Wilmer

WILMER EYE INSTITUTE

ANNUAL REPORT 2017

MISSION: *Critical*

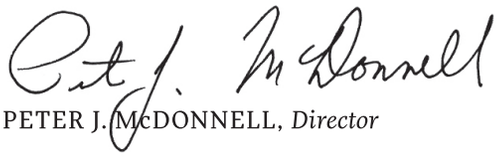

Pete J. McDonnell III, M.D.

The pages that follow this letter will give you snapshots of some of the many fascinating initiatives being undertaken by Wilmer faculty and staff. Their work spans the spectrum of caring for patients, making discoveries in our laboratories and preparing our trainees to emerge as future leaders in ophthalmology. Gene therapy, stem cells, CRISPR technology to repair mutations in DNA, robotic-assisted surgical technology... all of these are being tested *today* by Wilmer researchers. Never before in my career have I seen so much forward momentum.

I am particularly pleased to bring your attention to the newly installed endowed professors at Wilmer. The philosophical underpinnings for supporting exceptional scholars through endowments date back almost 2,000 years to the Roman emperor Marcus Aurelius. He established the earliest known "endowed chairs" for each of the major schools of philosophy. Our most recent professorship mirrors this governmental support for advancing knowledge; Dr. Jeffrey Mumm received Wilmer's 43rd endowed professorship, the Helen Larson and Charles Glenn Grover Professorship, thanks to partial funding by the state of Maryland. This professorship recognizes his entrepreneurial track record for founding new companies to speed discoveries from the laboratory to the clinic, where they can benefit our patients.

All of us at Wilmer were thrilled this year to celebrate the installations of Dr. Kannan Rangaramanujam as the Arnall Patz Distinguished Professor, Dr. Charles Eberhart as the Charlotte A. Wilson and Margaret K. Whitener Professor, Dr. Thomas "Mac" Bosley as the Knights Templar Eye Foundation Professor, Dr. Jiang Qian as the Karl H. Hagen Professor, and Dr. Dan Finkelstein as the Andreas C. Dracopoulos Professor. Each of these scholars embodies the best about Wilmer and serves to inspire and support the young scientists and physician-scientists with whom they work daily within our institute. We are grateful to the philanthropists who, following the example of the scholarly emperor Marcus Aurelius, created these endowed professorships, which empower Wilmer to attract and retain people at the top of their fields who perform the innovative research and progressive patient care currently happening here. We look forward to the future contributions that these faculty members and their successors will make to the benefit of the world.

Sincerely,



PETER J. McDONNELL, *Director*

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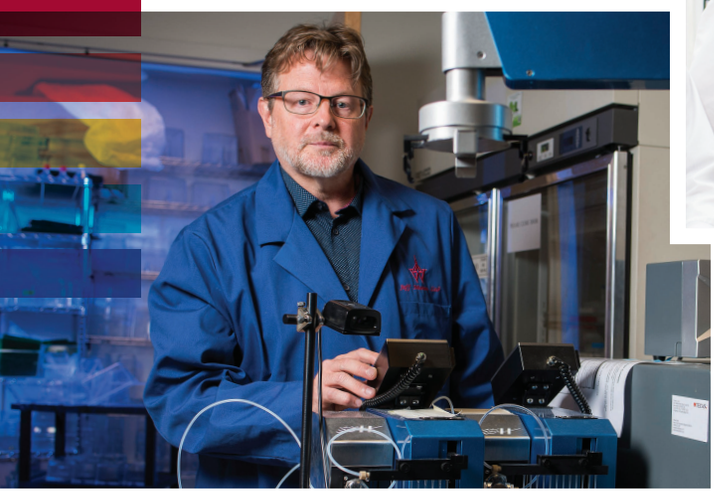
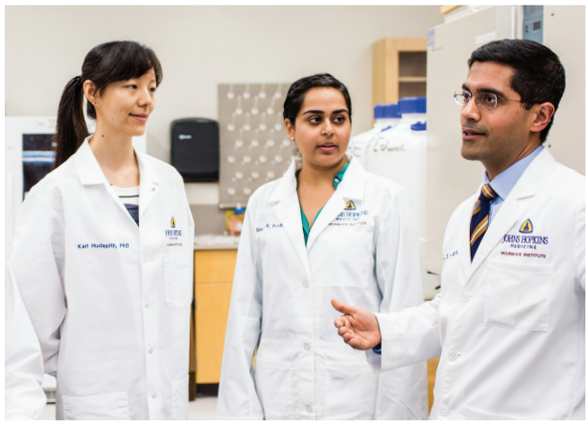
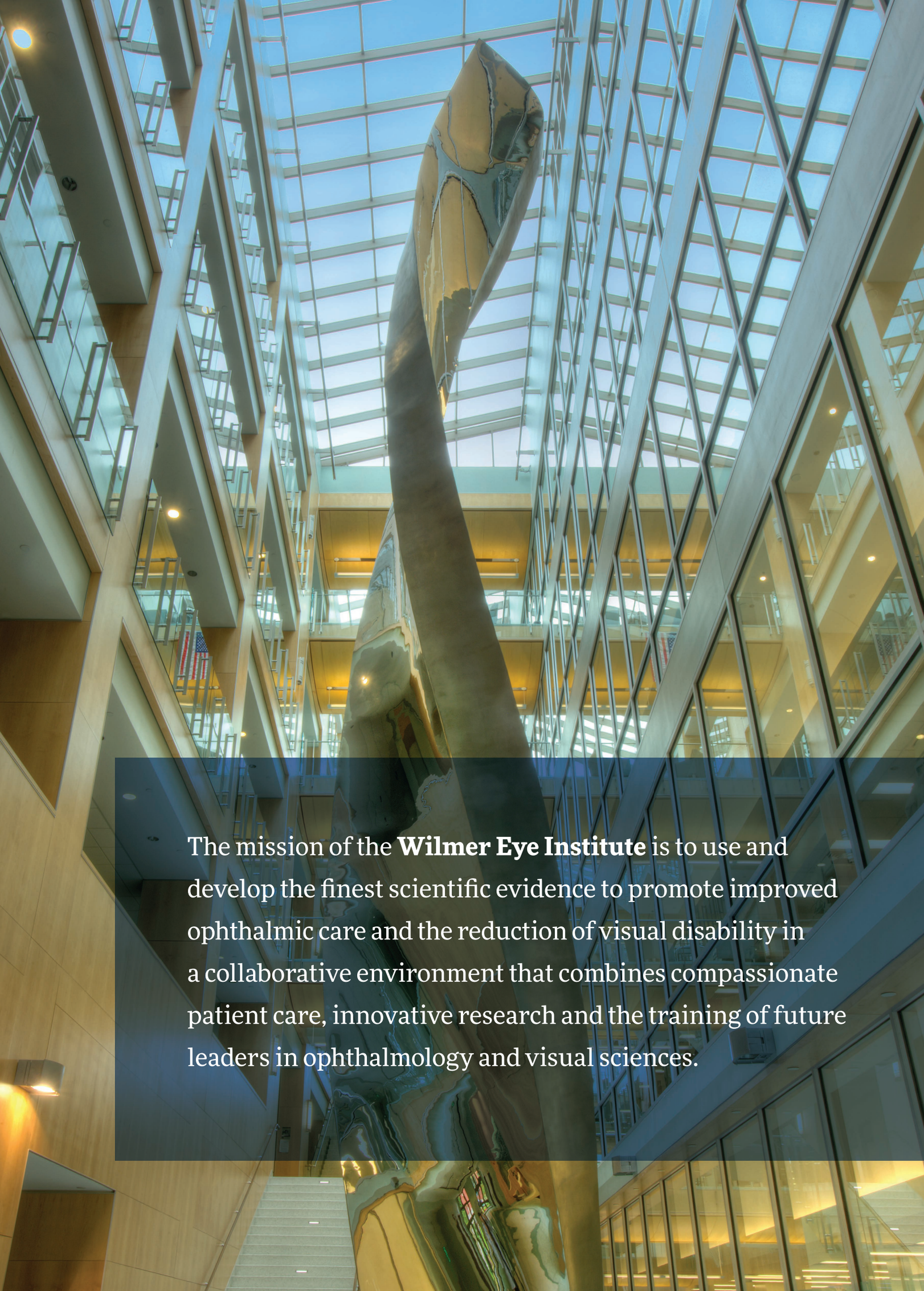






The mission of the **Wilmer Eye Institute** is to use and develop the finest scientific evidence to promote improved ophthalmic care and the reduction of visual disability in a collaborative environment that combines compassionate patient care, innovative research and the training of future leaders in ophthalmology and visual sciences.

HIGH-VOLUME TRAUMA CARE

A FAR-REACHING VISION TO HELP CRITICAL NEEDS PATIENTS

Directing the only Level I Eye Trauma Center in the state of Maryland is a weighty charge, says ophthalmologist Fasika Woreta, M.D., M.P.H. You get used to seeing the gravest eye injuries—but such is life for those who serve in the Wilmer Center, which operates in the adult and pediatric emergency departments of The Johns Hopkins Hospital.

"We have an in-house eye doctor on call 24 hours a day, seven days a week. Car accidents. Gunshot wounds. Knives. Fireworks. Bungee cords. You name it, we see it," says Woreta, who leads the Wilmer Eye Trauma Center. It is the only eye trauma facility in the state of Maryland as designated by the Maryland Institute for Emergency Medical Services Systems.

Fasika Woreta, M.D., M.P.H., leads the Wilmer Eye Trauma Center. →

Often, these are the most serious injuries, but the severity of the injuries is only half the story: The Wilmer Center is the highest-volume eye trauma center in the country. It has experts in every ophthalmic specialty, including oculoplastics, anterior segment, pediatrics and retina.

In partnership with The Johns Hopkins Hospital and Health System, eye doctors at the center care for patients transferred from more than 100 different facilities in Maryland and the surrounding region.

Woreta is new to the job, having assumed leadership in early 2017. She follows previous director Michael Grant, M.D., an oculoplastic surgeon who started the center and served as director for two decades. She is now settled in and starting to plan. Her road map for the future involves maintaining the center's clinical excellence, while also continuing to expand its role as a leader among trauma centers in the world.

Her vision for the Eye Trauma Center at Johns Hopkins is far-reaching and stretches from improved technology to more comprehensive training. On the technology front, Woreta would like to equip ophthalmology residents with iPhone adaptors that allow slit lamp-quality photos from a hand-held smartphone. Those photos help with training, record keeping and telemedicine efforts by allowing residents to consult with medical experts who are not on-site.

"These adapters would directly improve patient care through quicker, more convenient imaging that also happens to cost less than traditional slit-lamp cameras," Woreta says.

Better yet, the adapters would allow images to be uploaded to a common, HIPAA-compliant database that would inform future trauma decision-making. Indeed, better data infrastructure is also one of Woreta's priorities.

"We see so much trauma, and most care is done on the spot. What happens is usually not captured for the long term," she says. "With these iPhone adapters, we can put the cameras right in doctors' hands and begin to establish a database that can improve care down the road."

In another data-related initiative, Woreta envisions revitalizing the United States Eye Trauma Registry (which was established in 1988 but is no longer being used by trauma centers in the U.S.) and even creating an International Eye Trauma Registry. Such databases are essential, as they provide real-world data for designing injury prevention plans and improving best practices and treatment strategies, she says.

"We see so much trauma, and most care is done on the spot. What happens is usually not captured for the long term. With these iPhone adapters, we can put the cameras right in doctors' hands and begin to establish a database that can improve care down the road." —**Fasika Woreta, M.D., M.P.H.**

"When I was assistant chief of service, I will never forget the case of a patient with a fish hook stuck in his eye. It was tricky to remove, and by documenting this in an international online registry with 'surgical pearls,' other surgeons around the world could benefit," Woreta says.

The third leg of her plan is bolstered training for doctors and staff at Wilmer and at referring centers around the region. First, she would like to hire an Eye Trauma Center clinical coordinator—a person dedicated to help with the enormous responsibilities that running the Eye Trauma Center entail, such as maintaining the registry, organizing educational courses, and "helping patients and their families navigate the emergency room and Wilmer Eye Institute at a very scary time for them." She would also like to provide better resources to support Wilmer nurses, "who are critical in our Eye Trauma Center activities," she says.

Finally, she hopes to build a schedule for visiting lecturers, which would bring leading doctors from other centers to Wilmer to share the latest advances in eye trauma care.

To that end, she recently hosted the first Ocular Trauma Course, which was open to all ophthalmology residents in Maryland and Washington, D.C., programs. She hopes this will be the first of many trauma courses that Wilmer will host.

The desire for better tools and better data leads Woreta to note a common thread that binds her plans together—the need for funding to innovate and allow the Eye Trauma Center at Wilmer to provide even better care for patients.

"Ophthalmic trauma is often a field that is overlooked, but there is a lot of hard work that goes on behind the scenes, at all hours of the day and night. My goal as director is to keep Wilmer at the cutting edge when it comes to delivering care to patients with eye injuries," she says. "We can't get there without the help of donors who see the inherent value in this important work."

Wilmer Director Peter J. McDonnell, M.D., is excited about what the future holds for the Eye Trauma Center under Woreta's direction. "We are so fortunate," he says, "to have the leadership of Dr. Woreta and the teamwork of Wilmer's faculty, residents and staff who work in service of those from Maryland and from adjoining states that lack an eye trauma center—and even from other countries who come to us with serious eye injuries." ▲


Pradeep Ramulu, MD, PhD
Ophthalmology
Harry Quig

← *Harry Quigley, M.D., foreground, who was appointed to launch and lead the Glaucoma Division in 1977 by then Wilmer Director Edward Maumenee, M.D., depicted in the portrait, has now passed the torch to Pradeep Ramulu, M.D., Ph.D., left. Quigley continues his research and seeing patients.*

PASSING *the Torch*

A TRANSITION IN LEADERSHIP FOR THE GLAUCOMA DIVISION

Harry Quigley, M.D., the A. Edward Maumenee Professor of Ophthalmology, likes to joke that back in "ancient history," when he started the Glaucoma Division at Wilmer, "people used gas lights and came to Hopkins in street cars." Hyperbole aside, Quigley founded the division in 1977 and served as its chief until this year—a tenure of an astounding 40 years.

"Before that, there really weren't people who were subspecialists within ophthalmology," Quigley says. (His mentor, Irvin Pollack, M.D., taught glaucoma diagnosis and care at Wilmer for seven years, as a part-time faculty member.)

Quigley was the first full-time glaucoma specialist at Wilmer, appointed to the role by then Wilmer Director Edward Maumenee, M.D. Seeing that knowledge, procedures, treatments and diagnosis were improving and growing more complex, Maumenee had the foresight in the 1970s to recognize that there would be a need for people who were focused entirely on the treatment of glaucoma as well as other subspecialists dedicated to different major eye diseases.

Over the ensuing four decades, Quigley gradually assembled a faculty of 10 specialists, spread among five of Wilmer's satellite offices, with a staff of some 40 people doing research, providing world-class care and helping to keep the division running smoothly. Each new colleague has been both a clinician and a researcher, adding expertise to the group's collaborative efforts.

"Maumenee was the visionary. His entire concept was that you should put together M.D.s and Ph.D.s in the same building," Quigley recalls. "We have specialists studying the causes of glaucoma. Others are studying new drugs. And yet others are working on new surgeries and clinical treatments."

After a remarkable run, Quigley now passes the torch to a new leader. But he is far from retired. "I'm neither shy nor retiring," he says with self-deprecating humor. He will continue his research and maintain the largest patient load among Glaucoma Division doctors.

"In many ways, Harry Quigley set the standard," says Wilmer Director Peter J. McDonnell, M.D. "As a physician, scientist, teacher, leader, administrator and magnet for brilliant young ophthalmologists, he has been an example for others to emulate."

After a national search, Pradeep Ramulu, M.D., Ph.D., associate professor of ophthalmology, who trained at Wilmer and Bascom Palmer Institute, has been tapped as the division's new chief.

He has jumped right in. "Dr. Quigley has left us with a full cupboard. We're building from a position of strength, and I plan to continue reinforcing our three pillars of clinical care, teaching and research," Ramulu says of his immediate agenda.

On the patient front, Ramulu has benefited from an initiative to improve patient feedback, which was started by David Friedman, M.D., Ph.D., M.P.H., the Alfred Sommer Professor of Ophthalmology and director of the Dana Center for Preventive Ophthalmology. Ramulu is pressing to get at least half of patients coming through the door to provide some degree of feedback through the Bivarus system introduced by Friedman. (Mailed surveys, used previously, usually have a response rate of only 10 to 20 percent.)

"And we're not just hoping for positive feedback either, but to learn some of the things that we can do better," Ramulu says. "There's always room for improvement."

On the clinical front, Ramulu says that priorities like reducing patient wait time are always on his radar, but the field is also changing rapidly, and new surgical procedures and treatments will need to be evaluated and potentially introduced into practice.

"There are four or five new procedures on the horizon in the next couple of years alone. I see Wilmer's role to serve as objective experts in studying the efficacy of these new procedures to improve patient care," he says.

As for teaching, Ramulu has big plans. The first is to modernize the Glaucoma Division's continuing medical education teaching formats and then to expand the division's rich array of resident teaching tools to other Wilmer divisions—and perhaps to outside learners via an online format. All the while, he hopes to see the division publish papers about successful resident training efforts.

Knowing Ramulu and hearing of his plans leaves Quigley confident about the future. "I'm absolutely certain of Pradeep's ability to lead this division into tomorrow," he says. ▲

"Dr. Quigley has left us with a full cupboard. We're building from a position of strength, and I plan to continue reinforcing our three pillars of clinical care, teaching and research."

—**Pradeep Ramulu, M.D., Ph.D.**

A PATIENT BECOMES A PARTNER

Transforming a discipline into a division, as Harry Quigley, M.D., did with glaucoma, is no small task and an achievement no single person could do alone.

Quigley would be the first to agree. Standing beside him has been a long line of exceptional Wilmer physicians and researchers, but also a group of deeply committed philanthropists who played a key role in helping the Glaucoma Division to get off the ground and evolve into what it has become today.

One such donor is Mary Bartkus, who began as a patient of Quigley's and today holds a seat on the Wilmer Board of Governors.

"About 10 years ago, I asked some research scientists I knew to recommend top clinicians in the field of glaucoma. Dr. Quigley was on the short list, so I became a patient," she recalls.

Through her own observation and driven by curiosity to read scientific papers about glaucoma, Bartkus learned that Quigley is not only an excellent scientist—a leading expert on the causes and treatment of glaucoma—but also a much-admired clinician.

"It is especially gratifying to me to be able to contribute to the search for improved therapies and, eventually, a cure for glaucoma, and to support those, like Dr. Quigley, who are leading that important work," Bartkus says.

Mary Bartkus

Bartkus made the transition from patient to donor because, she says, patients play a key role in advancing research by partnering with and supporting the clinician-scientists investigating the diseases that afflict them.

From a patient's standpoint, Bartkus says it's reassuring that Quigley is continuing research and patient care, even as he steps back from administrative duties. "It is important to me that Dr. Quigley remain engaged," she says. "He's got important work still to do treating patients, investigating glaucoma, improving treatments, mentoring new generations and searching for that elusive cure."

An Angel AMONG US

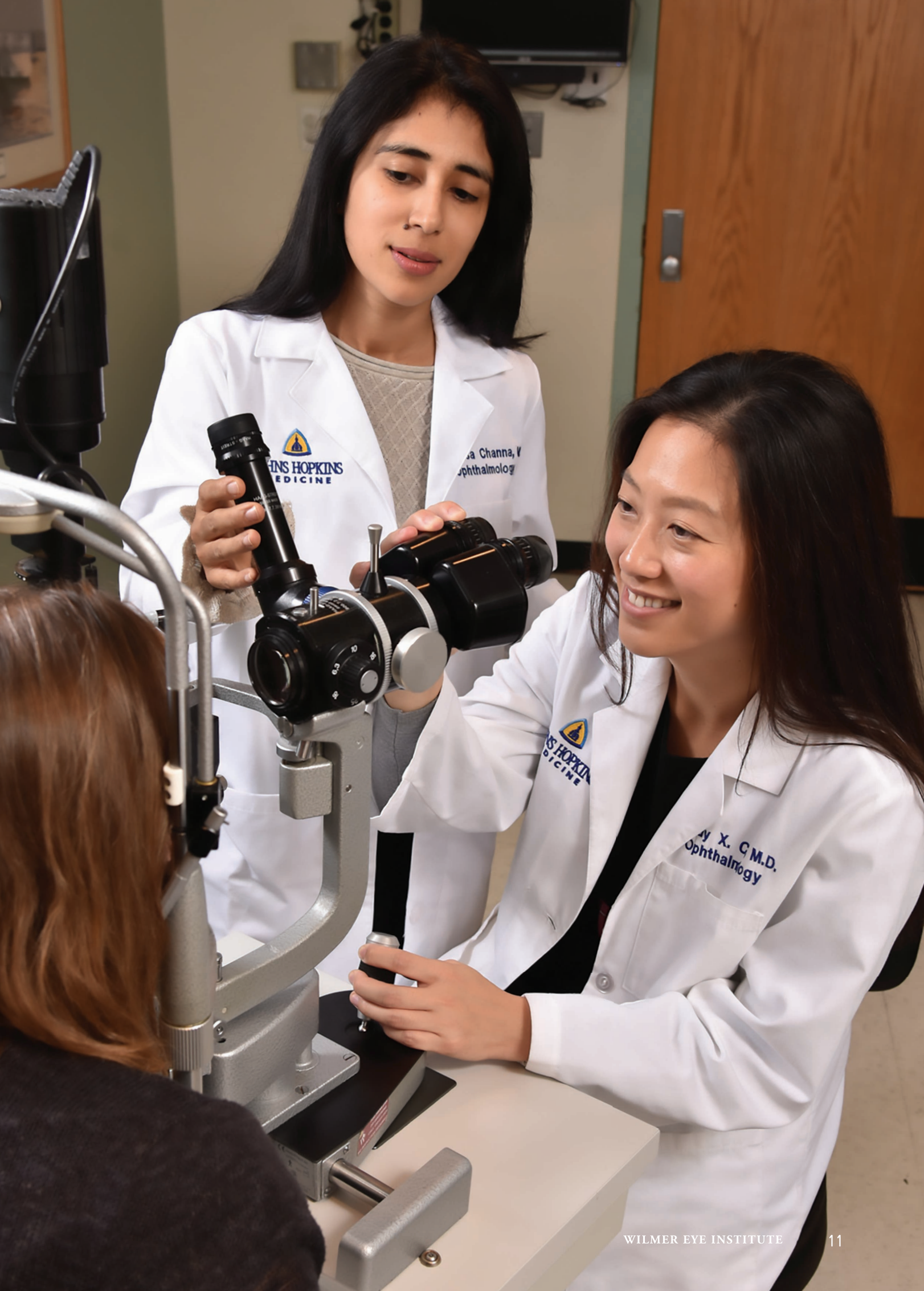
FUND COMES THROUGH FOR PATIENTS 'IN A BIG WAY'

As an ophthalmology resident in the General Eye Service (GES) clinic at the Wilmer Eye Institute, Cindy Cai, M.D., sometimes finds herself treating patients without health insurance who can't afford the treatments they desperately need.

For example, she recalls one young patient with chronic uveitis who needed constant follow-up, but her family did not have the resources to pay for her care. So Cai tapped into The Angel Fund. Established by an anonymous donor, the fund is aimed at helping people with a clear need but not enough funds to pay for life-changing treatments and tools.

With a simple phone call, Cai was able to secure approval for Angel Fund support. It covered the cost of the procedures needed to stabilize the patient's inflammation and for surgery on the cataracts that resulted from her uveitis. "When she walked in, her prognosis was not good, but she can still see today," Cai says. "The Angel Fund came through in a big way for her."

Roomasa Channa, M.D., Wilmer's 2017—2018 assistant chief of service, supervises Cindy Cai, M.D., a third-year resident, as she examines a patient in the General Eye Service clinic. →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↑ *Sheila Ashley, left, testing low-vision devices with Kristen Lindeman, O.T., right, in the Lions Low Vision and Vision Rehabilitation Center at Wilmer.*

Like Cai, Ravi Pandit, M.D., M.P.H., who is also an ophthalmology resident in the GES clinic at Wilmer, has seen support from The Angel Fund materialize within hours. He recalls one gentleman—who was uninsured—who came in with dangerously high eye pressure that persisted after treatment of a serious infection.

"It was very clear this man needed surgery as quickly as possible, but he didn't have money or insurance," Pandit says. "We got him approved within the hour and into surgery to save his vision."

These two cases are not unusual. For example, between October 2016 and June 2017, Wilmer clinicians tapped into The Angel Fund to cover 37 surgeries, 313 clinic visits/tests and nine low-vision devices.

"As a former Wilmer resident, I can personally attest to the sense of joy and privilege associated with caring for all, regardless of their financial resources," says Wilmer Director Peter J. McDonnell, M.D. "This is why young physicians go to medical school and why they spend countless hours in study and practice."

He adds, "At Wilmer, our ability to give whatever a patient requires is made possible by the selfless generosity of individuals like our anonymous 'angel' donor, who has helped ensure that Wilmer will turn away no one who needs our help to prevent or reverse vision loss."

Like her colleagues in the GES clinic, Kristen Lindeman, O.T., an occupational therapist at the Lions Low Vision and Vision Rehabilitation Center at Wilmer, has also seen The Angel Fund improve the lives of patients.

"The spirit of The Angel Fund is to provide financial coverage for people who can't afford the ophthalmic medical services they need," she says. "Now we are able to extend the financial assistance to cover visually assistive devices for patients whose needs cannot be fixed by glasses or surgeries. These devices are not covered by insurance."

Using support from The Angel Fund, Lindeman—whose job it is to help people cope with the challenges of diminishing eyesight—is able to provide the equipment that patients need to maintain their independence and participation in the community.

Consider the case of Sheila Ashley, a familiar figure in Baltimore public health circles. She is a grandmother who serves as a tireless advocate for better care and funding for Baltimore-area residents ravaged by diseases ranging from

"THE SPIRIT OF THE ANGEL FUND IS TO PROVIDE FINANCIAL COVERAGE FOR PEOPLE WHO CAN'T AFFORD THE OPHTHALMIC MEDICAL SERVICES THEY NEED. NOW WE ARE ABLE TO EXTEND THE FINANCIAL ASSISTANCE TO COVER VISUALLY ASSISTIVE DEVICES FOR PATIENTS WHOSE NEEDS CANNOT BE FIXED BY GLASSES OR SURGERIES. THESE DEVICES ARE NOT COVERED BY INSURANCE."

KRISTEN LINDEMAN, O.T.

cancer to HIV—work that frequently takes her to the corridors of Annapolis and Capitol Hill.

After her vision began to fail a few years ago, Ashley came to see Ashley Deemer, O.D., an optometrist at the Lions Low Vision Center, who referred her to occupational therapy for extensive rehabilitation. There, Ashley met Lindeman.

Ashley was faced with giving up her passion for community activism because she was having trouble reading documents. Glasses could not improve her vision. She needed electronic magnification for reading and writing. Lindeman showed her a range of technologies that could help, including a desktop magnifier.

"I was like a kid on Christmas morning," Ashley recalls.

Before Ashley could get her magnifier, however, she had to figure out how to pay for it. At $2,500 or more, the tool was well out of reach for the hardworking grandmother. In fact, low-vision assistive devices are not covered by any insurance plan. That's when Lindeman connected Ashley with The Angel Fund.

Now equipped with the desktop magnifier, Ashley is able to keep up with tasks such as reading and writing, which are so important to her career. But she says it has been the day-to-day things that have made the most difference—like putting on makeup and doing her hair.

"If I didn't have my magnifier, I'd be in the sink to see in the mirror to get ready for the day," Ashley says.

Lindeman shares the story of another patient who was helped by The Angel Fund, a nearly blind man who received an optical recognition camera that not only read printed material to him—like the denominations of the cash in his pocket—but was programmable as well.

"He was able to program in a photo of his mother's face," says Lindeman. "Now, each time she passes by, a little camera on the side of his glasses recognizes her and says, 'Mom.'" ▲

← *Jeffrey Mumm, Ph.D., in the lab with some of his zebrafish.*

ALL LIT UP

ZEBRAFISH OFFER CLUES TO REGENERATION

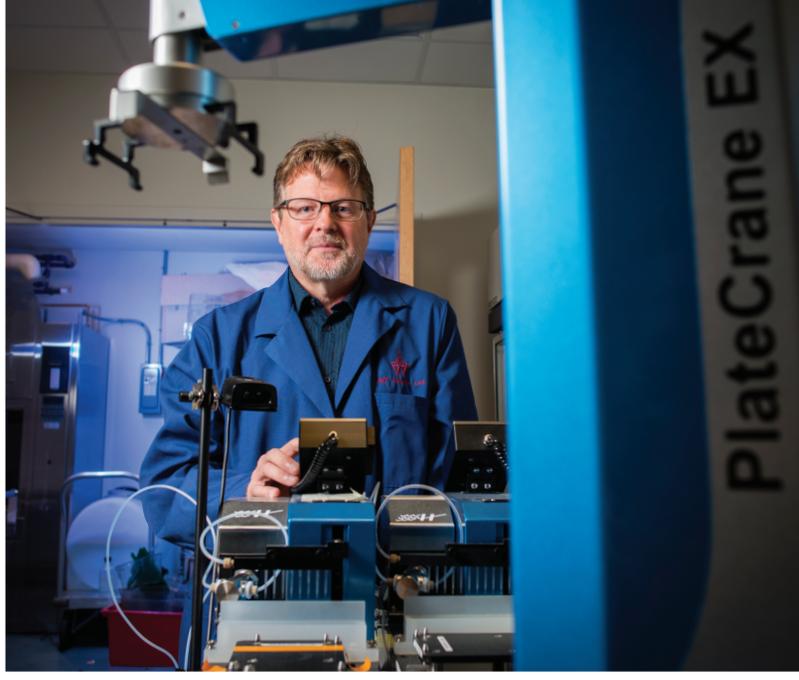
When Jeffrey Mumm, Ph.D., was an undergraduate student at the University of Iowa, a tragedy occurred on campus that left him with a question that has guided the past two decades of his career. The sole survivor of a campus shooting—a woman he knew—ended up paralyzed from the neck down.

"This occurred right as I was taking courses about evolutionary biology and development," he says. "And it didn't make sense to me that we could sit so firmly on top of the food chain and yet not have the capacity to regenerate our central nervous system, like other species did. I thought, 'How in the world could a species without that ability win?'"

He set out to answer this question by studying neuronal cells that do regenerate in humans, specifically the neurons in our noses, which the body continually replaces. Eventually, Mumm became interested in the translational potential of stem cell regenerative medicine, where the focus is on degenerative diseases caused by the loss of individual cell types.

While a postdoc at Washington University, Mumm began to work with the species that would transform his research: zebrafish, an animal with "a remarkable capacity for regeneration," he says. To explore how individual cell types regenerate, Mumm developed a method to trigger the loss of discrete cells in the zebrafish so that he could observe their process of regeneration.

This technique creates temporary degenerative disease models for conditions linked to cell loss, such as diabetes, Parkinson's and amyotrophic lateral sclerosis (better known as Lou Gehrig's disease). Because the zebrafish efficiently replace the lost cells, Mumm can identify which cells function as "adult" stem cells that create new neurons—and thus determine how the capacity for regeneration is regulated. →



↑ Mumm has developed a robotic screening method, ARQiv, which allows study of the mechanics of regeneration and serves as a drug discovery platform.

"AT THE CELLULAR LEVEL, ZEBRAFISH AND HUMAN EYES ARE QUITE SIMILAR. IN FACT, THE CELLS THAT ACT AS STEM CELLS IN THE REGENERATING FISH EYE ARE PRESENT IN OUR EYES AS WELL." **JEFFREY MUMM, PH.D.**

Though his method can model several different degenerative diseases, Mumm focuses on ones that lead to vision loss. "At the cellular level, zebrafish and human eyes are quite similar. In fact, the cells that act as stem cells in the regenerating fish eye are present in our eyes as well," says Mumm, an associate professor of ophthalmology at Wilmer since 2014. Why these cells respond differently to cell loss in fish than in humans is a key question.

One disease he and his lab are studying is retinitis pigmentosa (RP), which occurs when rod photoreceptors in the retina die. "With our approach, we can create 20,000 little RP patients on Tuesday, whereas on Monday everybody was fine," says Mumm.

"The process starts with creating a transgenic fish that has two components in the targeted cell type—in this case, rod photoreceptors," says Mumm. First, through genetic manipulation, the researchers insert a fluorescent jellyfish protein into the fish's rod photoreceptors so that they glow when exposed to light. The brighter the light, the more rod photoreceptors the fish possesses.

"Because the fish is transparent, you can determine how many rod photoreceptors there are, what they look like and how healthy they are, directly in the living fish," he says.

The other genetic component put into the rod photoreceptors is a bacterial enzyme sensitive to the antibiotic metronidazole. When the fish is exposed to metronidazole, the specialized enzyme converts the antibiotic into a toxin, which selectively kills the rod photoreceptors over the next 24 hours—creating an RP "patient." Or in Mumm's system, thousands of them.

After the removal of the antibiotic, the rod photoreceptors will naturally regenerate. Because they emit light as they come back, the process of regeneration can be measured simply by capturing the intensity of the light.

To further large-scale discovery with his disease modeling approach, Mumm developed a robotic screening method to automate quantification of the regeneration process—i.e., measuring the intensity of the light—termed ARQiv (Automated Reporter Quantification in vivo).

Importantly, the ARQiv system can also add chemical compounds to test what speeds up or slows down regeneration, making it more than a way to study the mechanics of regeneration, but also a drug discovery platform.

ARQiv and other "whole-organism" screening systems provide a fresh perspective to the drug discovery landscape by placing living disease models at the start rather than the end of the discovery process.

Currently, drugs do not make the jump into animals for several years, and once they do, they often fail—one reason for the exorbitant cost of prescription drugs. "We're hoping that by starting with animals at the outset, we can jump-start the process by three to six years," says Mumm.

A significant way Mumm's ARQiv system breaks new ground is the volume of tests it can run—more than 50,000 transgenic zebrafish can be screened per day, which qualifies as high-throughput screening in the pharmaceutical industry.

While ARQiv is making waves as a drug discovery tool, Mumm continues his quest to discover what controls the potential for regeneration. He recently embarked on a new area of inquiry: the immune system. In a paper published in the *Proceedings of the National Academy of Sciences* in April, his lab details how a specific immune cell type, also found in humans, influences the potential for retinal regeneration in zebrafish.

"Immune cells appear to be key regulators in regenerative species like fish. Differences in how our immune systems respond to neuronal cell loss might be causative for why we don't regenerate," says Mumm. Thus, a new question has arisen: Could we someday "trick" the human immune system to behave more like that of a fish? That could work because "humans have the same cellular equipment, we just don't use it for the same ends." Such strategies could one day lead to therapies that restore vision to patients. ▲

E-NNOVATIVE RESEARCH

Jeffrey Mumm, Ph.D., has blended collaborative technology projects and basic science discovery into a unique career. An equally unique mix of funds supports his quest to unlock the mysteries of regeneration.

The Johns Hopkins University received $1 million from the Maryland E-Nnovation Initiative to partially fund an endowed professorship for Mumm. The state of Maryland awards an E-Nnovation grant to a university or college to match funds already raised by the institution to endow a professorship. The goals are to spur basic and applied research, and build up the science and technology research infrastructure of Maryland.

A powerful addition to this infrastructure, Mumm's new drug screening technology, called ARQiv, is available to research teams at Johns Hopkins and throughout Maryland. In the ARQiv system, the drug discovery process begins with rather than ends with living disease models, thereby addressing a challenging bottleneck in modern drug development.

Mumm's current work focuses on creating a living disease model of macular degeneration on which to test compounds, via ARQiv, to treat age-related macular degeneration by promoting cell regeneration.

Johns Hopkins matched the E-Nnovation grant with the Helen Larson and Charles Glenn Grover Endowed Fund for Basic Science Research into Macular Degeneration. Thanks to this combined support and because of his stellar achievements, Mumm is now the inaugural Helen Larson and Charles Glenn Grover Professor of Ophthalmology at Wilmer.

A CRITICAL CONNECTION

PROMISING TRIAL COULD OFFER HOPE FOR THOSE WITH RETINITIS PIGMENTOSA

For the one in 4,000 or so people who suffer from the inherited eye disease retinitis pigmentosa (RP), vision loss comes when the photoreceptors in the retina—known as rods and cones—die off.

Rods comprise 95 percent of the eye's photoreceptors. Largely responsible for low-light vision, they are the first to go. "Early on, patients with RP can't see well at night, but they still can read and drive and function well in good light," says Peter Campochiaro, M.D., the George S. and Dolores Doré Eccles Professor of Ophthalmology and Neuroscience.

Peter Campochiaro, M.D., has launched a new clinical trial that ultimately could point to new drugs that might one day delay or even prevent retinitis pigmentosa. →


A. Campoch M.D.

But for some as-yet-unknown reason, the death of the rods eventually leads to the death of the cones, which are responsible for fine detail and color. "Only when the cones die do patients go blind," Campochiaro says.

This crushing one-two punch has perplexed researchers for years, since the cones are unaffected by the underlying genetic mutations behind RP. Now Campochiaro has embarked on a promising clinical trial that he believes will shed light on the biology of RP and provide a glimmer of hope for new drugs that might delay or even cure the condition altogether.

He believes he has discovered the connection that causes the mutual decline of rods and cones. After the rods die, he says, they stop consuming oxygen, and the oxygen level in the retina goes way up. The high oxygen causes production of free radicals that damage critical molecules in cones, through a process called oxidative damage. The damage mounts over time and eventually leads to cone cell death.

Campochiaro has shown further that certain drugs can reduce this oxidative damage, preserving the cones and their function and the patient's ability to see. In animal studies, he has found that one agent in particular—N-acetylcysteine—is very good at preserving the cones.

In a clinical trial now underway, he is about to find out if results in mice translate to patients with RP. He and his team are testing N-acetylcysteine for the first time in human patients with ocular disorders.

Sampling aqueous humor inside the eyes of patients with RP and control patients without RP, Campochiaro's group showed that patients with RP have significant elevation of a biomarker for oxidative damage as well as depletion of glutathione, a major component of the body's defense mechanism against oxidative damage. By administering N-acetylcysteine and watching its impact on these two biomarkers, Campochiaro will determine if the underlying biochemical problem can be reversed—and if so, with what dose of drug.

"The drug is administered orally—not through drops or injections. So far, it has been very well-tolerated with no adverse effects," he says.

N-acetylcysteine works in two ways to prevent oxidation. First, it penetrates into the retina from the blood, enters cones and scavenges free radicals that would otherwise bind and damage critical molecules in precious remaining cones. "It's sort of like jumping on a grenade so the grenade doesn't kill the good guys," Campochiaro explains.

"It's amazing to me that within two years, [the work has advanced to] a human trial. And it's a privilege to be a part of something with the potential to affect your own family."

—Marc Sumerlin

Second, N-acetylcysteine is used to produce more glutathione, the master protector that is depleted in the eyes of patients with RP.

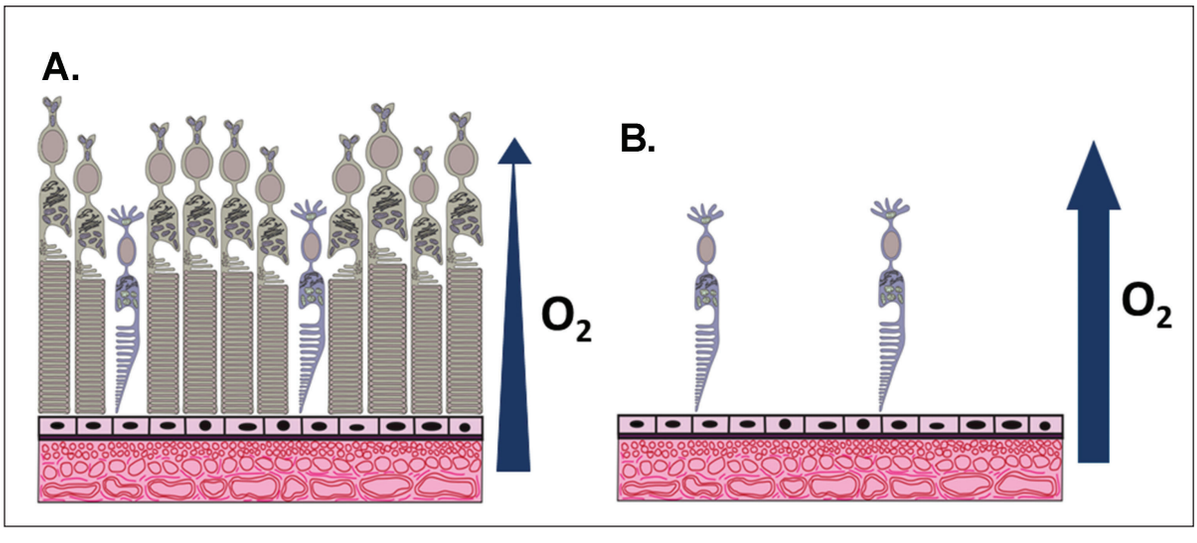
Campochiaro has enrolled 12 out of a total of 30 patients. He hopes that the remaining 18 patients will be enrolled by the end of 2017 and that initial results will be available near the middle of 2018.

Such work would be impossible without the help of donors, who fund the underlying research and help to get important trials like these off the ground. Two of the donors supporting Campochiaro, Robert and Kathleen Wallace, have a vested interest in the outcome: Robert's brother, Jonathan Wallace, suffers from RP. "We are delighted to support Dr. Campochiaro and his world-class team in their research of RP," says Robert Wallace.

Another donor who will eagerly await results is Marc Sumerlin, a member of Wilmer's Board of Governors, whose daughter was diagnosed with RP in 2015. Sumerlin was impressed with Campochiaro's approach and made the leap from father of a patient to donor, even though his daughter would not be eligible to participate in the trial.

"Optimistically, you hope for a treatment. But, if not, at least we'll have advanced the science," Sumerlin says. "It's amazing to me that within two years, [the work has advanced to] a human trial. And it's a privilege to be a part of something with the potential to affect your own family."

Says Campochiaro, "Currently, no effective treatment exists for RP. This assistance has allowed us to get this trial going and make rapid progress. We could never have done it without the compassion and generosity of these donors." ▲



↑ *A schematic illustrating the oxygen gradient in the outer retina in a normal retina and the lack of a gradient in a retinitis pigmentosa (RP) retina.*
A. In a normal retina, marked oxygen (O_2) consumption by photoreceptor inner segments results in a steep O_2 gradient and low O_2 levels in the outer retina.
B. In RP, rod cell death markedly reduces O_2 consumption resulting in a small gradient and high O_2 levels in the outer retina.


JOHNS HOPKINS
MEDICINE

← *With a grant from Research to Prevent Blindness, Laura Ensign, Ph.D., is exploring a new drug delivery strategy that taps into the power of microcrystals.*

Crystal Clear

TAPPING NANOTECHNOLOGY FOR BETTER DRUG DELIVERY

As a chemical and biomolecular engineer, Laura Ensign, Ph.D., thrives on solving problems. A member of Wilmer's Center for Nanomedicine, she has focused her problem-solving acumen on more effective drug delivery systems for treating ocular diseases.

More specifically, she's teamed up with Don Zack, M.D., Ph.D., the Guerrieri Professor of Genetic Engineering and Molecular Ophthalmology, on drug delivery strategies for compounds that act as neuroprotective agents for retinal ganglion cells (RGCs). The death of a significant number of RGCs can lead to a loss of vision, and diseases such as glaucoma pose a direct threat to these types of cells.

The Center for Nanomedicine team had previously worked with Zack to design a microparticle, a polymer shell in which a drug is loaded, to be injected into the vitreous of the eye. The polymer shell degrades over time and allows for a sustained release of the drug—crucial to overcoming the challenge of the drug being cleared from the eye too quickly.

Building on that work, Ensign recently received funding from Research to Prevent Blindness (RPB)—in the form of the Sybil B. Harrington Special Scholar Award—to explore a new drug delivery strategy: microcrystals delivered to a "potential space" next to the vascular area that surrounds the outside of the retina, called the choroid.

"By injecting into that area, you're opening up a space to inject fluid into. That's why it's called a potential space. It's not actually a physical empty space," explains Ensign. The advantage of injecting into the suprachoroidal space is that the drug ends up in close proximity to the cells it's meant to protect, she says.

And the advantage of microcrystals over microparticles is that rather than merely containing the drug, the microcrystal is the drug. The simpler formulation is more efficient because less of it is needed to get the same drug dose, which can also improve the safety profile. To form the microcrystals and slow the dissolution of the drug, Ensign uses a strategy called ion pairing, which provides the sustained release without the polymer shell.

"Dr. Ensign joins a long list of Wilmer scientists to have their accomplishments and future potential recognized by RPB, and we are most grateful for RPB's support of this amazingly productive young faculty member," notes Wilmer Director Peter J. McDonnell, M.D.

Ensign is grateful for the award. "It validates that I'm working on approaches that are important for the eye, and that's motivating," she says.

THE GIFT OF EQUIPMENT

GIFT FUNDS VALUABLE NEW CAMERAS

In the last decade, medical science has made tremendous progress in understanding and developing treatments for vision impairment from two of the major causes of blindness: retinal damage caused by diabetes and age-related degeneration.

"Research from around the world, including at Wilmer, has allowed us to wipe out about 80 or 90 percent of the blindness from these conditions through new approaches and a better understanding of the diseases. It's just a great success story," says Neil Bressler, M.D., the James P. Gills Professor of Ophthalmology and chief of the Retina Division at Wilmer.


HEIDELBERG
ENGINEERING
OCT
SPECTRALIS

"PEOPLE CAN'T REALIZE THEIR FULL POTENTIAL IF THEY DON'T HAVE TOP-QUALITY TECHNICAL EQUIPMENT, PARTICULARLY IN THE TECHNOLOGICAL AGE WE ARE IN." **LAWRENCE SMALL**

↑ *Thanks to a gift from Lawrence and Sandra Small, Wilmer researchers, clinicians and instructors now have the use of two new optical coherence tomography devices, which are valuable to their work on many levels. The Smalls donated the cameras in honor of Goldie and Albert Kurtin, Lawrence Small's parents, both of whom suffered from eye problems.*

New drugs and surgeries have fueled these advances. But another important factor has been a marked advancement in retinal imaging technology.

In particular, imaging of the retina has been a key part of the success in treating macular degeneration and diabetic retinopathy. The ability to image the retina to spot disease, determine treatment and guide patient management has improved considerably in recent years, Bressler says.

One such tool is optical coherence tomography, or OCT, imaging, which produces high-resolution, three-dimensional diagnostic images of the structures and diseases tucked in the layers of the retina, the light-sensitive tissue that lines the back of the eye, as well as the optic disc that carries information from the retina to the brain. Earlier technologies could not capture these types of images.

The digital images captured by OCT can be displayed on high-resolution LCD monitors for side-by-side comparison or uploaded to a database for long-term image study.

For Wilmer, OCT is a very valuable tool widely used in research labs, classrooms and clinics, says Bressler. "These special cameras just have a broad, broad reach—from facilitating teaching of residents to helping researchers and patients."

The Wilmer Retina Division has added several OCT devices over the years, but demand always seemed to far outstretch supply, given their need by almost the entire institute—not only retina physicians but retina researchers, residents and other specialties of the eye (including glaucoma and neuro-ophthalmology). And the cameras are not cheap: Depending upon features and options, each camera can carry a price tag of between $80,000 and $150,000.

The Retina Division faculty identified these devices as one of the division's highest-priority needs. Subsequently, to help add new cameras to Wilmer's toolbox, Bressler looked to the generous support of Wilmer's donor base. Lawrence and Sandra Small saw the need and the benefit, and have helped the Retina Division purchase two additional OCT devices.

"Wilmer is an amazing professional and patient-oriented place. We are really impressed by the people—not just the skilled doctors, but the technical staff, the nurses, right down to the people who meet you at the front door," Lawrence Small says.

He is a patient of Wilmer specialist Sharon Solomon, M.D., the Katharine M. Graham Associate Professor of Ophthalmology. During his regular biannual visits to Wilmer, Small noticed something amiss in an otherwise seamless and speedy operation. He always seemed to get stalled in imaging. "Everything runs so quickly and everybody is so well attended to, but there's this bottleneck," says Small. "They said, 'We don't have enough of these cameras.' It was pretty clear how we could help."

The gift of equipment was a bit of a departure for the division. Philanthropists often choose to endow professorships or to fund science, such as the pharmaceutical research of a particular faculty member, Bressler says. But the Smalls understood the need for technology and the wide reach such a donation would have.

"People can't realize their full potential if they don't have top-quality technical equipment, particularly in the technological age we are in," says Small.

The new cameras are valuable on many levels, says Bressler. "They help us be more efficient in the clinic, but they're also helping treat these major causes of blindness, all while fueling more research to improve upon those treatments."

He adds, "We owe a great deal of thanks to the Smalls. I hope others will put such technology on their philanthropic radar. The opportunity is real and the impact across the institute is undeniable."▲


JOHNS HOPKINS
MEDICINE
WILMER EYE INSTITUTE
OPHTHALMOLOGY
FACULTY
MANDEEP SINGH MD, Ph.D.

←*Mandeep Singh, M.D., Ph.D., is tapping into the power of regenerative medicine in his quest to restore vision loss caused by Startgardt-4.*

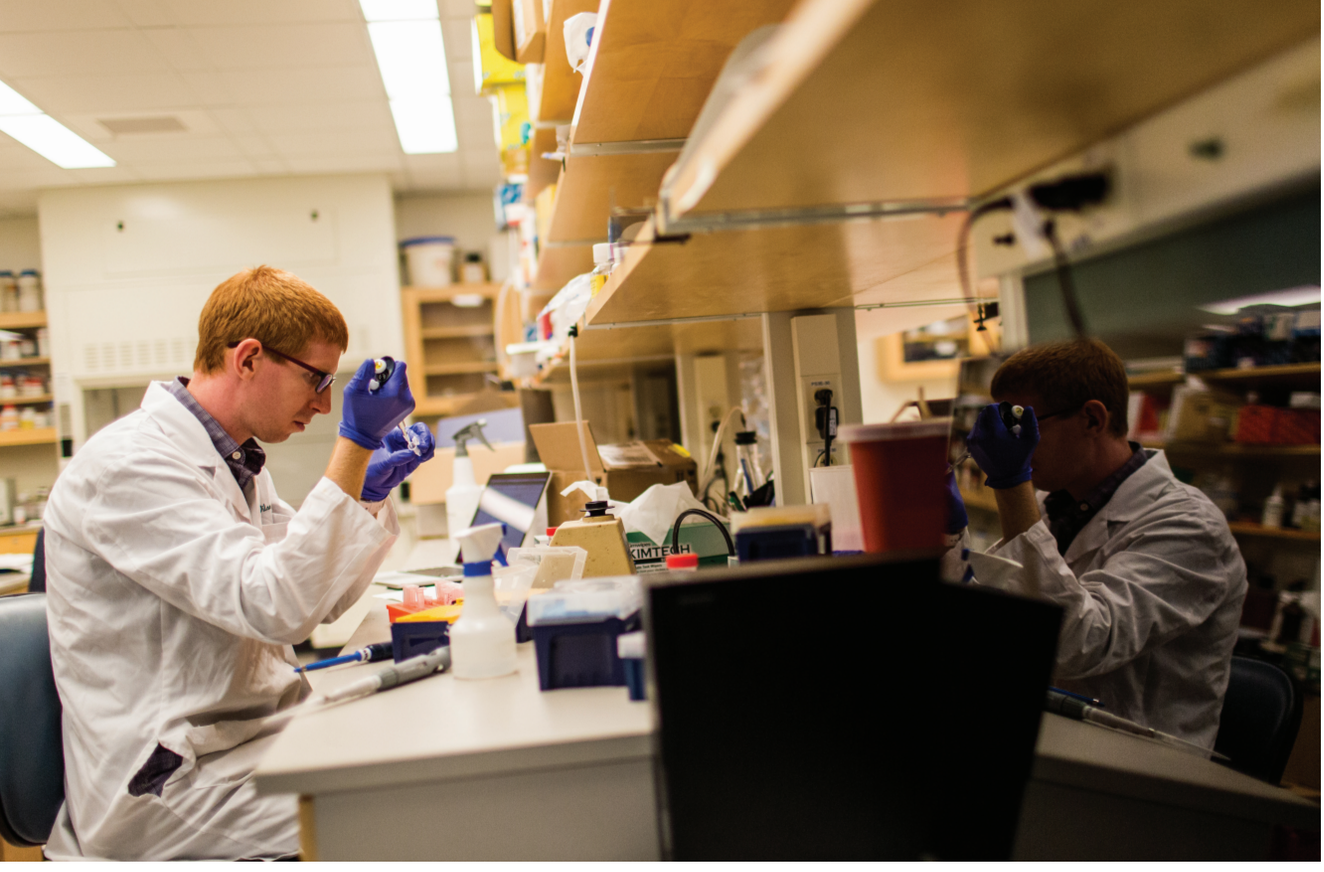
FARSIGHTED PHILANTHROPY

FUELING HOPE FOR STARGARDT-4

When you talk to someone with Stargardt macular dystrophy, a rare disease that affects the macula—the very heart of detailed vision—they speak of little things lost, like the ability to read a Sunday newspaper or recognize the face of a friend.

These are the stories that drive Wilmer's Mandeep Singh, M.D., Ph.D., toward a cure for Stargardt-4—a genetically dominant variation of the typically recessive Stargardt mutation. It takes just a single copy of the mutant gene to cause the disease, rather than two.

Singh, an assistant professor of ophthalmology, has placed the disease at the center of the bull's-eye of his groundbreaking work in regenerative medicine.



"Stargardt-4 is rare, but its impact on people's lives is immense. It usually strikes in adolescence and slowly degrades central vision over the course of many years. My team and I are privileged to bring our thoughts to bear on such a significant problem," Singh says. He is working to regenerate photoreceptors from stem cells and then transplant the regenerated tissue into the macula of patients with Stargardt-4—with the ultimate goal of restoring vision.

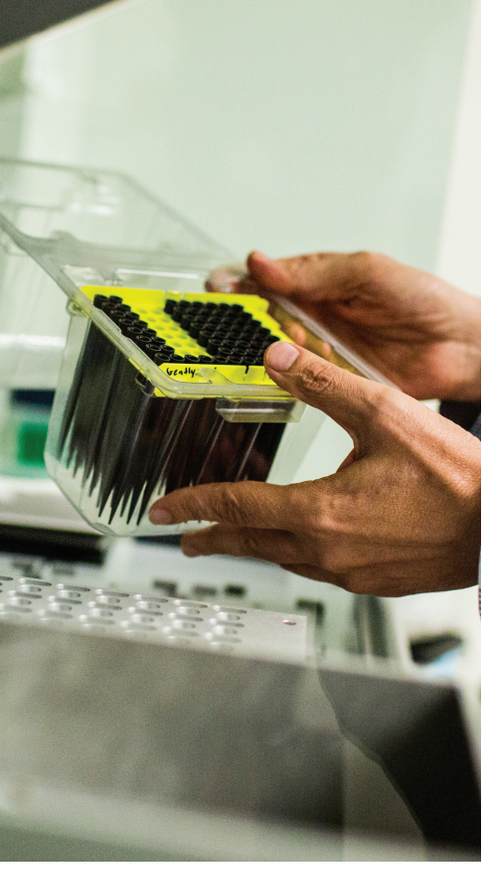
While his research is transformational, it is as-yet unproven, and many traditional sources of funding are hesitant to support such nascent ideas. This makes Singh's job harder still, but it was precisely Singh's outside-the-box thinking that first drew the attention of The Shulsky Foundation, which funds research in vision and hearing loss.

"The Shulsky Foundation is interested in what we call 'nonincremental' research—high-reward approaches that also carry a fair degree of risk. They are promising yet unproven, and that's what excites us," says Shaun Jones, M.D., president and research and development director at The Shulsky Foundation. To Jones and the foundation, the promise of a life-altering breakthrough makes the risk worth taking.

"We look for aggressive researchers at the cutting edge, and we encourage their unbridled creativity," Jones adds.

In Singh's case, that creativity is best exemplified by his efforts to regenerate not just certain types of cells—rods or cones or retinal epithelia—but rather composite retinal tissues made of many types of cells assembled in complex and interdependent layers. He is trying to regenerate complete working retinas. The goal is a renewable stem cell source that he hopes might fuel research in the lab and, eventually, yield transplantable tissue for patients.

"We want to have a stem cell source that could provide millions of photoreceptors for all the patients affected by this and perhaps other retinal conditions. If we can do that, we might never have to rely on human donors for transplants," Singh says.



"We look for aggressive researchers at the cutting edge, and we encourage their unbridled creativity."

—Shaun Jones, M.D.,
President and Research and Development Director at The Shulsky Foundation

While regeneration is hard enough, Singh then takes his work a step further. As a surgeon, Singh is also developing the techniques necessary to safely and successfully transplant working tissues into the eyes of patients with Stargardt-4.

These tissues are incredibly complex and delicate. They are but a few layers of cells thick. Much has to go right to get them to work in the lab—and more still to get them to work when transplanted into patients.

In this regard, Singh has come as close as anyone in the world to doing just that. As the Shulsky funding decision suggests, the world is beginning to take note of the broader implications.

"Our work in developing a treatment to restore vision in Stargardt-4 may open the doors to curing other kinds of macular degeneration, even age-related macular degeneration, which is a leading cause of vision loss across the world," Singh says.

At the moment, Singh's work is still in the preclinical phases. He is working on a proof-of-concept. The financial burdens on a researcher at this stage of his career are immense. There is equipment to buy, researchers to hire and lab assistants to train. In this regard, the vision of a farsighted donor like The Shulsky Foundation is invaluable.

"The Shulsky Foundation has been so incredibly generous and stable in its support," Singh says. "We're moving as fast as possible, thanks to them."

"Dr. Singh is typical of the researchers that Shulsky tries to identify," Jones says. "These are tomorrow's superstars." ▲

7 YEARS LATER

DELIVERING ON THE PROMISE OF THE ROBERT H. AND CLARICE SMITH BUILDING

"When the Robert H. and Clarice Smith Building opened, I said it was a dream come true. Seven years later, that dream has delivered far more than we could have imagined. Interdisciplinary collaboration has opened the door to revolutionary new treatments, helped create new companies and products that fuel further discovery, and attracted rising stars in the research world to our institution. Most exciting, it has allowed us to dream even bigger about the next steps for the Wilmer Eye Institute and what we can do for patients around the world."

PETER J. MCDONNELL, M.D. WILLIAM HOLLAND WILMER PROFESSOR OF OPHTHALMOLOGY
DIRECTOR, WILMER EYE INSTITUTE

A HOME FOR INNOVATION

Before the Robert H. and Clarice Smith Building, researchers at the Wilmer Eye Institute were spread across different buildings and sometimes even different campuses. Now, they have a shared home in a facility that, by its very design, encourages collaboration and cross-cutting multidisciplinary projects. Glass-enclosed offices and lab spaces ensure that researchers are aware of the work of their neighbors; shared equipment maximizes resources; and proximity throughout the day breeds creative group problem-solving. A unique space so conducive to state-of-the-art work has served as a magnet for talent, drawing researchers and scientists to Wilmer to work on pressing challenges facing eye care and on improving health care as a whole.

"The philanthropists who made the Robert H. and Clarice Smith Building possible had a dream for interdisciplinary research, and it has succeeded even beyond what they imagined. We would never have made the kinds of connections and discoveries without the vision the Smith Building supporters brought to the table."

—Sheila West, Ph.D., *El-Maghraby Professor of Preventive Ophthalmology, Vice Chair for Research, Wilmer Eye Institute*

"The Robert H. and Clarice Smith Building is a model of what can be achieved when the vision of our partners aligns so well with our mission of discovery and service. Because of our donors, this building has unleashed innovation in eye care, encouraging the kind of paradigm-shifting investigations that can lead to the next great breakthrough and allowing this novel research to be widely translated into clinics and the marketplace to benefit our patients and our community."

–Ronald J. Daniels, J.D., LL.M., *President, The Johns Hopkins University*

A BEACON OF HOPE: THE MAURICE BENDANN SURGICAL PAVILION

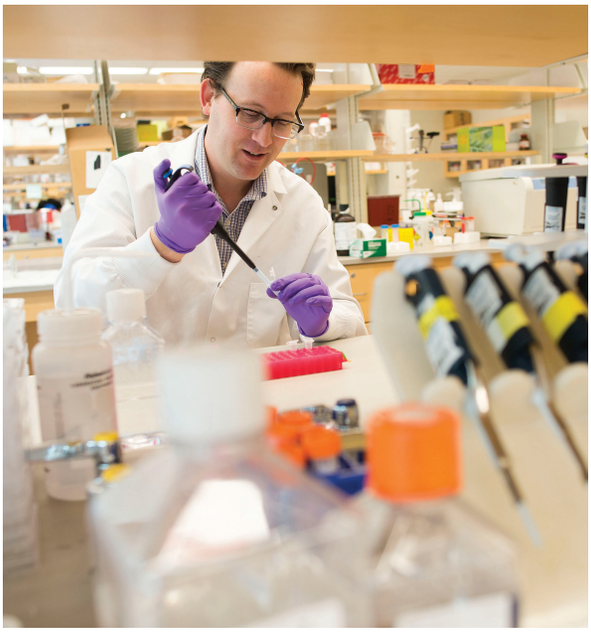
For patients traveling to Wilmer from across Maryland, the nation and the world, the Maurice Bendann Surgical Pavilion, located on the first floor of the Robert H. and Clarice Smith Building, is a beacon of hope.

Some 7,745 surgeries were performed in fiscal year 2017 in the seven state-of-the-art operating rooms of the pavilion—a dramatic 27 percent increase in surgical volume from the time before the building opened.

The pavilion offers more than increased volume. Because of the expanded facility, long waits have largely been eliminated, patients and families are able to park directly outside the building, and welcoming waiting areas are available for loved ones.

"From decreased wait times, to access to cutting-edge surgical facilities and techniques, to attention to the kind of small details that make all the difference to a worried patient and family, the Maurice Bendann Surgical Pavilion has dramatically enhanced the way we can deliver care. We are tremendously grateful to be able to provide this level of service to the men, women and children seeking care at Wilmer."

PAUL B. ROTHMAN, M.D., FRANCES WATT BAKER, M.D., AND LENOX D. BAKER JR., M.D.,
DEAN OF THE MEDICAL FACULTY AND CEO OF JOHNS HOPKINS MEDICINE



† *Looking up, visitors can see five floors of labs, glass walls reflecting and encouraging an open approach to the work that takes place here. Lounges provide a setting for informal interactions, encouraging the kind of conversations that can lead to the next great project or partnership. Conference rooms allow faculty and staff members to hold weekly meetings to talk about their work and explore future collaborations.*

Advancing THE TRADITION

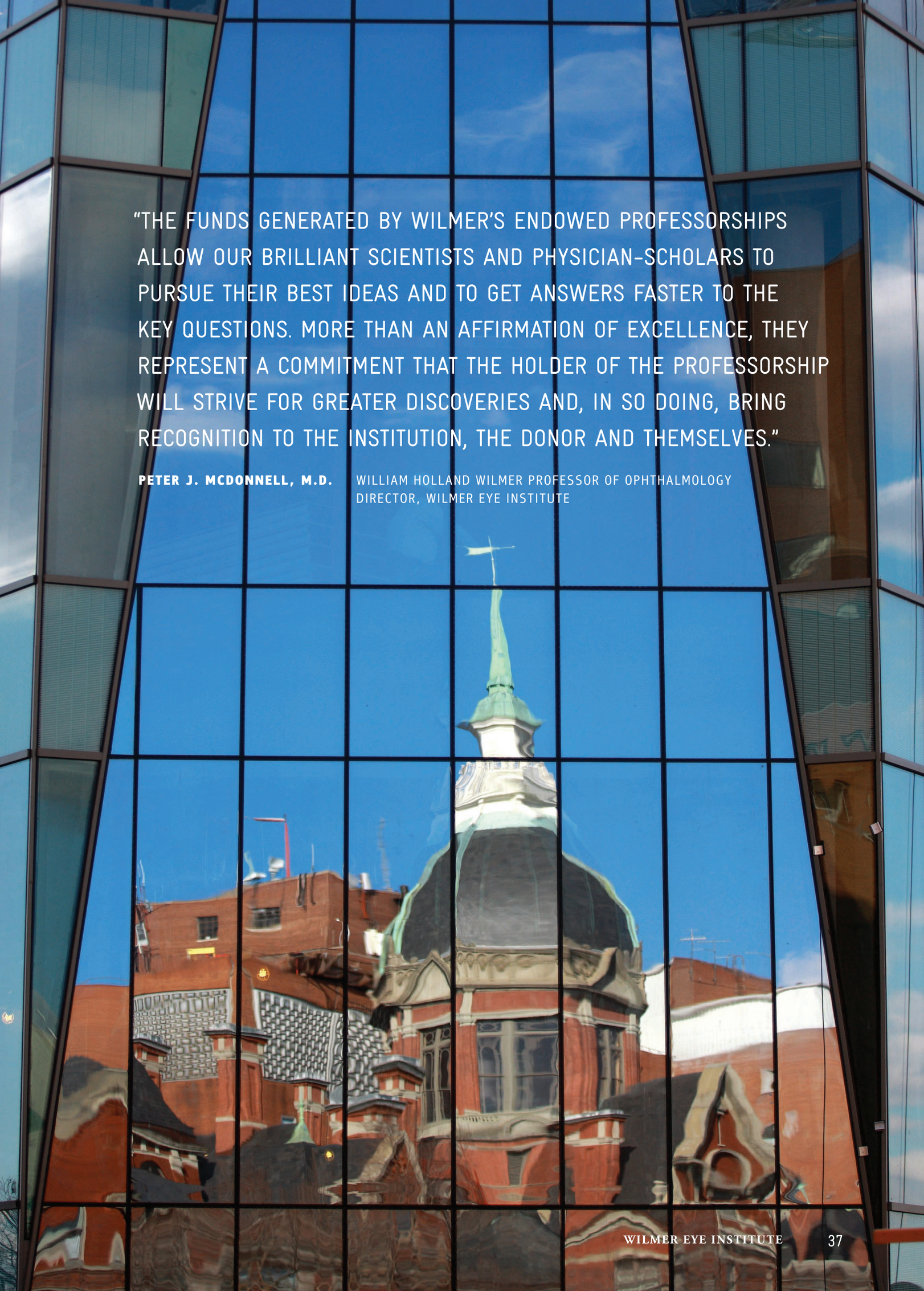
ENDOWED PROFESSORSHIPS AT THE WILMER EYE INSTITUTE

Roman Emperor Marcus Aurelius established the earliest endowed chairs in 176 A.D., representing the four schools of philosophy in Athens: Platonism, Aristotelianism, Stoicism and Epicureanism.

The first endowed professorships of the modern university system were established in the 1500s, with the creation of the Lady Margaret chairs in divinity at Cambridge (1502) and Oxford (1540). Margaret, countess of Richmond and grandmother of Henry VIII, sponsored these chairs.

Later, private individuals joined in providing chairs, such as the Lucasian Chair of Mathematics, which Isaac Newton held beginning in 1669. The honor associated with appointment to an endowed position has remained unchanged ever since.

At the Wilmer Eye Institute, endowed professorships are especially important to the ongoing mission of teaching, research and patient care. The men and women receiving this highest honor conduct some of our most significant research, attract bright and dedicated students, and bring considerable prestige to the Wilmer name.



"THE FUNDS GENERATED BY WILMER'S ENDOWED PROFESSORSHIPS ALLOW OUR BRILLIANT SCIENTISTS AND PHYSICIAN-SCHOLARS TO PURSUE THEIR BEST IDEAS AND TO GET ANSWERS FASTER TO THE KEY QUESTIONS. MORE THAN AN AFFIRMATION OF EXCELLENCE, THEY REPRESENT A COMMITMENT THAT THE HOLDER OF THE PROFESSORSHIP WILL STRIVE FOR GREATER DISCOVERIES AND, IN SO DOING, BRING RECOGNITION TO THE INSTITUTION, THE DONOR AND THEMSELVES."

PETER J. MCDONNELL, M.D. WILLIAM HOLLAND WILMER PROFESSOR OF OPHTHALMOLOGY
DIRECTOR, WILMER EYE INSTITUTE

KANNAN RANGARAMANUJAM, PH.D.

Co-Director, Wilmer's Center for Nanomedicine

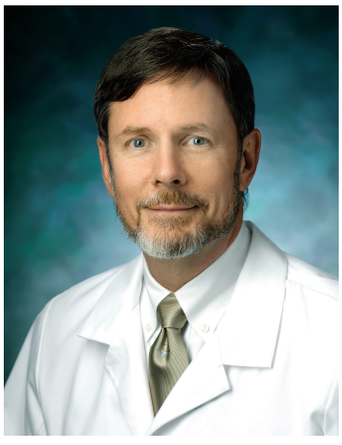
Receiving the **Arnall Patz Distinguished Professorship** is a great honor for me because it represents the ideals of Dr. Patz, who was a great ophthalmologist, researcher, leader and, above all, a humble, wonderful human being! It is an inspiration for me to live up to.

The resources from the professorship will help the Center for Nanomedicine undertake high-risk, high-reward research initiatives that can potentially revolutionize the way therapies for eye diseases are developed and translated. We will initiate collaborations with researchers and clinicians across Wilmer to tackle unmet needs, including the development of oral nanomedicines for ocular disorders, of gene delivery, and of targeted therapies for age-related macular degeneration, diabetic retinopathy and dry eye. In many ways, these goals were dear to Dr. Patz, and the Arnall Patz Distinguished Professorship helps us carry on his vision.

CHARLES EBERHART, M.D., PH.D.

Receiving the **Charlotte A. Wilson and Margaret K. Whitener Professorship in Ophthalmology** represents a high point of my career thus far. It is tremendously gratifying to know that The Johns Hopkins University and the Wilmer Eye Institute have chosen to support me in this way.

The tangible benefits of ongoing support from a professorship such as this will prove critical in our quest to develop new treatments for ocular tumors that can threaten both the vision and the lives of children and adults. In particular, this support will allow us to initiate and nurture innovative new research projects until they reach the stage at which they are competitive for standard research grants. The importance of stable sources of funds like this cannot be overemphasized.



THOMAS M. "MAC" BOSLEY, M.D.

It is a tremendous honor to receive the **Knights Templar Eye Foundation Professorship in Ophthalmology**. The income from this endowed chair will give me the time and resources to continue the research that I have done since the beginning of my career.

Much of my effort over the past 15 years has focused on phenotype-genotype correlation studies, where my colleagues and I in the clinic have described new syndromes, while my colleagues in the laboratory have identified the responsible genetic abnormalities. Now that I have joined the Wilmer Eye Institute, I have the opportunity to continue this and other types of research, with the generous support of the Knights Templar Eye Foundation, in the best clinics and laboratories in the world.

The wall commemorating the donors and recipients of Wilmer's endowed professorships in the Robert H. and Clarice Smith Building, T. Boone Pickens Atrium.

Daniel Finkelstein, M.D., M.A. Theology

Andreas C. Dracopoulos

DANIEL FINKELSTEIN, M.D., M.A. THEOLOGY

Received the Andreas C. Dracopoulos Professorship

Excerpt from Remarks by President Daniels at the Dedication of the Andreas C. Dracopoulos Professorship and Installation of Daniel Finkelstein

Dan Finkelstein opened a window into our university for Andreas Dracopoulos to see Johns Hopkins as a place committed to excellence in clinical care—the kind of clinical care that is embedded in a world of ideas, ethics and humanity, and that asks physicians to look beyond disease and take into account the whole person.

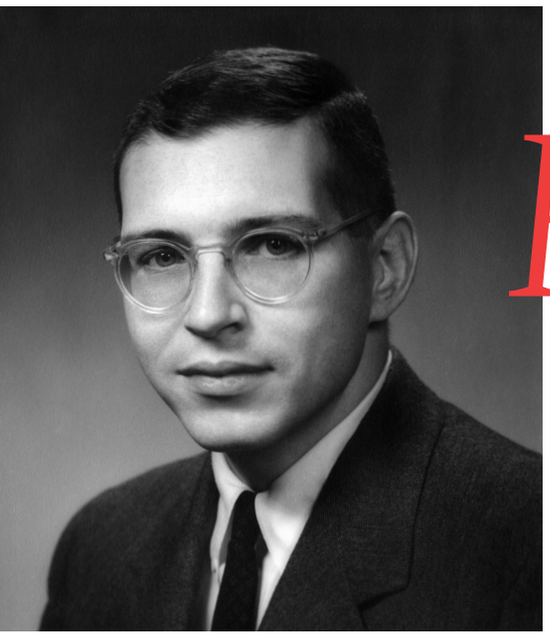
A clinician with a master's in theology and a passion for ethics, Dan has been a powerful advocate for ethical care in the treatment of all patients. In the clinic and on the pages of *The Journal of the American Medical Association*, he has shown how understanding the full complement of a patient's attributes—physical, psychological, cultural and spiritual—can guide a physician in meeting a person—or a community—where they are in order to serve them well.

It comes as no surprise that Dan and Andreas connected. Andreas has the preternatural ability to see what a person, an institution, a community needs—often when they do not—and in his quiet, determined, expansive way, go about making it happen.

I have had the privilege of seeing this truth manifest as Andreas' relationship with our university has grown from its beginning at Wilmer with Dan, then through Dan with the Berman Institute of Bioethics, and into Andreas' role as a steward and trustee of our university.

We are grateful for the gifts of Andreas Dracopoulos' vision, inspiration and friendship, which have touched and united the many parts of our great enterprise.

– Ronald J. Daniels, J.D., LL.M.,
President, The Johns Hopkins University



← *Dr. William Jarrett joined Wilmer as an opthalmology resident nearly 57 years ago.*

Privileged TO PERPETUATE WILMER

The inspiration that brought William Jarrett, M.D., to the Wilmer Eye Institute as an ophthalmology resident nearly 57 years ago remains just as strong today. He credits the people and educational experience at Wilmer with shaping his career.

Dr. Jarrett, a Baltimore native, returned home in 1954 after completing his undergraduate studies at Yale to attend the Johns Hopkins University School of Medicine. Once he obtained his medical degree, he originally served on the Osler Medical Service. After a few years and conversations with friends and Wilmer alumni, like Stuart Wolfe, M.D., and Bob Welch, M.D., he decided to shift gears and explore ophthalmology.

Dr. Jarrett entered the Wilmer residency program and quickly found the educational experience that he craved. "I worked my tail off every day," he recalls. He learned alongside ophthalmology legends, such as A. Edward Maumenee, M.D., and Frank Walsh, M.D., whom Dr. Jarrett describes as, "lovely people at the top of their game ... it was a marvelous learning experience." He also spent six months in Algeria through a Wilmer program that sought to give residents additional surgical experience.

His hard work paid off. After his time at Wilmer, Dr. Jarrett was recruited by a friend, Bill Hagler, M.D., to join him at Emory School of Medicine and fill the regional need for retina specialists. They spent five years together at Emory before opening a private practice in Atlanta, known as Eye Consultants of Atlanta. Like many Wilmer alumni, Dr. Jarrett became a leader in the field, serving as president of the Georgia Society of Ophthalmology and a founding member of the Retina Society. He retired in 1998 and has since received the Wilmer Distinguished Alumni Award and Johns Hopkins Alumni Association Heritage Award.

He also became a committed financial supporter of Wilmer and the Johns Hopkins University School of Medicine. His philanthropy stems from gratitude for all that Wilmer did for him. "You feel so privileged to participate in this wonderful place that when you get in a position to give back, you want to perpetuate the institution that you love and that benefited you so much in your own career," he says. "Wilmer is an incredible place. I'm just as proud as I can be that I trained there." ▲

↑ *Neil Miller, M.D., and Jeanne Wolfe at Wilmer's Legacy Society luncheon in April.*

A LASTING GIFT TO SUPPORT OPTIC NERVE RESEARCH

Jeanne Wolfe first accompanied her husband, Don, to The Johns Hopkins Hospital in 1979 when he had an appointment to see Neil Miller, M.D., at the Wilmer Eye Institute on the recommendation of the hospital's president.

Miller, the Frank B. Walsh Professor of Neuro-Ophthalmology, diagnosed Don with a large lymphangioma—a type of tumor—in the orbit of his eye and successfully operated to remove it. The tumor never reoccurred, and the Wolfes continued to visit Wilmer for Don's annual follow-up for 35 years, until Don passed away in 2014.

The Wolfes began giving to support Miller's work, which focuses on the neuro-ophthalmology of eye disease, in the mid-1990s. "It was a pleasure to contribute. Don would always say that a little bit of himself would be left behind in giving," says Jeanne.

As Don's health had declined, he had emphasized the importance of supporting Miller. "He asked me to continue in any way I could after he was not here," says Jeanne. "And I have done exactly that." Now, she's decided to do even more. Recently, she took the step to become a Legacy Society member, signaling her intention to give part of her estate to Wilmer.

The Johns Hopkins Legacy Society honors individuals who make a lasting commitment to any area of Johns Hopkins by including Johns Hopkins in their estate plans or by making a life income gift. Jeanne's legacy gift, made in honor of Don, will support Miller's optic nerve research.

"It truly does feel better to give than to receive!" says Jeanne. "I will continue to give while I'm still around and kicking. But even better, I will know—as my husband knew—I will leave a little bit of myself here, at Hopkins, for the patients who come after." ▲

Johns Hopkins
LEGACY SOCIETY

VISION FOR THE FUTURE

In 1925, the nation's first university eye clinic to combine eye patient care, research and teaching was established, thanks to the generosity of friends and former patients of William Holland Wilmer. Your legacy gift will ensure Dr. Wilmer's legacy continues through education, treatment and pioneering research. Consider these opportunities to leave a meaningful legacy while taking into account your personal goals.

FROM YOUR WILL OR TRUST
Gifts that cost nothing in your lifetime.

RETIREMENT PLAN DESIGNATION
A tax-efficient way to leave a legacy.

LIFE INCOME GIFT
Receive annual income and an immediate tax deduction with a charitable gift annuity or charitable remainder trust.

To learn more about these and other creative ways to support any area of Johns Hopkins, contact:

Office of Gift Planning
410-516-7954 or 800-548-1268
giftplanning@jhu.edu
rising.jhu.edu/giftplanning

Seek advice from a tax professional before entering into a gift annuity agreement. Johns Hopkins gift annuities are not available in all states.

2017 EVENTS

↑ *Left to right, Sir Knight Michael Burke Johnson; Kim Jiramongkolchai, M.D.; Allison Martin, M.D.; Grand Master Sir Knight Duane L. Vaught; and Wilmer Director Peter J. McDonnell, M.D.*

KNIGHTS TEMPLAR EYE FOUNDATION PRESENTATION OF CAREER STARTER GRANTS AND DEDICATION OF KTEF PROFESSORSHIP

MAY 8, 2017

Representatives from the Knights Templar Eye Foundation (KTEF) awarded two 2017–2018 KTEF Career Starter Grants—each in the amount of $65,000—at an event held in the Wilmer Eye Institute Robert H. and Clarice Smith Building. The recipients, Kim Jiramongkolchai, M.D., a member of the assistant faculty in Wilmer's Retina Division, and Allison Martin, M.D., an instructor of pediatric oncology at the Johns Hopkins Children's Center/ Kimmel Cancer Center, gave presentations about their current research.

Last year, the Knights Templar expanded its support of Wilmer by endowing the Knights Templar Eye Foundation Professorship in Ophthalmology. On May 8, Wilmer Director Peter J. McDonnell, M.D., unveiled the plaque honoring Thomas "Mac" Bosley, M.D., of the Division of Neuro-Ophthalmology, as the inaugural recipient of the professorship.

↑ *Left to right, Wilmer Director Peter J. McDonnell, M.D.; Sir Knight Michael Burke Johnson; Grand Master Sir Knight Duane L. Vaught; and Thomas "Mac" Bosley, M.D.*

WILMER ALUMNI EVENTS

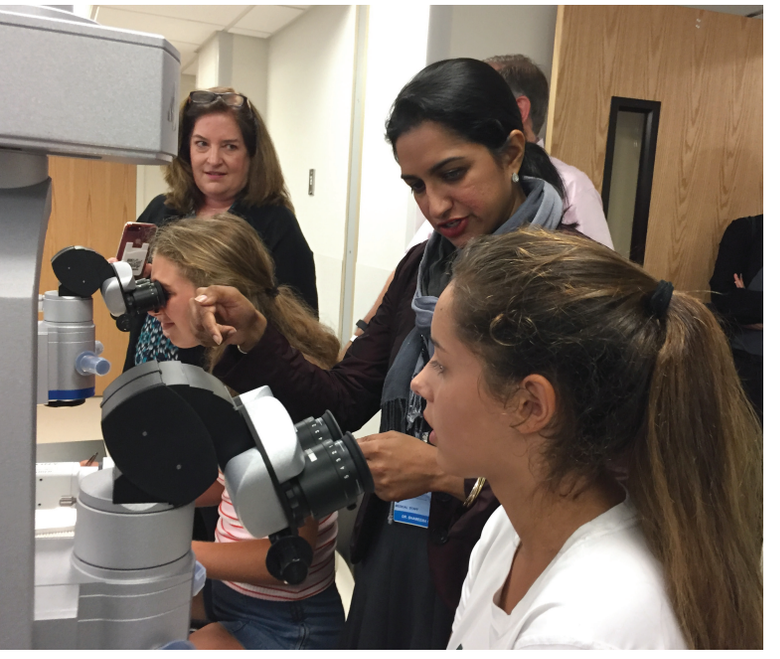
↑ *Left to right, Mary Lynch, M.D.; Lee Snyder, M.D.; Shannath Merbs, M.D.; Michelle Tarver, M.D.; Mira Sachdeva, M.D., Ph.D.; Kristin Hammersmith, M.D.; and Shameema Sikder, M.D., at the Women of Wilmer Symposium.*

WOMEN OF WILMER SYMPOSIUM **MAY 18, 2017**

76TH ANNUAL WILMER RESIDENTS ASSOCIATION CLINICAL MEETING **MAY 19, 2017**

On May 18, the Women of Wilmer Symposium took place to recognize the impact that women have had and continue to have at the institute. Wilmer Director Peter J. McDonnell, M.D., and Mira Sachdeva, M.D., Ph.D., the chief resident at the time, opened the event. Speakers included alumnae from throughout Wilmer's history; each reflected upon her time in residency and on the women who helped shape her career as well as gave updates on her current work.

On May 19, Allan Jensen, M.D. '72, delivered the Wilmer Memorial Lecture at the 76th Annual Wilmer Residents Association Clinical Meeting. The Distinguished Alumni Award recipients included Earl Kidwell, M.D. '77; Robert Frank, M.D. '72; and Ellen Strahlman, M.D., M.H.Sc. '87. Jeffrey Kahn, Ph.D., M.P.H., the Andreas C. Dracopoulos Director of the Johns Hopkins Berman Institute of Bioethics, delivered the Susruta Lecture in medical ethics.

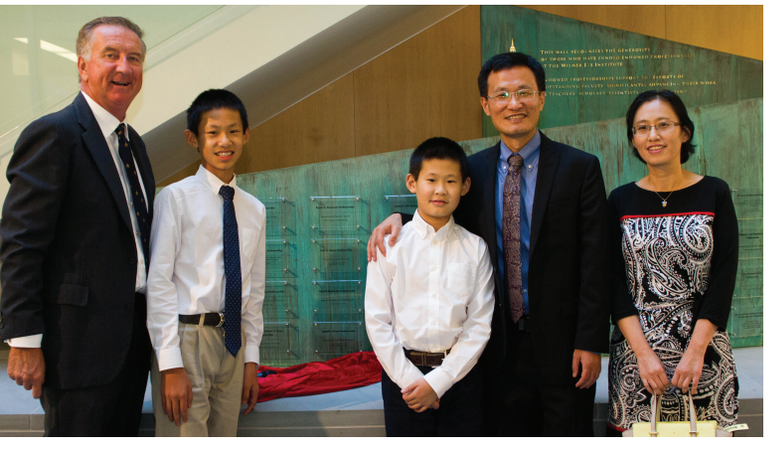


↑ *Shameema Sikder, M.D., director of OphSET, explains how a surgical microscope works to a student attendee.*

ARCS FOUNDATION METRO WASHINGTON CHAPTER VISITS WILMER

AUG. 15, 2017

The Metro Washington Chapter of the ARCS Foundation Inc., a national organization run entirely by women and dedicated to supporting the brightest U.S. graduate and undergraduate scholars by providing financial awards in science, engineering and medical research, visited Wilmer to tour the Center of Excellence for Ophthalmic Surgical Education and Training (OphSET) and the Center for Nanomedicine. Members and family of members of the Metro ARCS chapter attended, including high school and college students pursuing studies and careers in the STEM field. Some had the chance to practice suturing in the OphSET wet lab and discovered they may be budding eye surgeons.



↑ *Left to right, Wilmer Director Peter J. McDonnell, M.D.; Johannes Qian; Simon Qian; Jiang Qian, Ph.D., and Shuli Xia, Ph.D., in front of the wall commemorating Wilmer's endowed professorships in the Robert H. and Clarice Smith Building, T. Boone Pickens Atrium.*

DEDICATION OF THE HAGEN PROFESSORSHIP

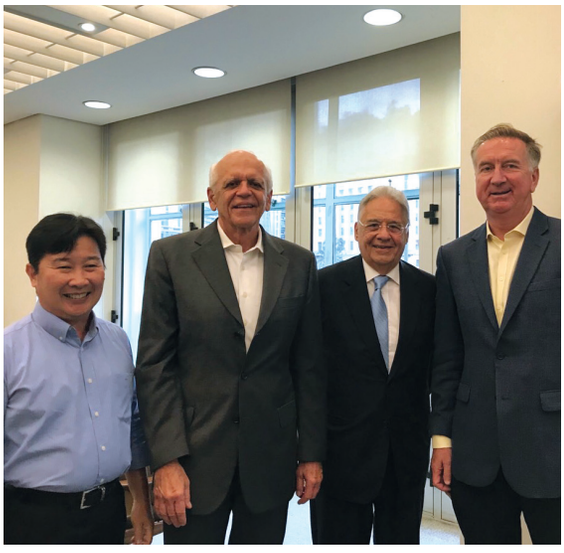
SEPT. 19, 2017

Wilmer Director Peter J. McDonnell, M.D., kicked off the ceremony with a welcoming address. Next came James Handa, M.D., the Robert Bond Welch Professor of Ophthalmology, who introduced Jiang Qian, Ph.D., director of the Wilmer Bioinformatics Group and recipient of the Karl H. Hagen Professorship. After a talk by Qian, "Greater Than the Sum of Its Parts: A Systems Biology Approach to Modeling Retinal Disease," McDonnell unveiled the plaque commemorating Qian as Wilmer's new Karl H. Hagen Professor of Ophthalmology.

← *Johannes Qian looking at the plaque commemorating his father, Jiang Qian, Ph.D., as Wilmer's new Karl H. Hagen Professor of Ophthalmology.*

↑ *Left to right, Wilmer Director Peter J. McDonnell, M.D.; Fernando Henrique Cardoso, former president of Brazil; and Jan McDonnell, M.D.*

↑ *Wilmer Board of Governors and Wilmer Director Peter J. McDonnell, M.D., visiting with Rubens Belfort Jr., M.D., Ph.D., M.B.A., and Fernando Henrique Cardoso, former president of Brazil.*



↑ *Left to right, Seiji Hayashi; Rubens Belfort Jr., M.D., Ph.D., M.B.A.; Fernando Henrique Cardoso, former president of Brazil; and Wilmer Director Peter J. McDonnell, M.D.*

↑ *Left to right, first row, Ken Merlau; Rubens Belfort Jr., M.D., Ph.D., M.B.A.; Wilmer Director Peter J. McDonnell, M.D.; Jan McDonnell, M.D.; Mary Bartkus; Niel Starkson; and Jo Merlau.*

Left to right, second row, Paul Schor, M.D., Mauro Campus and Nelson Marquez.

WILMER BOARD OF GOVERNORS' TRIP TO BRAZIL **OCT. 1–4, 2017**

Members of the Wilmer Board of Governors, along with Wilmer Director Peter J. McDonnell, M.D., and his wife, Jan McDonnell, M.D., traveled to São Paulo, Brazil, to meet with key leaders of Brazilian ophthalmology. They toured the São Paulo Federal University Department of Ophthalmology and met with Rubens Belfort Jr., M.D., Ph.D., M.B.A., at the Vision Institute to discuss what members of the Board of Governors/Trustees can do to help nonprofits move forward strategically and successfully. The former president of Brazil, Fernando Henrique Cardoso, noted that they would be visiting his foundation and sought time to meet with the Wilmer group.

Left to right, Akrit Sodhi, M.D, Ph.D., an associate professor of ophthalmology at Wilmer; Barbi Smole; James Handa, M.D., the Robert Bond Welch, M.D., Professor of Ophthalmology at Wilmer; Kevin Smole; (center front) Sean Smole. →

COATS' DISEASE FUNDRAISER

OCT. 7, 2017

The Smole family hosted their fourth annual fundraiser at their home to benefit Coats' disease research at Wilmer in the lab of Akrit Sodhi, M.D., Ph.D. Kevin and Barbi Smole's son, Sean, was diagnosed with Coats', a rare pediatric eye disease, five years ago. Their efforts since then have rallied friends, family, neighbors and Coats' patients around the country to donate money for research and to raise awareness about this disease.

↑ *Zachary Gilliam, patient coordinator at Wilmer's Maurice Bendann Surgical Pavilion, with Sushmi Kosuri, development coordinator at Wilmer, manning the World Sight Day in the lobby of Bendann on Oct. 12.*

CELEBRATING WORLD SIGHT DAY AT WILMER

OCT. 12, 2017

In celebration of World Sight Day on Oct. 12, Wilmer raised funds for resident education and awareness about global eye health. Development staff visited all eight of Wilmer's satellite clinics, from Bethesda to Bel Air, to talk with patients, families and staff about research and patient care initiatives. Wilmer also hosted a Reddit "Ask Me Anything" online forum, where people from around the world asked Wilmer residents questions on subjects ranging from the future of eye care to the solar eclipse to how dogs see.

↑ *Rita Dziecichowicz, guest services coordinator, and Carlisa Jones, administrative supervisor, at the World Sight Day table in the lobby of the Wilmer Eye Institute at The Johns Hopkins Hospital.*

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JOIN US IN OUR QUEST FOR DISCOVERY

The mission of the Wilmer Eye Institute is to use and develop the finest scientific evidence to promote improved ophthalmic care and the reduction of visual disability in a collaborative environment that combines compassionate patient care, innovative research and the training of future leaders in ophthalmology and visual sciences. For the past nine decades, our efforts have been made possible by the financial support of our generous donors.

Your investment in the Wilmer Eye Institute makes it possible for our physicians to offer unrivaled patient care to you and to countless others who may find their sight threatened by illness or injury. We invite you to partner with the Wilmer Eye Institute on our quest of discovery and to help us find the next treatment or cure.

For information on how to join us in our mission to end blindness and life-altering eye diseases, please contact:

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410.955.2020, wildev@jhmi.edu

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Jessica Wilson,
Communications Specialist
Jeff Weingart,
Senior Development Coordinator
Sushmitha Kosuri,
Development Coordinator
Allison Kerr,
Administrative Coordinator

2017 AWARDS

J. Fernando Arevalo, M.D., the Edmund and Virginia Ball Professor of Ophthalmology at the Wilmer Eye Institute and director of the Department of Ophthalmology at Johns Hopkins Bayview Medical Center, earned the **American Academy of Ophthalmology's Lifetime Achievement Honor Award** for his "contributions to the Academy, its scientific and educational programs and to ophthalmology." In addition, representing his native country of Venezuela, Arevalo was appointed the **30th president of the Pan-American Association of Ophthalmology**, which represents more than 15,000 ophthalmologists and is accepted by all Latin American ophthalmologists as their only international representative.

Neil Bressler, M.D., the James P. Gills Professor of Ophthalmology and chief of the Retina Division at the Wilmer Eye Institute, received the **Arnall Patz Medal** at the 40th Annual Meeting of the Macula Society in June 2017 and delivered the **Arnall Patz Lecture** at the annual meeting of the American Academy of Ophthalmology in November 2017.

Wilmer Director Peter J. McDonnell, M.D., the William Holland Wilmer Professor of Ophthalmology, was named by ***Ocular Surgery News* as one of the 300 leading innovators** in the field of refractive cataract surgery. In addition, the **Council of Canadian Academies** identified McDonnell as an **author of one of the top 1 percent most cited papers** in his field worldwide.

Jennifer Thorne, M.D., Ph.D., the Cross Family Professor of Ophthalmology and chief of the Division of Ocular Immunology at the Wilmer Eye Institute, was appointed the **president of the American Uveitis Society**, which has as its goal to increase, promote and disseminate knowledge regarding uveitis, and to develop and promote research and investigation in the field.

Sheila West, Ph.D., Pharm.D., the El-Maghraby Professor of Preventive Ophthalmology and vice chair for research at the Wilmer Eye Institute, received the **2017 International Blindness Prevention Award**, established by the American Academy of Ophthalmology's Board of Trustees "to recognize individuals who have made significant contributions to the prevention of blindness and/or restoration of sight."

Cathy Kowalewski, the administrator of the Wilmer Eye Institute, was elected to the **Board of the World Association of Eye Hospitals**, the global umbrella body composed of member hospitals that are "Centres of Excellence" in ophthalmology focused on delivering the best and safest ophthalmic care.

Judith Goldstein, O.D., an associate professor of ophthalmology and rehabilitative medicine and chief of the Low Vision and Vision Rehabilitation Service at the Wilmer Eye Institute, was awarded the **2017 Humanitarian of the Year Award by the Lions Multiple District 22-C** for her research in vision rehabilitation and commitment to extending low-vision services to populations in need.

Sharon Solomon, M.D., the Katharine M. Graham Associate Professor of Ophthalmology at the Wilmer Eye Institute, was inducted into the **Miller-Coulson Academy of Excellence in Patient Care**, an initiative of the Johns Hopkins Center for Innovative Medicine to recognize and promote excellence in patient care at The Johns Hopkins Hospital and Johns Hopkins Bayview Medical Center.

Megan Collins, M.D., M.P.H., an assistant professor of ophthalmology and fellowship program director of pediatric ophthalmology and adult strabismus at the Krieger Children's Eye Center at the Wilmer Eye Institute, received a **2017 Johns Hopkins Catalyst Award**—accompanied by a $75,000 grant, mentoring opportunities and institutional recognition. Catalyst Awards honor early-career faculty members who are some of the most creative thinkers from across The Johns Hopkins University.

2017–18 RESIDENTS

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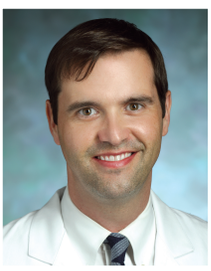
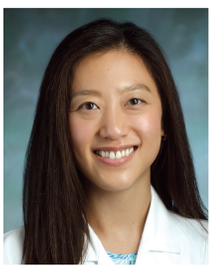
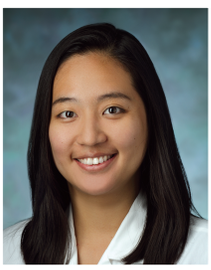


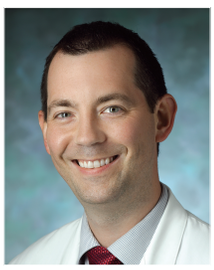
Bradley Barnett



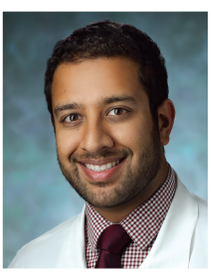
Cindy Cai



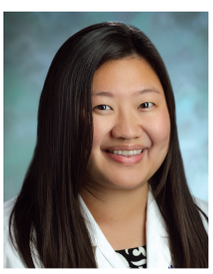
Dolly Chang



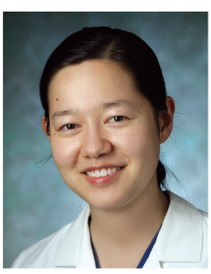
Thomas Johnson



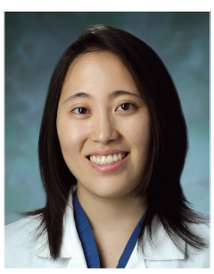
Ravi Pandit



Mary Qiu

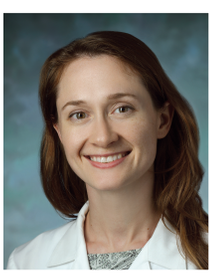


Sophie Cai

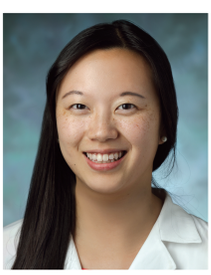


Kathleen Jee

Angeline Nguyen

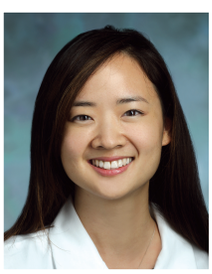


Inna Stroh

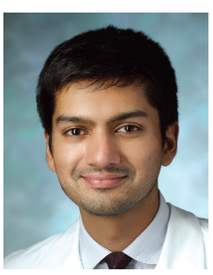


Angela Zhu

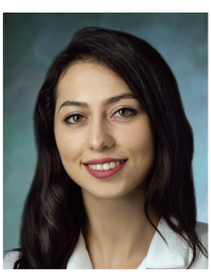
Inas Aboobakar



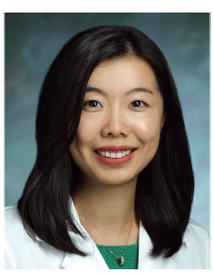
Tracy Krick



Kapil Mishra



Narine Viruni



Jiawei "Jenny" Zhao

Wilmer Eye Institute

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The scientists and staff members of the Wilmer Eye Institute gratefully acknowledge our partners in philanthropy listed here. The generosity of these friends supports a tradition of collaboration and far-reaching investigation as, together, we pursue the complex challenges of eye diseases. While our space here is limited, our thankfulness is not. Although gifts of any amount are gratefully received, only gifts, pledges and pledge payments totaling more than $250 in the fiscal year ending June 30, 2017, could be listed in this report. If any donor was accidentally missed, or if you prefer to remain anonymous, please contact the Development Office at 410-955-2020.

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