

FALL 2021

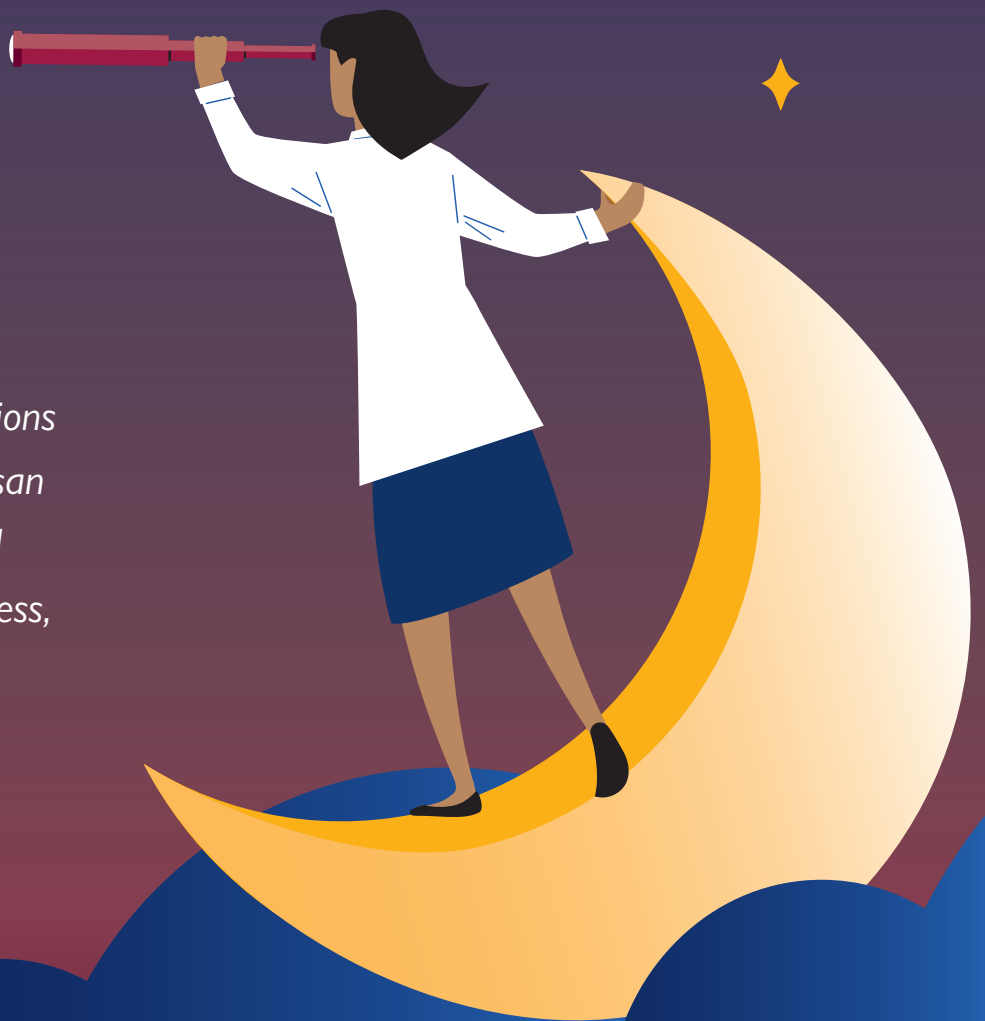
Wilmer Eye
Institute



Wilmer

The Future
Is Here

Inspired by the moonshot aspirations of an earlier era, Sanford and Susan Greenberg have embraced a bold mission at Wilmer: to end blindness, "for everyone and forever more."





Looking Forward

Monitoring eye pressure in patients with glaucoma is vital to determine if and when treatment is needed, and how well it is working. Currently, eye pressure is checked in the clinic.

To gain a fuller picture of patients' eye pressure, glaucoma specialists **Thomas Johnson III, M.D., Ph.D.**, and **Elyse McGlumphy, M.D.**, recently conducted a study of patients who performed home monitoring of their eye pressure with a hand-held tonometer.

They found that more than 50 percent of the time, patients' maximum daily eye pressure occurred outside of clinic hours (8 a.m. to 5 p.m.), and thus would not have been captured at an appointment. In a number of patients, fluctuations in pressure were significant enough to warrant more aggressive treatment, including surgery. The results were published in *Ophthalmology Glaucoma*.

While research is ongoing, Wilmer specialists believe the convenience and additional information offered by the home monitoring of glaucoma will help both patients and doctors manage the disease more effectively.

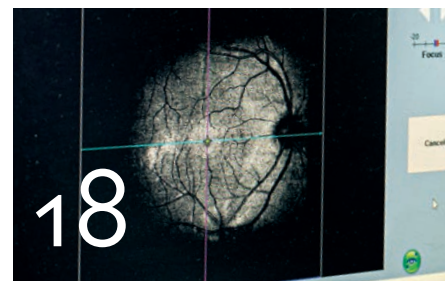
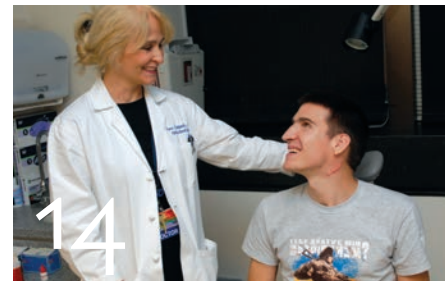


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As I See It...

WHEN READING IN THESE PAGES THE STORIES OF EXCEPTIONAL PATIENT CARE, ONE CAN UNDERSTAND THE PASSIONATE SUPPORT WILMER INSPIRES IN OUR FRIENDS AND SUPPORTERS.

Dear Friends,

Wilmer is a place of vision — both literal and metaphorical. Our experts focus their time and resources on researching its loss, its regeneration and everything in between. Our existence is thanks to the vision of philanthropist Aida de Acosta Root Breckinridge who saw the value of enshrining and perpetuating Dr. Wilmer's knowledge and skill in an eye institute. Since then, faculty members, staff members and supporters have woven these two meanings of vision together to create the Wilmer Eye Institute of today — a place of empathetic patient care without boundaries, world-class research and a residency program famous for producing the leaders of our field (including more than 100 department chairs).

When reading in these pages the stories of exceptional patient care, one can understand the passionate support Wilmer inspires in our friends and supporters. As an example, philanthropist and businessman Philip Van Horn Gerdine has endowed two professorships to support the Cornea division and age-related macular degeneration research — as a “thank-you,” in his words, for the care he received here.

The newly formed Sanford and Susan Greenberg Center to End Blindness at the Wilmer Eye Institute is a unique result of the creative partnership between inspired supporters and Wilmer leadership. The vision of a future where we end blindness will be implemented by providing resources to today's junior faculty. These future leaders of the field have both a fresh perspective and need to jumpstart their research early in their careers. The Greenberg Center strives to be a home for those who wish to invest in the future of vision research and for young faculty members with the moonshot goal of ending blindness — a goal worthy of the original vision for the Wilmer Eye Institute.

Yours in continued good health,

PETER J. McDONNELL, Director



THE LATEST VIEW FROM WILMER

W NEWS

Wilmer recognized as Best Overall Program

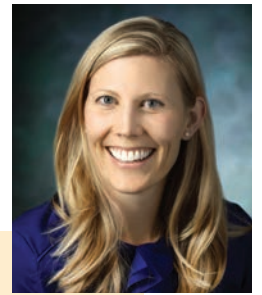
The Wilmer Eye Institute was recognized as the Best Overall Program in the 2020 Best Program Survey conducted by *Ophthalmology Times*. The results are based on a survey sent by *Ophthalmology Times* to chairs and residency directors of programs across the United States.

Wilmer Director **Peter J. McDonnell, M.D.**, said the recognition from peers around the nation is particularly meaningful to his Wilmer colleagues, given the massive challenges they have faced this past year with the COVID-19 pandemic.

“I have never been more appreciative of the efforts of the more than 200 faculty and over 1,000 employees who move Wilmer forward,” he said. “Our physicians, nurses, residents, fellows and staff members have been tireless and courageous in responding to the needs of our patients, and our scientists have furthered their research programs.”

Wilmer also earned a first-place ranking for Best Research Program. Noting that Wilmer Eye Institute was founded with the mission of bringing clinicians and researchers together to solve ophthalmology’s biggest problems, **Laura Ensign, Ph.D.**, the Marcella E. Woll Professor and Vice Chair for Research, said, “We believe this integration is the catalyst for true advancement, and that the research we are doing today will transform the medical outcomes in ophthalmology tomorrow.”

“I have never been more appreciative of the efforts of the more than 200 faculty and over 1,000 employees who move Wilmer forward.” — PETER J. MCDONNELL



Left to right:
Adrienne Scott,
Esen Akpek
and Bonnie Swenor

Inspirational Minds

Three Wilmer faculty members have garnered a coveted spot on *The Ophthalmologist's* 2021 Power List, an annual celebration of “the inspirational minds in ophthalmology,” which this year focused exclusively on women.

Adrienne Scott, M.D., chief, Wilmer Eye Institute – Bel Air, was honored for being “an accomplished leader in ophthalmology and a role model for many aspiring women and minorities in ophthalmology.” Her nominator continued, “Her research is innovative and multidisciplinary, focusing on improved access to care for the underserved through screening for disease such as sickle cell retinopathy, where she is an internationally recognized leader in the field.”

Esen Akpek, M.D., director of the Ocular Surface Disease and Dry Eye Clinic at Wilmer, is an internationally renowned leader in the fields of corneal transplantation and surface reconstruction. Asked by *The Ophthalmologist* to name her proudest professional achievement, she noted that it was, “being the first woman cornea surgeon rising to full professor status at the world-renowned Wilmer Eye Institute.”

Director of the Johns Hopkins Disability Health Research Center and associate professor of ophthalmology at Wilmer, **Bonnie Swenor, Ph.D., M.P.H.**, was praised for her efforts, “which aim to increase the representation and inclusion of women in ophthalmology, [and] are not only necessary to achieve diversity, but are needed to address the persistent gender disparities in eye health.”

Moving Education Back on Track



As nations around the world move from emergency COVID-19 responses toward policies aimed for recovery, the COVID-19 Global Education Recovery Tracker aims to support this process by focusing on data that can help build back better and more resilient education systems. The site, which captures ongoing information about the global status of schools, teachers and students, was developed by Wilmer’s **Megan Collins, M.D., M.P.H.**, in collaboration with colleagues across Johns Hopkins University. Collins is co-director of the Johns Hopkins Consortium for School-Based Health Solutions and assistant professor of ophthalmology at Wilmer. Visit: covideducationrecovery.global

“Who counts depends on who is counted.”

Bonnie Swenor, Ph.D., M.P.H., associate professor of ophthalmology and director of the Johns Hopkins Disability Health Research Center, collaborated with colleagues across Johns Hopkins University and beyond to launch a tool to measure and rank the accessibility of state vaccine information websites.



A common barrier to vaccines for people with disabilities is the accessibility of information. Often state websites rely on charts and tables that can be difficult or impossible for people with vision impairments and other disabilities to read.

The dashboard tracks the accessibility of state and U.S. territory COVID-19 vaccine information websites, and updates that information weekly. The tool includes accessible data visualizations and expands an effort to help people with disabilities determine when they qualify for the COVID-19 vaccine and how different states prioritize the disability community in the vaccine rollout.

The Johns Hopkins Disability Health Research Center COVID-19 Vaccine Dashboard was created to not only help the disability community get vaccinated, but arm policymakers with data to improve the system. Visit: disabilityhealth.jhu.edu/vaccinedashboard



Meeting a Critical Need

Meghan Berkenstock, M.D., whose clinical research focuses on identifying ocular adverse events associated with use of immunotherapy agents in the treatment of systemic malignancies, was named to Pennsylvania Medical Society’s Top Physicians Under 40 for 2021.

Berkenstock sees patients from Maryland and southern Pennsylvania with ocular inflammatory diseases in her tertiary referral practice. “Given this is an underrepresented subspecialty in Pennsylvania, where less than five uveitis specialists actively practice, Dr. Berkenstock provides a critical resource for Pennsylvanians who need tertiary care for potentially blinding conditions,” the society noted.

FACULTY PROMOTIONS

Yassine Daoud, M.D.

Associate Professor

Allen Eghrari, M.D., M.P.H.

Associate Professor

Nicholas Mahoney, M.D.

Associate Professor

Shameema Sikder, M.D.

Associate Professor

Divya Srikumaran, M.D.

Associate Professor

Lee Guo, O.D.

Assistant Professor

Liyun Zhang, Ph.D.

Research Associate

A Bold Mission to End Blindness



By Andrew Myers

One morning when he was in his junior year at Columbia University, Sanford “Sandy” Greenberg emerged from a deep sleep in a hospital bed, unable to see. The increasing cloudiness in his vision, at first thought to be conjunctivitis, had instead been glaucoma. A last-ditch surgery to save his sight had not gone well. “When I woke up newly blinded, I promised God that I would do everything I could for the rest of my life to make sure that no one else would go blind,” Greenberg says today. “It was an insane, adolescent promise, but it stayed with me all this time.”

In the spring of 2021 — almost 60 years to the day after Sandy Greenberg awoke in a Detroit hospital to total darkness — he and his wife Sue saw the establishment of The Sanford and Susan Greenberg Center to End Blindness at the Wilmer Eye Institute.

The Greenberg Center’s mission is as bold as the name would suggest: to end blindness, “permanently, and for everyone,” says Greenberg.

PERSEVERANCE PAYS OFF

After losing his sight, Greenberg persevered, perhaps as few would or could. With early help from his college roommate (the soon-to-be-famous singer Art Garfunkel) reading him his textbooks aloud, Greenberg not only returned to Columbia and graduated Phi Beta Kappa, he went on to achieve an impressive string of academic accomplishments: a Ph.D. from Harvard, an M.B.A. from Columbia, a stint at Oxford University as a Marshall Scholar, and law school at Harvard.

Over the next four decades, Greenberg charted an equally impressive career. He invented a device to help vision-impaired people listen to recorded speech, started several companies to provide services for the blind and served as a White House Fellow in the Johnson Administration. He also chaired the federal government’s Rural Healthcare Corporation and was a member of the National Science Board. He was a trustee of The Johns Hopkins University from 1994 to 2011. He currently chairs the Board of Governors of the Wilmer Eye Institute.

“I consider being chairman of Wilmer’s Board of Governors one of the great

privileges of my life and one of my most significant learning experiences,” he says. “Strategizing, particularly for the long term, has been a thoroughly enjoyable experience — especially working with Dr. Peter McDonnell and the members of the Board of Governors. This work is consistent with the promise I made to God in 1961 — that I would do everything I could to end blindness for everyone for evermore.”

VISION FOR THE FUTURE

Greenberg’s promise to end blindness was shaped by two seminal figures of American history: Jonas Salk and President John F. Kennedy. Greenberg credits a personal meeting with Salk, creator of the polio vaccine, as inspiration for the Center: Rather than obtaining funds for the purchase of iron lungs for victims during the polio epidemic, Salk realized that the focus should be on eliminating the disease. Salk, he says, encouraged him to focus on the big picture of ending blindness. “‘Just end it,’ he told me,” Greenberg recalls.

A second important influence, Greenberg says, was President John F. Kennedy, whose eyebrow-raising challenge to put a man on the moon within a decade came just months after Greenberg’s own oath to end blindness.

THE PRIZE

“It wasn’t until 2012, however, that I began to feel that the science had begun to catch up with my ambitions to end blindness,” says Greenberg. He points to the advent of new technologies and techniques such as artificial retinas that interface with the brain allowing people to see again, novel

Opposite page:
Sanford Greenberg
and Art Garfunkel
at their alma mater
Columbia University

nanoscale drugs, the gene editing tool CRISPR, and regenerative medicine. All have the potential to slow, restore or even cure vision loss in myriad ways — and Wilmer researchers are working on all of them.

It was in that year, 2012, that Greenberg and his wife announced to the Wilmer Board of Governors the launch of the End Blindness Campaign. In December 2020, they awarded the Greenberg Prize, bestowing \$3 million to be shared by 13 leading researchers in ophthalmology from across the globe.

“I’m proud to say we are well on our way to meeting our goal.”

SANFORD GREENBERG

THE NEXT STEP

The Greenberg Center’s goal is to ultimately deploy an endowment of \$100 million. The Greenbergs, their friends, and supporters of Wilmer have placed a down payment of energy and resources toward that considerable target and are leading a campaign to raise the balance from others who share with them a commitment to their objective.

“I’m proud to say we are well on our way to meeting our goal,” Greenberg adds.

In planning the Center, Greenberg wanted to inspire promising early-career researchers who have an abundance of high-risk, high-reward ideas but lack the funding to pursue those ideas.

The Greenberg Center expects to dedicate four Rising Professorships in the coming year, and many more will follow as the Center grows. These professorships are set aside

for up-and-coming researchers — assistant professors whose work is focused on ending one or more causes of blindness — with seed funding for up to seven years each to get their careers and their potentially transformative research off to a flying start.

That sort of unrestricted support, coming at such a juncture in a young researcher’s career, is critical, says Peter J. McDonnell, M.D., director of the Wilmer Eye Institute. The scramble for funding is so competitive in fact, that the average age at which a scientist receives his or her all-important R01 initial grant from the National Institutes of Health is 44.

“If you’re a young researcher and you’re competing with established, often very famous senior people who have very large research teams, it’s very challenging,” McDonnell says. “Sandy and Sue’s efforts mean that these brilliant young scientists will get up to speed at an age closer to 30, than 50. One generous supporter of Wilmer has coined the term ‘Rising Professorships’ for these endowments — reflecting the fact that the recipients of this support are the rising future superstars of their scientific fields.”

In addition to providing direct funding to those researchers, the Greenberg Center will provide mentorship and grant-writing resources to help young scientists apply for — and win — those key NIH grants much earlier in their careers.

“It’s an unwritten rule in research that a key milestone is securing that first R01 grant from NIH. But the climb is steep,” says Laura Ensign, Ph.D., the Marcella E. Woll Professor of Ophthalmology and



Jan McDonnell,
Wilmer Director
Peter J. McDonnell,
Wilmer Board of
Governors' Chair
Sanford Greenberg,
Sue Greenberg and
Dean of the Medical
Faculty/CEO of Johns
Hopkins Medicine
Paul B. Rothman

vice chair for research at Wilmer, who will help to mentor early career faculty members through the Greenberg Center.

Even the most promising researchers lack the infrastructure — the lab equipment and the staff — but also the preliminary data needed to bolster their NIH applications, notes Ensign, a biomedical engineer who herself has pioneered several promising nanomedicines that have reached startup stage. The Rising Professorships will help close both gaps.

WILMER: THE FUTURE IS HERE

Greenberg believes the state of scientific knowledge today is up to the task of ending blindness — and that, as the leader in vision research in the United States and the world, Wilmer Eye Institute is the only logical choice for the establishment of the Sanford and Susan Greenberg Center to End Blindness. “It’s within reach,” adds Sandy Greenberg. “In the Greenberg Center, we’ve created the world’s only facility that is devoted solely to ending blindness for everyone and for evermore.”

McDonnell traces the model for the Greenberg Center to the very beginning of the Wilmer Eye Institute, when Dr. William Holland Wilmer and his patient Aida Breckinridge, a philanthropist whose vision Wilmer had saved, raised the original

endowment to get the Institute off the ground. Their “tripartite mission” (integrating patient care, teaching and research under one roof) drives the Institute to this day. Those founding principles foresaw the symbiotic relationship between groundbreaking research to both understand and treat blindness, the mentoring of new generations of specialists and the uncompromising patient care that remain the hallmarks of Wilmer’s global reputation.

Precedents exist for Wilmer faculty eliminating causes of blindness, notes McDonnell. About 40 years ago, Al Sommer joined the Wilmer faculty determined to target trachoma, then the world’s most common cause of corneal blindness (with 8 million or so blind worldwide). Thanks to the efforts of a team of ophthalmologists and epidemiologists and the development of successful strategies in which entire areas of a country receive medication simultaneously, Sommer saw his dream realized. The World Health Organization has certified that most countries afflicted with this disease in the 1980s are today completely disease-free, with the remaining countries well on their way to total elimination of trachoma.


“Ending blindness. Those of us at Wilmer can imagine no more noble goal to which to dedicate our professional lives,” McDonnell says. ●

A Center for Genetic Eye Diseases

By Jessica Wilson

From left to right:
Jefferson Doyle,
Christy Smith and
Mandeep Singh





When Jefferson Doyle, M.D., Ph.D., returned to the Wilmer Eye Institute in the summer of 2018 to begin his year as assistant chief of service, he had an idea in mind to discuss with Wilmer Director Peter J. McDonnell, M.D. A pediatric ophthalmologist whose research focuses on genetic diseases, Doyle wanted to create a pediatric ophthalmology clinic dedicated to genetic eye diseases. McDonnell encouraged Doyle to think bigger, which inspired him to envision a genetic eye disease center — a place to centralize and coordinate care for all patients with genetic diseases affecting the eye. He outlined two central goals for the center: to make it easier to refer patients to the correct subspecialists within Wilmer and at Johns Hopkins in general, and to expedite genetic testing and genetic counseling for these patients.

Doyle approached Mandeep Singh, M.D., Ph.D., with the idea. A retina specialist whose research focuses on stem cells and genetic retinal diseases, Singh was intrigued. “Flashback to just five years ago, there weren’t any available gene therapies — and very few clinical trials were happening,” says Singh. But 2017 marked “a gateway moment in ophthalmology,” he explains, when the U.S. Food and Drug Administration approved the first gene therapy for a form of inherited retinal dystrophy that is caused by mutations in the RPE65 gene. Called Luxturna, this gene therapy increased the relevance, and urgency, of knowing the specific genetic mutation implicated in a genetic eye condition.

“Jef and I both recognized that during our careers, gene testing and gene therapy were going to become hugely

important — that it was the future of high-quality eye care,” says Singh. They both also recognized that Wilmer was uniquely situated for a genetic eye disease center. “There are very few places in the country that have a truly exceptional ophthalmology department and a truly exceptional genetics department,” says Doyle.

“Wilmer had all the pieces in place: the different areas of expertise, the proximity to the Department of Genetic Medicine, and an Institute that was committed to innovation and excellence in ophthalmic treatment,” says Singh. “To bring all those pieces together we had to centralize this into a genetic center.”

The two launched the Wilmer Eye Institute Genetic Eye Disease (GEDi) Center in early 2020. While they are co-directors of the GEDi Center, they

are both quick to point out it is not a two-man band. “We have centralized, multidisciplinary eye care across all Wilmer subspecialties,” says Singh.

The GEDi Center has a website [hopkinsmedicine.org/wilmer/services/gedi] with one contact number and one email address, so patients and referring physicians do not need to spend time calling around for a specialist. The contact information leads them to GEDi patient coordinator Alie Collins, who can direct patients and referring physicians to a doctor from a “go-to” list of contacts in Wilmer’s different subspecialties and in other Hopkins departments.

In addition to coordination of care, a central pillar of the GEDi Center is the genetic counseling service. In her position as the GEDi’s primary genetic counselor, Christy Smith, from the Johns Hopkins Department of Genetic Medicine, facilitates and interprets genetic testing for patients.

“My role as a genetic counselor is not just to order a test. It’s to meet with the family, collect more information

about their medical and family history and to help to figure out what is the most appropriate test for them. And then I talk them through what the implications of that test would be in terms of their health and the health of other family members,” says Smith.

One family she has worked closely with is the Morgans. Emily Morgan met her husband, Dirk, playing blind hockey — “ice hockey, but the puck is metal and has bells inside of it. And everybody is blind,” she explains. Both she and her husband have Stargardt disease, an inherited disorder of the retina.

Stargardt causes deterioration of the light-sensitive cells in the macula where fine focusing occurs. The result is the loss of central vision, although the severity of the disease has a wide spectrum. Emily can see color, read with magnification and “get around really well,” while her husband’s vision is “basically shadows and motion.”

A question that has vexed them is why the course of their diseases has taken two very different paths. This question

“Jef and I both recognized that during our careers, gene testing and gene therapy were going to become hugely important — that it was the future of high-quality eye care.”

— MANDEEP SINGH

became more important when she became pregnant with their first child.

Both Emily and Dirk had been clinically diagnosed, but neither had received a confirmation of the Stargardt disease diagnosis from genetic testing. When Emily saw Singh, he referred her to Smith for genetic testing. Smith recommended both Emily and Dirk be tested. When the results came back, they learned that they both do have Stargardt disease, which means their son — and all future children — will have the disease.

They also learned another key piece of information. “We didn’t realize there were different mutations that caused Stargardt,” she says. Dirk turns out to have “two of the rarest mutations ever,” she says. This knowledge has provided them peace of mind. “Now he’s able to understand why his vision is different from other people’s Stargardt,” says Emily.

Emily gave birth to her son, Killian, in March of 2021. While she and Dirk are patients of Singh, Killian will soon become a patient of Doyle. When he is old enough, they will have him tested. Knowing which mutations he has will help them plan for the future — plans that could range from getting the appropriate resources once he starts school to possibly teaching him Braille. And knowledge of their specific mutations will be of paramount importance to qualify for any clinical trials that could arise for therapies targeting those mutations.



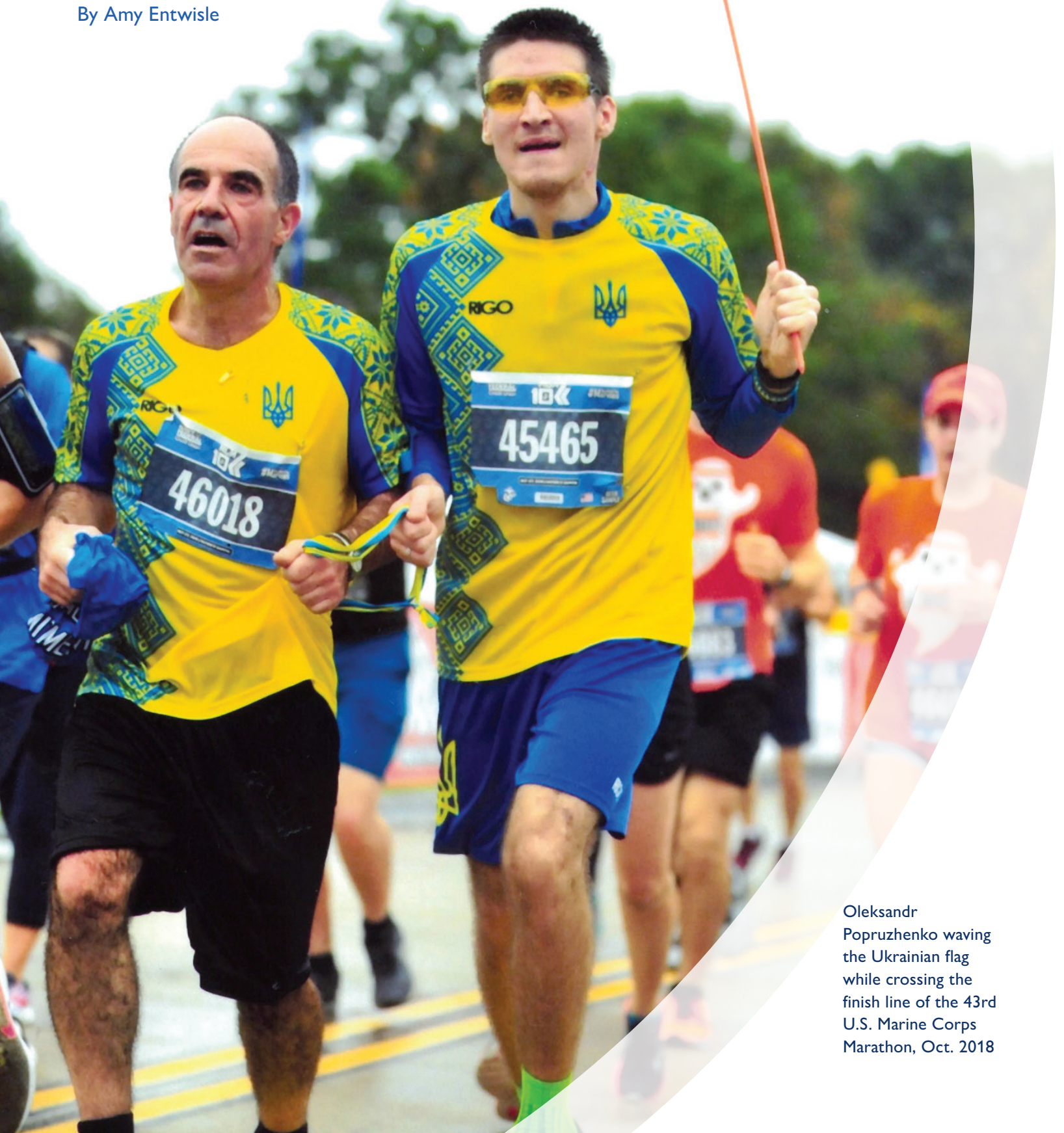
Since the GEDi Center launched, the team has been able to streamline the process of providing genetic diagnoses to patients and families like the Morgans.

“Singh and Doyle have done a stellar job addressing this unmet need,” says McDonnell, “as referrals of patients with known or suspected genetic eye problems have skyrocketed since they created GEDi.”

“We’ve successfully conducted genetic testing on hundreds of patients,” says Singh. Doyle adds that they have reduced the wait time by more than a year to see a genetic counselor, undergo testing and receive a final diagnosis. “We have so many more patients who have completed this diagnostic journey because of the capacity that we have built up. It’s really transformative,” says Singh. ●

No Longer in the Dark

By Amy Entwisle



Oleksandr Popruzhenko waving the Ukrainian flag while crossing the finish line of the 43rd U.S. Marine Corps Marathon, Oct. 2018

April 9, 2015, was a sunny day in Kyiv, Ukraine. Oleksandr Popruzhenko, a 20-year-old senior lieutenant in the Ukrainian army, was training a group of 15 soldiers on the proper way to lob a grenade when a de-pinned grenade fell short and rolled into a nearby trench. Popruzhenko dove for the grenade, but before he could throw it, the grenade exploded in his hands.

The force threw Popruzhenko backward. He couldn't see, and for a moment, he wondered if he was dead. But the pain convinced him he was still alive. Hundreds of grenade fragments had lodged under his skin and embedded in the muscles of his face, arms and legs — basically, anywhere that wasn't protected by his bulletproof vest and helmet.

At a military hospital in Odessa, doctors were able to remove most of the foreign bodies from his eyes, repair the corneal perforations and flatten the detached retina in his right eye. But they couldn't restore his vision. The left eye was beyond repair, they told him, and his only chance of regaining any vision in his right eye was to have a highly specialized corneal transplant that was not available in Ukraine.

Over the next couple of years, Popruzhenko reminded himself — frequently — that he was lucky to be alive. But in Ukraine, there weren't many resources to support a young man who couldn't see, and it became increasingly difficult to stave off depression.

Then, in June 2017, Popruzhenko met Vlasta Troyanovskaya, and the two fell in love. "Vlasta told me that I needed to do something," Popruzhenko says. "She said

that I needed to move." Troyanovskaya read about the U.S. Marine Corps Marathon, and with her encouragement, Popruzhenko began running. He qualified for a spot in the marathon reserved for wounded warriors. In July 2018, he and Troyanovskaya were married, and in October she accompanied him to Washington, D.C., for the marathon.

ANSWERING A CALL FOR HELP

The couple stayed in the Maryland home of Ilona Doerfler. Born in Kyiv, she had come to the United States 29 years ago and had long participated in fundraising efforts and events to support the Ukrainian community. She was among those watching as Popruzhenko crossed the finish line. By the time the couple returned to Ukraine, Doerfler had begun formulating a plan to help him.

She reached out to Wilmer Eye Institute, where her daughter had been treated in 2000 to correct a condition known as lazy eye. Describing Popruzhenko's plight, Doerfler asked Wilmer Director Peter J. McDonnell, M.D., whether the renowned institute could help Popruzhenko. The reply came quickly: He would need to be evaluated at Wilmer, but indeed there was hope.

“One of the amazing things about working here at Wilmer and Johns Hopkins is that we are able to put together teams like this and do procedures that can only be done in a handful of places across the world.” — ADAM WENICK

With her letter, Doerfler set in motion a chain of events that would bring Popruzhenko to Wilmer for surgery that might allow him to see again. The complex operation would be performed by Wilmer corneal surgeon Esen Akpek, M.D., the Bendann Family Professor of Ophthalmology, and retinal surgeon Adam Wenick, M.D., Ph.D.

THROUGH COLLABORATION, HOPE

While Akpek had heard about Oleksandr's injuries, it wasn't until he came to Wilmer — nearly four years after the accident— that she was able to gauge their extent. There was nothing Wilmer doctors could do for the left eye, but by performing artificial corneal transplant surgery and surgery to rehabilitate the retina at the same time, they hoped to restore some vision to his right eye.

Because the cornea was damaged, the surgeons were unable to assess the state of the retina, which is behind it. Moreover, doctors in Ukraine had placed silicone oil in the eye, a practice often performed for severe retinal detachment. Now that oil prevented the

Wilmer team from viewing the back of the eye by ultrasound before surgery.

In the operating room, Akpek first put a temporary artificial cornea on Popruzhenko to allow the team to view the eye's posterior structures — the optic nerve and the retina. Wenick then removed the oil and flattened the retina, and Akpek repaired the cornea. By the time it was over, the team had spent three and a half hours in the operating room.

“One of the amazing things about working here at Wilmer and Johns Hopkins is that we are able to put together teams like this and do procedures that can only be done in a handful of places across the world,” says Wenick.

Four months after surgery, Popruzhenko had achieved 20/200 vision, which “is actually pretty good vision for a person who sustained such severe injuries,” says Akpek. “He was able to see the second big ‘E’ on the eye chart. He was able to walk around by himself. He was also able to see his wife's face for the first time.”

At Wilmer's Vision Rehabilitation department, Popruzhenko met with

occupational therapist Kristen Shifflett, O.T., to identify modifications and devices that would help maximize his vision. For example, he learned that because he has very reduced contrast sensitivity, he needs light-colored objects against a black background and dark-colored objects against a light background. “If he’s eating chicken, he should put it on a black plate for higher contrast,” Shifflett says. “If he’s having coffee, he can put it in a white mug so he can see the black coffee rise and he won’t spill it.”

To enlarge standard print for reading, Shifflett demonstrated how to use a desktop closed-circuit TV, which can also read content aloud — helpful for people experiencing visual fatigue. “He hadn’t read in the longest time, so he was really hesitant at first,” says Shifflett. “He was spelling out each letter initially, and then he was like, ‘Oh, it’s this word!’ He was really excited.”

Today, Popruzhenko can walk around unaided, although he uses a white cane to let others know he is visually impaired. He also runs regularly. “The incredible doctors at Wilmer, they have returned my sight,” Popruzhenko says. “Thanks to them, I can see what time it is. I can see silhouettes of people, I can see colors. I am no longer in the dark.”

For her part, Doerfler says, “I think all of us have an opportunity to make a difference in someone’s life. It just was my turn, and it happened to be Oleksandr. I am very grateful for what the doctors at Wilmer did for him. For each person they help, it’s a miracle.” ●



Above: Esen Akpek with Oleksandr Popruzhenko
Below: Popruzhenko and his wife Vlasta Troyanovskaya

Earlier Insight Into Alzheimer's Disease

By Jessica Wilson

When ophthalmologists look into the eye, they can see more than the health of our eyes. They can see if our blood pressure might be elevated and whether or not we have diabetes and even catch a glimpse of our brain in the form of our retina. And one day soon they could be able to spot the beginning of Alzheimer's disease before someone has even experienced any symptoms.

Researchers have known for a long time that Alzheimer's disease is characterized by the abnormal function and accumulation of at least two kinds of proteins: amyloid beta and tau. But the changes in those proteins happen over the course of decades — long before memory loss occurs. “The causation is incompletely understood but part of the picture may be that amyloid in some way impairs capillary function,” says Amir Kashani, M.D., Ph.D., a retina specialist and Wilmer's Boone Pickens Professor of Ophthalmology.

Kashani and his team are using high-resolution imaging equipment called optical coherence tomography angiography (OCTA) to look in the

eye to almost micron level — about 1,000th of a millimeter — to identify cellular-level changes in the body. They are tracking the action of capillaries inside the eye to discover if, and in what ways, capillary function could be affected in people with Alzheimer's disease.

Kashani's path to studying Alzheimer's disease began when John Ringman, M.D., a neurologist at the University of Southern California, approached him to collaborate. “I became aware that Amir was using OCTA and developing cutting-edge measures of blood vessels in the eye — how to directly quantify perfusion [blood flow] in the eye and blood vessel density,” he says.



“I thought that would be potentially a good biomarker for what’s going on in the brain,” says Ringman. The retina can be a good model for the brain because it is neural tissue and has a blood-retina barrier similar to the blood-brain barrier.

A central challenge of research into Alzheimer’s disease, however, is the age of most people who have it. “It’s very hard to disentangle the problems that are caused by late-onset Alzheimer’s [LOAD] and everything else that accumulates with time and age,” Kashani says.

For the past two decades, however, Ringman has been working with a population of people with specific genetic mutations that predispose them to develop a highly genetic, very rare kind of Alzheimer’s disease called autosomal dominant Alzheimer’s disease (ADAD). “They’re very enthusiastic about research participation,” says Ringman, who has engaged with this population on multiple research projects. Ringman and Kashani as a team began to study them in 2018.

Amir Kashani (far right) with members of his research team, (left to right) Suman Adhikari, Ana Collazo Martinez and Sahi Wuppukondur

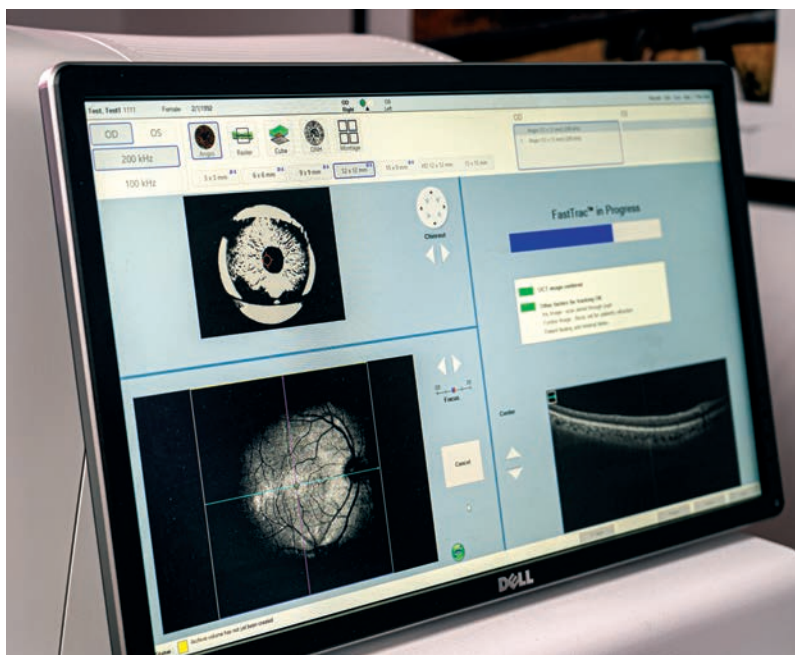


“Being relatively young, they tend to have little else wrong with them. They don’t have high blood pressure. They don’t have diabetes. They are generally not overweight or underweight. They’re just young, healthy people who happen to have this mutation,” says Kashani.

When someone has inherited the mutation for ADAD, the age of onset for symptoms can be predicted based on when their family members developed symptoms. This relative predictability allowed Kashani’s team to image the retinas of people with ADAD to correlate changes with the age at which a person might be predicted to develop symptoms of the disease.

“It gave us an opportunity to look at these people’s retinas and say, do they have changes in their retina five years before they develop clinical symptoms of Alzheimer’s? Two years before? At the time of? And see if we can detect changes in their capillaries before they actually develop disease,” says Kashani.

What they found was unexpected. “It turns out that people with ADAD-causing mutations that we looked at had abnormally increased levels of capillary blood flow long before they were expected to develop symptoms. Not only that, they also have different patterns of blood flow from those without the mutation,” says Kashani. “It suggests there’s something wrong with the way capillaries are regulating blood flow even before there are any signs of neurological or retinal problems.”



Kashani reviewing optical coherence tomography (OCT) and angiography (OCTA) images

Because the study subjects were healthy other than the genetic mutation, the researchers could conclude that there was likely a direct link between the abnormal blood flow at the capillary level and the mutations that cause ADAD. In fact, the study, which made the cover of *Alzheimer's & Dementia* in 2021, showed the first such link between abnormal retinal capillary blood flow and genetic mutations known to cause ADAD in living human subjects.

Kashani's team has also made strides in identifying a similar association between capillary behavior and the much more common late-onset form of Alzheimer's disease. In a study published in *Alzheimer's & Dementia* (2021), Kashani and colleague Fanny Elahi, M.D., Ph.D., from University of California, San Francisco, showed significant abnormalities in capillary density in the eyes of people with the APOEε4 mutation (the most prevalent genetic risk factor for developing late-onset Alzheimer's) but without any other signs of cognitive impairment.

"These pair of studies demonstrate that we can detect subclinical capillary-level changes that are associated with Alzheimer's pathology in human subjects at high risk for disease but without any symptoms," says Kashani. He adds, "In medicine, typically, before you can cure or treat anything, you have to measure it safely and reliably." Changes in capillary blood flow offer such an objective measurement.

Kashani and his team hope future studies measuring retinal blood flow in patients will help neurologists more easily identify

patients at high risk for developing Alzheimer's disease — patients who could, ideally, benefit from treatments developed in the future. Perhaps retinal blood flow itself could even become the target for such a future treatment, he says. ●

Amir Kashani, M.D., Ph.D., is a retina specialist and surgeon treating patients at Wilmer Eye Institute's East Baltimore and Columbia locations. He joined Wilmer in 2020 after seven years at University of Southern California. Before that, he attended Johns Hopkins School of Medicine where he obtained his M.D. and Ph.D. in neuroscience.

"It gave us an opportunity to look at these people's retinas and say, do they have changes in their retina five years before they develop clinical symptoms of Alzheimer's? Two years before? At the time of? And see if we can detect changes in their capillaries before they actually develop disease." — AMIR KASHANI



Phyllis Warner
and Akrit Sodhi

A Shot of Hope

By Joan Katherine Cramer

It was little more than a decade ago that Phyllis Warner, who will turn 90 on September 9, first noticed she was having trouble with her vision. It happened while she was playing the organ, as she had every Sunday for years, at her church in Fawn Grove, Pennsylvania.

“I was suddenly having a hard time reading some of the smaller notes,” she says. “It wasn’t bad at the time, but that was the beginning.”

Sometime after that her ophthalmologist referred her to Akrit Sodhi, M.D., Ph.D., the Branna and Irving Sisenwein Professor of Ophthalmology at the Wilmer Eye Institute. Sodhi specializes in the management of complex vitreoretinal diseases, including conditions like macular degeneration, that affect the retina and the vitreous fluid around it.

“I like to go to the best doctors, and Dr. Sodhi is the best,” she says. “He is also a very nice person and has always been there for me when I’ve needed him.”

Sodhi says Warner was initially referred to him because she had developed scar tissue on the surface of the retina of her left eye — a not uncommon occurrence with age — which he removed. “She did very well,” he says.

But then Warner developed wet macular degeneration, first in the left eye, and then in her right eye. Sodhi treated her with anti-VEGF (vascular endothelial growth factor) injections, which target a protein that promotes the growth of abnormal blood vessels in the eye, causing vision loss.

When introduced in the mid-2000s, anti-VEGF injections revolutionized patient outcomes for the treatment of age-related wet macular degeneration (AMD) and today they are the standard of care for that disease. Approximately 30 to 35 percent of people with AMD who receive anti-VEGF injections experience significant improvement in vision — which is life-changing for many people.

“The treatment did work to preserve her vision in her right eye, which has made it possible for Warner to remain independent,” says Sodhi. “Her eyes have been relatively

stable,” he says. “We’re continuing to focus on preserving the vision.”

Warner, who has lived alone since her husband, Austin, died in 2003, can see well enough to get around and do things like cook for herself and clean her home. “I really appreciate being able to read,” she says, “and pay bills” — with the help of bright lights and magnifying equipment. She is thankful for her old friends in her small town of fewer than 500 people who help get her to appointments, to church, to her polling place, to the grocery store. She is also grateful to be able to simply take in the world.

“I really enjoy seeing bright red roses and when the trees bloom with white flowers,” she says. “But I am hoping Dr. Sodhi will come up with new ways to treat this.”

Her hope is not misplaced. Sodhi is looking beyond anti-VEGF to the next generation of AMD medicines. His research focuses on a protein called

hypoxia-inducible factor, or HIF, which guides how cells sense and respond to low oxygen levels. Sodhi collaborates with Gregg Semenza, M.D., Ph.D., who won the Nobel Prize for his discovery of HIF. They are developing drugs called HIF inhibitors to treat cancer and certain eye conditions — specifically diseases such as AMD that involve the rapid development of blood vessels.

Warner has participated in Sodhi’s research efforts. He is using fluid from her eyes as part of his investigation into differences between the eyes of people whose vision is improved by the anti-VEGF injections and those whose eyes don’t respond as well. Already Sodhi’s team has identified a new protein that may explain the difference and perhaps be used both to identify patients who won’t respond to anti-VEGF treatments and to help develop an alternative therapy. He is also investigating potential treatments for dry macular degeneration.

“I like to go to the best doctors, and Dr. Sodhi is the best. He is also a very nice person and has always been there for me when I’ve needed him.” — PHYLLIS WARNER

She has supported his research in other ways as well. Every year she has donated money to fund Sodhi's research at Wilmer, and this year donated a large lump sum in the form of a charitable gift annuity (CGA). A CGA is a giving vehicle that is tax deductible and pays her interest income while she is alive. Warner's CGA is earmarked to fully support Sodhi's research after she dies.

"Most research grants do not fund the initial steps toward identifying a target, so we couldn't do this work without gifts like Mrs. Warner's," Sodhi says.

And Phyllis Warner says Sodhi's research gives her hope. "I pray every day that he comes up with a new treatment." ●

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Wilmer Eye Institute Development Office

600 N. Wolfe St., Wilmer 112

Baltimore, MD 21287

410.955.2020 | wildev@jhmi.edu

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Common Sense and Uncommon Generosity

By Jessica Wilson



Philip Van Horn Gerdine
Credit: Pierce Harman
Photography

Marjorie Wells Gerdine was a clinical psychologist known for her common sense, says her husband Philip Van Horn Gerdine. “She was not to be trivialized.”

While Marjorie passed away in 2019, her influence remains large in his life and his legacy, which includes two professorships at the Wilmer Eye Institute made available as part of his estate plan. Both are named the Philip and Marjorie Gerdine Professorship of Ophthalmology. One is for the Cornea Division and one is for age-related macular degeneration research. Also part of his estate plan will be the Philip and Marjorie Gerdine Precision Medicine Scholars Fund at the Johns Hopkins University School of Medicine.

Philip has a connection to Johns Hopkins through his grandfather, Lynn Van Horn Gerdine, who was class of 1895 at Johns Hopkins University, and eventually became a psychiatrist. His grandfather’s career inspired Philip to study clinical psychology. Both he and Marjorie studied clinical psychology in Boston. In the 1980s, he and Marjorie were living in Boston where Philip sought treatment for his eye condition and encountered Oliver Schein for the first time. Schein treated Philip for about half a year but then left to join the Wilmer Eye Institute, Johns Hopkins Medicine in Baltimore.

Because of Philip’s respect for Johns Hopkins thanks to his grandfather’s educational experience as well as the progress he had made under Schein’s care, Philip chose to continue his treatment at the Wilmer Eye Institute.

“I followed Oliver Schein down there because I knew he was an expert in corneal disease and this particular one.”

The disease in question, Fuchs’ dystrophy, affects the cornea — the clear front part of the eye — by causing the layer of cells responsible for maintaining proper fluid levels in the cornea to deteriorate and tiny bumps to form on the back of the cornea. When enough of these cells die, fluid builds up in the cornea, resulting in swelling and blurred vision.

Schein, now Wilmer’s Burton E. Grossman Professor of Ophthalmology, eventually performed corneal transplants on Philip to treat his Fuchs’ dystrophy, which were a success. Philip recalls regaining clear vision again. “You discover the world really does exist and it’s not a big blur. And as you improve, you’re able to do things and deliver services and all the rest again.”

These services, in his case, included traveling the world — to every continent except Antarctica — to fix companies. Both Philip and Marjorie began their careers as clinical psychologists. Marjorie

remained one throughout her professional career, maintaining a large private practice in Massachusetts working with children and adolescents. On the advice of Marjorie, however, Philip transitioned into business. As evidence for her point, she reminded him that he had built radio station WDHA-FM in New Jersey just before going to study psychology in Boston.

“The famous statement from my wife was, ‘You don’t belong in psychology. You belong in business.’ I got quite angry and then thought that over. She then said, ‘Here’s a Harvard Business application filled out.’ And she was right.”

After business school, Philip worked as a business consultant in mergers and acquisitions. “My whole life, I’ve been fixing things. Which is part of psychiatry and psychology but now it’s fixing businesses.”

Decades after Philip’s corneal transplants, Marjorie was treated for age-related macular degeneration at Wilmer. Both

underwent treatment in other departments of Johns Hopkins Medicine, as well.

“When my wife and I worked on our wills, we knew that Johns Hopkins Medicine would be at the top for gift giving,” says Gerdine. “It’s a thank-you for what [Hopkins] did for Marjorie and me. We have gotten to know the doctors there well. And it’s a thank-you for Baltimore being what it is — a semi-Southern town with kind people,” says Philip.

“We are grateful that Dr. Gerdine has chosen to invest in innovation within the field of ophthalmology and research into eye disease,” says Wilmer Director Peter J. McDonnell, M.D. “The professorships he is establishing will accelerate the work of the next generation of Wilmer faculty, leading the way to better understanding and treatment of the major retinal and corneal diseases.” ●

Your gift will ensure Wilmer’s legacy continues through education, treatment and research. Consider these opportunities to leave a meaningful legacy and account for your personal goals.



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Feedback?

Send letters to Jessica Wilson at the above
address or email jwilso28@jh.edu
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This image was originally published in the Retina Image Bank® website. Brenda Fallas. Persistent Fetal Vasculature. Retina Image Bank. 2018; Image Number 28184. © the American Society of Retina Specialists.



Above – Left: persistent fetal vasculature (PFV); right: ruby brittle star

Looking Back

“Marine invertebrates and diseased human retinal arteries and veins have little in common except for their instantly recognizable and similar configurations,” noted Wilmer Director Emeritus Morton Goldberg, M.D., in explaining how he came to name the blood vessel malformation pictured in the image on the left.

“Years ago, I noted a blood vessel disease in human baby eyes with congenitally abnormal arteries behind the lens. I called the entire syndrome ‘persistent fetal vasculature.’ To me, the malformation resembled the ruby brittle star, *Ophioderma rubicundum*, which looks like a skinny red starfish, so I included it in my published Jackson Memorial Lecture for the American Academy of Ophthalmology in 1997.”

The moniker stuck. “Amazingly, [it] has become universally used since 1997,” he added.

Giving the Jackson Memorial Lecture marks the speaker as a premier ophthalmologist. Wilmer faculty members, past and present, who have given the lecture include Stuart Fine, Jonas Friedenwald, Morton Goldberg, Douglas Jabs, A. Edward Maumenee, Neil Miller, Arnall Patz, Harry Quigley, Al Sommer, Alan Woods and, most recently, Michael Repka, in October 2020.



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**Johns Hopkins Bayview
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