

UNIVERSITY OF MICHIGAN W.K. KELLOGG EYE CENTER



KELLOGG EYE CENTER
MICHIGAN MEDICINE

ANNUAL REPORT

2019

University of Michigan Kellogg Eye Center Annual Report 2019



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Front cover clockwise from top:

Senait Fesseha, M.D., J.D., Emily Schehlein, M.D., Yanniss Paulus, M.D., F.A.C.S., Bella Guzzardo, patient, PaulaAnne Newman-Casey, M.D., M.S.



At the University of Michigan W.K. Kellogg Eye Center, faculty, staff, students and trainees collaborate to improve patients' lives and innovate for the future of vision care.

The Chair's Perspective

Dear Friends and Colleagues,

It is always a joy to highlight the people, programs and progress of the Kellogg Eye Center in our annual report. As we organized this year's articles—which represent a sampling of our work throughout the year—several themes emerged:

At Kellogg, there's no tunnel vision in visual science

Every day, our clinicians and scientists advance the field of ophthalmology. At the same time, we're discovering pathways to improve patient health on a broader scale. This year's report highlights several examples: repurposing a diabetic retinopathy treatment into a potentially life-saving stroke rescue drug; using an unsuccessful cancer drug to dramatically improve the treatment of thyroid eye disease; applying insights from prostate cancer imaging and diagnostics to future ophthalmic uses; and identifying a link between visual impairment and lower rates of mammography screening.

At Kellogg, we celebrate crossing one finish line by starting another race

Kellogg brought together a consortium of ophthalmology departments to compile a database of comprehensive medical (in addition to eye care) information from hundreds of thousands of eye patients. This complements the tens of millions of patients whose eye care information has been collected by the American Academy of Ophthalmology's IRIS Registry. Researchers are already mining these big-data powerhouses, using machine learning and other algorithms, to identify new diagnostic markers and treatment targets.

Our colleagues at Emory University and the VA developed a telemedicine intervention to improve access to eye care for veterans. Kellogg investigators are now bringing the program to veterans in Michigan and applying the model to glaucoma screening for high-risk individuals in underserved communities in the region.

At Kellogg, we go all in

Our patient's story in this year's report demonstrates what's possible when many ophthalmic subspecialties work together to see one patient through a lifetime of complex vision challenges. Other stories highlight our teams working to improve vision health in community settings, including in schools and underserved areas of Michigan and in countries as far off as Ethiopia and India.

The accomplishments highlighted in these pages illustrate the ultimate team effort. They showcase the ingenuity and drive of our faculty, staff, trainees and alumni, the dedication and generosity of our donor partners, and the engagement and perseverance of the patients we are so honored to serve. Thank you for reading our annual report. We are grateful to every member of the Kellogg family for another year of remarkable progress.

Paul

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

Multidisciplinary Care to Restore Vision: One Patient's Nearly 50 Year Journey

Sometimes, life throws a curve ball. Strangely, many of the curve balls in Todd Osment's life have hit him in the left eye.

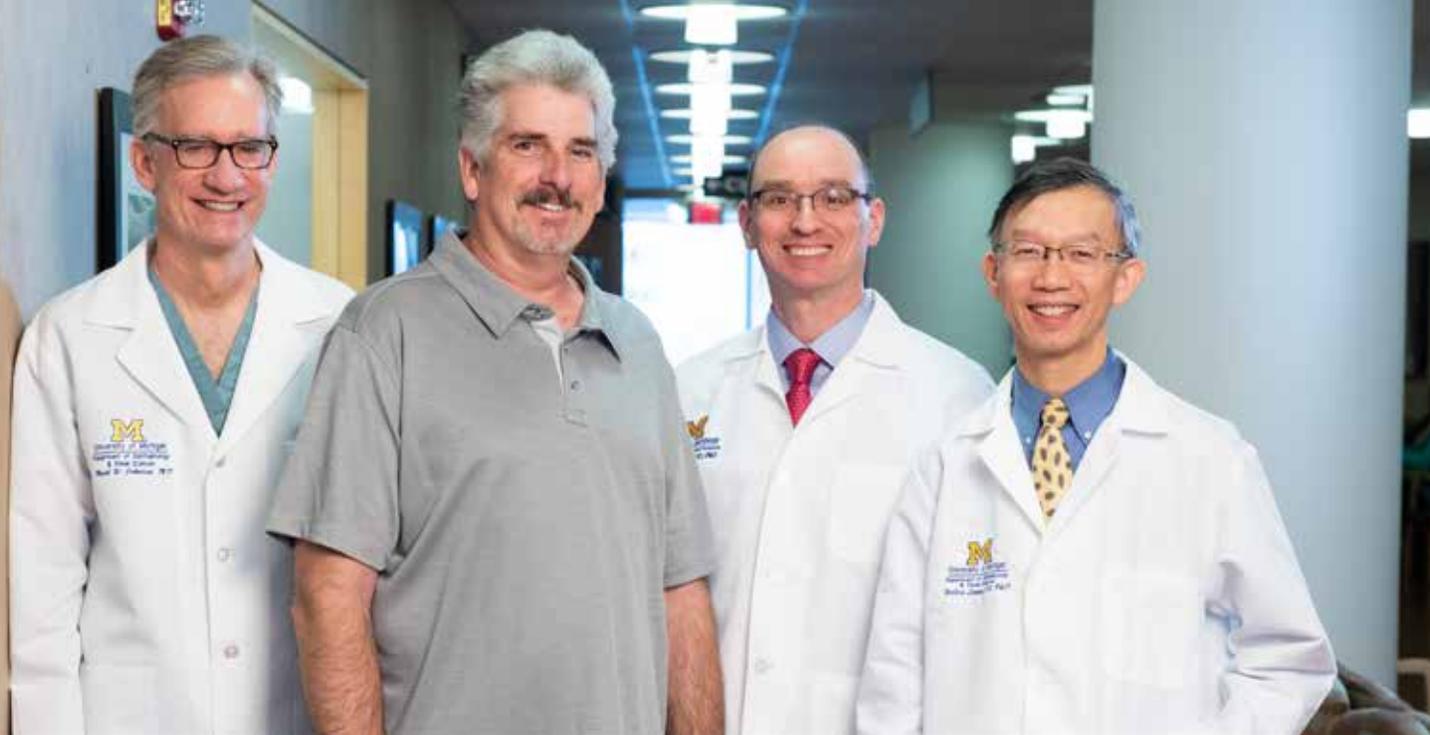
"I was nine years old the first time the eye was injured," says Osment, now 56. "A classmate shot a pencil at me with a rubber band." That was also the first time Osment made the 45-mile trip from his home in Monroe, Michigan, to the Kellogg Eye Center where a surgeon was able to save the eye, but not its vision. This is the story of how, 47 years later, he is able to see in that eye.





— Todd Osment

SIGHT IS A GIFT, AND I WILL BE FOREVER GRATEFUL TO THE TEAM AT KELLOGG FOR SAVING MINE. MY DAUGHTER WAS INVOLVED IN CHEERLEADING, SPORTS AND MUSIC IN SCHOOL. THANKS TO MY KELLOGG DOCTORS, I NEVER MISSED AN EVENT.



Patient Todd Osment with part of his Kellogg care team. Left to right: Mark W. Johnson, M.D., David N. Zacks, M.D., Ph.D., Helios T. Leung, O.D., Ph.D.

After his injury Osment would rely solely on his right eye for the next 20 years. As he got older, he became more aware of images in his left eye and—after surgery to implant an intraocular lens—he saw slightly better.

In 2012, Osment would suffer yet another injury to his left eye. While clearing tree branches in his yard after a storm, a branch struck Osment under the safety glasses he was wearing, rupturing his left globe.

Doctors at the hospital near his home in Adrian, Michigan, determined that the injury was too severe to be managed there. Arrangements were made for a Kellogg surgical team to perform an emergency procedure to reconstruct the globe. After his eye healed, Maria Woodward, M.D., M.S., a corneal specialist who has helped care for Osment at Kellogg, performed a cornea transplant.



For the first time since childhood, Osment had reliable vision in his left eye. Yet another curve ball was coming. In 2014, he began to experience redness and pain in the eye. Due to his multiple traumas and the development of glaucoma, “it appeared that the corneal transplant was slowly rejecting,” says Kellogg

glaucoma specialist **Paula Anne Newman-Casey, M.D., M.S.**, who, along with Joshua Stein, M.D., M.S., was treating his glaucoma.

Despite an aggressive regimen of both steroid drops and oral steroids, the team was unable to rescue the graft. A second transplant was performed by cornea specialist Roni Shtein, M.D., M.S.

**ONE PATIENT'S REMARKABLE STORY
ILLUSTRATES THE BENEFITS OF SEEKING
TREATMENT AT AN INSTITUTION
THAT'S READY FOR ANYTHING.**

“Both Mr. Osment’s transplant and a follow-up procedure to remove residual membranes were very successful,” Dr. Shtein says. “He healed well, and we were able to refer him for a special contact lens to further improve his vision.”

Kellogg optometrist Helios Tin-Chung Leung, O.D., a specialist in fitting contact lenses for irregular and post-surgical corneas, prescribed a lens that restored Osment’s vision to 20/20.

In fall 2017, Osment developed a serious infection inside the eye called endophthalmitis and was evaluated by Kellogg's retina service. “Endophthalmitis is a painful condition that compromises vision and can cost a patient both sight and the eye if not treated promptly,” says retinal specialist **Thérèse Sassalos, M.D.**



Sassalos and colleagues Mark Johnson, M.D., and David Zacks, M.D., Ph.D., monitored Osment every day until the infection was resolved. They used ultrasound to examine the inflammation in the back of the eye, and performed retinal injections to remove fluid for analysis and administer antibiotics.

Today, Todd Osment enjoys excellent health and vision in both eyes. He credits his Kellogg physicians, but they credit him. “Through each challenge, he remained engaged in his care, which is impressive,” says Dr. Woodward.

“At every step he was diligent, asked great questions, and did everything we asked of him,” adds Dr. Sassalos. “It’s a privilege to care for someone so involved and so appreciative.”

A Revolutionary Treatment for Thyroid Eye Disease

Physicians have long searched for a more effective treatment for Graves’ disease, an autoimmune disorder that leads the thyroid gland to produce more hormones than it should. About half of patients with Graves’ disease also develop thyroid-associated ophthalmopathy, or thyroid eye disease. In that condition, patients frequently experience symptoms such as eye bulging (proptosis), eyelid swelling, constant stare, pain and double vision. They can even go blind.

Traditionally, doctors have turned to oral steroids to reduce inflammation around the eye and artificial tears to relieve dryness. Surgery isn’t usually an option until the disease becomes inactive. Even then, the procedure is costly, complex and not guaranteed to fully restore vision or appearance.

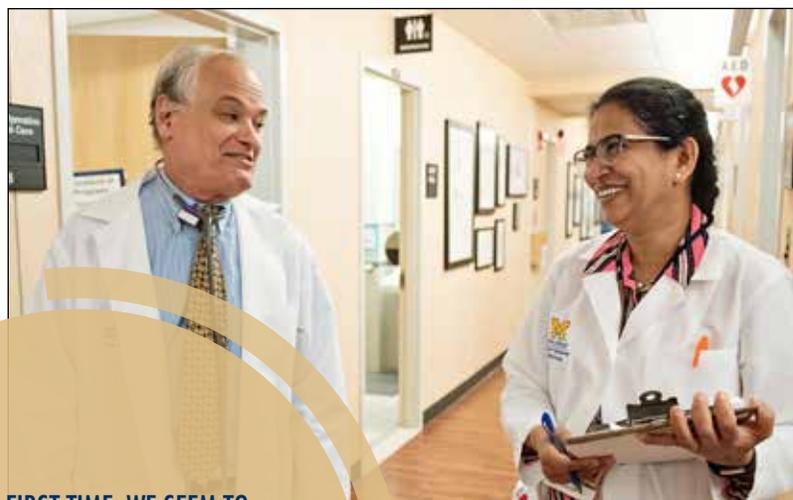
Now a highly anticipated drug could change the treatment paradigm. The drug, teprotumumab, is a monoclonal antibody first developed to treat cancer. It proved an ineffective cancer therapy, but Terry J. Smith, M.D., saw its potential to interrupt the development of Graves’ disease. Dr. Smith’s basic science research laid the groundwork for translating teprotumumab to ocular patient care.

Dr. Smith, who directs the national Graves’ Disease and Thyroid Foundation, is a professor of ophthalmology at Kellogg—the only endocrinologist in the U.S. with a full-time primary faculty appointment at an academic eye center.

Phase 2 and phase 3 clinical trials, directed with co-principal investigator Raymond Douglas, M.D., Ph.D., a Graves’ disease specialist, oculoplastic surgeon, and past Kellogg faculty member, yielded dramatic results. Most trial participants who received intravenous teprotumumab had reduced proptosis, eye pain, double vision and swelling. Many experienced positive results within weeks. The results often lasted for a year or more, with limited, manageable side effects.

After fast-tracking its review, a FDA Advisory Panel recently voted unanimously to recommend approval of teprotumumab with a vote of 12-0 in favor of this breakthrough therapy.

“For the first time, we seem to have a medical therapy that outperforms currently available treatments,” says Dr. Smith. “Teprotumumab may make it possible to treat the disease earlier, reducing inflammation around the eyes and lessening the severity of other symptoms.”



—Terry J. Smith, M.D.

“FOR THE FIRST TIME, WE SEEM TO HAVE A MEDICAL THERAPY THAT OUTPERFORMS CURRENTLY AVAILABLE TREATMENTS.”

Top: Terry J. Smith, M.D., and Nina Tate, B.S., C.O.A., meet with patient Janet Rost.
Middle photo: Dr. Smith and Roshini S. Fernando, M.S.
Bottom: Dr. Smith with patient Sarah Newland.



Kellogg Initiates Joint Internship and Residency Program

Michigan Medicine and the Kellogg Eye Center are implementing changes to the established post-graduate calendar for future ophthalmologists.

The traditional way...

Before graduating medical school, students apply for and match with a residency program in their desired specialty, such as a three-year ophthalmology residency. During the first post-graduate year or PGY1, a newly minted doctor completes a one-year internship in a different medical specialty or combination of specialties before formal residency begins. Internships and residencies are often completed at different institutions.

As of July 2019...

Aspiring ophthalmologists can complete a PGY-1 internship at Michigan Medicine that includes three one-month blocks of ophthalmology training interspersed among nine months of training in internal medicine.

The change, approved by the Accreditation Council for Graduate Medical Education, will soon become the standard for post-graduate training in ophthalmology.

“This is an exciting evolution in how ophthalmologists are trained,” says clinical associate professor Bradford Tannen,



PGY1 Omar Moinuddin, M.D., Bernadete Ayres, M.D., Bradford Tannen, M.D., J.D., M.B.A., and patient Andrew McKeon.

M.D., J.D., M.B.A. “While building a ‘provider skill set’ at a top medical school, they’re also getting a jump start on the fundamentals of practicing ophthalmology, including patient work-ups, basic diagnostics and even an introduction to the operating room.”

“By covering the basics sooner, they’re ready to hit the ground running when their ophthalmology residency begins,” adds professor Shahzad Mian, M.D. “It also frees up more time at the end of residency for more focused, tailored studies and even research.”

Dr. Tannen assumed responsibilities as Kellogg’s residency program director in 2019, succeeding Dr. Mian, who had served in the position since 2004.

Kellogg Hosts Conference for Retinal Dystrophy Patients, Caregivers

On Oct. 19, 2019, Kellogg, with partial support from the Foundation Fighting Blindness and the Milton M. Ratner Foundation, hosted a one-day informational and inspirational forum for patients living with inherited retinal diseases.

The event, Living with a Retinal Dystrophy—Tools to Help You Thrive, drew more than 100 people—about 70 patients and 30 family members or caregivers—from Michigan, Ohio, Indiana and Illinois.

One session focused on clinical issues. “We provided education on the various inherited retinal syndromes and their genetic origins,” says Kari Branham, M.S., C.G.C.,

a Kellogg genetic counselor and director of the event. “We also reviewed current treatment options, including clinical trials of experimental gene and stem cell therapies.”

A second session covered living with a retinal dystrophy. Specialists in clinical psychology, occupational therapy and low vision, as well as representatives from the local school district and Leader Dogs for the Blind chapter shared ideas and resources.

“We can’t change the diagnosis,” says Branham. “But events like this help patients and caregivers cope with these challenging diseases by learning from experts and from each other.”



Sue Hackman from Leader Dogs for the Blind speaks during the forum.

A Look at Vision Impairment and Age-Related Risk of Falls

It's estimated that 29 million seniors fall every year, resulting in 7 million injuries, 2.8 million emergency department visits, 800,000 hospitalizations and 27,000 deaths.

Several factors are linked with fall risk, including balance and cognitive impairment. Anecdotally, it is known that visual problems play a part too, yet there is much to learn about the interplay between vision and the physical and cognitive issues that place older adults at greater risk of falling.

A new study led by David Musch, Ph.D., M.P.H., and Sayoko Moroi, M.D., Ph.D., attempts to narrow this knowledge gap. Dr. Musch is a professor of ophthalmology and visual sciences at Kellogg and of epidemiology in the U-M School of Public Health. Dr. Moroi is a recent Kellogg active emeritus professor and the new chair of the Department of Ophthalmology and Visual Science at The Ohio State University Wexner Medical Center.

“We hypothesize that specific vision measures, such as acuity and contrast sensitivity, are associated with physical function, balance, cognition and, ultimately, falls,” says Dr. Musch. “We hope our analysis will provide a more detailed map of how all of those age-related risk factors interact.”

Their approach combines data from an ongoing national longitudinal study (the Study of Women’s Health Across the

—David Musch, Ph.D., M.P.H.

“AVOIDING INJURY AND MAINTAINING INDEPENDENCE BECOME MAJOR HEALTH PRIORITIES AS WE AGE. THE GOAL IS TO GIVE DOCTORS AND PATIENTS AN ADDITIONAL EDGE IN SUPPORTING HEALTHY AGING.”

Nation or SWAN) with information gathered from performing comprehensive vision examinations on 255 Michigan SWAN participants. The project is supported by an NIH Research Grant for Secondary Analysis (R21), which provides support for studies that use existing database resources.

“Avoiding injury and maintaining independence become major health priorities as we age,” says Dr. Musch. “We want to help doctors recognize which factors are contributing to their older patients’ cognitive troubles and falls—including vision problems that may be preventable or treatable. The goal is to give doctors and patients an additional edge in supporting healthy aging.”



Members of the Study of Women’s Health Across the Nation, or SWAN, include Michelle Hood, M.S., David Musch, Ph.D., M.P.H., Brenda Gillespie, Ph.D., Sayoko Moroi, M.D., Ph.D., Carrie Karvonen-Gutierrez, Ph.D.



Cagri Besirli, M.D., Ph.D., with Mercy Pawar, a research lab technician in the Besirli Lab.

Saving Sight by Reprogramming the Metabolism of Photoreceptors

A defining characteristic of retinal degenerative diseases, such as age-related macular degeneration and retinitis pigmentosa, is damage to photoreceptor (PR) cells in the retina. PR cells sense light and trigger signals to the brain to receive an image. As PR cells deteriorate, images grow blurry or distorted, and eventually, disappear entirely.

Currently, no treatments exist to reverse or repair PR damage.

A team led by Cagri G. Besirli, M.D., Ph.D., Skillman Career Development Professor of Pediatric Ophthalmology and an assistant professor of ophthalmology and visual sciences, believes that boosting the metabolism of PR cells may improve their survival.

A critical component of PR cell metabolism is aerobic glycolysis, a specialized process of efficiently using energy stored in glucose molecules in cells with high metabolic needs.

Dr. Besirli hypothesizes that by modifying two genes that drive aerobic glycolysis, PR cells can be reprogrammed to survive longer. The first, HK2, is believed to act as an intracellular control switch, linking energy needs and metabolism to cell dysfunction and death. The second, PKM2, serves as a gatekeeper of energy activity within the cell, shifting glucose to generate building blocks for the cell or to produce energy.

Using several approaches, Dr. Besirli plans to manipulate HK and PKM function, effectively reprogramming the metabolism of PR cells. This would improve their ability to make energy efficiently, and slow PR cell death during energy crises.

Studies made possible by this NEI (NIH) R0-1 grant will lay the foundation for continued exploration of connections between metabolism and PR survival during retinal stress, and may lead to new treatment targets for retinal diseases.



Grant Comer, M.D., M.S., and Lindsay Godsey, M.S., C.O.A., work with Bella Guzzardo, a patient participating in one of the ongoing studies.

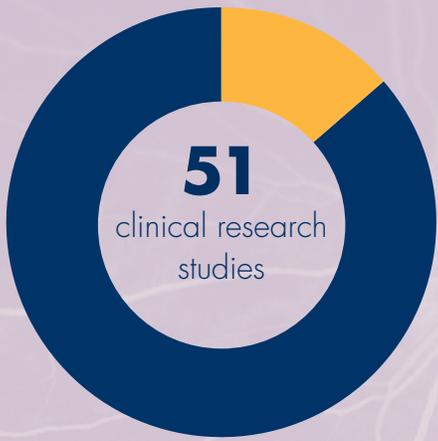
Clinical Research Update

The Kellogg Clinical Research Center (KCRC) continues to flourish, supporting a portfolio of clinical trials that is expanding in both volume and variety.

“Our goal is to make the clinical research process easier for both the investigators who oversee studies and the patients who so generously participate in them,” says KCRC’s Medical Director, associate professor Grant Comer, M.D., M.S.

More than 60 clinical studies are currently managed through the KCRC, including investigator- and sponsor-initiated trials overseen by 20 different Kellogg faculty members. Support is also provided for projects at the early stage of trial design, and for studies originating elsewhere in Michigan Medicine that include an ophthalmic component.

“OUR GOAL IS TO MAKE THE CLINICAL RESEARCH PROCESS EASIER FOR BOTH THE INVESTIGATORS WHO OVERSEE STUDIES AND THE PATIENTS WHO SO GENEROUSLY PARTICIPATE IN THEM.”
 —Grant Comer, M.D., M.S.



-  **7** Investigator-initiated
-  **44** Sponsor-initiated



-  **7** Research Coordinators
-  **1** Compliance Specialist
-  **1** Finance Specialist
-  **1** Research Technician
-  **1** Research Imager



Kellogg Safety Committee team members include, from left to right in the top row, Davonn Whitcomb, Nadine VanWassehnova, Erin Manno, Stephen Armenti, M.D., Ph.D., Alan Sugar, M.D., M.S., Christine Nelson, M.D., Philip Lieu, M.D. **Bottom Row:** Beth Hanseemann, Jennifer Weizer, M.D., Roni Shtein, M.D., M.S., and Carol George.

Award-Winning Safety in Our Retina Clinics

In October, the Kellogg Eye Center retina clinics were the first ambulatory clinics recognized by Michigan Medicine with the 365 Days of Safety award. While so many of our clinics merit this award, Michigan Medicine recognized the special team commitment in a very busy clinical environment.

As its name implies, the award acknowledges patient care units that avoid patient harm or care-acquired conditions for at least 365 consecutive days. The retina clinic’s record far exceeds this milestone.

“It’s an especially significant achievement given our clinic volume,” says retina specialist and assistant professor Philip Lieu, M.D. “We administer more than 12,000 injections in our clinics each year.”

“A major team effort goes into a safety record like this,” says professor Jennifer Weizer, M.D. Both Drs. Lieu and Weizer, who chairs Kellogg’s Safety Committee, were part of a dedicated group that systematically reviewed and refined the retina injection protocol. They analyzed every point where a potential error could occur, even if none ever had. Because communication is critical to avoiding errors, daily team huddles have been standard for many years.

Dr. Lieu says, “All of these efforts show that when it comes to safety, we don’t take anything for granted.”



365 Days of Safety award.

12,000 Injections in our clinics each year.

“A major team effort goes into a safety record like this” —Jennifer Weizer, M.D.



Kelley Lathrop, RAHS ancillary care coordinator, with Courtney Dewey, O.D., and Adam Burgess, RAHS mobile unit driver.

— Courtney Dewey, O.D.

AN INTERDISCIPLINARY TEAM OF NURSE PRACTITIONERS, PHYSICIANS, CLINICAL SOCIAL WORKERS, MEDICAL ASSISTANTS AND A CARE COORDINATOR ON-SITE MAKES SURE KIDS KEEP APPOINTMENTS AND SCHEDULE FOLLOW-UP CARE.

Mobile Vision Screening Piloted in Ypsilanti Expands to Flint

Good vision is essential to healthy childhood development and success in school. The state of Michigan administers no-charge basic vision screening to children through school-based health centers and local health departments. But when a screening flags a child as needing eyeglasses or an eye examination to address a potential concern, several factors can make timely, accessible follow-up care a challenge.

Working with Michigan Medicine’s Regional Alliance for Healthy Schools (RAHS), a team led by Kellogg optometrist Courtney Dewey, O.D., is piloting two models for delivering no-cost follow-up care: bringing students to services, and bringing services to students.

In the nearby community of Ypsilanti, students are transported from area schools to a health center run by RAHS at Ypsilanti Community High School. There, Kellogg faculty and staff conduct basic screenings, eye examinations and eyeglass fittings. RAHS also has a mobile unit equipped to offer the same services. Students needing new or replacement glasses can choose from a good selection of eyeglass frames. Orders are filled at the Kellogg Eye Center, and a Kellogg optician returns to the patient’s school to deliver and adjust the glasses. When advanced follow-up care is called for, clinicians facilitate appointments with ophthalmologists at one of Kellogg’s clinical locations.

Building on their success, another RAHS mobile clinic began visiting school-based health centers in Flint, Michigan,

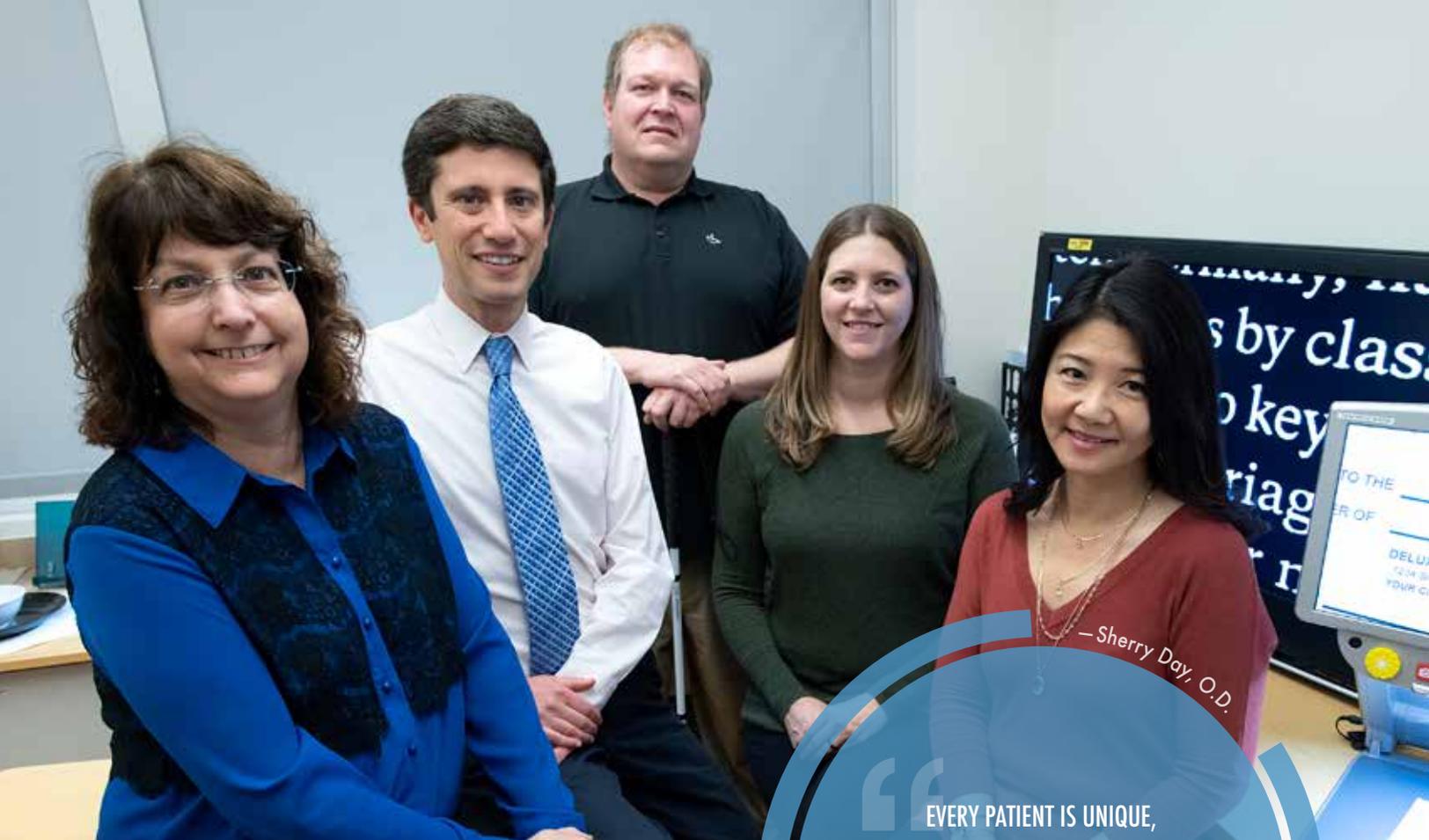


Dr. Dewey examining a student inside the mobile unit.

in early 2019, this one equipped and staffed to provide both eye and dental care.

“It’s been a learning process for us,” says Dr. Dewey. “RAHS first tried providing vouchers for free eye examinations. But parents can’t always arrange for transportation or time off from work, and follow-through rates were low. Transporting students to and from school-based health centers has been an improvement, and so far, it looks like the mobile unit allows us to see even more patients.”

While other communities utilize mobile care units, Dr. Dewey notes that coordinating the unit with school-based health centers makes Kellogg’s approach unique. “An interdisciplinary team of nurse practitioners, physicians, clinical social workers, medical assistants and a care coordinator on-site makes sure kids keep appointments and schedule follow-up care,” she explains. “So far that added attention seems to be making a big difference.”



Donna M. Wicker, O.D., F.A.A.O., Joshua Ehrlich, M.D., M.P.H., Russ Ellis, C.O.T.A., Ashley Howson, M.S., O.T.R./L., Sherry H. Day, O.D., F.A.A.O.

EVERY PATIENT IS UNIQUE,
AND WE ARE DEDICATED TO HELPING
THEM PERFORM THEIR SPECIFIC ACTIVITIES
WITH GREATER INDEPENDENCE.

— Sherry Day, O.D.

A Comprehensive Approach to Low Vision

More than 250 million people worldwide live with low vision or blindness. Low vision is defined as moderate to severe vision impairment with visual acuity worse than 20/60 that cannot be corrected with medical treatment, surgery or glasses. Most have some useful sight, but everyday actions like reading, cooking, recognizing faces or differentiating color can be challenging.

Kellogg takes a multidisciplinary approach to low vision, combining individualized care, novel research, and training for providers from around the world (see page 20).

One-on-One Strategies and Support

At Kellogg’s Low Vision and Visual Rehabilitation Service, specialists in optometry, ophthalmology, occupational therapy, social work and more collaborate to design personalized plans to maximize sight and independence for people with low vision.

“Every patient is unique, and we are dedicated to helping them perform their specific activities with greater independence,” say program co-directors Sherry Day, O.D., and Donna Wicker, O.D. “We work with adults pursuing law

degrees, seniors who want to continue making art or music, and kids who need help reading or seeing the blackboard. Their goals become our goals.”

After a thorough evaluation, patients spend time in the clinic’s Low Vision Technology Center, where they can try out the latest devices, technologies and techniques, including magnifiers, lighting options, adaptive TVs, audio smartwatches, timers, and medical devices.

Patients also meet with occupational therapist Ashley Howson, M.S., O.T.R./L., in the Independent Living Skills Center, to use low vision-adapted lighting, appliances and cookware. “They learn and practice skills to help stay safe and autonomous in their own homes,” she explains. Michigan Medicine’s certified orientation and mobility specialist, Russ Ellis, C.O.T.A., also works with patients in locations around Ann Arbor, helping them learn to navigate challenges like curbs, steps and public transportation.



Olivia Walch, Ph.D., demonstrating the new app. Kwoon Wong, Ph.D., showing the capabilities of the app on a tablet device.

A New App for Low Vision

University of Michigan researchers in ophthalmology, mathematics and neurology, led by Kellogg associate professor Kwoon Wong, Ph.D., are making everyday tasks like reading labels, price tags and menus easier for people with low vision.

They have developed the Android mobile app LVFree Vision Enhancer, which can now be downloaded for free from the Google Play store.

LVFree uses mathematical algorithms to process in real time the scene captured by the Android device's camera, and shows the user a digitally enhanced version that is easier to see. It can be used with a smartphone or tablet alone, or with a smartphone mounted on a low-cost virtual reality headset.

A few similar devices are commercially available. But they are often difficult to use and, at costs exceeding \$1,000, unaffordable for many.

To combat that, Dr. Wong says, "We focused on the most critical functions for low vision users—magnification, brightness enhancement and reverse contrast."

LVFree was written by research fellow Olivia Walch, Ph.D., and tested by Kellogg patients, who gave valuable feedback. This project was funded in part by the Promobilia Foundation in Sweden.

Low Vision Research

Vision impairments make daily living more difficult. Yet researchers don't have all of the tools to specifically measure vision-related disability.

"We use eye charts to assess visual acuity, and surveys to determine if a person can read a label or recognize someone across the street," says Kellogg health services researcher Joshua Ehrlich, M.D., M.P.H. "But neither paints a complete picture of how individuals with low vision are getting by in their daily lives."

In response, Dr. Ehrlich is undertaking several large-scale projects to improve the measurement of visual function. One of these, funded by the National Eye Institute, aims to develop a survey instrument that will measure functioning among those with severe peripheral vision loss, a patient population for which there are few evidence-based vision rehabilitation options. In another project funded by the National Institute on Aging, Dr. Ehrlich, along with an optometrist and a team of survey researchers, developed a series of tablet-based vision measures that can be administered in-home by a trained facilitator. "Data from a pilot study with 400 participants shows that these measures perform well. When implemented on a large-scale, we anticipate that they will provide much-needed data on the vision health of the U.S. population," he says.

In fact, these measures will soon to be used to track vision within one of the nation's most robust studies of aging and disability.

The National Health and Aging Trends Study (NHATS), conducted through the U-M Institute for Social Research, follows a nationally representative group of more than 8,500 adults 65 and older. The study focuses on trends in late-life disability in areas such as cognitive impairment and falls. The tablet-based vision tests will become part of the annual NHATS protocol starting in early 2020, and will provide much-needed data on the vision health of older U.S. adults and on the role of vision in late-life disability.

Glaucoma specialist and health services researcher Joshua Stein, M.D., M.S., is another Kellogg faculty member involved in low vision research. Dr. Stein's work, funded in part by the Lighthouse Guild, focuses on improving access to eye care for disadvantaged and at-risk populations.



Some of the program's participants and mentors: Shahzad I. Mian, M.D., Angela R. Elam, M.D., Oluyemi Olumolade, Keith D. Carter, M.D., F.A.C.S., Tochukwu Ndukwe, Anjali Shah, M.D.

Improving Equity in Ophthalmology

Kellogg has long supported diversity, equity and inclusion (DEI) initiatives to address the under-representation of minority populations in ophthalmic care delivery, research participation and provider education.

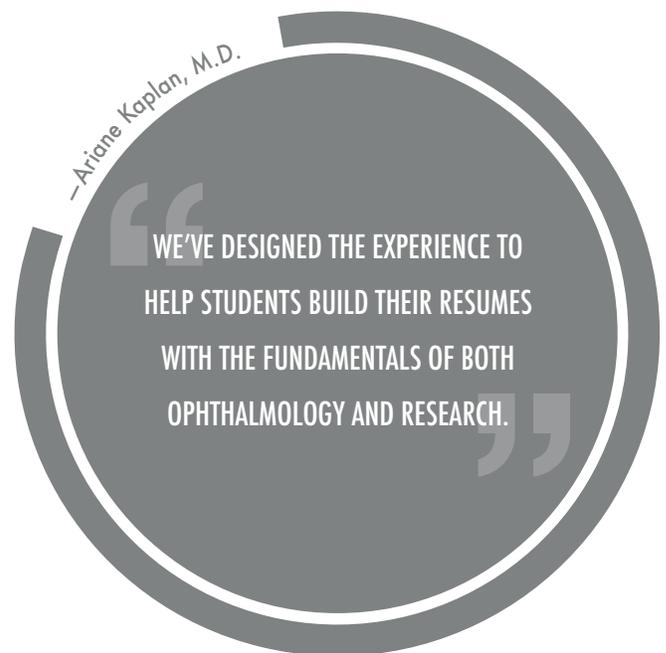
The Health Equity Ophthalmology Summer Program provides students between their first and second years of medical school with an introduction to medical and surgical ophthalmology and with hands-on experience in health equity research.



Clinical assistant professor and medical student clerkship director **Ariane Kaplan, M.D.**, directs the program. “We’ve designed the experience to help students build their resumes with the fundamentals of both ophthalmology and research,” she explains, “which will be beneficial regardless of what direction their careers ultimately head.”

Students work with a mentor on a DEI-related research project and shadow Kellogg faculty members in the clinic and the operating room. Research projects have included examining disparities in diabetic retinopathy treatment based on race, ethnicity and income, and surveying the eye care resources and care delivery options available to Michigan’s Native American population.

The summer ends with students presenting their research at a local meeting such as Kellogg’s DEI grand rounds, or a national forum such as the Rabb-Venable Excellence in Research event held during the annual convention of the National Medical Association.





New Research Impacts How Surgeons Around The World Approach Glaucoma

Emily Schehlein, M.D., a second-year resident at Kellogg, is one of the driving forces behind new research that may impact how eye surgeons around the world approach glaucoma and cataract care.

She is one of the lead authors of a five-year study comparing rates of newly developed glaucoma, visual outcomes and complications in eyes with and without pseudoexfoliation (PEX) undergoing cataract surgery.

PEX is an age-related eye condition characterized by the deposition of material, most prominently on the lens surface and border of the pupil. It is associated with the development of glaucoma.

The first large-scale, long-term prospective study of its kind, the work was conducted and led by colleagues at India's Aravind Eye Care System, the world's largest eye care system. Approximately 1,000 eyes with PEX and 500 without were randomized to different cataract removal procedures and lens implants.

Importantly, the percentage of patients with newly diagnosed glaucoma was four times higher in the PEX group (7.4 percent) than in the control group (1.8 percent). This reinforces the importance of long-term monitoring of these eyes.

"This part of my Kellogg residency was incredibly fulfilling," Schehlein says. "My Aravind colleagues were so welcoming, and it was a privilege to work side by side with them and see how ophthalmology is practiced in another country. But what made this project so exciting was the potential, as a resident, to be part of changing how we approach cataract surgery in the future."

In 2019 Dr. Schehlein was honored with the American Glaucoma Society's Bernard Schwartz Memorial Award, the Michigan Society of Eye Physicians and Surgeons' Resident Research Award and the U-M Howard Resident Prize for Glaucoma Excellence.



Resident Working With Underserved Populations and Mentoring Medical Students

Philip Garza, M.D., M.Sc., a third-year resident, is making the most of his Kellogg experience, combining his interests in clinical research, working with underserved populations and mentoring medical students.

He's also playing a central role in two "firsts" for one of Kellogg's flagship international partnerships.

In 2015, the Kellogg Eye Center for International Ophthalmology began a collaboration with St. Paul's Hospital Millennium Medical College (SPHMMC) in Addis Ababa, Ethiopia. Since then, more and more Kellogg faculty have traveled to the capital city to collaborate with their Ethiopian colleagues.

While the partnership has focused on clinical and educational goals, it is now expanding to include research. Dr. Garza is a contributing author on one of the first research projects, a study of awareness and attitudes about glaucoma.

The study is nearing publication.

Garza and a Kellogg/SPHMMC team set out to describe perceptions of glaucoma and its medical and surgical treatments among patients in Addis Ababa. "To our knowledge, this is the first survey of glaucoma attitudes and knowledge to be conducted in Addis," he explains. "Our study will help inform future public health interventions aimed at increasing awareness of glaucoma in the city," which is home to more than three million ethnically diverse residents.

Dr. Garza was also the first Kellogg resident to travel to Ethiopia.

"The trip was a tremendous opportunity to broaden my horizons as a researcher, to interact with collaborators in Ethiopia, and to gain hands-on teaching and mentoring experience with the U-M medical student who performed data collection," he says.



Big Data to Transform Understanding in Patient Care

Annie Wu, M.D., a second-year resident, knows the power of big data to transform understanding.

She chose Kellogg for residency in part to work with and learn from associate professor Joshua Stein, M.D. Drs. Stein and Wu have leveraged large electronic health record (EHR) databases to answer two intriguing questions with implications far beyond ophthalmology.

Does vision impairment influence whether women get mammograms?

Screening mammography has been shown to save lives by detecting breast cancer early. However, it is more challenging for people with physical disabilities to access preventive services such as cancer screenings. Dr. Wu set to find out to what degree vision impairment might be preventing women from undergoing mammography.

Mining thousands of EHRs, Dr. Wu's analysis demonstrated that women with partial vision loss

were significantly less likely to undergo screening mammography.

Do commonly prescribed medications impact glaucoma risk?

Dr. Wu also aggregated and reviewed data from several of Dr. Stein's previous studies looking for connections—helpful or harmful—between drugs commonly prescribed to regulate blood sugar or lower cholesterol and the risk of glaucoma or glaucoma progression. Her review revealed several associations that warrant more study. Some medications, including systemic corticosteroids, are linked to increased risk, while others, like metformin and statins, appear to have a protective effect.

"Big data helps us see relationships like these that we never considered before," Dr. Wu says. "As a resident, it's exciting to be part of eye research that may eventually help primary care doctors care for their patients."

Tele-Ophthalmology

Brings Care to Medically Underserved Michiganders

Routine eye examinations are vital to prevent vision loss from common, treatable eye diseases. But some people, notably seniors and the economically disadvantaged, are less likely to seek eye care, for many reasons including poor access to reliable transportation and a lack of local services.

A new care delivery model called Technology-based Eye Care Services (TECS) helps patients overcome these barriers. After a highly successful pilot in and around Atlanta, Georgia, the tele-ophthalmology platform is expanding into Michigan.

How TECS Works

A trained ophthalmic technician is stationed in a primary care clinic away from the main hospital. The technician follows a detailed protocol to take measurements of the patient's eyes, and patients are fit for eyeglasses. The information collected in the exam is electronically transmitted to an eye provider at the main hospital, who interprets the data remotely. Patients with abnormal findings are scheduled for follow-up care at the main hospital's eye clinic, and help is available to get patients to these appointments.



April Maa, M.D., TECS clinical director, is an associate professor in the Department of Ophthalmology at Emory University School of Medicine and also an adjunct associate professor of research at Kellogg. Dr. Maa led the team that, in 2015, created TECS in partnership with five primary care clinics associated with the Atlanta

Veterans Affairs Medical Center.

In the first 13 months of TECS operation, nearly 2,700 patients received eye care. Six quality and satisfaction metrics were recorded, and the results were impressive. "TECS was shown to be a win-win for providers and patients," Dr. Maa says.

TECS in Michigan

With support from the VA Office of Rural Health, TECS now provides eye care to veterans at 20 sites in seven states. Eight more VA hospital hubs are slated to launch TECS in 2020, including the Ann Arbor VA Health System.



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

Assistant professor, co-directs Kellogg's eHealth programs and serves as the site director for TECS at the Ann Arbor VA.

"It's been exciting to watch the TECS success story unfold," says Dr. Woodward. "We could see it would be a great tool to better serve our Michigan veterans. The Ann Arbor clinic location

is up and running, and we're expanding to other medically underserved parts of the state."

Expanding Glaucoma Screening With TECS

The TECS approach may also help expand access to specialty screening for high-risk populations.

Kellogg glaucoma specialist and co-director of the Kellogg Center for eHealth, Paula Anne Newman-Casey, M.D., M.S., is leading a pilot program funded by a grant from the Centers



Paula Anne Newman-Casey, M.D., M.S., and patient Victor Ajoyi.



Dr. Newman-Casey and David Musch, Ph.D., meet with community clinic leaders to discuss the CDC-funded SIGHT research program.

for Disease Control and Prevention to screen individuals at increased risk of primary open-angle glaucoma. Although just 2 percent of the U.S. population has this condition, it's still a top cause of irreversible blindness, particularly among African Americans and low income individuals.

It will be the first time the fundamentals of TECS will be applied to a population other than veterans.

“My experience volunteering at free screening events showed me that we’ve been approaching the challenge the wrong way,” says Dr. Newman-Casey. “We disproportionately screen low-risk individuals, and when we do identify a patient with glaucoma, we leave too many barriers to follow-up care unaddressed.”

Two clinics serving low income populations, the Hope Clinic in Ypsilanti, Michigan, and the Hamilton Clinic in Flint, Michigan, are partnering with Kellogg for the trial, Screening and Intervention for Glaucoma and eye Health through

Telemedicine (SIGHT). Technicians will perform screenings in the community clinics and transmit the data to an ophthalmologist at Kellogg for interpretation. Follow-up appointments and transportation will be coordinated for patients as needed.

The pilot program incentivizes participation in glaucoma screening with low-cost glasses and includes access to education and help obtaining follow-up care. The program will also test whether personalized education and counseling improves follow-up adherence compared to standard education.

“We’ve tried to address every key logistical and psychosocial barrier to screening and care, including cost, transportation, mistrust of providers, and skepticism that a disease with no symptoms can lead to blindness,” says Dr. Newman-Casey. “We’re excited to see if we can improve outcomes for at-risk individuals in our area and create a roadmap for expansion to other communities.”

The Next Frontier: Tele-Genetics

There are about 30 genetic counselors devoted to inherited eye diseases serving the entire United States. Kellogg is home to two of them.

To expand access to this rare specialty, Kellogg is exploring partnerships with ophthalmologists outside of southeast Michigan with patients in need of genetic counseling.

The aim is to use videoconferencing to link patients and family members with Kellogg genetic counselors Kari Branham, M.S., C.G.C., and Dana Schlegel, M.S., M.P.H., C.G.C. Remote counseling could take place prior to genetic testing to gather family histories and discuss the risks, benefits and limitations of testing. After genetic testing, the same remote approach could be used to explain the diagnosis of an inherited disease, explore potential risks to other family members, or discuss whether experimental genetic treatments might be available.



Highlights from International Night

Each year, the accomplishments of the Kellogg Eye Center for International Ophthalmology (KECIO) are celebrated on International Night. The evening's keynote speaker was Senait Fesseha, M.D., J.D. Born in Ethiopia, Dr. Fisseha was educated in the U.S. and the U.K. She trained in obstetrics and gynecology, including a fellowship in reproductive endocrinology and infertility at Michigan Medicine. As an associate professor at U-M, she served as medical director of the Michigan Center for Reproductive Medicine and was the founding executive director of the Center for International Reproductive Health Training. Dr. Fesseha helped Michigan set up a partnership with St. Paul's hospital in Ethiopia (see page 22). She joined the Susan Thompson Buffett Foundation in 2015 as director of international programs.

One of the world's foremost experts in reproductive health access in developing countries, Dr. Fisseha challenged the audience to "tip the scales of power" in global health. Among her recommendations: address inequalities in leadership and research collaboration and move beyond a disease-specific focus toward efforts that strengthen health systems—from supply chain logistics to workforce development and informatics.



— Senait Fesseha, M.D., J.D.

HOME IS WHERE YOUR STORY BEGINS, AND HERE IS WHERE MY STORY BEGAN.

Dr. Fisseha credits U-M with providing the opportunities, mentorship and support she needed to pursue a career in global health. "Home is where your story begins," she told the audience, "and here is where my story began."

International Collaborations

During the 2019 event, three trainees shared highlights of their global outreach projects with KECIO, which included clinical and research initiatives with partners in Ethiopia, Jamaica and India.

Equally important is KECIO's work to bring visiting scholars to Michigan for specialized training. At the event Sherry Day, O.D., shared details about Kellogg's curriculum in specialty contact lenses and low-vision rehabilitation. Now in its sixth year, the courses have been completed by trainees from as far away as Israel, Kenya, Poland and Taiwan.



Monte A. Del Monte, M.D., Donna Donato, Christine C. Nelson, M.D., Senait Fesseha, M.D., J.D., and Jonathan D. Trobe, M.D., commemorate International Night at Kellogg.



Joshua Ehrlich, M.D., M.P.H., visiting with colleagues at the Aravind Eye Care System in India.

Kellogg/Aravind Research Supported by New World Medical Award

Established in the 1980s, Michigan's and Kellogg's collaboration with India's Aravind Eye Care System continues to foster innovation. Aravind and Kellogg received the New World Medical Health Outcomes Research Award for 2019 to support research on potential enhancements of Aravind's existing model to screen for and treat eye diseases in rural India.

New World Medical, Inc., is a privately held manufacturer of devices to treat glaucoma. The annual award supports research in eye health care delivery in underserved regions.

Assistant professor Joshua Ehrlich, M.D., M.P.H., is Kellogg's co-principal investigator on the project, along with Rengaraj Venkatesh, M.D., and Dayakar Yadalla, M.D., from Aravind. "Aravind's eye hospital in the city of Pondicherry is one of the only eye care facilities serving about four million people across a large geographic area," Dr. Ehrlich explains. "They've developed a 'hub-and-spoke' approach to screen and triage patients.

Monthly 'eye camps' are held in local villages to provide free screening, then patients who need surgery are transported to Pondicherry for no-charge care."

The team took a novel approach to clinical trial design—randomizing eye camps instead of individual patients. Two technology upgrades were added to one group of camps: digital fundus photography to image retinas, and electronic health records to track follow-up.

Preliminary findings from the study of more than 3,000 patients show impressive increases in both the number of diseases diagnosed and the number of patients who receive follow-up care at the camps with the technology upgrades.

Says Dr. Ehrlich, "We're excited about the potential to build on Aravind's proven approach to meet India's and potentially other regions' growing need to address age-related eye diseases."

—Joshua Ehrlich, M.D., M.P.H.

“WE'RE EXCITED ABOUT THE POTENTIAL TO BUILD ON ARAVIND'S PROVEN APPROACH TO MEET INDIA'S GROWING NEED TO ADDRESS AGE-RELATED EYE DISEASES.”



Left: A snapshot from the residency graduation at St. Paul's Hospital in Addis Ababa, Ethiopia. **Right:** Pediatric ophthalmologist Dr. Mandefro Sintayehu, Christine C. Nelson, M.D., and Dr. Girum Gebreal, the ophthalmology department chair.

Ethiopian Residency Program Graduates First Class

In 2015, Kellogg faculty partnered with the St. Paul Hospital Millennium Medical Center (SPHMMC) in Addis Ababa, Ethiopia, to establish an ophthalmologic residency program. This year, the first group of six trainees graduated from the four-year program.

Christine Nelson, M.D., chief of oculoplastic surgery and a co-director of the Kellogg International Center of Ophthalmology, leads the initiative. “We’re so proud of the inaugural class,” she says. “Their board examination scores contributed to Ethiopia posting the highest scores in the specialty of any country on the African continent.”

Several other Michigan Medicine specialties have launched training programs with SPHMMC, and many Kellogg specialists have traveled to St. Paul’s to mentor faculty and residents.

“The goal is to build capacity and counter the ‘brain drain’ that happens in underserved regions when physicians pursue specialty training out of country and never return,” says Dr. Nelson. All six new ophthalmologists have secured positions practicing in Ethiopia.

The curriculum includes a foundation in research fundamentals. The class of 2019 conducted two studies in collaboration with visiting U-M third-year medical student Curtis Heisel. The first was an assessment of patient awareness of glaucoma to guide future public education initiatives. The second gathered standard eye measurements (how deep, close together or far apart eyes are set, how much eyelids droop, etc.) from area residents. The resulting dataset is the first of its kind in Ethiopia, where eye characteristics vary across the country’s more than 80 distinct ethnicities.

— Christine Nelson, M.D.

“THE GOAL IS TO BUILD CAPACITY AND COUNTER THE ‘BRAIN DRAIN’ THAT HAPPENS IN UNDERSERVED REGIONS WHEN PHYSICIANS PURSUE SPECIALTY TRAINING OUT OF COUNTRY AND NEVER RETURN.”

Looking ahead

As the resident education program continues, additional Kellogg-SPHMMC research and training projects will begin in 2020.

Dr. Nelson will lead an initiative to perform 1,000 pediatric eye screenings, using a mobile app developed by Kellogg professor Hakan Demirci, M.D., to help identify symptoms of 135 eye disorders. A new, two-year ophthalmology medical assistant training program will welcome its first 10 students, filling an urgent need for skilled support staff. This enables physicians and nurses to practice at their level of training and creates job opportunities in a country challenged by high unemployment.

Strengthening Research Capacity in India

The numbers speak for themselves: India is home to 17 percent of the world’s population, and a quarter of the world’s blind or visually impaired—more than any other country. Since 1990, India’s disability burden from eye disease has increased 24 percent and is projected to continue to rise as the population ages and life expectancy increases. More than 9 in 10 cases of vision loss in India result from non-communicable eye disease, and 3 in 4 are avoidable.

Compounding this large and growing health crisis is an acute need for additional medical research expertise generally and ophthalmic research specifically. Typically, medical education in India does not include instruction in designing and conducting research studies, and additional investigators are needed to explore the specific factors contributing to India’s epidemic of preventable eye disease and vision loss.

A team of Kellogg researchers will soon be working with colleagues in India to strengthen capacity to conduct clinical and epidemiological research needed to address these fundamental issues.

A platform for change

For nearly 40 years, the University of Michigan has collaborated with the Aravind Eye Care System (AECS), the world’s largest eye care system, to cross-train providers and operational leaders. The established, productive partnership provides the



Dr. S. R. Krishnadas, David Musch, Ph.D., M.P.H., Joshua Ehrlich, M.D., M.P.H., Alan Robin, M.D., and Dr. Ashok Vardhan.

ideal platform to launch an ambitious research training program to address India’s specific eye health challenges.

The program curriculum will emphasize clinical and population research skills. The goal is to further develop the capacity of junior and mid-career AECS faculty to identify and implement evidence-based interventions to reduce vision loss from preventable and treatable diseases.

The program will be directed by Joshua Ehrlich, M.D., M.P.H., an assistant professor at Kellogg, David Musch, Ph.D., M.P.H., a professor at both Kellogg and the U-M School of Public Health’s Department of Epidemiology, and Thulasiraj Ravilla, M.B.A, director of operations at AECS, with support from Kellogg director and chair of Ophthalmology and Visual Sciences Paul Lee, M.D., J.D., and AECS chairman R.D. Ravindran, M.S., D.O. A grant application for a NIH Fogarty International Research Training Award to support this five-year program is currently under review.

Dean’s Award

Donna Donato, administrative director for the Kellogg Eye Center for International Ophthalmology (KECIO), was named Support Staff Member of the Year by Marschall S. Runge, M.D., Ph.D., Dean of the University of Michigan Medical School. The annual Dean’s Awards acknowledge the exceptional accomplishments and distinctive service of faculty and staff.

“Donna Donato has been the heart and soul of the Center since its inception nearly a decade ago,” says KECIO co-director Jonathan Trobe, M.D. “Among the countless functions she performs flawlessly, Donna is the lifeline for our visiting scholars, overseeing every detail of their time at Kellogg. The many successes of this unique program are impossible to imagine without her.”



Eye and Vision Research Grant from Eversight awarded to **Abigail Fahim, M.D., Ph.D.**

Clinical assistant professor Abigail Fahim, M.D., Ph.D., was one of five 2019 recipients of an Eye and Vision Research Grant from the Eversight Center for Vision and Eye Banking Research.

The grant provides early-stage funding for Dr. Fahim's research into the molecular drivers of choroideremia, one of several early-onset inherited blinding retinal diseases for which there are no current treatments.

Dr. Fahim's lab is focusing on the gene CHM, which plays a key role in transporting proteins within cells. She hypothesizes that the retinal pigment epithelium (RPE), a layer of cells between the retina and the choroid (the retinal blood supply at the back of the eye), drives the development of choroideremia by altering the secretion of proteins towards the retina and the choroid.

To test this theory, Dr. Fahim's team has developed a model of RPE cells affected with choroideremia. This novel approach will help better describe how the choroideremia genetic defect causes disease and provide a platform for testing potential treatments in human cells.

Dr. Fahim was also among the researchers invited to participate in the National Alliance for Eye and Vision Research (NAEVR) Emerging Vision Scientist Day in Washington, D.C. The event connects early-career investigators with legislators to promote robust National Institutes of Health research funding, stressing the importance of seed funding to incubate the work of promising investigators.



Abigail Fahim, M.D., Ph.D., and Ebony Johnson from the Eversight Center for Vision and Eye Banking Research.



The Eversight Center's Carrie Wolverton with David Antonetti, Ph.D., Dr. Fahim, Ebony Johnson and Paul Lee, M.D., J.D.



Donald Puro, M.D., Ph.D., has been elected a Fellow of the American Association for the Advancement of Science (AAAS). Founded in 1848, the AAAS was the first organization founded to promote the development and accomplishments of the scientific community in the United States.

Dr. Puro, professor of ophthalmology and visual sciences and of molecular and integrative physiology at Michigan, was elected an AAAS Fellow in recognition of his

contributions to ocular physiology and pathobiology—specifically, for his novel use of patch clamp technology to study ophthalmic diseases.

Developed in the late 1970s, patch clamp is a Nobel prize-winning electrophysiology technique used to examine the movement of ions in and out of cells. As an ophthalmology resident, Dr. Puro saw the potential of the new tool and incorporated it into his laboratory studies.



Dr. Lindsay De Lott explains how optic neuritis affects the eye.

Improving Treatment Decisions for Optic Neuritis

Acute demyelinating optic neuritis is an inflammation of the optic nerve often associated with multiple sclerosis. It results in decreased vision and ability to see color, as well as pain with eye movement.

The established treatment, steroid medication delivered through an IV, has been shown to help speed recovery somewhat, but it appears to do nothing to improve long-term visual outcomes. It also has potential risks, including medication side effects, and the inconvenience, cost and discomfort of injections. Despite this lackluster reward/risk tradeoff, providers treat nearly every patient with intensive steroid therapy.

“We’re working to help providers move away from this one-size-fits-all approach, toward more nuanced decision-making,” says Kellogg assistant professor Lindsey De Lott, M.D., M.S. Her research has two aims: understand current provider perceptions about the efficacy and risks of steroid treatment, and design a decision-making tool that helps direct the right treatment to the right patient.

Dr. De Lott’s project, supported by a Mentored Patient-Oriented Research Career Development (K23) award, draws on her expertise in both neuro-ophthalmology and health services research, and reflects her commitment—and the NIH/NEI mission—to advance personalized medicine in the treatment of ocular diseases.



Next-Generation Prognostication

Kellogg researchers are leading several projects using machine-learning technology, a form of artificial intelligence, to analyze huge amounts of data on patients with ocular diseases. The results of their efforts illustrate the technology's potential to make personalized predictions of disease stability and help guide clinical management decisions.

Tapping Into Big Data

For the past two years, Joshua Stein, M.D., M.S., and his team of biostatisticians, data architects and research assistants have been building the Sight Outcomes Research Collaborative (SOURCE) repository, a transformative resource that contains hundreds of millions of data points from the electronic health records and ocular diagnostic tests of patients receiving eye care at the Kellogg Eye Center. After methodically preparing the data and removing all patient identifiers, the team feeds it into sophisticated machine-learning algorithms to provide clinicians with new tools to better care for patients with ocular diseases.

Based on the success of this initiative at Kellogg, other academic ophthalmology departments nationwide are now sharing their data in a new collaborative arrangement with SOURCE. The database contains more than 500,000 patients with ocular diseases, 1.2 million office visits, 36,000 eye surgeries, 8 million laboratory test results, 17.8 million medication orders and 530,000 images of the retina.

Researchers have been tapping into data from SOURCE to learn about an array of different ocular diseases. Examples of projects using this resource include generating personalized forecasts of whether a patient's glaucoma will remain stable or experience progression over time, using machine learning to predict the small subset of patients who are at high risk for experiencing poor outcomes following cataract surgery, and predicting which patients with keratoconus will require corneal transplantation.

Targeting Treatment for Corneal Ulcers

Corneal specialist Maria Woodward, M.D., M.S., is using machine-learning algorithms to drive individualized treatments for microbial keratitis (MK).



Nambi Nallasamy, M.D., Joshua D. Stein, M.D., M.S., and Maria A. Woodward, M.D., M.S. All are working on ways to apply machine learning to ophthalmology.

An infection or ulceration of the cornea, MK is the fourth-leading cause of blindness worldwide. Although the clinical features and severity of MK symptoms vary widely, most patients are treated with nonspecific broad-spectrum antimicrobials, increasing their risk of developing antimicrobial resistance.

Her project uses two algorithms to characterize the full clinical spectrum of MK. The first, developed with Karandeep Singh, M.D., an assistant professor of learning health sciences and internal medicine at Michigan Medicine, will extract and analyze MK data from patient records in the SOURCE database. The second, the result of a partnership with Sina Farsiu, Ph.D., an associate professor of biomedical engineering and ophthalmology at Duke University, automates the process of analyzing slit lamp images of MK.

The information will be combined to build a new evidence-based model to classify and score MK, which physicians can use to assess risks and personalize treatments.

Choosing the Best Lens for Cataract Surgery

Machine learning may also help doctors select the optimal artificial lens to implant during cataract surgery, the most commonly performed surgical procedure in the world.

Currently, doctors choose from a number of formulas that recommend a power of intraocular lens (IOL) to implant. There is no optimal formula; each uses measurements such as eye length or corneal power, and each has the potential to overestimate or underestimate these variables.

Kellogg corneal specialist Nambi Nallasamy, M.D., is bringing doctors more precise tools for this critical decision.

As a first step, his team developed an algorithm to help doctors choose an IOL formula from six established options. The algorithm can predict which formula produces the smallest



Drs. Nallasamy and Stein with the team of biostatisticians, data architects and research assistants working on the SOURCE database.

error in refraction based on a patient’s preoperative eye measurements. Testing with the SOURCE database showed this improved accuracy by 13.5 percent.

Dr. Nallasamy is now working on a data-driven, patient-specific IOL selection tool to someday replace existing selection formulas.

Non-Invasive Diagnosis of Ocular Surface Tumors

Dr. Nallasamy is also applying machine learning to diagnose tumors on the eye’s surface in a noninvasive, completely data-driven way.

Why? Few doctors can differentiate between benign and cancerous surface lesions using imaging alone, so surgical biopsies are needed to confirm diagnoses.

A notable exception is Kellogg alumnus Carol Karp, M.D. (see page 33) who pioneered the use of ultra-high-resolution optical coherence tomography (OCT) alone as a noninvasive optical biopsy. Dr. Nallasamy, who Dr. Karp mentored, believes artificial intelligence tools can expand this diagnostic approach.

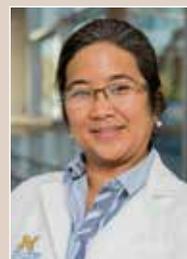
Dr. Nallasamy is collaborating with Kellogg ocular oncologist Hakam Demirci, M.D., to build a comprehensive dataset of pathology and imaging on a variety of ocular surface tumors. Then, they will develop and test an algorithm to distinguish between cancerous and benign lesions, classify cancerous lesions, and differentiate tumor cells from healthy tissue. This automated, virtual biopsy may even help identify subtle features OCT does not recognize.

Honorary Award Lectures



This year, the American Society of Ophthalmic Plastic and Reconstructive Surgery awarded **Christine Nelson, M.D.**, the James A. Katowitz Pediatric Award. Dr. Nelson, the Bartley R. Frueh, M.D. and Frueh Family Collegiate Professor of Eye Plastics and Orbital Surgery at Kellogg, was honored in

recognition of her longstanding contributions to the field of pediatric oculoplastic surgery.



Sayoko Moroi, M.D., Ph.D., has been selected to give the 2020 American Glaucoma Society Clinician-Scientist Lecture.

Each year, a special committee of the AGS bestows this honor on an individual who exemplifies excellence in both patient care and basic research.

Dr. Moroi held the Jerome Jacobson Professorship in Ophthalmology and Visual Sciences at Kellogg until January 2020, when she was named Chair of the Department of Ophthalmology and Visual Science at the Ohio State University Wexner Medical Center.

An Eye Research Connection That Could Change Stroke Care

While studying diabetic retinopathy, a Kellogg researcher made a connection that could one day revolutionize stroke care.

David A. Antonetti, Ph.D., is the Roger W. Kittendorf Research Professor of Ophthalmology and Visual Sciences and a professor of molecular and integrative physiology. His lab studies the protective blood-retinal barrier and how it is compromised in diseases like diabetic retinopathy.

In 2009, the Antonetti lab demonstrated that the blood-retinal barrier is weakened when the protein occludin is compromised. “We began to wonder if something similar might be happening in the other part of the body where blood vessels perform the same protective function—the blood-brain barrier,” says Dr. Antonetti.

To investigate, Dr. Antonetti reached out to blood-brain barrier expert and Michigan Medicine stroke researcher Daniel Lawrence, Ph.D., Frederick G. L. Huetwell Collegiate Professor of Basic Research in Cardiovascular Medicine. Dr. Lawrence was the first to demonstrate that tissue plasminogen activator (tPA), a drug used to restore blood flow in the brain after a stroke, can damage the blood-brain barrier if administered too late after an acute stroke. If given too many hours after a stroke, tPA can trigger a similar—but even more profound—weakening of and damage to blood vessels than what Dr. Antonetti observed in retinopathy models.

Connecting the Dots

At the same time, Dr. Antonetti knew of a drug called ruboxistaurin that was in the development pipeline as a potential treatment for diabetic retinopathy. Clinical trials confirmed its effectiveness in protecting retinal vascular barriers but indicated that when used over many years (as is necessary to manage diabetic retinopathy), its cumulative side effects could be harmful. For that reason, clinical testing for diabetic retinopathy was suspended.

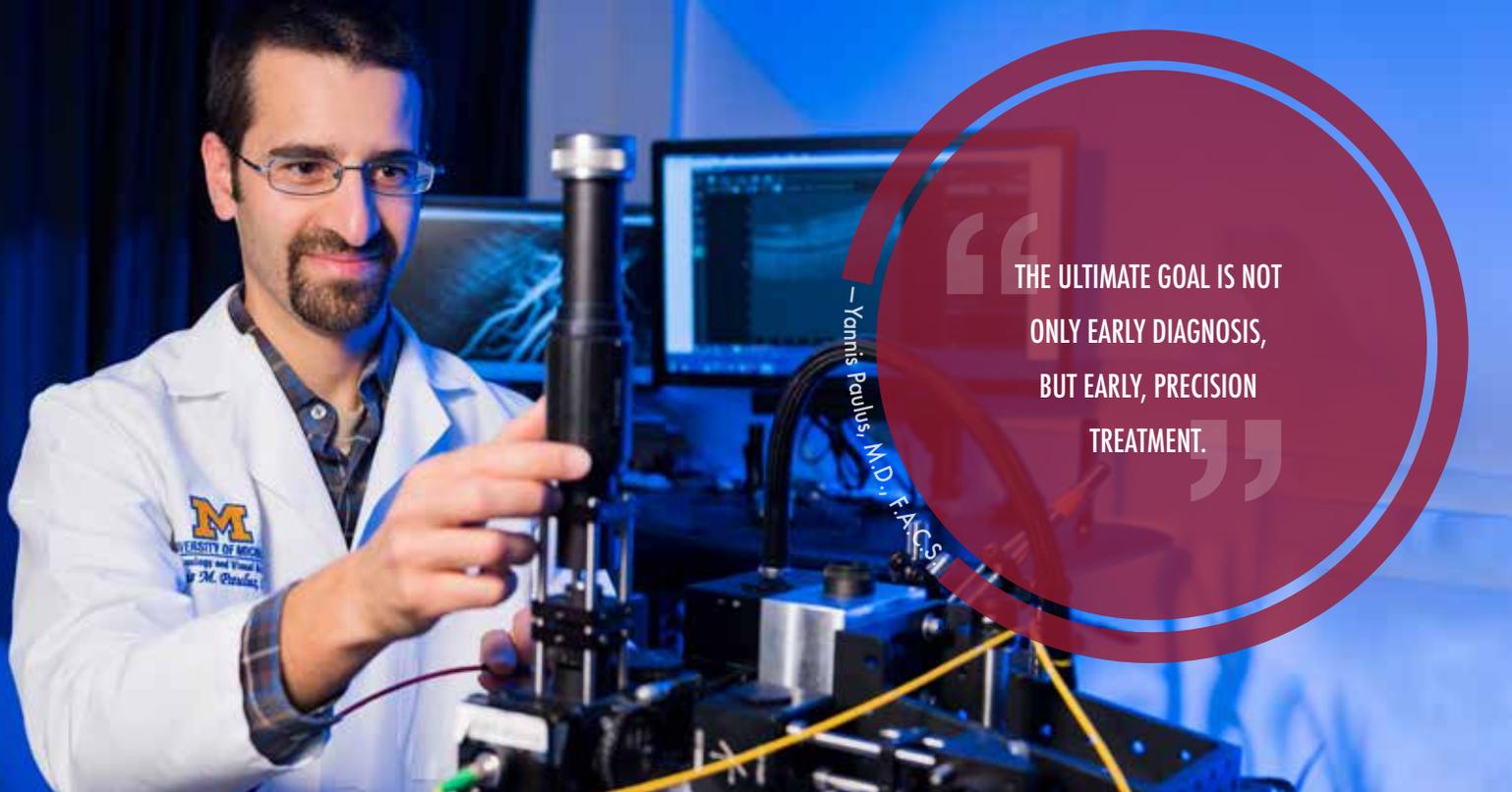
Drs. Antonetti and Lawrence hypothesize that ruboxistaurin could be used with tPA as a one-time rescue treatment for stroke patients—preventing damage to the blood-brain barrier, but without the potential side effects of using tPA too late. This could greatly extend the time for which strokes can be treated. The Antonetti and Lawrence laboratories began the basic science steps necessary to investigate this idea, which has led to exciting new preliminary data and an NIH-funded R01 grant to fully explore the potential of this treatment.

“This is why it’s such an exciting time in medical science,” says Dr. Antonetti. “We’re discovering that important research in one area may actually lead to previously unrecognized therapies for other diseases. Diabetic retinopathy has benefited enormously from cancer research, and we hope that stroke patients can benefit from eye research. Each step forward leads to a new opportunity to share therapeutic advances.”

“DIABETIC RETINOPATHY HAS BENEFITED ENORMOUSLY FROM CANCER RESEARCH, AND WE HOPE THAT STROKE PATIENTS CAN BENEFIT FROM EYE RESEARCH. EACH STEP FORWARD LEADS TO A NEW OPPORTUNITY TO SHARE THERAPEUTIC ADVANCES.”

—David A. Antonetti, Ph.D.





— Yannis Paulus, M.D., F.A.C.S.

“THE ULTIMATE GOAL IS NOT ONLY EARLY DIAGNOSIS, BUT EARLY, PRECISION TREATMENT.”

Photoacoustic Imaging for Macular Degeneration

Neovascular age-related macular degeneration, or wet macular degeneration, is characterized by the creation of new blood vessels in the choroid layer of the eye. If not treated early, the resulting swelling, fluid buildup and bleeding can result in significant and irreversible vision loss.

The No. 1 factor in predicting treatment outcomes for wet macular degeneration is the patient’s vision at the time of diagnosis, so early detection is vital. But current methods of imaging the retina only capture the effects of choroidal neovascularization already in progress.

Kellogg researchers led by Yannis Paulus, M.D., F.A.C.S., are applying a novel imaging technology to spot retinal changes before anatomic evidence of disease appears. The work is supported by an NIH Mentored Clinical Scientist Development (K08) award, which funds early career clinician-scientists conducting basic research.

The technology, photoacoustic microscopy, uses both light waves and sound waves to see activity at the molecular level. This concept is commonly used in tumor imaging, but until now its potential in ophthalmology has been largely unrealized.

The Paulus lab is one of a handful worldwide to apply photoacoustic microscopy to retinal imaging in animal models, and has pioneered its potential in large eyes such as human eyes.

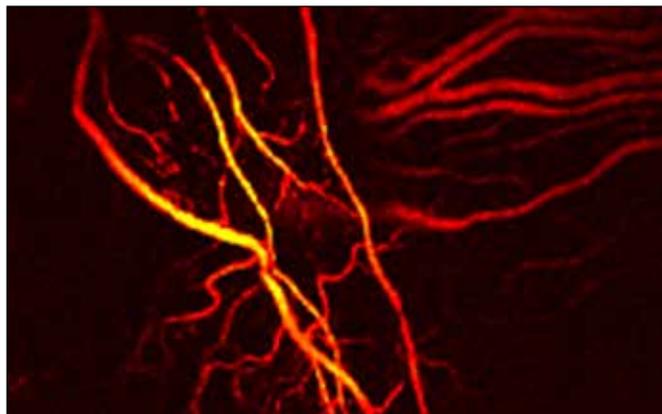
“The challenge with the technology has been that the farther away the machine’s detector is from the source—in this case, the retina—the weaker the sound waves it captures, and the poorer the resulting image,” says Dr. Paulus, assistant professor of ophthalmology and visual sciences and of

biomedical engineering. This has limited its effectiveness for imaging larger eyes.

The Paulus lab has improved the technology in two ways: It’s now more sensitive, able to generate very high resolution images of emerging blood vessel formation, even in larger mammalian eyes. It also uses less energy—a fraction of the established safe limit. These advances make photoacoustic microscopy for the human eye far more attractive.

Dr. Paulus will use the grant to continue refining the technology. His team is experimenting with injecting light-activated therapeutic nanoparticles into the retina to slow or stop neovascularization without damaging cells.

“The ultimate goal is not only early diagnosis, but early, precision treatment,” he says.



A photoacoustic microscopy image reveals the structure of newly forming retinal blood vessels.



WE FOUND THAT MYRF REGULATES THE EXPRESSION OF THE GENE TMEM98, PREVIOUSLY IMPLICATED IN NANOPHTHALMOS. IN MOUSE MODELS WITHOUT MYRF, WE SAW A SHARP DECLINE IN THE EXPRESSION OF TMEM98, FURTHER EVIDENCE THAT A MYRFTMEM98 INTERACTION CAUSES NANOPHTHALMOS.

— Julia Richards, Ph.D.

Kellogg Team Identifies the Genetic Origins of Nanophthalmos

In people born with nanophthalmos, the eyes are small, but the eye structures—including the size of the lens—are otherwise normal. A normal-sized lens in a small eyeball can cause a host of vision-related problems, including severe hyperopia (farsightedness), amblyopia (lazy eye) or strabismus (crossed eyes) in children, retinal detachments, and glaucoma. Nanophthalmos also makes ocular procedures like cataract surgery riskier.

A Kellogg team led by ophthalmologist and geneticist Lev Prasov, M.D., Ph.D., is the first to link nanophthalmos with a mutation in the myelin regulatory factor (MYRF) gene that causes it to produce an abnormal protein. They also established an interaction between MYRF and TMEM98, another gene implicated in nanophthalmos, describing a new pathway for eye growth and development.

The findings, published in the journal *PLOS Genetics*, build on the work of Kellogg professor emerita Julia Richards, Ph.D., who led the team that, after identifying one large family with numerous occurrences of nanophthalmos, first linked the origins of the condition to a specific area in the genome called the NN01 locus.

A Compelling Misspelling

“There are numerous steps in making a gene-disease connection,” says Dr. Prasov. “One is to confirm that whatever mutation you suspect is not unique to members of one bloodline. For our study, we augmented the information from NN01 with that of unrelated nanophthalmos patients to ensure we started with a comprehensive sample.”

The team then sequenced numerous genes within the same region, looking for mutations or “misspellings” that might be driving the development of the disease. “During that process, MYRF rose to the top of the list of compelling misspellings,” Dr. Prasov explains.

During the genetic sequencing process, another important link was established. “We found that MYRF regulates the expression of the gene TMEM98, previously implicated in nanophthalmos,” Dr. Richards says. “In mouse models without MYRF, we saw a sharp decline in the expression of TMEM98, further evidence that a MYRF/TMEM98 interaction causes nanophthalmos.”



“FOR OUR STUDY, WE AUGMENTED THE INFORMATION FROM NN01 WITH THAT OF UNRELATED NANOPHTHALMOS PATIENTS TO ENSURE WE STARTED WITH A COMPREHENSIVE SAMPLE.”

—Lev Prasov, M.D., Ph.D.

Clinical Implications

The finding points to a brighter future for children born with nanophthalmos. “We know that the eye continues to grow after birth,” says Dr. Prasov, “so there are opportunities to intervene early with genetic counseling and screening for nanophthalmos and to prescribe glasses. Eventually we hope to develop genetically targeted treatments as well.”

Dr. Prasov also sees the potential of this discovery to address a much more common problem. “While nanophthalmos results in an underdeveloped eye, myopia, or nearsightedness, occurs when the eye grows too much,” he explains. Myopia impacts 30 to 40 percent of adults in the U.S. and Europe and

up to 80 percent of adults in Asia. “It’s exciting to imagine how this new knowledge about eye development may open a door to new interventions to address a major worldwide public health issue.”

In 2019, Dr. Prasov received the ARVO/Alcon Early Career Clinician Scientist Award for his studies of the genetic basis of developmental ocular disorders. He continues his focus on the genetic mechanisms of nanophthalmos as an assistant professor of ophthalmology and visual sciences and of human genetics and a scholar in the Michigan Vision Clinician-Scientist Development Program. His work is supported in part by grants from the Knights Templar Eye Foundation.

K12 Grants Support Talented Young Physician-scientists

The National Institutes of Health/National Eye Institute supports efforts to prepare the next generation of ophthalmology researchers through a series of Research Career Development Awards, or K grants, to pursue laboratory and clinical research.

The Kellogg Eye Center consistently ranks among the top academic institutions in K-grant funding, including a K12 institutional training grant overseen by professors Thomas Gardner, M.D., M.S., and Paul Lee, M.D., J.D.

Kellogg’s K12 grant supports the Michigan Vision Clinician-Scientist Development Program. The program provides time, resources and mentorship to up to two investigators each year to a point when they can compete for individual K-grant funding. “Our K12 scholars are terrific examples of Kellogg’s deep bench of talented young physician-scientists,” says Dr. Gardner. “We’re proud of them all.”

Abigail Fahim, M.D., Ph.D., is beginning her second year of K12 support. Lev Prasov, M.D., Ph.D., is the newest investigator supported by the K12

Alumni Highlights

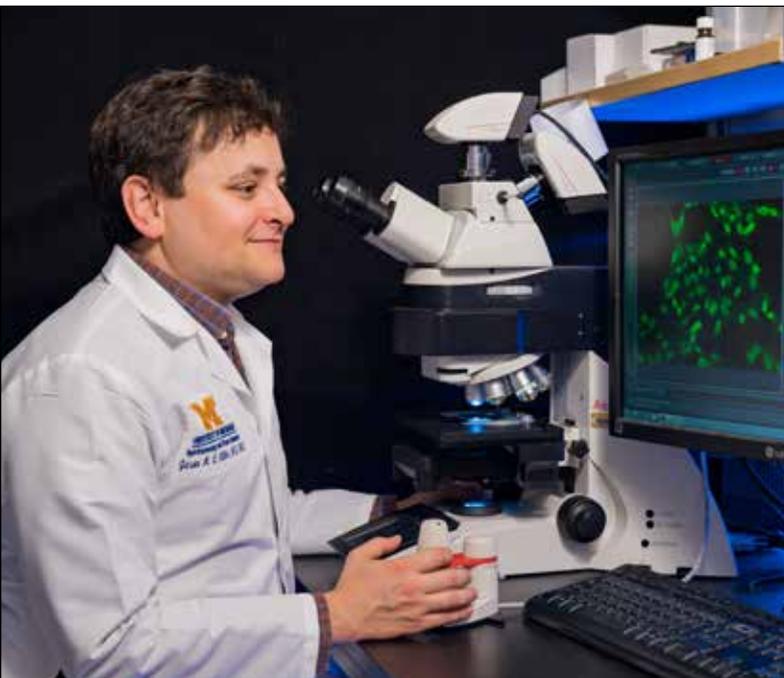
AMD Research Award

Jason Miller, M.D., Ph.D., was one of only four U.S. ophthalmology residents and fellows invited to participate in the AUPO/RPB Resident and Fellow Research Forum. Showcasing the work of the most promising emerging vision researchers, the forum is held at the annual meeting of the Association of University Professors of Ophthalmology (AUPO) and is supported by a grant from Research to Prevent Blindness (RPB).

Dr. Miller's research focuses on the pathways leading to the degeneration of the retinal pigment epithelium (RPE) in the dry form of age-related macular degeneration (AMD).

The RPE is a layer of cells that support photoreceptors, the cells that translate light into electrical signals that travel to the brain. Among its many functions, the RPE controls the amount of fat in and around photoreceptors. Dr. Miller hypothesizes that inefficiencies in how the RPE does this job can lead to the fatty deposits associated with dry AMD, and that medications can be used to relieve this buildup.

Using RPE cells cultured in his lab, Dr. Miller studies cell processes that improve fat handling, including the pathway tasked with self-digesting unwanted parts of the cell. He has identified specific molecules that activate the pathway and decrease fat deposits in and around the RPE. This may lead to new treatments that promote photoreceptor survival, slowing the rate of progression of dry AMD.



Carol L. Karp, M.D. (Residency, 1993) is the Richard K. Forster Chair in Ophthalmology and the Dr. Ronald and Alicia Lepke Endowed Professor in Corneal Diseases at the University of Miami Health System Bascom Palmer Eye Institute in Miami, Florida. A trailblazing clinician and researcher,

her work in both non-surgical therapeutics and ocular imaging have transformed the diagnosis and management of ocular surface tumors.

Years before eye injections became standard practice, she pioneered the injection of interferon around the eye along with topical drops, with remarkable curative outcomes. Dr. Karp also helped develop a non-invasive "optical biopsy" known as OCT, which yields more precise diagnostics and treatment planning for benign and malignant ocular tumors.

Since winning the LaBerge and Slocum resident awards at Kellogg for her first publication in *Ophthalmology* as a resident, she now has over 130 peer-reviewed manuscripts, and more than 25 chapters. She has also received multiple awards from the AAO and AMA for her service and mentorship.

"I'm forever grateful for my time at Kellogg," she says. "I discovered my love of research there, and by example, my Kellogg mentors showed me how to be an ethical, thorough investigator and a compassionate, patient-focused clinician."



Ryan Fante, M.D. (Residency, 2014) is a practicing ophthalmologist at the Sansum Clinic in Santa Barbara, California.

Celebrating its 98th anniversary in 2019, the Sansum Clinic is the oldest and largest not-for-profit outpatient healthcare provider on California's central coast. Dr. Fante is one of six ophthalmologists in a multispecialty group of 180 physicians.

Dr. Fante's practice includes cataract and minimally invasive glaucoma surgery as well as injections and laser treatments for macular degeneration and diabetic retinopathy. Since joining the clinic in 2014, he has also stepped into leadership roles on Sansum's Clinician Advisory Committee and Peer Review and Credentialing Committee.

"Unlike many of my peers, I did not elect to do a fellowship," he says. "But thanks to my residency at Kellogg, I was more than prepared to hit the ground running in a busy, comprehensive ophthalmology practice."



Raymond Cho, M.D. (Fellowship, 2009) is director of ophthalmic plastic and reconstructive surgery at the Ohio State University Wexner Medical Center.

Dr. Cho specializes in plastic and reconstructive surgery of the eyelids, orbit and lacrimal drainage system.

He is also an associate professor at

the Ohio State University College of Medicine and a member of the OSU Wexner Medical Center skull base team. He is well known for his expertise in the treatment of thyroid orbitopathy, orbital trauma and complex periocular and orbitofacial reconstruction after cancer resection.

“I was fortunate to have completed my fellowship at Kellogg,” he says. “Kellogg provided world-class training in ophthalmic plastic and reconstructive surgery, preparing me for the wide variety of surgical challenges I face in my clinical practice.”



Courtney Kauh, M.D. (Residency, 2015) is a practicing oculoplastic surgeon at the Ohio State University Wexner Medical Center.

Dr. Kauh joined the Wexner Medical Center’s Havener Eye Institute in 2017. Her busy practice includes surgical procedures to treat orbital and periorbital tumors, eye trauma and diseases, and eyelid and tear

duct abnormalities. She also coordinates a comprehensive orbital dissection course for ophthalmology residents, and cares for patients at the Veteran’s Administration facility in Columbus.

“My residency experience at Kellogg was exceptional,” says Dr. Kauh. “I had terrific instructors in every discipline, many of whom remain colleagues and mentors to this day.”

The surgical training Dr. Kauh received played a big role in her choice to specialize in oculoplastics. “I learned from the best, and have incorporated many of their surgical techniques into my practice.”



A More Complete Picture of Intraocular Tumors

To properly diagnose and treat cancer, it is essential to understand not only the physical characteristics of a tumor, but also its molecular and chemical properties. This presents a particular challenge for tumors in hard-to-reach spots or where traditional tissue biopsy is impractical, like inside the eye.

Diagnosis of intraocular tumors mainly requires noninvasive imaging technologies like optical coherence tomography and ultrasound. While these tools show the tumor’s structural characteristics, they don’t reveal key molecular and chemical properties.

A multidisciplinary Michigan Medicine team including new Kellogg assistant professor Guan Xu, Ph.D., is addressing the limitations of current imaging modalities with a new hybrid technology called photoacoustic imaging (PAI).

As its name implies, PAI combines useful properties of both light (photo) and sound (acoustic) waves. A laser inserted through a fine needle endoscope illuminates an area of tissue. As the tissue absorbs the light energy and converts it to heat, it generates high-frequency waves that reveal its structural characteristics. At the same time, the tissue projects some of the absorbed infrared light as a different light form that provides information about the tissue’s chemical properties.

PAI can potentially be used to image tumors anywhere in the body. Dr. Xu, who is also an assistant professor of biomedical engineering, has demonstrated its ability to characterize several tissue types in mice. His application of PAI to prostate cancer has been recognized with a prestigious NIH Method to Extend Research in Time (MERIT) award. At Kellogg, he will focus on refining the use of PAI to diagnose and direct treatment for intraocular tumors.

M Legacies in Vision

Donors Establish Endowed Chairs, Ensuring Leadership and Progress

The Kellogg Eye Center inaugurated three professorships this year — two established by longtime patients and one by a faculty member of more than 60 years. Each will support faculty, providing time for research, educational and leadership activities in perpetuity.

“We are very grateful to these individuals, whose generosity and foresight will forever benefit faculty and patients,” says Paul P. Lee, M.D., J.D., F. Bruce Fralick Professor and chair of the Department of Ophthalmology and Visual Sciences. “And we were pleased to be able to recognize and support outstanding faculty members who are making significant contributions to the field.”

Roger W. Kittendorf Research Professorship in Ophthalmology and Visual Sciences

David A. Antonetti, Ph.D., became the inaugural Roger W. Kittendorf Research Professor in Ophthalmology and Visual Sciences on April 4.

Dr. Antonetti is scientific director at Kellogg and one of the world’s leading experts in the blood-retinal barrier. He is part of a team advancing approaches to protect and restore the barrier during disease processes so vision can be saved and restored.

Roger W. Kittendorf, an attorney and businessman in Genesee County, Michigan, died in 2012. Mr. Kittendorf was

a long-time Kellogg supporter; he made generous gifts to vision research and ophthalmic education, and Kellogg’s Resident Education Center is named in his honor. The professorship was created through a bequest.

Mr. Kittendorf often said he felt privileged to share his success with others.

“He would have been awed by David Antonetti’s approach to science and his passion for pushing the envelope to benefit patients,” says Paul R. Lichter, M.D., M.S., an active emeritus professor and immediate past chair of the Department of Ophthalmology and Visual Sciences. “He would have been very moved to know that he was playing such a significant role in ensuring such work will continue at the University of Michigan for generations to come.”

Leonard G. Miller Professorship in Ophthalmology and Visual Sciences

When Rajesh C. Rao, M.D., became the first Leonard G. Miller Professor in Ophthalmology and Visual Sciences on June 11, he described it as a transformative opportunity.

“The Kellogg Eye Center and the University of Michigan have to be one of the most inspiring places in the country for a clinician-scientist to pursue dreams,” he says. “It is a privilege to collaborate with colleagues inside and outside our department.”



Carol Bradford, M.D., M.S., presents the professorship award to David Antonetti, Ph.D.



Leonard G. Miller with Rajesh C. Rao, M.D.

Dr. Rao studies the role of epigenetics in retinal development, which includes the chemical modifications on DNA and DNA-associated proteins that regulate gene activity. His aim is to advance treatments for blinding diseases. His team has made major contributions to the field, including linking the dysfunction of certain epigenetic proteins to blinding human diseases for the first time.

Leonard G. “Larry” Miller, a retired business owner and philanthropist, wanted to support Dr. Rao's efforts. Mr. Miller has sought care for a range of eye conditions at the W.K. Kellogg Eye Center, including age-related macular degeneration.

A U-M graduate, Mr. Miller has provided wide-ranging support to U-M. Additional gifts to Kellogg include purchasing two high-powered microscopes and supporting the eye center's capital expansion campaign.

Ida Lucy Iacobucci Collegiate Professorship in Ophthalmology and Visual Sciences

Steven M. Archer, M.D., became the first Ida Lucy Iacobucci Collegiate Professor of Ophthalmology and Visual Sciences on Aug. 14, a position that honors a longtime colleague.

Ms. Iacobucci, affectionately known as “Miss Ida,” was a clinical associate professor of ophthalmology and visual sciences, for nearly 30 years and one of the country's leading specialists in orthoptics, which is the treatment of disorders of vision, eye movements and eye alignment. She began her career at U-M in 1957, developing new treatment methods and authoring two textbooks.

She trained more than 300 ophthalmology residents and orthoptics students in the clinic at Kellogg that now bears her name: the Ida Lucy Iacobucci Orthoptics Clinic. Before she



Dr. Bradford with Steven M. Archer, M.D., and Paul P. Lee, M.D., J.D.

died in 2017 at age 85, she arranged for the professorship to be established through her estate.

Dr. Archer, a pediatric ophthalmologist and dedicated researcher and educator, worked alongside Ms. Iacobucci for nearly 30 years. His wide-ranging clinical research interests include vision screening for preschoolers, the management of eye-muscle paralysis, improving surgical interventions and more. About a third of his patients are adults with a misalignment of the eyes, and he has ongoing projects looking at the causes and treatment of double vision in adults. He also helped develop a standout fellowship program to train pediatric ophthalmologists.

Before she died, Ms. Iacobucci said it was her sincerest wish that Dr. Archer be the first to hold the professorship in her name.



Heed-Gutman Award Paul P. Lee, M.D., J.D.

Kellogg Eye Center Director Paul P. Lee, M.D., J.D., is the 2019 recipient of the prestigious Heed-Gutman Award from the Society of Heed Fellows. The award, presented during the annual meeting of the American Academy of Ophthalmology, recognizes extraordinary and distinguished leadership in ophthalmology and major clinical, research and educational contributions to the field.

Dr. Lee, the F. Bruce Fralick Professor and Chair of the U-M Department of Ophthalmology, was also recognized by Women in Ophthalmology with the organization's Honorary Lecture Award, which is given annually to recognize contributions as an educator, researcher or humanitarian. Dr. Lee's lecture was presented at the 2019 WIO Summer Symposium.

Generous Gift Supports Early-Stage Vision Research

Philanthropic support is critical to early-stage laboratory research, which is why longtime Kellogg supporters Laurie and Timothy Wadhams endowed the Wadhams Ophthalmic Research Fund. The gift will support cutting-edge research in its early stages.

“I experienced challenges with my eyesight at an early age, and with successful treatment, was able to overcome them,” says Mr. Wadhams, retired CEO of Masco Corporation. “Laurie and I want to help ensure that treatments exist for all of the diseases that threaten vision.”

The Wadhams’ endowed gift of more than \$500,000 is part of the Paul R. Lichter, M.D., M.S., Vision Research Discovery Fund, an umbrella fund that supports research to build knowledge and open doors for more effective treatments and cures. With the contribution, the Lichter Fund reached a pivotal \$5 million milestone.

“Discovery research is the foundation of tomorrow’s sight-saving therapies, and I am grateful for this partnership with Mr. and Mrs. Wadhams,” says Dr. Lichter, immediate past chair of the U-M Department of Ophthalmology and Visual Sciences and an active professor emeritus. “As physicians, scientists and community members, ensuring ongoing scientific advancement is one of the greatest contributions we can make to vision.”



Longtime Kellogg supporters Laurie and Timothy Wadhams have endowed the Wadhams Ophthalmic Research Fund.

The Lichter Fund provides competitive, peer-reviewed grants to researchers. Applications must include colleagues in other departments and schools, catalyzing innovation and collaboration.

Proceeds from the Wadhams’ fund will support researchers such as Brenda L. Bohnsack, M.D., Ph.D., the Helmut F. Stern Career Development Professor of Ophthalmology and Visual Sciences and a pediatric ophthalmologist. With a Lichter Fund grant, she studied a gene related to aniridia, a congenital eye disease, and established new, novel research partnerships across Michigan.

With the early-stage data that resulted, she applied for further funding from the National Institutes of Health to continue her work on preventing the disease.



In Memoriam: Terry J. Bergstrom, M.D.

Terry J. Bergstrom M.D. (M.D. 1965, Residency 1969, Fellowship 1975), professor emeritus of ophthalmology and visual sciences, died June 23, 2019, at the age of 85. Dr. Bergstrom pursued his ophthalmology training while serving in the U.S. Air Force. Over the course of his 26 year military career, he served as a flight surgeon and chief ophthalmologist at March Air Force Base in California and the USAF hospital in Wiesbaden, Germany. He received the Legion of Merit award upon retiring at the rank of colonel.

In 1980, Dr. Bergstrom returned to his alma mater and joined the faculty of the Kellogg Eye Center, where he practiced for 24 years and continued to work as an emeritus professor.

His numerous accomplishments include serving as chief of the glaucoma service, chief of the low vision service, residency program director, and chief of the comprehensive ophthalmology service. He also served as chief of ophthalmology at the VA Ann Arbor Healthcare System.

“Terry’s contributions to education at Michigan were transcendent,” says Professor Jonathan Trobe, M.D. “His passion for teaching lives on through our resident teaching award, which was renamed in his honor after being bestowed upon him for 14 consecutive years.” An endowed professorship was also created in his name by grateful alumni and patients.



Cheers! for Kellogg

Family hosts fundraiser to support research of much-appreciated faculty member

When the Kelleher family took their daughter Kate to Brenda Bohnsack, M.D., Ph.D., for childhood glaucoma, they were grateful to discover that she is a dedicated and caring pediatric ophthalmologist. Over many visits, they also learned she is a committed researcher, working to advance knowledge toward cures for pediatric eye diseases.

They wanted to help.

“Kate is 11 and just started middle school in the fall. She is facing a disease that most people get when they are in their 60s or later, and she will have it her whole life,” says Alison Kelleher. “We were surprised at how little research is being done in this area, and thrilled that Dr. Bohnsack is changing that.”

“She is a rock star—a standout doctor,” says Michael Kelleher. “We don’t take that for granted.”

The Kellehers live in Ann Arbor. Mr. Kelleher is in a sales leadership position with Terryberry, a Grand Rapids, Michigan-based firm, and Mrs. Kelleher is a stay-at-home mom to Kate and her brother Brennan, 8. The family began making gifts to Dr. Bohnsack’s research and then decided to invite others to get involved as well.

They created Cheers! for Charity, a reception and silent auction held in Ann Arbor, and hosted events in the fall of 2018 and 2019. About 100 people attended each, and the events together have raised more than \$30,000.

“These funds are so important to advancing our work,” says Dr. Bohnsack, the Helmut F. Stern Career Development Professor of Ophthalmology and Visual Sciences at Kellogg. Her laboratory team studies eye development. By identifying ways to intervene when it goes awry, they are moving the field closer to new therapies to prevent vision loss and improve quality of life for children.

“The Kellehers’ family and friends are so enthusiastic about our progress, which comes from how much they care about Kate and what she is facing,” says Dr. Bohnsack, who presents at Cheers! for Charity. “That is what motivates us, too—our patients.”

“These have been really, really great events,” Mrs. Kelleher says. “People tell us how much they enjoy them. Not only are people learning about this—it is an eye-opening experience—but there is just a warmth and lots of love in the room.”



Alison, Michael and Kate Kelleher with Brenda Bohnsack, M.D., Ph.D. at the Cheers! for Charity event in Ann Arbor.

A Welcome Event

Lobby naming celebrates generosity, families' comfort

Real estate developer Mickey Shapiro has a wealth of experience helping people feel at home. As founder of the M. Shapiro Real Estate Group, his companies own and provide property management services for communities throughout the United States and Canada.

That's why it's fitting that the Mickey Shapiro Surgical Care Lobby, designed to put visitors at ease as they support those undergoing eye surgery, was dedicated this spring.

"The Kellogg Eye Center is a world-renowned eye institute, and the doctors, nurses, and administrators are first-in-class," Mr. Shapiro says. "I am proud to be affiliated with the center and am especially pleased with every detail of the lobby. It gives families and friends of patients a relaxing and comfortable space in which to wait for their loved ones."

Each year, Kellogg's faculty perform more than 8,000 surgical procedures. The entire center was created to move patients easily through check in, surgery preparation, procedures and recovery. The lobby, which features comfortable furnishings and private consultation rooms, was conceived as a spacious and warm environment.



Faculty and staff gathered to dedicate the Mickey Shapiro Surgical Care Lobby on May 6, 2019. From left: Paul R. Lichter, M.D., M.S., Mr. Shapiro, Carol George, BSN, R.N., and Paul P. Lee, M.D., J.D.

"This is a very special place, where we are working to save sight every day," says Paul P. Lee, M.D., J.D., F. Bruce Fralick Professor and Chair of the department. "We are honored that the surgical care lobby is named for Mr. Shapiro, who is widely recognized as someone who is dedicated to helping others."

Mr. Shapiro is actively involved in numerous charitable organizations, and he served on the community advisory board for the Kellogg Eye Center's successful capital expansion campaign.

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 6, 2020
92nd Annual Spring Postgraduate Conference
Plastics
8 a.m. – 5 p.m.
Kellogg Eye Center
Ann Arbor, Michigan

Thursday, June 19, 2020
36th Annual Research Day

Friday, September 11, 2020
Fall Alumni Day



For more information or to register for these programs, visit: www.umkelloggeye.org

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

KELLOGG'S NEW FACULTY

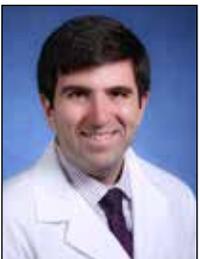


Maria Fernanda Abalem, M.D., M.Sc.
Adjunct Assistant Professor
Research

Dr. Fernanda Abalem completed a surgical and medical retina fellowship at the

University of São Paulo, São Paulo, Brazil, and a postdoctoral fellowship in inherited retinal degenerations at Kellogg. She holds a dual appointment at both institutions.

A retina specialist, her research focuses on applying gene therapy, artificial intelligence and telemedicine to retinal degenerations.



Stephen Armenti, M.D., Ph.D.
Clinical Lecturer,
Chief Graduate Resident
Comprehensive Ophthalmology

Dr. Armenti's clinical practice includes the

evaluation and treatment of both complex and routine cataracts, glaucoma and diabetic eye disease. His research focuses on developing a new resident teaching curriculum, including improving anterior segment and trauma surgical education.



April Maa, M.D.
Adjunct Associate Professor
Research

Dr. Maa is an associate professor in the department of ophthalmology at Emory University School of Medicine.

Dr. Maa is the clinical director of Technology-Based Eye Care Services (TECS), a novel telehealth program, which provides eye care in medically underserved areas. As an adjunct faculty member, Dr. Maa is collaborating with Kellogg colleagues to expand the program into select Michigan communities.



Nambi Nallasamy, M.D.
Assistant Professor
Cornea

A graduate of Harvard Medical School, Dr. Nallasamy completed his ophthalmology residency at Duke

University Eye Center, followed by a cornea, external disease and refractive surgery fellowship at the Bascom Palmer Eye Institute.

An assistant professor of both ophthalmology and computational medicine and bio-informatics, Dr. Nallasamy combines clinical practice with research in applying machine learning to improve diagnostics and treatment planning.



Karan H. Patel, M.D.
Clinical Assistant Professor
Comprehensive Ophthalmology

Dr. Patel completed medical school at the University of Miami Miller School of

Medicine and an ophthalmology residency at the Kresge Eye Institute in Detroit.

His clinical practice includes the evaluation and treatment of cataracts, astigmatism and presbyopia-correcting intraocular lenses, minimally invasive glaucoma surgery and diabetic eye disease. His research focuses on ophthalmic technologies and devices.



Lev Prasov, M.D., Ph.D.
Associate Professor
Comprehensive Ophthalmology and Ophthalmic Genetics

Dr. Prasov completed undergraduate, graduate, post-graduate,

medical school and residency training at U-M, followed by fellowship training in ophthalmic genetics at the National Eye Institute.

An NEI K12 scholar, his research focuses on the genetic basis of developmental ocular disorders and the development of novel therapies for these conditions.



Thérèse Sassalos, M.D.
Clinical Assistant Professor
Uveitis, Retina and Comprehensive Ophthalmology

Dr. Sassalos completed a medical degree at

U-M, an ophthalmology residency at Henry Ford Hospital and fellowships in both medical retina and uveitis at Kellogg. She is also an adjunct assistant professor at Northwestern Memorial Hospital in Chicago.



Thomas Wubben, M.D., Ph.D.
Assistant Professor
Retina

Dr. Wubben earned medical and post-graduate degrees in biochemistry and molecular genetics

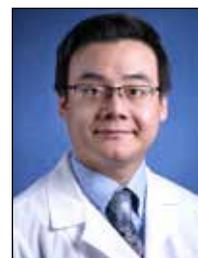
from the University of Illinois at Chicago. His research explores the intersection of metabolism and cell survival in the retina to develop novel therapies for retinal disorders.



Guan Xu, Ph.D.
Assistant Professor
Research

Dr. Xu is part of a U-M team pioneering minimally invasive imaging that uses infrared light and ultrasound to reveal

cellular and chemical information without a physical biopsy. After successfully imaging various organs in mice, his team is evaluating its potential to image structures and abnormalities in the eye.



Jason Zhang, M.D.
Clinical Assistant Professor
Comprehensive, Glaucoma

Dr. Zhang completed an ophthalmology residency at Yale New Haven Hospital, and

a glaucoma fellowship at the University of Virginia. He sees glaucoma and comprehensive ophthalmology patients at Kellogg's Huron River and Grand Blanc offices.



Michigan Alumnus Elected to the National Academy of Medicine

Anthony Adamis, M.D. (Residency, 1989) has been elected to the National Academy of Medicine. Considered one of the highest honors in the fields of health and medicine, election to the Academy recognizes individuals who have demonstrated outstanding professional achievement and commitment to service.

Dr. Adamis is best known for co-discovering the key role of vascular endothelial growth factor (VEGF) in eye disease, and obtaining FDA approval for the first anti-VEGF drug in ophthalmology, which treats millions of people annually. Today, he is senior vice president of development innovation at Genentech, a biotechnology firm, member of the Roche Group, and a lecturer in ophthalmology at Harvard University Medical School.

“At Michigan, I was trained to ask how things work, so I decided to try my hand at research,” Dr. Adamis told a Kellogg grand rounds audience in 2017, upon receiving the Michigan Medicine Alumni Society’s Distinguished Achievement Award. He credits U-M and Kellogg with providing “the kind of guidance and support that a very junior scientist can only wish for.”

2019 FIRST-YEAR RESIDENTS



Nicholas Carducci, M.D.

B.S. – Cellular and Molecular Biology,
University of Michigan
M.D. – Perelman School of Medicine,
University of Pennsylvania



Emily Chang, M.D.

B.S. – Bioengineering,
University of California, Berkeley
M.D. – Baylor College of Medicine



Asad Durrani, M.D.

B.Sc. – Molecular and Cellular Biology,
Economics, Johns Hopkins University
M.D. – University of Pittsburgh



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Helen Devos Childrens Hospital
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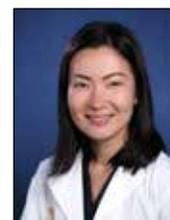
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 Heed-Gutman Award, Heed Ophthalmic Foundation
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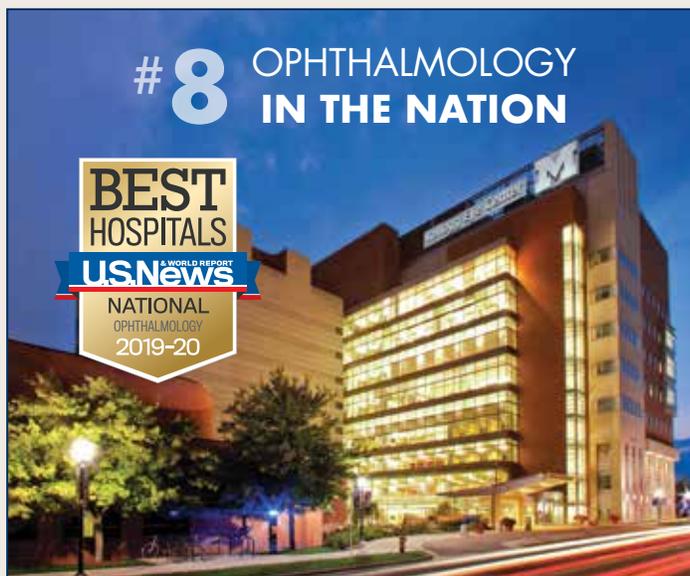
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