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Dear Friends,

At what promises to be a time of significant change—and thus opportunity—in health care, research, and education, I am heartened by the spirit, energy, and values of our “Michigan family.” In this Annual Report, we are proud to highlight the achievements of our faculty, trainees, and staff during the past year. We are also pleased to share with you some of our new initiatives that will help catalyze changes to meet national and global health care needs. We believe that these examples of new approaches to how we work will not only fundamentally enhance our knowledge of science and improve our care for tomorrow’s patients but also empower all of us to realize a better future in which we can truly cure or prevent visual disability.

The Department’s vision care initiatives hold great promise because they reflect the guiding principles we all strive to honor: integrity, caring, innovation, and teamwork. In addition, the stories behind the articles in this report—representing the perspectives of our patients, faculty and staff—demonstrate how we try each day to integrate these enduring principles into our work. In fact, it is through stories about our experiences at Michigan that we know we are moving in the right direction. Your stories are part of the Michigan and Kellogg experience as well. If you have one you’d like to share, please send it to me at pleemd@med.umich.edu.

As a graduate of the University of Michigan School of Literature, Science, and the Arts and the Medical School, my experience and stories reflect the strengths of our University and show why I am so confident that the future is bright. Michigan’s support for individual passion and opportunities to work across disciplines was evident during my student years; this dedication has only grown stronger with time. Future achievement will be built on multi-disciplinary teamwork in research, education, and clinical care. Our faculty, trainees and staff have embraced this approach, as you will see through stories of our work with the College of Engineering, School of Public Health, the new Institute for Healthcare Policy and Innovation, and international colleagues. We look forward to forging even more partnerships here and around the world.

Michigan’s greatest story is about our people: our alumni and friends, faculty and staff, patients and students, and those we ask to join us in creating the future. From great mentors, starting with Paul Lichter, the Department’s longtime chair, I have been fortunate to learn that our obligation is not to repay their kindness but instead to pass their wisdom to others—our colleagues, residents, and fellows—to realize the better future that we all seek. On behalf of the Kellogg family, I thank all of you who have so generously provided support toward our shared goal of preserving vision and improving the lives of our patients.

Paul P. Lee, M.D., J.D.
F. Bruce Fralick Professor and Chair
University of Michigan
Department of Ophthalmology and Visual Sciences
Director, W.K. Kellogg Eye Center
“The third function of institutions of higher learning is the creation of wisdom in our students, trainees, staff, and faculty. Wisdom is the multidisciplinary integration of knowledge and experience resulting in the development of new insights—the innovations that improve our understanding of the world and our ability to improve lives.”

— Paul P. Lee, M.D., J.D.
Curing, Preventing, and Treating Eye Disease

The Kellogg Eye Center has always upheld the values of exemplary patient care and dedication to our patients and their families. Kellogg faculty and staff together have developed a statement of purpose, a long-term vision, and a set of guiding principles that reaffirm these values.

PURPOSE: Improve lives through curing, preventing, and treating eye disease

VISION: We seek to improve lives around the world by enhancing vision

GUIDING PRINCIPLES

TEAMWORK: We are a collegial, productive, and collaborative community

CARING: We are respectful and compassionate

INNOVATION: Our curiosity drives innovation and the quest for knowledge

INTEGRITY: Our ethics are built on openness, honesty, and trust
University of Michigan Provost Philip J. Hanlon, Ph.D., has noted that institutions of higher learning traditionally have three functions. The first is the transmission of information—the passing on of facts and discrete bits of data. Today, to varying degrees, information is free and readily accessible on the internet. The second function is the development of knowledge—of organizing facts into coherent frameworks and perspectives. Knowledge is also increasingly available through the internet in ways that both resemble and complement the offerings of the traditional university. The third function, to which the University of Michigan is dedicated, is the creation of wisdom in our students, trainees, staff, and faculty. Wisdom is the multidisciplinary integration of knowledge and experience resulting in the development of new insights—the innovations that improve our understanding of the world and our ability to improve lives.

At Kellogg, our passion for wisdom will drive the successes of tomorrow and will give us reason to be optimistic about the future, despite the challenges we face.

“Our passion for wisdom will drive the successes of tomorrow and will give us reason to be optimistic about the future, despite the challenges we face.”

— Paul P. Lee, M.D., J.D.

Our focus at Kellogg will not change: to provide our patients with the highest level of care. We seek to continuously implement the best and latest research and to create and refine new models for the delivery of care so that we may improve the lives of patients through the treatment, cure, and prevention of eye disease. What are some of the steps Kellogg is taking toward a better eye and health care system for tomorrow?

Understanding the “why” of diseases will enable us to create new therapies. Recent work on inflammatory pathways and early disease manifestations suggest new avenues of treatment for diabetic retinopathy and open-angle glaucoma that complement existing modes of therapy. Discoveries in thyroid eye disease mechanisms are anticipated to lead to new clinical trials for thyroid eye disease within the next year.

Accelerating the pace of research will have a direct impact on patient care and make these treatments available sooner. Across our campus, Michigan is a leader in many areas of translational research. One that holds great promise is personalized medicine, which integrates many current concepts about disease. Better understanding of the relationships among genes associated with eye disease, potential environmental factors, and clinical observations brings us closer to not only assessing a patient’s risk for a particular disease, but also to targeting treatments to the individual’s profile. Similarly, new approaches to clinical research and trials will play a key role in speeding the availability of new therapies. Our faculty have formed companies to accelerate the movement of the discoveries they have made in the lab to patient care settings.
Developing our technological expertise will enable us to develop new systems for creating care that are truly patient- and family-centered. In collaboration with the U-M College of Engineering, Kellogg faculty and staff are developing a computer model that will allow physicians in remote locations to tap the diagnostic expertise of a small number of specialists in inherited eye disease. Such a tool could help patients around the world receive emerging treatments for these rare dystrophies. Our faculty have also developed an instrument that might one day be easily used by non-specialists to detect diseases like diabetic retinopathy and macular degeneration long before the first symptoms appear.

Health services research is a burgeoning field that brings together experts from many disciplines to ensure that patients can access the right care at the right time. Many faculty in this Department and the University are engaged in initiatives to improve the use of care by populations of individuals who are not receiving adequate care. Other studies seek to identify how to improve outcomes—how patients fare—after being treated with certain medications or procedures. Our potential for solving problems through these kinds of studies is greatly increased by the creation of the Institute for Healthcare Policy and Innovation that brings together over 400 of Michigan’s top health care researchers.

Forming new structures adapted to the workforce of tomorrow will enable us to leverage new technologies to enhance teaching and patient care. Collaborative, interactive learning will prepare our trainees for the very different health care environment they will work in as leaders of teams. We have also structured a leadership team at Kellogg (see photo) that integrates the strengths of our faculty to create a joint vision for what we hope to accomplish.

Taking the time to ask “why?” and to question our assumptions will drive our continuous quest for wisdom. Asking what we can learn from other industries and borrowing the best from among ourselves and others will be critical. Among physicians and trainees, we can encourage curiosity and innovation and resist the reflexive response to do things the same way “because we’ve always done it that way.”

Keeping our focus on the patient will be our guide. How can we provide care that is faster, more accessible, and less demanding in terms of time and costs? How can patients participate in their own care to the extent they wish to be involved? These and other questions frame our opportunities.

As we adapt to meet the challenges of our time, our traditional values and our passion for improving our patients’ lives will not change—but the way we achieve our goals will change. It is our responsibility to think about, encourage, and implement collaborative and innovative ways of improving our systems for delivering health and eye care. By so doing, we honor our responsibility to generate the wisdom that will guide the next generation in their quest for a brighter future.
“Leaders and Best” in Ophthalmology

The Kellogg Eye Center has enjoyed steady growth, thanks, in part, to the recent opening of our new facility with expanded space for patients needing clinical and surgical care. The new space has allowed us to recruit additional faculty who are developing innovative and treatment-directed programs for patients suffering from debilitating eye disease. The Department continues to attract important federal grants and this year achieved a ranking of #5 in funding awarded to departments of ophthalmology by the National Institutes of Health.
Ester M. Skutt, of Holt, Michigan, remembers vividly the day she was diagnosed with Graves’ disease in October 2009. “I was frightened,” says the former nurse. “I knew it was a pretty bleak situation. I had taken care of patients with the disease.” A complex autoimmune disorder, Graves’ disease results in the overproduction of thyroid hormones, or hyperthyroidism. The condition affects over 3 million Americans.

One year later, in December 2010, Ms. Skutt developed a cluster of “blisters” on her eyes. “I knew that with Graves’ disease there was a possibility that my eyes could be involved,” she says. Her greatest fear was that her symptoms could be related to Graves’ eye disease, a complication that results in swelling of the eyelids, a constant stare, eyelid retraction, and double vision. Left untreated, the disorder can lead to permanent vision loss.

Ms. Skutt’s ophthalmologist in nearby Lansing started her on a regimen of steroid therapy to address the blistering. After two doses and strong drug intolerance, she found herself in the hospital with atrial fibrillation, an irregular heartbeat often associated with congestive heart failure. Days later, she was referred to Kellogg’s Raymond S. Douglas, M.D., Ph.D., a specialist in Graves’ eye disease and renowned orbital, facial plastic and reconstructive surgeon.

“Ms. Skutt’s inflammation and eye bulging had progressed rapidly and she was beginning to lose vision,” says Dr. Douglas. “Given her intolerance for steroids, we felt it would be reasonable to try alternative anti-inflammatory therapies in conjunction with the care of a team of rheumatologists. After two infusions, her disease regressed and we were able to stabilize her thyroid function. Most of her pain also ceased.”

To help patients like Ms. Skutt receive expert care for this complex condition, the Kellogg Eye Center has formed its Thyroid Eye Disease Center, which brings together specialists from multiple disciplines to provide integrated care for individuals with thyroid disorders. Surgeons from Kellogg’s oculoplastics service are at the core of the Center, coordinating clinical care as well as participating in research aimed at discovering new therapies for Graves’ and thyroid disorders.

In the months that followed, Ms. Skutt underwent orbital decompression surgery to move her eyes back into place followed by surgery to correct her double vision. “It was a terrific team effort,” she says. “I saw specialists in orbital surgery, strabismus, and endocrinology at Kellogg—and a specialist in rheumatology at the University of Michigan Health System. The communication between doctors was fantastic.”

Dr. Douglas’ office serves as a destination for patients with Graves’ eye disease. “If Ms. Skutt had to go through the normal referral channels, it would have been months of delay and time lost,” says Dr. Douglas. “With one appointment, her care was consolidated and she had a rapid treatment plan.”

Ms. Skutt has returned to her normal life. “I’m doing fantastic,” she says. “My eyes look better than they did before I was diagnosed with Graves’ disease. The whole experience was just unbelievably good.”
Charlotte Bush was just two years old when she made her first trip to the University of Michigan Kellogg Eye Center in 2009. A new experience for the toddler, such visits were more than familiar to her mother, Amanda Bush, of Marshall, Michigan, who has been treated at Kellogg for nearly 33 years for a condition known as Axenfeld-Rieger (A-R) syndrome—an inherited disease that predominantly affects the development of the eye.

Ms. Bush suspected Charlotte might have the same disease and, if so, wanted to have it diagnosed and treated promptly; fifty percent of those with the disorder suffer from glaucoma. “Ever since I was a baby, I’ve been coming to Kellogg—it was just a normal part of my life,” says Ms. Bush. “And, I’ve always had great experiences so it was natural to bring my daughter here.”

Unfortunately, the mother’s keen instincts proved correct. At Charlotte’s first appointment she was diagnosed with A-R by Paul R. Lichter, M.D., a highly respected glaucoma specialist and former Chair of the Department—and Ms. Bush’s childhood doctor.

Once Charlotte’s vision and intraocular pressures were stabilized, she returned to her local ophthalmolo-
“Coming to Kellogg’s new pediatric eye clinic has been a good experience for Charlotte. She even asks when we can come back,” says Ms. Bush. “As for Dr. Bohnsack, she is a wonderful doctor who knows how to put Charlotte at ease.”

**L I N K I N G**

**CHILDREN’S EYE CARE**

and vision development research

The Kellogg Eye Center and Carls Pediatric Ophthalmology Clinic have a longstanding reputation for excellence in children’s eye care. Established in 1985 when Monte A. Del Monte, M.D., joined the Eye Center and was named the Skillman Professor of Pediatric Ophthalmology—the first endowed chair for pediatric ophthalmology in the world—the Service now widens its scope with the addition of two new subspecialists: Cagri G. Besirli, M.D., Ph.D., in pediatric retina, and Brenda L. Bohnsack, M.D., Ph.D., in pediatric glaucoma.

These new faculty members join some 15 Kellogg physicians in providing children’s eye care throughout the Eye Center. Now, Dr. Del Monte, along with oculoplastics surgeon Christine C. Nelson, M.D., plans to create a center for visual development and pediatric eye disease to integrate both the clinical care for children and our research across the Michigan campus.

As a clinician-scientist, Dr. Bohnsack navigates easily between the clinic and laboratory with a clear sense of how her research will benefit her patients. She believes that understanding how the eye develops will shed light on the cause and possible prevention of congenital eye diseases.

Dr. Bohnsack studies the function of genes that are important for the proper development of the front portion of the eye. “Zebrafish serve as a wonderful model because their embryos are transparent, allowing us to see development of the visual system as it happens,” she explains. She works closely with Alon Kahana, M.D., Ph.D., whose study of zebrafish focuses on the use of stem cells to regenerate eye tissue lost to injury or disease.

Dr. Bohnsack is joining an area of research that has been supported for many years by senior scientists Peter F. Hitchcock, Ph.D., and Philip J. Gage, Ph.D. Dr. Hitchcock’s laboratory investigates the function of molecules that govern development of the embryonic retina and the capacities of intrinsic stem cells in the adult retina. This work also utilizes zebrafish as a model. Dr. Gage’s laboratory studies mammalian models of congenital eye diseases and glaucoma, including Axenfeld-Rieger syndrome, with the aim of further understanding the developmental events that lead to these diseases and eventually developing better treatments.

Though they take different approaches to study the development of vision, these Kellogg researchers have a common goal: to make scientific discoveries that will improve care today and will cure and prevent eye disease in the future.

**As a clinician-scientist,**

**Dr. Bohnsack has a clear sense of how her research will benefit her patients.**

Brenda Bohnsack, M.D., Ph.D., with patient Charlotte Bush who, like her mother, has Axenfeld-Rieger syndrome.
Third-year resident Kristen Harris Nwanyanwu, M.D., M.B.A., earned an M.B.A. because she wanted to understand the business side of the health care system. The degree would provide the tools needed to help her fulfill her passion: helping people get the health care they need.

It is this passion that led her to work with diabetic retinopathy specialist Thomas W. Gardner, M.D., M.S., and health services researcher Joshua D. Stein, M.D., M.S., on a project investigating factors that influence the progression of diabetic retinopathy, a complication of diabetes caused by changes in the blood vessels of the retina.

The project involved examining medical claims from a large health care database in hopes of finding factors—such as hypertension, age, gender, duration of disease, and socioeconomic status—to determine a “score” that could help predict a patient’s risk for developing diabetic retinopathy. Clinicians could then use this score as a tool in identifying and treating their high-risk patients as well as motivating them to change behaviors and reduce risk factors.

During the second year of residency, Kellogg offers a research rotation that can be completed at the Eye Center or at any other institution in this country or around the world. Dr. Harris Nwanyanwu began her project during her first year and used the rotation to design, research, and write a grant.

“The research rotation helps residents build something and see it to fruition,” says Dr. Harris Nwanyanwu. “We have the opportunity to learn about design protocols and research models, as well as writing the grant and navigating the application process. The rotation also allows us to see the value of collaboration within Kellogg and with other parts of the University.”

Dr. Harris Nwanyanwu plans to join an academic medical center after completing a retina fellowship. “My goal is to ensure that patients not only have access to eye care but that they also receive the proper treatment for their condition,” she says.

“My goal is to ensure that patients not only have access to eye care but that they also receive the proper treatment for their condition.”

—Kristen Harris Nwanyanwu, M.D., M.B.A.
When second-year resident Ira H. Schachar, M.D., began his residency, he was pleasantly surprised that so many members of the Kellogg faculty wanted him to be involved in their research. He opted to work on a project with retina specialist Thiran Jayasundera, M.D., and ocular pathologist Victor M. Elner, M.D., Ph.D., to quantify fundus autofluorescence (FAF) in age-related macular degeneration (AMD).

FAF is an imaging method that targets the retinal pigment epithelial (RPE) cells—cells under the retina that nourish the rods and cones—and yields a higher detection rate for changes associated with vision-threatening diseases like AMD. FAF provides a topographic map of accumulated lipofuscin, the aging pigment, within the RPE. Normal accumulation of lipofuscin occurs with age, but accumulation is more pronounced in AMD. Lipofuscin will produce the majority of FAF when excited by blue light, and FAF that is emitted can be digitally recorded and analyzed.

During his second-year research rotation, Dr. Schachar designed a method for quantifying the severity of disease seen in FAF images. By using a novel image analysis technique, it was possible to compare and quantify differences and changes in FAF images. This quantification process yields a single value—the Index of Retinal Autofluorescence—which can be used to assess AMD severity and its change over time.

“Until this Index was developed, we did not have a quantitative tool for analyzing FAF images,” says Dr. Schachar. “With the help of Dr. Jayasundera and Dr. Elner, we designed an algorithm and took this project from ground zero to a point where we could create a pilot study,” says Dr. Schachar. When Dr. Jayasundera recently presented this research at a national retina conference, he received an enthusiastic response. “Some researchers wanted to share their images with us so they could be analyzed,” says Dr. Schachar.

“This research is a hot topic in ophthalmology, and the project has allowed me to tap into the scientific community much sooner than I would have otherwise,” he adds. “The project has also helped me learn the value of collaboration very early in my career.”

Dr. Schachar presented his research at the Michigan Society of Eye Physicians and Surgeons’ annual conference in the summer of 2012. “After speaking with physicians at the conference,” he says. “I realized how academic research can help clinicians in private practice.”
Peter F. Hitchcock, Ph.D., Professor, Ophthalmology and Visual Sciences and Professor, Cell and Developmental Biology, has been appointed as an Associate Dean for Academic Programs and Initiatives at the University of Michigan Rackham Graduate School. He will serve the Dean of Rackham for the next four years toward the goal of ensuring excellence in graduate education at the University of Michigan. In his new role, Dr. Hitchcock will undertake two broad tasks. The first is to provide administrative oversight for thirty-one Ph.D. and M.S. graduate programs in the biological, biomedical, and health sciences. The second is to direct initiatives and help craft policy decisions that impact graduate education at the University of Michigan.

During his tenure at Rackham, Dr. Hitchcock will continue to direct his NIH-funded laboratory, which investigates the molecular mechanisms governing early development of the vertebrate retina and stem-cell-based neuronal regeneration in adult nervous tissue. Throughout his career, Dr. Hitchcock has also been dedicated to graduate and postdoctoral training at Michigan. In addition to current and past trainees mentored in his laboratory, Dr. Hitchcock was a former director of the U-M Neuroscience Graduate Program, founding director of the Office of Postdoctoral Studies at the U-M Medical School, and currently serves as director of U-M’s Vision Research Training Grant.

Among the many honors Dr. Hitchcock has received are the William and Mary Greve International Research Scholar Award, the Research Sabbatical Award, and the Senior Scientific Investigator Award from Research to Prevent Blindness. He has also received a Fogarty Senior International Research Scholar Award from the National Institutes of Health.

Medical Innovation Fellows to Develop “Telehealth” Concept

Four fellows from the U-M Medical Innovation Center (MIC) are stationed at Kellogg during the 2012–13 academic year in hopes of finding ideas that have potential for commercial development.

The fellows have been on-site since July learning about Kellogg and the field of ophthalmology. They’ve met with personnel from Kellogg’s clinics, labs and satellite offices, have shadowed physicians during patient appointments, and have observed surgeries from the operating room.

“It is important for us to know ophthalmology and be immersed in the culture at Kellogg,” says fellow Marius Tijunelis, M.D., M.B.A. (at left). “Although one year is a tight timeline, our team hopes to reach the goal of discovering a true need, developing a solution, and starting the commercialization process.”

In the fall, the fellows narrowed their list of 10 ideas to 3 and presented them to a group of MIC advisors who helped the group select one concept. The fellows are finalizing an idea related to telehealth to improve patient care.
Ophthalmic disease knows no boundaries. Worldwide, complex eye diseases—from glaucoma to age-related macular degeneration to cataract to diabetic retinopathy—steal the sight of millions of children and adults every year. According to the World Health Organization, more than 285 million people are significantly visually impaired and, of these, 246 million have low vision and 39 million are blind. Uncorrected refractive errors remain the major cause of visual impairment.

To solve the puzzles of blinding eye disease, Kellogg clinicians and scientists have long believed that collaboration with our global partners—in clinical care, research, and education—is central to the discovery of new treatments and cures that will improve the lives of patients here and abroad.

Global Vision

The Center for International Ophthalmology is advancing clinical care, education, and research worldwide

To this end, every year our faculty travel the globe with one objective in mind—to participate in the exchange of knowledge about ophthalmology and vision sciences. And we leave our doors wide open to welcome our partners and peers from eye centers and health care institutions—from Beijing to Copenhagen to New Delhi—to do the same.

In the past year, Kellogg faculty have led educational courses on Graves’ eye disease in Guangzhou, China; on neuro-ophthalmology in Zurich, Switzerland; and on specialized uses of contact lenses in Shanghai and Taipei. Our clinicians also regularly participate in mission trips to provide basic eye care and surgical care to patients around the world.

“We want to learn from others. And we want
others to learn from us,” says Jonathan D. Trobe, M.D., Professor, Ophthalmology and Visual Sciences, and Professor, Department of Neurology. “We believe that it’s not a one plus one equals two, but a one plus one equals ten when we all get together—because everyone has different expertise to share.”

Expanding partnerships are highlighted by a June, 2012, visit to the Kellogg Eye Center by Dr. Aravind Srinivasan, administrator of the internationally acclaimed Aravind Eye Hospital in Madurai, India, and a graduate of the U-M Ross School of Business, along with his architect, Israel Gnanaraj. Dr. Srinivasan is also the grandson of Aravind founder Dr. G. Venkataswamy. In preparation for an expansion of their operating facilities, Dr. Srinivasan and his team were eager to learn from Kellogg’s experience. Paul R. Lichter, M.D., who served as Chair during the recent expansion of the Eye Center, led the Aravind team on a tour of Kellogg’s state-of-the-art surgical suites.

“We believe that it’s not a one plus one equals two, but a one plus one equals ten when we all get together—because everyone has different expertise to share.”

—Jonathan D. Trobe, M.D.

Since this visit, Kellogg faculty and staff have traveled to Aravind. Department Chair Paul P. Lee, M.D., J.D., participated in a strategic planning session for the Glaucoma Society of India hosted by Aravind. He also visited several sites within the eye care system.

“The Aravind system is a remarkable realization of Dr. Venkataswamy’s vision to provide high quality eye care to all and to eliminate needless blindness,” says Dr. Lee. “We hope to establish greater relationships with Aravind as part of Michigan’s expanding global health mission.”

Growing collaborations between Kellogg and its international partners have led to the formation of a new platform—the Center for International Ophthalmology, a coordinating agency for interchanges between ophthalmologists and vision scientists here and abroad. The Center is part of a larger network of international initiatives under the University of Michigan Global Reach program. “We have our own projects and creativities,” says Dr. Trobe. “Yet we are integrated with the U-M Global Reach program, which seeks to unify all efforts across campus.”
The Department of Ophthalmology and Visual Sciences has initiated the Michigan Ophthalmology Trainee Career Development Award, a new academic grant program that encourages residents and trainees to pursue projects they are passionate about. Recipients of the award select faculty at Kellogg and throughout the campus to partner with them in accomplishing their goals. Since its inauguration, two grants have been awarded to Kellogg residents.

Crandall E. Peeler, M.D., second-year resident, will travel to Bhairawa, Nepal to evaluate whether a low-cost automated fundus camera can improve screening efforts in rural areas. A central question in his project is whether health care workers with little training in ocular photography can use the portable camera to capture high-resolution fundus photographs used to diagnose eye disease. His goal is to help remote clinics identify patients who should be referred to larger medical centers where higher level care for eye disease is available.

Abigail T. Fahim, M.D., Ph.D., also a second-year resident, received grant funding for her research in X-linked retinitis pigmentosa (XLRP), an inherited blinding disorder of the retina. Dr. Fahim is working to understand how lyonization, a process in which one X chromosome is silenced in every cell of a woman's body, affects disease severity in women who carry a mutation for XLRP.

All residents and trainees are eligible to apply for the award, and proposals are reviewed by the Kellogg Research and Therapeutics Committee.
Specialists in inherited retinal diseases—rare eye conditions that often lead to blindness or near blindness—are few and far between. Yet these physicians offer their patients a great deal of hope by identifying complex conditions and then confirming the diagnosis with genetic testing.

To share the expertise of this small group of retina experts, Thiran Jayasundera, M.D., a specialist in retinal dystrophy at the Kellogg Eye Center, is collaborating with faculty from the U-M College of Engineering. Together, they plan to create a computer model, RetDeDx, to help physicians arrive at a diagnosis for their patients—the first step in finding treatments for uncommon retinal diseases.

The Kellogg Eye Center is a natural starting point for such a system. John R. Heckenlively, M.D., the Paul R. Lichter Professor of Ophthalmic Genetics, has kept genetic profiles of his patients for years, creating a rich collection of clinical observations linked with genetic tests confirming the causative gene or genes. “It’s still very early in the development process,” observes Dr. Jayasundera, who completed a fellowship with Dr. Heckenlively before joining Kellogg’s faculty. “But we know that data like this could help direct at least a small group of patients to the correct therapeutic trial.”

The engineering team will develop image recognition software to identify indicators of disease that a specialist like Dr. Jayasundera would readily see in
scans of his patients’ retinas. Added to the data are profiles of individual patients with confirmed diagnoses, including the causative genes that have been identified. As the tool grows with confirmed cases, it would allow another physician to enter a retinal scan and clinical data, triggering a search for near matches. In the best case, the physician would receive a probable diagnosis and a “short list” of genes to be tested.

Besides offering patients and doctors a faster diagnosis, RetDegenDx has economic advantages. Genetic testing is costly, and few clinics can afford the time or expense of testing for more than a few “suspect” genes among the 185 that have been identified in retinal diseases to date.

“Developing this type of scan recognition, combining it with clinical data, and creating a diagnostic tool is a straightforward engineering problem,” says Gail Hohner, Managing Director of the U-M College of Engineering’s Multidisciplinary Design Program. “Our engineering students will be part of a team developing algorithms to identify patterns and make predictions from a wide range of variables,” she says. “Because the system improves as more data are entered, the key is to collect as many cases as possible from clinics across the country.”

Dr. Jayasundera observes that a few clinical trials for retinal dystrophies are beginning to emerge with gene therapies and stem cell treatments. “As new therapies are discovered, we want to make sure that patients everywhere have a chance to learn about trials that could benefit them,” he says. “We hope that RetDegenDx is the tool that links patients with the treatments that can target their specific conditions.”

Tracking the progression of Stargardt’s disease

Learning about the progression of a disease may help researchers develop new treatments or direct patients to clinical trials. Thanks to a grant from the Midwest Eye-Banks, Dr. Jayasundera and his team will monitor the vision of a group of Kellogg patients affected by Stargardt’s disease, an inherited eye disease that affects children and young adults, and results in the loss of central vision.

Compared to macular degenerations that affect adults, Stargardt’s progresses at a relatively fast pace. Using an analysis algorithm developed at the Kellogg Eye Center, the research team hopes to track the stages of vision loss at an earlier point in the disease than is now possible.

“This study should help us understand how young patients with similar characteristics will progress over time,” says Dr. Jayasundera. “That information could tell us who might benefit from therapies on the horizon or in newly emerging clinical trials.”
Over the past year, Kellogg researchers and clinicians have been laying the groundwork for a new clinical trials center to meet the needs of patients who seek promising new treatments for eye disease. One of the driving forces behind the center is Grant M. Comer, M.D., M.S., a retina specialist and the Edward T. and Ellen K. Dryer Career Development Professor.

“Clinical trials allow us to determine whether promising new medications are effective and safe in treating eye disease,” says Dr. Comer. “Our patients look to us for the latest advances in treatment, especially when they experience diseases for which there are less than optimal treatments—or none at all.”

Renovations will soon begin to create a more convenient setting for research volunteers. The new space will also accommodate the larger clinical staff needed to help manage compliance with federal regulations, study protocols, and increasing reporting requirements.

**Highlighted studies and trials at Kellogg:**

Dr. Comer is currently recruiting volunteers for a two-year observational study to investigate functional and structural changes to the retina before and after treatment with anti-VEGF agents. His goal is to determine the source of vision loss in macular edema, a condition in which leaking blood vessels cause swelling of the retina.

Victor M. Elner, M.D., Ph.D., and his team are using novel non-invasive imaging he developed in 2008 to assess severity and treatment of juvenile diabetes and age-related macular degeneration. These diseases are traditionally evaluated only by alterations in vision or ocular structure that occur late in the disease and only slowly respond to treatment. The new imaging is being used to assess metabolic status of retinal cells that changes early and rapidly in early disease and after treatment, giving researchers a more effective guide for dealing with these diseases.

John R. Heckenlively, M.D., is helping to test whether the compound, valproic acid (VPA), would be a good candidate for treating retinitis pigmentosa (RP). To date there are no FDA-approved treatments for RP, a group of diseases in which damage to retinal cells leads to gradual loss of vision and eventual blindness. The trial will collect safety information and will evaluate the ability of VPA to slow or even reverse vision loss from RP.

Kellogg has also been awarded a National Eye Institute Clinical Trial Planning Grant to develop the infrastructure needed to carry out a large multi-center glaucoma trial. The proposed trial would evaluate whether statins, a class of drugs used to lower cholesterol, could prevent disease progression among individuals with mild to moderate open-angle glaucoma.

David C. Musch, Ph.D., M.P.H., and Joshua D. Stein, M.D., M.S., will lead the effort.

Dr. Comer and the clinical research staff are optimistic about the impact the center could have on improving eye care. “We are hopeful that we can develop clinical studies to bring more treatments to more patients on a fast, safe, and effective timeline,” he says.
How frequently should your ophthalmologist ask you to undergo testing for glaucoma? The answer is important because patients with glaucoma who are not seen frequently enough are at risk of losing vision that cannot be restored. Yet too-frequent monitoring can be a burden for patients.

A new computer modeling system could help physicians—especially non-specialists—predict which patients are likely to remain stable and which are likely to experience worsening disease over a relatively short time. The patient could then be advised when to return to the clinic for testing and treatment based on output from an algorithm.

The project is a collaboration of Kellogg glaucoma specialist Joshua D. Stein, M.D., M.S., and epidemiologist David C. Musch, Ph.D., M.P.H., and colleagues in Industrial and Operations Engineering at the U-M College of Engineering, including Mariel S. Lavieri, Ph.D., and Mark P. Van Oyen, Ph.D.

For specialists like Dr. Stein, the model provides one more tool to aid with decision making. “Technology of this sort is not a replacement for the judgment of the physician,” he says. “But taking advantage of computer modeling–based innovations can absolutely enhance our diagnostic abilities.”

Over 2.2 million Americans have glaucoma, a leading cause of visual impairment in the United States and worldwide. Because glaucoma often occurs without symptoms, a patient can experience irreversible vision loss before being diagnosed with the disease. Any delay in treatment can have significant consequences.

“There are also costs to having patients return to the clinic for testing more often than needed,” says Dr. Stein. “And patients can become anxious while undergoing testing, which can lead to unreliable results and the need to repeat the test.”

The computer model, which projects a personalized “time for next test,” is novel because it is updated each time a test has been performed. The algorithm is based on data from large clinical trials in combination with patient information—such as eye pressure and visual field test results—that accumulates as more tests are completed.

The research team has filed a patent for the model, which has applications beyond glaucoma or even eye disease. “An algorithm like this can be applied to any chronic disease that requires testing over time,” says Dr. Stein. “It could help physicians manage diabetes and high blood pressure, or any condition requiring repeated measurements.”

The research team has validated the model by testing it against data from national clinical studies. One such trial, the Collaborative Initial Glaucoma Treatment Study, led by investigators at the Kellogg Eye Center, provided 10 years of test results on over 600 patients with newly diagnosed glaucoma. “When we compared our algorithm to currently accepted testing practices represented in the trial, it demonstrated better accuracy and decreased delay in identifying disease progression,” says Dr. Lavieri.

“Our work is based on foundational systems engineering models that also allowed us to put a man on the moon.”

— Mark Van Oyen, Ph.D.
Kellogg will train clinician-scientists under a new NEI K12 Training Grant

The Kellogg Eye Center has been awarded a grant to recruit, train, and mentor ophthalmologists who plan to develop research programs in tandem with their clinical practice. Kellogg is one of six ophthalmology departments in the nation to have received this award from the National Eye Institute, whose goal is to increase the number and effectiveness of clinician-scientists in ophthalmology and vision sciences.

Newly trained ophthalmologists, who have had years of medical education, often find it difficult to invest additional time acquiring the skills needed to develop successful research programs. Under the grant, Kellogg is recruiting candidates to the Michigan Vision Clinician-Scientist Development Program and will provide them with mentoring, protected time for research, core instruction, and a range of skills that will enable them to manage a major research enterprise. The program is designed to help trainees make the transition from participating in mentored research projects to serving as investigators for independently funded projects.

“The K12 grant provides an avenue for the Department to recruit and train outstanding clinician-scientists.”
—Thomas W. Gardner, M.D., M.S.

Fostering repair processes in diabetic retinopathy

Steven F. Abcouwer, Ph.D., Associate Professor, Ophthalmology and Visual Sciences, has been awarded a National Institutes of Health grant (R01). Under the grant, Bone Marrow Neuropathy Drives Diabetic Retinopathy, Dr. Abcouwer and colleagues at Michigan State University and the University of Florida will study repair processes that may prevent the progression of retinal tissue damage and inflammation that results in loss of sight during diabetic retinopathy.

“Our work is based on the observation that diabetes impedes nerve communication with the bone marrow, which is necessary for the release of stem-cell-derived precursor cells that travel to sites of tissue damage and aid in their repair,” says Dr. Abcouwer. “Previous studies have focused on processes that lead to retinal damage, rather than restoration. This research is significant because it could lead to ways of preventing diabetic retinopathy by fostering the bodies’ own repair processes.”

Steven Abcouwer, Ph.D.
Preventing retinal cell death associated with diabetes

Patrice E. Fort, Ph.D., M.S., Research Assistant Professor, recently received a National Institutes of Health grant (R01) for his project, *Progressive Impact of Diabetes on Retinal Neuroprotection by Alpha-Crystallins*. Dr. Fort is studying how the natural adaptive mechanisms for protection of the retina are impaired by diabetes—which leads to cell death and ultimately loss of vision. “Understanding how the protective abilities of alpha-crystallins [neuroprotective proteins] are affected in disease states will enable us to develop novel approaches to manipulate these pathways and provide therapeutic benefit to preserve vision in persons with diabetes,” says Dr. Fort. “This research is significant because it could lead to the development of new therapeutic strategies for diabetic retinopathy and other chronic retinal neurodegenerative disorders such as age-related macular degeneration.”

Finding the optimal GLAUCOMA TREATMENT for each patient

Sayoko E. Moroi, M.D., Ph.D., Professor and glaucoma specialist, is also a recent recipient of a National Institutes of Health award (R01). Under the four-year collaborative research investigation, *Aqueous Humor Dynamic Components that Determine Intraocular Pressure Variance*, Dr. Moroi seeks to identify biomarkers associated with fluctuation in eye pressure and variation in response to glaucoma treatment that will make it possible to predict the optimal treatment for each patient. “If there are biomarkers that are linked to a poor response, then we may be able to avoid unnecessary treatment and wasted office visits,” says Dr. Moroi. “Using these profiles to determine in advance the best treatment could have a major impact in preventing the most severe effects of the disease.”
Kellogg researcher Kwoon Y. Wong, Ph.D., investigates retinal neurons that drive subconscious physiological responses to light—such as pupil reflex, the synchronization of the sleep-wake cycle with environmental light-dark cycles, and the modulation of hormone secretion.

Dr. Wong believes this research would benefit from collaboration with other departments at the University. “We could partner with architects to study how lighting conditions might influence subconscious vision or with engineers to develop novel lighting technologies that optimally stimulate these subconscious visual neurons,” says Dr. Wong. “But lack of funding has been an issue.”

Such collaboration is a reality thanks to MCubed—a new U-M program designed to fund pilot studies that spark innovation and foster multidisciplinary teamwork. To qualify, researchers form teams of three, representing at least two disciplines. Funded projects receive $60,000.

The first 50 projects were selected in November. Kellogg epidemiologist David C. Musch, Ph.D., M.P.H., along with faculty from the Department of Otolaryngology-Head and Neck Surgery and the College of Engineering, received funding for a project on the potential benefit of using antacids to treat skin cancer of the head and neck.

Retina specialist Thiran Jayasundera, M.D., and colleagues from the College of Engineering won funding to create a computer model for patients with inherited retinal diseases (read more on page 16).

MCubed plans to select 200 additional projects, and more than 20 Kellogg faculty members—like Dr. Wong—are hopeful their projects will be chosen.

**Fast Forward to tomorrow’s cures**

Another initiative to support research at Michigan is the Strategic Research Initiative—a $100 million commitment over three years from the Medical School Dean’s Office. Its goal is to “fast forward” research around a common vision to develop tomorrow’s cures.

As a first step, the Health System’s research strengths were identified—cancer, inflammation, metabolic diseases, vascular diseases, and nervous system disorders. From there, the goal was to discover opportunities at the intersections of 10 research strengths, including drug development, personalized medicine, and aging.

U-M researchers, including 15 Kellogg faculty members, have formed interdisciplinary teams to develop proposals. Winners will be announced in early 2013.

“Research in the visual sciences fits quite naturally at the intersections defined by the Dean’s initiative.”

— Paul P. Lee, M.D., J.D.
400 health services researchers will work together to make health care better, safer, and more cost effective

Joshua D. Stein, M.D., M.S., a clinician and health services researcher at the University of Michigan Kellogg Eye Center, uses large health care databases to study utilization patterns and patient outcomes of eye care in the United States. Now, Dr. Stein will have access to even more resources—as well as more opportunities to collaborate with U-M faculty and others—as a member of the newly created U-M Institute for Healthcare Policy and Innovation (IHPI).

IHPI is one of the nation’s largest communities of physicians, scientists, and policy analysts studying how health care works and, more importantly, how to improve it. To date, IHPI is comprised of approximately 400 health services researchers at U-M, as well as nonprofit and private sector organizations.

“The idea behind IHPI is to gather talented individuals from different disciplines and university programs and give them the shared space and support they need to successfully understand the changing health care system, advance beneficial health-related policies, and inform efforts to improve patients’ well-being through health services research,” says Dr. Stein. “Although IHPI members come from many different departments and programs throughout the University, we are now positioned to pool our resources and learn from one another in a highly collaborative environment.” In addition to faculty from the U-M Medical School, IHPI members include faculty from the U-M School of Public Health, the Ford School of Public Policy, and the U-M Institute for Social Research. Founded in 2011, the Institute is an initiative of the U-M Medical School.

According to Department Chair and IHPI member Paul P. Lee, M.D., J.D., the Institute will tap the expertise of specialists in health care data analysis, among them Marie Lynn Miranda, Ph.D., Dean of the U-M School of Natural Resources and Environment. “Dean Miranda has made groundbreaking use of geospatial mapping in health care,” he says. “We are fortunate that her team will be applying those tools to the new W.K. Kellogg Foundation grant to improve utilization of eye care services by children throughout the state of Michigan, especially in disadvantaged communities.” Geospatial mapping allows researchers to visualize data related to the locations of patients, patterns of health care, and social and community resources for a given area.

“Through affiliation and partnerships with other centers and institutes at Michigan, we can begin to link changes in public policies to improvements in the health of people in Michigan and around the United States,” adds Dr. Lee.

In addition to Dr. Lee and Dr. Stein, Kellogg is represented by Paul R. Lichter, M.D., David C. Musch, Ph.D., M.P.H., Roni M. Shtein, M.D., M.S., and fellow Paula Anne Newman-Casey, M.D.

“Establishing this institute shows U-M’s commitment and dedication to supporting researchers and creating an environment for us to achieve our potential as health care innovators,” says Dr. Stein. “We now have an exciting opportunity to come together, share ideas, and learn from each other. Through our synergy, we hope to make substantial contributions to the practice of health care and the health of patients here in Michigan and around the globe.”

“We hope to make substantial contributions to the practice of health care and to the health of our patients.”

—Joshua D. Stein, M.D., M.S.
Last year, Joanne Rackham, 81, and Katherine Rackham, 80, of Plymouth, Michigan, grandnieces of U-M benefactors Horace H. and Mary A. Rackham, widened the reach of their extraordinary family legacy with their bequests to the Kellogg Eye Center in support of cornea research. The planned gifts celebrate their special relationship with Alan Sugar, M.D., Professor and Vice Chair, Ophthalmology and Visual Sciences, who has cared for Joanne for over 25 years. The gifts will establish an endowment to support cornea research in perpetuity.

“We want Dr. Sugar to have what he needs to do his research. My work and Katherine’s work always meant everything to us, and now Dr. Sugar’s work is the future we care most about. He will change the world for so many people,” says Joanne. “Dr. Sugar is the greatest guy in the world. He’s been a savior to me. There are people who come along once in a lifetime who are irreplaceable. Dr. Sugar is one of them.” With full agreement and gratitude, her sister Katherine adds, “The man is remarkable.”

The sisters’ longstanding relationship with the University of Michigan Kellogg Eye Center began in 1987 when Joanne was diagnosed with Fuchs dystrophy, an inherited corneal degeneration that required her to have a first corneal transplant in her right eye in 1987 and a second in her left eye in 1993. “I would sit in the waiting room and see children and ladies who...
were also dealing with this condition. I wanted to help them. This is something I can do as a service, because I didn’t have any children myself.” Retinal specialist, Andrew K. Vine, M.D., also assisted in Joanne’s care when she needed treatment for a detached retina.

Affecting four percent of the population, Fuchs disease destroys the thin layer of cells that line the back part of the cornea and is the leading indication for corneal transplantation. More common in women than in men, the disorder typically affects individuals in their 50s or 60s—although occasionally appears earlier in adulthood.

Dr. Sugar admits he was greatly surprised when he learned of the bequests. “The generosity of the Rackham sisters is remarkable,” he says. “It shows a willingness to create a lasting legacy that will help patients for decades to come. I am deeply honored.”

The cornea service will use this gift for generations to gain better understanding of the physiology of Fuchs disease and its genetics, advance surgical techniques, and improve donor cornea preparation and eye banking. “I don’t think that we will end corneal dystrophies and degenerations, but we will lessen the blindness they can cause and improve the lives of those with these conditions,” says Dr. Sugar.

The sisters—and last remaining heirs to carry the Rackham name—continue the family legacy in support of intellectual exploration that began in 1935 when trustees of the Horace and Mary Rackham Fund gave the University of Michigan $6.5 million for the construction of the Rackham Graduate School and an endowment for graduate education. At the time it was the largest gift ever given in support of graduate education in the United States, and without a doubt in the world.

The Rackham Graduate School continues today as the home of graduate and professional education at the University of Michigan and as a major center of cultural and intellectual exchange.

Paul P. Lee, M.D., J.D., Chair of the Department of Ophthalmology and Visual Sciences, says, “Dr. Sugar’s research has advanced our understanding of corneal transplantation and degenerative diseases like Fuchs dystrophy. With this gift, Dr. Sugar and his team will be able to carry their work forward to have an enduring impact on patients who suffer from corneal disease. It is a fitting tribute to one of our most distinguished and respected faculty members.”

For the past thirty years, Dr. Sugar has provided a small white card with his office phone number, home phone number, and paging number to all his surgical patients. “Something as simple as this card reflects Michigan’s philosophy of patient-centered care, of thinking what would most help our patients when they encounter problems, even if it’s in the middle of the night,” he explains. Over the years, Joanne was one of many patients who benefited from Dr. Sugar’s uncommon kindness. “One of my girlfriends needed eye care recently, so I called Dr. Sugar to ask if he accepted referrals,” says Joanne. “Then I gave her his home phone number. She still sees him and is doing very well.”
Dr. Gardner is the Taubman Healthy Eyes Scholar

Thomas W. Gardner, M.D., M.S., Professor of Ophthalmology and Visual Sciences and of Molecular and Integrative Physiology, has long been recognized for his research to find novel treatments for diabetes-related eye disease. Dr. Gardner was named the first Healthy Eyes Scholar by the A. Alfred Taubman Medical Research Institute and JDRF, formerly the Juvenile Diabetes Research Foundation, the leading global organization focused on type 1 diabetes research.

JDRF and the Taubman Institute will support a three-year grant for Dr. Gardner to study novel treatments and biomarkers — indicators that can measure the progress of disease and the effectiveness of treatments — for diabetic retinopathy, the most common complication of diabetes and the leading cause of legal blindness among adults aged 20 to 74 years in the United States.

“Dr. Gardner’s focus on detection of preclinical diabetic eye disease — that is, before individuals or their physicians realize that eye function is deteriorating — would allow people with diabetes to be treated at an earlier stage of the disease when therapy is more likely to be effective,” says Helen Nickerson, Ph.D., JDRF’s senior scientific manager of complications. “Validated methods of early detection would also reduce the time needed to conduct clinical trials and speed the development of new therapies for diabetic eye disease.”

Dr. Gardner will receive $150,000 for each of three years from the Taubman Institute’s endowment and JDRF. The JDRF grant is supported by the Ford Motor Company Fund as part of JDRF’s Healthy Eyes Project, an initiative to ensure that advances in retinopathy science are translated into treatments for people with diabetes.

“This research offers promise for those facing or living with blindness caused by diabetes,” says James G. Vella, president of the Ford Motor Company Fund and Community Services. “This investment is made possible by the thousands of Ford employees around the world who together with Ford Motor Company have raised tens of millions to support JDRF and diabetes research.”

The collaboration with JDRF marks the first time an outside organization has co-sponsored a Taubman Scholar. “This exciting alliance will make it possible for us to accept yet another eminent researcher into the program,” says Eva L. Feldman, M.D., Ph.D., Director of the Taubman Institute. “We’re proud of our relationship with JDRF and delighted to welcome Dr. Gardner and his colleagues to our pool of scientists who are working on cutting-edge cures and treatment.”

“I’m thrilled and honored,” says Dr. Gardner. “We hope to not only understand what causes retinopathy and how to prevent it, but perhaps even to restore the vision in patients who have lost it,” he says. “Right now we truly have nothing to offer those people, but our goal is to change that. The Taubman Institute likes bold and audacious ideas, and we’ve given them one.”
NEW TREATMENTS FOR EYE DISEASE

Dr. Kahana is a Taubman Emerging Scholar

Alon Kahana, M.D., Ph.D., Assistant Professor and Helmut F. Stern Career Development Professor of Ophthalmology and Visual Sciences, directs a research program investigating the use of stem cells to regenerate eye tissue. Now he has been named the Mrs. William Davidson Emerging Scholar by the Taubman Emerging Scholars Program at the A. Alfred Taubman Medical Research Institute.

The Emerging Scholars Program, created to support early career physician-scientists whose laboratory work aims to translate basic research into new treatments for disease, connects University of Michigan Medical School faculty members at the assistant professor level with philanthropists who pledge to support the physicians’ research for three years—at $50,000 per year.

“We urgently need the best and brightest doctors who are motivated by the patient suffering they witness each day to continue to develop new therapies,” says Eva L. Feldman, M.D., Ph.D., Director of the Taubman Institute.

Dr. Kahana’s research focuses on the use of stem cells to regenerate eye tissue lost to injury or disease.

“We believe that regenerative medicine will play a key role in the future of medical care,” says Dr. Kahana. “Our work on eye muscles has identified stem cells and pathways that could one day be used to facilitate regeneration as therapy for muscle disorders affecting vision, as well as for degenerative disorders such as Duchene muscular dystrophy. In addition, greater understanding of the role of stem cells in driving tissue repair versus scarring could help us develop new approaches to the treatment of complex eye conditions, such as thyroid eye disease.”

Karen Davidson will tell you that what struck her most when she first met Dr. Kahana was his enthusiasm for research. “He has such passion to grow our understanding of disease and directly affect treatment. If there’s anyone who can do it, he can. And I really hope he does,” says Mrs. Davidson. “My family has been personally impacted by the type of orbital eye diseases that Dr. Kahana studies. I want to do what I can to help others who struggle with these diseases—they deserve to have hope. Finding meaningful treatments could significantly improve outcomes for these patients.”

“I’m honored to be the recipient of Mrs. Davidson’s trust and generosity,” says Dr. Kahana. “This gift provides the opportunity to have an impact on the lives of patients, colleagues, and trainees. And, it connects us with some of the most accomplished scientists and physicians at the University of Michigan. Her belief in our research has motivated us to work even harder to develop new treatments and cures to blinding and debilitating diseases. We are very grateful to Mrs. Davidson, as well as Mr. Taubman and Dr. Feldman, for their support and leadership.”
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“Generous donor support has allowed us to follow hunches and explore new ideas that are outside the scope of NIH-funded research. This has resulted in exciting discoveries and new avenues of research that otherwise may not have been possible.”

—Bret A. Hughes, Ph.D.
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As a young investigator in the process of developing a research program,
I am grateful for early funding and awards from individual donors
and privately funded organizations. Such generosity allows me to study
retinal diseases and their mechanisms—with the goal of developing
new treatments to prevent or reverse associated vision loss.”

—Patrice E. Fort, Ph.D., M.S.
Assistant Professor
“The Dryer Career Development Professorship has provided the resources needed to build a clinical studies infrastructure that will serve as the foundation for the next generation of clinical research we are building at Kellogg. These studies will enable us to more quickly bring new, more effective treatments to our patients.”

—Grant M. Comer, M.D., M.S., Assistant Professor
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“Support for education enables us to provide our future ophthalmologists and vision scientists with the tools, technologies, and skills needed to make real contributions in a changing health care and scientific environment.”

— Shahzad I. Mian, M.D.
Associate Chair for Education and Residency Program Director
In Memory Of
The Kellogg Eye Center is honored to have received gifts in memory of the following individuals.

Margaret Baier
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In Honor Of
The following individuals were honored through gifts to the Kellogg Eye Center.

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David N. Zacks, M.D., Ph.D.

Bequests and Other Planned Gifts
It is with deep gratitude that we recognize the following individuals for making the Kellogg Eye Center a part of their estate plans.

Frank J. and Helga Arnold
Nancy Bender
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Editorial Board, American Journal of Physiology:
Endocrinology & Metabolism
Editorial Board, Journal of Clinical & Experimental Ophthalmology
Study Section, Research Grant Review Committee,
American Diabetes Association Research Funding Program

David A. Antonetti, Ph.D.
Study Section, National Institutes of Health Diseases
and Pathophysiology of the Visual System
Editorial Board, Tissue Barriers

Steven M. Archer, M.D.
Best Doctors in America
U.S. News & World Report Top Doctor
Guest of Honor, 736th meeting of the New England
Ophthalmological Society, Boston, MA
Robby-Peterson Lecture, Children’s Hospital Pediatric
Ophthalmology Fellowship Alumni Meeting, Boston, MA
Eugene R. Folk, M.D., Visiting Professorship, Illinois Eye
and Ear Infirmary, Chicago, IL
Arthur W. Stickles Lecture, Washington University, St. Louis, MO
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Fellow, Society of Heed Fellows
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Society for the Michigan Society of Eye Physicians and Surgeons

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Ophthalmology Society - American Academy of Ophthalmology

Monte A. Del Monte, M.D.
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U.S. News & World Report Top Doctor
Top Doctor, Hour Detroit
North American Chair, Program Committee, Sub-Specialty Day
in Pediatric Ophthalmology, Pan American Association of
Ophthalmology, Buenos Aires, Argentina
Invited Scientific Advisor and Lead Faculty, WebMDCentral

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Knight’s Templar Eye Research Foundation, Schaumburg, IL
Special Invited International Keynote Speaker, 3rd Chinese
Pediatric Ophthalmology Society Meeting, Xiamen, China
Chair, Program Committee, American Orthoptic Council

Hakan Demirici, M.D.
Best Doctors in America

Raymond S. Douglas, M.D., Ph.D.
Best Doctors in America
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in Published Clinical Research

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Executive Editor, American Journal of Ophthalmology

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U.S. News & World Report Top Doctor
Study Section C Grant Reviewer, National Eye Institute
Chair, ASOPRS Awards Committee

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Co-host, American Academy of Ophthalmology/American
Orthoptic Council/American Association of Certified Orthoptists
Strabismus Symposium, American Academy of Ophthalmology
Annual Meeting
Member, International Affairs Committee, American Association
for Pediatric Ophthalmology and Strabismus
Editorial Board, American Orthoptic Journal

Christopher Gappy, M.D.
Peer Reviewer, Journal of American Association for Pediatric
Ophthalmology and Strabismus

Thomas W. Gardner, M.D., M.S.
Healthy Eyes Taubman Scholar, A. Alfred Taubman Medical
Research Institute, University of Michigan Medical School
and JDRF
Research to Prevent Blindness Physician-Scientist Award
Associate Editor, Diabetes and Acta Ophthalmologica
Editorial Board, Journal of Ocular Biology, Diseases, and
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Scientific Advisory Board, Diabetic Retinopathy Clinical
Research Network
Scientific Review Committee, T1D Exchange Biobank
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Juvenile Diabetes Foundation International Medical Science Review Committee: Clinical Affairs Advisory Committee
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Best Doctors in America
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Associate Dean for Academic Programs and Initiatives, Rackham Graduate School
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Academic Editor, PLoS ONE

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Lifetime Achievement Award for 54 Years’ Service, American Association of Certified Orthoptists

Thiran Jayasundera, M.D., FRCSC, FRANZCO
Associate Editor, BMC Ophthalmology

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Elected to membership in the Gass Fluorescein Club
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Treasurer and Executive Committee, The Retina Society
Member, Nominating Committee, The Retina Society
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Editorial Board, Retina
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Best Doctors in America
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Taubman Emerging Scholar, A. Alfred Taubman Medical Research Institute, University of Michigan Medical School
Michael Blumenthal Keynote Lecture, Israel Microsurgical Convention, Eilat, Israel
Research to Prevent Blindness Career Development Award

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U.S. News & World Report Top Doctor
Editorial Board, Archives of Ophthalmology
Board of Directors, American Board of Ophthalmology
Board of Directors, ARVO Foundation
Board of Advisors, Hoskins Center for Patient Safety and Quality, American Academy of Ophthalmology
G. Victor Simpson, M.D., Lecture, Washington Hospital Center (Georgetown University), Washington, D.C.
Ernest K. Goodner Lecture, University of California at San Francisco
Knapp Symposium, American Ophthalmological Society
Academia Ophthalmologica Internationalis

Paul R. Lichter, M.D., FACS
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President, Academia Ophthalmologica Internationalis
Board of Trustees, International Council of Ophthalmology
Chair, Clinical and Educational Conflict of Interest Committee, University of Michigan Medical School

Shahzad I. Mian, M.D.
Best Doctors in America
Patrick Regan O’Connor, M.D., Memorial Lecture, University of Louisville
Ralph and Sophie Heintz Lecture, 38th Annual H. Bruce Ostler Association of Proctor Fellows Meeting
Editorial Board, Cornea
Cornea Editor for the Ophthalmic News and Education Network
Board of Directors, Cornea Society
Policy and Position Review Committee, Eye Bank Association of America
Accreditation Board, Eye Bank Association of America
Program Director’s Council, Association of University Professors in Ophthalmology
Deputy Section Leader, Council, American Academy of Ophthalmology
Cornea Representative, Ophthalmology Leadership Advocacy Group

Sayoko E. Moroi, M.D., Ph.D.
Best Doctors in America
ARVO Foundation for Eye Research, Certificate of Appreciation for Service as a Developing Country Eye Researcher Travel Fellowship Mentor
Planning Committee and Glaucoma Subcommittee, National Eye Health Education Program, National Eye Institute, National Institutes of Health
Ad Hoc Member, Study Section, Diseases and Pathophysiology of the Visual System, National Eye Institute
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Editorial Board, Ophthalmology
Editorial Board, Retina
Preferred Practice Patterns Committee, American Academy of Ophthalmology
Advisory Board, Cochrane Eyes and Vision Group
Data and Safety Monitoring Board Appointments:
- Corneal Preservation Time Study, NEI, NIH (chair)
- Hydrus IV Phase 3 study, IVT, Irvine, CA (chair)
- Sirolimus Treatment of Geographic AMD Phase 2 study, NEI, NIH (member)
- Leber Congenital Amaurosis Treatment Phase 3 study, Children’s Hospital of Philadelphia (member)

Christine C. Nelson, M.D., FACS
Best Doctors in America
Top Doctor, Hour Detroit
Advisory Board, Women in Ophthalmology

Donald G. Puro, M.D., Ph.D.
Best Doctors in America

Julia E. Richards, Ph.D.
Fellow, Association for Research in Vision and Ophthalmology
League of Research Excellence, University of Michigan Medical School

Roni M. Shtein, M.D., M.S.
Young Physician Leader, Eye Bank Association of America
Outstanding Research Mentor Award, University of Michigan Undergraduate Research Opportunities Program
Achievement Award, American Academy of Ophthalmology

Terry J. Smith, M.D.
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The Endocrine Society International Award for Excellence in Published Clinical Research
League of Research Excellence, University of Michigan Medical School
Research to Prevent Blindness Physician-Scientist Award
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Assistant Editor, Cornea

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Research to Prevent Blindness Physician-Scientist Award
Fellow, Center for Health Care Research and Transformation
Editor in Chief, Evidence-Based Ophthalmology

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Editor in Chief, Cornea
Secretariat Award, Clinical Education, American Academy of Ophthalmology
R. Townley Paton Award Lectureship, Eye Bank Association of America
Roger F. Meyer Cornea Lectureship

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Fellow, Association for Research in Vision and Ophthalmology

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Best Doctors in America
U.S. News & World Report Top Doctor
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Associate Editor (Neuro-Ophthalmology), Medlink
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Basic and Clinical Science Course Committee, American Academy of Ophthalmology

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Best Doctors in America

Dongli Yang, M.D., Ph.D.
Reviewer, Molecular Vision
Reviewer, BMC Ophthalmology

David N. Zacks, M.D., Ph.D.
Best Doctors in America
Terry J. Bergstrom Teaching Award

* Only peer-selected “Best Doctors” and “Top Doctors” rankings are noted


FACULTY PUBLICATIONS


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<td>Regulation of Retinal Cell Death in Diabetes; Co-I JDRF Center for Mechanisms and Intervention of Diabetic Retinopathy; Project 2 Co-PI</td>
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<td>D. Antonetti, Ph.D.</td>
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<td>Induction of the Blood-Retinal Barrier</td>
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<td>The Retinal Microenvironment in Diabetic Retinopathy Subcontract with Northwestern University, PI: Robert Linsenmeier, Ph.D.</td>
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<td>Developing Atypical PKC Inhibitors to Treat Diabetic Retinopathy</td>
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<td>G. Comer, M.D., M.S.</td>
<td>Lowy Medical Research Institute/ Clinical Trial Ocuscience</td>
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<td>A Natural History Study of Macular Telangiectasia — The MacTel Study</td>
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<td>Phase II/III Study of the Efficacy and Safety of Macular MC-1101 1% TID in the Treatment of Nonexudative AMD</td>
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<td>Reproducibility and Tolerability of Visual Tests Used to Evaluate Nonexudative AMD</td>
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<td>W. Cornblath, M.D.</td>
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<td>Case-Crossover Study of PDE5 Inhibitor Exposure as a Potential “Trigger Factor” for Acute NAION</td>
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<td>H. Demirci, M.D.</td>
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<td>Roles of Inflammation and Angiogenesis in Conjunctival Melanoma: Progression and Metastasis</td>
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<td>P. Fort, Ph.D.</td>
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<td>R01-EY008850-20</td>
<td>Ion Conducances in the Retinal Pigment Epithelium</td>
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<td>M. Johnson, M.D.</td>
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<td>Student Stipend Award for Natalia Bajenova, M.D.</td>
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<td>A. Kahana, M.D., Ph.D.</td>
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<td>Biological Signals Controlling Extraocular Muscle Regeneration Chemical Genomic Screen for Modifiers of Axenfeld-Rieger Syndrome: A Pilot Study to Identify Novel Therapeutics of Anterior Segment Dysgenesis</td>
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<td>A. Kahana, M.D., Ph.D. (cont.)</td>
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<td>Investigating the Role of Extracellular Matrix Factors and Collective Cell Migration in Extraocular Muscle Repair and Regeneration Using a Zebrafish Model</td>
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<td>Thyroid-Related Eye Disease: A Preclinical Study Investigating the Role of Retinoid Receptors in Mediating Orbitopathy</td>
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<td>Fight for Sight</td>
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<td>Developing Genomic Technologies to Study Extraocular Muscle Organization and Strabismus Using a Zebrafish Model; Award for Brenda Bohnsack, M.D., Ph.D.</td>
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<td>Development and Regeneration of Extraocular Muscles in Zebrafish - Student Stipend Award for U-M Medical Student Daniel Kasprick</td>
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<td>VisionCare Ophthalmic Technologies Implantable Miniature Telescope for Central Vision Impairment Associated with Age-Related Macular Degeneration and Other Maculopathies</td>
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<td>M. Lipson, O.D.</td>
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<td>Stabilizing Myopia by Accelerated Reshaping Technique Duette Versus Biofinity Toric: Visual Acuity and Vision-Related Quality of Life</td>
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<td>Cost-Effectiveness of Endothelial Keratoplasty Compared with Penetrating Keratoplasty</td>
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<td>Treatment of Ocular Graft-versus-Host Disease (GVHD) with Topical Loteprednol Etabonate 0.5%</td>
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<td>Outcomes of Refractive Surgery Performed by Trainees</td>
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<td>S. Moroi, M.D., Ph.D.</td>
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<td>Aqueous Humor Dynamic Components that Determine Intraocular Pressure Variance Merck IISP #31911 Study: Effect of Myocilin Genetic Variants on Intraocular Pressure and Pressure Variation in Sitting and Supine Positions</td>
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<td>Clinical and Quality of Life Insights on Glaucoma from Analyses of CIGTS Data</td>
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<td>RC1-EY020140-01</td>
<td>Comparative Effectiveness and Medical Interventions for Primary Open-Angle Glaucoma; Subcontract with Johns Hopkins University</td>
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<td>M-CASTL</td>
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<td>A Survey of Vision Care Providers for Older Drivers Value Estimation Project in Glaucoma (Phase III)</td>
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# EXTERNAL GRANTS AND FUNDING

**JULY 1, 2011 – JUNE 30, 2012**

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<td>C. Nelson, M.D.</td>
<td>NIH</td>
<td>R01 EY019497-03</td>
<td>Genetic Basis of Congenital Anophthalmia; Subaccount with Thomas Glaser, Ph.D., Departments of Internal Medicine and Human Genetics, University of Michigan Midwest Eye-Banks</td>
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<td>D. Puro, M.D., Ph.D.</td>
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<td>Retinovascular Physiology and Pathobiology</td>
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<td>J. Richards, Ph.D.</td>
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<td>Molecular Genetics of Primary Open-Angle Glaucoma</td>
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<td>Ocular Effects of Metformin</td>
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<td>NSF</td>
<td>CMMI 1130275</td>
<td>Mechanics of Intraocular Pressure Increase Associated with Genetic Factors</td>
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<td>R. Shtein, M.D., M.S.</td>
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<td>Neovascularization Patterns in Corneal Graft Rejection</td>
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<td>NIH</td>
<td>P60-DK020572-34</td>
<td>In Vivo Corneal Confocal Microscopy for Non-invasive Assessment of Diabetic Peripheral Neuropathy; Subaccount with Michigan Diabetes Research and Training Center, University of Michigan, Co-PI Midwest Eye-Banks UAM Medical School</td>
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<tr>
<td>T. Smith, M.D.</td>
<td>NIH</td>
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<td>Immunoglobulin Activation of Fibroblasts</td>
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<td>Regulation of Retroocular Connective Tissue</td>
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<td>Functional Diversity of Orbital Fibroblasts Howard Hughes Medical Institute RPB</td>
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<td>J. Stein, M.D., M.S.</td>
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<td>K23-EY019511-03</td>
<td>Association between Cataract Surgery and Progression of Diabetic Retinopathy</td>
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<td>NIH</td>
<td>P60-DK020572</td>
<td>Cost-Effectiveness of Different Treatments for Clinically Significant Diabetic Macular Edema; Subcontract with Michigan Diabetes Research and Training Center, University of Michigan Alliance for Vision Research American Glaucoma Society</td>
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## EXTERNAL GRANTS AND FUNDING

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</table>
| J. Stein, M.D., M.S.  | Blue Cross Blue Shield of Michigan | RPB | Longitudinal Rates of Postoperative Adverse Outcomes after Glaucoma Surgery among Medicare Beneficiaries 1994–2005  
Provider-Scientist Award |
| A. Sugar, M.D.        | NIH/Clinical Trial  | U10-EY012358        | Cornea Donor Study, Coordinating Center: Jaeb  
Cooperative Clinical Research in Ocular and Cutaneous Tissue Transplantation |
|                       | NIH/Clinical Trial  | U10-EY020797-01     | Corneal Preserving Time Study, Coordinating Center: Jaeb  
Cooperative Clinical Research in Ocular and Cutaneous Tissue Transplantation |
| D. Thompson, Ph.D.    | NIH                 | R21-EY020967-01     | Chromophore Effects in Genetically Diverse Forms of Retinal Dystrophy  
Consortium Treatment Grant: Small Molecular Interventions  
Gene-Replacement Therapy for XLRP Due to RPGR Mutations - Continuation |
|                       | FFB                 |                     | Chromophore Therapy in Retinal Degeneration  
Midwest Eye-Banks  
RDH12 Fund for Sight  
Consortium Treatment Grant: Small Molecular Interventions  
Gene-Replacement Therapy for RDH12 Mutations |
| K. Wong, Ph.D.        | NIH                 | R00-EY018863-05     | Cross-Talk between Ganglion-Cell Photoreceptors and Other Neurons in the Retina  
Midwest Eye-Banks  
Functional Characterization of Developmental Changes in NMDA Receptor Subunit Composition of Retinal Ganglion Cells  
RBP  
Career Development Award |
| D. Zacks, M.D., Ph.D. | NIH                 | R01-EY020823-03     | Autophagy and Control of Photoreceptor Apoptosis  
Beckman Foundation  
FFB  
Lincy Foundation  
Autophagy and Age-Related Macular Degeneration  
Center for the Study of Retinal Degenerative Diseases  
Consortium Treatment Grant: Transplantation of Photoreceptor Precursors  
Preventing Photoreceptor Cell Death in Age-Related Macular Degeneration |

### Source Abbreviations

- **FFB:** Foundation Fighting Blindness
- **JDRF:** Juvenile Diabetes Research Foundation International
- **M-CASTL:** Michigan Center for Advancing Safe Transportation throughout the Lifespan
- **NIH:** National Institutes of Health
- **NNRI:** National Neurovision Research Institute
- **NSF:** National Science Foundation
- **RPB:** Research to Prevent Blindness
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Rockefeller, Sloan Kettering
Ph.D. The Rockefeller University

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University of Michigan

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University of Michigan

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M.D. Ohio State University
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Ryan J. Fante, M.D.
M.D. University of Colorado Denver

Denise S. Kim, M.D.
M.D. University of Michigan

Crandall E. Peeler, M.D.
M.D. Dartmouth College

Patricia A. Ple-plakon, M.D.
M.D. University of Michigan

Ira H. Schachar, M.D.
M.D. Washington University in
St. Louis
M.Sc. Oxford University

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M.D. University of Michigan

S. Asha Balakrishnan, M.D.
M.D. Washington University in
St. Louis

Michael L. Bullard, M.D., M.D.
University of Iowa

Blake V. Fausett, M.D., Ph.D.
M.D. University of Michigan
Ph.D. University of Michigan

Molly L. Fuller, M.D., Ph.D.
M.D. Case Western Reserve University
Ph.D. Case Western Reserve University

Kristen Harris Nwanyanwu, M.D., M.B.A.
M.D. University of Pennsylvania
M.B.A. University of Pennsylvania

Duna Raaoof-Daneshir, M.D.
M.D. University of Michigan

Travis Rumery, D.O.
M.D. Des Moines University,
College of Osteopathic Medicine

CLINICAL FELLOWS
Cesar A. Briceno, M.D.
Eye Plastic, Orbital and
Facial Cosmetic Surgery
M.D. - Johns Hopkins University
Residency - Doheny Eye Institute,
University of Southern California

Lindsey B. DeLott, M.D.
Neuro-Ophthalmology
M.D. - Ohio State University
Residency - University of Michigan

Nadeem H. Fatteh, M.D.
Cornea and External Disease,
Cataract and Refractive Surgery
M.D. - Medical College of Georgia
Residency - Georgia Health Sciences University

Jonathan B. Greene, M.D.
Cornea and External Disease,
Cataract and Refractive Surgery
M.D. - University of Michigan
Residency - University of California

Shivani Gupta, M.D., M.P.H.
Eye Plastic, Orbital and
Facial Cosmetic Surgery
M.P.H. - University of Michigan
M.D. - Ohio State University
Residency - University of Illinois
at Chicago

Nieraj Jain, M.D.
Vitreo-Retinal Surgical
M.D. - Duke University
Residency - Duke University

Partho S. Kalyani, M.D.
Vitreo-Retinal Surgical
M.D. - Northeastern Ohio
Universities College of Medicine
Residency - University of Arizona
Fellowship - Jules Stein Eye Institute,
University of California
Los Angeles

Allison N. McCoy, M.D., Ph.D.
Eye Plastic, Orbital and Facial
Cosmetic Surgery
M.D. - Duke University
Residency - Wilmer Eye Institute

Paula Anne Newman-Casey, M.D.
Research / Comprehensive
Ophthalmology
M.D. - University of Michigan
Residency - University of Michigan

Shreya S. Prabhu, M.D., M.P.H.
Pediatric Ophthalmology and
Adult Strabismus
M.D. - Boston University
Residency - University of Michigan

Jasleen K. Singh, M.D.
Pediatric Ophthalmology and
Adult Strabismus
M.D. - Medical College of Georgia
Residency - Northwestern University

Jeffrey M. Sundstrom, M.D., Ph.D.
Medical Retina Fellow
M.D. - Pennsylvania State University
Residency - Pennsylvania State University

Linda Zhang, M.D.
Glaucoma, Cataract and
Anterior Segment Disease
M.D. - University of Michigan
Residency - University of Michigan

RESEARCH FELLOWS
Alma Rosa Barajas-Espinoza, Ph.D.
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Edith Arnold Hernandez, Ph.D.
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The W.K. Kellogg Eye Center at The University of Michigan has again been named one of the top ophthalmology programs in the country by U.S. News & World Report. In this survey, ophthalmologists select the programs where patients receive the best care for the most complex or difficult conditions.

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For additional copies, please contact us:
University of Michigan
Department of Ophthalmology and Visual Sciences
W.K. Kellogg Eye Center
1000 Wall Street
Ann Arbor, Michigan 48105
734.763.4660 • www.kellogg.umich.edu
For patient queries, please call 734.763.8122