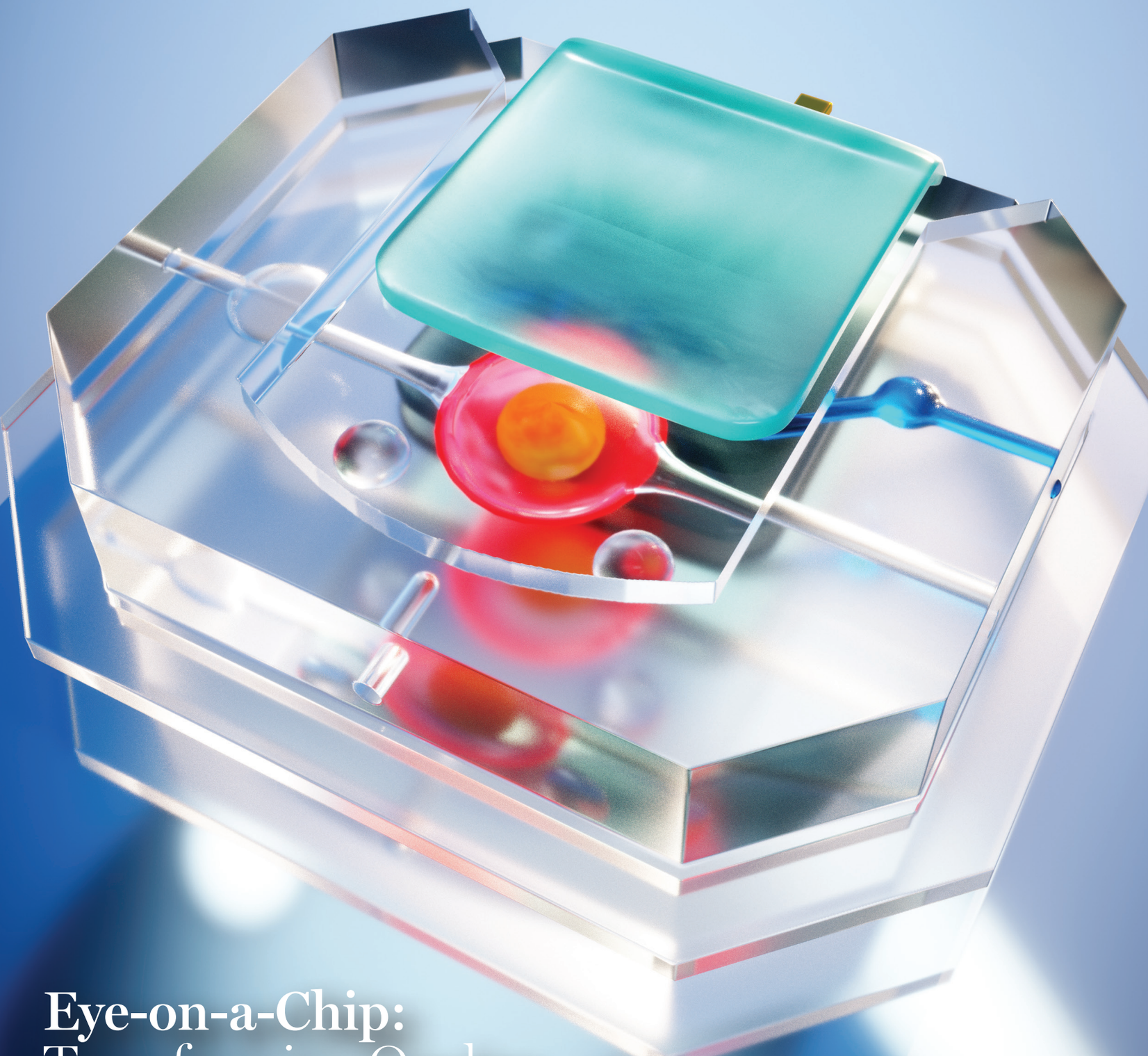
annual report 2019

scheie vision

Penn Medicine | Department of Ophthalmology



Eye-on-a-Chip: Transforming Ocular Disease Research

IN THIS ISSUE

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A MESSAGE FROM THE CHAIR

Welcome to the annual edition of *Scheie Vision*. Our Department has made exciting advances this past year, with remarkable progress in research, education, patient care, and community service – all of which you can read about in this issue.

Our faculty is committed to researching innovative treatments and therapies. Our basic science researchers regularly engage with our clinicians to translate discoveries from bench to patient care through numerous impactful clinical trials. In August, three faculty members collaborated with bioengineers to publish a cutting-edge research development in *Nature Medicine*, demonstrating the successful creation and testing of an artificial human eye model ("eye-on-a-chip") that can be used to study ocular diseases.

We also feature another cross-departmental project with Dr. David Brainard, Director of the Vision Research Center, whose R01 grant has led to important discoveries on color constancy. We are grateful to David for again submitting a renewal of his longstanding NIH P30 Core Grant, which enables ophthalmologists and vision scientists spanning many schools (School of Arts and Sciences, Dental School, Veterinary Medicine, Engineering, School of Medicine) to share research modules and ideas across disciplines. It is this sharing of diverse experience that allows for leading-edge discoveries at the intersection of distinct fields of knowledge.

Major strides were also taken this year in pediatric ophthalmology, one of our seventeen ophthalmic specialties. In March, Robert Avery of the Children's Hospital of Philadelphia (CHOP) received an NIH grant to study biomarkers of vision loss in children with optic pathway gliomas – one of the most common pediatric brain tumors. The Postnatal Growth and Retinopathy of Prematurity (G-ROP) study, led by Dr. Gil Binenbaum and his team, also published promising results that demonstrate the sensitivity and specificity of a new model for predicting ROP in premature babies.

Our strong research foundation ensures that we provide the most advanced treatments to our patients. In 2019, our physicians saw more than 125,000 patient visits. We share the story of one of these patients, whose vision was saved after being struck in the eye by a firework blast. We also answer common questions about LASIK eye surgery, an elective procedure performed by our cornea specialists, Drs. Stephen Orlin and Michael Sulewski.

Finally, we highlight our mission to provide care and support to underserved populations throughout Philadelphia and around the world. This mission is lived out each day by our faculty and staff members in many ways, such as hosting low vision device giveaways, or giving the first talk to the American Academy of Ophthalmology on caring for transgender patients (both highlighted in this issue).

I would like to express my sincere appreciation for the colleagues, trainees, alumni, patients, and friends who have made all of these accomplishments possible, and who together make the Scheie Eye Institute a remarkable place. I wish you all a very happy and healthy holiday season!

Sincerely,
Joan O'Brien, MD

welcoming

penn ophthalmology women's association

By Nora Laberee

The first POWA event in May 2019 brought together female ophthalmology faculty, residents, and fellows at Penn.

In 2018, Dr. Prathima Neerukonda Atluri established the Penn Ophthalmology Women's Association (POWA) with the goal of bringing together female ophthalmologists at Penn Medicine. The purpose of POWA is to further academic success in female ophthalmologists by promoting an environment that fosters career development, education, and networking. Dr. Neerukonda was inspired to start the group to celebrate and nurture the growth of women in ophthalmology.

"With such a large Department, I think it's important to celebrate our strengths, one of which is our large number of female faculty members," she explained. "We should be available to one another to foster career development, encourage mentoring, and provide a platform to develop leadership skills."

The group hosted its first event in May 2019, held at the Continental Midtown in Center City Philadelphia. The purpose of this event was to spend time with fellow female ophthalmologists at Penn in a more social setting. The event was a great success, with 23 Penn physicians, residents, and fellows in attendance. "We had a large turnout from both faculty and residents," Dr. Neerukonda said. "We were able to exchange ideas for future events."

The group's next event was the POWA Symposium, which took place in October 2019 at the Scheie Eye Institute. The event included invited speakers who discussed issues such as physician burnout and leadership development. These speakers, including Dr. Lisa Bellini, Senior Vice Dean for Academic Affairs at Penn Medicine, came from both within the Penn community and beyond.

Looking forward, Dr. Neerukonda hopes to expand the group and create a space for communication and progress. "I hope developing this group will create an environment of inclusivity and camaraderie, where we can share information and learn about relevant topics that affect our personal and professional lives," said Dr. Neerukonda.

Chairman Dr. Joan O'Brien is a strong supporter of POWA and its mission: "This new association is a valuable addition to the Department, and I am thrilled to see the group grow and continue to make a positive impact here." ■

MIRACULOUS RECOVERY
after fireworks accident

By Kristen Mulvihill

On July 4, 2018, Robert George was celebrating the Fourth of July just as he did every other year: lighting off fireworks with family and friends. As he was enjoying the display, a firework was launched about 30 feet from where he was standing.

"The next thing I remember, I was holding my eye and blood was streaming down my shirt," Robert recalled. "It didn't hurt at first, but I knew something was wrong." The firework had struck his left eye, causing him to immediately lose vision.

As the pain intensified, Robert was rushed to the emergency room at Penn Presbyterian Medical Center, where he was seen by a team of ophthalmologists from the Scheie Eye Institute.

On route to the hospital, Robert remembers thinking, "Alright, I can get used to only seeing with one eye, I'll just have to figure it out." Luckily for Robert, he did not have to adjust to blindness in his left eye; his team of doctors at Scheie acted quickly to save his vision.

As a result of the accident, he suffered extensive injuries to his left eye and lost most of his iris. The blast also burned the skin around his eye and damaged his lens, which caused a cataract to form.

When he was first examined, Robert was unable to read the eye chart with his affected eye, and was only able to count fingers held merely one foot in front of him.

Due to the blunt trauma inflicted by the firework blast, Robert severely injured his cornea and sclera (the white outer layer of the eye), and underwent a ruptured globe repair on the morning of July 5th to mend the damage. During this surgery, performed by the Attending Physician, Dr. Michael Sulewski, Sr., with assistance from Drs. Michael Sulewski, Jr. and Drew Scoles, a third and second year resident at the time, the skin lacerations surrounding Robert's left eye were also repaired.

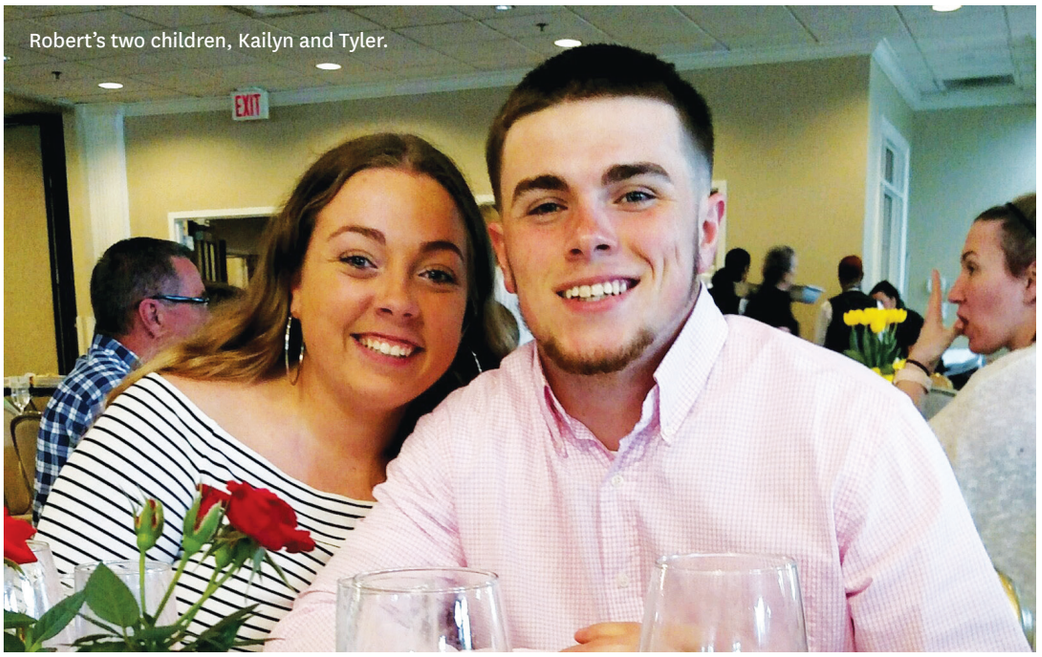
After the first operation, Robert's vision was still limited, and he could only see light in his left eye. Adriane Santa Croce, Director of Echography, performed serial ultrasound examinations on his eye and diagnosed a complex retinal detachment, which required additional surgery.

On July 26, Robert underwent a vitrectomy, performed by Dr. Benjamin Kim, Assistant Professor of Ophthalmology, with assistance from Dr. Robert Carroll, a retina fellow at the time. During this procedure, Drs. Kim and Carroll removed the cataract in Robert's eye, which left him aphakic, or without a lens. A significant amount of blood was in the eye from the original trauma, which was also removed. Next, they repaired the retinal detachment and placed a gas bubble in the affected eye so the retina would remain attached as it healed.

Understanding the gravity of his injuries and operations, Robert knew he was in the best possible care at Scheie. "My doctors were awesome," he said. "They explained everything and told me exactly what was going on. They were just phenomenal."

Robert's eye right after the fireworks accident.

Robert's eye after recovering from his two surgeries.



Robert's two children, Kailyn and Tyler.

Robert endured a long and draining recovery. During the initial period after the retinal detachment surgery, Robert had to lay face down whenever possible to ensure the eye healed properly.

"When I slept, I used a pillow with a hole in the center so I could lay face down. When I wanted to watch TV, I watched on an iPad that I kept below me," Robert explained. "I didn't even look people in the eyes when holding conversations." In the weeks following his surgeries, he stayed home from work and required frequent post-operative visits.

Despite the severity of his injuries and the demanding recovery process that followed, struggling to keep his vision was not the most difficult of Robert's health battles.

"I've been electrocuted, I was crushed by a seven-ton roller and almost lost my leg, I was hit by a drunk driver, which rolled my truck down a mountain," Robert said. "The recovery after this accident is probably the easiest one I've been through. Having my friends and family around – especially my wife and two kids – really helped, and my boss, Kevin Rabe, went above and beyond to get me and my family through this."

With the support of his family, friends, coworkers, and team of doctors, Robert's vision began to dramatically improve. After his eye healed, Robert received careful aphakic refraction and was evaluated and fitted for an aphakic contact lens by Dr. Regina Altemus, an optometrist at Scheie. This custom lens will eliminate the remaining blurriness in his left eye and further improve his vision to 20/30.

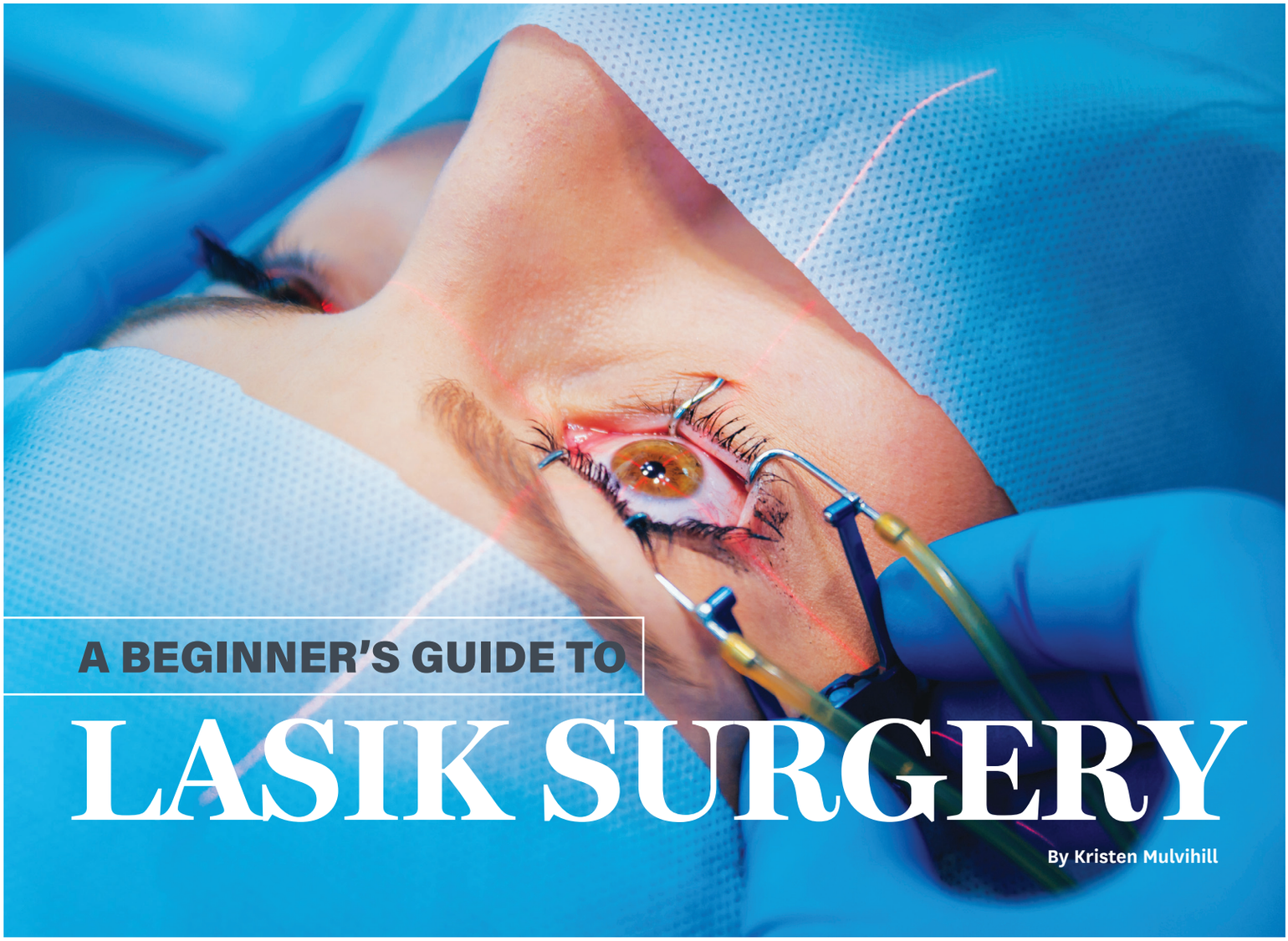
"The result of this case is miraculous, as many of these kinds of devastating eye injuries end up with very poor vision or even loss of the eye," Dr. Sulewski said. "Robert was able to achieve 20/30 visual acuity after several very complex surgeries and then visual rehabilitation with our top flight contact lens service."

> Understanding the gravity of his injuries and operations, Robert knew he was in the best possible care at Scheie.

"When we first see injuries of this nature, the prognosis is always guarded. Retinal detachments related to severe trauma can be complex surgical cases," Dr. Kim explained. "We had a wonderful group of surgeons that took care of Mr. George, and it really was a team effort by our department, from the time of the initial evaluation by Dr. Scoles to the final fitting of the contact lens by Dr. Altemus."

Amidst all of the obstacles that continue to pose challenges to his health, Robert has yet to lose hope or succumb to his battles. "I've been dealt a full house of cards as far as I'm concerned, but you have to get up and keep going," Robert said. "You can't take anything for granted and you can't give up." ■

Are you a patient interested in telling your story in a future issue of *Scheie Vision*? If so, call 215.662.9892 or email kristen.mulvihill@pennmedicine.upenn.edu. We would love to hear from you!



A BEGINNER'S GUIDE TO LASIK SURGERY

By Kristen Mulvihill

For more than 20 years, the Scheie Eye Institute has offered patients exceptional refractive care to correct a variety of vision problems. Scheie offers several types of refractive surgeries, including PRK, Phakic-IOL, and LASIK, highlighted below.

Scheie's highly-qualified cornea specialists – Michael E. Sulewski, MD, and Stephen E. Orlin, MD – use the most advanced laser technology to provide optimal results. Tired of wearing glasses or contact lenses, and looking for a permanent solution to your vision problems? Here are some questions to consider with your ophthalmologist to determine if LASIK is right for you.

WHAT IS LASIK?

Laser Assisted In-Situ Keratomileusis (LASIK) is a type of refractive surgery used to correct vision problems, including myopia (nearsightedness), hyperopia (farsightedness), and astigmatism (an imperfection in the eye's curvature). The procedure is intended to reduce an individual's dependency on glasses or contact lenses, as it permanently alters the shape of the cornea. This change of shape enables the cornea to more precisely focus light onto the retina for clearer vision.

AM I ELIGIBLE FOR LASIK?

The ideal candidate for LASIK surgery must:

- Be at least 21 years old
- Not be pregnant or breastfeeding, as hormonal changes during pregnancy can temporarily alter the shape of the cornea
- Not have an autoimmune disease, which can prevent proper healing after the procedure
- Have stable vision and healthy eyes, with no history of glaucoma, cataracts, chronic dry eye disease, or other significant eye problems

WHAT SHOULD I EXPECT BEFORE THE PROCEDURE?

Before receiving LASIK, you are required to schedule an appointment with your ophthalmologist to receive a comprehensive eye exam. During this visit, your physician will also discuss the eligibility criteria for the surgery, the risks and benefits of LASIK, and what to expect during and after the procedure. You should also arrange transportation on the days of your procedure and your follow-up visit, as you will not be permitted to drive until after your follow-up visit.

WHAT HAPPENS DURING THE PROCEDURE?

During LASIK surgery, your ophthalmologist will place anesthetic drops in your eyes to numb the cornea. Although the procedure is painless, you may experience some pressure around your eye. During the surgery, your eyelids will be held open by an instrument called a lid speculum. The procedure involves making a thin flap in the cornea with a femtosecond laser. This precisely cut, small flap will remain attached to the cornea by a hinge, and will be gently folded back to expose the underlying cornea.

An excimer laser will be used to reshape the cornea to achieve the desired vision correction. The flap will then be put back in place without stitches, and the cornea will be given time to heal naturally. The entire procedure is typically completed in thirty minutes or less.

WHAT IS THE RECOVERY PROCESS LIKE?

Following your LASIK surgery, your ophthalmologist will perform a brief post-operative eye exam. It is common to feel a slight itching, burning, or gritty sensation in your eyes immediately after the procedure, but this sensitivity should subside quickly. Eye drops and artificial tears will be prescribed by your doctor, which will help accelerate the healing process and prevent infection.

Once your ophthalmologist confirms the surgery's success, you will be discharged. For several days following your LASIK surgery, you should refrain from participating in strenuous exercise and contact sports and from wearing eye makeup.

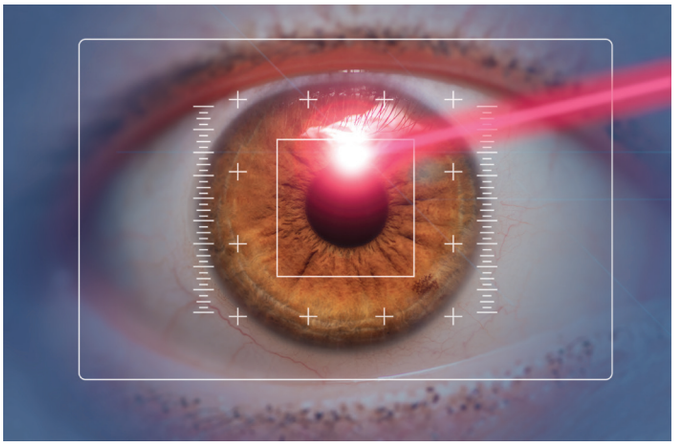
Your first follow-up visit typically occurs the day after your surgery. At this visit, your ophthalmologist will ensure that your vision is within the legal standard for driving, and you will be cleared to drive.

Approximately a week after your surgery, you will meet with your ophthalmologist again to ensure your eyes are healing properly. During this visit, your doctor will determine if additional follow-up appointments are necessary.

WHAT ARE THE ADVANTAGES OF LASIK, AND WHEN WILL I NOTICE RESULTS?

You will begin to notice improvements in your vision immediately following the procedure. Although your vision will likely be blurry and hazy initially, your vision should continue to stabilize and improve over the next several days. Depending on your eyesight prior to the surgery, 20/20 vision is attainable with LASIK.

The surgery requires no bandages or stitches, and patients can typically resume their normal schedule within 24 hours of the surgery. Most patients experience a dramatic reduction in the need for glasses or contact lenses following the surgery.



WHAT ARE THE RISKS AND SIDE EFFECTS ASSOCIATED WITH LASIK?

LASIK surgery can dramatically improve your vision and quality of life. However, like any other medical procedure, there are some risks and side effects associated with LASIK. You may experience the following issues after surgery, though they typically resolve over time:

- Dry eyes
- Double vision or glare, especially at night
- Corneal infection and/or inflammation
- Impaired nighttime vision
- Under or over correction, which would require the use of glasses or contact lenses to improve vision
- Surgical complications that may lead to vision loss or vision changes

WHAT ARE SOME ALTERNATIVES TO LASIK?

PRK (photorefractive keratectomy) is an alternative to LASIK in which the first layer of the cornea is gently removed. An excimer laser is then utilized to reshape the cornea to eliminate refractive error. A contact lens is placed onto the treated eye to protect the cornea as it heals for three to five days. Though recovery from PRK usually takes a bit longer than LASIK, patients typically experience the same visual results.

Phakic-IOLs (phakic intraocular lenses) may benefit patients who are not suitable candidates for laser vision correction because their prescription is too high or other measurements are not compatible. Phakic-IOL is an implantable lens that is surgically placed in the eye to correct moderate to severe myopia. A small slit is made in the cornea and a thin, artificial lens is placed in front of the eye's natural lens. The lens is centered behind the pupil and is naturally held in place. Patients do not feel the lens, and this option offers permanent vision correction, unless the lens is surgically removed. ■

For more information about LASIK eye surgery, or to inquire about your eligibility for this procedure, please call 215.662.8100.

promoting inclusivity: caring for transgender patients

By Kristen Mulvihill

César A. Briceño, MD

César A. Briceño, MD, Assistant Professor of Ophthalmology, presented the first talk to the American Academy of Ophthalmology (AAO) on caring for transgender patients in November 2018. In this talk, titled "How to Talk to Transgender Patients," Dr. Briceño offered advice on how providers can begin to address some of the health care disparities affecting this population.

Transgender patients are an underserved population who often experience barriers in navigating the health system, which may prompt these individuals to delay or avoid seeking medical care. These challenges include decreased access to health care, discrimination by some health care providers, and lack of sensitivity and awareness to their unique health needs.

To ensure the transgender community receives more suitable patient-centered care, Dr. Briceño suggested strategies physicians and health care institutions can adopt to create a more inclusive environment for this population.

"I think the key to providing culturally competent care to any patient is to be as well-informed as possible," said Dr. Briceño. "Language can be a powerful tool to promote inclusivity, and with simple training, we can make sure that we are not alienating vulnerable patient populations."

To help this population obtain better care, Dr. Briceño advised physicians to foster a nonjudgmental and respectful environment, using inclusive language to reassure and welcome transgender patients. For example, physicians should not assume the patient's gender identity, and instead should ask the patient's preferred name and pronouns. Providers can also train clinical staff members on how to ask appropriate questions and how to use gender neutral language when applicable.

Dr. Briceño also suggested that health care institutions incorporate inclusive language and open-ended questions for all print and digital materials. For example, hospitals can update intake forms to include both the patient's preferred and legal names. In terms of structural modifications, Dr. Briceño recommended including single occupancy restrooms with gender neutral signs in waiting areas.

Awareness, respect, and education are key components in overcoming the barriers that contribute to health disparities experienced by the transgender community. Enhancing both interpersonal and clinical skills will help address these issues and create a more welcoming and comfortable environment for all patients.

While there are still meaningful steps to be taken to promote inclusivity, Penn Medicine's efforts to create a safe space to receive health care have distinguished the institute among national providers. In July, all six of Penn Medicine's hospitals were recognized as 2019 leaders in lesbian, gay, bisexual, transgender, and queer (LGBTQ) health care equality by the Human Rights Campaign Foundation. This foundation is the educational sect of the nation's largest LGBTQ civil rights organization.

"I believe in championing diversity and inclusion in all of its forms," said Dr. Briceño. "The more informed we are as clinicians, the better care we can provide for all of our patients." ■

R01 GRANT INVESTIGATES color constancy

By Rebecca Salowe

Dr. David Brainard, the RRL Professor of Psychology and Director of the Vision Research Center at University of Pennsylvania (UPenn), is fascinated by color constancy. His longstanding R01 grant on this topic has yielded numerous discoveries and publications in journals such as *Journal of Vision*, *Annual Review of Vision Science*, *Ophthalmology*, *PLoS Computational Biology*, and *Annual Review of Neuroscience*.

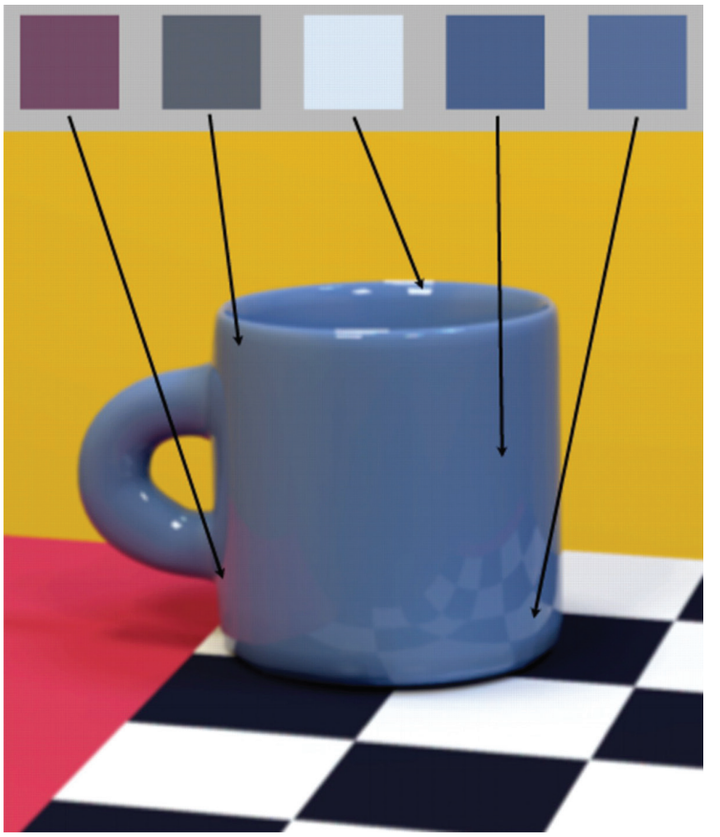
Color constancy refers to our ability to perceive colors as relatively constant over varying illuminations (i.e. light sources). For example, a red apple will still look red on a sunny day or cloudy day – or in a grocery store or a home.

However, when we look at the apple, the resultant image on the retina is based not only on its intrinsic red, but also on the spectrum of the light source striking it. By this logic, the apple would shift in color depending on the surrounding illumination. Thankfully, our brains employ the process of color constancy, which "undoes" the surrounding illumination and allows us to perceive objects as a consistent color in different settings.

"It's one of many examples of where the image on the retina does not correctly, or immediately, predict what we see," explained Dr. Brainard. "For example, a similar illusion is how a phone looks the same shape when you pick it up and rotate it. Color constancy is why we can say, 'this is a red shirt' and not 'this is a red shirt under this specific light.'"

We use the process of color constancy many times over the course of the day. Small differences in color provide us with essential information about an object's properties, such as distinguishing fresh fish from old fish. Even simple tasks such as putting together a matching outfit in your closet, or interpreting a stop sign on a cloudy versus sunny day, involve the process of color constancy.

Sometimes, color constancy fails or can be manipulated. For example, the produce section in a supermarket intentionally shines bright lights on the produce. "These lights are designed to defeat our color constancy and to make the food look ripe and fresh," said Dr. Brainard. "This is why you may buy a tomato, thinking it looks very ripe, then take it home and wonder why you bought *that* tomato."



Though the mug is perceived as a homogenous blue, each pixel shows slight variations in reflected wavelengths, due to changes in illumination.

Source: Brainard, D. H., & Maloney, L. T. (2011). Surface color perception and equivalent illumination models. Journal of Vision, 11(5), 1-1. doi:10.1167/11.5.1. Association for Research in Vision and Ophthalmology is copyright holder.

Dressing rooms in retail stores provide another example. Here, the lighting is often altered to make clothing look as flattering as possible, encouraging purchases. A dress that looked very appealing in the fitting room may look less enticing in the regular lighting of home, for this reason.

Though it is ever-present in our lives, color constancy has historically been a difficult field to study. "I have spent a fair fraction of my research career learning how to measure, model, and understand color constancy in more detail," said Dr. Brainard. "This area has been studied since the mid-1800s, and has a long history – which is a way of saying that we have not nailed it yet."

A red apple will still look red on a sunny day or a cloudy day - or in a grocery store or a home.

For his current R01, Dr. Brainard returned to the basic question of why color constancy is an important area to study: it influences decision-making. Previous studies have focused more on how subjects judge the appearance of an object, without taking the extra step to evaluate subsequent choices. In these experiments, subjects adjusted the color of an object seen under one illumination to match the color of a reference object at a different illumination. However, this task is not representative of everyday life. We do not, for example, adjust the reflectance properties of a tomato to look extra red or tasty; instead, we evaluate the color of the tomato and make a decision about buying it.

Dr. Brainard's lab took this extra leap, devising experimental methods that directly test how evaluation of object appearance affects decision-making. For example, in one study, healthy participants were asked to match colors of images shown in different illuminations. The subjects viewed computer renderings of an object, such as the cube shown on the right page, which has a reference button and two comparison buttons. The reference was seen under one illuminant, while the comparisons were under another. The subject then decided which comparison button best matched the color of the reference object.

"We force you to choose, and over lots of trials, we vary the available choices in a careful way," Dr. Brainard said. "The key is that subjects are not asked what the image looks like, or to adjust the color; they are just asked to pick the one that matches most closely. This forces them to do a task that they do in real life. How well you do will depend on how good your constancy is."

Subjects achieved 100% constancy if they correctly matched the button with identical reflectance properties, but different illumination, to the reference button. In contrast, 0% constancy meant that the subject chose a button that had a different surface reflectance that compensated for illumination differences, making it reflect the same light as the reference. The experiment also probed choices between the 0% and 100% options; these indicated partial constancy.

The results of this experiment, as well as other similar setups, showed that individuals have a wide range of color constancy. At the moment, what drives these differences is not fully understood. It is possible that variations in cone spectral sensitivity or number of cones in different classes contribute to these differences.

In 2015, the viral internet sensation of #theDress (shown to the right) brought this topic into popular culture. Viewers passionately debated whether the photographed dress was blue/black or white/gold in color. At first, many assumed that the lighting of the room or glow of the computer screen was responsible for these differences in color perception. However, it quickly became clear that this was not the case. "In my classes, I've put the image onto a projector, so everyone is seeing the dress on the same screen and in the same lighting," said Dr. Brainard. "There is still the same debate."

Color constancy allows us to recognize the colors in this hot air balloon as being the same, whether in the sun or the shade.

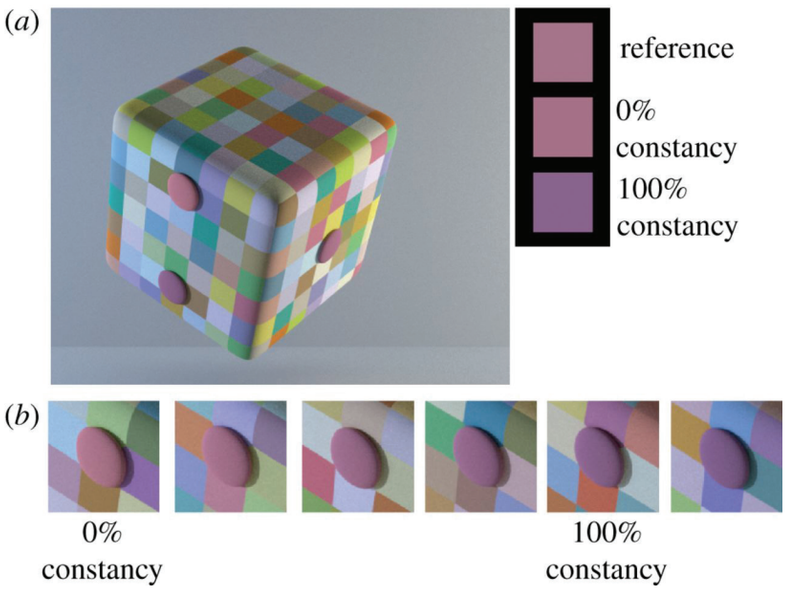
Most researchers now agree that differences in the application of color constancy to the dress contribute to these variations. "When different people look at this photo, their color constancy goes one way or the other," said Dr. Brainard. "Some people process it as if the illumination were yellow, and thus discount the yellowness and get a blue/black look; other people process the illumination as bluer and see the dress as white/gold."

In addition to examining how color constancy influences object selection, Dr. Brainard has also studied how the material of an object affects choices. "We vary color and material and ask subjects which was more similar to the reference," said Dr. Brainard. "In one case, the color differed, and in one case, the material differed, and we worked on measuring how the two attributes are weighed."

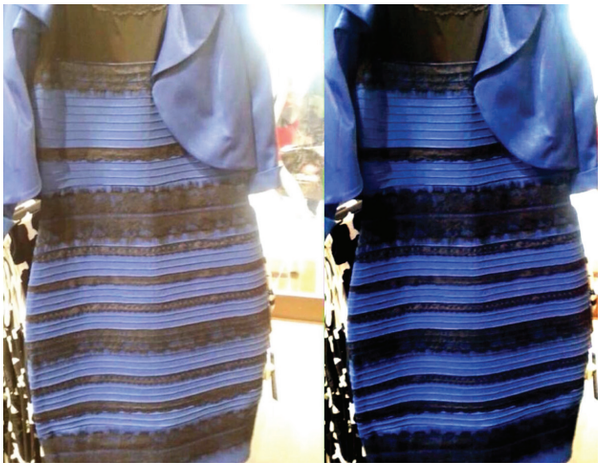
The results were surprising, showing a large variation from person to person. This suggests that some people rely more heavily on color, while others rely more on material, when evaluating object properties.

Some experiments also probed if providing subjects with feedback on their choices helped to improve future color-based selections. They did find that feedback helped subjects to be more conscious of their choices.

Much of Dr. Brainard's research to date has focused on quantifying how color is perceived and used. Going forward, Dr. Brainard hopes to extend his research program to gain insight into the neural mechanisms that process the retinal image. This research will help us understand how this processing provides the basis for the color constancy we enjoy. ■



In this experiment, subjects viewed an image of a cube with differing illuminations on a computer screen. In (a), the comparison buttons (left) were matched to the reference button (right). The lower left button represents 100% constancy, meaning that it has identical reflectance to the reference button, while the upper button represents 0% constancy. In (b), a range of possible comparison buttons are illustrated.



This viral photograph illustrates individual differences in color constancy. While some viewers see the dress as blue/black, others interpret it as white/gold.

Viewers passionately debated whether the photographed dress was blue/black or white/gold in color... Most researchers now agree that differences in the application of color constancy to the dress contribute to these variations.

department provides free LOW VISION DEVICES at community screenings

By Rebecca Salowe

Low Vision Screening in February 2019, with Marquis Vaughn, Pastor Dicks, First Lady Dicks, Councilwoman Jannie Blackwell, Darlene Foy, and two Penn CAREs Volunteers (left to right).

This past year, the Scheie Eye Institute hosted community screenings for low vision, which provided eligible patients with low vision devices to take home.

Low vision refers to any significant vision loss that cannot be corrected with existing treatments. This condition affects more than five million Americans, and is increasing in prevalence with the aging population.

Even with correction from glasses or contact lens, low vision patients may still find everyday tasks such as reading the mail, writing, or cooking difficult to complete. As a result, low vision has been associated with impaired quality of life, depression, loss of independence, barriers to employment opportunities, decreased mobility, falls, and general life dissatisfaction.

Low vision devices, such as magnifiers, allow patients to use their existing vision to live as independently as possible. Studies show significant improvements in perceived near tasks, social functioning, reading ability, and quality of life when patients use these devices.

However, many patients with low vision have difficulty obtaining these devices. “Access and insurance issues are big barriers,” said Dr. Ranjoo Prasad, a low vision optometrist and Director of the Penn Center for Low Vision Rehabilitation. “Transportation and knowledge of services are big obstacles too.” In fact, Medicare and most insurance plans do not reimburse for low vision devices.

Recognizing this need, the Department applied for and received a generous grant from the UPenn Hospital Board of Women Visitors in 2018. The requested funds were used to purchase a number of low vision devices to distribute to eligible patients at community screenings.

The screenings were organized by Dr. Prasad and Marquis Vaughn, Community Outreach Coordinator. The first event, conducted in October 2018 at Robert Vaux Junior High School, provided patients with more basic aids (i.e. no prescription required) as part of a glaucoma screening.

The second event, which took place in February 2019 at Pleasant Grove Baptist Church, was focused entirely on low vision and provided training on more complex devices. At this event, interested community members were first asked to fill out a screening form. The goal of this form was to assess functional vision and to identify other areas of difficulty. "For example, we asked the patients questions about if they had trouble paying bills, bumping into things, seeing up close, and more," said Marquis.

The form also included questions about mental health, as well as practical issues such as housing and insurance. "The questions about mental health and housing are pertinent," said Dr. Prasad. "When someone loses their vision, they experience grief. We also want to make sure they are safe in their homes." Patients who reported struggles or requested help in these areas were directed to the appropriate resources.

After completing the form, each patient received an eye screening with Dr. Prasad. Patients with signs of another disease, such as glaucoma, were referred to the appropriate specialist at Scheie. "For example, we detected signs of glaucoma in a young lady in her late 30s," recalled Marquis. "She happened to come to the event with her sister, who heard about it from a flyer. We made sure that she attended her scheduled appointment at Scheie with the glaucoma specialist and stayed in touch with her."

For the patients identified as having low vision, the final stage of the screening involved training on suitable devices. Dr. Prasad worked closely with each low vision patient to determine the device(s) that best fit his or her needs. "We did not want to just give devices away," explained Dr. Prasad. "We needed to assess their needs and acuity, and prescribe them something appropriate."

Most patients received stand magnifiers, which provide 360-rotation and magnification of large areas of text, and/or LED handheld magnifiers. In addition, patients were prescribed reading glasses and lubricant eye drops if symptomatic for dry eyes.

"The patients were very excited and could not believe that we were actually giving these devices to them," said Marquis. "A lot of patients immediately tried them on books, papers, or anything they had on them."

Low vision patients were typically scheduled for a follow-up visit at the Penn Center for Low Vision Rehabilitation at the Ralston House. In addition, these patients were invited to join the monthly Vision Loss Support Group, which provides open discussions, information on relevant resources, and emotional support to low vision patients.

Low vision devices, such as magnifiers, allow patients to use their existing vision to live as independently as possible.

At one of the events, patients also received free blood pressure screenings from a team sent by the Penn Presbyterian Outreach Council. Dr. Prasad and Marquis hope to include more external groups that offer non-eye related services at future events. "It's great to have collaborative events so patients can gain access to multiple resources," said Marquis. "It also helps more people become aware of the event."

The team also encouraged attendance by making the screenings into social gatherings with food and entertainment. They even invited local government leaders, with Councilwoman Jannie Blackwell attending one of the screenings to provide her support.

In the week following the low vision screening, each patient was contacted about the next steps listed in his or her chart, whether it be scheduling a specialist appointment, attending the Vision Loss Support Group, or connecting with another resource. Marquis reviewed the individual plan with each patient and offered assistance with follow-up. "This truly tells us the success of the screening," said Dr. Prasad. "Vision care must involve a comprehensive team to positively impact our patients."

The next low vision screening event is planned for early 2020. ■

To learn more about partnership opportunities or for more information about Scheie's screening events, please contact Marquis Vaughn at 215.662.8023 or marquisv@pennmedicine.upenn.edu.

defining biomarkers of vision loss

in children with optic pathway gliomas

By Kristen Mulvihill

In March 2019, the Children's Hospital of Philadelphia (CHOP) received a $3.5 million grant from the National Institutes of Health (NIH) titled Biomarkers of Vision Loss in Children with Optic Pathway Gliomas. Robert Avery, DO, MSCE, Assistant Professor of Ophthalmology and Assistant Professor of Neurology, is the Principal Investigator of this five-year study.

Optic pathway gliomas (OPGs) are one of the most common brain tumors in children, representing approximately two to five percent of pediatric brain tumors. Nearly 75 percent of OPGs occur in children younger than 10 years old. These slow progressing tumors emerge in or around the optic nerve, which transmits visual information from the eye to the brain; the optic chiasm, the X-shaped structure formed by the intersection of the optic nerves from each eye; and/or the optic tract, an extension of the optic nerve. OPGs can disturb the function of the visual pathway and lead to severe vision loss.

Most often, OPGs are treated with chemotherapy, which is used to stop the progression of the tumor and stabilize or improve the child's vision. In this study, Dr. Avery and colleagues are aiming to discern why some children respond well to chemotherapy, with their vision stabilizing or recovering, while others respond poorly, with their vision declining after treatment.

The long-term goal of the project is to improve the clinical care and visual outcomes of children with OPGs by better understanding the timing and causes of vision loss. More specifically, this proposal aims to determine whether optical coherence tomography (OCT) measures are accurate biomarkers for vision, thereby defining an optimal treatment window for vision loss.

OCT is a non-invasive imaging technology that uses light waves to take cross-sectional images of the optic nerve and retina. Dr. Avery and colleagues plan to study the OCT measures of circumpapillary retinal nerve fiber layer (cpRNFL) and ganglion cell-inner plexiform layer (GCIPL) thickness, as both measures are important for the detection and ongoing monitoring of optic nerve damage.

Traditional OCT machines will be used in older, more cooperative children. Some of the younger patients will undergo handheld OCT while they are being sedated for their clinical MRI scan. Analyzing OCT measures will allow for a reproducible and objective evaluation of the entire visual pathway, ensuring consistency across studies and centers regardless of the child's ability to comply with standard vision testing.

The researchers hypothesize that the location and magnitude of cpRNFL and GCIPL thickness will be closely correlated to visual function. Based on previously published research, both measures will start to decline before visual function declines, thus identifying a prime treatment window to prevent or slow vision loss.

"We are looking at these biomarkers in both a cross sectional analysis as well as a longitudinal analysis," explained Dr. Avery. "Specifically, can we use these OCT measures to detect impending vision loss that is heralded by a slowly declining cpRNFL and/or GCIPL, allowing us to initiate chemotherapy earlier and hopefully improve visual outcomes. This type of data would be especially helpful for our young children who cannot cooperate with standard vision testing."

Given the complexity of vision loss from OPGs, they are also utilizing electrophysiology measures (i.e. photophic negative response and visual evoked potential), along with advanced MRI techniques such as diffusion tensor imaging, and volumetric measures of the visual pathway. They also hypothesize that children who recover their vision during OPG treatment will display specific electrophysiologic and MRI features when compared to children who do not experience visual recovery after treatment.

"We are trying to understand why some children respond well to treatment with chemotherapy, with their vision stabilizing or improving, compared to others who respond poorly, with their vision worsening," said Dr. Avery. "This may help us decide whether to treat kids with more aggressive therapy up front if they have features to suggest they will not respond well to standard treatments."

This study will significantly impact the clinical management and visual outcomes of children with this common type of brain tumor. By understanding the timing and causes of vision loss in children with OPGs, this research will allow for earlier treatment to prevent vision loss, and will help develop new treatments, including neuroprotective therapies.

To accomplish this large study, Dr. Avery is fortunate to have expert collaborators from Penn Ophthalmology (Dr. Gui-shuang Ying), and Neuro-Oncology (Dr. Michael Fisher) and advanced MRI analytics (Drs. Jeffrey Berman and Ritto Datta) from CHOP. Additional study sites and collaborators are from Boston Children's Hospital (Dr. Gena Heidary) and The Hospital for Sick Children in Toronto (Dr. Arun Reginald). ■

Dr. Joan O'Brien with ASRS President Elect Timothy G. Murray, MD, MBA.

DEPARTMENT CHAIR
Receives the Gertrude D. Pyron Award

By Nora Laberee

In July 2019, Joan O'Brien, MD, Chairman of the Department of Ophthalmology, received the Retina Research Foundation's Gertrude D. Pyron Award. This award recognizes outstanding vision scientists whose research contributes to knowledge about vitreoretinal disease.

Named after renowned geologist Gertrude D. Pyron, the Pyron Award was established by the Retina Research Foundation (RRF) and Alice McPherson, MD in 1969. Dr. McPherson was the first female vitreoretinal fellow and first full-time female retina specialist in the world. Her leadership in vision science inspired Gertrude Pyron to donate to the RRF, establishing the foundation.

The RRF sponsors lectureships at multiple vision science conferences worldwide, including a Lectureship Research Award at the American Society of Retina Specialists (ASRS) Annual Meeting, named after Gertrude Pyron in 1999. Dr. O'Brien received the 24th Annual Gertrude D. Pyron Award at the 2019 ASRS Annual Meeting, held in Chicago.

At the meeting, Dr. O'Brien gave the Pyron Award Lecture, focusing on her work investigating retinal disease. She discussed her research on the creation of a retinoblastoma staging system and investigation of genes implicated in uveal melanoma and glaucoma.

"I am truly honored to receive this award, and am grateful to Dr. McPherson and the rest of the society's leadership for their pioneering work within ASRS, and their dedication to our field," said Dr. O'Brien. ■

A New Model for Predicting Retinopathy of Prematurity in Babies

By Nora Laberee

Retinopathy of prematurity (ROP) is a leading cause of vision loss in children. If not caught and treated in time, it can lead to lifelong blindness. ROP affects over 30,000 new premature infants in the United States each year. While many of these cases will improve without treatment, the most severe cases are important to diagnose and treat quickly to prevent retinal detachment and blindness.

The American Academy of Pediatrics publishes ROP screening guidelines, which currently recommend performing retinal examinations for infants with a birth weight below 1,501 grams or a gestational age of 30 weeks or less (for perspective, normal human gestation is 40 weeks). Bigger and older babies who have an unstable clinical course, per the judgment of the neonatologist, should also be screened. Based on these guidelines, roughly 70,000 infants each year undergo repeated eye examinations, even though less than half of them will even develop ROP. These examinations can be uncomfortable and physically stressful for very small babies. In addition, coordinating and performing these examinations requires significant time and resources from neonatologists, ophthalmologists, nurses, and coordinators. A decade ago, Gil Binenbaum, MD, MSCE, set out to find a better way to screen for ROP.

Dr. Binenbaum is the Richard Shafritz Endowed Chair of Pediatric Ophthalmology Research at the Children's Hospital of Philadelphia (CHOP), and Associate Professor of Ophthalmology at the Scheie Eye Institute. By closely considering how ROP develops, Dr. Binenbaum and his collaborators have been able to better predict which babies will develop severe ROP.

WHY ROP DEVELOPS

The causes of ROP are complex. Premature birth introduces a baby to a hyperoxic, or high oxygen, environment, because oxygen levels for the fetus are actually low inside the womb. Hyperoxia results in decreased production of a protein called vascular endothelial growth factor (VEGF), which the retina produces to induce growth of blood vessels when oxygen levels are low. In the new hyperoxic environment of the premature infant, VEGF production in the retina stops, so retinal vessel development also halts. Immature blood vessels also can be damaged by hyperoxia in a process called vaso-obliteration. The results of both processes are poor retinal vessel development.

A second effect of premature birth is a drop in the growth hormone insulin-like growth factor 1 (IGF-1), which premature infants do not produce well. VEGF activity requires adequate IGF-1 levels. As the retina develops in the weeks following birth, it shifts from relative hyperoxia to hypoxia, or low oxygen, because the poorly developed retinal vessels do not deliver enough oxygen. In response, the retina secretes VEGF to promote blood vessel growth, but because the baby is not making much IGF-1, the VEGF does not function effectively, and the retinal vessels still do not grow well. By the time the baby starts to produce higher amounts of IGF-1, VEGF levels in the eye are too high, and the retinal blood vessels grow uncontrollably and in the wrong direction. The retina can be pulled off into a retinal detachment, and vision is lost.

Low levels of IGF-1 are a key factor in this process, and therefore slow weight gain, a surrogate measure for low IGF-1, is predictive of the later development of severe ROP. This is the key piece of information that Dr. Binenbaum and his team took advantage of to better predict which infants need retinal examinations.

REVISING ROP SCREENING CRITERIA

While Dr. Binenbaum has a number of research interests (for example, he was the principal investigator of the collaborative project between Penn and the Philadelphia Museum of Art that showed how art classes can improve the observational skills of medical students), he has been intrigued by ROP since his days as a fellow. Soon after, he began conducting early studies on infant weight gain, IGF-1, and ROP with the support of the Penn Vision Scientist NIH K12 program and his mentors, Dr. Graham Quinn and Dr. Maureen Maguire. In 2012, he received an R01 grant from the National Eye Institute to form the Postnatal Growth and Retinopathy of Prematurity (G-ROP) Study Group.

"We worked closely with Gui-shuang Ying, director of the G-ROP data center at Penn, and an executive committee of national experts, to design two large studies," he explained. "First, a retrospective model development study, and second, a prospective model validation study to make sure that the model was reliable before using it clinically."

Twenty-nine hospitals participated in the first study (G-ROP-1), and 7,483 premature infants at risk for ROP were retrospectively studied. Published in *JAMA Ophthalmology* in July 2018, the study produced new evidence-based screening criteria for ROP. These criteria

not only greatly improved specificity, or the ability to rule out the babies who will not develop severe ROP, but also improved sensitivity, which refers to the ability to detect babies who will develop severe ROP and must have examinations. By using a hybrid modeling approach, Dr. Binenbaum and his team were able to lower the birth weight and gestational age thresholds. In order to capture the few larger babies who developed severe ROP, they had to add criteria for slow postnatal weight gain. If an infant met any one of the six resulting criteria, he or she required retinal examinations.

These new "G-ROP Criteria" correctly predicted 459 out of 459 infants with severe ROP. At the same time, if the criteria had been used to decide who receives examinations at the study hospitals instead of the current guidelines, the new criteria would have saved 2,269, or 30%, of infants from unnecessary exams.

VALIDATING THE MODEL

With these encouraging results from the retrospective study under their belts, the study group began a prospective validation study, which tested the criteria in a new cohort of infants. While many groups had previously attempted to improve ROP screening guidelines by incorporating measures of slow weight gain, they universally ran into the same problem: the number of babies in the model development study had been too low, and the models did not perform well enough when tested in new groups of infants. "When developing a model, if the model is overly complex relative to the number of cases of severe ROP in the study, the model can be overfitted," Dr. Binenbaum explained. "This means the model may be predicting random variation, instead of true associations."

The G-ROP study group tried to avoid overfitting by studying thousands of infants when creating the G-ROP criteria. Even so, there was a still a chance that overfitting had occurred, or that some other unknown factors might make the criteria not perform well when applied to new groups of infants. Therefore, it was important to validate the criteria in a second study before using them clinically.

The study group prospectively studied 3,980 new infants at 41 hospitals in this second study (G-ROP-2). "We applied the same G-ROP criteria developed in the first study, and we found that the criteria held up to validation," Dr. Binenbaum said. "The model identified 100% of babies with severe ROP and reduced the number of babies needing exams by 36%." These results were just published in *JAMA Ophthalmology* in November 2019. This was the first growth-based model for ROP to maintain 100% sensitivity when validated.

Between the G-ROP-1 and G-ROP-2 studies, a total of 11,463 premature infants were studied. The G-ROP criteria predicted 100% of the 677 infants who developed severe ROP, while the currently used birth weight and gestational age guidelines missed a small number of these severe ROP cases. At the same time, the G-ROP criteria greatly reduced the number of infants requiring examinations compared to the current criteria. "We estimate that if you scale these results to ROP screening across the United States, about 25 additional cases of severe ROP would be caught, and about 14,000 fewer infants would receive examinations each year, if we used the G-ROP criteria instead of the current birthweight and gestational age criteria," Dr. Binenbaum explained.

"With successful validation, we now believe that these new criteria can be used clinically to reduce the number of babies who require exams," Dr. Binenbaum said. "In fact, some may argue that they *should* be used, because they have a higher sensitivity than the current criteria, in addition to higher specificity."

Looking forward, Dr. Binenbaum recognizes that modifying ROP screening criteria is not a simple process. He thinks that the G-ROP criteria may first need to be incorporated into the published guidelines, in order for clinicians to feel comfortable using them. In addition, he points to the possibility of using the G-ROP criteria in conjunction with the original subjective "third" criteria, which suggests examining babies with an unstable clinical course who do not otherwise meet the criteria. This would allow neonatologists to continue to use their clinical judgment in requesting ROP examinations for infants they feel are at high risk.

"We also recommend that if and when physicians start using the new criteria, that we continue to monitor their performance," Dr. Binenbaum said. "So if there are outliers who are identified, we share those data with each other so we can update the criteria if needed, and so we understand what's being missed, if something is being missed."

With such a large and comprehensive dataset, Dr. Binenbaum and his team plan to continue examining the rich data and gaining as much knowledge as possible from them. The team hopes to provide new insights that can help to improve outcomes for neonatologists and ophthalmologists treating ROP, and most importantly, for babies who develop ROP. ■

The team of researchers (from left to right): Mina Massaro-Giordano, MD, Vivian Lee, MD, Vatinee Y. Bunya, MD, MSCE, Jeongyun Seo, and Dan Huh, PhD.

ORGAN-ON-A-CHIP TECHNOLOGY

Transforms Ocular Disease Modeling and Drug Testing

By Nora Laberee

In August 2019, researchers from the University of Pennsylvania in the Schools of Medicine and Engineering published a groundbreaking research development in *Nature Medicine*. Led in part by Mina Massaro-Giordano, MD, Vatinee Y. Bunya, MD, MSCE, and Vivian Lee, MD in the Department of Ophthalmology, this study demonstrates the successful creation and testing of an artificial human eye model that can be used to replicate and study diseases affecting the surface of the eyes.

The device is a blinking, *in-vitro* model of the human ocular surface, designed and constructed by Dan Huh, PhD, Associate Professor of Bioengineering in the Department of Bioengineering and Jeongyun Seo, a graduate student in Dr. Huh's lab. His lab specializes in creating organs-on-a-chip that simulate their counterparts within the body. This allows for in depth scrutiny of the functions and malfunctions of these organs that would not be feasible otherwise.

The ocular surface in humans consists of two main structures: 1) the cornea, the transparent cover over the iris and pupil and the surface where a contact lens would sit; and 2) the conjunctiva, the thin layer that covers the white part of the eye and the inner surface of the eyelids. The team first started by 3D-printing a small scaffold, similar in shape to the human cornea. Human corneal and conjunctival cells were then grown on the scaffold, utilizing a unique cell culturing technique developed by the Huh lab. This technique allowed for the two types of cells to be positioned in relation to one another as they are in humans. They also created an eyelid out of gelatin that

mimicked the function of a human eyelid, engineered to blink and spread tears across the surface at the same rate as the human eye.

This blinking device serves many purposes, and researchers in the Department of Ophthalmology are most interested in the ways the eye-on-a-chip can be used to study eye diseases and drug treatment testing. Dry Eye Disease (DED) is one of the most common ocular surface diseases worldwide. It is a complex disease, involving many pathways including tear deficiency, inflammation, and meibomian gland dysfunction. This can cause extreme discomfort and visual deficits for those affected by the condition, and can make day-to-day tasks difficult or impossible. Dr. Mina Massaro, Professor of Clinical Ophthalmology at Penn Medicine, and Dr. Vatinee Bunya, Assistant Professor of Ophthalmology at Penn Medicine, are Co-Directors of the Penn Dry Eye and Ocular Surface Center at the Scheie Eye Institute. The pair has been interested in DED for much of their careers, and was joined by Dr. Vivian Lee, an Assistant Professor of Ophthalmology at Penn Medicine who studies epithelial cell biology, as members of the research team for the development of this new technology.

"Although dry eye is a very common, debilitating disease, there are currently only two FDA-approved treatments, which do not work for all patients. There is a significant need for better methods for understanding dry eye in order to develop new and more effective therapies," said Dr. Bunya.

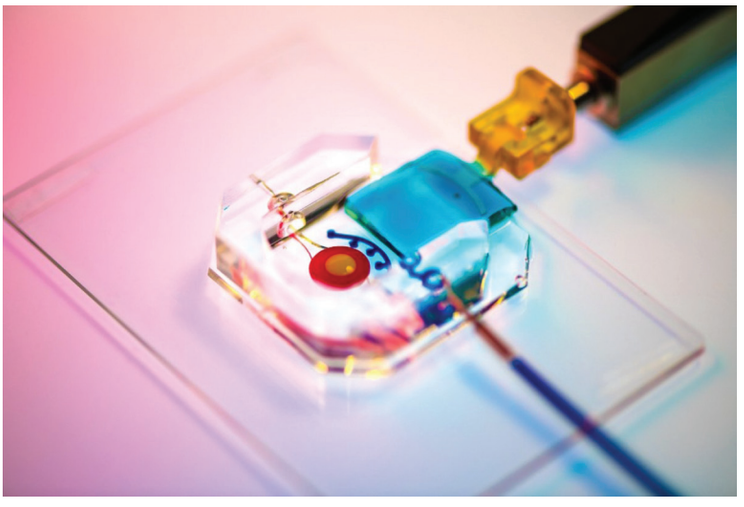
The team first set out to determine if they could induce DED in the eye model. Their results suggested that simulating DED in the model was more complicated than the team previously thought. "Initially, we thought modeling DED would be as simple as just keeping the culture environment dry. But as it turns out, it's an incredibly complex multifactorial disease with a variety of sub-types," Dr. Huh said. "Regardless of type, however, there are two core mechanisms that underlie the development and progression of DED. First, as water evaporates from the tear film, salt concentration increases dramatically, resulting in hyperosmolarity of tears. And second, with increased tear evaporation, the tear film becomes thinner more rapidly and often ruptures prematurely, which is referred to as tear film instability. The question was: Is our model capable of modeling these core mechanisms of dry eye?"

The end results suggest that it is, and Drs. Massaro, Bunya, and Lee put the model to the test by examining its performance against human eyes, in patients with and without DED. Through multiple tests, they found that the eye-on-a-chip successfully mimicked what occurs in human eyes. Once they established this, the research team was ready to investigate the effects of potential treatments for real human eyes on this artificial model. This granted the researchers the valuable ability to avoid possible damage to real human eyes through risky new treatments.

The team began their investigation by testing the effect of lubricin, a mucinous glycoprotein that is secreted in joints, on the DED model of the eye-on-a-chip. Previous research suggested that the production of lubricin is impaired in individuals with DED, and the team hoped that testing this drug on their model would counteract some of this effect. The results were impressive. "While we knew patients with dry eyes were deficient in lubricin, its role in the pathophysiology of dry eyes was unknown. Testing lubricin with our device showed that it not only helps maintain the ocular surface by decreasing frictional forces exerted on the eye, but more importantly also suppresses inflammation. This suggests lubricin may play a key role in modulating multiple pathways," said Dr. Lee.

The team also found that the artificial 'eyelid' in their device plays an important role in cell differentiation. Corneal cells matured faster and more efficiently when the gelatin eyelid was blinking on top of them, suggesting a mechanical role in cell differentiation. This discovery could have important implications for understanding cell function, as well as uncovering how DED, or a change in blinking rates, impacts cell function in the eye.

For Drs. Massaro, Bunya, and Lee, the study represents a huge step forward in understanding DED mechanisms. Looking forward, they hope to further study the effectiveness of various drug treatments in their eye model, and gain a better understanding of the mechanisms involved in DED. According to Dr. Massaro, "This model has the potential to revolutionize the way we understand fluid dynamics on the surface of the eye and their effects on human cells, and could accelerate the discovery of new treatments." They credit much of the study's success to the collaborative work fostered at the University of Pennsylvania, which brought together multiple departments across Penn's campus, each specializing in an important aspect of the study. ■



The eye-on-a-chip model developed by the research team.

SCHEIE BY THE NUMBERS

FY2019*

CREATED BY KRISTEN MULVIHILL

60 CLINICAL & RESEARCH FACULTY

3,195 SURGERIES PERFORMED BY FACULTY

17 OPHTHALMIC SPECIALTIES

125,275 PATIENT VISITS

169 FACULTY PUBLICATIONS

A LEADER IN RESEARCH IMPACT

112 H-INDEX

>100 CLINICAL STUDIES IN PROGRESS

100% OF GRADUATING RESIDENTS PURSUE TOP FELLOWSHIP PROGRAMS

#1 DEPARTMENT AT PENN IN PATIENT ENCOUNTERS & SURGICAL VOLUMES AT VA HOSPITAL

RESIDENCY PROGRAM **#3** IN NATION FOR RESEARCH OUTPUT PER ALUMNUS

6 PENN MEDICAL STUDENTS MATCHED A TOP OPHTHALMOLOGY RESIDENCY PROGRAM

FACULTY HAVE TRAVELED TO **30+ COUNTRIES** FOR CLINICAL SERVICE

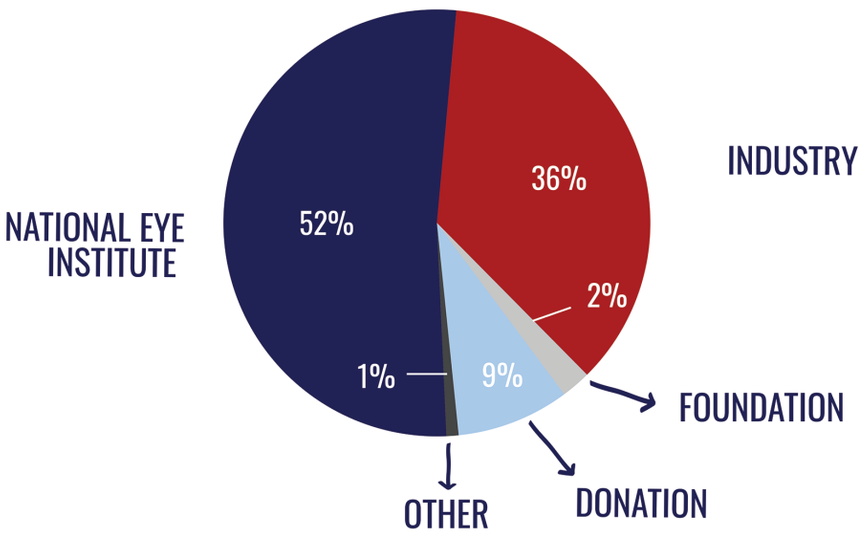
TOP 5

IN THE NATION FOR NATIONAL EYE INSTITUTE FUNDING

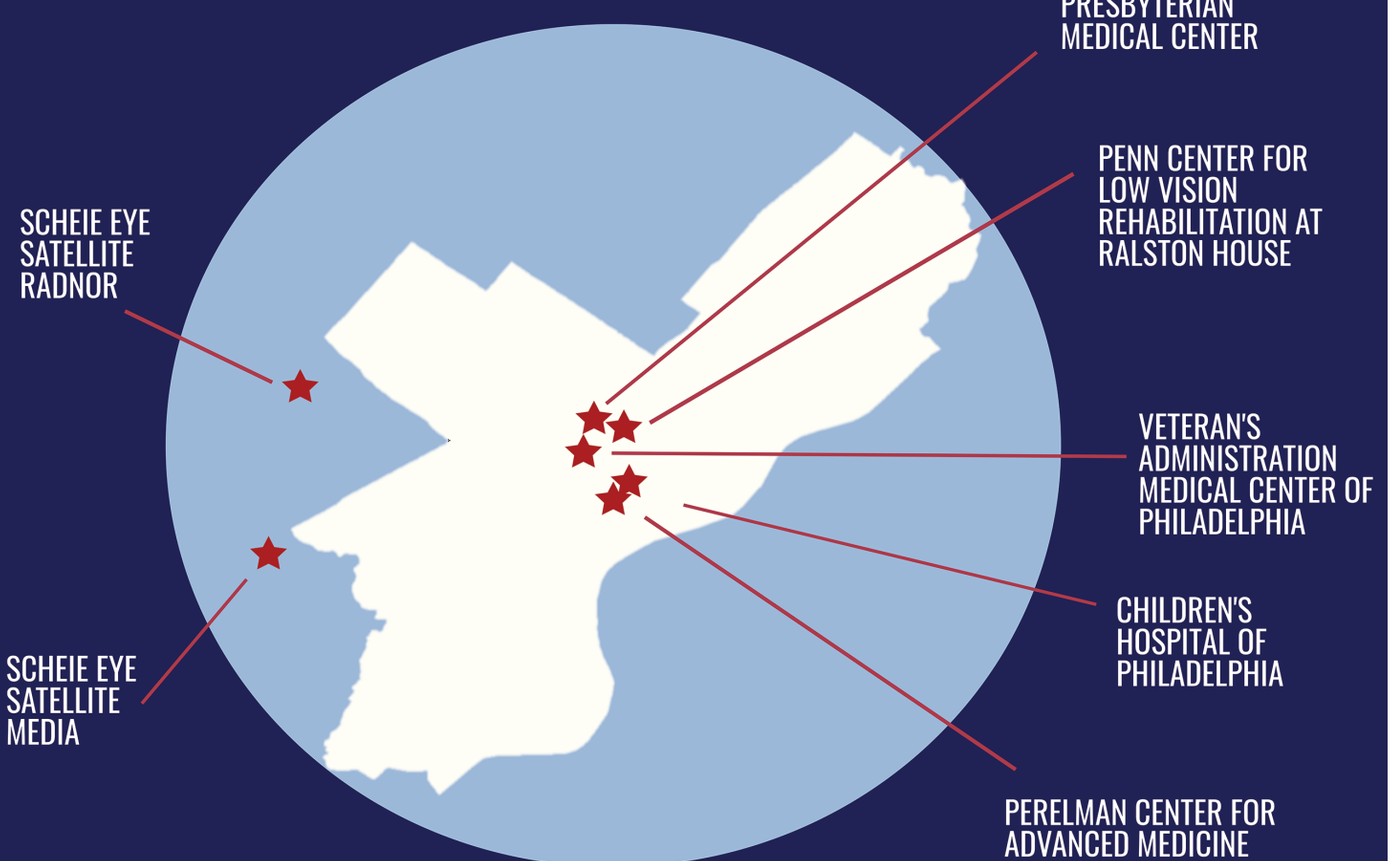
of active projects

$15,499,479

SOURCES OF EXTERNAL FUNDING FOR CLINICAL STUDIES



SCHEIE OFFERS EYE CARE IN SEVEN CLINICAL FACILITIES ACROSS PHILADELPHIA AND DELAWARE COUNTY



*July 1, 2018 - July 1, 2019

dear friends

Scott M. Goldstein, MD
Pediatrics & Adult
Oculo-Facial Plastic Surgeon
Tri-County Eye & Wills Eye Institute

As physicians, we are keenly aware of the long road one must travel to become an ophthalmologist. From the time we finish college through medical school and residency, we are exposed to many areas of interest and career opportunities. Overall, almost all individuals in the field of ophthalmology are pleased with their chosen profession. In particular, the Scheie alumni that I have met over the years have all found meaningful careers in clinical practice, academics, and/or research. Yet, in the era of declining reimbursement (cataract fees were cut again for 2020) and increasing patient load, we often find ourselves working harder and not always smarter.

More patients, more hours, more paperwork for most – it is no shock that physician burnout is a real entity. This has impacted ophthalmology as much as primary care fields. Heading into the next few decades of the 21st century, there will be more patients who require our help as ophthalmologists and less of us to see them. Therefore, there will likely be increased pressure on us simply from a supply and demand perspective.

Mindfulness and life balance are not typically skills that we obtain in training. Certainly as Scheie trainees, we have had extraordinary experiences in all areas of ophthalmology. However, being aware of our time, the stress around us, and how we best decompress will allow us to remain focused, invigorated, and refreshed for the remainder of our careers. I encourage everyone to find avenues to balance work and life with the ultimate goal to stay productive and to stay healthy. ■

Scott M. Goldstein, MD Res '00, Fel '02
President, Scheie Alumni Society

SAVE the DATE

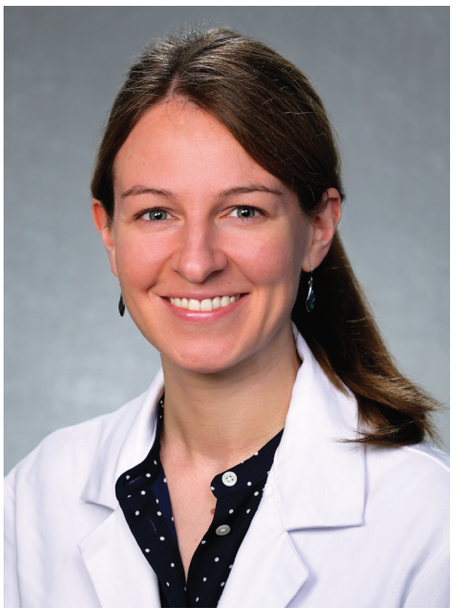
2020 Scheie Eye Institute Alumni Association CME Accredited Conference "When to Refer"

Friday, April 17, 2020

7:30am-4:30pm
Scheie Eye Institute, Breakfast and Lunch served
Honored Alumni Lecture: William B. Trattler, MD
David M. Kozart Lecture: Myron Yanoff, MD

7:00pm-10:30pm
Dinner and Dancing at The Rittenhouse Hotel

scheie welcomes Katherine Uyhazi



By Kristen Mulvihill

The Scheie Eye Institute is delighted to welcome back Dr. Katherine Uyhazi, who recently joined the faculty as an Instructor of Ophthalmology, with a specialty in retinal degeneration.

Dr. Uyhazi received her MD and PhD in Cell Biology from the Yale School of Medicine, where she focused on understanding gene regulation in embryonic stem cells. She completed her residency in ophthalmology and her fellowship in retinal degeneration here at Scheie.

She first became interested in ophthalmology during an undergraduate research internship, where she studied a protein expressed in photoreceptor cells in fluorescent green-eyed frogs.

"It was exciting and had the potential to help people with macular degeneration – and I was hooked," Dr. Uyhazi recalled.

Dr. Uyhazi was recently awarded a University of Pennsylvania K12 grant, which will allow her to devote the majority of her time to research. Her research will focus on developing stem cell-based treatments for patients who have lost vision due to retinal cell death.

"If we can coax stem cells to replace the rods and cones and their support cells in the eye, there is hope that we can restore vision to those who have lost their sight due to retinal cell death," she explained.

In addition to her research, Dr. Uyhazi will devote a portion of her efforts to clinical practice, where she will see patients with inherited retinal diseases such as retinitis pigmentosa and Leber congenital amaurosis (LCA), a form of childhood blindness. She looks forward to working alongside her mentors Drs. Jean Bennett, Albert Maguire, and Tomas Aleman on several clinical trials of gene therapy treatments.

"Penn is a research powerhouse filled with world-renowned experts, but also has a warmth that makes Scheie feel like family," she said. "I am honored to have trained here and look forward to continuing my career in such a collaborative place."

Dr. Uyhazi lives in Fairmount with her husband David, an endocrinologist at Penn Medicine, as well as their one-year-old daughter and their Labrador Retriever. In her free time, she enjoys playing the piano, scuba diving, and skiing. ■

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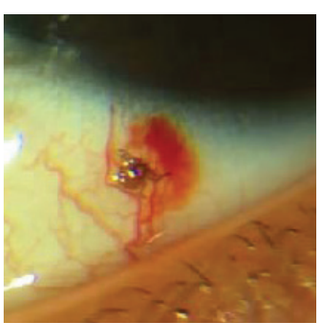
name that photo:
identification case study

By Brian M. Shafer, MD

Below you will see a portion of a photo relating to an interesting case study. Can you guess the object depicted on the eyeball below?



A) **Piece of Tree Branch**

B) **Metal Fragment**

C) **Tick**

D) **Nevus**

Answer on page 27

EVENTS 2019

created by
Kristen Mulvihill

Holiday Party

January 2019

In January, our faculty and staff celebrated at Scheie's annual Holiday Party at Fairmount Water Works.

Photos: Brian Holmes

Scheie Alumni Meeting

April 2019

Celebrating the Department's 145th Anniversary, faculty, staff, alumni, and friends enjoyed dinner and dancing at the Rittenhouse Hotel following a day packed with lectures.

Photos: Brian Holmes

Resident & Fellow Graduation

June 2019

On June 14, Scheie faculty and staff gathered at the College of Physicians of Philadelphia to honor the graduating residents and fellows. Congratulations to all of our residents and fellows!

Phillies Game

August 2019

Photos: Brian Holmes

For Scheie's annual employee engagement event, faculty and staff attended an exciting 15-inning baseball game as the Phillies took on the Chicago White Sox.

EVENTS 2019

Photos: Brian Holmes

Philadelphia VisionWalk

October 2019

On October 5, a team of Scheie faculty, staff, family, and friends joined the Foundation Fighting Blindness for the 13th Annual Philadelphia VisionWalk to support sight-saving research. Our team exceeded our fundraising goal of $10,000 and had our biggest turnout yet! Special thanks to Marquis Vaughn for making this walk such a big success.

Screening Events

Throughout 2019

Throughout the year, Scheie faculty and staff organized various screening events across Philadelphia. These events provided free health and eye screenings and offered visual device giveaways, educational materials, and other health and wellness related resources to members of the community.

name that photo:
identification case study

Answer:

C. Tick (Ixodes Scapularis)

A 3-year-old girl presented to the Children's Hospital of Philadelphia after her parents noticed a brown-colored foreign body on her conjunctiva. The child spent the previous day hiking in the woods outside of Philadelphia. The child did not have any complaints and was in no distress. Slit lamp examination revealed a 1.1 x 0.8 millimeter tick adherent to the conjunctiva near the inferotemporal limbus. Oxymetazoline drops were placed in the eye and Erythomycin ointment was smeared over the tick to encourage detachment from the conjunctiva. Blunt tissue forceps were used to grasp the body of the tick and gentle, tangential traction was applied. The entire tick, including the head, was removed. The child was not started on any antibiotic prophylaxis. The tick was identified as Ixodes Scapularis larvae and was negative for all infectious disease. The child recovered from the incident with no further sequelae.

Meet Our Team

Comprehensive Ophthalmology
Allison Brucker, MD
Charles Nichols, MD
Deborah Herrmann, MD
Dwight Stambolian, MD, PhD
Jane Portnoy, MD
Paul Tapino, MD
Thomasine Gorry, MD, MGA

Cornea
Christina Moon, MD
Michael Sulewski, MD
Stephen Orlin, MD

Dry Eye
Giacomina Massaro-Giordano, MD
Vatinee Bunya, MD, MSCE

Glaucoma
Amanda Lehman, MD, MSc
Eve Higginbotham, SM, MD
Eydie Miller-Ellis, MD
Prathima Neerukonda Atluri, MD
Prithvi Sankar, MD
Qi Cui, MD, PhD
Victoria Addis, MD

Low Vision
Ranjoo Prasad, OD

Neuro-Ophthalmology
Ahmara Ross, MD, PhD
Grant Liu, MD
Kenneth Shindler, MD, PhD
Madhura Tamhankar, MD

Ocular Oncology
Joan O'Brien, MD
Katayoon Baradaran Ebrahimi, MD

Ocular Pathology
Vivian Lee, MD

Oculoplastics
César Briceño, MD
Sonul Mehta, MD

Optometry
Alisha Fleming, OD
Regina Altemus, OD
Sara Bierwerth, OD
Stacey Cesarano, OD

Pediatric Ophthalmology (CHOP)
Anne Jensen, MD
Brian Forbes, MD, PhD
Gil Binenbaum, MD, MSCE
Graham Quinn, MD
James Katowitz, MD
Karen Revere, MD
Monte Mills, MD
Priyanka Kumar, MD
Robert Avery, DO, MSCE
Stefanie Davidson, MD
William Anninger, MD
William Katowitz, MD

Retina & Vitreous
Albert Maguire, MD
Alexander Brucker, MD
Benjamin Kim, MD
Brian VanderBeek, MD, MPH
Joshua Dunaief, MD, PhD
Juan Grunwald, MD
Katherine Uyhazi, MD, PhD
Samuel Jacobson, MD, PhD
Tomas Aleman, MD

Uveitis
Nirali Bhatt, MD

Research Faculty
Artur Cideciyan, PhD
Ebenezer Daniel, MD, PhD, MPH
Gui-shuang Ying, MD, PhD
Jean Bennett, MD, PhD (CAROT)
Jessica Morgan, PhD (CAROT)
Manzar Ashtari, PhD, DABR (CAROT)
Maureen Maguire, PhD
Richard Stone, MD
Venkata Ramana Murthy Chavali, PhD

2019-2020 Fellows

Esteban Vazquez Valencia, MD (Glaucoma)
Marcela Estrada, MD (CHOP Pediatrics)
Neena Cherayil, MD (Neuro-Ophthalmology)
Peter Bracha, MD (Retina)
Sana Bautista, MD (CHOP Oculoplastics)
Stephanie Kletke, MD (CHOP Pediatrics)
Tina Xia, MD (Retina)
Venkatesh Brahma, MD (Neuro-Ophthalmology)

2019-2020 Residents

First Year Residents
Daniel Choi, MD
Dario Marangoni, MD, PhD
Diana Kim, MD
Jennifer Nadelmann, MD
Zujaja Tauqeer, MD, DPhil

Second Year Residents
Delu Song, MD
Enny Oyeniran, MD
Lana Verkuil, MD
Meera Ramakrishnan, MD
Yafeng Li, MD, PhD

Third Year Residents
Brian Shafer, MD
Drew Scoles, MD, PhD
Erin O'Neil, MD
James Clay Bavinger, MD
Kurt Scavelli, MD

Ongoing Clinical Studies

COMPREHENSIVE OPHTHALMOLOGY
César Briceño, MD
Adaptation to the 9-Item National Eye Institute Visual Functioning Quality of Life Questionnaire to Broaden its Applicability to Homeless Individuals
Joan DuPont
(215) 662-8038

CORNEA
Stephen Orlin, MD
Zoster Eye Disease Study (ZEDS): A Study of Valacyclovir in Immunocompetent Subjects with a History of Dendriform Epithelial Keratitis, Stromal Keratitis, Endothelial Keratitis, and/or Iritis due to Herpes Zoster Ophthalmicus
Adrienne Saludades
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DRY EYE
Vatinee Bunya, MD, MSCE
Identification of Patients with Early Sjogrens Syndrome
Jonathan Lilley
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Vatinee Bunya, MD, MSCE
Sjogrens Screening Dry Eye Study
Kennedy Johnson
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Vatinee Bunya, MD, MSCE
A Phase 2 Open Label Trial of ST266 Eye Drops in the Treatment of Persistent Corneal Epithelial Defects
Kennedy Johnson
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Mina Massaro-Giordano, MD
A Study of Brimonidine Tartarte Nanoemulsion Eye Drops in Patients with Ocular Graft-Vs-Host Disease (oGVHD)
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Mina Massaro-Giordano, MD
Lacripep in Dry Eye Associated with Primary Sjogrens Syndrome
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Mina Massaro-Giordano, MD
Prospective Controlled Study of Intranasal Tear Neurostimulation for Sjogrens Patients with Dry Eye Disease
Jonathan Lilley
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Maureen Maguire, PhD
Coordinating Center for the Dry Eye Evaluation and Management Study

GLAUCOMA

Ahmara Ross, MD, PhD
A Study of ST266 Given by Non-Invasive Intranasal Trans-Cribriform Delivery in Subjects with Increased Intraocular Pressure Without Evidence of Glaucomatous Damage
Devica Bhutani
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Qi Cui, MD, PhD
Comparison of Outcomes Following Laser Peripheral Iridotomies

Joan O'Brien, MD
A Study to Detect Genes Associated with Glaucoma in African Americans
Selam Zenebe-Gete
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NEURO-OPHTHALMOLOGY

Madhura Tamhankar, MD
Characteristics, Risk Factors and Management of Visual Disturbance After Cataract Surgery

Madhura Tamhankar, MD
Correlating the Presence of Fatty Infiltration Seen in Extra Ocular Muscle with Strabismus Phenotype

Madhura Tamhankar, MD
Visual Restoration for Hemianopia
Devica Bhutani
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Kenneth Shindler, MD, PhD
A Phase IV Trial of Neuroprotection with ACTH in Acute Optic Neuritis
Joan DuPont
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OCULAR PATHOLOGY

Vivian Lee, MD
The Roles of Src-Family Tyrosine Kinases (SFKs) and Srcasm in Ocular Surface (OS) Epithelial Wound Repair and Tumorigenesis

Vivian Lee, MD
Sebaceous Gland Carcinoma

Vivian Lee, MD
Analysis of the Mutational and Gene Expression Landscape of Eyelid Sebaceous Gland Carcinoma

OCULOPLASTICS

César Briceño, MD
Evaluating the Utility of Sentinel Lymph Node Biopsy in Patients with Sebaceous Carcinoma of the Eyelid
Joan DuPont
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César Briceño, MD
Smoking Cessation Counseling and Thyroid Disease
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César Briceño, MD
Meibography of Common Eyelid Margin Lesions
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PEDIATRIC OPHTHALMOLOGY

William Anninger, MD
Clinical Study of the Artisan Aphakia Lens for the Correction of Aphakia in Children
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Robert Avery, DO, MSCE
Retinal Imaging in Children with Tumors of the Visual Pathway and/or Neurofibromatosis Type 1
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Robert Avery, DO, MSCE
Volumetric Analysis of Optic Pathway Gliomas in Children with Neurofibromatosis Type 1 (NF1)
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Biomarkers of Vision Loss in Children with Optic Pathway Gliomas
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Robert Avery, DO, MSCE
Laser Speckle Flowgraphy in ICP
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Robert Avery, DO, MSCE
Neurofibromatosis Type 1 Optic Pathway Glioma (OPG) Natural History Study
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Luminopia One Treatment Study (C-AM-2)
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James Katowitz, MD
The Importance of Appearance to Severely Visually Impaired Individuals
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James Katowitz, MD
Causes for Failure in Frontalis Suspension Surgery Using Autogenous Fascia Lata for Congenital Ptosis
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James Katowitz, MD
Hydrogel Implants: A Children's Hospital of Philadelphia Experience
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William Katowitz, MD
The Use of the Microdebrider in Endoscopic Dacryocystorhinostomy (eDCR) in Children
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Karen Revere, MD
Height of the Tarsal Plates in Children
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Gil Binenbaum, MD, MSCE
Development of a Postnatal Growth Model to Stratify Risk for Retinopathy of Prematurity
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Periocular Ulcerative Dermatitis Associated with Neonatal Gentamic in Ointment Prophylaxis in Newborns
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Gil Binenbaum, MD, MSCE
The Effect of Dance Training on Visuospatial Perception and Bodily-Kinesthetics and its Relation to Surgical Skills
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Gil Binenbaum, MD, MSCE
Retinopathy of Prematurity (ROP) Time and Motion
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Retinal Hemorrhage Patterns
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Postnatal Growth and Retinopathy of Prematurity (G-ROP) Registry
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Gil Binenbaum, MD, MSCE
Pediatric Ocular Motor Nerve Palsies
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Gil Binenbaum, MD, MSCE
Insulin-Like Growth Factor 1 (IGF-1) and Retinopathy of Prematurity (ROP)
Lauren Tomlinson
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RETINA

Maureen Maguire, PhD
Coordinating Center for the Complications of Age-Related Macular Degeneration Trial (CAPT)

Maureen Maguire, PhD
Coordinating Center for the Comparisons of AMD Treatments Trial (CATT)

Maureen Maguire, PhD
Vision in Preschoolers Hyperopia in Preschoolers (VIP-HIP)

Maureen Maguire, PhD
Analyzing Retinal Microanatomy in Retinopathy of Prematurity to Improve Care

Maureen Maguire, PhD
Vision in Preschoolers Early Literacy & Farsightedness (VIP-ELF) Study

Jean Bennett, MD, PhD
Outcome Measure Study for Inherited Retinal Degeneration
Denise Pearson
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Jean Bennett, MD, PhD
Vascular Biomarkers in Retinal Gene Therapy for Leber Congenital Amaurosis
Denise Pearson
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Albert Maguire, MD
A Study to Evaluate the Safety and Tolerability of Gene Therapy with RGX-314 in Subjects with Neovascular AMD (nAMD)
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Albert Maguire, MD
A Long-Term Follow-Up Study to Evaluate the Safety and Efficacy of RGX-314
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Albert Maguire, MD
A Phase 1/2 Safety Study in Subjects with CHM (Choroideremia) Gene Mutations Using an Adeno-Associated Virus Serotype 2 Vector to Deliver the Normal Human CHM Gene
Denise Pearson
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Tomas Aleman, MD
A Study to Evaluate the Efficacy, Safety, Tolerability and Systemic Exposure of QR-110 in Subjects with Leber's Congenital Amaurosis (LCA) due to c.2991+1655AG Mutation (p.Cys998X) in the CEP290 Gene
Denise Pearson
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Tomas Aleman, MD
A Clinical Trial of Retinal Gene Therapy for X-linked Retinitis Pigmentosa Using an Adeno-Associated Viral Vector (AAV8) Encoding Retinitis Pigmentosa GTPase Regulator (RPGR)
Denise Pearson
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Tomas Aleman, MD
A Post-Authorization, Multicenter, Multinational, Longitudinal, Observational Safety Registry for Patients Treated with Voretigene Neparvovec
Joan DuPont
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Charles Miller
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Joshua Dunaief, MD, PhD
Gene Expression Patterns in Age Related Macular Degeneration (AMD)

Joshua Dunaief, MD, PhD
Interleukin 6 (IL-6) in Center for Neurodegenerative Disease Research (CNDR) Tissue

Joshua Dunaief, MD, PhD
Effect of Plant-Based Diet on Blood Chemistries

Alexander Brucker, MD
Randomized Trial of Intravitreous Aflibercept Versus Intravitreous Bevacizumab + Deferred Aflibercept for Treatment of Central-Involved Diabetic Macular Edema
Sheri Drossner
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Alexander Brucker, MD
A Natural History Observation and Registry Study of Macular Telangiectasia Type 2: The MacTel Study
Sheri Drossner
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Alexander Brucker, MD
Genes in Diabetic Retinopathy Project
Sheri Drossner
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Alexander Brucker, MD
Study of Comparative Treatments for Retinal Vein Occlusion 2: A Trial of Eyes with Macular Edema Secondary to Central Retinal Vein Occlusion
Joan DuPont
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Alexander Brucker, MD
Intravitreous Anti-VEGF Treatment for Prevention of Vision Threatening Diabetic Retinopathy in Eyes at High Risk
Sheri Drossner
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Alexander Brucker, MD
A Study to Determine the Safety and Efficacy of RenexusTM in Macular Telangiectasia Type 2
Sheri Drossner
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Alexander Brucker, MD
A Study That Tests BI 1467335 in Patients with Diabetic Eye Disease
Adrienne Saludades
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Alexander Brucker, MD
Evaluation of Optical Coherence Tomography (OCT) in Patients with Clinical Diagnosis of PVD
Adrienne Saludades
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Alexander Brucker, MD
A Study to Evaluate the Efficacy and Safety of Faricimab in Patients with Neovascular Age-Related Macular Denegation Tenya
Devica Bhutani
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Alexander Brucker, MD
Randomized Clinical Trial Assessing the Effects of Pneumatic Vitreolysis on Vitreomacular Traction
Sheri Drossner
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Alexander Brucker, MD
Study to Assess Safety and Efficacy of Multiple Doses of IONIS-FB-LRX, an Antisense Inhibitor of Complement Factor B, in Patients with Geographic Atrophy Secondary to Age-Related Macular Degeneration (AMD)
Joan DuPont
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Alexander Brucker, MD
Single-Arm Study Assessing the Effects of Pneumatic Vitreolysis on Macular Hole
Sheri Drossner
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Alexander Brucker, MD
Sequoia Retinal Image Collection Study
Joan DuPont
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Benjamin Kim, MD
Quantification of Beta-D-Glucan Levels in the Aqueous and Vitreous Humor of Patients with Fungal Endophthalmitis
Adrienne Saludades
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Benjamin Kim, MD
Optical Coherence Tomography Imaging of the Retina of Frontotemporal Lobar Degeneration Patients
Adrienne Saludades
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Manzar Ashtari, PhD, DABR
Study of the Functional Neuroplasticity and Connectivity in Patients with Choroideremia Who Undergo Unilateral Retinal Gene Therapy

Manzar Ashtari, PhD, DABR
Longitudinal Functional and Structural Neuroimaging of Leber's Congenital Amaurosis of Phase 3 Patients

Manzar Ashtari, PhD, DABR
Longitudinal Functional and Structural Neuroimaging of Leber's Congenital Amaurosis

Katayoon Baradaran Ebrahimi, MD
Histopathology Study of Human Age-Related Macular Degeneration (AMD)

Katayoon Baradaran Ebrahimi, MD
Multimodal Imaging in Age-Related Macular Degeneration
Joan DuPont
(215) 662-8038

Brian VanderBeek, MD, MPH
Hydroxychloroquine Retinal Toxicity in African Americans

Gui-shuang Ying, MD, PhD
Data Center. Fluoromethelone as Adjunctive Medical Therapy for TT Surgery (FLAME) Trial

Gui-shuang Ying, MD, PhD
Multivariate Methods for Clustered Ordinal Data with Application to Longitudinal Analysis for Diabetic Retinopathy Progression

Gui-shuang Ying, MD, PhD
Secondary Analysis of the Data from G-ROP Study

Gui-shuang Ying, MD, PhD
Additional Analyses of the Data from the Comparison of Age-Related Macular Degeneration Treatment Trials (CATT) and CATT Follow-Up Study (CATT-FS)

Ebenezer Daniel, MBBS, MS, MPH, PhD
Optokinetic Nystagmus (OKN) Vision Testing
Monte Mills
mills@email.chop.edu

Jessica Morgan, PhD
Investigating Retinal Function Through High Resolution Imaging
Yu You Jiang
(215) 614-4198

Jessica Morgan, PhD
A Safety and Efficacy Trial of AGTC 402, a Recombinant Adeno-Associated Virus Vector Expressing CNGA3, in Patients with Congenital Achromatopsia Caused by Mutations in the CNGA3 Gene
Yu You Jiang
(215) 614-4198

Jessica Morgan, PhD
High Resolution Retinal Imaging
Yu You Jiang
(215) 614-4198

UVEITIS

Nirali Bhatt, MD
ADalimumab Vs. conventional ImmunoSupprEssion for uveitis (ADVISE) Trial
Charles Miller
(215) 349-5803 or (215) 662-8094

Nirali Bhatt, MD
Macular Edema Ranibizumab v. Intravitreal Anti-Inflammatory Therapy (MERIT) Trial
Charles Miller
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Faculty Awards
(July 1, 2018 – Present)

Jean Bennett, MD, PhD
- 2018 António Champalimaud Vision Award (co-recipient)
- 2018 American Ingenuity Award for Life Sciences, Smithsonian Magazine
- 2018 August M. Watanabe Prize in Translational Research, Indiana University School of Medicine
- 2018 Marion Spencer Fay Award, Drexel University College of Medicine
- 2018 Sanford Lorraine Cross Award (co-recipient)

César Briceño, MD
- Golden Apple Resident Teaching Award
- Best Doctors in America 2019-2020

Alexander Brucker, MD
- 2019 Philadelphia Magazine Top Doctor
- 2019 Castle Connolly Regional Top Doctor

Ebenezer Daniel, MBBS, MS, MPH, PhD
- 2019 Achievement Award, American Academy of Ophthalmology

Stefanie Davidson, MD
- 2019 SJ Magazine Top Docs for Kids

Katayoon Baradaran Ebrahimi, MD
- 5th Biennial International Symposium on AMD Travel Award, Harvard Medical School
- Travel Grant, Association for Research in Vision and Ophthalmology

Deborah Herrmann, MD
- 2019 Castle Connolly Exceptional Women in Medicine
- 2019 Philadelphia Magazine Top Doctor
- 2019 Castle Connolly Regional Top Doctor
- Best Doctors in America 2019-2020

Eve Higginbotham, SM, MD
- Fight for Sight's 2019 Physician/Scientist Award

Samuel Jacobson, MD, PhD
- 2018 António Champalimaud Vision Award (co-recipient)

William Katowitz, MD
- 2019 Philadelphia Magazine Top Doctor
- 2019 Castle Connolly Regional Top Doctor

Grant Liu, MD
- 2019 Castle Connolly Regional Top Doctor

Albert Maguire, MD
- 2018 António Champalimaud Vision Award (co-recipient)
- 2018 American Ingenuity Award for Life Sciences, Smithsonian Magazine

Maureen Maguire, PhD
- 2019 Secretariat Award, American Academy of Ophthalmology
- 2019 Lawrence J. Singerman Medal, The Macula Society (co-recipient)

Eydie Miller-Ellis, MD
- 2019 FOCUS Award for the Advancement of Women in Medicine, Perelman School of Medicine
- 2019 Philadelphia Magazine Top Doctor
- 2019 Castle Connolly Regional Top Doctor

Monte Mills, MD
- 2019 Philadelphia Magazine Top Doctor
- 2019 Castle Connolly Regional Top Doctor

Jessica Morgan, PhD
- ARVO Leadership Development Program

Joan O'Brien, MD
- 2019 Philadelphia Magazine Top Doctor
- 2019 Castle Connolly Regional Top Doctor
- The Retina Research Foundation's Gertrude D. Pyron Award, American Society of Retina Specialists Annual Meeting

Stephen Orlin, MD
- 2019 Philadelphia Magazine Top Doctor
- 2019 Castle Connolly Regional Top Doctor

Graham Quinn, MD
- 2019 Outstanding Humanitarian Service Award, American Academy of Ophthalmology
- 2019 Philadelphia Magazine Top Doctor
- 2019 Castle Connolly Regional Top Doctor
- 2019 SJ Magazine Top Docs for Kids

Ahmara Ross, MD, PhD
- Harold Amos Medical Faculty Development Award

Prithvi Sankar, MD
- 2018 Senior Achievement Award, American Academy of Ophthalmology
- 2019 Medical Student Government Clinical Teaching Award, Perelman School of Medicine
- 2019 Secretariat Award, American Academy of Ophthalmology
- Elected to the 2019 PSOM Chapter of the Alpha Omega Alpha National Medical Honor Society
- Elected to the Gold Humanism Honor Society, The Arnold P. Gold Foundation

Michael Sulewski, MD
- 2019 Secretariat Award, American Academy of Ophthalmology
- 2019 Resident Surgical Teaching Award

Madhura Tamhankar, MD
- 2019 Philadelphia Magazine Top Doctor
- 2019 Castle Connolly Regional Top Doctor

Brian VanderBeek, MD, MPH
- 2019 Achievement Award, American Academy of Ophthalmology

Gui-shuang Ying, MD, PhD
- Outstanding Achievement Award in Ophthalmology & Visual Science for Overseas of Chinese Ophthalmological Society

Faculty Publications

(July 1, 2018 – July 1, 2019)

Due to space constraints, only the first three authors for each publication are listed below.

Addis, V., Oyeniran, E., Daniel, E., et al. (2019). **Non-physician grader reliability in measuring morphological features of the optic nerve head in stereo digital images**. *Eye (London, England), 33*(5), 838-844.

Addis, V. M., & Miller-Ellis, E. (2018). **Latanoprostene bunod ophthalmic solution 0.024% in the treatment of open-angle glaucoma: Design, development, and place in therapy**. *Clinical Ophthalmology (Auckland, N.Z.), 12*, 2649-2657.

Akpek, E. K., Bunya, V. Y., & Saldanha, I. J. (2019). **Sjogren's syndrome: More than just dry eye**. *Cornea, 38*(5), 658-661.

Aldave, A. J., Terry, M. A., Szczotka-Flynn, L. B., et al. (2019). **Effect of graft attachment status and intraocular pressure on descemet stripping automated endothelial keratoplasty outcomes in the cornea preservation time study**. *American Journal of Ophthalmology, 203*, 78-88.

Aleman, T. S., Uyhazi, K. E., Serrano, L. W., et al. (2018). **RDH12 mutations cause a severe retinal degeneration with relatively spared rod function**. *Investigative Ophthalmology & Visual Science, 59*(12), 5225-5236.

Ammar, M. J., & Tapino, P. (2019). **Macrodendrite in a patient with herpes simplex virus keratitis**. *JAMA Ophthalmology, 137*(2), e183979.

Asbell, P. A., Maguire, M. G., Peskin, E., et al. (2018). **Dry eye assessment and management (DREAM(c)) study: Study design and baseline characteristics**. *Contemporary Clinical Trials, 71*, 70-79.

Aysola, J., Harris, D., Huo, H., et al. (2018). **Measuring organizational cultural competence to promote**

diversity in academic healthcare organizations. *Health Equity, 2*(1), 316-320.

Badiei, A., Sudharsan, R., Santana, E., et al. (2019). **Comparative localization of cystathionine beta synthases and cystathionine gamma lyase in canine, non-human primate and human retina**. *Experimental Eye Research, 181*, 72-84.

Bavinger, J. C., Yu, Y., & VanderBeek, B. L. (2018). **Comparative risk of endophthalmitis after intravitreal injection with bevacizumab, aflibercept, and ranibizumab**. *Retina, 39*(10), 2004-2011.

Benetz, B. A., Stoeger, C. G., Patel, S. V., et al. (2019). **Comparison of donor cornea endothelial cell density determined by eye banks and by a central reading center in the cornea preservation time study**. *Cornea, 38*(4), 426-432.

Beres, S. J., Digre, K. B., Friedman, D. I., et al. (2018). **Pseudotumor cerebri syndrome is the best term for this condition**. *Pediatric Neurology, 87*, 9-10.

Binenbaum, G., Bell, E. F., Donohue, P., et al. (2018). **Development of modified screening criteria for retinopathy of prematurity: Primary results from the postnatal growth and retinopathy of prematurity study**. *JAMA Ophthalmology, 136*(9), 1034-1040.

Borkar, D. S., Sobrin, L., Hubbard, R. A., et al. (2019). **Techniques for improving ophthalmic studies performed on administrative databases**. *Ophthalmic Epidemiology, 26*(3), 147-149.

Bressler, N. M., Beaulieu, W. T., Maguire, M. G., et al. (2018). **Early response to anti-vascular endothelial growth factor and two-year outcomes among eyes with diabetic macular edema in protocol T**. *American Journal of Ophthalmology, 195*, 93-100.

Bressler, N. M., Odia, I., Maguire, M., et al. (2019). **Association between change in visual acuity and change in central subfield thickness during treatment of diabetic macular edema in participants randomized to aflibercept, bevacizumab, or ranibizumab: A post hoc analysis of the protocol T randomized clinical trial**. *JAMA Ophthalmology.*

Bressler, S. B., Odia, I., Glassman, A. R., et al. (2018). **Changes in diabetic retinopathy severity when treating diabetic macular edema with Ranibizumab: DRCR.net protocol I 5-year report**. *Retina. 38*(10), 1896-1904.

Bressler, S. B., Odia, I., Maguire, M. G., et al. (2019). **Factors associated with visual acuity and central subfield thickness changes when treating diabetic macular edema with anti-vascular endothelial growth factor therapy: An exploratory analysis of the protocol T randomized clinical trial**. *JAMA Ophthalmology, 137*(4), 382-389.

Bryant, L., Lozynska, O., Marsh, A., et al. (2019). **Identification of a novel pathogenic missense mutation in PRPF31 using whole exome sequencing: A case report**. *The British Journal of Ophthalmology, 103*(6), 761-767.

Bunya, V. Y., Fernandez, K. B., Ying, G. S., et al. (2018). **Survey of ophthalmologists regarding practice patterns for dry eye and sjogren syndrome**. *Eye & Contact Lens, 44 Suppl 2*, S196-S201.

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Faculty In the News

Below is a selection of recent news stories featuring our ophthalmology faculty's research and clinical work.

October 16, 2019: Dr. Mina Massaro-Giordano – **Compound Eye as Treatment for Neurotrophic Keratitis**. *Ophthalmology Times*: "In her clinical practice Dr. Massaro reported that she has had positive results with the drops. Thus far, she has treated about 25 people with all three stages of neurotrophic keratitis."

September 19, 2019: Dr. Brian VanderBeek – **Eye Surgeons Prescribed More Opioids as Procedures Became Less Invasive, Study Finds**. *PhillyVoice*: "The rates of opioid prescriptions filled after eye surgeries more than doubled during a recent 14-year stretch, even as procedures became less invasive."

September 9, 2019: Drs. Artur Cideciyan and Samuel Jacobson – **Success of Gene Therapy for a Form of Inherited Blindness Depends on Timing**. *Science Daily*: "Researchers from UPenn turned back to canines to learn more about the factors that determine the outcome of gene therapy; this time, they treated dogs at more advanced stages of the disease, timepoints at which human patients are more likely to be treated."

August 7, 2019: Dr. Eydie Miller-Ellis – **Hypotony More Than Just a Number; Consider Symptoms During Therapy**. *Ophthalmology Times*: "Numerous techniques are available to avoid chronic hypotony, but Dr. Miller noted that awareness of the condition is important."

August 5, 2019: Drs. Vivian Lee, Vatinee Bunya, and Mina Massaro-Giordano – **Penn Engineering's Blinking Eye-on-a-Chip Used for Disease Modeling and Drug Testing**. *Medium*: "This eye-on-a-chip, complete with a blinking eyelid, is helping scientists and drug developers to improve their understanding and treatment of dry eye disease, among other potential uses."

June 11, 2019: Dr. Mina Massaro-Giordano – **A High-Tech Solution is Zapping the Problem of Dry Eyes**. *CBS Philadelphia*: "Dry eyes is an issue for a growing number of people, but there's now a high-tech solution that's been successfully used by a Philadelphia doctor at Penn Medicine's Scheie Eye Institute."

May 9, 2019: Dr. Kenneth Shindler – **Noveome Biotherapeutics, Inc. Announces Publication of Further Preclinical Results Supporting the Neuroprotective Properties of ST266 in Retinal Ganglion Cells**. *AP News*: "Noveome Biotherapeutics, Inc. announced the publication of preclinical results for ST266, its proprietary, cell-free platform biologic, published in the *Journal of Neuro-Ophthalmology*."

March 18, 2019: Dr. Joshua Dunaief – **Dr. Dunaief Joins Mperia Therapeutics Inc. Clinical Advisory Board**. *BioSpace*: "A front-line age-related macular degeneration clinician for two decades, combined with a stellar research reputation around oxidative stress in the eye, means Dr. Dunaief is the perfect final appointee to our clinical advisory board."

March 6, 2019: Dr. Robert Avery – **CHOP Receives NIH Grant for Biomarkers of Vision Loss in Children with Optic Pathway Gliomas**. *OCT News*: "The Children's Hospital of Philadelphia receives a 2019 NIH Grant for Biomarkers of Vision Loss in Children with Optical Pathway Gliomas. The principal investigator is Dr. Robert Avery."

February 26, 2019: Dr. Ranjoo Prasad – **Traveling with Low Vision**. *AARP*: "When you have a visual impairment, travel can seem challenging or even overwhelming. But with advance planning and these expert tips, you can comfortably – and safely – get to where you want to go."

January 23, 2019: Dr. Eydie Miller-Ellis – **WURD Radio Reality Check**. *WURD Radio*: "Glaucoma is still a problem, especially in the African American community. The prevalence among this community is between 7 and 10 percent, sometimes more."

January 3, 2019: Dr. Mina Massaro-Giordano – **Dompé Announces First Treatment with Oxervate Eye Drops for Neurotrophic Keratitits**. *Cision PR Newswire*: "I am excited to be among the first physicians to treat neurotrophic keratitis patients with this new therapy."

December 17, 2018: Drs. Artur Cideciyan and Samuel Jacobson – **Intraocular Injection Improves Vision in a Form of Congenital Retinal Blindness**. *News Medical Life Sciences*: "A new treatment for patients with a form of congenital retinal blindness has shown success in improving vision, according to results published in *Nature Medicine* led by researchers at the Scheie Eye Institute in the Perelman School of Medicine."

December 4, 2018: Dr. Jean Bennett – **Sanford Lorraine Cross Award Goes to Blindness Researchers**. *Sanford Health News*: "For their work in creating a path for genetic treatments for blindness and other devastating diseases, Drs. Katherine High and Jean Bennett won the inaugural $1 million Sanford Lorraine Cross Award at a ceremony in Sioux Falls, South Dakota."

December 2018: Drs. Jean Bennett and Albert Maguire – **A New Treatment for Blindness Comes from Gene Therapy**. *Smithsonian Magazine*: "A wife-and-husband research team cracks the code to allow certain patients to see again."

Note: This list includes a selection of news items published in 2018 and 2019. For a complete list, visit https://www.pennmedicine.org/departments-and-centers/ophthalmology/about-us/news/faculty-in-the-news.

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The Scheie Eye Institute is the Department of Ophthalmology at the University of Pennsylvania. Scheie has been a leader in the field of ophthalmic research, education, and patient care for 145 years. Many of our greatest advancements in vision-saving therapy have been made possible by donations from individuals and organizations.

Will you join the Scheie Eye Institute?

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