Wilmer Eye Institute

Wilmer

ANNUAL REPORT
2021

On the Rise

New support for promising junior faculty members will ensure Wilmer's continued global leadership.

Wilmer Eye Institute
Johns Hopkins Medicine

#1 Wilmer Voted BEST OVERALL PROGRAM in the country

in the 2021 Ophthalmology Times survey of program directors

The Wilmer Eye Institute's winning formula of compassionate care + world-renowned research is our legacy, our identity and our driving force.

At Wilmer, our goal is to deliver unsurpassed patient care using diagnostic, surgical and pharmaceutical advances to protect the critically important sense of sight. We are honored to be recognized as the preeminent ophthalmology program by our peer institutions.

SERVICES:

Comprehensive Eye Care | Cornea, Cataracts, External Disease | Glaucoma
Laser Vision Correction | Neuro-ophthalmology | Ocular Immunology | Oculoplastics
Pediatric Ophthalmology & Adult Strabismus | Retina | Vision Rehabilitation

#1 BEST OVERALL PROGRAM

#1 RESEARCH PROGRAM

Learn more about Wilmer: https://www.hopkinsmedicine.org/wilmer

TELEPHONE: 410-955-5080 ADDRESS: 600 N. Wolfe Street, Baltimore MD 21287

As I See It...

RESEARCH CREATES THE KNOWLEDGE THAT POWERS OUR PATIENT CARE.

Dear Friends,

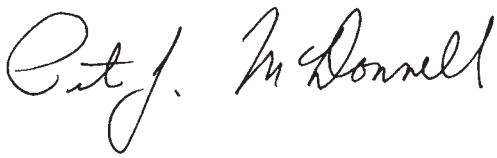
Proactive people and institutions attend to the present while anticipating the future. When Aida Breckinridge became a patient of Dr. Wilmer, she observed his skill and compassion — and she was impressed. However, she did not simply enjoy her good fortune at having such a talented ophthalmologist diagnose and surgically cure her problem. She anticipated a future where Dr. Wilmer would no longer be practicing. His knowledge would leave the field of ophthalmology when he did, she realized. So she took steps to kick-start the funding for the creation of the Wilmer Eye Institute so that Dr. Wilmer could impart his knowledge to the young physicians who would succeed him. Aida Breckenridge's proactive approach infuses the spirit of Wilmer to this day.

This proactive spirit is evident in many ways, but one in particular is the sheer number of research papers published this year by Wilmer faculty members: more than 700 papers appeared in peer-reviewed journals. As a former Wilmer chief resident, John Payne, explains it: "It's the research that really cements your love of ophthalmology and leads to the breakthroughs in treatments and in understanding how disease works." Research creates the knowledge that powers our patient care.

During the past year, we continued to treat the same number of patients as we did during pre-pandemic times while successfully keeping patients and staff members safe. Providing empathetic care without boundaries remains a guiding principle at Wilmer, and this issue explores stories of our doctors who cared for patients with logistical creativity in addition to medical and surgical skill.

Our proactive approach extends to the entire field of ophthalmology as well. With foresight and initiative that would make Aida proud, we established a new type of funding for our junior faculty members this year: rising professorships. The goal of this funding is to add years of productivity to the careers of young researchers — whose work will benefit patients today and into the future.

Yours in continued good health,



PETER J. McDONNELL, M.D., Director

The mission of the Wilmer Eye Institute, Johns Hopkins Medicine is to transform medical outcomes in the field of ophthalmology through collaboration and innovation, resulting in compassionate, leading-edge, patient-informed care.

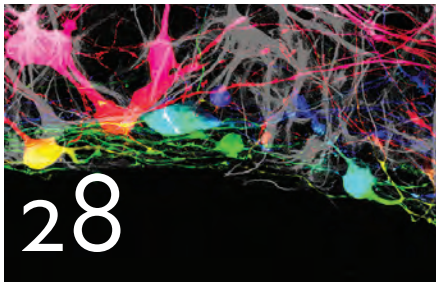
With an unwavering dedication to our founding vision, Wilmer offers:

- A human approach to patient care
- A breadth of leading solutions
- A deep investment in research
- An ability to produce leaders in the field of ophthalmology

Collaborative and purpose-driven, the Wilmer Eye Institute understands the critical importance of sight, an essential part of the human condition.

To explore more of the Wilmer World, open the camera on your phone, point it at the square to the left and click the pop-up link. This is a QR code that will take you to Wilmer's website.

Inside

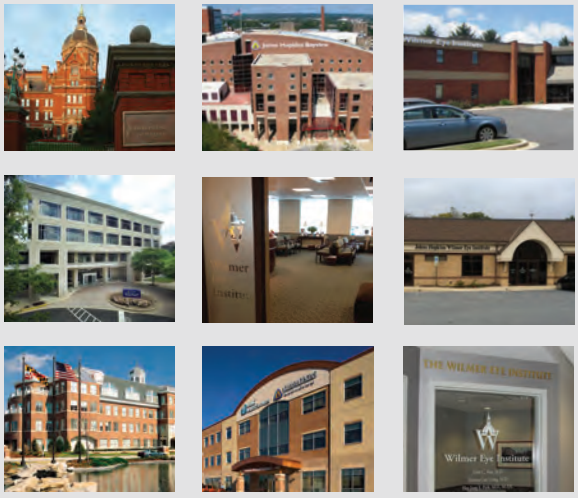


ON THE COVER: *Thomas Johnson III, M.D., Ph.D., and Cindy Cai, M.D.; read the stories on p. 20 and on p. 28.*

This Is **Wilmer**

CARING FOR PATIENTS

9 Clinical Locations



263,000+ Patient Visits Annually

14,000+ Surgeries Annually

POWERED BY COLLABORATION*

21 Scientists

22 Research Associates

68 Ophthalmologists

28 Optometrists

13 Clinical Fellows

20 Residents

29 Nurses

384 Staff Members/ Technicians

67 Students

1 Trainees

** Full-time staff*

DEDICATED TO RESEARCH

5 Core Research Centers

700+ Peer-Reviewed Papers Published in 2021

HIGHLIGHTS

BRIGHT SPOTS IN 2021 FROM WILMER

Wilmer Recognized for Excellence, Nationally and Locally

The Wilmer Eye Institute was ranked #1 Best Overall Program and #1 Best Research Program by *Ophthalmology Times* for 2020 and 2021. The results are based on a survey sent by the publication to chairs and residency directors of programs across the United States.

The Wilmer Eye Institute was once again recognized as one of the top-tier programs in the nation and #1 in Maryland in *U.S. News & World Report*'s annual survey.

The Wilmer Eye Institute was voted Best in Eye/Vision Care in the 2021 *Baltimore Sun* Readers' Choice contest. Winners were recognized for outstanding service and customer satisfaction over the last year.

HIGHLIGHTS 2021

Thomas Johnson III, M.D., Ph.D., received the American Academy of Ophthalmology Artemis Award for 2021, which recognizes a young ophthalmologist academy member who has demonstrated caring and service of an exemplary degree to his or her patients. Johnson was honored for his efforts with the Vision Screenings in Our Neighborhoods (ViSION) program, his work with Charm City Care Connection and "his enduring commitment to caring for the underserved," according to the academy.

Esen Akpek, M.D., and **Pradeep Ramulu, M.D., Ph.D.**, **were ranked among America's Best Eye Doctors** by *Newsweek* based on "the quality of care they provide, the continuity of care and the quality of the technology they use in their practices."

Five Wilmer faculty members were named Top Doctors in *Baltimore* magazine's 2021 survey in which thousands of the metro area's physicians voted. This year's honorees include **Kraig Bower, M.D.**; **Laura Di Meglio, O.D.**; **Albert Jun, M.D., Ph.D.**; **Michael Repka, M.D.**; and **Divya Srikumaran, M.D.**

Above: Children from Commodore John Rodgers Elementary/ Middle School in Baltimore's Butchers Hill neighborhood at a ceremony celebrating Vision for Baltimore's distribution of 5,000 pairs of glasses in December 2018.

Vision for Baltimore reached a major milestone in 2021. Wilmer Eye Institute and Johns Hopkins researchers published the results from a research study based on Vision for Baltimore in *JAMA Ophthalmology*. In the study — the largest clinical study of the impact of glasses on education ever conducted in the United States — researchers found that students who received eyeglasses through the school-based Vision for Baltimore program launched in 2016 scored higher on reading and math tests. Students who struggled the most academically before receiving glasses showed the greatest improvement.

Wilmer researchers involved in the study include **Megan Collins, M.D., M.P.H.**, a pediatric ophthalmologist and member of the Dana Center for Preventive Ophthalmology; **Michael Repka, M.D.**, chief of the Division of Pediatric Ophthalmology and Adult Strabismus; and **Xinxing Guo, M.D., Ph.D.**, and **Ahmed Shakarchi, M.B.B.S., M.P.H.**, from the Dana Center for Preventive Ophthalmology.

Bonnielin Swenor, Ph.D., M.P.H., led a pivotal research study that revealed which measures of vision say the most about the link between vision impairment and cognitive decline. The novel study found that the association between vision and cognition differs based on the measure of vision used, such as contrast sensitivity versus visual acuity. The researchers found that impaired contrast sensitivity is associated with declines across more cognitive domains — such as language, memory and attention — than visual acuity. The study was published in July 2021 in *JAMA Ophthalmology*.

Wilmer researchers involved in the study also include **Varshini Varadaraj, M.D., M.P.H.**, and **Beatriz Muñoz.**

Prizing Research

By Jessica Wilson

"ONCE WE'RE WILMER RESIDENTS, WE'RE ALWAYS WILMER RESIDENTS."

– JOHN PAYNE

Morton Goldberg and John Payne

A storied program like the Wilmer residency produces more than leaders in the field of ophthalmology — it creates a culture, an approach to ophthalmology, that those who pass through the program carry with them for life.

"Once we're Wilmer residents, we're always Wilmer residents," explains **John Payne, M.D.**, who completed his residency in the mid-1960s and then served as chief resident in 1968. Part of that culture is putting into practice the tenets that Dr. William Holland Wilmer laid out at the founding of the institute — combining research, education and patient care in a way that increases knowledge of the eye and consistently improves upon or creates new treatments.

From his own experience at Wilmer, Payne knows the capacity that research has to ignite a young person's mind. "When you get into research as a young resident, you never lose that interest in trying to find out how the eye works and how to treat it better," he says. "It's the research that really cements your love of ophthalmology and leads to the breakthroughs in treatments and in understanding how disease works."

Inspired by his Wilmer heritage, Payne has created his own legacy within the Wilmer residency program — the coveted Mitchell Prize, awarded each year to the top three research projects conducted by Wilmer residents and presented at the annual Wilmer Residents Association (WRA) Meeting.

Payne funds the prize through the Mitchell Trust. For many decades, he provided eye care for siblings John, Gladys and Al Mitchell. When Al passed away in 2000, Payne and two others, including another doctor who had also treated the family, were charged with using the Mitchell Trust to support ophthalmology and otolaryngology efforts in any way they saw fit. "It's a challenge and responsibility because one tries to do what the benefactors wanted to do," says Payne. Yet, it is also a "delight" to distribute the money, he says, "and it has been a wonderful gift over the years for me to do so."

In 2001 and in consultation with then-Wilmer Director **Morton Goldberg, M.D.** — who is also a former Wilmer resident and chief resident — Payne arranged for the top research project

presented at the annual WRA Meeting to be awarded a $10,000 prize. He was adamant that the winner be allowed to use the funds however desired. "Just like the Nobel Prize, there are no strings attached," he says. Eventually, the trust was able to fund a $10,000 first place award, a $5,000 second place award and a $2,500 third place award. He hopes to raise the amount of the prizes in the future.

Though the WRA Meeting has existed since 1938, as well as the expectation that residents would present research at the meeting, times had changed by the early 2000s. More ophthalmology research meetings had sprung up, which had the potential to shift residents' focus away from participating in the WRA Meeting. With the research prize, Payne and Goldberg had hoped to refocus resident attention on the WRA Meeting. And it worked, says Goldberg. Resident participation has held steady.

"It's the research that really cements your love of ophthalmology and leads to the breakthroughs in treatments and in understanding how disease works."

— JOHN PAYNE

And there was an additional positive development. Prior to the Mitchell Prize, "the quality of the research was very, very good, but a written manuscript was not required," explains Goldberg. In order to compete for the prize, though, residents are required both to present their research orally and turn in a publication-ready manuscript one month before the WRA Meeting for the faculty committee to evaluate. This requirement "has increased the number of research publications by the Wilmer residents over what occurred in the 'good old days,'" says Goldberg.

To see just how much of an effect the Mitchell Prize competition and the WRA presentations have had on the residency, a Wilmer faculty member did some research. **Divya Srikumaran, M.D.**, Wilmer's vice chair for education (and former Wilmer resident), performed a review of 34 residents who graduated from the Wilmer residency program from 2012 to 2017 and found that presenting at the WRA Meeting was "associated with 1.44 times increased odds of publishing work, and residents who competed for the research prize were 1.76 times more likely to publish." Since the institution of the contest for the Mitchell Prize, many more residents than before are producing papers, which are then getting published.

Such early publications can have dramatic effects on one's career, explains **Fasika Woreta, M.D., M.P.H.**, the head of

Wilmer's residency program and a former Wilmer resident — and chief resident — who won a second place in the Mitchell Prize competition. The paper she produced for the Mitchell Prize appeared in a peer-reviewed journal, and she received first-author credit, an important credential in academic medicine. She says such a credit helped her stand out when applying for her fellowship and contributed to her starting as an assistant professor, rather than an instructor, when she joined Wilmer as a faculty member.

Both Woreta and Srikumaran, who also won second place in the Mitchell Prize competition during her residency, emphasize the importance of having a goal when performing research as a resident. "They do the research after hours, weekends, nights. They have a full clinical load and are working on the front lines in the Emergency Department," says Woreta. "Having this generous prize as an incentive is helpful, but so is having a deadline to produce a publication-ready manuscript one month before the oral presentation."

Above: From left to right, Divya Srikumaran, Fasika Woreta and David Guyton

Srikumaran points out that such multitasking is good training for those choosing to go into academic ophthalmology. "This is what you have to do when you're a faculty member. You're going to have your clinical work, and then on top of that, you have to dedicate countless hours, evenings and weekends to further your research," she says. "Wilmer is trying to train future academic leaders. And if that is our mission, then we have to reward, recognize and incentivize research. To honor the incredible amount of work that the residents have to do to get these projects done is truly valuable."

Since the prize's inception, **David Guyton, M.D.**, the Zanvyl Krieger Professor of Pediatric Ophthalmology — and a former Wilmer resident and chief resident — has administered annually the competition for the Mitchell Prize.

This task runs a wide gamut, starting with informing residents about the requirements and continues to coordinating the submission of manuscripts, which average seven to eight each year. After the presentations at the WRA Meeting, Guyton convenes the judging committee, composed of eight to 10 Wilmer faculty members, to discuss the totality of the residents' submissions. They evaluate the papers, presentations and mentors' confidential assessments of the residents' contributions. Guyton tabulates the secret rankings from the committee members and stores them securely until he announces the winners at the residents' graduation ceremony.

"Winning this prize involves not just the money, but they get their name inscribed on a treasured plaque in the Patz Lecture Hall. It helps enable them to carry forth Wilmer's traditions," he says — whether they return to Wilmer or take the "Wilmer way" to programs around the world. ●

"To honor the incredible amount of work that the residents have to do to get these projects done is truly valuable."

— DIVYA SRIKUMARAN

IN THEIR WORDS: IMPACT OF THE MITCHELL PRIZE

"I am grateful to Dr. Payne for his generous support of the Mitchell Prize. Dr. Payne has always been a terrific advocate and mentor to the residents. The Wilmer Eye Institute is a research powerhouse, and residents are able to benefit from the mentorship and collaboration with world-renowned faculty. Being a recipient of the Mitchell Prize and being able to conduct impactful clinical research at Wilmer was instrumental in my career development as a retina clinician-scientist."

Diana Do, M.D., *inaugural recipient (2002); currently professor of ophthalmology at Byers Eye Institute at Stanford University School of Medicine and vice chair for clinical affairs*

"Conducting research, presenting research and writing papers takes confidence and dedication. For me, the Mitchell Prize and the research it represented was my first taste of retina research and a key reason that I want to be engaged and active in research throughout my career. Thanks to this early experience, I consider how to determine or test a hypothesis rather than simply read someone else's publication. The Mitchell Prize encouraged my curiosity."

Geoffrey Emerson, M.D., Ph.D., *2004 recipient; currently medical director at Phillips Eye Institute in Minneapolis*

"The work that I did with Dr. Bert Jun helped solidify my interest in becoming a cornea specialist. The recognition from the Mitchell Trust, through Dr. Payne's support, allowed me to set the foundation in surgical education and research. I am where I am today, with a recently awarded R01 grant from the National Institutes of Health, thanks in part to this prize and the Mitchell Trust."

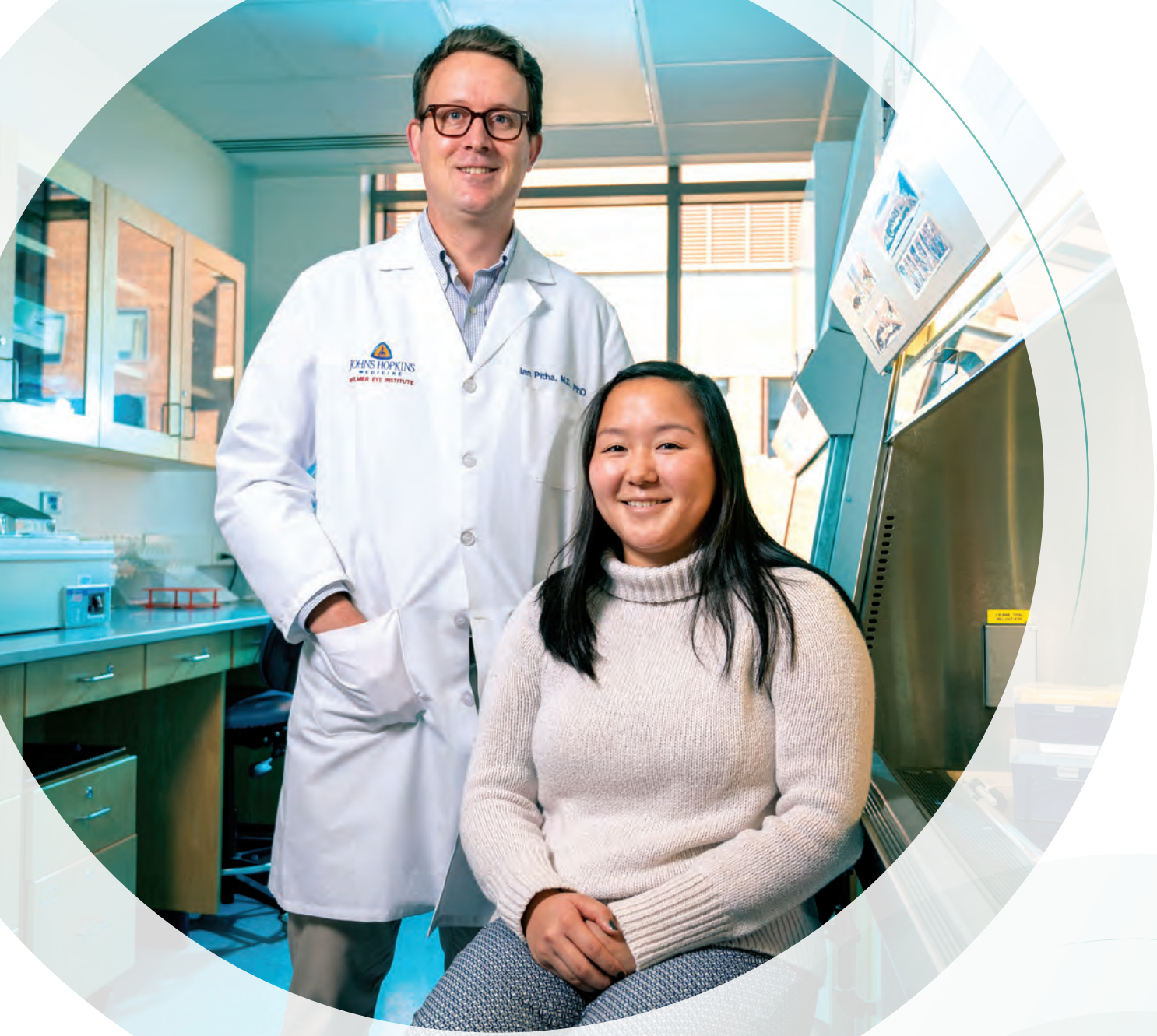
Shameema Sikder, M.D., *2009 recipient; currently associate professor of ophthalmology at the Wilmer Eye Institute and director of the Center of Excellence for Ophthalmic Surgical Education and Training*

"[The Mitchell Prize] offered significant reassurance that leading professors at Wilmer felt that we were pursuing a meaningful line of research into an area that was relatively unexplored in the ophthalmology field. We have continued to pursue it since then, and the project has dramatically increased in scope and discovery."

Jefferson Doyle, M.D., Ph.D., *2017 recipient; currently assistant professor of ophthalmology at the Wilmer Eye Institute and co-director of the Wilmer Genetic Eye Disease Center*

"The prize and research funding emphasize the importance of research at Wilmer. In most other programs, residents have minimal support for their research and do not have such avenues to present their work. Performing the research as part of presenting for the Mitchell Prize allowed me to work closely with mentors at Wilmer, Dr. Mandeep Singh and Dr. Alvin Liu, who serve as great role models for being a clinician-scientist. It is motivating to see an idea we developed receive recognition and helps me better understand how to identify clinically relevant problems and perform higher-quality research."

Jasdeep Sabharwal, M.D., Ph.D., *2021 recipient; current Wilmer resident (2019–2022)*



By Adam Hadhazy

A New Subset of Cells Offers Hope for Glaucoma

Although glaucoma is the second leading cause of blindness worldwide and affects more than 3 million Americans, little is known about its root causes. And because many cases of glaucoma do not present symptoms until the disease is advanced and causing vision loss, people who might benefit from earlier interventions often miss the chance.

Opposite page: Ian Pitha and Annie Mozzer, a research assistant in his lab

To learn more about glaucoma's origins with the hope of developing promising new treatments, researchers at the Wilmer Eye Institute are taking an innovative approach by studying the sclera, the tough, white-colored outer shell of the eyeball. Through its responses to ocular pressure — which can be but often is not elevated in glaucoma — the sclera might play an important role in glaucoma progression. Changes in the sclera's shape and elasticity are thought to put strain on the optic nerve where it passes through a narrow hole in the sclera at the back of the eye, in turn stressing nerve cells lining the eye's interior. This trauma can ultimately damage the neural cells and prevent visual information from reaching our brain.

While investigating the structure of the sclera around the optic nerve, a group led by **Ian Pitha, M.D., Ph.D.**, an assistant professor of ophthalmology at Wilmer, recently made a surprising discovery involving fibroblasts, a type of cell found in connective tissue. He and a team of scientists discovered a unique pocket of scleral cells that, unlike some scleral fibroblasts, do not align themselves with the dense connective tissue that otherwise composes the sclera. "These fibroblast cells are mavericks because they don't listen to how surrounding tissue tells them to behave," says Pitha.

The finding is doubly intriguing because studies by other Wilmer researchers have noted increased activity by scleral fibroblasts in animal models of glaucoma. While it is too soon to know exactly what this newly described population of scleral cells is doing in glaucoma, the findings add to the growing picture that the sclera is far more dynamic — and thus possibly involved in various eye conditions — than previously realized.

Harry Quigley

"The conventional wisdom had long been that the sclera is like a piece of shoe leather and doesn't have any cells in it," says **Harry Quigley, M.D.**, the A. Edward Maumenee Professor of Ophthalmology at Wilmer and a mentor of Pitha.

"As it turns out, the sclera is actually packed full of cells, but we know very little about them," adds Pitha. "That's why from a standpoint of basic science, identifying this new subset of scleral cells is very exciting."

Pitha first came to Johns Hopkins on a glaucoma clinical fellowship in 2013. Since then, he has worked closely with Quigley, who himself originally came to Johns Hopkins back in 1977. The two researchers partly credit their latest discovery — along with many other advances in glaucoma and eye disease — to the cooperative, interdisciplinary environment at Wilmer and Johns Hopkins more broadly.

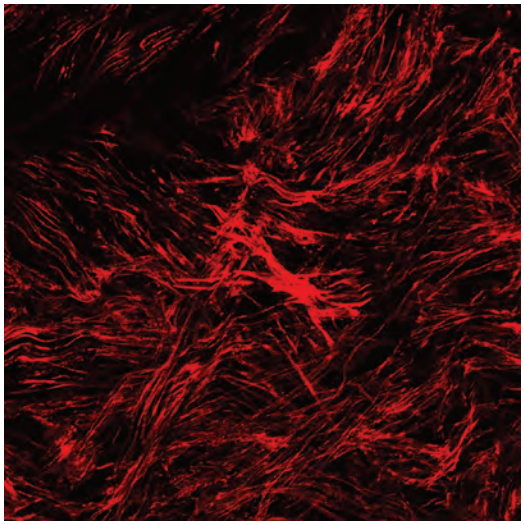
"Wilmer continues to attract people with strong specialties in ophthalmology and other related fields, and that adds to what everyone else here is doing," says Quigley.

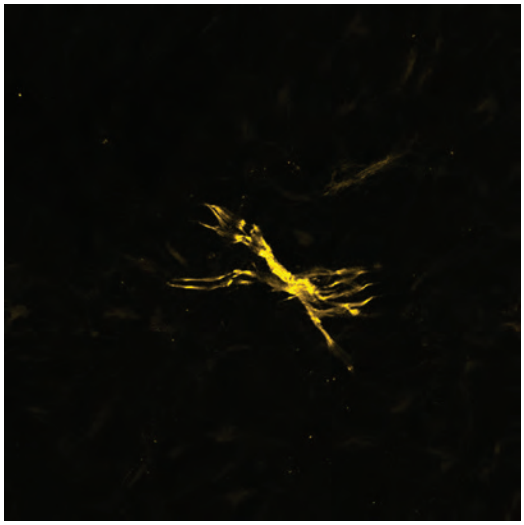
The line of research associating the sclera and glaucoma, for instance, grew out of focusing on the biomechanics of the eye, work that was kick-started a decade ago when Quigley collaborated with **Thao Nguyen, Ph.D.**, the Marlin U. Zimmerman, Jr. Faculty Scholar in the Department of Mechanical Engineering at Johns Hopkins. As a further example, Pitha, who holds a Ph.D. in pharmacology and toxicology in addition to his M.D., brings unique skills to Wilmer. His expertise could offer insights into potential drug development for eventually targeting scleral cells, opening up a promising new way to treat glaucoma, and possibly in its earliest stages.

"There are so many unmet needs in glaucoma," says Pitha. "We're encouraged by our results so far and will keep striving to deliver for our patients." ●

"Wilmer continues to attract people with strong specialties in ophthalmology and other related fields, and that adds to what everyone else here is doing."

— HARRY QUIGLEY





Above: The complex cellular architecture of a scleral cross section (red) with an activated — or "maverick" — cell highlighted in yellow.

PAYING IT FORWARD

A key financial supporter of the glaucoma work at the Wilmer Eye Institute is Phil Rogers, president of an aerospace laser sensor company and a patient of Harry Quigley's. Around 10 years ago, Quigley performed a procedure that has since stabilized Rogers' glaucoma, a condition he has wrestled with since the late 1980s. "Harry saved my vision," Rogers says. "I had the opportunity to support his research, and that was something very important to my wife and me."

Rogers learned of his glaucoma when he started experiencing unexplained headaches around his eyes. After consulting an ophthalmologist, Rogers was shocked to learn he had very high eye pressure and measurable vision loss. The cause turned out to be pigment cells shed from Rogers' irises that blocked the spongy network for draining fluid from his eyes.

Medications and procedures over the years have thankfully staved off any further vision loss, allowing Rogers to still fly airplanes recreationally. "Glaucoma is a condition that can sneak up on you," Rogers says. "The message I have for everybody is, get your eyes checked regularly. Don't just let it go."

From left to right:
Albert Jun, Nicholas
Dalesio and Tina Tran

Uniquely Positioned to Tackle the Most Challenging Cases

Backed by the powerhouse that is Johns Hopkins Medicine, Wilmer Eye Institute experts provide specialized care to those who need it most.

By Joan Katherine Cramer

Victor Harten's perfect towheaded baby boy, Henry, was little more than a year old when a Seattle neurologist diagnosed him with Hurler syndrome, a rare genetic disorder characterized by an enzyme deficiency that allows large sugar molecules to build up in all the tissues of the body, causing catastrophic damage and, if untreated, early death.

"After crying for a week, I got on the phone and learned we could arrest his disease with a stem cell transplant," Victor says. Henry underwent the stem cell transplant — a nine-month process. Afterward, Victor and Henry moved back to Victor's home state of Texas to be near family.

Henry, now 21 years old, is the spunky veteran of some 40 surgeries to correct the damage to his joints and spine wrought by Hurler's during his first year of life. But one of the things that bothered him most was yet another common symptom of the disease — cloudy corneas.

The cornea is the normally clear outer layer of the eye, and from the time Henry was a toddler, "it was like looking through a fogged shower door with a coat of Vaseline on it," Victor says. "And I couldn't find anyone in Texas willing to treat him."

Indeed, the specialized care required to address not only Henry's eye condition but the risks anesthesia posed to him because of Hurler syndrome was hard to come by. After six doctors turned him down, Victor wrote to the head of the National Institutes of Health, who promptly referred him to **Albert Jun, M.D., Ph.D.**, the Walter J. Stark, M.D., Professor of Ophthalmology and chief of the Division of Cornea, Cataract and External Eye Diseases at the Wilmer Eye Institute.

What Jun could offer was a cutting-edge transplant procedure known as DALK, or deep anterior lamellar keratoplasty, to replace just the middle layer — the part that was damaged — of Henry's cornea.

"This is exactly why we are here, so that someone like Henry, who can get the care he needs at only a handful of places in the world, can realize his dream of being able to see." — ALBERT JUN

The cornea has three layers, and sparing Henry's own bottom layer would mean he would be far less likely to reject the transplant or suffer other complications. It would also triple the life span of the transplant — meaning his new, improved cornea would likely last Henry a lifetime.

Jun is one of the world's experts in performing the extremely delicate procedure, supported by a specialized and very expensive piece of equipment called an optical coherence tomography enabled/integrated surgical microscope. The entire cornea is minuscule, about two-hundredths of an inch thick. This state-of-the-art imaging machine — which allows Jun to see every layer, enlarged and distinct, on a big computer screen — minimizes the risk of damaging the bottom layer and, thus, the need to replace the entire cornea after all.

"I knew Dr. Jun was a perfectionist from our first appointment," Victor says. "He had a team of physicians, and he would say, 'Run that test again,' over and over, until he was satisfied. I had complete confidence in him."

But Jun sees the story of Henry's treatment as "a true Hopkins story" because it wasn't just his own surgical prowess that made it possible. Hurler's patients are particularly challenging to operate on; even anesthetizing them can be life-threatening.

"Hurler's patients have historically been considered the most difficult to put a breathing tube in," says **Nicholas Dalesio, M.D., M.P.H.**, associate professor of anesthesiology and critical care medicine, who participated in the surgery. Dalesio is also director of the Pediatric Difficult Airway Program at Johns Hopkins, an ultraspecialized program that encompasses an emergency response team, a difficult airway consultation service and a multidisciplinary program to educate clinicians on basic and difficult airway management.

Henry's surgery was in January 2021, and Victor and Henry, who love to travel together, used it as an excuse for a road trip, driving all the way from Texas to Baltimore. "Henry got to see 12 states [and] learned a lot of geography," Victor says.

Their surgical team at Wilmer was taking no chances. In talks he gives to doctors around the country, Dalesio emphasizes the importance of planning when intubating people with difficult airways. Jun says more than 20 people were

involved in preparing for Henry's surgery. A special team was assembled, everyone's schedules coordinated and 1,000 pounds of equipment, including that expensive microscope, moved across the street to the main hospital, where additional specialized equipment and emergency care would be readily available.

Intubating patients usually takes about four minutes; intubating Henry took an hour, with the expert team working together to provide the specialized care he needed. "We had a lot of incredibly experienced people doing everything from administering drugs and grabbing equipment to adjusting Henry's body," says Dalesio. "You can't work on someone as complex as Henry by yourself."

Tina Tran, M.D., chief of anesthesiology for the Wilmer Eye Institute, who helped plan the surgery, says working as a team is key to delivering optimal care. "Knowing and respecting one another's expertise is everything," she says.

The surgery was successful, and Jun remembers marveling that morning about all the resources and preparation that had gone into one corneal transplant. (Jun estimates that he spent over 40 hours on the planning alone.) "My next thought was that this is exactly why we are here, so that someone like Henry, who can get the care he needs at only a handful of places in the world, can realize his dream of being able to see."

Albert Jun and Henry Harten in an exam room in January 2020.

Henry was delighted with the results of the surgery. It takes about a year to fully recover, but for the first time, he could see out of the eye that was operated on. "I couldn't believe what things actually looked like," he says.

While Henry is recovering from recent ankle surgery, he is already looking ahead. Victor says Henry, whose strong sense of faith has helped see him through turbulent times, would like to pursue an undergraduate degree in ministry. "Knowledge is power," says Victor. Indeed. ●

Accelerating the Careers of Wilmer's Rising Leaders

Assistant professors who are also juggling clinical and administrative duties can face a lack of time and funding for their research, which can slow their career growth in academic medicine. **Jonathan Javitt, M.D., M.P.H.**, who was first appointed to the faculty at Wilmer by **Arnall Patz, M.D.**, in 1987 and now serves on the adjunct faculty, wants to address this challenge with the Jonathan and Marcia Javitt Rising Professorship. It offers a seven-year program that will provide training and support to help accelerate the careers of Wilmer's next generation of leaders.

By Jennifer Walker

Opposite page: Cindy Cai

"If we don't implement formal mechanisms to support the most promising junior faculty members, our academic future will be far less rich than our academic past," says Javitt, who is the CEO and chair of NRx Pharmaceuticals, a company that most recently developed aviptadil, an FDA-approved investigational new drug for COVID-19. "The key objective of the rising professorship program is to build resources within Wilmer to continue Wilmer's global leadership for at least another century."

In the 1990s, Javitt benefited from similar support when former Wilmer professor **David Worthen, M.D.**, recruited him to lead the Worthen Center for Eye Care Research at Georgetown University Medical Center. (He continued to serve on the faculty at Wilmer while also on the faculty at Georgetown.) Javitt's role at the center, along with financial support from the National Institutes of Health and private foundations, gave him the time and resources to conduct the first formal health economics and outcomes research in ophthalmology.

"Without that support and the intellectual freedom to innovate outside the conventional areas that were popular at the time, it's unlikely I would have had those productive early years in my career," Javitt says. He went on to become the first ophthalmologist to receive a Physician Scientist Award from the National Eye Institute, founded several companies and led a health information technology advisory committee under President George W. Bush.

Marcia Javitt, M.D., was previously the director of women's imaging at Johns Hopkins Health Care & Surgery Center at Green Spring Station and is currently the director of medical imaging at Rambam Health Care Campus in northern Israel.

Marcia and Jonathan Javitt

The Jonathan and Marcia Javitt Rising Professorship provides funding, mentorship and leadership training to one assistant professor at Wilmer. It is one of four rising professorships at Wilmer that will be granted to four assistant professors in total starting in January.

The mentorship component of the rising professorships will be led by **Henry Jampel, M.D.**, the Odd Fellows Professor of Ophthalmology at Wilmer and a member of the Glaucoma Division since 1988. Jampel will advise the rising professors on their research trajectory, developing a consistent voice as peer-reviewed authors, taking on national leadership roles and contributing to editorial boards.

"The idea is to get them to that next level in their careers much faster," Jampel says. "This happens by giving them extra funds and protected time to further their research. And then we add in leadership courses to make them even better researchers and administrators."

Cindy Cai, M.D., an assistant professor of ophthalmology at Wilmer, is the recipient of the Jonathan and Marcia Javitt Rising Professorship. She says working closely with Jampel is an important part of the program. "He's very well-connected to lots of researchers at Hopkins, so he will be a very valuable resource to all of us," says Cai, who specializes in the medical and surgical treatment of retinal diseases.

For her research, Cai is focused on how social determinants of health, like lack of insurance and transportation, lead patients with diabetes to have lapses in their ophthalmology care, which decreases the likelihood of prompt intervention and can lead to poor outcomes.

Currently, Cai is using data in the electronic medical record, as well as national data, to study these lapses in care for patients who have been diagnosed with diabetic retinopathy. Diabetic retinopathy is a condition that causes blindness and is expected to afflict more than 14 million people by 2050, according to the National

Eye Institute. Cai is drawing from U.S. census data to leverage information on the neighborhood level, focusing on statistics such as the percentage of people who live below the poverty line and who own a car, to help predict which patients might have gaps in ophthalmology care.

"The idea is that hopefully in the future, we can highlight the population of patients with diabetes who are at high risk for a lapse in their care, and we can offer them support for their social needs," says Cai, who was also a recipient of the Heed Ophthalmic Foundation Fellowship.

Cai was drawn to apply for a rising professorship because it will ensure more time can be devoted to research. She will also have the funding to hire a research assistant to help with analytics and potentially make her research progress even faster. "The rising professorship can only advance our careers more quickly," Cai says. "It's a huge opportunity for all of us." ●

"If we don't implement formal mechanisms to support the most promising junior faculty members, our academic future will be far less rich than our academic past."

— JONATHAN JAVITT

Teaming Up to Treat Pediatric Glaucoma

By Joan Katherine Cramer

Opposite page: Courtney Kraus and Jefferson Doyle

Armon and Aaron Raynor were just 5 months old when they were diagnosed at the Wilmer Eye Institute with an exceptionally rare form of glaucoma. Since that day in February 2019, parents Robyn and Chris Raynor have been fully participating members of their boys' medical care team, regularly driving two-and-a-half hours from their home on Maryland's Eastern Shore for countless exams and more than a dozen surgeries.

Glaucoma is a condition in which the optic nerve is damaged, usually by abnormally high fluid pressure in the eye. The Raynors faithfully administer the eyedrops and other medications used to control that pressure three times a day. They also raised money to purchase and use an instrument called a tonometer to regularly check the twins' eye pressure themselves. And they provide a constant stream of data to the boys' doctors — Wilmer pediatric ophthalmologists **Jefferson Doyle, M.D., Ph.D.**, and **Courtney Kraus, M.D.**

"Glaucoma is one of the toughest conditions we deal with in pediatric ophthalmology, but you can have a markedly different outcome when you have a good care team, including multiple doctors and very, very importantly, [involved] parents," says Kraus, whose glaucoma research includes studying ways to optimize care for this condition. "Dr. Doyle and I enjoy working together, and the Raynors are just amazing."

Closely monitoring eye pressure at home, which has only recently become possible with the creation of the accurate, portable and relatively affordable iCare tonometer, can be of great benefit to glaucoma patients. And it's especially helpful for small children, who usually have to have the exam done under anesthesia in an operating room.

"We don't want to put them to sleep every three months to check their pressure if we can avoid it," says Kraus. "At home, they feel safe, they get used to it and it can be done much more frequently."

Because eye pressure changes constantly, even in a single day, frequent exams provide a way to catch spikes early, perhaps even to determine which activities or situations contribute to those spikes, and intervene quickly to prevent damage.

Though not everyone is comfortable learning to use the instrument on themselves or their children, the Raynors are a formidable team. Robyn, who is an ER nurse, maintains a spreadsheet and is in constant communication by text with Kraus and Doyle. Chris, who is an EMT with a private ambulance company, usually does the weekly eye pressure check, bribing the boys with a chance to play with his smartphone while they sit for the exam. Now 3 years old, the boys sometimes even ask for the exam so they can play with the phone. "And doing the drops has become more manageable because they don't squirm," says Robyn.

The boys were first diagnosed and treated by Doyle, who brought in Kraus because they often consult on pediatric glaucoma cases and because she specializes in a surgical procedure that creates a new pathway for fluid to drain from the eye.

In addition to being a pediatric ophthalmologist, Doyle is also a genetics researcher who in early 2020 launched the Wilmer Eye Institute Genetic Eye Disease Center with his colleague **Mandeep Singh, M.D., Ph.D.**, a retina specialist. Doyle, from the beginning, has been interested in the Raynors' genetic history, a puzzle he hopes he and his genetics colleagues might eventually unravel. The hope is that isolating a causal gene — and they have already identified a suspect gene in Armon, the more affected of the twins — will not only provide a clearer diagnosis and prognosis for the boys but might also eventually lead to a novel therapy to treat them.

The Raynors have all had genetics counseling and testing, and Robyn says the research gives her a certain amount

"Dr. Kraus and Dr. Doyle are such an incredible blessing. They are so caring. You can tell it's not just a job for them. They are devoted to their patients, and they are my biggest supporters."

— ROBYN RAYNOR

The Raynor family, from left to right, Emory, Armon, Robyn, Chris and Aaron

of hope. "Even if it's not in time for the boys, it might help future children with their characteristics," she says. But she is also realistic. Both boys are already in an early intervention program sponsored by their school district to help them learn skills to cope with vision loss, including preparations for learning Braille and practicing navigation techniques, like how to walk with a cane. "I am determined that they will be as independent as possible," she says.

Raynor says she is very lucky that she and her husband work so well together, but they both work full time, their lives are stressful and they sometimes feel isolated. They can't leave the twins and their older brother, Emory, with family or babysitters because no one else is comfortable learning to check their eye pressure and, more important, to religiously administer those drops.

"That's why Dr. Kraus and Dr. Doyle are such an incredible blessing," she says. "They are so caring. You can tell it's not just a job for them. They are devoted to their patients, and they are my biggest supporters," she says. "I always have so many questions, and sometimes I worry about bothering them, but any time I text them with a problem or question, I hear back right away. Dr. Doyle has even rearranged his schedule to see us and to participate in surgery with Dr. Kraus. And if I don't text them for a week or so, they will text me. 'How are you doing? What's going on?' And they are incredibly respectful of my opinion. 'You are with Armon and Aaron all the time. What do you think?' They've included us in every decision they've made about the boys' care, and I honestly don't know what I would do without them." ●

What the Future Holds

By Tracy Vogel

Thomas Johnson III, M.D., Ph.D., is on a mission to turn findings in the lab into therapies that will dramatically improve the lives of patients. He leads a translational neuroscience laboratory that focuses on stem cell transplantation to regenerate damaged optic nerves. This work has the potential to someday restore vision damaged by conditions like eye stroke, an injury to the optic nerve caused by restricted blood flow in the eye, as well as by diseases like glaucoma, the world's second leading cause of blindness.

Opposite page:
Thomas Johnson III

His 2-year-old lab is part of an effort dubbed the Audacious Goals Initiative for Regenerative Medicine by the National Eye Institute. The title is appropriately respectful of the challenges, Johnson says, "but I think the science in the last 20 years has come so far. Twenty years ago, people thought the work we're doing now was science fiction."

Over those two decades, the accumulated research and scientific evidence have shown it should be possible to turn human stem cells into the retinal ganglion cells that make up the optic nerve, Johnson says. It should be possible to get retinal ganglion cells to regrow their long fibers from the eyeball to the brain and reconnect. "So now, how do we put all these different processes together to replace this entire pathway?"

The Allan and Shelley Holt Rising Professorship, part of the Sanford and Susan Greenberg Center to End Blindness at the Wilmer Eye Institute, aims to speed those answers. The professorship provides financial support for an assistant professor that is equivalent to Wilmer's traditional professorships for senior faculty members. That means a tremendous jump in resources for researchers who are still beginning their careers. Johnson is one of the first recipients of a rising professorship.

"A rising professorship is an opportunity for our best and brightest to get their research programs up to speed years sooner than would happen through the traditional standard pathway," says Wilmer Director **Peter J. McDonnell, M.D.**, counting off some of the issues that the new professorships will address.

Allan and Shelley Holt

First, the competition for resources in the biomedical field is fierce, and younger researchers are disadvantaged compared to established scientists with large teams. Clinician-scientists like Johnson are often closest to the patients and their needs and concerns but don't always have the opportunity to transfer that practical knowledge into research. Finally, the average age for a standard biomedical grant from the National Institutes of Health is 45, resulting in perhaps 20 years of research before retirement, while the new professorships can add a decade to that.

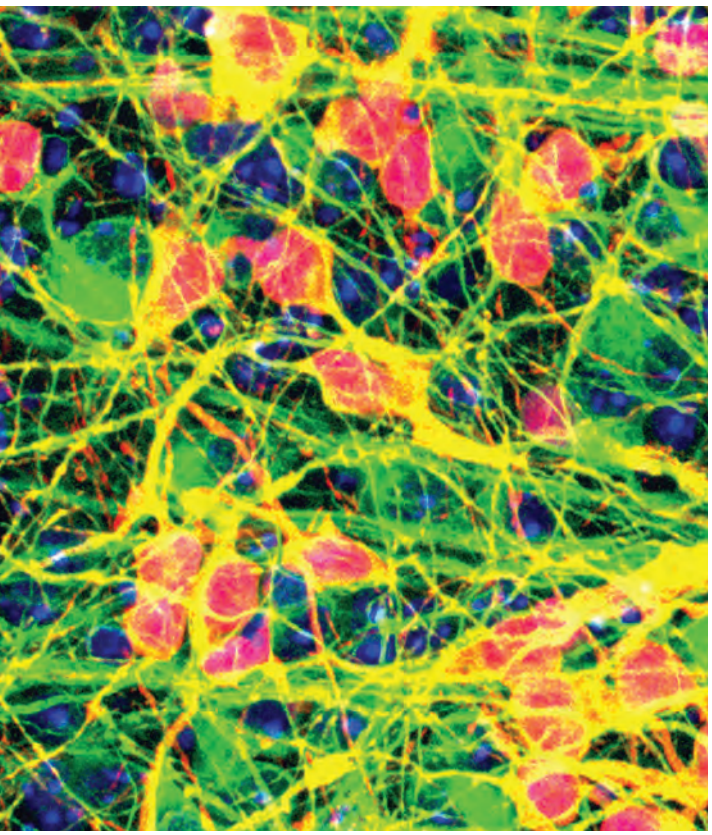
"The question is always, if somebody gets an endowed chair when they're a full professor and world famous, what would they have accomplished if they received a professorship at 30 instead of 60? How much more could have been accomplished?" McDonnell says. "It will change the whole trajectory of our top young scientists."

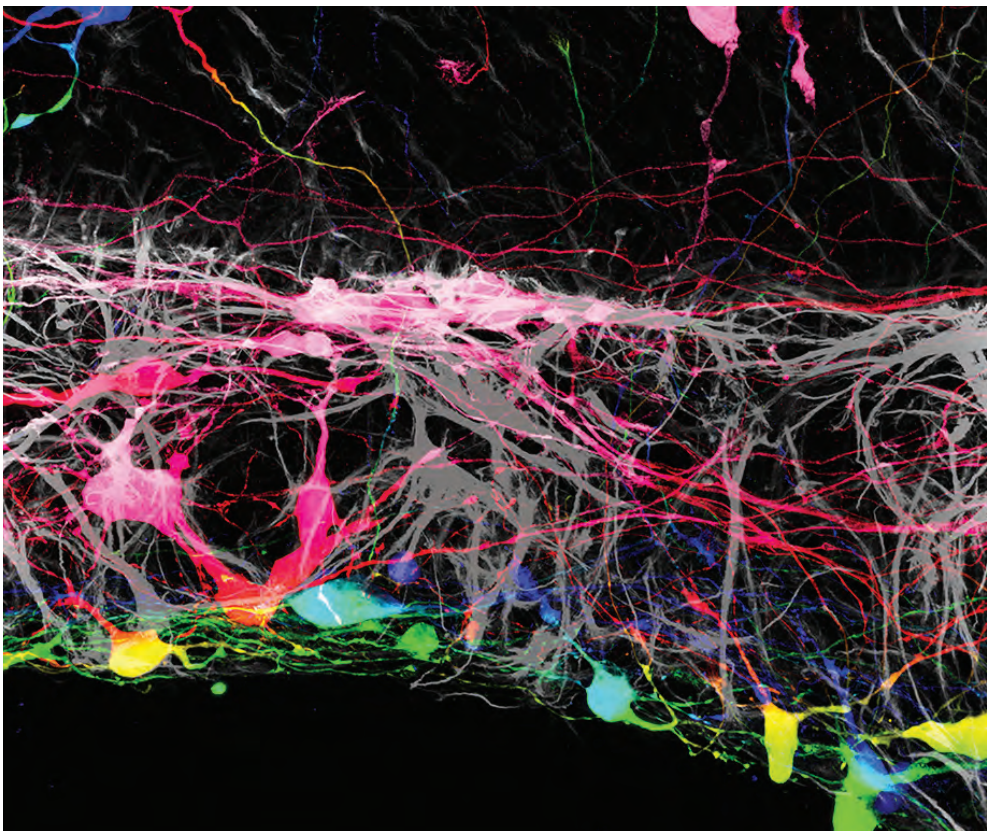
For Allan Holt, a member of the Wilmer Eye Institute Board of Governors, the professorship that bears his and his wife's name is personal. Two close family members suffered vision loss from non-arteritic anterior ischemic optic neuropathy (NAION), a disruption of the blood flow to the optic nerve. "I have tremendous respect and admiration for Sandy and Susan Greenberg, and frankly it was an easy decision to support their work and their center at Wilmer," Holt says.

Holt says he's inspired by the prospect of someday ending blindness. "It's a noble goal," he says. "And it's near and dear to me because two family members had NAION. Other family members might have it potentially down the road."

Johnson, who calls the professorship "transformative" for his work, estimates that with the new resources, he can conduct the experiments he expected to take three years in just half that time.

As a glaucoma specialist, Johnson says: "My patients with blindness often ask me, how far away are we? I honestly can't put a number on it. I think it's unlikely that anyone's going to be doing clinical trials for eight to 10 years, but I do think something on that horizon may very well be feasible. We could be looking at trying this in people in a decade." ●





Above left: Human stem cell derived retinal ganglion cells (RGCs) in red are seen intermingling with the surviving native RGCs of the recipient retina in green following transplantation.

Above right: Human RGCs transplanted into a host retina are able to integrate by extending processes below the surface of the tissue (depth location is color-coded, so the rainbow of colors shown here indicates RGCs in many different retinal layers). Glial cells (gray) do not seem to limit the engraftment, but Johnson's work has shown that disruption of the internal limiting membrane enhances engraftment.

"Twenty years ago, people thought the work we're doing now was science fiction."

— THOMAS JOHNSON III

A Lifetime of Contributions to Ophthalmic Treatment and Research

By Joan Katherine Cramer

Don Zack, M.D., Ph.D., is a vision researcher extraordinaire. His work on photoreceptor cells in the retina that sense light and retinal ganglion cells that transmit information from the eye to the brain has transformed our understanding of how diseases such as retinal degenerations and glaucoma lead to vision loss. His lab at the Wilmer Eye Institute has already translated these insights into potential new glaucoma treatments — "neuroprotective" drugs that interrupt the process of cell death and, hence, progression of the disease. Even more exciting, his team has spent years figuring out how to convert stem cells into retinal ganglion cells, which they hope will eventually lead to simple injections into the eye to actually reverse vision loss.

Left: Don Zack

"I'd die a very happy person if we could get close to restoring vision to people," says Zack. "That's the ultimate dream."

Zack is the Guerrieri Family Professor of Ophthalmology and director of the Center for Stem Cells and Ocular Regenerative Medicine at Wilmer, as well as a professor in the departments of Molecular Biology and Genetics, Neuroscience, and Genetic Medicine. He has won numerous awards for his work and has now been named winner of the prestigious Research to Prevent Blindness (RPB) David F. Weeks Award for Outstanding Vision Research for 2022, an honor bestowed by both the RPB and the Association of University Professors of Ophthalmology.

His longtime friend and collaborator at the National Institutes of Health (NIH), Anand Swaroop, Ph.D., can't think of anyone more deserving. "Don has always worked at the cutting edge of the kind of research we do and has made so many contributions to the field," says Swaroop, who is himself an award-winning researcher at NIH, where his lab does similar work with photoreceptors — nerve cells in the eye, like rods and cones, that collect light and whose deaths are implicated in diseases like macular degeneration.

"Don has always recognized the potential of new research technologies earlier than most people," says Swaroop. "In the early days, he was one of the first to use transgenic mouse [mice that had been genetically altered] technology. More recently, he has pioneered the use of stem cell technologies and other novel research tools very effectively."

Swaroop marvels at the sheer breadth of Zack's research. "Most researchers focus either on ganglion cells or photoreceptors," he says. "Don does both." And while most of their peers were focusing solely on gene research, Zack also started working with small molecules because they can be used to study biological function and develop

Anand Swaroop
National Institutes of Health

M. Alan Guerrieri

new medications to inhibit specific disease processes. Small-molecule drugs are chemically synthesized therapeutics that can easily enter cells — and alter other molecules for therapeutic effect — because of their low molecular weight. Zack has already developed several small-molecule drugs that have the potential to help prevent blindness in glaucoma by interfering with the nerve cell death process.

"Conventional glaucoma treatment focuses on controlling pressure in the eye, but this is a new approach that addresses the root cause of disease," Swaroop says.

But Swaroop says it's not only Zack's gift for innovation that sets him apart. "It's his gift for collaboration. Don is a good person, a very good teacher, very open-minded, very willing to share his findings and ideas, and it's incredibly easy to collaborate with him," Swaroop says. "So, he has not only created a wealth of knowledge himself, he has created a network of collaborators and students who are also creating knowledge, and that is a wonderful legacy."

Zack is himself emphatic that anything he has achieved during his 33 years at Wilmer has everything to do with the people he has worked with and the synergy of the institution. "Wilmer is very collaborative," he says. "There are lots of wonderful, skilled people to work with. And Hopkins has great scientists, so outside of Wilmer, you can always find somebody who's an expert in whatever you happen to be interested in. I've been very lucky and very happy here."

He talks about his mentors. He talks about the people in his lab. "The PI, or principal investigator, gets all the credit, but the people who do the science every day — they're the ones who make things happen," he says. He talks about colleagues beyond Johns Hopkins, like Swaroop, who have exchanged ideas with him over the years.

And he talks about donors. "There is no way we could do any of this without funding, and we need more of it if we are going to achieve our research goals," he says. The promise of stem cell technology is the great hope for so many patients. And though researchers are getting tantalizingly close — his lab's ganglion cells are now being tested in animal studies at labs around the country — Zack says they are still probably years away from being able to actually use these cells to treat patients. Government funding is vital but insufficient, and generous private donors make all the difference, he says.

Among Zack's supporters is M. Alan Guerrieri, a very successful poultry farmer from Maryland's Eastern Shore who, through his family foundation, has been supporting vital work at Wilmer and The Johns Hopkins University for nearly three decades. Zack's endowed professorship and the Alan Guerrieri

Family Research Endowment in Retinal Diseases are two of the many substantial gifts he has bestowed.

"Alan has been fantastically generous in supporting our research, and donations like his make our work possible," Zack says.

Guerrieri, who first came to Wilmer in the early 1990s for surgery to repair a detached retina, decided he liked what he saw and wanted to help. "I heard wonderful things from Mort Goldberg [professor of ophthalmology and director emeritus of the Wilmer Eye Institute] about Don from the time I first got involved," says Guerrieri, a member of the Wilmer Board of Governors and past member of the National Council for Johns Hopkins Medicine. "His work is amazing and important, and I am very proud to be able to contribute to it." ●

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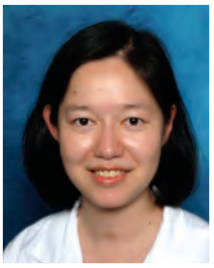

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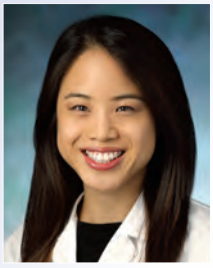

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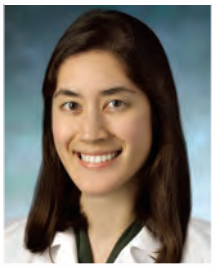

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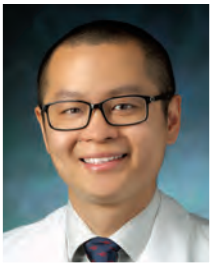

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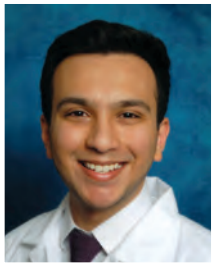

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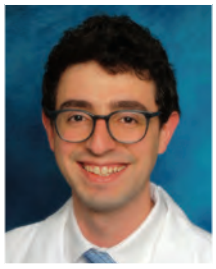

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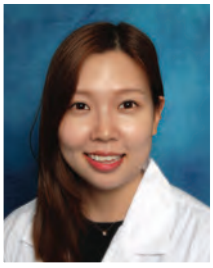

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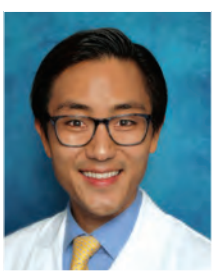

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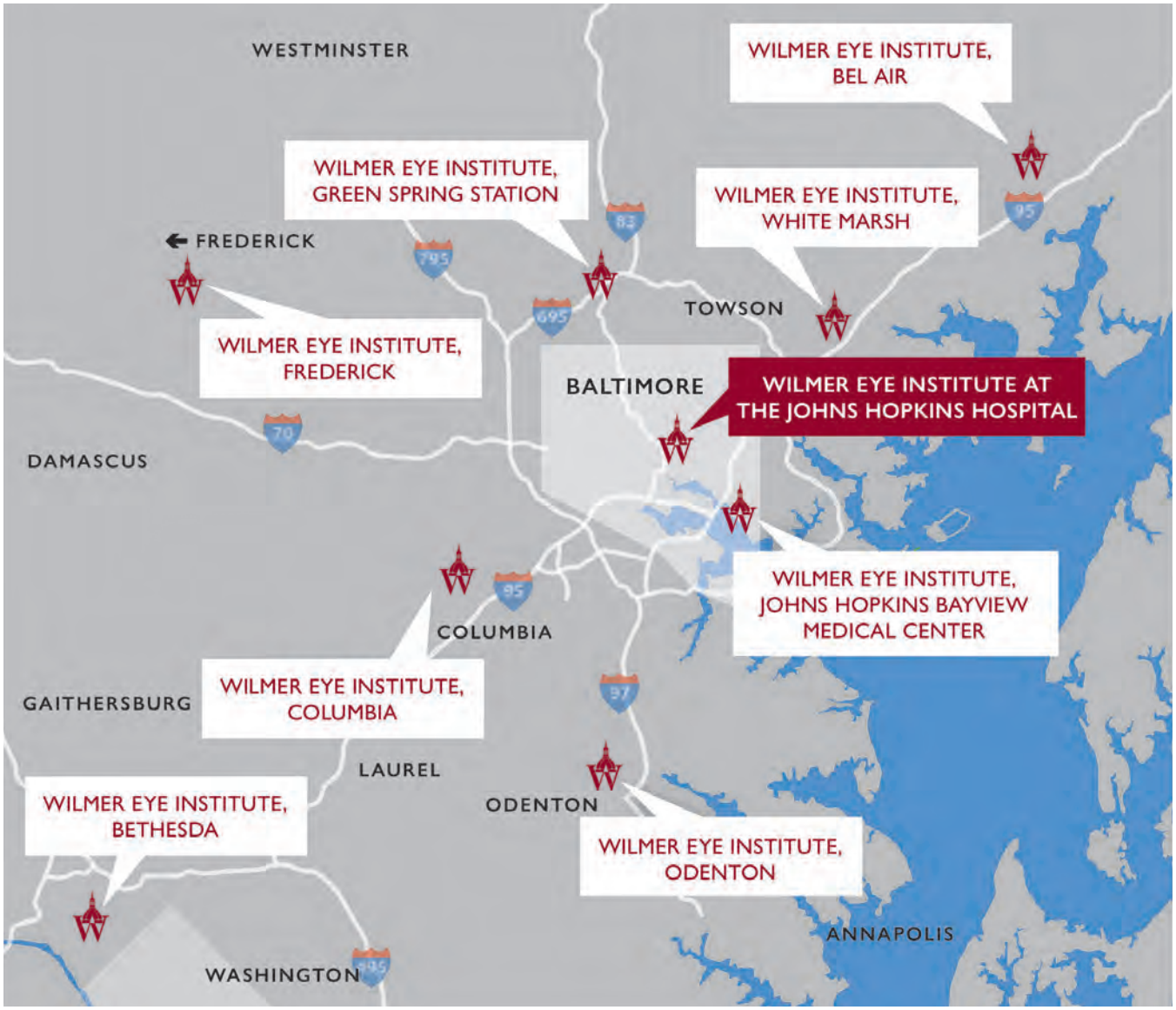

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