



Spring 2016

# SightLine

Wilmer Eye Institute at Johns Hopkins

## Taking Regenerative Medicine by STORM

Wilmer researchers are teaming up to capitalize on advances in stem cell research in the quest to cure blindness.





Dear Friends,

“Justice delayed is justice denied” is the oft-cited—but variously attributed—quotation that captures one positive tenet of our legal system. It recognizes the harm that may result when a citizen is wrongfully accused or injured in some way but may be forced to wait an excessive period before his or her proverbial day in court.

To my way of thinking, prompt attention to health problems is even more paramount—especially with the

eyes. When a person perceives that he or she has an eye problem—for example, pain or redness—or a recent decrease in vision, or even if the eyes seem fine but the person has a systemic condition that is known to affect the eyes, such as diabetes, there are many advantages to prompt evaluation, diagnosis and care. These include:

1. The peace of mind that comes from knowing that a problem, such as subconjunctival hemorrhage, which looks quite scary in the mirror, will resolve without worsening
2. The ability of a careful eye examination to detect whether a seemingly minor eye problem is in fact potentially serious
3. The higher likelihood of success with treatment for a problem that is in its early stages, compared to a disease process that is allowed to worsen over time and become severe
4. The cost savings to our society from the typically less costly intervention for problems in their early, milder stages
5. The improved quality of life enjoyed by patients who, thanks to the proverbial ounce of prevention, do not end up experiencing difficulties that can result from even successfully managed severe problems (the pound of cure)

It is therefore a pleasure to call your attention to Wilmer’s commitment to offer appointments on the same or following day whenever desired by a patient or the patient’s referring doctor (see p. 6 for more).

Our size and locations around the state, our skilled and caring physicians and staff members, and our single contact number—410-955-5080—that allows access to all of our doctors at all of our locations now make it routinely possible for us to offer virtually immediate attention to all who call with a concern.

May Wilmer serve you now?

Peter J. McDonnell, M.D.  
*William Holland Wilmer Professor and Director*

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Justin Hanes, center, in the lab with Kunal Parikh and Laura Ensign-Hodges.

# Future Suture

Spinning a solution to deliver infection-preventing drugs after eye surgery.

**W**ilmer's Justin Hanes, Ph.D., knows a thing or two about necessity and invention. As a chemical and biomedical engineer specializing in nanomedicine, he has developed numerous technologies that offer life-changing treatments to patients across the eye disease spectrum. He has co-founded two companies to commercialize his creations. And so, when Wilmer Director Peter McDonnell, M.D., wanted to develop a new sort of suture specifically for eye surgery, he knew exactly where to turn.

"Peter had identified this gap in the medical technology for a suture—specifically designed for eye surgery—that could be impregnated with antibiotics to prevent infections," Hanes says. "The challenge, engineeringwise, was huge."

Developing a drug-eluting suture for the eye is very complex, Hanes

explains. The suture must be thin and very strong. Those used in slow-healing corneal transplants, for instance, often must last a year or more. With the added requirement that the suture must also retain its strength after incorporation of a drug, the challenges became trickier still.

The thinner the suture, the larger the surface area-to-volume ratio is, meaning the drugs tend to escape too fast, Hanes says. His team also discovered that incorporation of drugs can make sutures weaker—too weak to be useful for surgical applications.

For inspiration, the team looked to nature, exploring how spiders spin their resilient threads. They also examined the science of rope making and worked with civil engineers to produce computer models of various fiber structures they might want to try.

Laura Ensign-Hodges, Ph.D., an assistant professor at Wilmer and a chemical and biomedical engineer like Hanes, helped investigate various

For inspiration, the team looked to nature, exploring how spiders spin their resilient threads. They also examined the science of rope making.

We're now using this electrospinning technology to make drug-eluting sutures for vascular surgery and unique medical devices for glaucoma, and we are also spinning drug-carrying polymers around other devices to make the devices infection-resistant.

—Justin Hanes

electrospinning methods with a team of talented faculty members and students that also included biomedical engineering professor Hai-Quan Mao, Ph.D., and graduate student Kunal Parikh.

“Normal sutures are made of a single thread of polymer—a monofilament,” Ensign-Hodges says. Though the team succeeded in using electrospinning to create drug-loaded polymeric monofilament structures, these were often one-third the strength necessary for clinical use.

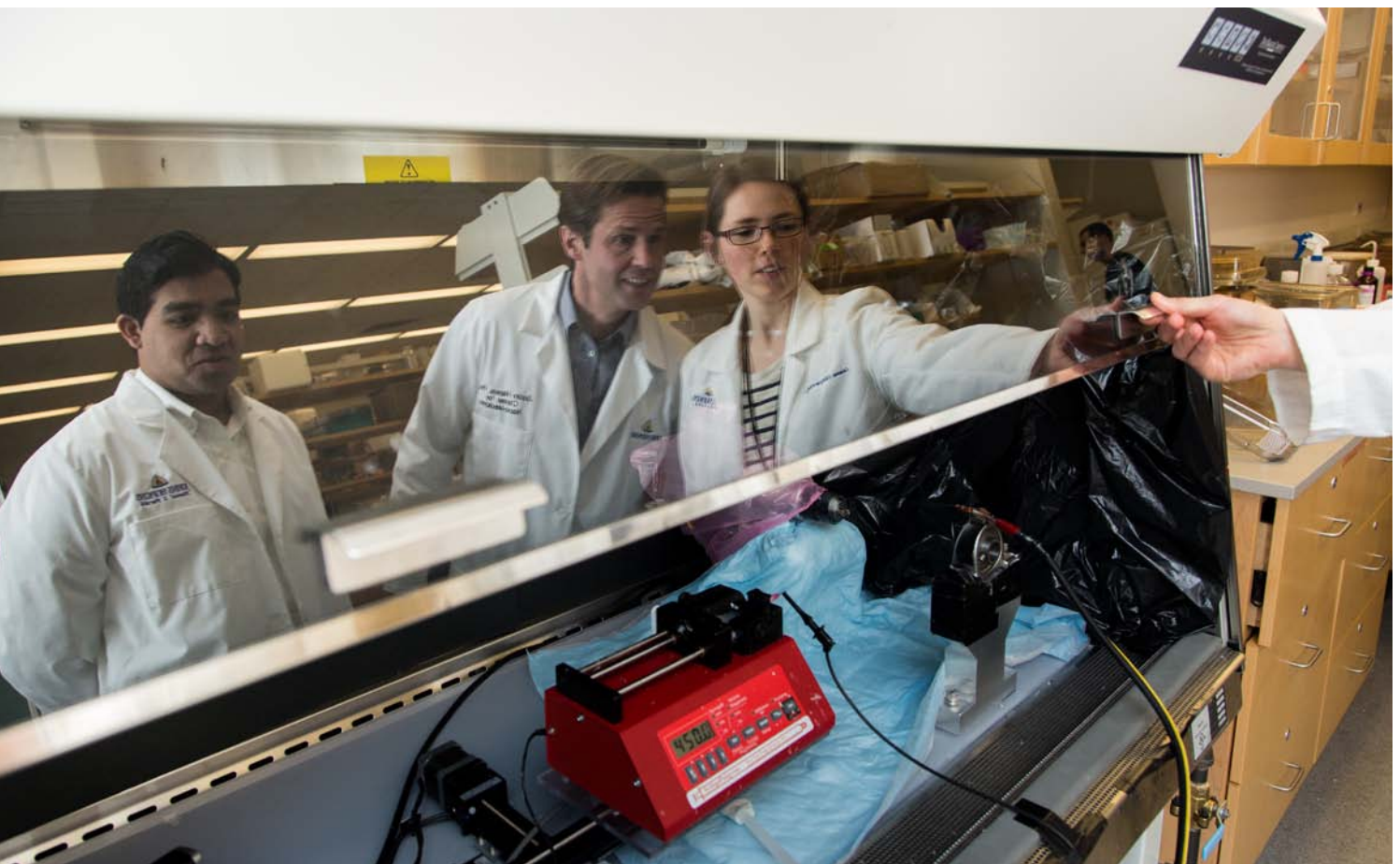
After months of work, Parikh found success by building a state-of-the-art spinning system in-house. It begins with a solution of a quick-drying solvent in which molecules of antibiotic drugs are swirling alongside billions of tiny polymer chains. The solution is pressed through a tiny aperture, similar to the way medicine is dispensed from a syringe. As the solvent-drug-polymer cocktail travels through the opening, the polymer

chains align into nanofibers—each 100 times thinner than a human hair.

The solution is electrically charged as it exits the aperture, and the now-charged solution gets attracted to two metal plates, thus forming a thin thread of drug-containing polymer. These nanofibers are then twisted together by the spinning system into a single thread—a multifilament suture. The nanosuture, as the team has dubbed it, is both strong and capable of releasing incorporated drugs over long periods of time, up to many months. The drug nestles comfortably within the fibers.

The next step was to test whether the antibiotic-eluting suture would reduce the rate of ocular infections in laboratory animals. The results showed that the technology was 100 percent effective in preventing ocular infections.

“The team could not be more excited about the potential of this technology,” Hanes says. “We’re now





**Kunal Parikh's in-house spinning system produces a multifilament suture that is capable of releasing incorporated drugs over long periods of time.**

using this electrospinning technology to make drug-eluting sutures for vascular surgery and unique medical devices for glaucoma, and we are also spinning drug-carrying polymers around other devices to make the devices infection-resistant.”

The scientists are also exploring the use of other medicines, including steroids, immune suppressants and drugs that prevent unwanted cell growth. The team working on this technology has grown from a few to more than 15 people, including engineers, ophthalmologists and vascular surgeons.

Of course, groundbreaking

research like this does not happen simply because people wish it so. There is usually some forward-thinking donor who sees the promise and stakes the researchers with the considerable funding necessary to get their ideas off the ground. In this case, that donor was the Robert H. Smith Family Foundation.

The results to date have been due to a true team effort, Hanes says. McDonnell had the vision, and Hanes, Mao, Ensign-Hodges and Parikh brought the engineering skill. But it was the foundation's financial support that allowed the researchers to purchase critical equipment and build

a team.

“Now it's time to push to make the first-generation, antibiotic-eluting nanosutures using a commercial process as we begin the hard work of preparing to test them in humans. But it is also time to go beyond sutures to medical devices with this technology. The possibilities are only limited by our imaginations in this next-generation stuff,” Hanes says.

“It's really fun for me, personally,” Ensign-Hodges says. “We're engineering unique solutions to real clinical problems that haven't been solved before.” ■

# The Doctor Will See You Now

**A**mid the groundbreaking research and world-renowned specialists treating some of the rarest and most complex eye diseases at the Wilmer Eye Institute, it's easy to miss the fact that Wilmer is a caring, full-service ophthalmic center.

Every day, Wilmer ophthalmologists see patients for everything from general checkups to contact lenses to laser eye surgery to treatment of nonemergency conditions, such as cataracts, dry eye and pinkeye. In addition to its flagship location at The Johns Hopkins Hospital, Wilmer operates eight satellite offices throughout Maryland, from Bethesda to Bel Air, and many of these locations provide this broad array of services.

Such services fall under the auspices of the Division of Comprehensive Eye Care. And now, thanks to recent initiatives, the division is pleased to routinely offer patients same-day access.

"Comprehensive care is the first stop for most new Wilmer patients. We're the front line, and it was critical that we be able to offer same-day appointments to every single patient," says Ashley Behrens, M.D., who heads the division and its team of ophthalmologists, optometrists



**Teaming up to provide same-day access: Ashley Behrens, Gina Locco and Eric Singman**

and support staff. "Time is often of the essence for many of these patients."

Charged by Wilmer Director Peter McDonnell, M.D., to ensure the most patient-centered care possible, including same-day appointments for any patient or referring doctor who wishes one, Behrens began in earnest in August 2014 to carve out a strategy. To assess the magnitude of the task, he began by mapping the number of calls per day throughout the system. Behrens and his team then set about sizing up the division's ability to meet the demand and evaluate what it would take to meet the same-day goal.

The need is great, with Wilmer last year caring not only for patients from throughout Maryland but from all 50 states and 84 foreign countries. In the course of the assessment, the team determined that the comprehensive division would need to provide approximately 1,000 same-day appointments per month. With a complete picture of the need, the division was able to institute operational changes and expand staff, recruiting new optometrists—five in the last year alone—and ophthalmologists.

The verdict is in. “We’ve seen a 35 percent growth in patients,” Behrens says. “Many patients are shocked when we offer appointments on the spot, but they love it.” Not only are they offered an appointment right away, should they wish one, but Behrens insists on short wait times for patients who arrive at Wilmer’s comprehensive clinic. “All patients should have their examination process begin within 15 minutes of their arrival—hopefully sooner,” he says.

Partnering with Behrens was Cathy Kowalewski, who as Wilmer’s administrator played a key role in the operational transformation necessary to make the vision a reality.

“The funny thing is that while same-day availability delights most patients, not that many can accept because they already have something scheduled that day. Still, it’s a nice thing to be able to offer, and it goes a long way to establishing Wilmer’s responsiveness to patient needs,” she says, noting an additional patient-friendly option: Spanish-speaking providers for patients who are more comfortable speaking in their native tongue.

For the past seven months, Wilmer’s call center has met the goal of 1,000 same-day appointments per month.

“The Wilmer call center is all about patient satisfaction and customer service. We’re patient-centered, and this same-day service is a key part of that,” says Gina Locco, who manages the call center.

Years ago, while he was an ophthalmologist in private practice, Eric Singman, M.D., Ph.D., would often refer patients to Wilmer, so he knew the frustration some felt at having to wait for appointments. He has since joined Wilmer’s General Eye Service, where he has been overseeing the resident teaching clinic and partnering in executing a similar same-day strategy since 2013.

“The first thing we did was expand service by staggering our front desk staff between 7:30 a.m. and 6 p.m. Then, we brought in additional specialists,” Singman says. “We cut the wait for appointments from weeks to days. Now, it’s same-day. Period.”

Behrens has implemented a survey system to closely track patient response, with numerical data quantifying how good a job Wilmer is doing at delighting its patients.

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—Eric Singman

Singman still prefers good, old-fashioned direct patient feedback, which, he says, has been overwhelmingly positive.

Another measure of that positive vibe has been a substantial increase in patient donations, which have significantly increased, according to Singman. Those donations have been used by Singman to purchase new equipment for the clinic, such as a laser for retinal treatments, that can further reduce waits, and also to support research aimed at developing new therapies for patients for whom current treatments are either lacking or inadequate.

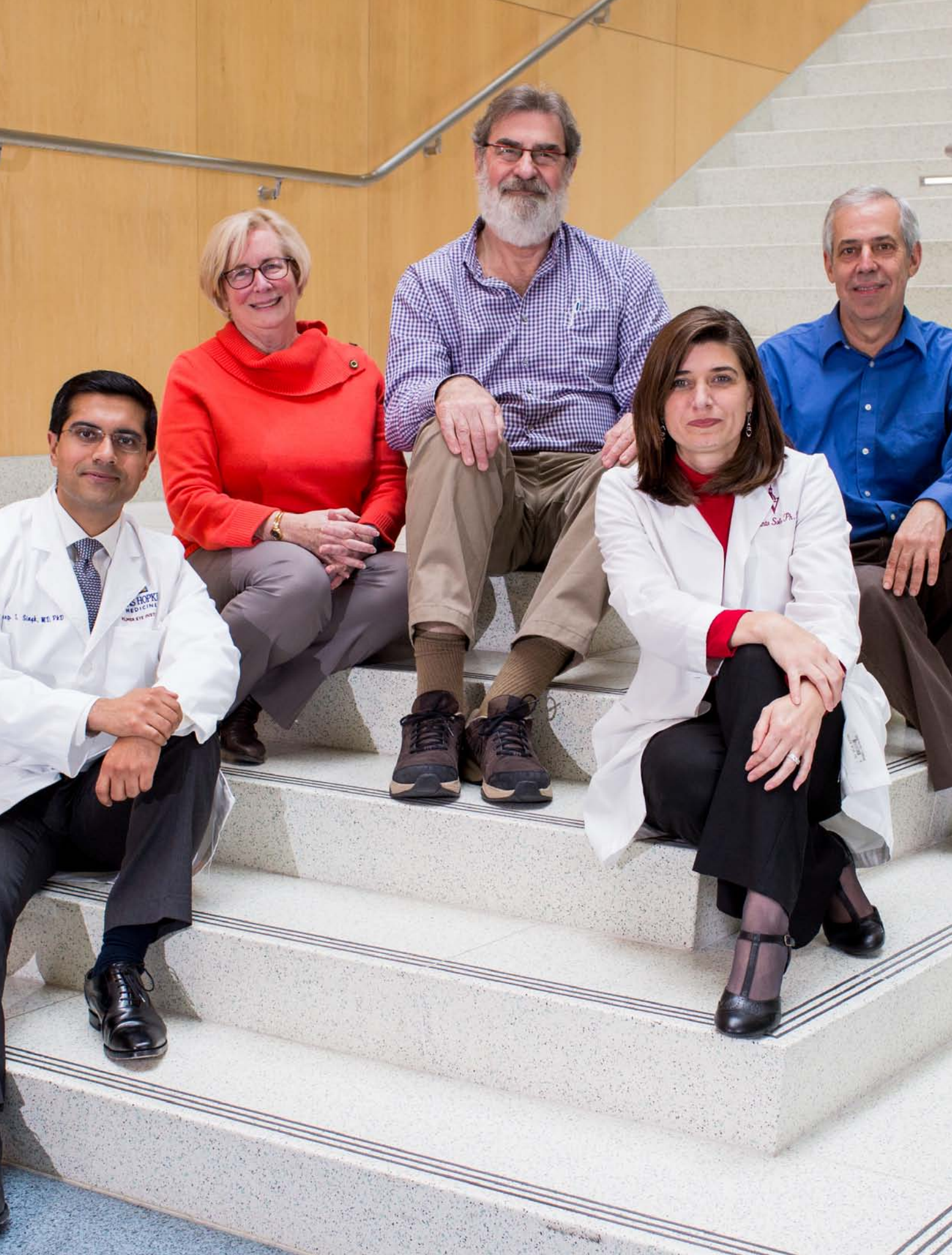
Another important partner in the effort to enhance service at Wilmer is Elliott Myrowitz, O.D., M.P.H., whom Behrens credits with searching the country to recruit outstanding optometrists to help meet the needs of Wilmer’s enormous and rapidly growing patient population.

Not willing to rest on the division’s laurels, Behrens is thinking ahead.

“It’s a never-ending story,” he says. “Just when we reach our goal, patient load increases. It’s never, ‘Hey, we achieved this and now we can relax.’ No, we must keep expanding and learning how we can delight our patients with the service we provide. Hopefully that will continue. The work is never done.” ■

Members of the Wilmer call center









# Taking Regenerative Medicine by STORM

“What’s in a name?” Shakespeare once asked, likely never anticipating just how many ways his simple query might be applied. The term “stem cell” is a perfect example. Most people have heard it. Many even understand the notion that stem cells are a very powerful biological tool and potential therapy. But what is in that name is something more: the kernel of a medical revolution that is only just beginning.

Teaming up for a "man on the moon" effort to cure blindness using stem cell therapies. Left to right, Mandeep Singh, Shelia West, Luty, Valeria Canto-Soler and Don Zack.

Stem cells are the raw material by which human tissues and, perhaps someday, whole organs might be regenerated in the lab from single cells. Stem cell regenerative medicine offers the prospect of studying and treating injuries and diseases of the eye as never before.

In the most basic sense, the earliest human stem cells that can be derived in the lab have the ability to become every other type of cell—heart cells, blood cells, lung cells, pancreas cells, retinal cells, corneal cells, blood vessels and so forth. Most importantly, and most tantalizingly, stem cells are healthy cells that may someday be used to replace dead, dying or broken cells to cure any number of diseases, including blindness.

In stem cells rest the hopes of millions of medical patients and the aspirations of thousands of researchers the world over.

“Regenerative ophthalmology is one of the most exciting things to come down at Wilmer since Arnall Patz discovered that oxygen therapy was bad for babies,” says Sheila West, Ph.D., Pharm.D., the vice chair for research at Wilmer, harkening to a time when the renowned former director of the Wilmer Eye Institute made his famous discovery that reduced the incidence of childhood blindness by as much as 60 percent in the early 1950s.

One of the most promising parts of the body for stem cells is the eye—and ocular regenerative medicine is a strong point of the Wilmer Eye Institute. Consider these recent headline-grabbing breakthroughs:

**Don Zack, M.D., Ph.D.**, a specialist in molecular biology and genetic engineering at Wilmer, gained international attention recently when his lab was able to utilize genomic engineering technology to regenerate retinal ganglion cells (RGCs). RGCs have fibers, called axons, which make up the optic nerve. The optic nerve acts like a telephone cable, transferring visual information from the eye to the brain. In glaucoma, as well as multiple sclerosis and other forms of optic neuropathy, the optic nerve becomes damaged, and the eye is unable to communicate with the brain. Zack’s research could one day lead to restorative treatments, perhaps even the potential of restoring vision by transplanting retinal ganglion cells.

**Valeria Canto-Soler, Ph.D.**, an assistant professor of ophthalmology at Wilmer, drew headlines worldwide when she mastered the process of generating tiny, light-sensitive, three-dimensional “retinal cups” in her lab. These “miniature retinas” grown from stem cells are structurally identical to the human retina and respond to light as the normal retina does. The hope is that individualized, lab-grown, healthy photoreceptors, retina pigment epithelia and perhaps other types of cells can be harvested from these miniature retinas for transplant.

**Gerard Lutty, Ph.D.**, a professor of ophthalmology at Wilmer and an expert in the development of blood vessels in the eye, collaborated with Elias Zambidis, M.D., Ph.D., an associate professor of oncology at Johns Hopkins Medicine and an expert in stem cells derived from bone marrow, to co-author a paper in the journal *Circulation* in which they described their ability to regenerate blood vessels in retina and choroid under retina—a key step in repairing diabetic retina and successful treatment of age-related macular degeneration.

Of course, cell regeneration is only part of the picture of regenerative medicine. Other researchers will be called upon to study the causes and treatment options and to test applications in clinical trials. One of those researchers is Mandeep Singh, M.D., Ph.D., an ocular surgeon at Wilmer and an expert in the surgical transplantation of regenerative cells. As a doctoral student, Singh restored sight to a blind mouse using transplanted regenerated cells. He joined Wilmer to explore and perfect the surgical techniques and technologies necessary to get stem cells to take root and generate new tissues in the eye.

## A Team Approach

Once, these researchers at Wilmer worked alone or in small collaborations, usually in isolation. Now, they are all members of the newly formed Center for Stem Cells and Ocular Regenerative Medicine, or STORM.

Led by Wilmer, STORM is a multidisciplinary team of specialists from across Johns Hopkins who are pursuing the dream of studying and eventually curing vision loss and blindness through regenerative medicine. STORM will also

I believe there is no other institution than Wilmer better positioned to bring regenerative therapies to reality. But, as exciting as the possibilities are, they are also expensive. To take STORM and Wilmer to the next level in regenerative medicine, we need sufficient funding. It's critical to the future.

—Valeria Canto-Soler

*assistant professor of ophthalmology at Wilmer*

collaborate with experts in regenerative medicine at other research institutions.

“There has been a lot of enthusiasm lately throughout the medical world about advances in stem cell research, but the eye has been a particular exciting and promising area for many reasons,” says Zack.

STORM, he says, was formed to capitalize on synergies among disciplines and to integrate the considerable expertise found in-house at Wilmer and Johns Hopkins more broadly.

“I’m not aware of another similar regenerative medicine program that unites such a diverse group of disciplines,” Zack says. “Wherever the best people are, we want to work with them.”

One of STORM’s first areas of focus is a multidisciplinary regenerative approach to curing retinitis pigmentosa, a degenerative disease of retinal photoreceptors and retinal pigment epithelial (RPE) cells caused by various genetic mutations. RP causes vision loss—and often blindness. Early efforts at replacing photoreceptors have not yet succeeded because the transplanted cells have failed to thrive and integrate. STORM’s innovative approach will attempt to transplant a collection of photoreceptors and RPE cells to encourage survival and function of the transplanted cells.

## ‘Man on the Moon’ Effort

STORM is a result of a new five-year strategic research planning process at Wilmer. West, who is leading the research strategic planning process, says that, despite Wilmer’s clear leadership in regenerative ocular medicine, the impressive research to date had not been coordinated and integrated. It was driven individually by various faculty members based on their own research interests and funding resources. Now, she says, “we are working toward a team effort,” with each team building upon the work and success of the other teams.

“In the simplest terms, we’re interested in using stem cell therapies to cure blindness,” Zambidis says.

“This is a ‘man on the moon’ effort for Wilmer—a

daring goal,” West says. “Wilmer benefits simply by thinking big and setting the goal. This is the first time we’ve set out a Wilmer-wide research goal that stretches from the lab bench to patient bedside.”

So much has been written and said about the promise of stem cells that Zack sounds a cautious note. Sometimes fiction can get ahead of fact. Zack notes that with all the lofty potential rewards, there are risks, both technically and ethically. Even the most rosy scenarios put potential cures multiple years into the future, he says. An important consideration is to shield patients from unrealistic expectations and from potentially dangerous and unproven treatments.

“With so much hype, it’s easy for patients to get overly excited,” Zack says. “STORM is on the cutting edge, of course, but it will study new therapies in an ethically and scientifically sound way, using state-of-the-art clinical trial approaches.”

While STORM was founded to unite complementary disciplines into a focused team, it was also founded to generate all-important, difference-making donor interest in the remarkable breadth of the effort and the potential for good.

“I believe there is no other institution than Wilmer better positioned to bring regenerative therapies to reality,” Canto-Soler says. “But, as exciting as the possibilities are, they are also expensive. To take STORM and Wilmer to the next level in regenerative medicine, we need sufficient funding. It’s critical to the future.”

For Zack, an ophthalmologist who recently gave up his 25-year clinical practice to focus full time on his research, the bigger goal is always on the horizon.

“Maybe not tomorrow, but someday, regenerative medicine has the potential to allow us to not only preserve vision but to restore it,” he says. “As a clinician, I learned how important sight is to people and what happens when it’s lost. Helping those people is what keeps us going. That’s what keeps us working so hard. We know we will get there.” ■



# An Uncommon Effort to Beat Coats' Disease

Soon after his 5th birthday, Sean Smole went to his ophthalmologist for a regular eye exam, and the doctor found nothing amiss. Sean was challenged by a slight astigmatism, requiring him to wear glasses since age 2, but he was otherwise a healthy kid.

Just 10 months later, Sean was blind in his right eye.

"Our whole world changed in an instant. We raced to Wilmer. And I played Mama Bear," says Sean's mother, Barbi Smole.

Sean was suffering from Coats' disease, a rare eye condition, striking most often in childhood, in which blood vessels in the retina leak blood and fluid into and behind the retina, causing an often-permanent loss of vision. Because Coats' typically strikes children, it often goes undiagnosed until it is too late. Sean had said nothing to his mother.

At Wilmer, Sean was placed in the care of ophthalmologists James Handa,

M.D., and Michael Repka, M.D. Handa performed a series of laser surgeries on Sean's eye to stanch the flow of fluid into his retina.

With the root cause under control, Sean began a series of procedures to regain as much sight in his eye as possible. His care included wearing a patch over the good eye to force the weakened eye to perform. Repka monitored him for common side effects, amblyopia and strabismus, commonly known as lazy eye and wandering eye.

"Often, with Coats', the bad eye just shuts off development of vision in the brain," Handa explains. "The brain learns to use only the good eye. It's a natural adaptation. As his retina



Michael Repka

improved, we put a patch on Sean's good eye to force the brain to switch to the bad eye to strengthen it. The brain has this wonderful plasticity to recover."

If Coats' disease is caught soon enough, some vision can be restored. Sean's mother calls him a "miracle child"—his vision in the affected eye has returned to 20/50. That is good enough to allow him to get a driver's license when he turns 16, Handa says, even if he were to lose vision in the good eye.

"Sean was lucky. He had attentive, proactive parents. They knew something was wrong, and they acted," Handa says.

As remarkable as Sean's good fortune and excellent care were, however, the real story was only beginning. It turns out that Barbi was no stranger to Coats' disease. Her cousin had



James Handa

suffered a similar fate 10 years earlier. She was disheartened to learn that the treatments, drugs and alternatives for Coats' sufferers had not changed in the intervening decade.

"That doesn't make sense. We can change that," she recalls thinking. From there, Barbi's instincts took over: "We got the ball rolling."

She soon founded the Curing Coats Fundraiser and began planning a series of events with her husband, Kevin, and her children, Samantha, Sydney and, of course, Sean. The first, a "big ol' party," was hosted at her home. It included cocktails and desserts, as well as a silent auction. A year later, a second fundraiser, complete with donated food trucks and live music, also included a raffle. The two events combined have produced \$32,000 in donations directly to Wilmer.

"We did it all just by reaching out to friends and family," Smole says.

The beneficiary of Barbi's drive has been Akrit Sodhi, M.D., Ph.D., assistant professor of ophthalmology at Wilmer. Sodhi is an expert in the complex biochemistry of the retina. He has been on the trail of gaining a better understanding of what causes diseases like Coats' to help develop the very latest treatment options available.

"Coats' is rare and therefore little studied, but that's where the Smoles really helped. They have raised some funding to start research, but more than that, they have raised awareness of Coats'," Sodhi says.

In particular, Sodhi has been focusing on the chemical pathways in the eye that cause the body to create new blood vessels, leading to the dangerous leakages in the retina. His lab has enjoyed some success and has published papers on why blood vessels grow and leak in diabetic eye disease, but the Smole funding will help him hire a study coordinator to help collect and study fluid samples specifically from patients with Coats' disease. Sodhi hopes to attract corporate partners to help drive this research forward.



**Akrit Sodhi with Barbi and Sean Smole, whose vision in his Coats'-affected eye has returned to 20/50.**

Beyond helping children lead healthier lives, there is additional promise for the work: Coats' disease shares similarities with the types of blindness experienced in patients with other diseases, including diabetic eye disease and wet macular degeneration—holding out the potential that discoveries made while researching Coats' might apply to more common forms of blindness.

For now, however, the doctors in charge of Sean's care and in the search for a cure for Coats' stand in awe of the force that is Barbi Smole.

"We are very fortunate that there are many generous patients out there who want to contribute to research. What's not common is for someone to start a foundation and to fundraise all on her own and do such an effective job at it," Sodhi says. "But I think I would use any word other than 'common' to describe Barbi Smole." ■

Coats' is rare and therefore little studied, but that's where the Smoles really helped. They have raised some funding to start research, but more than that, they have raised awareness of Coats'.

—Akrit Sodhi

# Progress in the Quest to Treat ‘Eye Stroke’

Dr. Miller does wonderful work, and I know firsthand the importance of such research, so it was clearly a good and deserving cause. I’m doing this not for my generation, but for the next and the one beyond that.

—Allan Holt

Usually, a patient will awaken one morning with sudden, often painless, vision loss. It is the first indication of nonarteritic anterior ischemic optic neuropathy, or NAION, for short.

“At first, the patient may dismiss it, thinking it will go away. Then, after a few days, he or she realizes it’s not going away,” says Neil Miller, M.D., a professor of neuro-ophthalmology at Wilmer, who is among the world’s leading experts on NAION.

In the very simplest terms, NAION is a stroke within the eye occurring near the head of the optic nerve, called the optic disc. It causes reduced blood flow, swelling and optic nerve damage that leads to vision loss. NAION is the leading cause of sudden optic nerve-related vision loss in people 50 and older.

Occurring without warning, the vision loss is typically stable, neither worsening or improving over time, although in about 10 percent of cases, the visual loss progresses over several days to a week or so.

Some 10,000 people in the United States develop the condition each year. More troubling, however: As many as one in five patients who experience NAION in one eye will have it happen in the second eye within five years. The outcome is devastating for the patient. Loss of livelihoods, emotional distress, inability to perform daily activities, such as driving and reading, and general loss of freedom are but a few of the more serious consequences. Until now, NAION has been understudied, Miller says, and little is known about its causes or its cures.

There are currently no drugs or surgeries that have shown consistent results in helping those with the condition, but Miller, in collaboration with colleagues at Wilmer and in the Department of Ophthalmology and Visual Sciences at the University of Maryland Medical Center, is leading the field in new directions. Their work to understand the root causes of the disease and its potential treatments is bolstered by recent developments both in genetics and in pharmaceuticals that are helping to alleviate NAION’s severity once it has struck.

“We were the first to develop reproducible animal models of the



Shelley and Allan Holt



Neil Miller, second from left, with his Wilmer team. Their work could hold promise for other forms of stroke as well.

disease in rats, mice and monkeys, and to show that much of the damage that occurs in both experimental and human NAION is due not to the optic nerve stroke itself but to an inflammatory reaction that develops after the stroke,” says Miller. “We are now testing a range of compounds that attack inflammation and are showing promise.”

The hope borne in those drug options has as much to do with how the drug is delivered as it does the drug itself. Individual molecules of the active drug N-acetyl cysteine—which has been shown to protect damaged nerves—are encapsulated in a nanoparticle called a dendrimer, which enables the drug to reach its intended target.

Dendrimers were developed by another Wilmer researcher, Kannan Rangaramanujam, Ph.D. According to Miller, dendrimers remarkably go directly and exclusively to the site of inflammation and thus can be configured to deliver a drug directly to that site. Since inflammation plays a major role in the severity of NAION, Miller says, dendrimers hold great promise in its treatment.

In the process of his research, Miller is bringing hope to thousands who, until now, were sentenced to suffer without prospect of relief or improvement. Among those whose family has been touched by NAION

is that of Allan and Shelley Holt, philanthropists in the Washington, D.C., area.

“We first became aware of NAION when my dad developed it and became a patient of Dr. Miller’s. Then, my sister also developed it, so I have a particular interest in this kind of research,” says Allan.

He says that he was impressed with Miller’s manner and then by the promise in his work. When Allan was presented with a funding proposal, it was an easy decision to make for him and his wife, who together direct The Hillside Foundation, a family foundation.

“Dr. Miller does wonderful work, and I know firsthand the importance of such research, so it was clearly a good and deserving cause. I’m doing this not for my generation, but for the next and the one beyond that,” says Allan.

For his part, Miller is profoundly grateful to the Holts and to other donors for their selfless contributions. “It’s a vicious cycle. You can’t get government funding without preliminary work, but you can’t do preliminary work without funding. That’s why you need private philanthropy like that of Mr. Holt and his wife. These personal gifts mean everything to my work.”

To that end, Miller says that the fruits of his research are not

restricted to a relatively rare—albeit devastating—ophthalmic disease but could potentially hold promise for other forms of stroke as well, including those in the brain. “After all,” says Miller, “the optic nerve is a part of the brain. Thus, we have every reason to believe that the drugs and techniques we use for NAION can be applied to brain strokes.” ■

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—Neil Miller

# A Bumper Crop of New Faculty Members

**R**eflecting Wilmer's rapid growth in both its clinical and research programs, this academic year has been a busy one for the institute's search committees. After international searches, Wilmer has added 20 stellar new faculty members to its ranks here in Baltimore and at its affiliated King Khaled Eye Specialist Hospital in Saudi Arabia.

**Alison Abraham**, *associate professor of ophthalmology (PAR), Dana Center for Preventive Ophthalmology.*  
*Location: Dana Center*

Abraham earned a master's degree in biomedical engineering while working for United Cerebral Palsy designing assistive technology. She then pursued a research career at the Harvard School of Public Health, becoming interested in epidemiology. She joined Johns Hopkins in 2002, graduated in 2008 with a Ph.D. in epidemiology and a master's degree in biostatistics, and joined the faculty in the Department of Epidemiology at the Johns Hopkins Bloomberg School of Public Health, working with the Statistics in Epidemiology group. Currently, with a team of Dana Center faculty members and Atherosclerosis Risk in Communities Study investigators, Abraham is delving into the intersection of vision and neurocognitive function to develop a screening tool for early Alzheimer's disease.

**Amanda Bicket**, *assistant professor of ophthalmology, Division of Glaucoma.* *Location: Glaucoma at Bethesda, Johns Hopkins Bayview Medical Center and East Baltimore*  
Bicket specializes in glaucoma. Her research focuses on novel intraocular devices and minimally invasive glaucoma surgery techniques. She earned her M.D. from Duke University, where she received the William G. Anlyan Senior Merit Scholarship and published research on computer-automated diagnostics for pediatric eye disease. She completed an internship at Memorial Sloan Kettering Cancer Center before completing her residency in ophthalmology at Wilmer. She returned to Duke for a fellowship in glaucoma prior to joining the Wilmer faculty.

**Thomas Bosley**, *professor of ophthalmology (PAR), Division of Neuro-Ophthalmology.* *Location: Neuro-Ophthalmology at Johns Hopkins Bayview and East Baltimore*

Bosley has been particularly involved in genetic abnormalities affecting human vision. He received his bachelor's degree from Yale and his M.D. from Stanford. He completed his neurology residency at the Hospital of the University of Pennsylvania and became board certified in neurology in 1983. His training also included fellowships in neurochemistry at the Institute of Neurology in London and in neuro-ophthalmology at Wills Eye Hospital in Philadelphia. Bosley later joined the neuro-ophthalmology unit at Wills, practicing there and at other teaching hospitals in the Philadelphia area for the next 15 years. Since then, he has spent considerable periods in Riyadh, Saudi Arabia, as one of the very few neuro-ophthalmologists in the Middle East. In the past, Bosley has been chief of two neurology departments and two neuro-ophthalmology divisions. He has been director of two neurology residency programs. He also founded a neurology residency program and a neuro-ophthalmology fellowship program.

**Lindsay Ciocco**, *instructor of ophthalmology, Division of Optometry.* *Location: Optometry at Odenton, Johns Hopkins Bayview and the Johns Hopkins Outpatient Center Vision Center*  
Ciocco earned both her O.D. and B.S. from The Ohio State University. After graduation, she served four years as an Army officer, providing eye care for service members, retirees and their families at a military treatment facility. Prior to joining Wilmer, she completed a residency in ocular disease and surgical co-management at Omni Eye Specialists, a private, multispecialty ophthalmology practice in Baltimore. She also completed the requirements to obtain board certification from the American Board of Optometry and is a fellow of the American Academy of Optometry.

**Laura Di Meglio**, *instructor of ophthalmology, Division of Optometry.* *Location: Optometry at White Marsh, Green Spring Station and East Baltimore*  
Di Meglio completed her undergraduate degree at McMaster University in Ontario, where she earned her





B.S. in biochemistry and biomedical sciences. She earned her O.D. from the New England College of Optometry in Boston. She completed the Cornea and Contact Lens Residency at the New England College of Optometry.

**David Glasser**, *assistant professor of ophthalmology, Division of Comprehensive Ophthalmology. Location: General Ophthalmology at Columbia*

Glasser earned his undergraduate degree from Rensselaer Polytechnic Institute. He completed his M.D. at Albany Medical College, his residency at the UCLA Jules Stein Eye Institute, and a cornea and external disease clinical fellowship and corneal physiology research fellowship at the Medical College of Wisconsin. Prior to joining Wilmer, Glasser was in private practice. He served as head of cornea/external disease and later chief of ophthalmology at Patuxent Medical Group in Columbia, Maryland, where he was on the board of directors from 1997 to 2001. Since 2004, Glasser has served as the managing partner of Patapsco Eye MDs. For the past 14 years, he has also been a clinical associate professor of ophthalmology at the University of Maryland School of Medicine.

**David Gritz**, *King Khaled Eye Specialist Hospital – Saudi Arabia, Chief of Anterior Segment. Location: Saudi Arabia*  
Gritz earned his bachelor's and medical degrees from the University of Missouri–Kansas City through its six-year dual-degree program. He then interned at Los Angeles County + USC Medical Center, where he was Dr. Peter McDonnell's first research fellow. Gritz completed his residency at the University of Texas Health Science Center at San Antonio and his fellowship at the University of California, San Francisco/Francis I. Proctor Foundation. Prior to joining the Wilmer family, he was director of cornea and uveitis at Montefiore Medical Center/Albert Einstein College of Medicine.

**Praveena Gupta**, *assistant professor of ophthalmology, Division of Optometry. Location: Optometry at East Baltimore*  
Gupta joined Wilmer from the University of Texas Medical Branch in Galveston, where she was an assistant professor

and director of the Optical Center. She earned her O.D. from New England College of Optometry. Prior to that, she completed a Ph.D. in neuroscience at Jiwaji University in India, and then completed a postdoctoral fellowship in Batten disease at the University of Texas Southwestern Medical Center. She specializes in primary care optometry and is interested in studying treatments for dry age-related macular degeneration.

**Malin Howard**, *assistant professor of ophthalmology, Division of Comprehensive Ophthalmology. Location: General Ophthalmology at Columbia*

Howard earned his M.D. from the University of Kansas School of Medicine and completed his medical internship at St. Paul-Ramsey Hospital in Minnesota. He then worked with the U.S. Air Force as a flight surgeon. Afterward, Howard completed his ophthalmology residency at the Strong Memorial Hospital University Rochester Medical Center.

**Abdul Rauf Kamboh**, *King Khaled Eye Specialist Hospital–Saudi Arabia, Chief of Pediatric Ophthalmology. Location: Saudi Arabia*

Kamboh went to the University of London, where he received his medical degree. He completed his ophthalmology residency at Moorfields Eye Hospital in London and a fellowship in pediatric ophthalmology at Moorfields and Great Ormond Children's Hospital. He was a consultant, Royal College of Ophthalmologists tutor and head of department in the Birmingham area until 2013, when he went to Abu Dhabi for two years before returning to the U.K. and joining Johns Hopkins.

**Clarissa Kum**, *instructor of ophthalmology, Division of Neuro-Ophthalmology. Location: Optometry at East Baltimore and Odenton*

Kum is an optometrist primarily involved with the evaluation of pituitary tumor patients and monitoring/supportive care of other neuro-ophthalmic patients. She also provides comprehensive primary eye care, with special interests in ocular diseases, such as glaucoma and diabetes.

Kum completed her O.D. at SUNY College of Optometry, with a six-month externship at Bascom Palmer Eye Institute in Miami. After SUNY, Kum completed a one-year residency in hospital-based primary eye care and ocular disease at Memphis VA Medical Center.

**William May**, *associate professor of ophthalmology, Division of Comprehensive Ophthalmology. Location: General Ophthalmology at East Baltimore*

May completed his undergraduate degree at the University of California, San Diego, then attended medical school at the University of California, Davis. He completed his residency at the Doheny Eye Institute and pursued refractive fellowship training there with Dr. Peter McDonnell. May subsequently served as president of the Doheny Laser Center, teaching and administering a medical group of 25 ophthalmologists who handled laser eye surgery and associated procedures. He was in private practice in Los Angeles and taught at the Doheny Eye Institute, where he eventually became clinical professor of ophthalmology. May also had a part-time practice on Catalina Island. He began working for Wilmer in Saudi Arabia three years ago.

**Marco Mura**, *King Khaled Eye Specialist Hospital—Saudi Arabia, Chief of Retina. Location: Saudi Arabia*  
Mura is chief of the retina division at King Khaled Eye Specialist Hospital in Saudi Arabia. He worked for more than 10 years as a vitreoretinal specialist at the University of Amsterdam and has been the director of the Retina Center of the Zonnestraal Eye Hospital in Amsterdam. He has also been the director of the University of Amsterdam's vitreoretinal fellowship program. He earned

his medical degree from the University of Cagliari in Italy. His postgraduate training includes a residency in ophthalmology at the University of Cagliari and several retina fellowships at the Hamilton Eye Institute in Memphis, Tennessee; Moorfields Eye Hospital in London; and the Academic Medical Center in Amsterdam.

**Sherry Narang**, *assistant professor of ophthalmology, Division of Comprehensive Ophthalmology. Location: General Ophthalmology at Columbia*

Narang earned her B.S. from Gannon University's eight-year medical program. She then attended Drexel University College of Medicine and obtained her M.D. Narang next worked as an Akanksha volunteer and provided medical care and health education for indigent children in Mumbai, India. She completed her pediatric residency at Children's National Medical Center in Washington, D.C. She completed her ophthalmology residency and worked as an administrative chief resident at SUNY Downstate Medical Center prior to joining the Wilmer faculty.

**Fatemeh Rajaii**, *assistant professor of ophthalmology, Division of Oculoplastics. Location: Oculoplastics at Columbia*  
Rajaii earned her M.D. and Ph.D. (neuroscience) in the Medical Scientist Training Program at The Johns Hopkins University. She completed her residency training at Wilmer. She then moved to the University of Michigan W.K. Kellogg Eye Center for fellowship training in ophthalmic plastic and reconstructive surgery prior to returning to Wilmer as a faculty member. She is certified by the ABO and is a candidate member of the American Society of Ophthalmic Plastic and Reconstructive Surgery.



**Ashvini Reddy**, *assistant professor of ophthalmology, Division of Ocular Immunology. Location: Uveitis and Retina at East Baltimore and Odenton*

Reddy earned her M.D. from Baylor College of Medicine, where she also completed a research fellowship in pediatric ophthalmology, a medical internship and her residency in ophthalmology. She then completed a fellowship in uveitis and medical retina at the Bascom Palmer Eye Institute in Miami and served as the director of uveitis and ocular inflammation at the University of Virginia before joining the Wilmer faculty in 2015. Her specialties include ocular immunology and the medical treatment of retinal diseases.

**Amde Shifera**, *assistant professor of ophthalmology, Division of Ocular Immunology. Location: Uveitis at White Marsh and East Baltimore*

Shifera earned his M.D. from Addis Ababa University in Ethiopia and his Ph.D. in microbiology and immunology from Albert Einstein College of Medicine. He completed residency training in ophthalmology at the University of Florida and fellowship training in uveitis at Oregon Health & Science University. Shifera's practice is focused on uveitis and comprehensive ophthalmology.

**Mandeep Singh**, *assistant professor of ophthalmology, Division of Retina. Location: East Baltimore*

Singh is a retinal surgeon and clinician-scientist. He earned his bachelor's degrees in medicine and surgery from the National University of Singapore in 2001, and a master's degree in medicine in ophthalmology in 2005. He was elected as a fellow of the Royal College of Surgeons of Edinburgh in 2009 and of the Academy of Medicine of Singapore in 2010. He completed his fellowship

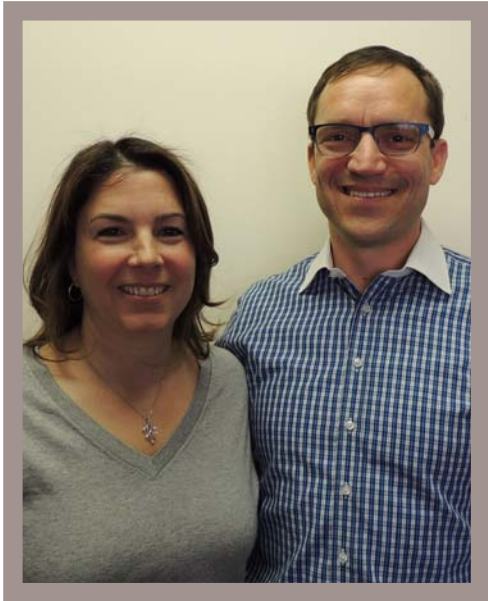
training in retinal surgery at the Oxford Eye Hospital and Moorfields Eye Hospital in London. He earned a Ph.D. in ophthalmology from the University of Oxford in 2014.

**Diego Strianese**, *King Khaled Eye Specialist Hospital – Saudi Arabia, Chief of Oculoplastics. Location: Saudi Arabia*  
Strianese trained at the school of medicine at the University of Naples Federico II before completing a fellowship at the University of British Columbia in Canada. Prior to joining the Wilmer faculty, Strianese was an academic assistant professor at the University of Naples Federico II, where he supervised residents for oculoplastic surgery and mentored oculoplastic fellows.

**Jung Soo Suk**, *assistant professor of ophthalmology, Nanotechnology Research. Location: East Baltimore*  
Suk is an assistant professor of ophthalmology at the Wilmer Eye Institute. He completed his undergraduate studies at Korea University and obtained his Ph.D. from the Department of Biomedical Engineering at the Johns Hopkins University School of Medicine. He joined the Center for Nanomedicine at the Wilmer Eye Institute as a research associate before appointment in 2015 to his current position. His research interests include characterization of physiological barriers to therapeutic delivery to lung, brain and eyes, and rational design of nanotechnology-based delivery systems and/or strategies. Specifically, his work largely involves developing nucleic acid-based nanomedicines for treating inherited or acquired diseases with identified genetic targets.



## The 2016 Wilmer Board of Governors welcomes two members:



**Cassandra Hanley** is executive director at Capital for Children, a donor-advised fund of private equity members from the Washington, D.C., region, that supports innovative organizations that educate and empower youth throughout the city. Prior to her work there, Hanley was on the board at Compass ProBono for eight years, serving as board chair for four of those years. During her time on the board, Compass expanded from Washington, D.C., to operate in Philadelphia, its budget grew by more than 300 percent, volunteer participation increased from 100 to more than 400 annually, and the number of nonprofits served annually grew from 20 to 70. Hanley received an M.B.A. from Harvard Business School and a master's degree of public policy from Duke University, where she was a Senator Jacob Javits Fellow. She received her undergraduate degree from State University of New York at Binghamton.

**Marc Sumerlin** is managing partner at Evenflow Macro, a global economic consulting firm. Previously, he spent 10 years as managing director of the Lindsey Group. He has traveled extensively to Japan, China, Saudi Arabia and Europe. From 2001 to 2002, Sumerlin served as deputy assistant to the president for economic policy and deputy director of the National Economic Council. In that capacity, he helped the president of the United States develop and implement his economic agenda. He also worked as an economic policy advisor for George W. Bush for President, after starting his career at the U.S. Senate Budget Committee. Sumerlin holds a master's degree in applied economics from The Johns Hopkins University and a master's degree in public policy from Duke University, where he was a Senator Jacob Javits Fellow. He graduated magna cum laude from Georgetown University.

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## Faculty Honors

### Esen Akpek, M.D.

- Editorial board of the *Journal of Ocular Pharmacology and Therapeutics*
- Tear Film and Ocular Surface Dry Eye Workshop II Steering Committee

### J. Fernando Arevalo, M.D.

- 2015: American Society of Retina Specialists' Rhett Buckler Award for Best Video, presented during the film festival of the American Society of Retina Specialists Annual Meeting
- 2015: Pan-American Congress of Ophthalmology's Gradle Lecture
- 2015: American Academy of Ophthalmology (AAO) Meeting Best of Show Video, awarded during the film festival of the AAO Annual Meeting
- 2015: AAO Meeting Best Poster, awarded during the film festival of the AAO Annual Meeting

### Susan Bressler, M.D.

- 2015: American Academy of Ophthalmology's Life Achievement Honor Award
- 2015: American Academy of Ophthalmology's Special Recognition Award
- 2016: John H. and Anna Marie Fish Memorial Lecture, Texas Ophthalmological Association

### Allen Eghrari, M.D.

- 2016 ARVO/Alcon Early Career Clinician-Scientist Research Award

### Laura Ensign-Hodges, Ph.D.

- 2015: Maryland Academy of Sciences Outstanding Young Engineer, sponsored by the Maryland Academy of Sciences and conferred by the Maryland Science Center to recognize and encourage the important work of young professional scientists and engineers residing in the state of Maryland and increase public awareness of their accomplishments

### James Handa, M.D.

- Exceptional Service Award from Palau, for 25 years of exceptional volunteer service to the country in the field of ophthalmology

### Justin Hanes

- 2015: Innovation in Biotechnology Award from the American Association of Pharmaceutical Scientists

### Harry Quigley, M.D., Ph.D.

- 2016: American Glaucoma Society honoree, an award given in the manner of a lifetime achievement award for contribution to the field of glaucoma research and clinical care

### Pradeep Ramulu, M.D., Ph.D.

- 2016: Lighthouse Guild's Pisart Award in Vision Science

### Hendrik Scholl, M.D.

- 2015: American Society of Retinal Specialists' President's Young Investigator Award
- 2015: Nominated as Best Consulting Physician and Best Physician 2015 of Johns Hopkins Medicine
- 2015: Moderator/panel organizer for AAO Retina Subspecialty Day's Inherited Disease Panel

### Akrit Sodhi, M.D., Ph.D.

- 2015: American Society for Clinical Investigation's Young Physician-Scientist Award
- 2015: Special Scholar Award from Research to Prevent Blindness Inc.

### Recipients of Endowed Professorships

**Albert Jun, M.D., Ph.D.:** Inaugural recipient of the Maurice E. Langham, Ph.D., Professorship of Ophthalmology

**Jeremy Nathans, M.D., Ph.D.:** Inaugural recipient of the Samuel Theobald Professorship of Ophthalmology

**Jennifer Thorne, M.D., Ph.D.:** Inaugural recipient of the Cross Family Professorship of Ophthalmology



Sheila West has been honored with ARVO's 2016 Joanne G. Angle Award. ARVO's highest service honor, it acknowledges outstanding volunteers and leaders who have made significant, continuous contributions to ARVO in support of its mission.

## The Knights Templar Eye Foundation Professorship Commemoration and a Celebration of Science and Art

Baltimore, MD | April 19, 2016

The Knights Templar Eye Foundation Professorship Commemoration and a Celebration of Science and Art, April 19, 2016. A historic day took place at the Wilmer Eye Institute on April 19th with two impactful celebrations: an endowed professorship commemoration and the acceptance of a Dominic Man-Kit Lam painting in honor of his two mentors, both Wilmer alumni, Nobel laureate Torsten Wiesel and David Paton.



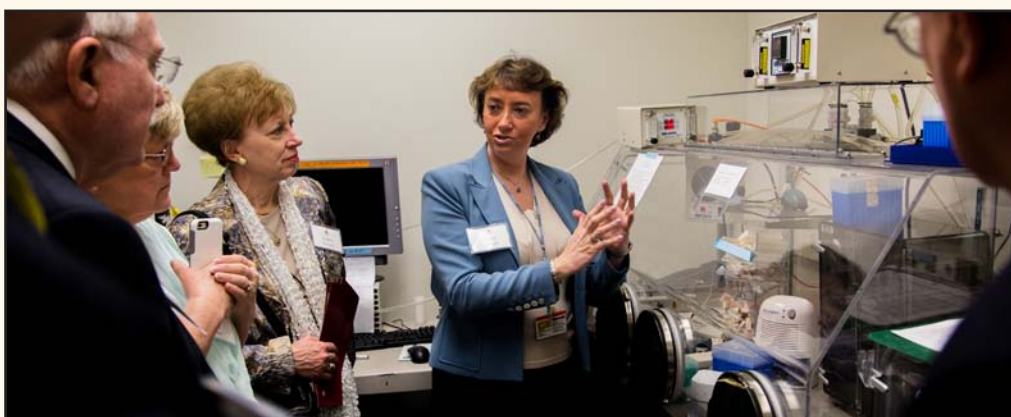
Nobel laureate Torsten Wiesel during his conversation with students, residents, graduate students and faculty members prior to the Celebration of Science and Art program.



The unveiling of the painting by Lam titled *If You Wish for a Grandeur Sight ... Walk Up a Floor to a Greater Height*, based on the poem *Ascending Stork Tower* by Wang Zhihuan (688–742). Left to right, Morton Goldberg, Torsten Wiesel, Dominic Man-Kit Lam, David Paton and Peter McDonnell.



Morton Goldberg introducing chief resident Ian Han to Wilmer's distinguished alumni visitors, Torsten Wiesel and David Paton.



Laura Asnagli, the 2014–2015 Career-Starter Grantee of the Knights Templar Eye Foundation, explains her research to the group. Left to right, William Jones, Lois Jones, Jeanne Karnegis and Laura Asnagli.

## Board of Governors Meeting Baltimore, MD | April 19, 2016



Peter McDonnell welcomes Wilmer's Board of Governors, Ann and Ted Reiver, to the spring board meeting and day of celebrations.

## Residents' Reception at the American Association of Ophthalmology Las Vegas, Nevada | Nov. 14, 2015



V.K. Ragu and Nagalakshmi Raju, sponsors of the Sustrata lecture at WRA Day, with Peter McDonnell during the reception at Madame Tussauds.

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