Retinoschisin in Patients with X-Linked Retinoschisis	Applied Genetic Technologies Corp.
	Retinitis Pigmentosa Natural History Study of Patients with the P23H Mutation of the Rhodopsin Gene	Ionis Pharmaceuticals

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JULY 1, 2016 — SEPTEMBER 30, 2017

FACULTY NAME	PROJECT TITLE	SOURCE
P. Hitchcock, Ph.D.	Neuronal Development, Injury and Repair in Retina Vision Research Training Program	NIH NIH
B. Hughes, Ph.D.	Core Center for Vision Research (five core modules) Ion Conductances in the Retinal Pigment Epithelium	NIH NIH
K.T. Jayasundera, M.D.	Targeted Functional Testing for Retinal Diseases Based on Patient Reported Outcomes A Phase 2a Multicenter, Randomized, Masked Study Evaluating the Pharmacodynamics of Emixustat Hydrochloride in Subjects with Macular Atrophy Secondary to Stargardt Disease EDI-OCT Choroidal Evaluation in Patients with Choroideremia Rate of Progression in USH2A Related Retinal Degeneration (RUSH2A) Natural History Study of Patients with Leber Congenital Amaurosis Associated with Mutations in RPE65 Post-Approval Study of the Argus II Retinal Prosthesis System	NIH Acucela, Inc. FFB FFB MeiraGTx Second Sight Medical Products, Inc.
M. Johnson, M.D.	A Multi-Center, Open-Label Extension Study to Evaluate the Long-term Safety and Tolerability of Lempalizumab in Patient with Geographic Atrophy Secondary to Age-Related Macular Degeneration Who Have Completed a Roche-Sponsored Study Efficacy and Safety of Lempalizumab Administered Intravitreally to Patients with Geographic Atrophy Secondary to Age-Related Macular Degeneration	Genentech, Inc. Genentech, Inc.
A. Kahana, M.D., Ph.D.	A Zebrafish Model of Extraocular Muscle Regeneration Development of Cultured Human Embryonic Extraocular Muscle Cells VISmodegib as Neo-Adjuvant for ORBITal Periocular Basal Cell Carcinoma Fast Forward Medical Innovation	NIH Alliance for Vision Research Genetech, Inc. William Davidson Foundation
P. Lee, M.D., J.D.	Vision Health Initiative Child Vision Care Fund Unrestricted Grant	Centers for Disease Control W.K. Kellogg Foundation RFB
S. Mian, M.D.	Cross Sectional Study of Prevalence of TGFBI Corneal Dystrophies Pilot Study on Riboflavin-Ultraviolet Light Collagen Crosslinked Donor Tissue for Use as a Carrier for the Boston Keratoprosthesis; Subcontract to Massachusetts Eye and Ear Infirmary Pilot Study to Assess Feasibility and Efficacy of Pre-Loaded Corneal Donor Grafts for Descemet Membrane Endothelial Keratoplasty A Prospective, Multicenter Clinical Trial of the Implantable Miniature Telescope in Pseudophakic Eyes with Central Vision Impairment Associated with End-Stage Macular Degeneration A Prospective, Multicenter Post-Approval Study of VisionCare's Implantable Miniature Telescope in Patients with Bilateral Severe to Profound Central Vision Impairment Associated with End-Stage Age-Related Macular Degeneration	Avellino Laboratory USA, Inc. Department of Defense Eversight VisionCare Ophthalmic Technologies VisionCare Ophthalmic Technologies
S. Moroi, M.D., Ph.D.	Therapy Development in Canine Models of Open-Angle Glaucoma Subcontract to Michigan State University A Prospective, Double-Masked, Randomized, Multi-Center, Active-Controlled, Parallel-Group 12-Month Study Assessing the Safety and Ocular Hypotensive Efficacy of PG324 Ophthalmic Solution Compared to AR-13324 Ophthalmic Solution and Latanoprost Ophthalmic Solution in Subjects with Elevated Intraocular Pressure The Efficacy and Safety of Bimatoprost SR in Patients with Open-Angle Glaucoma or Ocular Hypertension	NIH Aerie Pharmaceuticals, Inc. Allergan Pharmaceuticals, Inc.
D. Musch, Ph.D., M.P.H.	Assessing the Impact of Glaucoma and Its Treatment on the Person	NIH

# EXTERNAL GRANTS AND FUNDING

JULY 1, 2016 — SEPTEMBER 30, 2017

FACULTY NAME	PROJECT TITLE	SOURCE
P. Newman-Casey, M.D., M.S.	Improving Glaucoma Self-Management with Technology-Supported Counselors	NIH
	A Counseling Training Program for Glaucoma Staff: Development and Preliminary Assessment	American Glaucoma Society
	Creating and Evaluating a Counseling Training Program for Glaucoma Staff	Blue Cross Blue Shield of Michigan
	David L. Epstein, M.D. Clinician Scientist Research Award	Chandler-Grant Glaucoma Society
	The eyeGuide: Evaluating the Impact of a Personally Tailored Behavior Change Program for Glaucoma Patients	RPB
T. Patel, M.D., Ph.D.	Photo-Mediated Ultrasound Therapy as a Novel Adjunct Therapy for Macular Degeneration	Alliance for Vision Research
Y. Paulus, M.D.	Michigan Vision Clinician Scientist Development Program	NIH
	Real-time in vivo Visualization of Molecular Processes in Retinal and Choroidal Neovascularization	Fight for Sight, Inc.
	Smartphone-Based Wide-Field Fundus Photography for Diagnosis and Telemedicine in Pediatric Retinal Diseases	The Knights Templar Foundation, Inc.
L. Prasov, M.D., Ph.D.	Validating Myelin Regulatory Factor (MYRF) as a Nanophthalmos Gene and Regulator of Eye Development	The Knights Templar Foundation, Inc.
D. Puro, M.D., Ph.D.	A Novel Experimental Approach to Dry Eye: Role of Ion Channels in the Physiology and Pathobiology of Conjunctival Goblet Cells	RPB
R. Rao, M.D.	Epigenetic Control of Retinal Development	NIH
	Targeting EZH2-TET3 Epigenetic Axis in Human Retinoblastoma	Alcon Laboratories, Inc.
	Epigenetic Dissection of Hereditary Macular Degeneration: A Stem Cell Approach	E. Matilda Ziegler Foundation
	Sustaining Early-Born Retinal Neuron Potency from Stem Cells: An Epigenetic Approach	RPB
	Targeting EZH2, a Histone Methyltransferase, as a Novel Therapy for Human Retinoblastoma	The Knights Templar Foundation, Inc.
J. Richards, Ph.D.	NEIGHBORHOOD Consortium for POAG Genomics; Subcontract to MEEI	NIH
	Defining a New Gene for Nanophthalmos	Alliance for Vision Research
	Genetics of Homocysteine Metabolism in Glaucoma	BrightFocus Foundation
M. Shah, M.D.	Incidence of Missed Angle-Closure Diagnoses in Patients with Acute Angle-Closure	American Glaucoma Society
R. Shtein, M.D., M.S.	Assessment of Dry Eye Symptom Severity (DREAM study)	NIH
	Subcontract to University of Pennsylvania	
	Multinational, Collaborative Evaluation of Corneal Confocal Microscopy as a Surrogate Endpoint for the Identification and Prediction of Diabetic Neuropathy in Type 1 Diabetes; Subcontract to Mount Sinai Hospital, Toronto	NIH
	Study to Assess Loteprednol Etabonate Ophthalmic Gel	Bausch & Lomb
T. Smith, M.D.	Autoimmunity Center of Excellence Clinical Research	NIH
	Subaccount with David A. Fox, M.D., Internal Medicine, U-M	
	Regulation of Retroocular Connective Tissue	NIH
	River Vision Pilot Study	River Vision
B. Stagg, M.D.	Understanding the Burden of Glaucoma Care Delivery: The Patients' Perspective	Blue Cross Blue Shield

# EXTERNAL GRANTS AND FUNDING

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FACULTY NAME	PROJECT TITLE	SOURCE
J. Stein, M.D., M.S.	Collaboration on Cost-Effectiveness Analyses–DRCR Network	NIH
	Oral Microbiome and Periodontitis: A Prospective Study in Postmenopausal Women	NIH
	Personalized Forecasting of Disease Trajectory for Patients with Open-Angle Glaucoma; multi-PI	NIH
	Using Claims Data to Compare the Safety of Glaucoma Drainage Device vs. Trabeculectomy with and without ExPress Shunt	American Glaucoma Society
	Relationship Between Components of Metabolic Syndrome and Open-Angle Glaucoma	Blue Cross Blue Shield of Michigan
	Assessment of the Relation between Medications for Epilepsy and Risk of Developing Open-Angle Glaucoma	Harvard University
	Do Patients with Vision Loss Use More Healthcare Services and Incur Higher Overall Healthcare Costs? The Role of Vision Diagnosis and Visual Function	Lighthouse Guild
	Assessment of the Relation Medications for Erectile Dysfunction and Risk of Developing Open-Angle Glaucoma	MEEI
Stanford University - University of Michigan Collaboration	Does Exposure to Common Antibiotics Affect Risk of IHH?	Stanford University University of Minnesota
A. Sugar, M.D.	Central IRB Review of Local Context in Emergency Research: Empirical Ethics Study Subaccount with Robert Siliberleit, M.D., Emergency Medicine, U-M	NIH
	Effect of Corneal Preservation Time on Long-Term Graft Success Coordinating Center: Jaeb	NIH
D. Thompson, Ph.D.	The Role of NADPH Oxidase in RDH12-Associated Retinal Degeneration	VitreoRetinal Surgery Foundation
J. Weiland, Ph.D.	Core Grant for Vision Research	NIH
K. Wong, Ph.D.	Physiology of Intrinsically Photosensitive Retinal Ganglion Cells	NIH
	Treating Blindness by Manipulating Intraretinal Melanopsin Signaling	Brain Research Foundation
	An Inexpensive Smartphone-Based Eyewear for Persons with Low Vision	Promobilia Foundation
	Intraretinal Signaling by Intrinsically Photosensitive Retinal Ganglion Cells	RPB
Identification of Novel Drug Target for Retinal Disorders; multi-PI		Zietchick Research Institute
S. Wood, O.D.	Intense Pulsed Light (IPL) for the Treatment of Dry Eye Disease	Eversight
M. Woodward, M.D., M.S.	Telemedicine For Anterior Eye Diseases	NIH
	Development of Clinical Tools for Telemedicine in Ophthalmology	Alliance for Vision Research
	Optical Coherence Tomography for Anterior Eye Diseases	Alliance for Vision Research
D. Zacks, M.D., Ph.D.	Modulating Autophagy Flux: A Novel Mechanism for Treatment of ADRP Secondary to Rhodopsin Misfolding Mutations	FFB
	Dysregulation of RPE Autophagy and Age-Related Macular Degeneration	RPB
	Computer-Adaptive Contrast Sensitivity Testing in Macula-off Retinal Detachment, Central Serous Retinopathy and Plaque Toxicity	VitreoRetinal Surgery Foundation

## SOURCE ABBREVIATIONS

- FFB ..... *Foundation Fighting Blindness*  
 LMRI ..... *Lowy Medical Research Institute*  
 MEEI .... *Massachusetts Eye and Ear Infirmary*  
 NIH ..... *National Institutes of Health*  
 RPB ..... *Research to Prevent Blindness*

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University of Michigan

Department of Ophthalmology and Visual Sciences

W.K. Kellogg Eye Center

1000 Wall Street

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