RESEARCH INSIGHT

Ophthalmology Research Enterprise Moves to New Space in Hammer Health Sciences Center

For more than 20 years, the groundbreaking work of the Department of Ophthalmology’s highly ranked basic science research faculty, now consisting of 14 Principal Investigators with $12 million in extramural funding, has taken place in renovated laboratories in the research annex of the Edward S. Harkness Eye Institute. Beginning in August 2023, as part of the major facilities project resulting from the construction of the new cancer center, our research enterprise will move to new purpose-built space on the second floor of the Hammer Health Sciences Center.

“The 18-story building is dedicated to research,” notes Xin Zhang, PhD, Herbert and Florence Irving Professor of Ophthalmic Science (in Ophthalmology) and Pathology & Cell Biology, who is spearheading the move. “We are moving to the center of Columbia’s biomedical research program, one floor above the Augustus C. Long Health Sciences Library, with excellent resources immediately adjacent to our facilities. I think the new location and its environment will be very stimulating for our basic science research.”

All scientific faculty members have had significant input into the renovation. “We have had in-depth discussions with the architect and have been able to customize our laboratory space, the layout of the cell culture room, the layout of the conference room, and so on.” Dr. Zhang says. “The space is brand-new and designed with our needs in mind. While there has been significant

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Dear Friends,

It is an exciting time of great change for the Edward S. Harkness Eye Institute. As you will read in these pages, construction will soon begin on a state-of-the-art new cancer center on the Columbia University Irving Medical Center campus. The 10th floor of this modern, 17-story building, slated for completion in 2027, will be the new home of the clinical programs of the Department of Ophthalmology, where we will have significantly more space than our clinical facilities do now. With a department that is 155 years old and a building that is 90 years old, the time has come for new space that will usher us into the future of vision care and science.

Change is also bittersweet: to build this medical facility of the future, the Eye Institute building will be torn down later this year. While it will be difficult to say goodbye to the halls where Donn and DeVoe, Castroviejo and Dunnington, and so many other legendary pioneers of our field once worked, we are eager to begin work in a new building with a dedicated floor purpose-built for our needs and the needs of our patients.

In this issue of the Viewpoint, we will tell you all about the plans for the transitional period while the new building is under construction, as well as the new custom research space for our basic science laboratories in the Hammer Health Sciences Center, and other expansion plans for faculty practice locations elsewhere in the city and beyond. We will also pay tribute to the storied history of the Harkness Eye Institute building in our regular feature, Making History at Harkness.

We are pleased to have had a rich complement of clinical and research faculty members join us within the past year. Clinician-scientists Vlad Diaconita, Tony Valenzuela, Qing Wang, Aliaa Abdelhakim, Aakriti Garg Shukla, and Gabriel Rand did some part of their training at Columbia, and I couldn’t be happier that they have all decided to join us as full-time faculty members. I am also delighted to welcome Kaveri Thakoor, whose Artificial Intelligence for Vision Science (AI4VS) Laboratory focuses on transforming artificial intelligence deep learning systems into team-mates for ophthalmologists.

Dr. Rand joins the Westchester practice of cornea specialist George J. Florakis, MD, who after many years as a part-time faculty member has recently joined us full time as the Malcolm George J. Florakis, MD, who after many years as a part-time ophthalmologist.

We have also graduated some of the nation’s top young ophthalmologists, with many of our residents choosing to remain at Columbia to build their careers while others have gone on to take leadership roles at other renowned institutions.

Your support, dedication and commitment have been essential to each and every one of our accomplishments. As we move into a new era for the Eye Institute, in new facilities, we look forward to achieving even greater goals in the service of vision care, with your continued help and friendship.

Sincerely,

G.A. (Jack) Cioffi, MD
Jean and Richard Deems Professor
Edward S. Harkness Professor
Chairman, Department of Ophthalmology

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Continued from page 1

The past decade has been a time of explosive growth for the Department of Ophthalmology, marked by groundbreaking research discoveries and practice-changing advances in clinical care.

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In 2023, the Department of Ophthalmology begins a new chapter in its 155-year history. The historic Harkness Eye Institute building, originally completed in 1933 thanks to the generosity of philanthropist Edward S. Harkness, will be taken down to make space for a brand new building that will house state-of-the-art facilities for both ophthalmology and the Herbert Irving Comprehensive Cancer Center.

Slated for completion in 2027 and designed by noted healthcare architectural firm Ballinger, the building will include an entire floor dedicated to ophthalmology. The approximately 23,000 square feet of space on the 10th floor of the building will double the architectural firm Ballinger, the building will include an entire floor dedicated to ophthalmology. The 23,000 square feet of space on the 10th floor of the building will double the department’s current footprint and accommodate 30 or more exam rooms organized in a “pod-style” layout, with four to six relatively self-contained groups of exam rooms and diagnostic space. It will also include procedure rooms, diagnostic facilities and laser suites. Dedicated eye operating rooms will be housed on a separate surgical floor.

“The brand-new Eye Institute will be designed from the ground up to accommodate our expanding department and to anticipate the needs of 21st-century cutting-edge care,” says G.A. (Jack) Cioffi, MD, Jean and Richard Deems Professor, Edward S. Harkness Professor and Chairman of the Department of Ophthalmology. “We are building for the next generation. At the same time, the cherished history of the Harkness Eye Institute will be incorporated into the design.”

In December 2022, Research to Prevent Blindness (RPB) awarded two important grants to the Department of Ophthalmology. The first is an unrestricted grant to support the development and expansion of our renowned vision research program, while the second is the RPB Career Advancement Award presented to Tingting Yang, PhD, Associate Professor of Ophthalmic Science (in Ophthalmology).

First established in 2020, the career advancement award supports early- to mid-career vision researchers who have already received their first independent federal grant, the National Institutes of Health (NIH) R01, and are collecting new data to apply for a second R01—a period that has been identified as a critical gap in the funding pipeline for vision researchers. Dr. Yang’s research focuses on bestrophin proteins, a family of ion channels that play critical roles in the eye such as generating a vision-related electrical signal named “light peak” and regulating intraocular pressure. The two-year grant from RPB provides essential support at a critical time, Dr. Yang says.

Working with Stephen Tsang, MD, PhD, Laszlo Bito Professor of Ophthalmic Science (in Ophthalmology), Dr. Yang is collecting skin and blood cells donated by bestrophinopathy patients, and then reprogramming these cells to induced pluripotent stem cells (iPSCs) followed by differentiation to RPE cells. “Our goal is to compare RPE cells derived from wild-type donors and bestrophinopathy patients, and then reprogramm- ing these cells to induced pluripotent stem cells (iPSCs) followed by differentiation to RPE cells. “Our goal is to compare RPE cells derived from wild-type donors and bestrophinopathy patients, and then reprogramm- ing these cells to induced pluripotent stem cells (iPSCs) followed by differentiation to RPE cells. “Our goal is to compare RPE cells derived from wild-type donors and bestrophinopathy patients, and then reprogramm- ing these cells to induced pluripotent stem cells (iPSCs) followed by differentiation to RPE cells. “Our goal is to compare RPE cells derived from wild-type donors and bestrophinopathy patients, and then reprogramm- ing these cells to induced pluripotent stem cells (iPSCs) followed by differentiation to RPE cells.

In that gene are associated with a spectrum of at least five retinal degenerative diseases collectively known as bestrophinopathies. “Currently there is no treatment for any of the bestrophi- norpathies, and they typically result in progressive vision loss and, in some cases, blindness,” Dr. Yang says.

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From Chemistry and Earthquakes to AI for Eye Disease Detection: Kaveri Thakoor, PhD

As an undergraduate at Stanford University, Kaveri Thakoor, PhD, was passionate about her studies in chemistry. But in the heart of Silicon Valley, at a university consistently ranked as one of the top computer science programs in the world, Dr. Thakoor also found herself increasingly intrigued by computers, algorithms, development and artificial intelligence (AI). After earning her bachelor of science degree with honors in chemistry at Stanford, Dr. Thakoor earned a master’s degree in computer science at the University of Southern California. Pursuing a PhD was her next step in order to fulfill her childhood dream of becoming a professor. Her interdisciplinary passion for all scientific fields, inspired by her parents who are also scientists, set her on a path to explore the connections between chemistry, computers, and the human eye.

“While pursuing my computer science studies, I was also exposed to vision research and became fascinated with the field,” says Dr. Thakoor. After completing her master’s degree, she was immediately offered a faculty position in the Department of Ophthalmology in September 2022 as Assistant Professor of Ophthalmic Science (in Ophthalmology) to launch the Artificial Intelligence for Vision Science Laboratory. “It was the perfect intersection of my interests in chemistry and computer science. All the way from phototransduction, a chemical process initiated when light hits the retina, to the optics of the human eye, to attempting to simulate ‘sight’ in computers using AI, human vision intersects with almost all fields of science!”

After completing her master’s degree, Dr. Thakoor spent two years working as a research scientist with the Earthquake Early Warning team at the California Institute of Technology’s Seismological Laboratory. Even as she honed her algorithm development skills toward delivering early warning of ground-shaking to Southern Californians, her sights were set on earning a PhD in a vision science-related field. She found the right program at Columbia, where along with Donald Hood, PhD, the James F. Bender Professor of Psychology and Professor of Ophthalmic Science (in Ophthalmology), and Paul Sajda, PhD, Professor of Biomedical Engineering, Electrical Engineering, and Radiology, and Director of the Laboratory for Intelligent Imaging and Neural Computing, she was able to meld her interests in vision science and deep learning to develop computer systems that can improve detection of eye diseases such as glaucoma and age-related macular degeneration (AMD). “Meeting them enabled me to explore my passion for the synergy between deep learning, engineering, and ophthalmic science,” Dr. Thakoor says.

Supported by the Graduate Research Fellowship Program (GRFP) of the National Science Foundation (NSF), she moved from California to New York to pursue her PhD in 2018. “In a sense, I had done my postdoctoral fellowship before the PhD because of all my research experience, so when I came here it was a very focused and fruitful journey,” she says. When she completed her graduate studies in 2022, with an array of prizes under her belt, including the School of Engineering’s Morton B. Friedman Memorial Prize for Excellence, she was immediately offered a faculty position in the Department of Ophthalmology. “Dr. Cioffi envisioned that I could develop a program that could serve as a bridge between the engineering school and the medical school, and ophthalmology in particular,” she says.

In the AI for Vision Science Laboratory, Dr. Thakoor is developing artificial intelligence and machine learning systems that can find patterns in the vast amounts of medical and scientific data available to researchers in order to expedite the ability to detect disease. “I have a figure on my laboratory door that shows an electronic robotic hand shaking hands with a human hand;” she says. “That’s our passion, creating AI that will serve as a teammate to help humans better detect diseases ranging from glaucoma and AMD to amblyopia and strabismus.”

Dr. Thakoor stresses three key principles for AI in vision science. “It must be robust, meaning that it can accurately detect a specific condition utilizing data collected from multiple locations, not just at Columbia but across the country and around the world,” she says. “It must be interpretable, with mechanisms for decision-making that can be clearly explained to clinicians in order to achieve trust. It must also be portable, so that it can reach populations who need it most through miniaturized optics and easily transported imaging devices.”

One of the current projects in the AI for Vision Science Laboratory involves collecting eye movements from ophthalmologists while they review medical images. “In a way, when we look at an image, our eye movements can tell us a lot about their decision-making process, and can be used to train AI systems to make them more interpretable, and more efficient,” Dr. Thakoor says. With a seed fund program grant from Columbia’s Data Science Institute, the laboratory is creating an expert AI system that is guided by gaze data, which Dr. Thakoor hopes will revolutionize the field in three ways: expediting diagnosis of eye disease, training novices in good strategies to use when reviewing ocular images, and combining pattern recognition of the computer with the domain expertise of clinicians to identify novel ocular diagnostic signatures.

In pursuit of accessible AI-assisted diagnostic tools in ophthalmology, Dr. Thakoor has also recently demonstrated an AI system that can successfully detect AMD from data collected with a small, portable, low-cost OCT device, in a project that earned the Best Paper award in a workshop on affordable AI in global health at the 2022 Medical Image Computing and Computer Assisted Interventions (MICCAI) conference in Singapore. “Our next step is embedding this AI into the portable imaging device’s hardware and taking it out into the field to help the broadest populations possible,” she says. When not in the laboratory, Dr. Thakoor is a music lover who plays clarinet. “Last fall, I became involved with the CUIMC orchestra, and it’s great to connect with a community of clinicians and scientists who are also musicians,” she says.
“I’ve Lived Through a Revolution That’s Been So Exciting”: Stephen Trokel, MD

Under slightly different circumstances, renowned laser eye surgery pioneer Stephen Trokel, MD, Professor of Ophthalmology, might have instead become a noted nuclear physicist. Fortunately for the eyesight of millions of people around the world, Dr. Trokel spotted the limitations of nuclear power and chose a different career.

After completing his master’s degree in the then-novel field of radiation biology from the University of Rochester in 1956, when he was just 21 years old, Dr. Trokel stayed on at the university to take a position with the Atomic Energy Project (AEP). The AEP was a post-World War II continuation of the Manhattan Project, which produced the first atomic bombs; the goal was to pursue the peaceful use of atomic energy and nuclear materials. “I worked on a reactor and saw there was no future in electric power generated from them, because of significant problems with the disposition of fuel rods,” recalls Dr. Trokel. “Instead, I decided to return to school to study medicine.”

Dr. Trokel graduated from the University of Rochester School of Medicine in 1959 and completed a year’s internship at Montefiore Hospital. He then spent two years in the military as a commissioned officer in the US Public Health Service, assigned to the National Institutes of Health (NIH), before coming to Columbia as a special NIH fellow in 1962, and then pursuing a four-year ophthalmology residency. “Physicists for many years had been interested in the eye and how it works because it’s related to sensing the electromagnetic spectrum, so it should not be surprising that I developed a love for ophthalmology,” he says. “Do-
For more than 25 years, residents of Westchester County have known that there is one expert to go to for complex corneal disease and corneal transplantation: George J. Florakis, MD, and his practice at 110 Brook Street in Scarsdale. Although Dr. Florakis has been affiliated with the Eye Institute as part-time faculty since the late 1980s, in June 2022 he formally became a full-time faculty member and Malcolm P. Aldrich Professor of Ophthalmology at Columbia University Irving Medical Center (CUIMC), as well as Director of Columbia Ophthalmology-Westchester. This new affiliation is part of the Department of Ophthalmology’s continued initiative to increase its presence in locations beyond the Washington Heights campus, throughout Manhattan and in the suburbs.

A nationally known cornea expert, Dr. Florakis performs between 100 and 150 corneal transplants per year, as well as patients seeking treatment on Saturday mornings, “he says. “Since I grew up in Westchester, I decided to return to New York City to set up his fellowship at the University of Iowa before completing his cornea fellowship at Columbia, Dr. Florakis pursued a cornea fellowship, medical degree, and residency training at Cornell, as well as Director of Columbia Ophthalmology-Westchester. This new affiliation is part of the Department of Ophthalmology’s continued initiative to increase its presence in locations beyond the Washington Heights campus, throughout Manhattan and in the suburbs.

In 2013, Dr. Florakis became the first surgeon in the New York area to perform a Descemet membrane endothelial keratoplasty (DMEK), the most advanced form of partial corneal transplant procedure, which is used in diseases affecting the innermost, endothelial layer of the cornea. In DMEK surgery, only a single thin layer of cells is replaced, allowing for decreased rates of rejection and faster visual recovery. “It’s a one-stitch operation with a 1% risk of rejection, compared with 20% using other techniques,” he says. “In 95% of cases, patients are seeing significantly better within four to six weeks.”

After completing his undergraduate education, medical degree, and residency training at Columbia, Dr. Florakis pursued a cornea fellowship at the University of Iowa before returning to New York City to set up his practice. “Since I grew up in Westchester, I also decided to open an office there and see patients on Saturday mornings,” he says. “I rented space at 75 Brook Street, right across from where our offices are now. My mother was my secretary, and I got mailing lists from friends and from our church to help find patients.”

As more and more patients from Westchester gravitated to the convenience of the Scarsdale location, the practice hours expanded to include Wednesday afternoons, and in 2000, it relocated to its current space. “I decided to make this a purely consultative practice, limited to corneal surgeries alone,” says Dr. Florakis, who now divides his time evenly between CUIMC’s main campus and the Westchester location. “I don’t perform cataract surgeries unless they are associated with cornea, which means that I don’t compete with the local ophthalmologists, so they are happy to refer to me. I now have at least 100 referring physicians in the area, and this has become the premier cornea practice in Westchester.”

In 2020, after completing his corneal fellowship at Columbia, Gabriel Rand, MD, joined Dr. Florakis’ practice, which by then had 13 employees in addition to the two physicians. “It made sense at this stage of my career to formally affiliate the practice with Columbia and become full-time faculty. I’ve always taught medical students, residents, and fellows, so this is a natural extension for me,” Dr. Florakis says. “The Department of Ophthalmology will also expand further into Westchester in 2024, as NewYork-Presbyterian Hospital has purchased a building in White Plains for an ambulatory multi-specialty center, where we will have a satellite office.”

The addition of Dr. Rand, who is an Assistant Professor of Ophthalmology at Columbia, has also brought in a flow of new patients. “I have close relationships with the older practitioners, and he is instrumental in developing new referral patterns with the younger doctors in the area,” Dr. Florakis says. “He’s a major future player in cornea.”

With an undergraduate degree in engineering from Cornell, Dr. Rand worked as an environmental engineer prior to entering medical school and completing his ophthalmology residency at the Albert Einstein College of Medicine. There, he won the Ronald M. Burde Award for Excellence in Research for his work in the application of advanced statistical methods with eye bank data. “I was always more of a people person, and I felt drawn to a scientific career that involved helping people more directly, with one-on-one contact,” he says. The mentorship of Einstein cornea specialist Roy Chuck, MD, PhD, convinced Dr. Rand that cornea was the subspecialty for him.

“I interviewed for many cornea fellowships, but I was most impressed with Columbia,” he says. “The faculty are all brilliant and all come Continued on page 8 >

Westchester Cornea Experts Join Department of Ophthalmology Full-Time
Stanley Chang, MD, K.K. Tse and Ku Teh Ying Professor of Ophthalmology and former Edward S. Harkness Professor and Chair of the Department of Ophthalmology, was presented with the Seymour Milstein Distinguished Service Award at a ceremony on April 4, 2023. The award, now in its fourth year, is presented annually to a senior member of the medical staff at New York-Presbyterian/Columbia University Irving Medical Center (CUIMC) and Columbia University Vagelos College of Physicians and Surgeons (VP&S) for exceptional and longstanding service. Established by the Vivian and Seymour Milstein family, longtime and generous benefactors of the institution, the Milstein Award recognizes the excellence of our physicians and celebrates their vital role in making the Medical Center a leader in academic medicine and patient care.

“Receiving this award is particularly meaningful to me, because Mr. Milstein helped to recruit me as Chair of the Department of Ophthalmology back in 1995. He assured me that the Milstein family would support me and make sure that I was successful in my job,” Dr. Chang says. “Mr. Milstein was chairman of the hospital’s board of directors at that time, and it is thanks in large part to his leadership that the hospital has reached the level of excellence that it has today. He recruited some outstanding physicians into clinical leadership and helped to dramatically improve the quality of care, which ultimately led to the merger with Cornell and the creation of NewYork-Presbyterian Hospital, one of the best hospitals in the country. He was instrumental in ensuring that the Columbia part of the hospital was first class.”

With characteristic modesty, Dr. Chang said that he shares the award with everyone in the Eye Institute. “I’m not able to do a good job unless everyone on the team around me does as well,” he says. “They make me a great doctor. If I need expertise from anyone in one of the other subspecialties, they are all excellent clinicians who can help me manage the most complicated patients. So all of the people at the Eye Institute deserve part of this award, because we go above and beyond to give our patients the best possible care, make them happy and do what is best for them.”

Kaveri Thakoor, Assistant Professor of Ophthalmic Science (in Ophthalmology) and Director of the Artificial Intelligence for Vision Science Laboratory, received the Best Paper award at a workshop on affordable AI for resource-diverse global health at the 2022 Medical Image Computing and Computer Assisted Interventions (MICCAI) conference in Singapore, for her paper on “Enhancing Portable OCT Image Quality via GANs for AI-Based Eye Disease Detection.” Optical coherence tomography (OCT) is widely used for detection of ophthalmic diseases, such as glaucoma, age-related macular degeneration (AMD), and diabetic retinopathy, but OCT systems are often bulky and expensive. They typically cost tens of thousands of dollars and weigh 50 pounds or more, making it difficult for OCT to be accessible in low-resource settings. Lower-cost, portable OCT systems are available, but their image quality and scanning rate are inferior. Dr. Thakoor’s paper described how she and her team used a deep learning system called generative adversarial networks (GANs) to enhance the quality of portable OCT data, thereby improving AI’s ability to detect AMD using this low-cost data. “By exhibiting proof-of-principle AI-based AMD detection even on low-quality p-OCT data, this study stimulates future work toward low-cost, portable imaging+AI systems for eye disease detection,” Dr. Thakoor wrote in the award-winning paper.
“I always expected to pursue a career in the neurological sciences, perhaps neu- rology or neurosurgery, but then I was exposed to ophthalmology toward the end of my undergraduate medical education,” he says. “It brought together the aspects of neurology that I was passionate about with exciting elements of physics, optics, and chemistry. When I was able to ob- serve new eye surgeries being pioneered when I was a medical student, and within a few days after that I knew ophthalmology was the field I would pursue.”

During his residency, also at Western, Dr. Diaconita found himself drawn to the retina as a subspecialty. “That program is very retina-heavy, and I was seeing dozens of retina patients every day,” he says. “I had heard that Columbia had an outstanding retina program, so I emailed Dr. Tezel [Tongalp H. Tezel, MD, Chang Family Professor of Ophthalmology and Director of the Vitreoretinal Service and Fellowship Program], who arranged for me to come here as a visiting resident for a couple of weeks. I liked their approach to clinic and to surgery, with a focus on pushing the enve- lope and surpassing current levels of excellence.”

His experience as a visiting resident convinced Dr. Diaconita to apply for the two-year retina fellowship at Columbia. “While I applied to other programs as well, this was the place where I really wanted to go,” he says. “I was so excited to have the opportunity to work with giants like Dr. Tezel and Dr. Chang [Stanley Chang, MD, K.K. Tse and Ku Teh Ying Professor of Ophthalmology and former Edward S. Harkness Professor and Chair of the Department of Ophthalmology].”

Dr. Diaconita had only been in New York for about six months before the COVID-19 pandemic shut the city down. “For the next 18 months, the only people I saw were my mentors and my patients. Being in that kind of bubble was definitely challenging, but many positive experiences came out of it during that time,” he says. “I could focus intensely on patient care, because there really was nothing else you could do.”

After completing his fellowship in 2021, Dr. Diaconita returned home to Canada spend- ing his time between working in Ontario and just south of the US-Canadian border in Buffalo. “In Ontario, there is a real need for retina specialists, and a lot of patients waiting for referrals, with a backlog of almost a year after the pandemic,” he says. “Being able to go back home and provide that care, serving the community I grew up in, was very rewarding.”

Nonetheless, when a position opened at Columbia, Dr. Diaconita felt drawn to return, officially joining the Department of Ophthalmology faculty in 2022. “As a new team member, I hope that I can bring a novel perspective because I did most of my training in a different type of health- care system,” he says. “There’s a lot I hope to bring to the table, but a lot I can learn as well. I once asked another clinician how they became so successful in their career, and they said, ‘Just take care of patients.’ That’s my main aspiration.”

When he’s not in the clinic or the oper- ating room, Dr. Diaconita spends a lot of his time planning exotic trips. “Because of my medical training, I didn’t get as much of a chance to travel when I was younger, so I’m very interested in visiting parts of the world that are off the beaten path, like Tierra del Fuego or the Yukon,” he says. “I am also a big reader; I never leave a book store without buying a book and I always have multiple books on my nightstand.”

Aakriti Garg Shukla
Aakriti Garg Shukla grew up in a medical family. Her father, a cardiac electrophysi- ologist, is the owner of the Arizona Heart and Arrhythmia Clinic in Phoenix, and her mother is a pediatric pathologist at Phoe- nix Children’s Hospital. “I was always pretty sure that I wanted to go into medicine if I were given a chance,” she says. “I really liked every rotation I did throughout medical school and could have myself doing many different specialties, but what drew me to ophthalmology in particular was the ability to make a significant im- pact on people’s lives. It’s truly remarkable how the surgeries we perform can dramatically improve the quality of life for our patients.”

After earning her undergraduate degree as a Trustee and Renaiss- ance Scholar at the University of Southern California, Dr. Shukla moved east to study medicine at Columbia Vagelos College of Phys- cians and Surgeons, where she was awarded a Doris Duke Clinical Research Fellowship and earned the Edith and Denton McKane Memorial Award for Outstanding Research in Ophthalmology. After completing her residency at the Harkness Eye Institute, where she served as chief resident, she moved to Baltimore for a fellowship in glaucoma at Johns Hopkins Wilmer Eye Institute, and then joined the faculty at Wills Eye Hospital in Philadelphia.

“Returning to Columbia,” she says, “felt like home to me. We have such a diverse population here, and it’s a pleasure to be able to care for them. Glaucoma can be a tough condition to understand, as its symptoms often don’t become noticeable until the late stages of disease. It is no surprise that glaucoma can be an anxiety-provoking diagnosis. I truly enjoy speaking with patients to educate them on glaucoma, and I am also involved in teaching residents and students, and create a personalized treatment and follow-up plan together.”

Dr. Shukla treats all stages of glaucoma, from suspected to advanced disease.

Aakriti Garg Shukla, MD

Westchester Cornea Experts Join Department of Ophthalmology Full-Time

Continued on page 6

Continued from page 1

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Dr. Rand also appreciates the Department of Ophthalmology’s fellow clinic. “It’s there to serve the local community and welcomes Medicaid patients,” he says. “I was able to have my own patients and care for people in our neighborhood. Not all programs have that; in some cases the fellow in the clinic plays second fiddle to the attending doctor with the patients. I was able to build a relationship with my patients. It’s a very familiar, collegial environment where people look out for one another, and I learned a tremendous amount. When Dr. Florakis asked me if I would stay and work with him, there was no question in my mind.”

As a dedicated cornea practice, Dr. Florakis’ and Dr. Rand’s program is almost unique. “We see a concentrated population of dense corneal pathology,” Dr. Rand says. “We do a lot of transplants and manage unusual corneal dystrophies and other corneal diseases. When people are considering cornea fellowships, sometimes we are told that cornea is a dying field, but that’s completely the opposite of my experience. My wife, who is an endocrinologist and treats patients with diabetes, is flabbergasted by how many people have cornea problems. She might see 20 patients a day while I see 40 a day.”

“The boutique nature of our practice is very appealing to pa- tients,” Dr. Florakis says. “Patients know us and our entire team. It has been a great opportunity for us to build a successful practice and have some significant impact on our patients’ lives. I’m very grateful to have had the opportunity to come and work with you here.”

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On May 13, 1931, prominent New York businessman and philanthropist Edward S. Harkness wrote a letter to Dean Sage, the attorney who served as president of what was then known simply as Presbyterian Hospital.

“You have placed before me a proposition calling for the construction and operation of an Institute of Ophthalmology to be built at the Medical Center and operated by the Board of Managers of the Presbyterian Hospital,” he wrote. “You have also submitted plans for this Institute which have been prepared by Mr. James Gamble Rogers.” In the letter, Harkness agreed to donate a total of five million dollars for the construction and endowment of the proposed Eye Institute.

“Although eye hospitals had existed before, both in the United States and in Europe, this would be the first one to be integrated into a medical center,” says Stephen Trokel, MD, Professor of Ophthalmology, whose career with the department spans more than five decades.

“At the time, there was nothing up here except a baseball field,” says Stanley Chang, MD, K.K. Tse and Ku Teh Ying Professor of Ophthalmology and former Edward S. Harkness Professor and Chair of the Department of Ophthalmology. “Edward Harkness encouraged the development of the uptown campus.”

After less than two years of planning and construction, what would become known as the Edward S. Harkness Eye Institute, located on the northeast corner of Fort Washington Avenue and 165th Street, was opened for inspection by invited guests on January 10, 1933. Less than a week later, on January 16, the Institute admitted its first patient: Columbia University President Nicholas Murray Butler.

“As would be expected, the Institute was the last word in hospital planning in 1933,” wrote Maynard C. Wheeler, MD, in The Eye Institute in New York: a history of the Eye Institute in New York, a history of the Institute published in 1969. Dr. Wheeler was a Clinical Professor of Ophthalmology who spent more than 30 years at Columbia and later, on January 10, 1935, Less than a week after the Institute admitted its first patient: Columbia University President Nicholas Murray Butler.

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“…the best the architects could dream up for hot weather was to blow air over large cakes of ice, on the floor above, before forcing it into the operating rooms,” Dr. Wheeler wrote. Even as late as the 1960s, when Dr. Wheeler’s history was published, the seventh floor had been little changed, with the only major change the addition of a recovery room for six stretchers at the center of the floor and the installation of air conditioning.

On the eighth floor, space was set aside for the Institute’s large ophthalmology library and rare book collection, where it has remained until the present day.
performing complex cataract surgery as well as minimally invasive glaucoma surgery (MIGS). She is also the principal investigator on a randomized controlled trial of neuroprotective treatments for glaucoma, which will enroll nearly 200 patients over the next three years. "We are investigating whether two over-the-counter supplements, nicotinamide and pyruvate, can help people with glaucoma maintain their visual function and optic nerve structure," she says. "In our previous phase 2 study, which took place over just two months, individuals who took nicotinamide showed improvement on several visual field test locations compared with the placebo group. In the ongoing trial, we aim to be able to demonstrate improvement and maintenance of visual function over a longer period of time and in a larger cohort of participants."

The study is based on a foundation of basic science research, which found that the mitochondria degenerate prior to optic nerve dysfunction in glaucoma. Simon John, PhD, the Robert L. Burch III Professor of Ophthalmic Science (in Ophthalmology), demonstrated that supplementation with nicotinamide inhibits mitochondrial dysfunction in a mouse model of glaucoma, preventing the development of disease.

Dr. Shukla also has a longstanding interest in optimizing glaucoma surgery, having published multiple articles on the role of blood thinners in this setting. "Especially now that our population is aging and more people are on blood thinning agents, we need to consider this fact in our surgical planning," she says. "Never minimally invasive procedures are sometimes a better option than conventional surgery for people who are taking these medications or have other risk factors for failure of conventional surgery."

Her interests in the operating room also extend to sustainability and reducing surgical waste, and she leads groups in the American Academy of Ophthalmology and American Society of Cataract and Refractive Surgery on these topics. "As ophthalmologists, we have the highest clinical volumes in medicine," she says. "This gives us the obligation and opportunity to make systems-based changes to reduce the carbon footprint of our daily practice."

Growing up in Arizona instilled a love of the outdoors, and Dr. Shukla loves spending time in Central Park with her husband and toddler son. "On the weekends, you can almost always find me outside with my family, enjoying all that the city has to offer," she says.

Tony Valenzuela

Like Dr. Shukla, Tony Valenzuela earned his medical degree and completed his ophthalmology residency at Columbia, where he also served as chief resident, and then pursued his glaucoma fellowship at Johns Hopkins Wilmer Eye Institute. "I've been kind of following her around," he jokes. "I love everything about Columbia, but I thought it would be a good idea to learn from some other people as well," he says. "The faculty at Wilmer are amazing, and everyone is a role model for a specific reason. I feel very fortunate to have been there, but I always knew that I wanted to go back to Columbia." Dr. Cioffi and Dr. Liebmann, who are two of his greatest mentors, invest a lot of time and energy into their trainees, making us good ophthalmologists and good surgeons, but also developing our leadership and career skills. "I know no matter what path I take, I will be well taken care of, encouraged, and expected to develop as a young surgeon."

Qing Wang

As an undergraduate student at Yale, majoring in biochemistry and molecular physics, Qing Wang developed an interest in neuroscience after working in a lab that studied synaptogenesis—the formation of synapses, the points of contact between neurons that are transmitted between neurons. "We analyzed protein-protein interactions involved in synaptogenesis, which I found fascinating," she says. "At that point, I was already interested in pursuing an MD/PhD program and a career as a clinician-scientist, and I thought that the eye provided an amazing model for understanding important questions in neuroscience."

Dr. Wang came to Columbia to complete her MD/PhD through the Medical Science Training Program, where she worked with Carol Mason, PhD, Professor of Pathology & Cell Biology, Neuroscience, and Ophthalmic Science (in Ophthalmology). "We studied molecular programs that specify different subpopulations of retinal ganglion cells (RGCs) during the development of the eye, and their role in establishing the binocular vision pathways, which is how we have depth perception," she says. "That work cemented my interest in the intersection between neuroscience and ophthalmology. Glaucoma is a neurodegenerative disease of the retinal ganglion cells (RGCs), not only is it already an area where we can do so much for patients, there is extraordinary potential for developing new treatments. It's a very technol-
With mentor Simon John, PhD, the Robert L. Burch III Professor of Ophthalmic Science (in Ophthalmology), she is working on novel viral tools for genetically manipulating these astrocytes in a mouse model of glaucoma. “We have designed libraries to screen for the best viral vector to target the astrocytes and genetically manipulate them in an effort to change them from a neurotoxic to a neuroprotective state,” she says. “We are also trying to understand the early transcriptomic changes in optic nerve head astrocytes that occur when intraocular pressures start to rise but interventions do not occur until the ‘generation y’. How degeneration occurs is to partially understand how retinal ganglion cells from damage before they are lost in human disease. RGCs are particularly difficult to regenerate, she explains, because not only must the cells be replaced, but they must then also make very long-distance connections to targets in the brain. “After we do that in animal models the next step is to have patients to reconstitute the cells lost in human disease.”

Dr. Wang is also working with Drs. Shukla and John on the clinical trial of nicotinamide and pyruvate in the treatment of glaucoma. “In addition to studying whether these nutritional supplements can protect patient from progression of their glaucoma disease, we will also analyze patients’ blood samples to better understand how the treatment is affecting their metabolism, mitochondrial function, and oxidative stress. We also want to know what might distinguish patients who respond well from those who do not,” she says.

Dr. Wang has lived in many different environments throughout her childhood: China, Germany, California, and Texas. Having lived in New York City for eight years during her MD/PhD training, she says that Big Apple feels like home now. She enjoys exploring the city’s cultural and food scenes and running along the Hudson River or in Central Park. She completed the New York City Marathon and Triathlon as a student and is looking to return to running for fitness. Outside of the city, she likes hiking with her husband in the national parks of the US and elsewhere.

Aliaa Hamed Abdelhakim

Aliaa Hamed Abdelhakim is one of fewer than 10 physicians in the world to be dual-boarded in ophthalmology and clinical genetics. When she completed her Medical Genetics and Genomics training program at the Morgan Stanley Children’s Hospital in August 2022, while at the same time serving as an attending physician on the retina service in the Department of Ophthalmology, she joined a rarefied group of experts in both fields that includes her mentor, Irene Maumenee, MD, Professor of Ophthalmology and Director of Applied Genetics.

Along with Dr. Wang, she was one of two inaugural Chang-Burch Scholars. Prior to her medical education, Dr. Abdelhakim completed her PhD at MIT in Biochemistry and Molecular Biology and a postdoctoral fellowship in Structural and Cell Biology at Harvard Medical School/Children’s Hospital Boston. She subsequently completed her medical education at Columbia University Vagelos College of Physicians and Surgeons, where she graduated with multiple awards, including Alpha Omega Alpha and the Edith and Denton McKay Memorial Award for Outstanding Research in Ophthalmology. She stayed at Columbia to complete her ophthalmology residency followed by her fellowship in vitreoretinal surgery, during which she was awarded the Heed Fellowship. She completed her training with a second fellowship at Columbia Medical Genetics and Genomics, specially created with the help of clinical and molecular geneticist Wendy Chung, MD, PhD, Kennedy Family Professor of Pediatrics and Medicine, and Alejandro Iglésias, MD, Assistant Professor of Pediatrics and Director of the Inherited Metabolic Program.

Dr. Abdelhakim splits her time between clinical work caring for patients and research related to ophthalmic genetics. She is particularly interested in ophthalmic manifestations in rare syndromic genetic diseases. One of her primary projects is to focus on the study of KIF1A-associated Neurological Disorder (KAND), a rare, progressive neurodegenerative condition caused by pathogenic variants in the KIF1A gene. This gene produces a protein that is expressed in the brain and neurons, which studies suggest is essential for the function and survival of these cells. “It is typically diagnosed in childhood, and children with this condition experience neurological symptoms including seizures, diminished or exaggerated muscle tone, peripheral neuropathies and developmental delays,” she explains. They may also have visual impairment associated with optic nerve atrophy, which is degeneration of the main neuronal conduit that carries nerve impulses from the eyes to the brain.

Working with Dr. Chung, Dr. Abdelhakim is characterizing eye findings in these patients and how their visual disability affects their lives. “We are mapping out the progression of the decline in vision as they go from childhood to adulthood, and documenting the percentage of patients who have different ophthalmic symptoms and manifestations in approximately 50 individuals with this disorder, which has not been done before at this scale,” she says. “If we can correlate the genotype with the severity of visual disability, we hope to understand how the KIF1A protein functions in the eye, and the long-term goal of identifying some form of targeted gene therapy in the future.”

When she has time away from the clinic and the laboratory, Dr. Abdelhakim can almost always be found spending time with her seven-year-old son. “We recently went to Disney World and loved it!” she says. Whenever she can, she also tries to keep in touch with and visit her family members who live around the world, including a brother in Scotland and sister in Egypt. For eight years during her MD/PhD training, she says that the Big Apple feels like home now. She enjoys exploring the city’s cultural and food scenes and running along the Hudson River or in Central Park. She completed the New York City Marathon and Triathlon as a student and is looking to return to running for fitness. Outside of the city, she like hiking with her husband in the national parks of the US and elsewhere.

IN MEMORIAM

Patrizia Isabella Ciccarello

Ophthalmic technician Patrizia Ciccarello, who had worked in the Department of Ophthalmology for ten years, passed away on March 30, 2023, after a battle with ovarian cancer. Born December 4, 1970, to Orazio and Maria Ciccarello in the Bronx, she graduated from St. Catherine’s Academy in 1988 and moved to Italy to participate in the family-run atelier business. She later returned to New York to pursue a career in ophthalmology and joined the Department in October 2011.

“Patrizia had the biggest heart and the most beautiful smile,” said a family member in an email shared with her colleagues. “She was an outgoing and friendly person, witty and fun! She was fearless and independent, yet sensitive and incredibly compassionate towards her colleagues and friends. She loved her dogs, vacations to see her distant relatives in Italy, and gardening. She was strong-willed and stubborn, but those traits defined Patrizia. They were part of who she was and her strength undoubtedly helped her deal with life’s challenges.”

Colleagues agreed, saying of Pat, “She was full of life and could make anyone smile. Pat was the sunshine that lit up the rainiest day.”

We extend our deepest condolences to Pat’s family and loved ones.

The Eye Institute Building

Continued from page 9

Space limitations did not allow for much research to take place in the original Eye Institute building—although Charles Campbell, MD, director of the Knapp Memorial Library of Physiological Optics, did his research on the 9th floor, where renowned retinal specialist Francis L’Esperance, MD, Clinical Professor of Ophthalmology, later used some space in the west wing for his investigation of the argon laser in the 1960s. Between 1933 and 1963, most laboratories were housed in the 7th floor of the P&S Building, after which they brieﬂy moved to the 15th floor of the Black Building.

In the 1960s, Department Chair A. Gerard DeVoe, MD, arranged a donation from the Commonwealth Fund, which had been entrusted with the bulk of the Harkness charitable trusts, to finance the construction of a separate research building adjoining the Eye Institute. The research annex opened in 1969.

Unfortunately, during the 1960s and 1970s, the building fell into some disrepair. “When I arrived in 1995, no real renovations had been done for probably 20 years,” recalls Dr. Chang. “As the Eye Institute changed from an eye hospital to an ambulatory surgery center where surgery was performed and patients went home, a lot of the rooms that had been inpatient rooms became used for various temporary purposes. When Seymour Milstein became chair of the board, he took charge and raised funds to support a major renovation of the operating rooms and the practice spaces in the mid-1990s, which helped to revitalize the department and bring it to the standing that it has today.”

“The Harkness Eye Institute really set the standard for American ophthalmology programs,” says Dr. Trokel. “Many other eye institutes followed in our path.”
Three prominent members of the Eye Institute’s Board of Advisors have recently published books deserving of a place on your shelves.

Leadership: Six Studies in World Strategy is the latest book from former Secretary of State Henry Kissinger, a supporter of our program for decades. This New York Times bestseller analyzes the lives of six world leaders through their strategies of statecraft: Germany’s Konrad Adenauer, France’s Charles de Gaulle, the US’ Richard Nixon, Egypt’s Anwar Sadat, Singapore’s Lee Kuan Yew, and Britain’s Margaret Thatcher.

One of our newest board members, Edward Enninful, has published A Visible Man, a memoir of his life in the media and fashion worlds and his career as the first Black editor-in-chief of British Vogue. Beginning with his childhood in Ghana and his teen years as a model in London, the insightful and deeply personal book traces Enninful’s rise to become one of fashion’s most influential changemakers.

Historian Lori Zabar, daughter of longstanding board member Stanley Zabar and his wife Judith and granddaughter of Louis and Lilian Zabar, who founded the upper West Side gourmet food emporium Zabar’s, shared her family legacy in Zabar’s: A Family Story, with Recipes. The book describes her grandparents’ roots in Ukraine, where they were known as the Zabarkas, and their journey to New York, where they first established their Jewish-style food store in 1934. The book includes family photos, tales of the famous staples sold at Zabar’s, and treasured recipes. Ms. Zabar passed away in February 2022 after a five-year battle with cancer.

IMPORTANT PATIENT CARE INFORMATION

Specialties: Cornea/External Ocular Disease, Glaucoma, Pediatric Ophthalmology and Strabismus, Refractive Surgery/LASIK, Vitreoretinal and Uveitis

For inquiries and appointments, please call 212.305.9535