VISION 2021

Duke Eye Center

Navigating the Unexpected

VISION

2021 VOLUME 37

COVER STORY

Editor Tori Hall
Writers Vicki Frye, Ann Gehan, Tori Hall, Lori Malone, Ally Merritt
Art Direction Pam Chastain Design
Photography Pitch Story Lab, Nick Johnson, Nimesh Nagarsheth, MD, Huth Photo

dukeeye.org

For questions, comments or to add or remove your name from our mailing list, please contact us.

Office of Marketing and Communications
Duke Eye Center
2351 Erwin Road
Durham, NC 27710
e-mail: Duke_Eye_Center@duke.edu
phone: 919.668.1345

Department of Ophthalmology
Duke University School of Medicine

From our Chair, Edward G. Buckley, MD

As I reflect over the last year, I am overcome with gratitude and appreciation for the Duke Eye Center team who have allowed us to adapt to and conquer many obstacles thrown our way. Dealing with the stress of a global pandemic has been, and continues to be, difficult, causing stress beyond what we thought to be imaginable. I would like to extend a tremendous thank you to our faculty, staff and trainees for their continued support and dedication to the missions of Duke Eye Center. While we have had setbacks this year, we are proud to remain a leader in research, education and patient care despite the challenges we have endured.

Aside from the pandemic, the acts of racism, hatred and cruelty that have occurred this year have added to the burden we face. It is time that we come together in unity to respect inclusion and justice for all people. Bringing people together from a broad spectrum of perspectives enhances our ability to solve complex challenges. We reject the unacceptable acts that reflect deep injustices and disparities and we pledge to bring the power of our research, education and health care missions to expose and correct the underlying forces at the root of these injustices. I am proud of the strong commitment to diversity and inclusion by the Duke Eye Center family as we work to foster an environment to promote a sense of belonging for all.

Despite these challenges, the department of ophthalmology has made tremendous strides in research and education that are changing patient care. Some highlights in this issue of VISION magazine among many of the other outstanding accomplishments include:

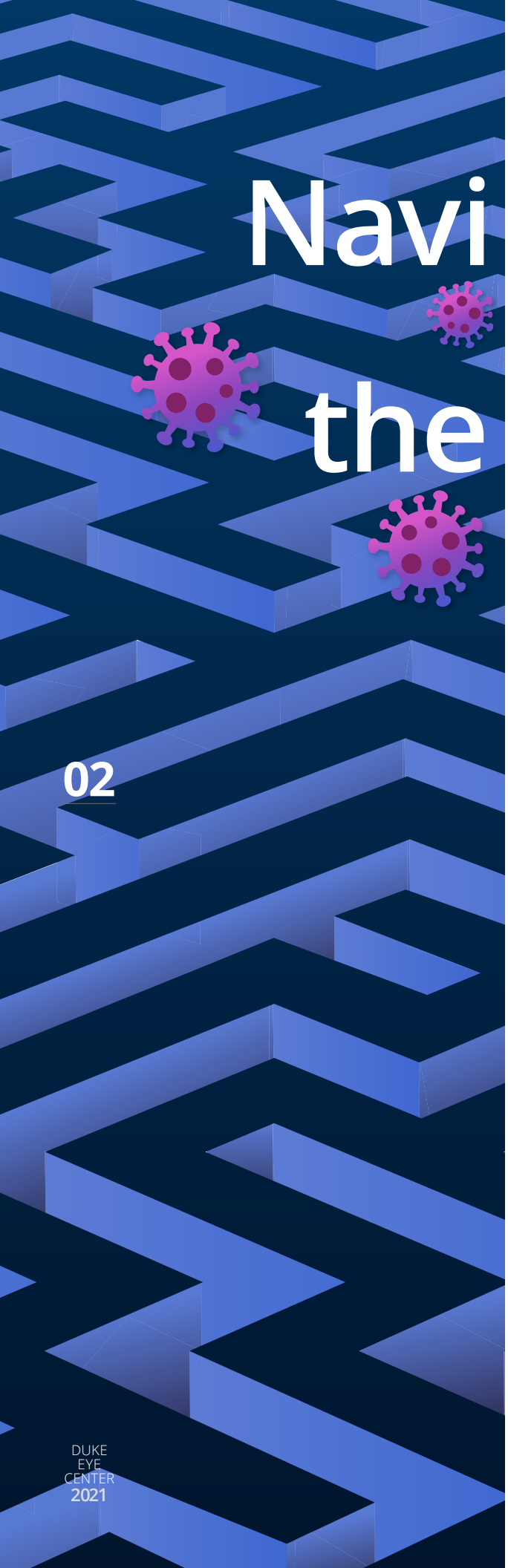
- Clinician scientist **Anthony Kuo, MD** and research scientist **Ryan McNabb, PhD** developed a robotically aligning OCT system that captures a three-dimensional image of the entire eye, all while allowing the system operator to maintain a safe physical distance from the patient.
- Cornea division chief **Terry Kim, MD** began his term as the American Society of Cataract and Refractive Surgery (ASCRS) president and has successfully transitioned how the society educates members and the community during this crisis.
- Glaucoma specialist **Felipe Medeiros, MD, PhD** was principal investigator for a phase 3 study that led to an FDA-approved biodegradable sustained-release implant that could provide better long-term control of IOP in patients with open-angle glaucoma (OAG) or ocular hypertension (OHT).

- Retina specialist **Sharon Fekrat, MD, FACS** and colleagues developed an artificial intelligence model using retinal scans that show promise for predicting Alzheimer's disease
- **Daniel Saban, PhD** and **Dilraj Grewal, MD** were instrumental in the purchase of a new state-of the art piece of equipment for the eye center, which they are using to analyze COVID patient samples through a collaboration with DARPA. Diraj Grewal, MD and **Divakar Gupta, MD** rapidly implemented teleophthalmology in response to the COVID-19 pandemic.
- **Jeremy N. Kay, PhD** and collaborators published groundbreaking research that has large implications for understanding and treating inherited blinding diseases.

It has been a year like no other, but I am proud of the teamwork and continued commitment to curing eye disease worldwide. I optimistically look forward to the achievements and accomplishments of 2021.

Sincerely,

Edward G. Buckley, MD
Vice Dean for Education, School of Medicine
Chair, Department of Ophthalmology
Vice Chancellor for Duke-National University Singapore Affairs
Gills Professor of Ophthalmology
Professor of Pediatrics
Duke University Medical School



Navigating the unexpected

02

How Duke Eye Center Responds to COVID-19 Pandemic

In January 2020, the world naively watched on as the city of Wuhan, China locked down to stop the spread of an unidentified virus, now universally known as COVID-19. Uncertain of the potential impact on the United States population and the medical community at-large, Duke Eye Center formed the COVID-Response Executive Task Force (see inset right).

Led by **Eric Postel, MD**, professor of ophthalmology and vice chair for clinical affairs, this team was composed of key cross-functional leaders from Duke Eye Center including **Edward G. Buckley, MD**, Gills Professor of Ophthalmology, department chair, **Heidi Campbell, COT**, clinical operations director, **Scott Cousins, MD**, Robert Machemer Professor of Ophthalmology and vice chair for strategy, **Elizabeth Hunter, MHA** interim chief department administrator and director of finance, and **Adrienne Lloyd, MHA**, former chief department administrator.

Edward G. Buckley, MD
Gills Professor of Ophthalmology, Department Chair

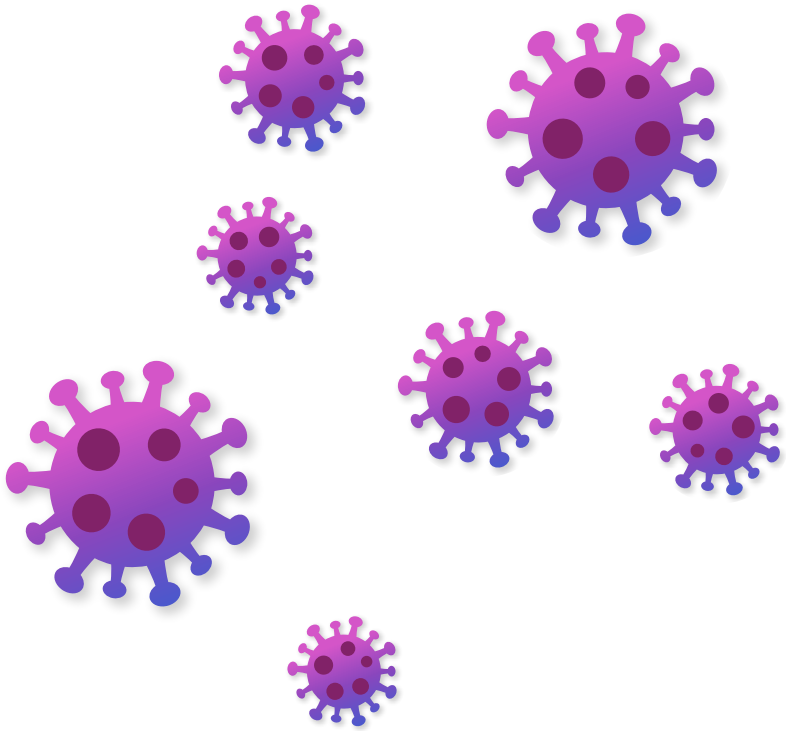
Heidi Campbell, COT
Clinical Operations Director

Scott Cousins, MD
Robert Machemer Professor of Ophthalmology and Vice Chair for Strategy

Elizabeth Hunter, MHA
Interim Chief Department Administrator and Director of Finance

Adrienne Lloyd, MHA
Former Chief Department Administrator

Eric Postel, MD
Professor of Ophthalmology and Vice Chair for Clinical Affairs



Together, the team proactively examined and mapped out scenarios to manage all aspects of clinical and research operations as the pandemic crisis grew in intensity, and as rapidly changing events necessitated. This required adapting to ever changing state mandates and responses, help lead the Duke Health System response to the crisis, and be prepared for many worst-case scenarios, from severe illness throughout the department to redistribution of staff to a nationwide shutdown of ambulatory care. **Robin Vann, MD**, associate professor of ophthalmology and operating room director and **Sarah-Jane Miller RN, BSN, CRNA, MSN** were key partners, helping develop strategy, policy, and tactics to manage the surgical practice.

Frequent meetings were held with faculty leaders, the faculty at large and staff to share information making sure that everyone was kept up-to-date with the ever-changing landscape early in the COVID crisis. The clinical operations leadership worked with faculty and staff to coordinate and implement complex process changes that assured the safety of all employees while also continuing to deliver care to patients. All-in-all, this was a massive and "all-hands-on-deck" team effort.

"It was essential to put a plan in place to manage the various functions of the department. While preparing for the most drastic scenarios was complex, our priorities were clear—care for our patients who require treatment; continue our robust research operation; maintain Duke's world-class education program and protect staff, faculty and their families," said **Edward G. Buckley, MD**, Gills Professor of Ophthalmology and chair, department of ophthalmology.

Thanks to the foresight of the administration team, staff across the board were equipped with the necessary resources to enable them to effectively work from home, in early March 2020.

As the pandemic persisted, it introduced unexpected and unfamiliar challenges; teams within each functional area of Duke Eye Center were forced to pivot and identify workable solutions.

The strength and resilience of the ophthalmology team was evident and impacted Duke Eye Center's ability to respond to the evolving pandemic.

Patient Care

Duke Eye Center is a major referral center for medical practices across North Carolina and throughout the country—more than 18,000 clinical patients and over 1,200 surgeries scheduled every month—individuals with severe eye disease rely on our timely response to help prevent the possibility of permanent vision loss.

"Though some medical specialties can rely on telemedicine, that approach is not as effective in ophthalmology because treatment is often contingent on obtaining images of the eye. Therefore, reopening of clinical space was a top priority, which meant for three months in early 2020, the team worked seven days a week with daily 6 a.m. planning calls," said Postel.

As stay-at-home orders were implemented and the seriousness of the pandemic gripped the country, a transformation in how patient care was delivered at Duke Eye Center was underway. The task force started by examining the footprint of each clinic to determine which could effectively accommodate our most urgent patient cases while maintaining necessary safety precautions and social distancing. Fortunately, an adequate number of clinical sites were able to accommodate these patients and perform surgeries on those individuals whose vision was at-risk without immediate care.

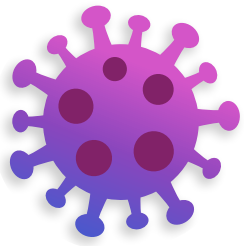
A system was established with alternating teams of caregivers and staff to protect individuals to the degree possible and minimize the risk of COVID transmission. A COVID outbreak would completely shut down the ability to deliver care.

As stay-at-home orders were implemented and the seriousness of the pandemic gripped the country, a transformation in how patient care was delivered at Duke Eye Center was underway.

These teams consisted of attendings, fellows, residents and staff. Each team worked at only one site, alternating for one week at a time, then spent the next week working remotely, creating a mini-quarantine period for each group.

"I am so proud of our clinical team, who understood the importance of taking care of our patients even during some of the hardest times in our careers. They were amazing with the COVID-19 protocols, they were flexible and willing to do what was necessary to make sure our patients could be seen safely," said Campbell.

The practice substantialy reduced patient volume in the early months of COVID, but as soon as CDC recommendations and state mandates allowed, clinical and surgical operations were rapidly reopened and providers and staff were redeployed to deliver care to all in need.



"Across the country, ophthalmology experienced more than an 80 percent decrease in patient visits—one of the hardest hit specialties in medicine," said Postel. Duke Eye Center managed to reopen very quickly and most importantly, safely, to care for the huge number of patients that rely on us to maintain, restore and improve vision.

Continuing patient care during the pandemic drove innovation and introduced improvements that will continue into the future. For example, the crisis clarified the need for technological innovation and process development that will make remote diagnosis in ophthalmology a common reality.

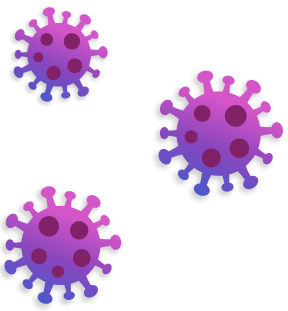
The strength and resilience of the ophthalmology team was evident and positively impacted Duke Eye Center's ability to respond to the evolving pandemic. Operational improvements made over the previous five years helped to prepare the department for unprecedented time. "Alignment on improved processes and systems allowed the group to implement adjustments to our clinical operations and communicate effectively during this time of crisis," said Buckely.

Research

Duke Eye Center is proud to have robust basic, translational and clinical research programs. In anticipation that significant measures would be taken to combat the spread of COVID-19, the research response team prepared to adjust all research operations.

The team identified essential basic research experiments—analyzing administrative activities that could be temporarily halted, while also confirming those that could not stop because of the years of work already invested.

"We worked efficiently and effectively to conserve research operations, pausing approximately 40 research studies temporarily during the initial shut down," said **Daniel Stamer, PhD**, Joseph A.C. Wadsworth Professor of Ophthalmology and member of the COVID-19 research response team.



The research labs at Duke ophthalmology employ dozens of people, from students and senior fellows to technical staff. However, between March and June, many of the Duke Eye Center labs were empty, with the exception of necessary visits to feed cells or to care for animals.

The challenges were especially significant for technical staff who typically spend the day conducting experiments and analysis. There was some work that could continue at home but that was finite, so the burden was on Stamer to make sure everyone stayed busy while at home.

Reopening the lab was a careful process. To complete the necessary work, research staff split each day into two shifts—early morning and late day—in order to limit the number of people in the lab at any given time.

Teaching within the labs remained a critical component. In the lab, you may need to teach a student your technique or review data together, both are challenging from six feet away. Fortunately, Duke provided face shields which allowed for closer interaction and more effective instruction.

"I feel tremendously lucky to be a Duke faculty member during the pandemic," Stamer said. "I've communicated with numerous of colleagues in the U.S. and around the world, and I've found that Duke has done an excellent job at keeping us safe and creating a work environment that is productive," he continued.

The clinical research operation also suffered during the initial months of the pandemic, having to temporarily halt clinical research. To optimize the ability to safely restart clinical research and many other processes, like other reopening processes, there was a gradual phased approach to the resumption of in-person research activities. The progression from one phase to the next was contingent on stable conditions in the health system and the local and state-wide community. Clinical resrach is similar to patient care. Often the clinical research coordinator or provider will need to be in close proximity to the patient in order to obtain eye images and perform evaluations.

"We held as many virtual research visits as possible and initially reopened only essential interventional studies following strict infection prevention procedures and revised patient flow. We gradually opened the clinical research unit to the rest of

the studies such as natural history studies, this approach protected our clinical research staff and paitents to the best of our ability," said **Eleonora Lad, MD, PhD**, associate director of the clinical research unit.

Clinical research is essential to the development of new treatments, imaging and surgical techniques. Duke Eye Center successfully resumed research activites in a timely manner with minimal impact on the projects that were in process.

Education

Duke Eye Center has a long history of offering a vigorous education program including medical student, residency and fellowship training, as well as a robust continuing medical education (CME) program.

There was concern that the educational programming was going to be severely impacted by COVID-19, especially the medical student and CME events. The team successfully pivoted to virtual learning for our external learners – previously uncharted territory for the programs.

The CME team and faculty learned how to successfully deliver virtual events. "I could not be prouder of **Renee Wynne**, CME director and her staff. They created powerful educational content that was well received, generated unprecedented attendance and will be accessible online long-term," said **Lejla Vajzovic, MD**, associate professor of ophthalmology and medical director for CME.

Medical student education was briefly halted, however **Jullia Rosdahl, MD, PhD**, associate professor of ophthalmology and medical student education director, had a vision that turned into a solution that met several needs. For medical students who were unable to rotate at our institution, virtual electives allowed them to continue learning during COVID, while simultaneously addressing the needs of underrepresented minority (URM) students at universities without an ophthalmology specialty.

"I could not allow medical students to miss out or have to wait on the ophthalmology elective. We previously identified a need for some sort of virtual platform to teach students at other universities, COVID just pushed us forward and launch the program sooner than expected," said Rosdahl.

Managing Costs and Taking Care of our People

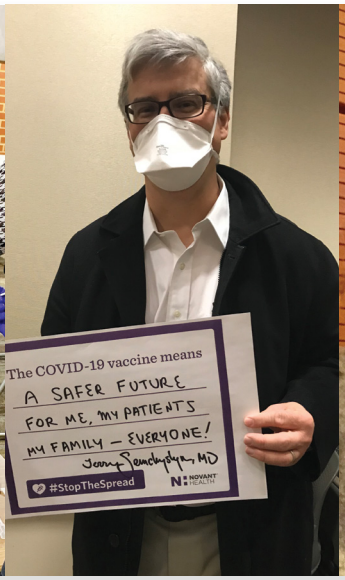
The pandemic generated a significant loss of revenue and unplanned expenses. This ultimately required a balanced approach between monitoring necessary expenses and identifying ways to conserve cash flow, while ensuring safe delivery of patient care, and allowing administrative staff to work remotely.

"Rearranging priorities and reallocating funds allowed the team to secure resources such as monitors and laptops for the anticipated work-from-home arrangement, facilitating a fairly seamless transition from on-campus to remote," Hunter said.

> The pandemic caused us to take a fresh look at finance operations and examine our expenses, and it's expected that some short-term changes will become permanent.

For example, staff assistants historically did not have laptops, yet those became critical tools to help them remotely schedule appointments and support faculty. "Our staff that support the faculty and assist with patient appointments were instrumental in organizing schedules, communicating with patients, and helping faculty identify which patients required urgent care. Without the proper equipment to work from home, we would have never been as successful as we have been" Campbell said.

Many medical centers experienced layoffs. To avoid this, the team worked to eliminate unnecessary expenses and avoid a deficit. Overtime hours were eliminated for employees, reimbursements were put on hold, and capital equipment purchases



At the end of 2020, in compliance with federal, state and local guidelines, Duke Health began vaccinating health care workers deemed high risk for COVID-19.

were delayed, all to ensure that clinics were properly staffed.

"We heard how many people were being furloughed across the country," Campbell said. "For us to keep everyone employed was a huge success."

The pandemic caused us to take a fresh look at finance operations and examine our expenses, and it's expected that some short-term changes will become permanent.

"The goal was something everyone could agree on, continue to pay staff and avoid a major deficit," said Hunter.

"When you step back and look at the past year, we did very well. The administrative team pulled together in a difficult situation and worked around the clock to deliver solutions," said Buckley. "I am so proud of the tireless dedication of the group for their exceptional job throughout this crisis."

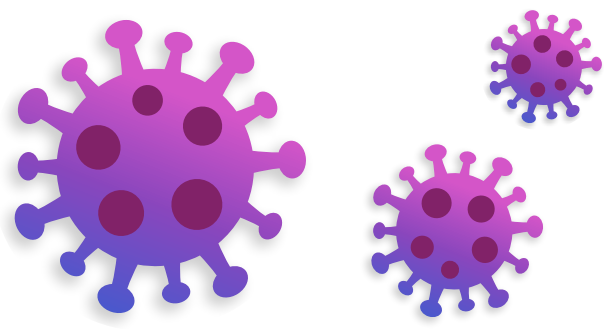
Hope in Sight

For months, medical research experts worldwide worked round-the-clock to expedite the development of vaccines that will help create immunity to the virus that causes COVID-19. December 2020 was a turning point in the pandemic. With the availability of COVID vaccines under emergency use authorization by the U.S. Food and Drug Administration, it created a light at the end of the tunnel for countless millions of people.

At the end of 2020, in compliance with federal, state and local guidelines, Duke Health began vaccinating health care workers deemed high risk for COVID-19.

"Our providers and trainees see a tremendous number of patients and must be in close proximity of them for their examination, which puts them at high risk for COVID exposure. Vaccinating our providers, trainees and clinical care team was top priority to help safeguard them from contracting coronavirus. There is hope in sight," said Postel.

Navigating the unimaginable, the COVID-19 pandemic has not been an easy experience for anyone, but there is always good and new wisdom that comes from a bad situation. "For Duke Ophthalmology, we have learned that we can continue our missions of research, education and patient care with a new innovative approach. We've developed a different level of trust for one another, made process improvements that will last and know that we can be resilient in the most difficult of times," said Buckley.



A First at Duke

BY ANN GEHAN

Leon W. Herndon Jr, MD, professor of ophthalmology and glaucoma division chief, has worked as a glaucoma specialist at Duke Eye Center for over 25 years. Despite his decades of experience, he recently experienced a first in his career—his first OR day with an all-Black trainee team. Only around 6% of practicing ophthalmologists are minorities, and only 3% of ophthalmologists are Black. Duke's department of ophthalmology had only had three Black residents in its entire history until last year, when there was one Black member in each residency class. Herndon's team decided to take a picture to commemorate the historic moment, which later received an overwhelmingly positive reaction on social media. "I'm not a social media kind of person, but it's been really amazing to see how the picture has generated so much buzz," Herndon said.

As part of Duke Health's broader Moments to Movement anti-racism initiative, leaders at Duke Eye Center like Herndon are working to continually improve these statistics through initiatives to recruit and mentor medical students and residents from traditionally underrepresented backgrounds and fight against racism and discrimination in their everyday work.

After **Goldis Malek, PhD,** associate professor in ophthalmology, was asked to serve on the School

of Medicine's diversity and inclusion council, she realized that Duke Eye Center did not have its own diversity and inclusion initiative and was inspired to create a council to address specific issues there. After protests across the country this summer called for an end to police violence against Black Americans, Malek and her team recognized an opportunity to continue the council's work at a crucial moment.

One of the most tangible results of the council's work are the banners posted throughout Duke Eye Center, emphasizing their commitment to anti-racism and zero-tolerance policy regarding racism or discrimination of any kind. The council has also started book clubs and educational efforts including training sessions to understand implicit bias and recognize sexual harassment and bullying, in order to create community as well as understanding. "[The book club] was really helpful in starting the conversation, because there are many people who have no idea what communities that are perceived to be different had to go through and still are going through, so this was a great opportunity," Malek said.

Eye On Med Students

Jullia Rosdahl, MD, PhD, associate professor of ophthalmology, and her colleagues recognize that the competitive nature of the field can deter minority students from specializing in ophthalmology. Rosdahl, who serves as the Duke Department of Ophthalmology's director of medical student education, makes an effort to reach students as early as possible in their careers to encourage them to consider ophthalmology. "We really want the students to know about ophthalmology when they're first starting medical school and to help them realize, 'This is something I want to learn more about and potentially consider,' and then be ready to be a great applicant [for residency programs]," Rosdahl says. Since ophthalmology is a competitive specialty and one that requires an early match for residency programs, Rosdahl focuses on encouraging students to consider ophthalmology as a specialty, as well as promoting access to clinical and research opportunities.

Rosdahl has helped develop Duke's relationship with various national programs, while also expanding access to programs unique to Duke. The Minority Ophthalmology Mentoring program is sponsored by the American Academy of Ophthalmology (AAO) and Association of University Professors of Ophthalmology (AUPO), and aims to help first- and second-year medical students become competitive applicants for ophthalmology residency by pairing them with mentors, providing access to educational and study materials, and sharing research opportunities.

Leon W. Herndon Jr, MD
Professor of Ophthalmology

Goldis Malek, PhD
Associate Professor of Ophthalmology

Jullia Rosdahl, MD, PhD
Associate Professor of Ophthalmology

Nicholas Johnson, MS
Duke Medical School Student

Mentor relationships are key for students' success as they develop their medical careers. **Nicholas Johnson, MS,** a current medical student at Duke, credits Duke Ophthalmology's strong tradition of mentorship as a key resource that helped him successfully pursue his interests. As he was learning the basics of ophthalmology, Johnson was able to shadow Herndon, which inspired him to continue to pursue the specialty. "It's just something powerful to see—to put yourself in someone's shoes and be able to see yourself there in the future," Johnson said. "I think that was one of the key factors that helped me stick with it. It just felt like such a small community or a family within the department that made it difficult to say no." >

Johnson also participated in the Rabb-Venable Program, a research award sponsored by the National Medical Association that promotes mentoring and career guidance for third- and fourth-year medical students from underrepresented backgrounds. Johnson, who was an incoming third-year student at the time, was one of four Duke trainees selected as finalists for the 2020 program and received the first-place award for medical student presentations. He was able to continue his research project from the program with **Felipe Medeiros, MD, PhD,** professor of ophthalmology, ultimately culminating in Johnson's first research publication.

> "No voice is too small. I hope that one day all staff would feel safe to share their feelings or concerns about social injustice in the correct forum."
> **Denelle Richmond, COT**

Even with the limitations presented by the coronavirus pandemic, Rosdahl and her team have worked to continue to facilitate mentor relationships between students and faculty. Typically, Duke Ophthalmology participates in the Visiting Clinical Scholars program, an initiative sponsored by Duke's medical school that allows fourth-year medical students from diverse backgrounds to participate in a clinical elective at Duke. Rosdahl says that the department's support for the program has been key to recruiting students from a wide range of backgrounds. "It's been a way that we've been able to recruit some students who have subsequently come back to be residents here, and they've been outstanding residents," she said. Pandemic-related restrictions have temporarily paused the program, but Rosdahl and her team were able to create a virtual alternative that has replicated the traditional program's success.

During the summer and fall months, Duke Ophthalmology developed a four-week virtual elective which allowed students to participate in mentorship opportunities, case presentations, and faculty meetings. The elective specifically targeted students from underrepresented backgrounds and students without ophthalmology programs at their home institutions, allowing more students to gain clinical exposure and develop mentoring relationships with Duke faculty. Rosdahl says that the structure provided unexpected benefits for both students and faculty. "Clearly they'd prefer to be in-person when that is available, but they did feel like there were some things that they got from that virtual elective that they wouldn't have gotten otherwise—the level of exposure to those faculty mentors was much higher than they would get in an in-person activity," she said.

Rosdahl credits leaders like Dr. Brenda Armstrong, who served for more than two decades as an admissions dean at Duke's medical school, for laying the foundation for efforts to recruit and support minority medical students. "She did a lot of personal outreach for students to let them know Black students are welcome here and we want to have Black students at Duke," Rosdahl said. "She really pulled [students] in, letting these students know, 'We want you. We want this to be a place for you to come and be a part of things.'"

Looking To the Future

The legacy of leaders like Armstrong continues today at Duke Eye Center, especially as recent protests for social and racial justice have spread across the country. This renewed push for equality has helped Duke Eye Center's existing programs take on a new sense of purpose. "Over the past few years, we have had discussions about these types of social justice issues, and those discussions have taken on a new meaning in the past seven or eight months," Herndon said. Looking to the future, he remains encouraged and optimistic. "I hope that people get a little uncomfortable having these conversations, because if you're not uncomfortable, then you can't move on to make a difference, so we're certainly doing the right things. I surely hope that we go from just having discussions to having some really lasting changes that will make a level playing field for all of us," he said.

Malek and the council are looking forward to the long-term changes their efforts will produce, "improving diversity and cultivating a culture of inclusivity". "[Our work] is something that we're not doing for just the next couple months—this is something we would like to do for the long haul," she said. "This is a learning experience for all of us, because if this was a simple thing to solve, it would have been solved years ago, so we must strive and set the stage for change to occur. Change will take time, but we're hopeful. We have a great group of dedicated people, all of whom are passionate and excited about making a change."

Ruth and Herman Albert's Eye on Research will Live on

Ruth Albert, generous benefactor of Duke Eye Center, passed away in March 2021 at the age of 97. Ruth and her husband, Herman, lovingly known as "Hy," were impactful donors to Duke Eye Center. In 2002, they bestowed an $8 million dollar gift to support a new eye research building. Ruth and Hy were honored by the building being named the Albert Eye Research Institute (AERI), which opened in 2005.

AERI is a five-story building adjoining the Wadsworth building that created a much-needed space for Duke ophthalmology research teams to make groundbreaking discoveries, a separate clinic designed for pediatric patients and a generous auditorium and gathering area for medical education events.

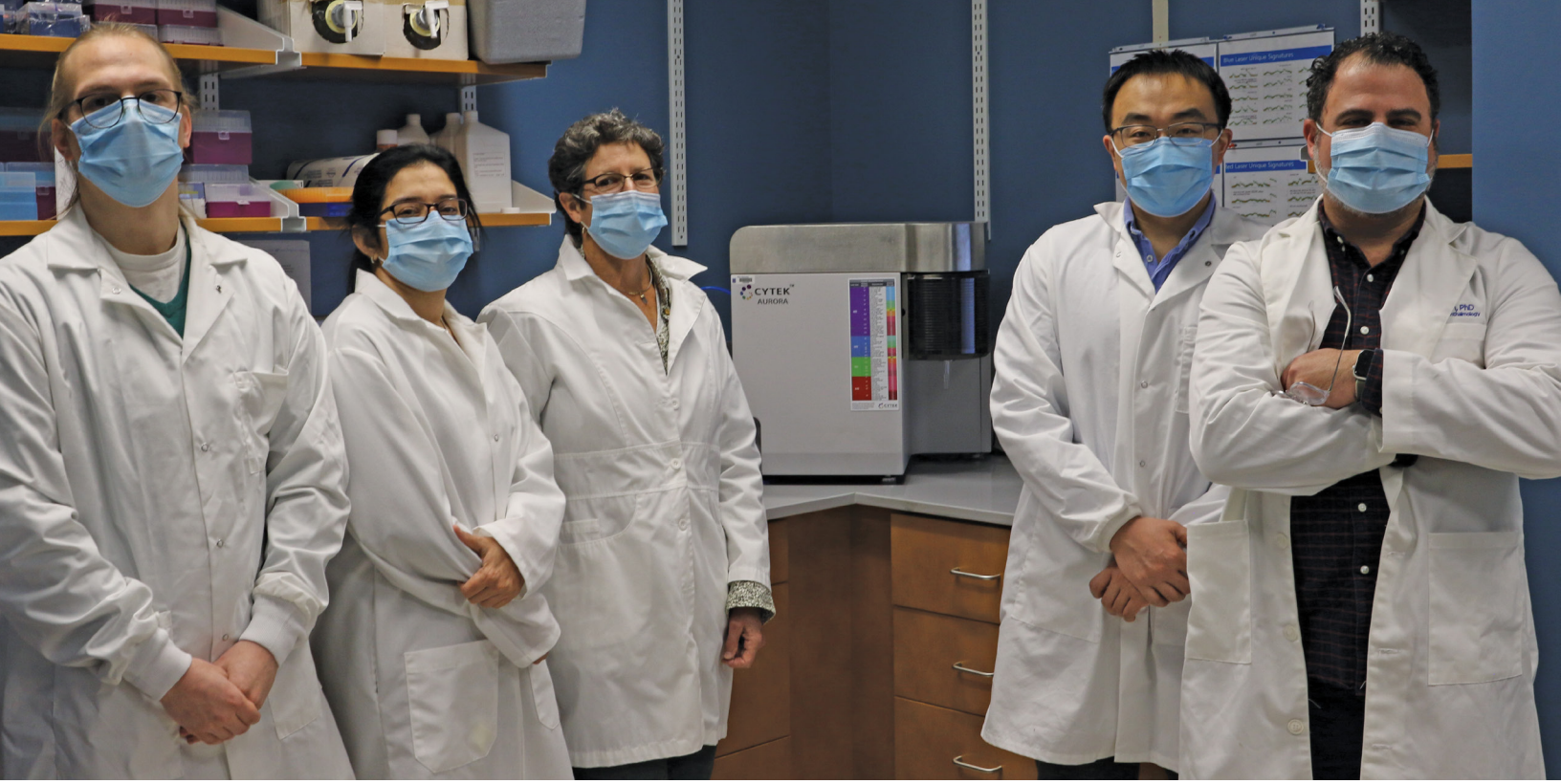
The Alberts were introduced to Duke in the 1990s and became long and dedicated friends of Duke University Medical Center. In addition to their loyal support for Duke Eye Center, they also contributed $3.5 million to lung cancer research and the thoracic oncology program.

Ruth and Hy loved Duke and the opportunity to serve in advisory roles. Hy was a member of the Duke Medical Center Board of Visitors and the couple joined the Duke Eye Center Advisory Board.

They were committed to the continued excellence in ophthalmic research, education and patient care. In a quote from VISION magazine in 2002, Hy said, "When it came time to make the gift of a lifetime for medical research, we had no doubt about where to place our trust as well as our resources. We know that we can do the most good for people through our philanthropic involvement here."

"The Department of Ophthalmology is immensely thankful for Ruth and Hy's commitment and contributions," said Edward G. Buckley, MD, chair for Duke ophthalmology. "Gifts like theirs are extraordinarily generous and afford us the opportunity to expand programs essential to continued success for our primary missions of research, education and patient care."

Ruth and Herman Albert's philanthropy will be remembered for generations to come—the researchers who occupy the labs at Albert Eye Research Institute continue to produce innovative research that leads to new and improved treatments and imaging for eye disease. The pediatric patients and caregivers who walk through the door of the pediatric clinic have a dedicated area to receive revolutionary care from our expert pediatric ophthalmologists, and the learners who sit in the auditorium for medical education will be tomorrow's ophthalmology leaders.



Flow Cytometry Could Offer New Insights into Complex Eye Disease

Preliminary yet promising findings emerge from latest technology

BY LORI MALONE

A new flow cytometer in Duke's Department of Ophthalmology is giving researchers a new way of looking at ocular tissue samples and the unique biomarkers associated with certain diseases—a view that will someday lead to a diagnostic tool for complex eye diseases and better insights into treatment strategies.

Using the most advanced technology currently available, Duke's flow cytometer processes ocular tissue and characterizes cells based on specific signatures.

"With data from the cytometer, we are beginning to ask if these cell signatures can actually predict disease outcomes and whether they can be used in precision medicine," explains **Daniel R. Saban, PhD,** associate professor of ophthalmology who was instrumental in obtaining the equipment.

"In clinical practice, when evaluating patients who have chronic uveitis, it can sometimes be challenging to determine the exact etiology of the underlying inflammation—whether it is autoimmune, infectious, or possibly a malignancy like lymphoma masquerading as chronic inflammation," says **Dilraj S. Grewal, MD,** associate professor of ophthalmology. "Routine blood-based testing only gives us an answer in about half the

"With data from the cytometer, we are beginning to ask if these cell signatures can actually predict disease outcomes and whether they can be used in precision medicine."

Daniel R. Saban, PhD
Associate Professor of Ophthalmology

patients. In the rest, we often have to obtain a sample from the fluid in the front of the eye (aqueous) or the back of the eye (vitreous). Analysis of this fluid can give us more information on the disease; however, current methods of analysis may still not give us an answer in almost half the cases. This is a source of frustration both for the patient and the physician."

The Flow Cytometry Method

The basic principle of flow cytometry is the passage of cells in single file in front of a laser so they can be detected, counted, and sorted. Cell components are fluorescently labeled and then excited by the laser to emit light at varying wavelengths.

Saban explains that each cell marker is positive or negative, and each generates two levels of data. A traditional flow cytometer searches for 10 markers simultaneously; however, Duke's state-of-the-art equipment processes at least 36 at a time, which results in a rich data set that requires artificial intelligence to analyze.

"This new generation multi-parameter flow cytometry is a very exciting technology that might allow us to determine unique cytometric profiles for different eye diseases."

Dilraj S. Grewal, MD

The equipment arrived at Duke shortly before the COVID-19 pandemic began and was quickly deployed to process blood samples from patients who were tested for the virus to analyze the immune system response in these patients. "We had access to a large repository of samples from asymptomatic patients, some who had mild to severe disease, and some with critical disease. We were able to look at changes at the single cell protein level with the flow cytometer," says Saban.

Several studies based on these analyses are currently underway, and the results could lead to answers about how viruses like COVID-19 manifest in the body, why men seem to be more susceptible to the novel coronavirus than women, and other unanswered questions.

Benefits of Flow Cytometry to Clinical Care

"This new generation multi-parameter flow cytometry is a very exciting technology that might allow us to determine unique cytometric profiles for different eye diseases," says Grewal. "Accurate identification of such signatures is critical to be able to deliver the correct treatment in a timely manner, whether it is immunosuppression in cases of autoimmune inflammation, antimicrobial treatment in cases of infections, or chemotherapy in cases of lymphoma."

Although the flow cytometer is primarily being used in a research setting only and on a limited basis in the clinics, Saban believes it will soon play a central role in making clinical decisions and offer a number of benefits for improving patient care, including:

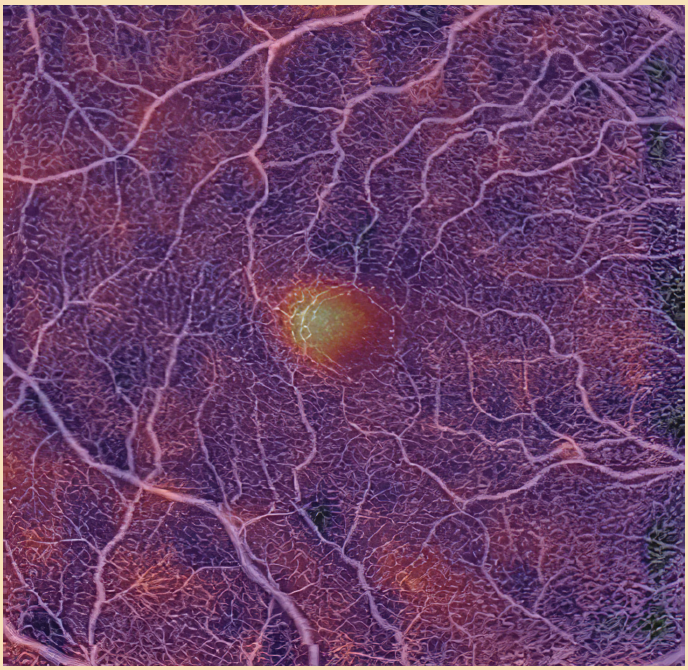
- Diagnostic capabilities with improved speed and accuracy for identifying complex diseases
- The ability to stratify patients according to disease severity and trajectory to facilitate more efficient drug trials
- Improved insights for developing treatment strategies based on early knowledge of whether a patient will benefit from certain therapies
- The ability to detect patterns in blood analyses that humans are unable to see, providing additional information to make accurate diagnoses

"We often see patients who have had a delay in diagnosis of their chronic inflammation for several months or even several years and such persistent inflammation can permanently impact the vision by causing damage to the retina and other parts of the eye," says Grewal. "Achieving early and accurate diagnosis from eye fluids with this technology carries the potential to be a huge advance in the care of patients with uveitis by allowing us to deliver timely treatment."

AI Model Uses Retinal Scans to Predict Alzheimer's Disease

Duke study shows potential for a new, accessible way to diagnose the neurological disease

A form of artificial intelligence designed to interpret a combination of retinal images was able to successfully identify a group of patients who were known to have Alzheimer's disease, suggesting the approach could one day be used as a predictive tool, according to an interdisciplinary study from Duke University.



This OCT angiography color map demonstrates areas of attention for the AI model. Brighter areas correspond to increased attention.

The novel computer software looks at retinal structure and blood vessels on images of the inside of the eye that have been correlated with cognitive changes.

The findings, appearing November 26, 2020 in the ***British Journal of Ophthalmology,*** provide proof-of-concept that machine learning analysis of certain types of retinal images has the potential to offer a non-invasive way to detect Alzheimer's disease in symptomatic individuals.

"Diagnosing Alzheimer's disease often relies on symptoms and cognitive testing," said senior author **Sharon Fekrat, MD, FACS,** retina specialist at the Duke Eye Center. "Additional tests to confirm the diagnosis are invasive, expensive, and carry some risk. Having a more accessible method to identify Alzheimer's could help patients in many ways, including improving diagnostic precision, allowing entry into clinical trials earlier in the disease course, and planning for necessary lifestyle adjustments."

Fekrat is part of an interdisciplinary team at Duke that also includes expertise from Duke's departments of Neurology, Electrical and Computer Engineering, and Biostatistics and Bioinformatics. The team built on earlier work in which they identified changes in retinal

Additional studies will also determine how well the AI approach compares to current methods of diagnosing Alzheimer's disease, which often include expensive and invasive neuroimaging and cerebral spinal fluid tests.

blood vessel density that correlated with changes in cognition. They found decreased density of the capillary network around the center of the macula in patients with Alzheimer's disease.

Using that knowledge, they then trained a machine learning model, known as a convolutional neural network (CNN), using four types of retinal scans as inputs to teach a computer to discern relevant differences among images.

Scans from 159 study participants were used to build the CNN; 123 patients were cognitively healthy, and 36 patients were known to have Alzheimer's disease.

"We tested several different approaches, but our best-performing model combined retinal images with clinical patient data," said lead author **C. Ellis Wisely, MD, MBA,** a comprehensive ophthalmologist at Duke. "Our CNN differentiated patients with symptomatic Alzheimer's disease from cognitively healthy participants in an independent test group."

Wisely said it will be important to enroll a more diverse group of patients to build models that can predict Alzheimer's in all racial groups as well as in those who have conditions such as glaucoma and diabetes, which can also alter retinal and vascular structures.

"We believe additional training using images from a larger, more diverse population with known confounders will improve the model's performance," added co-author **Dilraj S. Grewal, MD,** associate professor of ophthalmology.

He said additional studies will also determine how well the AI approach compares to current methods of diagnosing Alzheimer's disease, which often include expensive and invasive neuroimaging and cerebral spinal fluid tests.

"Links between Alzheimer's disease and retinal changes—coupled with non-invasive, cost-effective, and widely available retinal imaging platforms—position multimodal retinal image analysis combined with artificial intelligence as an attractive additional tool, or potentially even an alternative, for predicting the diagnosis of Alzheimer's," Fekrat said.

In addition to Fekrat, Wisely and Grewal, study co-authors include Dong Wang, Ricardo Henao, Atalie C. Thompson, Cason B. Robbins, Stephen P. Yoon, Srinath Soundararajan, Bryce W. Polascik, James R. Burke, Andy Liu and Lawrence Carin.

The research received support from the Alzheimer's Drug Discovery Foundation. The authors report no relevant financial interests.

Sharon Fekrat, MD, FACS
Professor of Ophthalmology

C. Ellis Wisely, MD, MBA
Chief Resident for the Department of Ophthalmology

Dilraj S. Grewal, MD
Associate Professor of Ophthalmology

Becoming ASCRS President in a Time of COVID-19

Terry Kim, MD, professor of ophthalmology and division chief of cornea, refractive surgery and external disease at Duke Eye Center, began his term as the American Society of Cataract and Refractive Surgery (ASCRS) president during an unprecedented time at the virtual annual ASCRS Meeting in May, 2020.

What has been your focus during your time as ASCRS President?

It is a tremendous honor and privilege to serve as the 35th president of ASCRS, but I certainly never imagined I would have to face the challenges our organization has encountered during my term. I have remained focused on 3 major issues: COVID recovery, education, and collaboration. It has been important to focus on the immediate COVID crisis at hand and help our members recover from this historic pandemic as we've re-opened our practices and transitioned to a new patient care and practice environment. Besides our missions of Philanthropy and Advocacy, Education still remains our top priority at ASCRS, and we've proactively transitioned to how we educate our members during this crisis. I also know there are a lot of doctors and staff in different stages of adapting to the current environment, and many of us are experiencing COVID fatigue, especially with the recent surge in coronavirus cases and how it's affected all of us both professionally and personally. I believe it is crucial for all of us to collaborate and coalesce together as a profession, which I've seen occur right here at Duke Eye Center and our surrounding community. And I can't think of a more important time than now for an organization like ASCRS to help lead us through this calamity.

How has ASCRS addressed the current challenges of members?

Ophthalmology was one of the hardest hit medical specialties with COVID, and we have focused our energies to address these COVID-related issues. These endeavors include ASCRS's advocacy and support for immediate and long-term governmental relief initiatives for our ophthalmic practices, our revised and enhanced web portal (which houses the COVID resource center), the transition to virtual CME programs and webinars (like our extremely successful 20/Happy program), and the introduction of new educational programs, including ASCRS Grand Rounds, ASCRS Journal Club, and the Quicksand Chronicles. The virtual format of the 2020 annual meeting was a first for ophthalmology and a major step forward to address the COVID-19 crisis. We took this important step because we thought it would be the best way to help our members with the recovery process. The meeting featured over 30 CME credits and over 400 hours of content, with sessions highlighting COVID-19 related material. But we are extremely excited to hold our annual ASCRS meeting LIVE on July 23-27, 2021 in Las Vegas!!! I'm sure all of us are eager to see all our friends and colleagues in person, resume the invaluable face-to-face networking, and access all the high-quality educational programs that our annual meeting has to offer. Highlights will include a keynote speech given by Dr. Scott Gottlieb, former head of the FDA and a leading authority on COVID-19, the inaugural Lindstrom Lecture, acknowledging the immeasurable contributions of Dr. Richard Lindstrom, as well as a totally revamped ASCRS Exhibit Hall. Of course, we will continue our traditional Binkhorst Lecture delivered by Dr. Richard Lewis, Charles D. Kelman Innovator's Lecture delivered by Dr. Stephen Slade, and our popular Cornea, Refractive, and Glaucoma Subspecialty Day programs.

Terry Kim, MD
Professor
of Ophthalmology

How did you first get involved with ASCRS?

I attended my first ASCRS meeting as a resident 25 years ago and haven't missed a single meeting since. The clinical program was one of the biggest draws, as I was impressed with the high quality of the paper presentations, symposia, instructional courses, and skills

transfer wet labs, the incredible access to all these educational events, and the tremendous networking opportunities. I instantly felt part of a larger community of anterior segment surgeons. I've been so fortunate to form strong friendships with so many role models within ASCRS: some who have served as previous presidents and officers of ASCRS, some industry leaders, and others who were brilliant surgeons around the globe; all of them not only encouraged me to participate in various ASCRS initiatives, but they've also given me constant mentoring and support throughout my career.

Is there any message you would like to send out to ASCRS members and the community?

First, I'd like to send a message of collegiality, as I encourage all our members to do what you can to support ASCRS and your colleagues with your time and resources. And if you're not a member, I encourage you to join by simply logging on to www.ASCRS.org, as ASCRS truly empowers its membership of all ages to make important decisions regarding our organization that significantly impact not only our practices but our specialty as a whole, especially as we all navigate through this COVID crisis together.

Second, I'd like to send a message of gratitude to all of our doctors, fellows, and residents who have risked their health and safety to put our patients' eyecare as a priority. I want to thank my entire ASCRS family, my Duke Eye Center family, Coach K and my Duke basketball family, my friends and associates in industry and other ophthalmic organizations, and to all my personal friends and colleagues out there. I also want to express my sincere gratitude to my wife Ellie, my daughters Ashley and Kayley, my sister Suzanne and her family, and my mother Hyun and father Kyung for their never-ending love and support, as I wouldn't be here today without them.

Finally, I want to end on a very personal note with a comment about the recent loss of my father, who passed away from COVID last year. I am especially sad that he's no longer around to give me advice as he did when he steered me towards the field of ophthalmology and academics. As a retired physician, he knew the importance of medical societies like ASCRS, and he was so proud to see me take on the role of President for this great and historic society in ophthalmology. He knew how much ASCRS has meant to me, and I'm deeply saddened that he is not here to see me take on this duty.

I encourage all of you to stay positive and to stay committed to one another and to ASCRS. I have high hopes for our future, and together we will move forward to an even greater future with new opportunities as we proceed to overcome our current challenges. Someone once said, "Never let a serious crisis go to waste, as there's an opportunity to do things that you didn't think you could do before." As your ASCRS President, I've been asked to lead our organization during a very difficult time, and I am fully committed to confront this challenge. And I assure you that ASCRS will be here, to help you overcome any and every obstacle and not only survive, but thrive, as we all adjust to this 'new normal.'

Best wishes and stay safe.

The virtual format of the 2020 annual meeting was a first for ophthalmology and a major step forward to address the COVID-19 crisis. We took this important step because we thought it would be the best way to help our members with the recovery process. The meeting featured over 30 CME credits and over 400 hours of content, with sessions highlighting COVID-19 related material.

(L-R) Kiara, Sharon Freedman, MD, and Allison Umfress, MD, pediatric ophthalmology fellow before Kiara's surgery.

Unrelenting Advocacy

A Parent's Love and Tenacity Leads to Duke Eye Center, and an Appeal to Innovate

BY VICKI FRYE

After a normal pregnancy and delivery, new parents, Nimesh Nagarsheth, MD and his wife Benita were thrilled to welcome their baby daughter Kiara Indie on July 4, 2019. However, within minutes of her birth, medical staff observed that Kiara's body was covered with wide-spread port wine marks and other potential abnormalities were also quickly detected. In order to gain full visibility to Kiara's condition and identify any discernable health issues, the medical staff at Mount Sinai Hospital in New York City, performed a full body MRI and ultrasound, neither of which confirmed clear findings.

Recognizing that port wine marks can be characteristic of Sturge Weber Syndrome (SWS), a rare disorder, Kiara's parents quickly became passionate advocates for her medical care. Other possible health challenges caused by SWS can include seizures, glaucoma, hyperreflexia and attention deficit and hyperactivity disorder (ADHD). For this reason, Nagarsheth, a former Duke OBGYN resident and now Director of Gynecologic Oncology and Robotic Surgery at Englewood Health, NJ and Clinical Professor at the Icahn School of Medicine at Mount Sinai continued to pursue an understanding of her condition from specialists across the U.S. His persistence helped to uncover that Kiara also had several ongoing issues in her left eye, including elevated eye pressure (ocular hypertension), as well as mild haziness of the left cornea and possible accelerated left eye growth.

It was during this discovery and assessment period, when several of the nation's leading pediatric ophthalmologists, practicing at hospitals like Mt. Sinai, Johns Hopkins and UC Davis, recommended that Kiara's parents seek insight and treatment from Duke Eye Center's **Sharon Freedman, MD,** professor of ophthalmology and pediatrics division chief—a world renowned expert and foremost authority on childhood glaucoma.

While in the process of connecting with Freedman, the onset of COVID-19 presented the entire medical community, including patients and their families, with a variety of unexpected and widespread constraints. In Kiara's case, not only was the much-needed local out-patient monitoring of her eye pressure a hurdle (since at her young age, she was uncooperative and consequently requiring anesthesia), the family lived in New York City and with travel restrictions in place, an in-person evaluation with Dr. Freedman was out of the question. Therefore, they turned to telemedicine.

Nagarsheth researched and purchased an iCare rebound tonometer and a hand-held retina camera, outfitting himself with the equipment necessary to perform at-home evaluations of his daughter's eye pressures and the appearance of her optic nerve. This proved to be especially valuable—enabling him to present detailed measurements and visuals of Kiara's condition to Freedman. In-home eye pressure monitoring can provide invaluable information to the treating physician and the patient's family, in cases of known or suspected glaucoma, especially when it provides real-time pressure values at different times outside of normal office hours. Although not yet widespread in its implementation, Freedman believes home IOP monitoring will increase in prevalence in the future.

With help from generous philanthropy (Sarah's Saving Kids Sight fund and Children's Eye Foundation), Freedman has developed an "iCare lending library" which allows her to enroll selected patients for home monitoring of eye pressures over a period of weeks to months, to optimize management for childhood glaucoma.

> "I admire Dr. Freedman's skill and approach to patient care and understand why she was repeatedly recommended to us by her ophthalmology colleagues nationwide."
>
> **Nimesh Nagarsheth, MD**

Following several telehealth visits and email exchanges with Freedman, Nagarsheth determined that Kiara should receive treatment at Duke Eye Center, and in September 2020, Nagarsheth accompanied his daughter to Durham for in-person evaluation.

Freedman conducted an examination, first in the office, and then under anesthesia. In keeping with an institutional review board-approved protocol, she used an investigational overhead-mount (FLEX) to enable Spectral Domain Optical Coherence Tomography (SD-OCT) imaging of Kiara's optic nerves, maculae, and the choroidal hemangioma in the affected left eye. They concluded that her left eye did indeed have mild glaucoma (rather than simply ocular hypertension) and immediately performed a Goniotomy surgery in the left eye, to open the trabecular meshwork, allowing aqueous humor to bypass that tissue and flow directly into the canal of Schlemm.

"Kiara tolerated the surgery well. We're now monitoring her optic nerve carefully while she continues to be treated with eye drops to lower the pressure as much as much as possible," Freedman said. "We look forward to her follow-up visit in about six months. At that time, I will reevaluate the optic nerve with OCT using our FLEX imaging protocol." This imaging will

> "Dr. Freedman, and every team member at Duke Eye Center involved in Kiara's medical treatment, provided our daughter with exceptional, personalized care and a sound strategy for imroving her long term eye health."
>
> **Nimesh Nagarsheth, MD**

>

either confirm stability of, or show progression of pressure-related changes to Kiara's left optic nerve which would necessitate additional pressure-lowering intervention.

During her brief recovery, Nagarsheth and Kiara stayed nearby the Duke Eye Center—even getting to enjoy the local area. In the months since surgery, Freedman has developed a valuable collaborative relationship with Kiara's ophthalmologist in New York City; this has been beneficial in her post-op care and ongoing treatment.

"Dr. Freedman, and every team member at Duke Eye Center involved in Kiara's medical treatment, provided our daughter—and by extension, us as her parents—with exceptional, personalized care and a sound strategy for improving her long-term eye health," said. Nagarsheth. "As a physician myself, I understand the challenge of meeting the expectations of hopeful patients. I admire Dr. Freedman's skill and approach to patient care and understand why she was repeatedly recommended to us by her ophthalmology colleagues nationwide."

Nagarsheth, being a clinician-scientist, wanted to know more about the research being conducted on SWS so he found some of the leading investigators across the country; and was even able to connect them with one another for collaborative efforts.

Duke Eye Center is set to be a testing site for an upcoming experimental drug—currently in development at Qlaris Bio—that is intended to help lower the episcleral venous pressure. The first patients expected to receive the treatment will be adult patients with Sturge Weber Syndrome-related glaucoma or elevated eye pressures.

When asked about what he's discovered as both a doctor, and a father, throughout this journey of seeking solutions for Kiara's medical issues (particularly during the time of the COVID crisis), Nagarsheth said, "Our challenge as medical professionals is to continually innovate and create treatment tools and techniques that are accessible for at-home use—making it easier for patients and their families to become advocates for their own health. As a parents and caregivers, we must be the advocate, seek resources to ensure the best care available, learn more about research that may help find more answers and do what we can at home to minimize invasive procedures," he continued. "By doing so, parents and caregivers become empowered members of the support team—working with us for positive patient outcomes."

Kiara enjoying The Washington Duke Golf Course during her recovery.

Kiara is a true rock star literally and figuratively. In December 2020, just 3 months after her surgery at Duke, Kiara (along with her 5 year-old sister Alina) released her first album of original music which is now available on Spotify, Amazon, Apple Music and other sites making her quite possibly the youngest artist ever to accomplish this.

Check out the album here:
https://alinamadisonkiaraindie.hearnow.com

The Forgotten Stroke

Duke Offers Innovative Care for Patients Suffering from Eye Stroke

Chantal Boisvert, OD, MD

Brian Mac Grory, MB BCh BAO, MRCP

People who suffer from sudden vision loss caused by retinal artery occlusion or eye stroke should be treated with the same urgency as those who suffer a stroke affecting the brain.

While considered a rare stroke (under 1% of all strokes), eye stroke causes permanent vision loss and devastating quality of life challenges. About one-third of those who have an eye stroke also have a brain stroke at the same time and remain at elevated risk for another stroke in the future.

A new multidisciplinary clinic at Duke plans to provide more seamless treatment for those who have suffered eye strokes. A collaboration between Duke Neuro-ophthalmology Division Chief, **Chantal Boisvert, OD, MD,** and Duke neurologist **Brian Mac Grory, MB BCh BAO, MRCP (UK),** the clinic will be the only one of its kind in the country.

"We are excited to offer this unique combined clinic that will improve the care of patients suffering from retinal artery occlusion by streamlining care—two specialties seeing the patient on the same day provides a convenience for the patient and allow us to manage the patient more effectively—together right in the same clinic not weeks apart," says Boisvert.

This collaboration will offer combined expertise in a clinic that will allow for patients to see an ophthalmologist and a neurologist in the same location. Patients can receive follow-up care for the eye stroke, and at the same time, undergo diagnostic testing to better understand and reduce their risk of another stroke. Eye stroke patients often must see many doctors across various practices. This novel clinic simplifies the patient experience.

The only symptom of an eye stroke is sudden vision loss and the diagnosis can sometimes be overlooked. Eyes are as important as the brain—eye stroke is an indication that the vascular system is not healthy.

Eye stroke does not currently receive the same awareness and immediate care as brain stroke. Tragically, a commonly used medication for treating brain stroke—tPA—may be just as effective at treating eye strokes. However, by the time patients arrive to emergency medical attention, it is usually too late for this medication (which must be given within 4.5 hours of symptoms starting).

Central Retinal Artery Occlusion (CRAO) causes an eye stroke and permanent vision loss.

"A person can be going about their day and all of a sudden permanently lose vision in one eye, the vision loss is not always recognized as a stroke and can be seriously disabling. Knowing so many patients go on to have a brain stoke, it's important that we coordinate care to maximize treatment for the patient," said Mac Grory.

"It is very common that patients who have sudden loss of vision in one eye may wait to tell someone, thinking their vision may come back, or if they do talk to someone they may not be taken seriously," Boisvert said. "A stroke in the eye should be considered an emergency."

Raising awareness for eye strokes and educating other healthcare providers is an important goal for Boisvert and Mac Grory. When patients have an eye stroke, it is imperative to go to the nearest hospital first. Helping patients and healthcare providers to understand the urgency of the condition will help patients get treatment quicker. The clinic will serve as a resource for follow up visits.

"We want to inform primary care, emergency department and other eye care providers of the importance of immediate triage for this condition and offer solutions for patients who suffer from the devastating effects of eye stroke," says Boisvert.

In addition to treating stroke of the eye, this clinic will also offer treatment for people who have suffered with other visual changes caused by stroke. This includes problems with seeing due to injury to the visual pathways in the brain, problems with eye muscles caused by stroke and problems with blood flow to the optic nerve (the connection between the eye and brain).

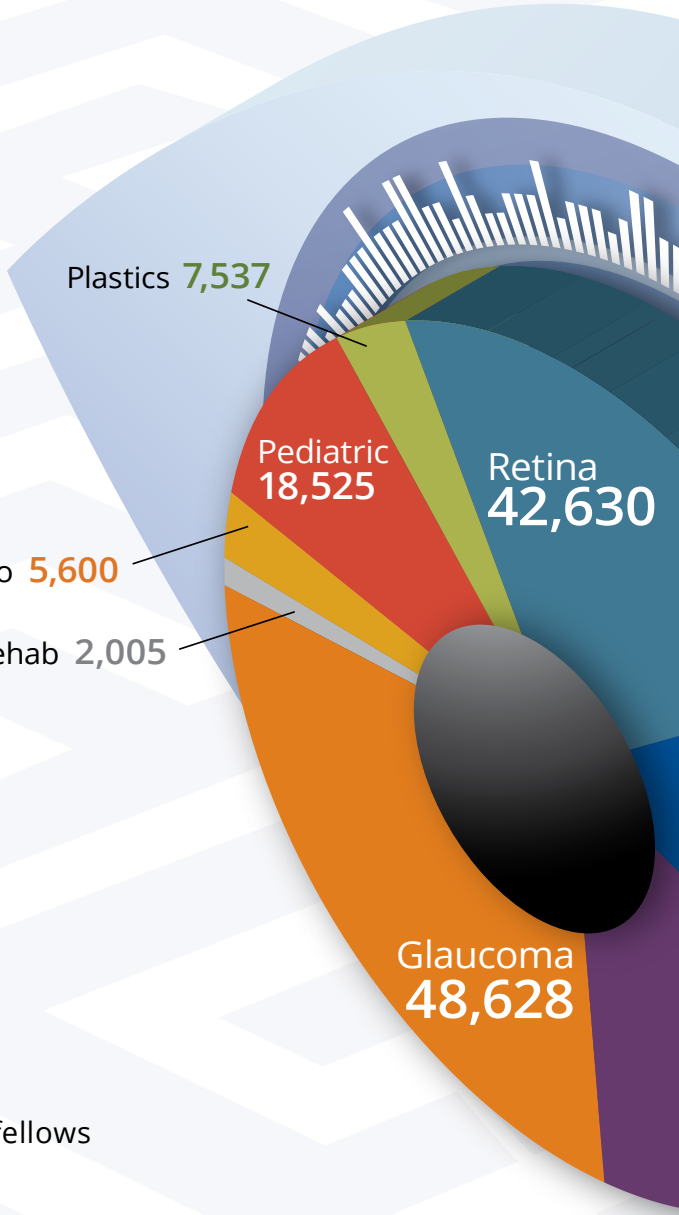
Research and training for residents and fellows are also among the priorities. A core part of the mission of the clinic will be outreach and advocacy work across North Carolina and the surrounding states. Drs. Mac Grory and Boisvert are founding a first-of-its-kind registry of patients with eye stroke which will provide sorely needed data on the long-term impact of eye strokes, the effect of treatment and the risk of future stroke. They are actively seeking collaborators on this registry and encourage anyone interested to reach out to them.

Boisvert and Mac Grory hope to change the way eye stroke is treated by offering a unified approach to care while educating key stakeholders in the process and hope other medical centers and institutions adopt our model to best care for patients suffering from this debilitating condition.

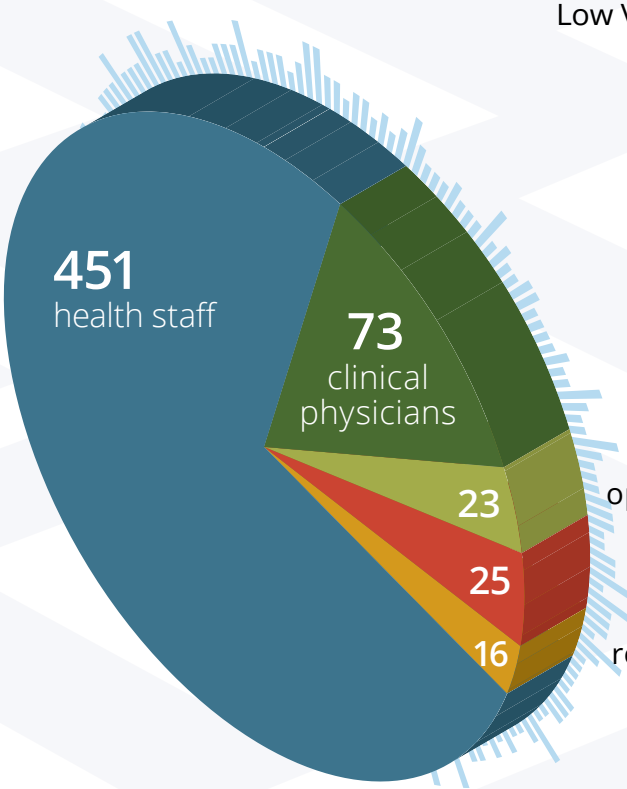
Duke Eye Center

Locations

1. **Main Duke Eye Center** *Duke Medical Center Campus*
2. **Page Road**
3. **South Durham**
4. **Winston-Salem**
5. **North Durham**
6. **Cary**
7. **Raleigh**
8. **Holly Springs**
9. **Arringdon**

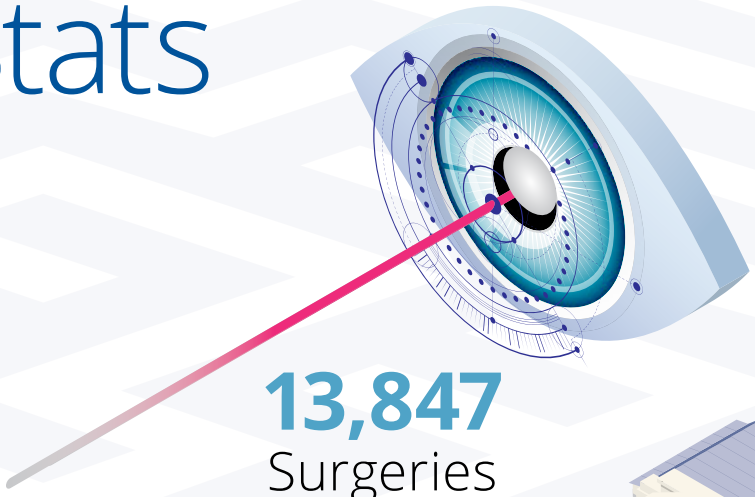


188,403
Total Patients



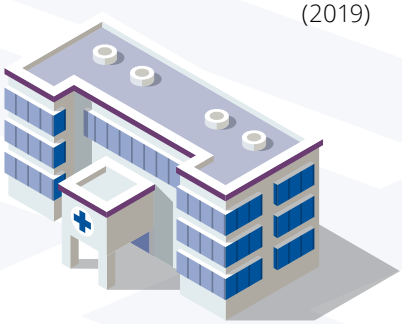
Faculty, Trainees and Staff

2020 Stats

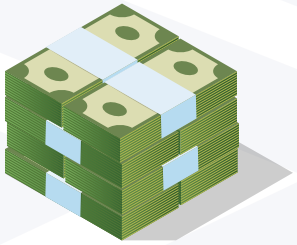


13,847
Surgeries

NIH Funding Ranking: **11**
(2019)



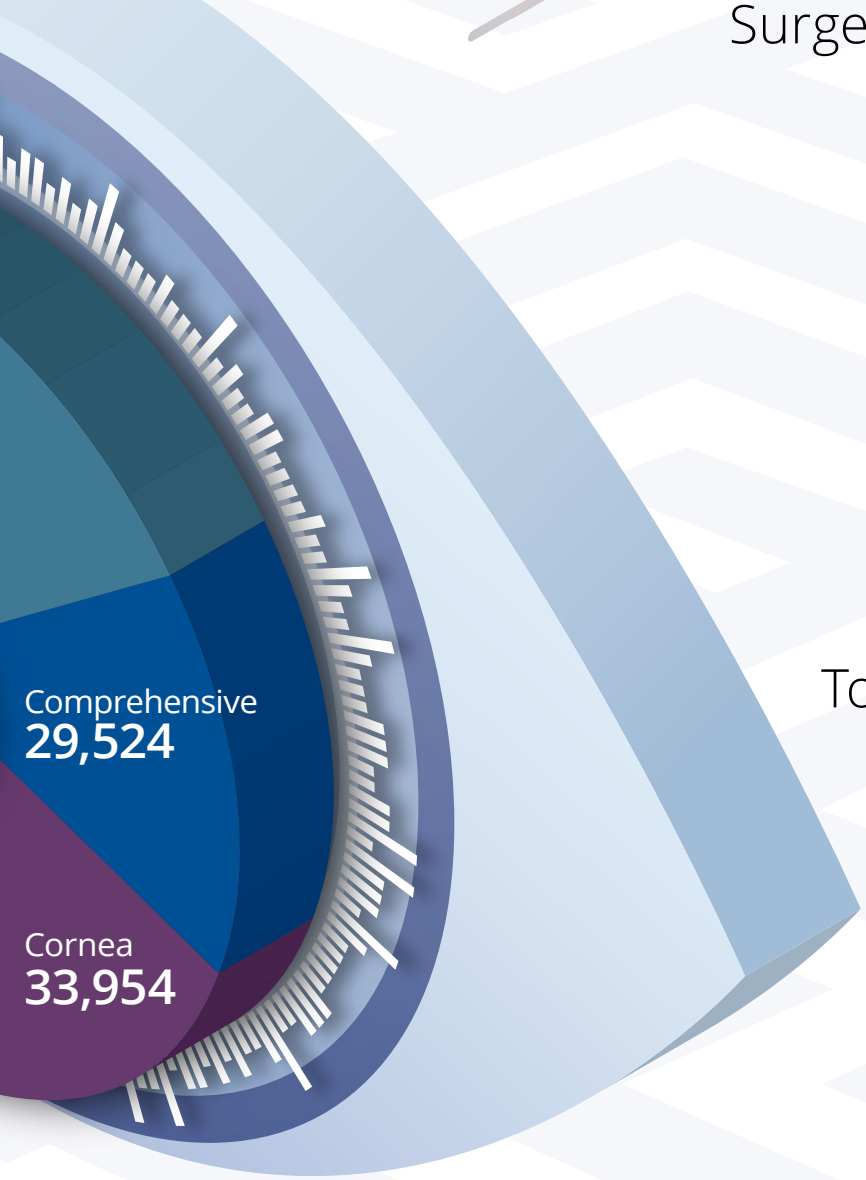
Total NIH Grants: **29**
awarded in 2020



$18,157,907
Award Funding

$8,981,545
Federal

$9,176,362
Non-Federal



7
Ranking
US News & World Report
Best Hospitals in Ophthalmology

DUKE
EYE
CENTER
2021

Robotic Optical Coherence Tomography System Demonstrates Potential to Improve Patient Care

Duke Continues to Lead the Way in Optical Coherence Tomography (OCT)

BY LEA HART

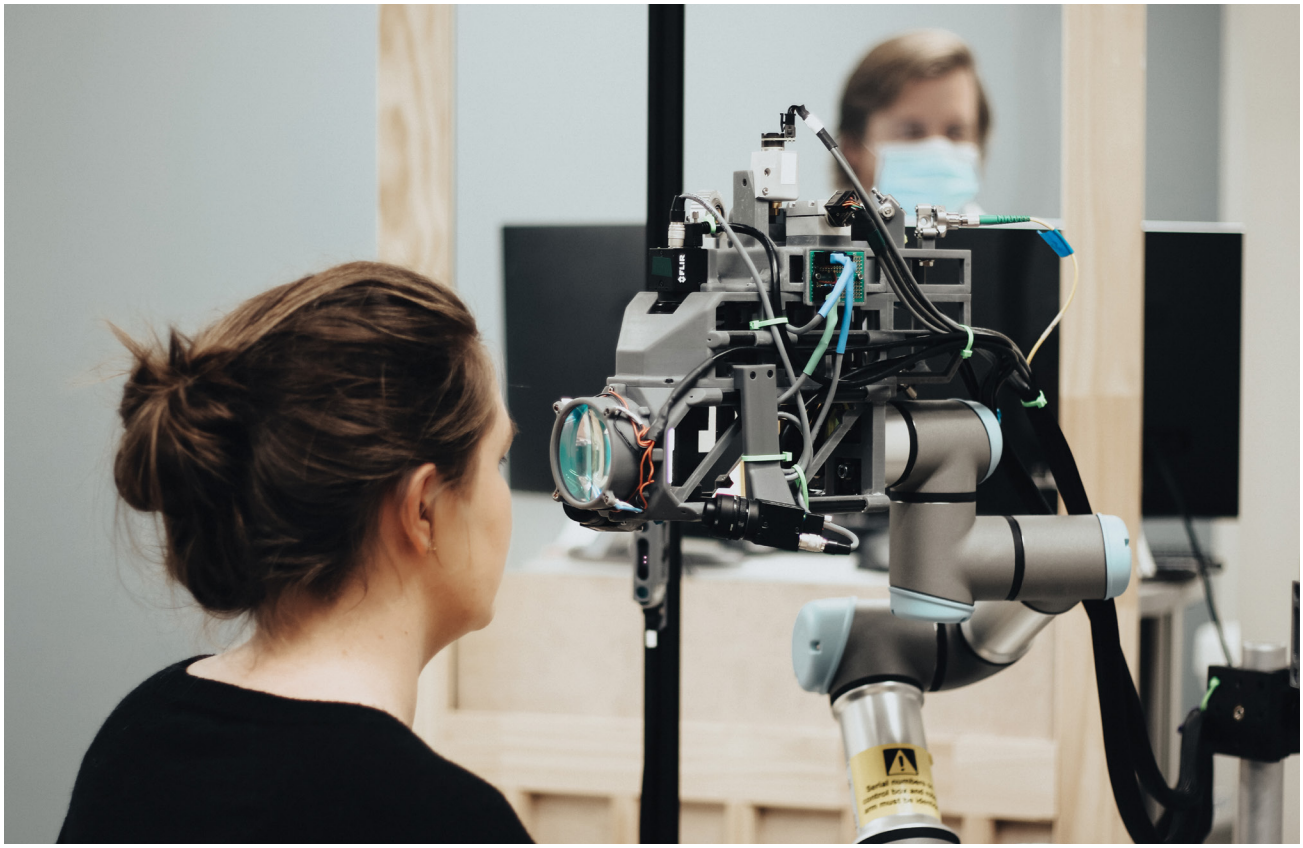
Duke has a long history of pioneering Optical Coherence Tomography (OCT) technology that has revolutionized patient care for adults and pediatric patients.

Duke clinician scientist **Anthony Kuo, MD,** associate professor of ophthalmology and corneal specialist; and research scientist **Ryan McNabb, PhD** have developed a robotically aligning OCT system that captures a three-dimensional image of the entire eye, all while allowing the system operator to maintain a safe physical distance from the patient. This robotically aligning OCT system builds off of a predecessor prototype system developed by Pratt School of Engineering collaborators **Mark Draelos, MD, PhD, Pablo Ortiz,** and **Joseph Izatt, PhD.**

"This is the first, to our knowledge, robotically aligning OCT system designed for potential clinical use in both normal patients and those with pathologies. This system offers the ability to safely distance operator and patient while providing the additional imaging benefits provided by active tracking and compensation," said Kuo.

A Pioneer in OCT

The work of Kuo and McNabb extend Duke's position as a pioneer in OCT technology, which began with the work of **Cynthia Toth, MD,** Joseph A.C. Wadsworth Distinguished Professor of Ophthalmology, and Joseph Izatt, PhD, Michael J. Fitzpatrick Distinguished Professor of Engineering, both having dual appointments in



each respective department. Toth and Izatt have developed applications of intraoperative OCT that allows more precise ophthalmic surgery and a handheld OCT that is particularly useful imaging infants in the NICU and pediatric patients.

"We are proud to continue the well-recognized contributions of Duke researchers who have encouraged us and led the way to make this project possible," said Kuo.

The robotic OCT system is a non-invasive imaging technique that is able to acquire OCT images of the eye without the need for chin/forehead rests for stabilization or the need for an operator of the system in close proximity.

Not needing chin/forehead rests or a nearby device operator is particularly important when confronted with the challenges posed by pandemics.

Robotic OCT Improves Accessibility and Safety

The innovative robotic system operates through the use of two sets of cameras tracking the face and the pupil. The robot is able to independently find the patient's eye and line up with it. If the patient moves, the robot will move with the patient. The system is robust enough to capture small motions and tremors patients may have, and it corrects for them in a way that current systems are not capable of.

"This new technology will improve accessibility and is more comfortable for patients. The robot can adapt for those who have mobility issues, may be wheelchair bound, and for children that have a hard time sitting still," McNabb said.

The system could potentially expand access for those in rural areas who may currently have limited access to ophthalmologists, and it can be used in telehealth. Once the robot is deployed to record the eye images, that data can be passed through the internet to wherever it is needed.

"The OCT images could be taken by the robot where the patient is and then sent electronically to specialty centers for reading," said Kuo. "There's a tremendous amount of potential."

A Timely Development to Address Limited Contact and Social Distancing

When physical distancing became important due to the COVID-19 pandemic, Kuo and McNabb expanded their work such that the robot can now be operated remotely, keeping space between patient and operator.

"The robotic OCT system is touchless—no contact with a chin rest or forehead strap—and with the operator keeping a safe distance behind a barrier more than six feet away," Kuo said. When we began development, we of course had no idea that we would be dealing with a pandemic, but this is certainly relevant for the future of eye imaging and for the future normal."

The patient is asked to fixate on a target behind the robot and is in control during the imaging process through the use of a foot pedal. As soon as the patient takes their foot off the peddle, the robot moves away, which we found increases the comfort level in patients who might be apprehensive about having the robot operate independently near their eye.

Ryan McNabb, PhD and Anthony Kuo, MD

"This new technology will improve accessibility and is more comfortable for patients. The robot can adapt for those who have mobility issues, may be wheelchair bound, and for children that have a hard time sitting still."

Ryan McNabb, PhD

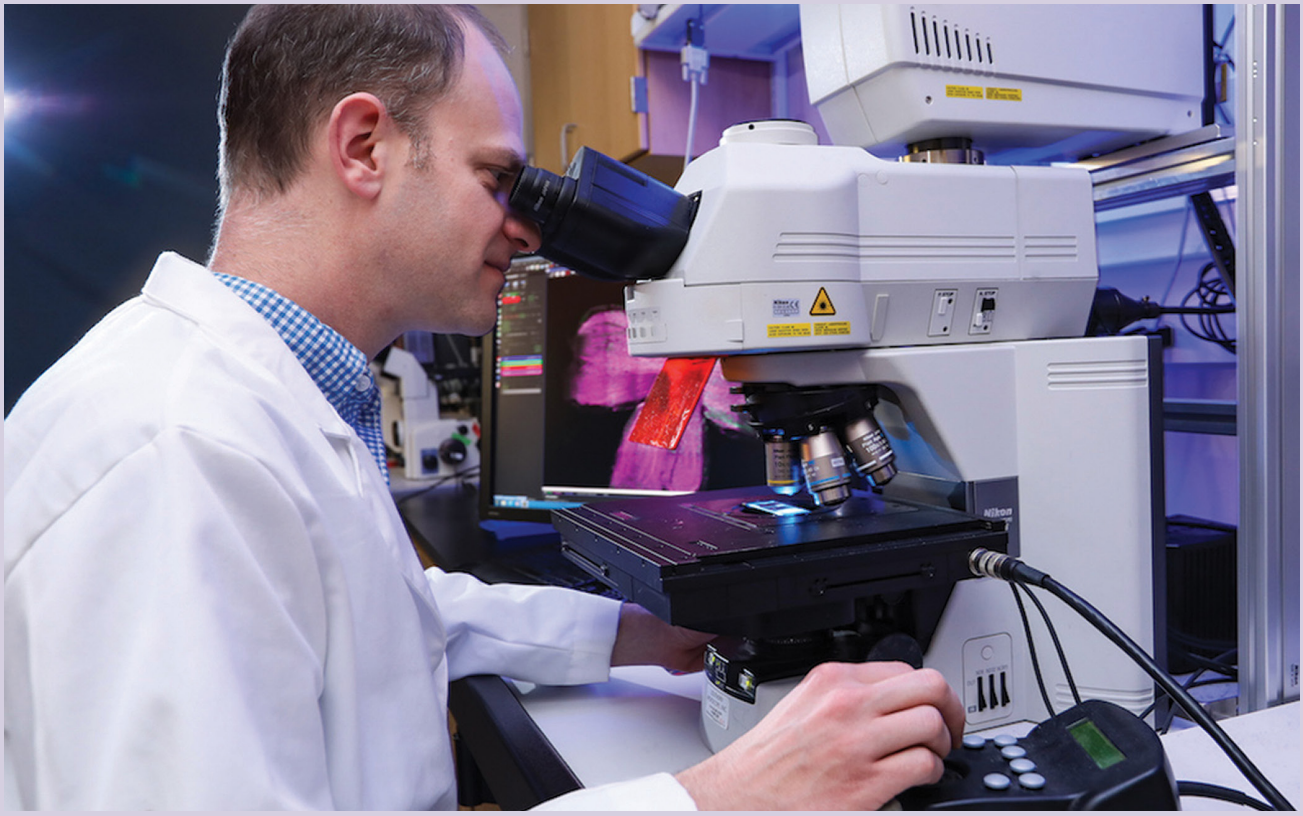
People volunteered for testing to determine accuracy with the current system. Volunteers encompassed a range of demographics—age, race, and gender, for example. "Even if people are a little hesitant at first, most all of our volunteers have loved it," McNabb said.

"Early results are promising that the robotic OCT is just as accurate as traditional technology. This discovery could change the way imaging is performed in clinical settings, and I'm glad that Duke continues to lead the way as innovators in ophthalmic imaging," Kuo said.

Duke Retinal Researchers Identify a Previously Undetected Form of CRB1

Unexpected Findings Could Lead to Future Gene Therapy for Patients Battling Retinal Degeneration

BY VICKI FRYE



Jeremy Kay, PhD

As often happens in medical research, a recent study intended to better understand the complexities of the central nervous system (CNS) resulted, as well, in surprising and extraordinary learnings that are already delivering hope to patients suffering with inherited retinal degenerative diseases caused by mutations in the CRB1 gene.

In a recent paper, published by *Nature Communicatons*[1], **Jeremy Kay, PhD,** associate professor of neurobiology and associate professor in ophthalmology, detailed a new method for identifying the mRNA isoforms produced by individual genes. Their study revealed that as many as 90% of CNS isoforms were previously unknown and overlooked by scientists as they try to understand gene function.

In this case, the team chose to study the development of the retina as an illustrative example of the intricacies of the "wiring" and complicated processing performed by the CNS. While it is a simpler system, the retina is built much like other parts of the brain: its cells come together in circuits to process light, just as the brain is designed to process other kinds of complex signals. In their research, the team was working to survey which proteins were present on the developing retinal cells. They were particularly interested in cataloguing protein isoforms, which are subtle variations in protein structure that can change how proteins work.

While they didn't set out to study CRB1, they knew it was present in the developing retina and that it fit their study criteria. In truth, it was the only

disease gene on their list and the only one related specifically to retinal diseases. Yet, in the process of characterizing the different gene variations, it came as a surprise to the group when they found a new "recipe" for CRB1; after all, CRB1 was one of the most studied genes on their list. They found that the same gene makes different RNAs and confirmed that there are two different isoforms of the CRB1 protein.

Before the paper, the team believed there was a single major version of CRB1, located in key supporting cells known as glial cells, which form junctions with the photoreceptor cells. However, their study revealed the discovery of a second more abundant variety—now referred to as CRB1-B—located within the photoreceptor cells.

Finding this new version in the photoreceptor is a game changer in light of the critical progress, over the past few years, in the treatment of inherited retinal diseases. In 2018, the FDA approved the first gene therapy for retinal disease. In gene therapy, a working copy of a mutated gene is inserted into retinal cells to recover function. For this strategy to work, it is crucial that the gene therapy be delivered to the cells that normally use the gene. The Kay lab's discovery suggests that previous gene therapy efforts were planning to put the wrong version of CRB1 into the wrong cell type. Based on the Kay lab's work, they have proposed the idea of replacing a working copy of CRB1-B into the photoreceptors. This idea has received considerable attention from corporate collaborators that are interested in further developing this into a gene therapy.

While there is still significant research to be conducted, the potential benefits of these findings have garnered notice from companies who want to do the experimental groundwork to show that there's enough promise to take this gene therapy to clinical trial.

"What's truly rewarding is that I've spoken with parents and other advocates who now have hope and are excited that there's a new discovery that provides a really clear and compelling new direction, that no one has tried before, for making a gene therapy that can help their child," says Kay.

This study led by Kay shows why research continues to be a top priority at Duke Eye Center. Through the unexpected findings of this exploratory work, the team came to a more conclusive understanding of the CRB1 gene and how it impacts the important functions of the retina and can cause progressive degenerative eye disease. Such research gives rise to hope for future gene therapy and the continued exploration of other inherited retinal diseases.

Important Facts on the Total Global Prevalence of Inherited Retinal Degeneration (IRD)[2]

- **1** case in 1,380 individuals or 5.5 Million people are affected
- **2.7** Billion people are healthy carriers of at least one mutation that can cause IRD

For CRB1

- **54,000** people worldwide have retinal degenerations cause by mutations in CRB1
- CRB1 is ranked as the **14**th most frequently mutated gene in retinal degenerations

[1] Comprehensive identification of mRNA isoforms reveals the diversity of neural cell-surface molecules with roles in retinal development and disease. *Nature Communications,* Thomas A. Ray, Kelly Cochran, Chris Kozlowski, Jingjing Wang, Graham Alexander, Martha A. Cady, William J. Spencer, Philip A. Ruzycki, Brian S. Clark, Annelies Laeremans, Ming-Xiao He, Xiaoming Wang, Emily Park, Ying Hao, Alessandro Iannaccone, Gary Hu, Olivier Fedrigo, Nikolai P. Skiba, Vadim Y. Arshavsky & Jeremy N. Kay, Article number: 3328 (2020)

[2] Worldwide carrier frequency and genetic prevalence of autosomal recessive inherited retinal diseases by Mor Hanany, Carlo Rivolta and Dror Sharon

First-of-its-Kind Implant Shifts Glaucoma Treatment Landscape

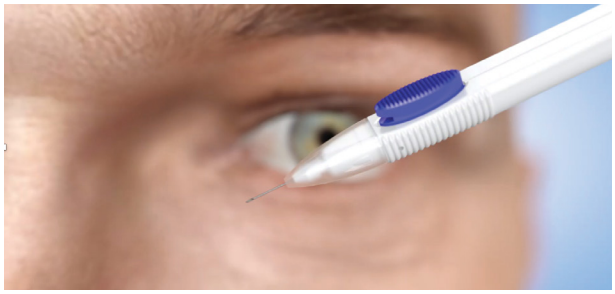
Benefits include increased patient adherence, slowed changes in visual field

BY LINDSAY KENTON

Standard first-line glaucoma treatments to lower intraocular pressure (IOP), such as eye drops, commonly have poor patient adherence, which may result in inadequate pressure control and lead to optic nerve damage and loss of vision over time.

However, results from two phase 3 studies indicate that a new FDA-approved intracameral biodegradable sustained-release implant—the first of its kind—could provide better long-term control of IOP in patients with open-angle glaucoma (OAG) or ocular hypertension (OHT).

Felipe Medeiros, MD, PhD, a Duke glaucoma specialist and principal investigator for the study of the sterile intracameral implant (DURYSTA, Allergan: Dublin, Ireland), says this new treatment has the potential to shift the paradigm for treating glaucoma, which affects more than 80 million people globally.



The implant contains 10 mcg of bimatoprost in a solid polymer sustained-release drug delivery system. Bimatoprost is believed to lower IOP by increasing outflow of aqueous humor through the trabecular meshwork and uveoscleral routes.

At the March 2020 American Glaucoma Society meeting, Medeiros presented the results from the two 20-month phase 3 ARTEMIS studies evaluating more than 1,100 participants with OAG or OHT on the safety and efficacy of the implant versus twice-daily topical timolol eye drops. Participants received an implant every four months for one year, and results showed that the implant reduced IOP by approximately 30%. Notably, Medeiros and his team of researchers observed that after the third implant, more than 80% of patients did not require any medication up to a year after the last implant.

Felipe Medeiros, MD, PhD
Joseph A. C. Wadsworth Professor of Ophthalmology

"One of the most important things that emerged from these studies is that the group using the implant had slower changes in the visual field compared to the group that was randomized to timolol," says Medeiros, who is also vice-chair for technology and director of the clinical research unit at the Duke Eye Center. "That's of fundamental importance because the goal of glaucoma treatment is to preserve visual function."

Medeiros notes that several studies have shown medication adherence for patients with glaucoma is typically less than 50%—though he says that "when patients are not being monitored in the context of a study, adherence may be even lower." Some reasons for low adherence include side effects from the eye drops (including discomfort, burning, or redness); forgetfulness; and coexisting systemic conditions such as rheumatoid arthritis, which may make it more difficult for patients to administer the eye drops as directed.

The results of the phase 3 ARTEMIS studies indicate that the benefits of this implant are significant for patients, Medeiros says, and may even extend to relatives of patients with glaucoma: "Frequently, a relative or a significant other is the one to administer the eye drops, and it can be a lot of effort."

Medeiros is currently involved with several additional phase 3 studies to further investigate the frequency of administration. "We expect that it's not necessary to administer it every four months, as we did in the trial, but maybe every six months to a year for some patients," he says. "Currently, the implant is approved by the FDA for a single application, but we hope the results of these studies will allow for an expansion of the label for multiple applications."

Light Perception: A Sestina

Christos Theophanous, MD

She already knows. She hears it in the pounding quiet
that blankets the sterile room as he slides his light
left and right, peering deep into the dark
hole of her eyes until it catches the reddish glow
in the face of the battered lens
clutched between his fingers.

He inches the instrument forward, his fingers
guiding a careful view of her quiet
eye, peering past her yellowed lens
to find the hollowed nerve centered in his light,
like a dull streetlamp casting its pale glow
though a deep night's dark.

Pulling the lens away, the eye again becomes dark.
He pauses a moment, rolling it between his fingers,
casting a circular shadow in the slit lamp's glow
as he ponders a moment, afraid to break the quiet.
He nudges the scope aside, extinguishes its light,
and pockets his lens.

She feels the cold touch of the lens
pull away from her eyelid as she settles back into the dark.
Faint colors linger from the quenched light.
She already knows his verdict. She just waits, fingering
a stitched edge of her chair in the thick quiet
watching the few remaining embers glow.

In a moment, they lose their final glow
leaving her with the tinkling sound of the lens
rattling on the linoleum floor, cutting the quiet.
He rummages across the room in the dark,
feeling along the wall until his fingers
find the switch and fill the room with light.

He shifts his stool beside her and places a light
hand on her shoulder. A faint smile glows
on her face as she places wrinkled fingers
on his. She's known this pattern, his lamp and lens,
for as long as they've fought this insidious dark.
But this time, he saves his words to preserve the quiet.

There is comfort in the quiet and no more he can do to bring back the light.
She rises to her feet in the now familiar dark and heads towards the doorway's dim glow.
His fingers guide her from the room, away from the doused lamp and the ineffectual lens.

Inspired by a patient with end-stage glaucoma, Duke Glaucoma fellow **Christos Theophanous, MD** describes the poignant moment when the doctor-patient relationship transitions towards comfort in a poem he wrote.[1]

The sestina is a fixed verse form dating back to the 12th century that contains six stanzas of six lines each and a seventh stanza of three lines. Every line ends with one of six words that are repeated in a specific pattern. In this piece, the use of the structured sestina form plays on the formulaic and routine nature of a patient encounter and contrasts it with the personal and emotional facets of the patient-physician relationship.

[1] *J Gen Intern Med*, DOI: 10.1007/s11606-020-06223-0.

Driving Research to New Treatments for AMD

BY MARY-RUSSELL ROBERSON

A Donor Takes the Wheel with his Leadership and Support

Decades ago, Tom Cabaniss watched as age-related macular degeneration (AMD) robbed his newly retired father of his independence. His father became legally blind in both eyes within a year and had to give up driving—a significant blow to a man who worked with and loved cars.

"I saw him completely lose control of everything he worked for," Cabaniss says. "It's very difficult to adjust to losing your sight when you're 60 years old. I dreaded that. I dreaded that for me."

Last year, Cabaniss himself was diagnosed with AMD, but his experience is markedly different than his father's, due to new treatments available at Duke Eye Center. His vision, while not perfect, has improved since he was first diagnosed and he is still able to drive and enjoy cars—which is important to him since he's a car aficionado like his dad. In place of dread, he now feels gratitude. "I'm very lucky," he says.

The Role of Family History

AMD can damage or destroy a person's central vision, leaving peripheral vision relatively unaffected, but still making it difficult or impossible to read, drive, or perform daily activities. Risk factors for AMD include age, race (white people are at higher risk), smoking, obesity, cardiovascular disease, and having a near relative with the disease. For some people, like Cabaniss' father, AMD progresses rapidly, while others maintain good vision indefinitely.

The disease typically begins when deposits build up beneath the central retina, an area called the macula. This stage is called "dry" macular degeneration. Sometimes, the disease progresses to "wet" macular degeneration, in which new blood vessels form and bleed or leak fluid under and into the retina, causing people to experience a large cloud or blind spot in the center of their vision.

Cabaniss' mother developed dry AMD about fifteen years after her husband became legally blind. Her disease progressed very slowly. Because both his parents had AMD, Cabaniss says, "I lived in fear of getting it. I was worried about myself and my daughter."

A Growing Relationship with Duke Eye Center

In the late 1990s, soon after his mother was diagnosed with AMD, Cabaniss drove from his home in Charlotte to Chase City in southern Virginia, picked up his parents, and took them to Duke Eye Center to be evaluated by **Eric Postel, MD,** professor of ophthalmology and a retinal specialist. That was the beginning of a decades-long relationship that continues today.

Cabaniss brought his mother to regular appointments with Postel, and eventually became a patient himself. When the two first met, Postel was studying the relationship between genetics and AMD, which Cabaniss found intensely interesting. Over the years, they racked up a lot of time discussing AMD, heredity, risk factors and prognosis.

"I developed a relationship with Dr. Postel and I started giving Duke Eye Center a little money for his research," Cabaniss says.

Cabaniss' mother participated in Postel's genetic study, which identified a gene variant that increases the risk for developing AMD. The results of the study were published by Postel and colleagues in ***Science*** in 2005.

"It was an important publication," Postel says, "and it was a step toward better therapies. [By participating in the study,] Tom's mother played a key role."

Better Therapies Emerge

In late 2019, Cabaniss noticed what he describes as a cloud in his left eye. Postel confirmed that he had wet AMD and immediately started Cabaniss on injection therapy. The cloud dissipated, and the only vision problem that remains is a slight distortion.

Postel explains that the treatment doesn't cure AMD, but limits the vision damage that can occur. "The injections have done what they are supposed to do, and his vision is better," Postel says. (The drugs are injected into the eye, but the eye is numbed ahead of time, and Cabaniss says it's not a painful procedure.)

The new treatments can be effective for AMD by slowing the formation of leaky blood vessels in the eye. There are several different drugs in this class that the Duke Eye Center uses for AMD, and Postel says more treatments are in the pipeline. "It's a rapidly changing field," he says. "We have treatments now that we didn't have 20 years ago, and 20 years from now—or even five—we'll have much better treatments."

Eric Postel, MD
Professor of Ophthalmology

> "We have treatments now that we didn't have 20 years ago, and 20 years from now—or even five—we'll have much better treatments."
>
> **Eric Postel, MD**

Participating on the Leadership Council

About 10 years ago, Postel recommended Cabaniss for a spot on the Duke Eye Center Leadership Council, and he has served ever since. Members of the Leadership Council meet regularly to hear about research and planning at Duke Eye Center and to offer their insight as community leaders.

"Tom's a lawyer," Postel says, "and he brings a very thoughtful and direct approach. He is interested in looking under the hood and figuring out what makes things work and how they run and, if they are rough at idle, how we're going to get it to work right."

Cabaniss, who now lives in Raleigh and is an attorney with McGuireWoods LLP, says, "There are lots of amazing things going on at Duke Eye Center, and it's really interesting to be on the Leadership Council and hear about them." Because of his own experiences, he enjoys staying on top of the current research, and he's grateful for the care he has received there.

"I'm a big fan of Duke Eye Center," he says. "Absolutely."

Duke Partners with LCI to Serve the BVI Community

Duke Eye Center has had a longstanding partnership with LC Industries (LCI), a manufacturing, distribution and retail company that is one of the largest employers of blind and visually impaired people in the U.S. **Diane B. Whitaker, OD,** division chief, vision rehabilitation & performance at Duke and the occupational therapists in her clinic have provided care for LCI employees at the Research Triangle Park site for many years. Whitaker initiated the proposal for LCI and William Hudson, former CEO and President of LCI who retired in 2019, to be primary benefactor of a state-of-the-art clinical pavilion that opened in 2015.

The relationship continues today with Jeffrey Hawting, at the helm. Earlier this year, LCI donated eSight devices—a head mounted electronic video magnifier, designed to offer the best visual acuity for those with visual impairment, making every day activities possible—to Whitaker's low vision patients.

Vision Rehabilitation and Performance Team

Cakisha Lyons with her new eSight head mounted electronic video magnifier

eSight recipients have expressed gratitude for the devices and the impact they have made on their daily activities.

These devices were given to two Duke low vision patients, who before struggled to complete everyday tasks. Several factors go into selecting the proper candidate for eSight. "We look for clients who are going to benefit from using the device to improve participation in daily activities." said **Omar Mohiuddin, MPH, MS, OTR/L,** occupational therapist at Duke Eye Center. Pairing these devices with clients who are already familiar with technology allows for a smooth transition when adopting assistive technology.

Unfortunately, the abandonment rate for assistive technology is over 70% so it is ideal to match the device with someone who will take advantage of its benefits on a regular basis. As with many new technologies, training is essential to ensure the device is used properly and at full potential to support the needs of the patient. Once the proper candidate is selected, Duke low vision occupational therapists demonstrate how to use the eSight device and offer practice with the technology by sitting down with the client to go over controls, how to properly store and clean the unit, and if they have any physical motor limitations, modify how they would use the device. Selected candidates are also asked to participate in daily activities using the device, including signing and reading documents, finding and reading signs, seeing and recognizing people and faces before using it on their own. eSight recipients have expressed gratitude for the devices and the

"LCI is proud to support Duke Eye Center patients and the community and we look forward to future collaborations to serve the visually impaired."

Jeffrey Hawting, president, LC Industries

impact they have made on their daily activities.

Duke Eye Center has worked with LCI for over a decade and will continue to partner with LCI in other ways to serve the Blind and Visually Impaired (BVI) community. One of the ways Whitaker and her staff contribute is by offering on-site vision screenings to LCI employees. The screenings often uncover conditions that are in need of treatment and are scheduled for follow-up care. One of the employees that participated in the screening is even driving again.

"We would like to thank LCI for their continued generous support of Duke Eye Center and our clinic. We are grateful for the ongoing collaboration to serve the blind and visually impaired community" said Whitaker.

New Faculty

Fowler
Oculofacial Surgery

Amy Fowler, MD is an ASOPRS fellowship-trained, board-certified oculofacial plastic surgeon specializing in diseases of the eyelids and lacrimal system. Her clinical interests include cosmetic and reconstructive surgery of the eyelids and peri-ocular area, and treatment of blepharospasm and hemi-facial spasm with neuromodulators.

She has a particular interest in surgical and minimally invasive facial rejuvenation techniques, including botulinum toxins, fillers, and energy-based skin therapies.

Fowler speaks frequently at both regional and national meetings. She joined the faculty of Duke Eye Center in 2020 after 13 years at UNC where she also served as the Ophthalmology Residency Program Director, Vice Chair of the Department of Ophthalmology and Director of Medical Student Education for Ophthalmology. As part of ongoing interests in medical education, she serves as an oral board examiner for ASOPRS and the American Board of Ophthalmology.

Liu
Glaucoma

Katy Liu, MD, PhD is a clinician-scientist who specializes in caring for patients with glaucoma and improving treatments for glaucoma through research. Her research focuses on the immune system and inflammation in glaucoma pathogenesis.

Dr. Liu received her basic science training in cell biology and physiology. Her research interests in ophthalmology led her to the Duke Eye Center, which has a long-standing tradition of advancing vision science with a vibrant research community including renowned clinician-scientists. She works closely with Dr. Dan Stamer and Dr. Danny Saban, who are leaders and pioneers in their respective fields of trabecular meshwork physiology and ocular immunology.

Aligned with her research interests, Dr. Liu cares for patients with glaucoma at the Center for Ocular Immunology at the Duke Eye Center, working closely with uveitis specialists including Dr. Victor Perez. Dr. Liu's goal is to bring her knowledge and findings from the laboratory to improve clinical care for patients with glaucoma.

Scriven
Optometry

Chelsea Scriven, OD is an optometrist who sees pediatric and adult patients. Dr. Scriven graduated from Illinois College of Optometry in 2019 before completing her Pediatric Optometry Residency at Duke Eye Center.

She specializes in pediatric primary eye care, including comprehensive eye exams, contact lenses, eye movement disorders, and myopia control for children. She also enjoys seeing adult patients for routine eye care. Scriven strives to listen to the individual needs of her patients and creates a treatment plan that is specialized to them. She was inspired to become an optometrist after working in an optometric office and seeing the difference they were able to make in the lives of children and adults every day.

Duke Ophthalmic Technician Program

CELEBRATING 35 YEARS

Duke Eye Center is proud to have offered the Duke Ophthalmic Technician Program in partnership with Duke University School of Medicine for 35 years. The 51-week accelerated, affordable program strives to provide an exceptional education that prepares students for the certification exam for ophthalmic technicians and to excel once on the job.

Those interested in the program should feel at ease knowing they have many career options after receiving a certified ophthalmic technician (COT) certification. Program graduates have become team leads, clinical operations managers, ophthalmic photographers among other eye care and leadership roles.

Facts about the Duke Ophthalmic Technician Program:

- **Accelerated Program. A two-year program condensed into less than a year.** One of only two programs in the country that can be completed in 51 weeks.
- **Teaching Hospital Setting.** Duke is a highly ranked teaching hospital and students are able to learn from some of the leading ophthalmologist in the country.
- **Comprehensive Multispecialty Education.** OpTech students attend many educational lectures with our ophthalmology trainees, their clinical rotation schedules include every sub-specialty in ophthalmology where they spend time with world-renowned physicians known for expertise and innovative techniques.
- **High employment rate. More than 90% of Duke graduates** are working in the field as Ophthalmic Technicians within a month of graduation, with many having secured their future positions prior to graduation.

What Students Will Learn:

- Technical skills to complete an eight-part eye exam, capture imaging studies, perform diagnostic testing, and assist in surgical procedures, as well as the importance of competence and accuracy.
- Gain an uncommon depth of knowledge of ocular anatomy, pathology, pharmacology, and medical and surgical treatment of eye disease.
- Rotating through their twelve clinical rotations, our students learn to be responsible, contributing members of an eye care team.
- Importance of reliably gathering information to support the ophthalmologist, using their resources in support of their team of staff members, and gaining the knowledge and confidence to effectively educate and advocate for the patients.

WHAT FORMER STUDENTS ARE SAYING

What is your favorite thing about this career?

Lee Ann McKinney, COT

The Duke OpTech program opened my eyes to the careers available in ophthalmology and there are many different pathways that you can take. I have experienced this first hand, starting out as a tech on the floor and progressing to Team Lead. From there, there was an additional opportunity to be clinic manager for the entire clinic. There is a lot of job security with becoming an ophthalmic technician because the field has grown so much.

-Lee Ann McKinney, COT, Health Care Administrator for Duke Eye Center of Winston-Salem

What would you say about the program to people who are considering to apply?

Judith Ramirez, COT

If you are considering applying for the program, do it. There are so many opportunities that come from the OpTech program at Duke. It is challenging, but the rewards and benefits are substantial. It is only a year, and after that you can work right away; that's amazing. It is also very rewarding to follow the progress on the patient's treatment and to see their vision improve and to know you are making a difference.

-Judith Ramirez, COT

What does it mean to be a Duke OpTech program graduate?

Henry Cameron, COT

There was an immense sense of pride finishing the Duke OpTech program, finishing it well, and becoming certified afterward. I am pursuing a career that I enjoy and get to work with a variety of patients. I have been moving toward photography and am very interested in it. I showed a 14-year-old the photography of the inside her eye and she thought that was very cool. Not many people get to see that. It's interesting and I look forward to further pursuing ophthalmic photography as a next step in my career.

-Henry Cameron, COT

"It is my privilege to work with our committed, dedicated, hardworking students who have tremendous potential for great achievements in the future."

FROM THE PROGRAM AND EDUCATION DIRECTOR

Deborah K. Smith, BS, COMT, OSC

Deborah K. Smith, BS, COMT, Program Director

Upon completion of the Duke Ophthalmic Technician Program, I want each student to have the knowledge, skills and confidence to successfully achieve their COT certification. Our students exercise extreme discipline and make great personal sacrifices to complete our accelerated program.

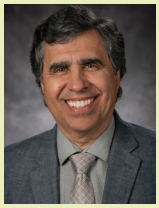
I am honored to contribute to the training of ophthalmic technicians. Our current students make each of my work-days an adventure-in-ophthalmology. Hearing from a graduate who has achieved a new career goal fuels my passion for my career. It has been said, "Find a job you enjoy doing, and you will never have to work a day in your life." It is my good fortune to have found such a job.

It is my privilege to work with our committed, dedicated, hardworking students who have tremendous potential for great achievements in the future. I wish all of our students and graduates continued success and a very bright future.

For more information: https://dukeeyecenter.duke.edu/education-and-training/duke-ophthalmic-technician-program

Or email deborah.smith1@duke.edu

Honors and Awards



Vadim Arshavsky, PhD was selected to receive the 2020 Endre A. Balaz Price by the International Society for Eye Research (ISER) for his outstanding contributions in the field of eye research and vision science.

Jiaxi Ding, MD received an Achievement Award by the American Academy of Ophthalmology. Her surgical video was also ranked as one of the top 5 finalists submitted for the American Glaucoma Society (AGS) 2021 Surgical Video Competition.

Laura B. Enyedi, MD completed the Duke AHEAD Certificate in Health Professions Education & Teaching Program.

Sina Farsiu, PhD was inducted into The American Institute for Medical and Biological Engineering (AIMBE) College of Fellows. He was elected as a Fellow Member of The Optical Society (OSA) at the September 2020 Board of Directors meeting.

Sharon Fekrat, MD, FACS is a 2020 recipient of the Distinguished Contributor Award from the American Society of Retina Specialists (ASRS) *Journal of VitreoRetinal Diseases* for publishing 7 papers as senior author in their journal since 2018.

Frank Brodie, MD, MBA won the 2020 Ronald G. Michels Foundation Award at a virtual awards ceremony.

She is series editor for *The Duke Manuals of Ophthalmic Surgery* and chief editor of *The Duke Manual of Vitreoretinal Surgery.*

Sharon Freedman, MD gave the keynote address (the Costenbader Lecture) on the opening day of the American Association for Pediatric Ophthalmology and Strabismus 2021 meeting.

Amy M. Fowler, MD was named medical director at Duke Eye Center of Holly Springs.

Sidney M. Gospe III, MD, PhD received the Research to Prevent Blindness (RPB) Career Development Award.

Dilraj S. Grewal, MD was inducted into The Macula Society as well as The Retina Society for his contributions to retina research.

Alessandro Iannaccone, MD, MS, FARVO is a co-editor of Handbook of Clinical Electrophysiology of Vision. He was also invited to join the Editorial Board of the journal *Genes* and the Editorial Board of the journal *Translational Vision Science and Technology.*

Glenn J. Jaffe, MD was appointed President-Elect of The Macula Society.

Terry Kim, MD was appointed President of the American Society of Cataract and Refractive Surgery (ASCRS) and was named in The Ophthalmologist's Power List 2020.

Anthony N. Kuo, MD received an Achievement Award by the American Academy of Ophthalmology.

>

Duke Ophthalmology **Events**

Resident Grand Rounds
May 13, 2021
September 21, 2021
October 12, 2021
November 19, 2021
December 3, 2021

Duke Ophthalmology Education Series
May 10, 2021
July 19, 2021
September 13, 2021
November 1, 2021

7th Annual Duke Fellow Advanced Vitreous Surgery Course (fAVS)
Session 3: April 29, 2021

Duke Ophthalmology Virtual Scientific Session: A Presentation of Trainee Scientific Discoveries
June 4, 2021
Keynote:
Todd Margolis MD, PhD
Professor and Chair
The Hardesty Department of Ophthalmology and Visual Sciences
Washington University

Ocular Inflammatory Disease Crash Course
September 18, 2021

Virtual Advances in Pediatric Retina Conference (APR)
September 18-19, 2021

Glaucoma Fellows Program
October 8, 2021

33rd Annual Glaucoma Symposium
October 9, 2021

Controversies in Cornea and Cataract Surgery Conference
February 5, 2022

Distinguished Lectures

Joseph M. Bryan Research Lecture
August 19, 2021
Gregory S. Hageman, PhD
John A Moran Presidential Professor
Department of Ophthalmology and Visual Sciences
University of Utah School of Medicine

The Stephen & Frances Foster Distinguished Lecture
September 20, 2021
Stephen Pflugfelder, MD
Professor and James and Margaret Elkins Chairman in Ophthalmology
Baylor College of Medicine

Inaugural Mittra Family Foundation Lecture
September 23, 2021
Daniel F. Martin, MD
Chairman, Cole Eye Institute
Barbara and A. Malachi Mixon III Institute Chair of Ophthalmology
Cleveland Clinic

Joseph M. Bryan Research Lecture
October 7, 2021
Rando Allikmets, PhD
Acquavella Professor, Department of Ophthalmology
Research Director, Harkness Eye Institute Columbia University
Lowy Medical Research Institute

The Dastgheib Pioneer Award in Ocular Innovation Lecture
October 19, 2021
José-Alain Sahel, MD
Distinguished Professor and Chairman
Department of Ophthalmology
University of Pittsburgh School of Medicine
Exceptional Class Professor at Sorbonne Université, Paris
The Eye and Ear Foundation Endowed Chair

The Annual Diversity and Inclusion Lecture Series
October 21, 2021
Eve J. Higginbotham SM, MD, ML
Vice Dean for Penn Medicine Office of Inclusion and Diversity
Senior Fellow, Leonard Davis Institute for Health Economics
Professor of Ophthalmology
Perelman School of Medicine
University of Pennsylvania

Gordon K. Klintworth, MD, PhD Distinguished Lecture
October 28, 2021
Robert F. Mullins, MS, PhD
Martin Carver Chair of Ocular Biology
Professor of Ophthalmology and Visual Science
University of Iowa Health Care
Carver College of Medicine

Transforming Education Amidst A Pandemic

Given the unprecedented year brought on by the COVID-19 pandemic, Duke Eye Center has remained dedicated to the long history of delivering the latest in ophthalmic education despite all obstacles.

Adhering to Duke and statewide policies on restrictions for gatherings, the Continuing Medical Education (CME) platform was adjusted to virtual programming that allowed continued valuable educational opportunities in a collaborative but safe environment to support the professional development of faculty, trainees, and colleagues.

Working together, while physically apart played an important role in navigating the transition from in-person to virtual learning using platforms and technologies not broadly used in this capacity prior to the COVID-19 pandemic.

The 2020 CME events were quickly transformed to virtual and most were held as scheduled including distinguished lectures by world-renowned faculty, robust sub-specialty focused conferences, bi-monthly lecture series for our local optometry community, and interactive grand rounds.

Lejla Vajzovic, MD, associate professor of ophthalmology and director of CME at Duke Eye Center, is thankful and proud of the CME planning team for the rapid transformation. "Although the pandemic has physically separated us, it has brought us together in more ways than one. We are committed to education and will continue to deliver outstanding content to demonstrate our commitment to research, education, and patient care," said Vajzovic.

We are looking forward to another great year of educational programs and hope you plan to join us in 2021!

Science Professor Lecture
November 18, 2021
Adriana Di Polo, PhD, ARVO
Professor, Department of Neuroscience
University of Montreal
Axe Neurosciences

Honors and Awards

Eleonora Lad, MD, PhD received the VA Clinical Science Research and Development I01 Merit Award titled "Role of Macrophages in Age-Related Macular Degeneration." She was also selected to serve as Heed Foundation Retreat Faculty during the 15th Annual HOF Residents Retreat.

Ilya Leyngold, MD published the world's first authoritative textbook on corneal neurotization.

Frank Moya, MD was named medical director at Duke Eye Center of Winston-Salem.

Felipe Medeiros, MD, PhD received the Bobier Award in Vision Science from the University of Waterloo, Canada, Rabb-Venable Award from the American Medical Association (Mentor) and the Garvin-Herbert Lecturer at the University of California Irvine. He gave the Keynote Lecture at the International Society for Eye Research as well as the Colombian Glaucoma Society. Dr. Medeiros received the International Award from the Brazilian Council of Ophthalmology 2020. He was elected Program Chair of the American Glaucoma Society 2020 and Co-Chair of the FDA Collaborative Community in Imaging Glaucoma Section. He served as Visiting Professor at Emory University, Columbia University and at Northwestern University.

2020 Faculty Promotions

Majda Hadziahmetovic, MD was promoted to Assistant Professor of Ophthalmology

Jeremy Kay, PhD earned tenure for his appointments Associate Professor of Neurobiology, Associate Professor in Ophthalmology and Associate Professor in Cell Biology

Daniel Saban, PhD earned tenure for his appointments Associate Professor of Ophthalmology and Associate Professor of Immunology

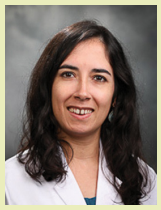
Henry Tseng, MD, PhD was promoted to Associate Professor of Ophthalmology

Federico G. Velez, MD earned tenure for his appointment Professor of Ophthalmology

S. Grace Prakalapakorn, MD, MPH was elected by the National Alliance for Eye and Vision Research (NAEVR) and Alliance for Eye and Vision Research (AEVR) Boards as one of three new Directors to serve in the class of 2020-2023. She received an Achievement Award by the American Academy of Ophthalmology. Dr. Prakalapakorn will be taking over as the Pediatric Ophthalmology/Strabismus Section Lead Editor for EyeWiki. She also became an Affiliate Faculty member of the Duke Global Health Institute (DGHI).

Vasantha Rao, PhD was awarded Richard and Kit Barkhouser Distinguished Professor.

Jullia Rosdahl, MD, PhD received an Achievement Award by the American Academy of Ophthalmology (AAO).

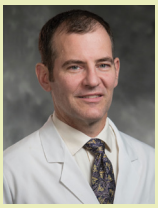


Atalie C. Thompson, MD, MPH received a K23 Mentored Patient-oriented Research Career Development Award from the NIH/NEI.

Lejla Vajzovic, MD received the 2020 Duke Medical Alumni Association Emerging Leader Award, the 2020 Women in Ophthalmology (WIO) Emerging Leader Award, and was inducted into The Macula Society. She was elected for a Director-at-Large position on the Women in Ophthalmology (WIO) Board of Directors.

Federico G. Velez, MD was named Chair of the Adult Strabismus Committee of the American Association of Pediatric Ophthalmology and Strabismus (AAPOS). He became Medical Editor of the World Society of Pediatric Ophthalmology and Strabismus (WSPOS) and joined the American Academy of Ophthalmology (AAO) Annual

Program Committee. Dr. Velez presented 2 named lectures (the Ham Lecture at the Latin American Council of Strabismus and the Knights Templar at Emory University) and 5 keynote lectures.



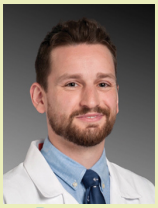
Lloyd Williams, MD, PhD became an Affiliate of the Duke Global Health Institute (DGHI).

Trainee Awards

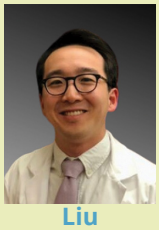
The 2020-2021 Heed Fellowship was awarded to:

Alekseev

Birnbaum



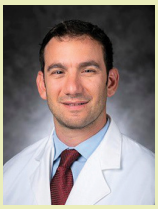
Deaner



Liu

Oleg Alekseev, MD, PhD – Medical Retina Fellow
Faith Birnbaum, MD – Resident
Jordan Deaner, MD – Vitreoretinal Fellow
James C. Liu, MD – Glaucoma Fellow

Oleg Alekseev, MD, PhD – MR Fellow received the Foundation Fighting Blindness (FFB) Clinical/Research Fellowship Award in Inherited Orphan Retinal Degenerations.



Frank Brodie, MD, MBA – VR Fellow received the Ronald G. Michels Fellowship Foundation award.

>

2020–2021 RESIDENTS

C. Ellis Wisely, MD, MBA
Chief Resident

Third Year Residents (PGY4)

Cassandra Brooks, MD
Abhilash (Abhi) Guduru, MD
Suzanne Michalak, MD
Matthew O'Sullivan, MD, PhD
Michael Quist, MD

Second Year Residents (PGY3)

Amal Al-Lozi, MD
Regina de Luna, MD
Hesham Gabr, MD
Priya Gupta, MD
Kevin Jackson, MD
Xinxin (Steph) Zhang, MD

First Year Residents (PGY2)

Sahil Aggarwal, MD
Eun Young (Alice) Choi, MD
Andrew Gross, MD
S. Tammy Hsu, MD
Katherine Peters, MD
Yunbo (James) Tian, MD

Interns (PGY1)

Rami Gabriel, MD
Lucy Hui, MD
Sri Meghana Konda, MD
Richmond Woodward, MD
Yuxi Zheng, MD

2020–2021 CLINICAL FELLOWS

Cornea

Amber Hoang, MD
Kyle Kirkland, DO
Austin Meeker, MD

Glaucoma

James Liu, MD
Christos Theophanous, MD
Obinna Umunakwe, MD, PhD
Andrew Williams, MD
Sarah Xu, MD

Medical Retina

Oleg Alekseev, MD, PhD
Effy Ojuok, MD

Neuro

Brian White, MD

Oculofacial

Anna Ginter, MD
Lauren May, MD
Anagha Medsinge, MD

Ocular Oncology

Ekaterina Semenova, MD, PhD

Pediatrics

Tanya Glaser, MD
Pimpiroon Ploysangam, MD
Isis Topete, OD
Allison Umfress, MD

Vitreoretinal Surgery

Frank Brodie, MD, MBA
Sophie Cai, MD
Jordan Deaner, MD
Henry Feng, MD

Duke Eye Center ranked by *Ophthalmology Times*

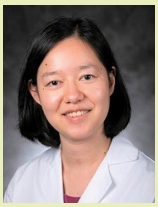
6 Best Overall Program

5 Best Research Program
(Advancing up one spot from last year)

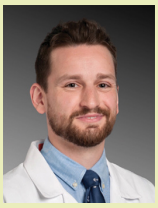
7 Best Clinical Care Program

7 Best Residency Program

Honors and Awards



Sophie Cai, MD – VR Fellow received the Detroit 2020: Motor City Retina travel grant.



Jordan Deaner, MD – VR Fellow was elected as the American Society of Retina Specialists (ASRS) Fellow in Training (FIT) Section Co-Chair.

Suzanne Michalak, MD – Resident was selected to attend the prestigious Heed Foundation Residents Retreat.

Michael Quist, MD – Resident received the Bernard Schwartz, MD, Memorial Award for his abstract presented at the American Glaucoma Society (AGS) Annual Meeting. He received the Copeland Fellowship awarded to a resident interested in advocacy and policy to represent the NMA Ophthalmology section at the AAO Advocacy Ambassador Program and the Duke Golden Apple Teaching Award awarded by medical students to the resident who has demonstrated exceptional dedication to medical education and training of medical students interested in Ophthalmology. Dr. Quist was selected as the first place resident winner to receive the Rabb-Venable Excellence in Research Award for his podium presentation at the Ophthalmology section of the annual National Medical Association (NMA) convention.

Research to Prevent Blindness Supporting Groundbreaking Eye Research

The Duke University School of Medicine has been granted an Unrestricted Grant by Research to Prevent Blindness (RPB) in the amount of $115,000 a year to support eye research conducted by the Department of Ophthalmology. This funding has been awarded based on a thorough review of criteria, including the department's research activities, laboratory environment, and clinical and scientific staff, as evaluated by RPB's renowned Scientific Advisory Panel.

The funds will be deployed at the discretion of the Department Chair, to provide maximum flexibility in developing and expanding eye research programs, and to provide opportunities for creative planning that go beyond the scope of restricted project grants.

The Duke University School of Medicine holds one of 32 RPB Unrestricted Grants nationwide.

Since it was founded in 1960, RPB has channeled more than $383 million into eye research. As a result, RPB has been identified with nearly every major breakthrough in vision research in that time. For information on RPB's grants program, listings of RPB institutional and individual grantees, and findings generated by these awards, go to **www.rpbusa.org.**

Medical Student Awards

Gloria Hong, AB was awarded a Korean American Scholarship Foundation (KASF) scholarship.

Justin Ma, BS received a VitreoRetinal Surgery Foundation (VRSF) Research Award for his research proposal under the mentorship of Sharon Fekrat, MD FACS.

Cason B. Robbins, BS was elected to the Duke University School of Medicine chapter of the Alpha Omega Alpha Medical Honor Society.

Kai Seely, BS received a VitreoRetinal Surgery Foundation (VRSF) Research Award.

Irene Song, BA received a Medical Student Eye Research Fellowship (MSF), encouraging gifted medical school students to consider careers in eye research and allowing them to take one year off from their studies to participate in a research project at a Research to Prevent Blindness (RPB)-supported department of ophthalmology.

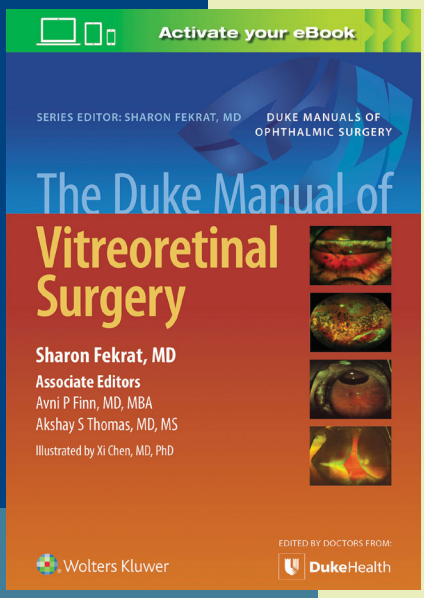
Introducing *The Duke Manuals of Ophthalmic Surgery*

The Duke Manuals of Ophthalmic Surgery is a series of five step-by-step, highly illustrated educational books to guide the common and challenging surgical procedures. The series offers a full spectrum of ophthalmology subspecialties, covering cornea and cataract, glaucoma, oculofacial, pediatric, and vitreoretinal surgery.

World-renowned retina surgeon **Sharon Fekrat, MD, FACS,** professor of ophthalmology and associate professor of surgery, was inspired to create the educational resources and spearheaded the project after working on two previous books, one about eye disease for the lay public and another on curbside retina questions for the eye doctor.

Sharon Fekrat, MD, FACS
Professor of Ophthalmology

Fekrat solicited Duke ophthalmology faculty and former trainees to share their expert approach and summary of cases as a guide for next steps in the operating room. "After working on the vitreoretinal surgery manual, I was excited to also share the expertise of the many other Duke faculty and previous trainees in the various ophthalmic subspecialties through *The Duke Manuals of Ophthalmic Surgery* series," said Fekrat.



Countless hours of work and collaboration by outstanding individuals in the field of ophthalmology have resulted in an unparalleled resource available to ophthalmology surgeons, residents, and fellows who want to maximize their surgical goals. The Duke Manuals series is also an invaluable resource for the surgical assistant as well as the operating room nurse as they prepare for the surgical case and anticipate the surgical steps.

"The goal of *The Duke Manuals* is to contribute to the knowledge base while having a positive impact on fellow surgeons and trainees as well as the entire clinical team which ultimately translates into improved patient outcomes," said Fekrat. "It is the hope of all authors and editors involved that this project will serve as an excellent tool for the wide variety of cases and scenarios that may be encountered," she said.

Series manuals

The Duke Manual of Vireoretinal Surgery
Editors: Sharon Fekrat, MD, FACS, Avni Patel Finn, MD, MBA, Akshay S. Thomas, MD, MS

Illustrations provided by Xi Chen, MD, PhD

The Duke Manual of Oculoplastic Surgery
Editors: Michael Richard, MD, Jason Liss, MD, Nicholas Ramey, MD

The Duke Manual of Pediatric Ophthalmology and Strabismus Surgery
Editors: Laura B Enyedi, MD, Nandini Ghandi, MD, Tammy Yanovitch, MD, MHSc

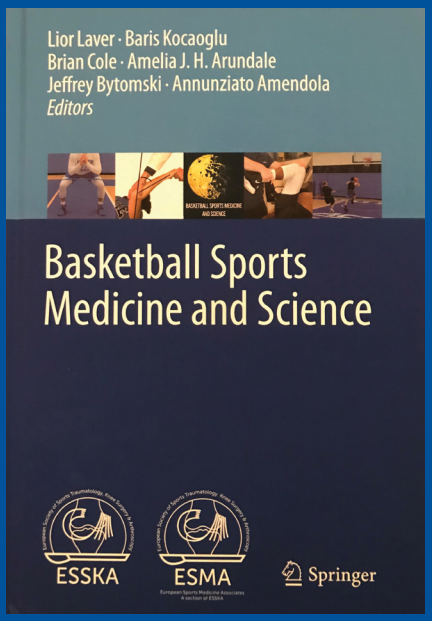
The Duke Manual of Glaucoma Surgery
Editors: Divakar Gupta, MD, Leon Herndon Jr, MD, Kelly Muir, MD

The Duke Manual of Cornea and Cataract Surgery
Editors: Preeya Gupta, MD and Nandini Venkateswaran, MD

To purchase the books, please visit Amazon or the Wolters Kluwer website.

Ophthalmic Trauma in Basketball

DUKE EXPERTS EXPLAIN THE PREVALENCE OF BASKETBALL-RELATED EYE INJURIES AND WHEN AN OPHTHALMOLOGIST EVALUATION IS NECESSARY



In recent years, many ocular injuries to famous players have been publicized in the sports media. Some examples include Jon Scheyer's retinal tear and traumatic optic nerve avulsion while playing in the NBA summer league team in 2010, and Amar'e Stoudemire's retinal detachment in 2008 while playing for the Phoenix Suns. While such severe injuries are memorable, basketball-related ocular injuries are common and are often benign.

Terry Kim, MD, consultant ophthalmologist for the Duke Men's Basketball Team, professor of ophthalmology, and chief of division of cornea and refractive surgery, along with **C. Ellis Wisely, MD, MBA,** chief resident for the department of ophthalmology, published a chapter titled "Ophthalmic Trauma in Basketball" as part of the recently published textbook: *Basketball Sports Medicine and Science.*

The textbook is designed as a comprehensive educational resource for sideline medical technicians, sports medicine physicians, and orthopedic surgeons, and includes a foreword written by Duke Men's Basketball Coach Mike Krzyzewski. In their chapter, Kim and Wisely discuss memorable ophthalmic trauma cases in basketball, the epidemiology of basketball-related ocular trauma, prevention strategies for ophthalmic injuries, the sideline ocular assessment, and guidelines for safe return to play, as well as specific descriptions of the common basketball-related ocular injuries and relevant treatment strategies.

Kim and Wisely demonstrate that eye injuries in basketball are common events and assert that protective eyewear is effective in injury prevention and underutilized in basketball. Additionally, they discuss that, while many aspects of ocular examination and diagnosis require special equipment or the expertise of an ophthalmologist, a systematic sideline assessment performed by medical staff can provide valuable information to guide next steps in referral or return to play. Given the possibility of vision-limiting injuries, uncertainty in the sideline diagnosis should prompt referral to an ophthalmologist.

The textbook is now available via Springer Publishing.

Terry Kim, MD
Professor of Ophthalmology

C. Ellis Wisely, MD, MBA
Chief Resident for the Department of Ophthalmology

In their chapter, Kim and Wisely discuss memorable ophthalmic trauma cases in basketball, the epidemiology of basketball-related ocular trauma, prevention strategies for ophthalmic injuries, the sideline ocular assessment, and guidelines for safe return to play.

Implementing Teleophthalmology in Response to COVID-19 Pandemic

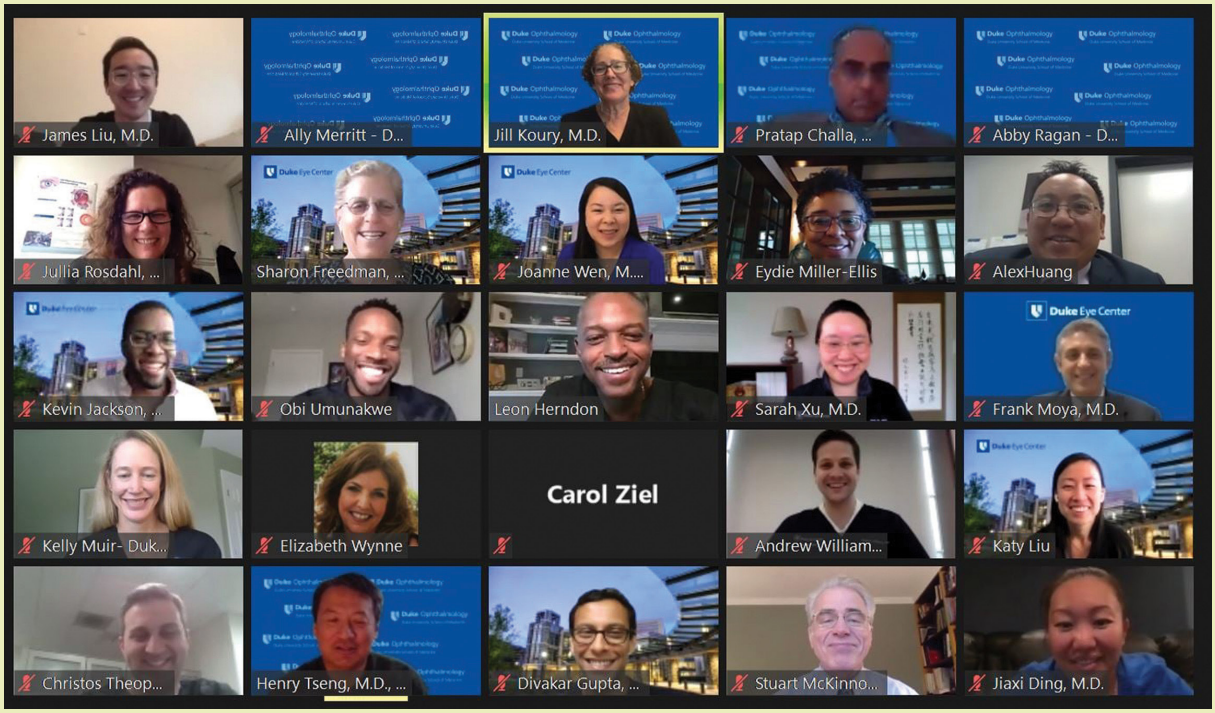
Dilraj S. Grewal, MD
Associate Professor of Ophthalmology

Divakar Gupta, MD
Assistant Professor of Ophthalmology

To maintain the continuity of care during the unprecedented and sudden change in practice patterns due to the COVID-19 pandemic, teleophthalmology was rapidly implemented at Duke Eye Center in late March 2020. Duke ophthalmology faculty **Dilraj S. Grewal, MD,** associate professor of ophthalmology and **Divakar Gupta, MD,** assistant professor of ophthalmology initiated a study to report the initial experience with teleophthalmology, using existing infrastructure, in a large tertiary care academic eye center during the first 4 weeks of the North Carolina statewide stay at home order.

A total of 206 adult teleophthalmology visits were scheduled, 113 video and 93 telephone. Technical issues were minimal and 96.1% of scheduled visits were successfully completed with the majority being over video. Among nearly 200 completed teleophthalmology encounters for adult patients, 22 ophthalmologists over 6 services provided care to a broad range of patients spanning multiple diagnosis and age groups. These results were reported at the American Academy of Ophthalmology 2020 annual meeting.

This initial experience with implementation, training and delivery of teleophthalmology suggests that it is a viable alternative for timely delivery and coordination of patient care across different subspecialties in emergency situations and is likely to have an expanded role in the future.



The **32nd Annual Glaucoma Symposium** was held virtually on Sepember 26, 2020.

Duke Eye Center Administration, Faculty and Staff

FACULTY LEADERSHIP

Edward G. Buckley, MD	Chair, Department of Ophthalmology Vice Dean of Medical Education, Duke University School of Medicine Vice Chancellor Duke-NUS Affairs
Scott W. Cousins, MD	Vice Chair of Strategy Director, Center for Macular Diseases Director, Ophthalmic Imaging Medical Director, Duke Eye Center Durham
Felipe Medeiros, MD, PhD	Vice Chair, Technology Director, Clinical Research Unit
Eric A. Postel, MD	Vice Chair, Clinical Affairs Vice Chair, Faculty Vice Chair, Patient Safety Chief, Ambulatory Surgery, Ophthalmology
Division Chiefs	Chantal Boisvert, OD, MD – Neuro Ophthalmology
	Sharon F. Freedman, MD – Pediatric Ophthalmology and Strabismus
	Leon W. Herndon Jr, MD – Glaucoma
	Anupama Horne, MD – Comprehensive
	Glenn J. Jaffe, MD – Vitreoretinal
	Terry Kim, MD – Cornea, External Disease and Refractive Surgery
	Diane Whitaker, OD – Vision Rehabilitation and Performance
	Julie A. Woodward, MD – Oculofacial
P. Vasantha Rao, PhD	Chair, Department APT Committee
Cynthia A. Toth, MD	Chair, Research Advisory Council Director for Clinical and Translational Research for Ophthalmology
Sanjay Asrani, MD	Medical Director Duke Eye Center, Cary
Christopher S. Boehlke, MD	Medical Director Duke Eye Center, Raleigh
Laura Enyedi, MD	Medical Director Duke Eye Center, South Durham
Amy M. Fowler, MD	Medical Director Duke Eye Center, Holly Springs
Divakar Gupta, MD	PDC At-Large Member
Frank J. Moya, MD	Medical Director, Duke Eye Center, Winston-Salem
Robin R. Vann, MD	Medical Director Perioperative Services Director, OR
Vadim Arshavsky, PhD	Scientific Director of Research
Anna Bordelon, MD	Director, Ophthalmic Technician Program
Catherine Bowes Rickman, PhD	Director, Third-Year Medical Student Program
Pratap Challa, MD	Director, Residency Program
Nathan Cheung, OD	Director, Optometry Education
Melissa Daluvoy, MD	Director, Cornea, External Disease and Refractive Surgery Fellowship
Sharon Fekrat, MD, FACS	Associate Chief of Staff, Durham Veterans Affairs Health Care System
Sharon F. Freedman, MD	Director, Pediatric Ophthalmology Fellowship
Alessandro Iannaccone, MD, MS, FARVO	Director, Retinal Degenerations and Ophthalmic Genetic Diseases Fellowship
Glenn J. Jaffe, MD	Director, Duke Reading Center
Eleonora Lad, MD, PhD	Associate/Interim Director, Clinical Research Unit Research Quality Officer
Miguel Materin, MD	Director, Ophthalmic Oncology Director, Ophthalmic Oncology and Pathology Fellowship
Goldis Malek, PhD	Chair, Diversity and Inclusion Committee
Prithu Mettu, MD	Director, Medical Retina Fellowship
Kelly Muir, MD, MHSc	Director, Ophthalmology Fellowship Program Chief, Division of Ophthalmology, Durham Veterans Affairs Medical Center Director, Glaucoma Fellowship
Victor Perez, MD	Director, Foster Center for Ocular Immunology
Jullia A. Rosdahl, MD, PhD	Director, Medical Student Education Director, Patient Education
Lejla Vajzovic, MD	Director, Ophthalmology Continuing Medical Education Program Director, Vitreoretinal Surgery Fellowship
Julie A. Woodward, MD	Director, Faculty Mentoring and Career Development Director, Oculofacial and Orbital Surgery Fellowship

ADMINISTRATION

Elizabeth Hunter, MHA, CFM	Interim Chief Administrator Director of Finance
Martha Dellinger, MHA	Division Administrator
Tammy Clay, MHA	Division Administrator
Heidi Campbell, COT	Director of Operations

COMPREHENSIVE OPHTHALMOLOGY

Anna Bordelon, MD	Assistant Professor of Ophthalmology
Thomas S. Devetski, OD	Assistant Professor of Ophthalmology
Anupama Horne, MD	Assistant Professor of Ophthalmology
Thomas Hunter, MD	Assistant Professor of Ophthalmology
Charlene James, OD	Medical Instructor in the Department of Ophthalmology
Nicola (Nicky) Kim, MD	Associate Professor of Ophthalmology
Laurie K. Pollock, MD	Assistant Professor of Ophthalmology
Dianna Seldomridge, MD, MBA	PDC Consulting Assistant Professional
Tina K. Singh, MD	Assistant Professor of Ophthalmology
Robin R. Vann, MD	Associate Professor of Ophthalmology

CORNEA AND REFRACTIVE SURGERY

Christopher S. Boehlke, MD	Assistant Professor of Ophthalmology
Alan N. Carlson, MD	Professor of Ophthalmology
Melissa Daluvoy, MD	Assistant Professor of Ophthalmology
Terry Kim, MD	Professor of Ophthalmology
Anthony Kuo, MD	Associate Professor of Ophthalmology Assistant Professor in Biomedical Engineering ++
Victor Perez, MD	Stephen and Frances Foster Professor of Ocular Immunology and Inflammation

Terry Semchyshyn, MD	Assistant Professor of Ophthalmology
Lloyd Williams, MD, PhD	Assistant Professor of Ophthalmology

GLAUCOMA

Sanjay Asrani, MD	Professor of Ophthalmology
Pratap Challa, MD	Associate Professor of Ophthalmology
Jiaxi Ding, MD	Assistant Professor of Ophthalmology
Divakar Gupta, MD	Assistant Professor of Ophthalmology
Leon W. Herndon Jr, MD	Professor of Ophthalmology
Jill B. Koury, MD	Assistant Professor of Ophthalmology
Katy Liu, MD, PhD	Medical Instructor in the Department of Ophthalmology
Stuart J. McKinnon, MD, PhD	Associate Professor of Ophthalmology Associate Professor in Neurobiology ++
Felipe Medeiros, MD, PhD	Joseph A. C. Wadsworth Professor of Ophthalmology Professor in Electrical and Computer Engineering ++
Frank J. Moya, MD	Assistant Professor of Ophthalmology
Kelly W. Muir, MD, MHSc	Associate Professor of Ophthalmology
Jullia Rosdahl, MD, PhD	Associate Professor of Ophthalmology
Henry Tseng, MD, PhD	Associate Professor of Ophthalmology
Joanne Wen, MD	Associate Professor of Ophthalmology

VISION REHABILITATION AND PERFORMANCE

Diane Whitaker, OD	Assistant Professor of Ophthalmology

NEURO-OPHTHALMOLOGY

Chantal Boisvert, OD, MD	Associate Professor of Ophthalmology
Mays Dairi, MD	Associate Professor of Ophthalmology
Sidney Gospe III, MD, PhD	Assistant Professor of Ophthalmology

OCULOFACIAL AND ORBITAL SURGERY

Amy M. Fowler, MD	Associate Professor of Ophthalmology
Ilya Leyngold, MD	Associate Professor of Ophthalmology
Jason Liss, MD	Assistant Professor of Ophthalmology
Julie A. Woodward, MD	Professor of Ophthalmology Professor in Dermatology ++

PEDIATRIC OPHTHALMOLOGY AND STRABISMUS

Edward G. Buckley, MD	Gills Professor of Ophthalmology Professor in Pediatrics ++
Nathan Cheung, OD	Medical Instructor in the Department of Ophthalmology
Laura B. Enyedi, MD	Professor of Ophthalmology Associate Professor in Pediatrics ++
Sharon F. Freedman, MD	Professor of Ophthalmology Professor in Pediatrics ++
Faramarz Hidaji, MD	Assistant Consulting Professor of Ophthalmology
S. Grace Prakalapakorn, MD, MPH	Associate Professor of Ophthalmology Associate Professor in Pediatrics ++
Yos Priestley, OD, FAAO	Assistant Professor of Ophthalmology
Chelsea Scriven, OD	Medical Instructor in the Department of Ophthalmology
Federico Velez, MD	Professor of Ophthalmology

VITREORETINAL DISEASES AND SURGERY

Yousef Aldairy, MD	Medical Instructor in the Department of Ophthalmology
Michael Allingham, MD, PhD	Assistant Professor of Ophthalmology
Durga Borkar, MD	Assistant Professor of Ophthalmology
Xi Chen, MD, PhD	Assistant Professor of Ophthalmology
Scott W. Cousins, MD	Robert Machemer, MD Professor of Ophthalmology Professor in Immunology ++
Sharon Fekrat, MD, FACS	Professor of Ophthalmology Associate Professor of Surgery ++
Dilraj Grewal, MD	Associate Professor of Ophthalmology
Majda Hadziahmetovic, MD	Assistant Professor of Ophthalmology
Alessandro Iannaccone, MD, MS, FARVO	Professor of Ophthalmology
Glenn J. Jaffe, MD	Robert Machemer, MD Professor of Ophthalmology
Eleonora Lad, MD, PhD	Associate Professor of Ophthalmology
Miguel Materin, MD	Professor of Ophthalmology Professor of Radiation Oncology ++
Prithu Mettu, MD	Assistant Professor of Ophthalmology
Eric A. Postel, MD	Professor of Ophthalmology
Stefanie G. Schuman, MD	Assistant Professor of Ophthalmology
Cynthia A. Toth, MD	Joseph A.C. Wadsworth Professor of Ophthalmology Professor in Biomedical Engineering++
Lejla Vajzovic, MD	Associate Professor of Ophthalmology

RESEARCH OPHTHALMOLOGY

Vadim Arshavsky, PhD	Helena Rubinstein Foundation Professor of Ophthalmology Professor in Pharmacology & Cancer Biology ++
Catherine Bowes Rickman, PhD	Professor of Ophthalmology Professor in Cell Biology ++
Romain Cartoni, PhD	Assistant Professor of Pharmacology and Cancer Biology Assistant Professor in Ophthalmology Assistant Professor in Neurobiology ++
Sina Farsiu, PhD	Paul Ruffin Scarborough Associate Professor of Biomedical Engineering and Associate Professor of Ophthalmology Associate Professor in Electrical and Computer Engineering++ Associate Professor in Computer Science++
Paulo Ferreira, PhD	Associate Professor of Ophthalmology Associate Professor in Pathology ++
Jeremy Kay, PhD	Associate Professor of Neurobiology Associate Professor of Ophthalmology, Associate Professor in Cell Biology ++
Paloma Liton, PhD	Associate Professor of Ophthalmology Associate Professor in Pathology ++
Rupalatha Maddala, PhD	Assistant Professor of Ophthalmology
Goldis Malek, PhD	Associate Professor of Ophthalmology Associate Professor in Pathology ++
P. Vasantha Rao, PhD	Richard and Kit Barkhouser Professor of Ophthalmology Professor in Pharmacology & Cancer Biology ++
Daniel R. Saban, PhD, MS	Associate Professor of Ophthalmology Associate Professor in Immunology ++
Nikolai Skiba, PhD	Associate Professor of Ophthalmology
W. Daniel Stamer, PhD	Joseph A.C. Wadsworth Professor of Ophthalmology Professor in Biomedical Engineering++
Sandra Stinnett, DrPH	Associate Professor of Biostatistics & Bioinformatics Associate Professor in Ophthalmology ++
Fulton Wong, PhD	Professor Emeritus of Ophthalmology Professor in Neurobiology and Pathology ++ Assistant Professor in Pathology ++

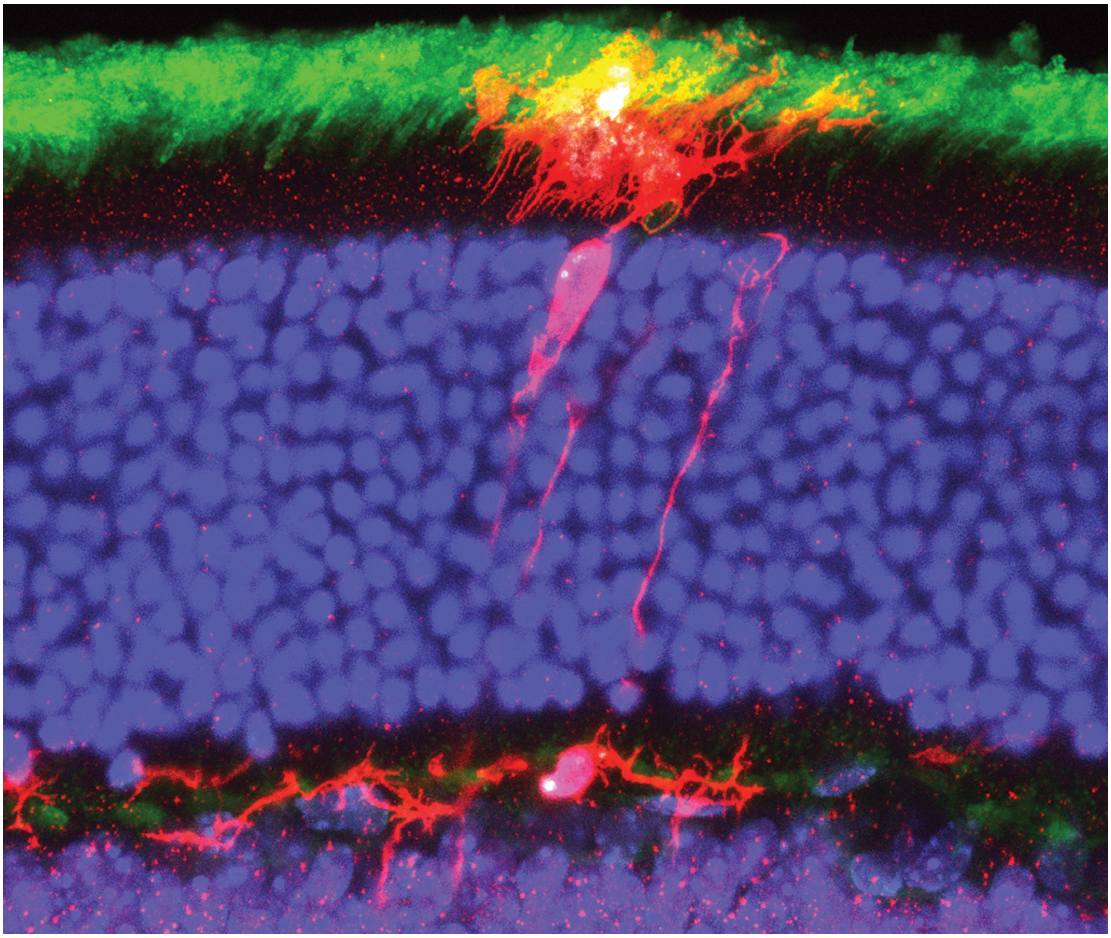
Secondary appointment ++

Duke Eye Center

Duke University Health System
Office of Marketing and Communications
DUMC 3802 Durham, NC 27710

dukeeye.org

Non-Profit Org.
US POSTAGE
PAID
Durham, NC
Permit No. 60



An image of the mouse retina depicting an immune cell, which migrates into the photoreceptor layer in an attempt to repair pathology caused by a mutation associated with inherited retinal degeneration in humans. Credit: William Spencer, PhD (*Proc. Natl. Acad. Sci. USA,* 2019; 116: 13087).