

Viewpoint

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Resilience: How the Department of Ophthalmology Rose to the Challenge of COVID-19

By early March of 2020, concerns about an outbreak of the novel coronavirus and a crisis in the New York area had been rising for several weeks. On February 1, Columbia University Irving Medical Center had put travel restrictions in place for faculty and staff, and on March 3, the first known case of the disease in New York State was reported in New Rochelle.

But the need for drastic action hit home in the Department of Ophthalmology on Friday, March 13. G.A. (Jack) Cioffi, MD, Jean and Richard Deems Professor, Edward S. Harkness Professor and Chairman of the Department of Ophthalmology and Jeffrey Liebmann, MD, the Shirlee and Bernard Brown Professor of Ophthalmology, Glaucoma Service Director, and Vice-Chair of the Department of Ophthalmology, attended a worldwide teleconference sponsored by Columbia Board of Trustees member Lu Li. On the call, they heard disturbing reports about the escalating crisis from directors of intensive care units in Wuhan, China, Fudan University in Shanghai, and a number of other health care systems around the world.

“By the end of that teleconference, we knew what we had to do,” says Dr. Cioffi. “We recognized that physicians who work in close proximity to the face like ophthalmologists are among those who are more at risk for the disease. In fact, Li Wenliang, the Wuhan physician who tried to issue the first warning about the coronavirus outbreak and later died from the disease, was an ophthalmologist. We understood that our faculty and staff were at very high risk, as were our patients. So that day, Dr. Liebmann and I decided we had to shut everything down.”

“Shut everything down” meant that all elective surgeries and clinic appointments were cancelled. Research projects were put on hold. Faculty, staff, residents and fellows were ordered to work from home. Within the next few days, virtually all other departments at the Medical Center followed suit, with outpatient visits, elective procedures and everything but the most urgent cases being postponed indefinitely as the Columbia community turned as one to face the life-and-death challenge of COVID-19.

“In retrospect, it seems like the obvious decision to close down clinics and surgeries, but Dr. Cioffi made that call before almost any other program

in New York,” recalls Michelle Maeng, MD, then a senior resident and now a fellow in oculoplastics at the Bascom Palmer Eye Institute in Miami. “It was a strong sign of leadership and strength and it was the right thing to do. As a result,



Chief residents on their graduation day, June 2020. From left, Marlene Wang, MD, Carolina Adams, MD, Portia Sirinek, MD, and Michelle Maeng, MD.

none of our cadre of 12 residents became infected with COVID, and none of our attending physicians were ever seriously ill.”

“In fact, we don’t know of a single case of COVID-19 that could be traced to our environment in the Department of Ophthalmology,” says Dr. Cioffi. “Although three faculty members did become infected last spring, they all

recovered well. We made it very clear that our guiding principle was to keep our faculty, staff and patients safe, so we stopped doing anything we believed could spread the disease.”

That decision came at a cost. The Department experienced a 25% downturn in clinical revenues for the fiscal year ending in June 2020. “It was a huge financial hit,” Dr. Cioffi says. “But we didn’t lay off a single person, and the dean’s office and

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Father’s Loss Inspires Staffer to Become Vaccine Champion

Although no COVID-19 case clusters were linked to the Department of Ophthalmology, several faculty and staff members had family members who became ill, and some lost loved ones to the disease. Jose A. Guzman, the father of ophthalmic technician Fianmy Guzman, battled COVID-19 for over a month. He was rushed to the hospital on April 22 of last year and spent several weeks in the CUI-



Fianmy Guzman

MC Milstein Hospital ICU. “The doctors here were so supportive. Dr. Cioffi would call to find out how my dad was doing and make sure he was getting the best treatment,” says Ms. Guzman. “And I was so grateful that I could concentrate on my father and not have to worry about being unemployed, which so many other people in New York went through.”

Sadly, on May 25, Jose Guzman passed away. In her father’s memory, Ms.

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VIEW FROM THE CHAIR

Dear Friends,

This is an issue of the *Viewpoint* like no other. For the past year and a half, the world has endured a global pandemic unlike any we have experienced in over a century. New York City was the earliest epicenter for the COVID-19 pandemic in the United States, and during the spring of 2020, the faculty and staff of Columbia University Irving Medical Center were all called upon to meet one of the greatest challenges of our personal and professional lives with courage, dedication and innovation.

I am extraordinarily proud of what we in the Department of Ophthalmology have been able to achieve over the course of the past year. In this issue, we have put together a series of connected articles that tells the story of our response to the COVID-19 pandemic: how our program was able to continue to provide world-class patient care, teach the next generation of ophthalmologists and scientists, sustain a vigorous research portfolio, and importantly, care for one another during the most difficult times. It is a testament to the tireless efforts of our faculty and staff that we were able to continue providing the most essential eye care throughout the worst of the pandemic, and that today, we have returned to well over 100% of our previous patient volumes while retaining all of the precautionary measures that we developed to ensure the safety of patients and staff alike.

Even as we achieved all this, we were also able to reach a remarkable new milestone: rising to #4 in the nation among National Institutes of Health-funded ophthalmology programs! One of the leading research faculty members who made major contributions to reaching that level of support, Xin Zhang, PhD, is profiled in this issue as he has also been honored with the Herbert and Florence Irving Professorship of Ophthalmic Sciences (in Ophthalmology and in Pathology and Cell Biology). Dr. Zhang continues to make truly transformative contributions to our understanding of the developmental biology of the eye and how those developmental processes may offer opportunities for novel therapies.

As you know, several years ago we introduced the concept of Precision Ophthalmology, the application of state-of-the-art genetic methods to create personalized treatments for eye diseases. In 2021, the promise of Precision Ophthalmology is coming to fruition at Columbia with the first trial of a gene therapy for dry age-related macular degeneration (AMD), led by Tongalp Tezel,



MD, the Chang Family Professor of Ophthalmology and Director of the Vitreoretinal Service. This novel treatment, a one-time surgical injection that aims to correct the genetic deficiencies and produce a protein that prevents the immune system from attacking retinal cells, was made possible by the research of Rando Allikmets, PhD, the William and Donna Acquavella Professor of Ophthalmic Sciences (in Ophthalmology and Pathology and Cell Biology), which identified the role of this protein family in dry AMD.

We are also happy to welcome a new pediatric ophthalmologist, Sonali Talsania, MD, as Assistant Professor of Ophthalmology. Dr. Talsania cares for patients at several of our locations, including the resident clinics at the Harkness Eye Institute and Harlem Hospital.

Several faculty members have received significant honors over the past several months, including Simon John, PhD, the Robert Burch Professor of Ophthalmic Sciences (in Ophthalmology), postdoctoral fellow Peter Quinn, PhD, and postdoctoral fellow Lulu Ya-Ju Chang, PhD. We spotlight these awards in this issue and congratulate them on their exemplary efforts in service of eliminating vision loss.

Sadly, this year we also lost two of the Department of Ophthalmology's dearest friends: Bernard Brown, whose philanthropy has made so much of our glaucoma research possible, and Peter Gouras, MD, a giant in the retinal field and Professor of Ophthalmology for more than 40 years. We will miss them both tremendously.

For many academic and research organizations, the past year has been particularly difficult in terms of support, as dire economic times have meant a corresponding decline in charitable giving. Therefore, I am more grateful to report that the Department of Ophthalmology has *not* been put in that position. Friends like you have been extraordinarily generous, and we have even been able to add supporters to our family of benefactors to achieve new levels of giving.

I hope that this issue of the *Viewpoint* makes you as proud as I am of the work our faculty and staff have done over the past year. It's a privilege to lead this Department and to work with all of you. Thank you!

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

Faculty Appointments

Royce Chen, MD, to Associate Professor of Ophthalmology, effective March 1, 2021

Gulgun Tezel, MD, to Professor of Ophthalmic Sciences (in Ophthalmology), with tenure, effective July 1, 2021

Nan-Kai Wang, MD, PhD, to Assistant Professor of Ophthalmic Sciences (in Ophthalmology), tenure track, effective January 2, 2021

Father's Loss Inspires Staffer to Become Vaccine Champion

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Guzman has now become an advocate for COVID-19 vaccination, serving as one of two "vaccine champions" in the Department and recording a televised public service announcement as part of the "Roll Up Your Sleeves" public education campaign, a partnership between the Medical Center and the New York Task Force for Vaccine Equity and Education. (You can view

the video at <https://www.publichealth.columbia.edu/roll-your-sleeves>.)

"If there's one thing I could say, it's that you probably think you'll never be the one to lose a loved one," Ms. Guzman says. "You don't think you and your family are going to be affected. My dad didn't have the choice to get vaccinated. It wasn't available yet. But now we can all get vaccinated, to protect ourselves and the people we love."

CLINICAL SPOTLIGHT

First-of-Its-Kind Gene Therapy for Dry AMD Begins Trials at Columbia

The Department of Ophthalmology is one of the leading United States centers conducting a groundbreaking Phase 2 clinical trial of an investigational gene therapy for dry age-related macular degeneration (AMD), the most common cause of blindness in the industrialized world.

Known as GT005, the gene therapy uses genetically modified viral vector to deliver DNA that encodes for complement factor I (CFI), a protein that prevents the overacting immune system from attacking retinal cells. GT005 is given as a single, one-time surgical injection underneath the retina.

“This is the first gene therapy designed to repair this complement factor variation for the treatment of dry AMD,” explains Tongalp Tezel, MD, the Chang Family Professor of Ophthalmology, Director of the Vitreoretinal Service and a principal investigator of the trial.

Columbia’s first patient in the trial, and the first in the tri-state area, received the gene therapy injection in December 2020. A total of 75 participants will be recruited, split into three groups: 25 controls who will not receive gene therapy, 25 patients who will receive a lower dose of the corrective gene therapy and 25 who will receive a higher dose.

Dry AMD causes blurred or reduced vision due to slow degeneration and thinning of the layer of retinal pigment epithelium (RPE) in the macula, the part of the retina responsible for central vision. The RPE cells support the light-sensitive photoreceptor cells that are essential to vision. In the most advanced stage of dry AMD, geographic atrophy, entire areas of photoreceptor cells die, leaving dark grayish patches in the central vision. Apart from the AREDS formula of vitamins and anti-oxidants which marginally slow down this degenerative process, there are currently no Food and Drug

Administration (FDA)-approved treatment options for the disease, which affects approximately 11 million people in the United States.

In 2005, a team of scientists led by Rando Allikmets, PhD, the William and Donna Acquavella Professor of Ophthalmic



Tongalp Tezel, MD

Sciences (in Ophthalmology and Pathology and Cell Biology), was among the first to discover that a variation in a gene that makes one of the complement proteins triggers macular degeneration through an immune reaction that kills retinal cells. “The new gene therapy conducted at Harkness Eye Institute targets one of the defective complement proteins called CFI and aims to correct this gene’s loss of function by making retinal cells express the correct copy of the molecule and suppressing the inflammation so that the body does not attack its own retinal cells,” Dr. Tezel says.

GT005 has received fast-track designation from the FDA, which streamlines the review of drugs for serious conditions lacking FDA-approved treatment options. Study participants will be followed for up to a year to determine if the therapy can slow the progression of geographic atrophy and be monitored for side effects.

The early surgeries have gone well, Dr. Tezel says. “Because Columbia is a major center for retinal surgery and ocular genetics, we do many more complex procedures than this, and there have been no complications. We cannot report any results yet, but we are very optimistic and so pleased to be taking a leading role in this study. It is true precision medicine.” To learn more about enrolling in the trial, email eyetrials@columbia.edu or call 212-342-4586.

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Peter Quinn, PhD, Receives Four Awards for Genetic Research in Retinal Dystrophies

Peter M.J. Quinn, PhD, a postdoctoral fellow in the Jonas Children's Vision Care laboratory of Stephen Tsang, MD, PhD, Laszlo T. Bito Professor of Ophthalmology and Pathology and Cell Biology, has received four highly prestigious awards to support his research on the pathophysiology of inherited retinal dystrophies and possible therapies towards their amelioration.

The first is a three-year fellowship from the New York Stem Cell Foundation (NYSCF) to support his investigation into three different messenger RNA (mRNA) variants, known as isoforms, produced by the *CRB1* gene, a large gene linked to the development of retinal dystrophies. "Most research to date has focused on CRB1-A, the isoform everyone thought was related to disease," says Dr. Quinn. "More recently, research led by investigators at Duke University has identified two other retinal specific isoforms, now labeled CRB1-B and CRB1-C. CRB1-B has specific importance to the light-sensitive photoreceptor cells, which suggests that these different isoforms might cause retinal disease in different ways. To better understand this disease process, we will take stem cells from healthy individuals and from patients who have retinal diseases linked to mutations in the *CRB1* gene, and analyze how these different isoforms are involved and how they might interact with each other to produce disease."

The second award is a "Young Investigator Draft" grant from the organization Uplifting Athletes, which raises money to support rare disease research through a network of over 20 chapters led by college football student-athletes. "In a non-COVID year, they host the event at the Lincoln Financial Field and call awardees up on stage as they do in the NFL draft," says Dr. Quinn, who wrote the grant proposal in collaboration with his sponsor, the Curing Retinal Blindness Foundation. "This year, they hosted it live on YouTube and other social media platforms, which was very exciting."

Dr. Quinn has also been selected for the National Institutes of Health's (NIH) Outstanding Scholars in Neuroscience Award Program (OSNAP), which recognizes and supports investigators who are conducting exceptional neuroscience research across the nation. He will receive the award and present a poster on his work at a symposium on the NIH campus, to be held in late fall 2021.

Finally, Dr. Quinn will be the International Retinal Research Foundation's (IRRF) 2021-2022 David and Loris Rich Postdoctoral Scholar, an award that supports young postdoctoral scientists nearing the end of their training as they make the transition to being independent Principal Investigators.

"I am honored that these eminent organizations recognize the importance of our work and its relevance to developing new therapies," Dr. Quinn says. "A better understanding of how the isoforms of *CRB1* interrelate to produce retinal dystrophies will allow us to select appropriate therapeutic options, such as gene augmentation and gene editing, which will ultimately have an enormous benefit for our patients."



Peter M.J. Quinn, PhD

Lulu Ya-Ju Chang, PhD, Receives BrightFocus Award

Simon John, PhD, Honored with Visionary Prize from End Blindness 2020

Simon John, PhD, the Robert Burch Professor of Ophthalmic Sciences (in Ophthalmology), has been awarded the prestigious Sanford and Susan Greenberg Visionary Prize for “uniquely valuable research having the greatest impact toward advancing restoration of vision in human patients.” In a virtual awards ceremony held on December 1, 2020, Dr. John was among 13 recipients honored in two categories who are sharing \$3 million in prize money to advance their research. Dr. John’s research is focused on accelerating new treatments for glaucoma and other ocular diseases.

“This unique one-time award is part of End Blindness 2020, an initiative envisioned by Sandy Greenberg as a way to change the paradigm of thought in ocular research and stimulate the field to eradicate blindness,” says Dr. John. “Being selected for this award is a great honor. I am proud for my colleagues at Columbia University as well as all of my current and former lab members and everyone who has supported our research.”

Greenberg, the chairman of the board of governors of John Hopkins University’s Wilmer Eye Institute, lost his vision to glaucoma while still a student at Columbia in 1961. He described his personal mission to eradicate blindness in his memoir, *Hello Darkness My Old Friend*, which also chronicles how his Columbia roommate, singer Art Garfunkel, helped Greenberg overcome depression and become independent after losing his sight at the age of 19.

“While I was still in a hospital bed in Detroit, newly blinded, I swore an outrageous oath that has been with me ever since: that *no one else should have to go blind*,” Greenberg wrote. “It was a promise I made not just to myself but to God—and one that has remained my personal mission ever since.”



Simon John, PhD

The End Blindness 2020 awards are Greenberg’s way of fulfilling that promise. “The idea is something he compared to the Cancer Moonshot program launched during the Obama administration,” says Dr. John. “The awards seek to identify and connect researchers around the world whom the award committee deems to be doing the most to prevent

vision loss. The value goes beyond just the dollar amount, which will help us continue with our research, but the recognition that will help open doors and lead to further partnerships to help achieve Sandy Greenberg’s goal.”

Dr. John’s recent work has identified metabolic abnormalities that develop very early in the glaucoma disease process in animal models. “We showed that those subtle age-related metabolic

changes contribute to the vulnerability of the retinal ganglion cells, the nerve cells in the eye that die as a result of high intraocular pressure in glaucoma,” he says.

With his mentor, geneticist and Nobel laureate Oliver Smithies, Dr. John theorized that a specific form of vitamin B3, a precursor of a key molecule whose level decreases with age as a precursor to glaucoma, could correct those metabolic abnormalities. “We were able to treat the mice with this agent and it was profoundly protective against glaucoma,” he says.

“Various things in our bodies change with the

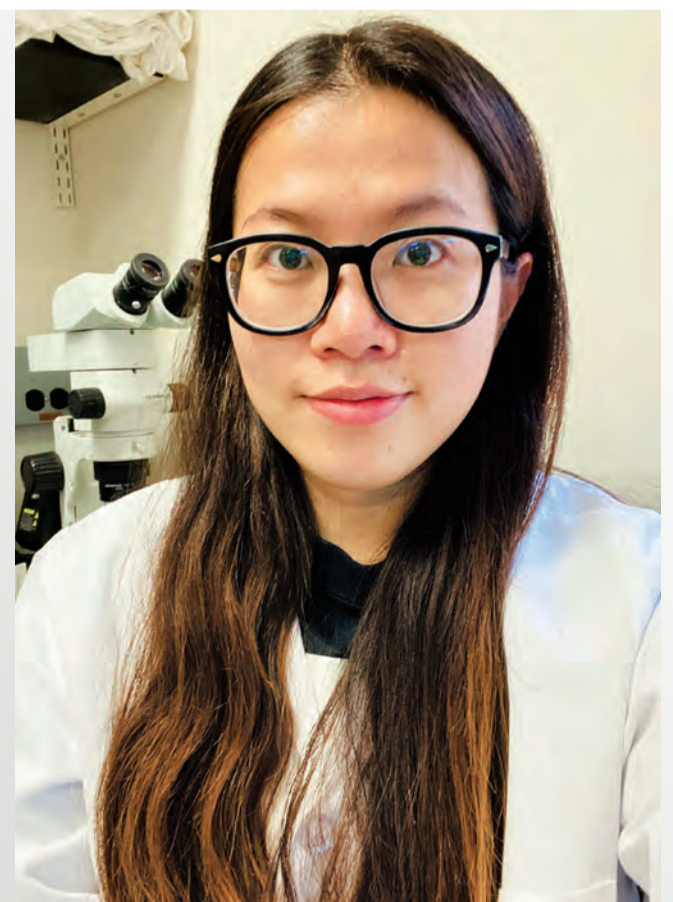
stressors of age and disease, and cells succumb to those changes and die. If by giving the right nutrients or the right drugs, we can supply bio-energetic or other metabolic support and boost cellular defenses against damage such as oxidative stress, we could make cells resilient so they can better fend off diseases like glaucoma. The Greenberg award will help us further our work on this concept, and lead to a better understanding of how we can boost metabolic pathways to improve resilience and protect from disease.”

Postdoctoral researcher Lulu Ya-Ju Chang, PhD, has been selected to receive a BrightFocus award for her research using patient-derived stem cell lines to identify genetic risk alleles for age-related macular degeneration (AMD). Dr. Chang was honored, along with other grant recipients from 2020 and 2021, in a virtual networking event held on May 3rd as part of the ARVO Foundation for Eye Research 2021 Annual Meeting.

“This award is a great honor, and the event was a wonderful opportunity to connect with many of my colleagues who have expertise in glaucoma and macular degeneration,” Dr. Chang says.

The prize, which equals two years of salary, will enable Dr. Chang to expand the number of stem cell lines used in her investigations. In addition, BrightFocus also funds Dr. Chang to use CRISPR genome surgery to repair age-related macular degeneration alleles.

“BrightFocus is proud to partner with these outstanding scientists on their bold, innovative research to save sight,” Diane Bovenkamp, PhD, BrightFocus Vice President for Scientific Affairs, says in a press release. “They are forging paths to new, great discoveries, and embody why this is such an exciting, hopeful time for vision research.”



Lulu Ya-Ju Chang, PhD

How the Department of Ophthalmology

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the university supported us through this. Almost a year later, March 2021 was one of our biggest months ever in terms of patient volume, and that has continued in April. Our department's recovery has been robust, and I believe it will continue to be."

This is the story of how Columbia's Department of Ophthalmology endured the worst pandemic in a century and protected its people, their health and their jobs, while still providing outstanding care for patients, educating residents, and reaching new heights in research funding.

Despite a Pandemic, Sustaining the Best Patient Care

During the peak of the pandemic, the Department was making every effort to keep patients safe, but also to identify patients with vision or even life-threatening disease that needed in-person evaluation. On April 3, 2020, optometrist Suzanne Sherman, OD, FAAO, Director of the Optometric Service and Assistant Professor of Optometric Science (in Ophthalmology) was taking telemedicine calls for ophthalmology patients when a teenage girl called about a terrible headache she was experiencing.

The 15-year-old girl had gone to the emergency room for the headache the day before and was told it was probably migraine-related. The next day, however, she had started throwing up, and the girl's mother noticed that her eyes were starting to cross. "She mentioned to me that her right eye was having a hard time focusing," says Dr. Sherman. Via FaceTime, she conducted an oculomotor exam to check the function of the patient's extraocular muscles—the muscles that control the movement of the eyeball and upper eyelid.

That exam showed nothing abnormal, but Dr. Sherman instructed the girl's mother to download the Eye Handbook mobile self-testing app to continue to check her vision. The next day, the girl's mother reported that she had been having double vision for 24 hours, and Dr. Sherman immediately involved the pediatric ophthalmology team, who decided that this was an urgent case that needed to be seen in the office.

"They identified damage to the sixth cranial nerve and optic nerve swelling," Dr. Sherman says. "After an MRI and spinal tap in the emergency department, the patient was diagnosed with a recurrent right frontal lobe hemorrhage." She had bleeding in the brain, caused by an arteriovenous malformation—an abnormal tangle of blood vessels connecting arteries and veins that disrupts normal blood flow and oxygen circulation. Neurosurgery in June 2020 successfully corrected the malformation and prevented lasting damage to the girl's vision.

Between mid-March and mid-May, when the Department of Ophthalmology was closed to all but the most serious clinical cases, Dr. Sherman, other faculty members and residents took turns staffing the telemedicine hotline, screening thousands of patients like this young woman to ensure that, despite the COVID-19 pandemic, their eye care would not be compromised and their vision would be protected.

Shortly after the Department's official shutdown began on Friday, March 13, Dr. Cioffi instructed clinical practice staff to call every current patient to discuss the decision and what it would mean for their care. He gave them ten days to complete the assignment. "We did it in a week," says Ophthalmic Technician Manager Jennifer Bazaz.



David Doobin, MD

Director of Practice Operations Daniel Trese estimates that more than 700 surgeries and more than 7,000 appointments were rescheduled in that short period of time. "It was quite a feat," Trese says. "Everyone worked long, hard hours every day to make it happen."

And as in the case of the teenage patient identified by Dr. Sherman, the Department never truly stopped operating and was one of the few centers in the city that provided emergency in-person care and vision surgery throughout the pandemic.

"We had limited operating hours, but we were able to manage all the emergency cases that needed immediate treatment," says Dr. Liebmann. He, Dr. Cioffi, and Residency Program Director Royce Chen, MD, the Helen and Martin Kimmel Associate Professor of Ophthalmology, collaborated to create a "triage tree" for the telephone screening service as well as a detailed guide to conducting and documenting video visits.

Among the most urgent cases at the top of that triage tree were patients with ocular cancers, such as ocular melanoma and retinoblastoma.

Because the Department's operating rooms were free of more routine eye surgery cases, Brian Marr, MD, John Wilson Espy Professor of Ophthalmology and Director of the Ophthalmic Oncology Service, was able to operate on these critical patients even more quickly than under normal circumstances. "We rescheduled all of our long-term follow-up patients, those who had been treated and cured and whose condition had been stable for some time, in order to give us the time and space to see patients with new diagnoses, people with active cancer and those who were still in a high-risk period following treatment," he says. "Supported by the hospital, we were able to continue to deliver

the best care possible, which is something a center of excellence for ocular oncology should do."

Active ocular cancer cases were obvious emergencies, but triaging other cases wasn't always so clear cut. "We had to assess every case and every patient carefully to decide what was emergent enough, especially once it became clear that this was not just a two-week shutdown," says Portia Sirinek, MD, then a senior resident and now a glaucoma fellow at Massachusetts Eye and Ear Infirmary in Boston. "What do you do when there's a patient you think needs to come in for their ocular symptoms, but they also have COVID symptoms and they absolutely can't come in? In a couple of truly urgent cases of retinal detachment where there may have been recent COVID symptoms, we performed those surgeries anyway."

Sometimes calls from the Department were a lifeline for patients even if they did not have an ocular or other medical crisis. "Many



William Plum, MD

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Rose to the Challenge of COVID-19

of our patients are elderly, and they were sitting at home alone and couldn't see their families," says Ms. Bazaz. "So in April, we decided we would call them all again for a wellness check, to see how they were feeling and if they needed anything. Some of them hadn't been out of the house for weeks. They couldn't believe we were calling and were so happy to talk to us."

When outpatient ophthalmology clinics reopened in May and elective surgery began slowly ramping up again, it was with carefully developed new safety protocols. "We now call all patients a day or two before their scheduled visit," Ms. Bazaz says. "In order to minimize the amount of time they have to spend in the clinic, we ask the questions we used to ask during the visit: have you experienced any changes in your vision, what medications are you currently taking, and so on."

These adaptations are likely to become permanent, says Dr. Liebmann. "Greater accessibility of telemedicine, online scheduling and access to electronic medical records, and pre-visit calls to organize and expedite the in-person appointment—these are all good advances that will persist, making care more efficient, more effective and safer for our patients."

"It's hard to quantify the disaster that *didn't* happen here," says Ryan Terribilini, Practice Manager for the Harkness Eye Institute, who directed the acquisition of personal protective equipment (PPE) for the Department. "That's the most notable achievement: we had no known outbreaks among staff or patients coming in."



Tavish Nanda, MD, and Royce Chen, MD, in COVID PPE

Transforming Resident Education

How do you teach residents in ophthalmology—an extremely hands-on surgical specialty—when they can't see patients in the clinic and can perform surgery only in rare, emergency circumstances? That was the dilemma facing Dr. Chen and Asso-

ciate Residency Program Director Lora Glass, MD, Assistant Professor of Ophthalmology, in the spring of 2020.

"We were worried for the safety of our trainees, but also for the clinical and surgical experience that they needed to complete their residencies," says Dr. Chen. "Would they need to stay an extra year to make up for lost learning opportunities? If we, as faculty, were redeployed elsewhere in the medical center as needed, would they have appropriate supervision?"

Dr. Chen and Dr. Glass swung into action, converting existing in-person lectures to virtual formats, reformatting the structure of the resident clinics, and even revising the residency curriculum itself. "Instead of 12-week blocks, we converted the rotation schedule so that each segment was composed of two sets of six-week blocks that were not back to back," Dr. Glass explains. "We anticipated that there could be future waves and additional lockdowns, during which a resident might miss out entirely on a particular learning experience. By adopting these split sets of six-week block rotations, there was less vulnerability to lockdown cycles."

Because Columbia's Ophthalmology residency offers strong surgical experience early on in the program, there ended up being no insurmountable gaps in education for the senior residents who were nearing the end of their training. "We participate in a good amount of surgical cases in our second year, so by our third year we were just building on what we had learned and were very comfortable," says one of those senior residents, Marlene Wang, MD, who is now completing a vitreoretinal fellowship at Massachusetts Eye and Ear Infirmary. "It was disappointing, but not dev-

astating, because we had already been provided with so much of what we needed."

After converting the usual schedule of resident lectures from in-person to virtual, Dr. Chen was struck by an idea: the shutdown offered a unique opportunity for all

New York City ophthalmology residents to benefit from others' clinical instruction. He and Dr. Glass reached out to program directors from area institutions, including New York Eye and Ear Infirmary of Mount Sinai (NYEE), NYU Langone's Department of Ophthalmology, and Montefiore

Medical Center, and soon residents from every New York ophthalmology program were receiving live Zoom links to all available lectures from the participating programs.

Next, Dr. Chen augmented the regular lectures with a new series of live interactive "Eye Talks," 30-minute virtual learning sessions on special topics in ophthalmology, held several times a week and hosted by an expert attending physician. They often focused on key subjects from the American Academy of Ophthalmology Basic and Clinical Science Course, but residents also had the opportunity to request

specific topics they wanted to explore further. When a resident emailed Dr. Chen expressing interest in complex retinal surgery, for example, he scheduled an Eye Talk focused on macular hole surgery with Stanley Chang, MD, the K.K. Tse and Ku Teh Ying Professor of Ophthalmology and Chairman Emeritus of the Department of Ophthalmology. "Our trainees now have access to even more ophthalmic educational content than they did before COVID-19," Dr. Chen says.

"Some of the attending physicians who might not have always been able to participate in our in-person resident lectures because they were at another location, such as the 880 Third Avenue practice site, have been able to be much more involved," says first-year resident Jennifer Hu, MD. "Dr. Liebmann and Dr. Moraes [C. Gustavo De Moraes, MD, MPH, Associate Professor of Ophthalmology and Medical Director of the Clinical Trial Unit] are both very active in our Zooms, for example, and I don't think we would have been able to have their insights as often under other circumstances."

When resident clinics reopened in May, they did so with teams of residents seeing patients as opposed to the previous practice of a single patient assigned to a single resident. "If a resident ever has to be quarantined or otherwise pulled from service, their patients can still be seen by a resident who has substantial experience with their case," explains Dr. Glass. She and Dr. Chen also shared the telephone screening algorithm developed at Columbia



Portia Sirinek, MD, in COVID PPE

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How the Department of Ophthalmology

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with other residency program directors nationwide for use in their own resident clinics. “It was so early in the pandemic that institutions outside New York had not yet developed any systems like ours. We became a strong national model, helping prepare other programs elsewhere in the country for what was coming their way.”

The COVID-19 pandemic offered the Department the opportunity to “re-imagine everything we were doing and think about how we are providing resident education in a holistic way,” says Dr. Chen. “For example, this shared lecture approach that we adopted during the pandemic may suggest the opportunity to develop a single unified curriculum for residents from multiple institutions to access. And what if circumstances arise where we are forced to shut down for a significant period of time again? That possibility has pushed us to think about simulation and other models of surgical education to offer more venues for residents to practice, and as a result we have developed a stronger relationship with a simulation company and started developing a virtual simulation curriculum for residency training.”

“Our Department’s response to the pandemic has been about finding opportunities in adversity,” says Dr. Maeng. “Dr. Chen and Dr. Glass ensured that we were still given a very vigorous education at a time when we could have just taken a pause and no one would have blamed them. Rather than focusing on what was taken away from us, they constantly looked for opportunities to help us grow and learn.”

Research Resurgence

Despite the restrictions of the COVID-19 pandemic, the Department achieved extraordinary success for its research mission in 2020, rising to #4 in the nation in National Institutes of Health (NIH) research funding. “In 2019, we were ranked #12 in the nation; a jump to #4 in just one year exemplifies our team’s resilience during a very difficult time,” says Dr. Cioffi. “Our scientific investigators garnered our highest level of NIH funding ever, more than double what they brought in a decade earlier,” says Dr. Cioffi.

This achievement is all the more remarkable given that all research activities were either fully or partially closed for several months between March and May 2020. “Ramping down meant no new on-site or in-person research projects could begin,” says Janet Sparrow, PhD, Anthony Donn Professor of Ophthalmic Sciences (in Ophthalmology) and Professor of Pathology and Cell Biology. “Remote activities were allowed, however, and we were also allowed to come into

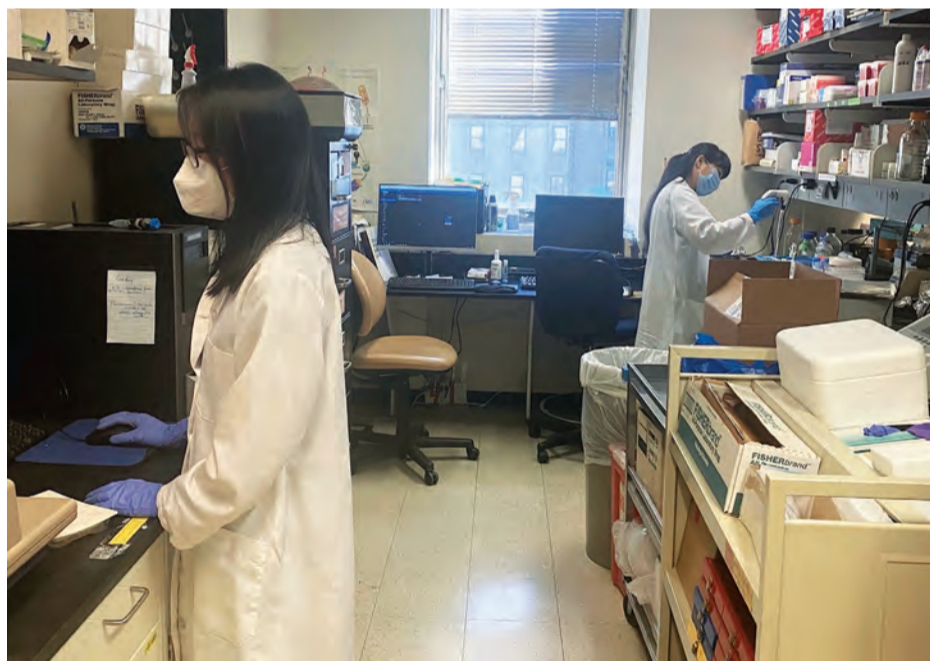
the lab to maintain cell cultures and mouse models of disease.”

But maintaining those essential components of the department’s ongoing laboratory research was extremely difficult. “Sustaining the animal research during the pandemic shut down was one of our biggest challenges,” says Dr. Sparrow. “With the severe limitation on the number of people allowed in the lab, people took turns to help manage our large mouse colonies.”

When the pause in research was initiated, Tingting Yang, PhD, Assistant Professor of Ophthalmic Sciences (in Ophthalmology), had just hired two new lab technicians, one who had been on board for only two weeks and the other for less than two months. Neither technician had been trained to conduct any essential work during the ramp-down period, and one of them soon left for a clinical position in a hospital. “There was a shortage of hands in my lab for several months, which we overcame by effective collaboration within the department,” Dr. Yang says. “For instance, Stephen Tsang, MD, PhD, [Laszlo T. Bito Professor of Ophthalmology and Professor of Pathology and Cell Biology]

activity of her laboratory. “Except for the work specifically depending on closed research facilities, such as confocal microscopy, or those requiring new purchasing/delivery of some lab supplies and reagents, we could accomplish many of our research aims,” she says. “Despite all the difficulties, our work resulted in new publications of our research findings, as well as review articles. We did not allow the pandemic to lower our motivation, and after the lockdown we pushed ourselves even more to reach our research goals.”

Lead investigators took advantage of the shutdown to press forward with grant applications and other projects. For example, Konstantin Petrukhin, PhD, Professor of Ophthalmic Sciences (in Ophthalmology), submitted four grants to the NIH and one to the Department of Defense, which are currently pending. Dr. Yang also submitted four grant applications, three of which have been awarded and one of which will be reviewed in June. Dr. Sparrow’s group published 18 peer-reviewed scientific publications in 2020 alone, submitted three new grant proposals, renewed one major grant and received a new \$300,000 award.



Lab maintenance continued during the pandemic

stepped in to help us maintain some precious retinal pigment epithelial cells, which took over half a year to generate and must be continuously kept in cell culture.”

“Everyone in the lab volunteered to help with lab maintenance during the worst part of the pandemic, and they also willingly resumed research despite the lingering fear when the situation improved,” agrees Xin Zhang, PhD, the Herbert and Florence Irving Professor of Ophthalmic Sciences (in Ophthalmology and in Pathology and Cell Biology). “A trying time like the past year has really revealed people’s dedication to research.”

Gulgun Tezel, MD, initiated a rotating work schedule to ensure the continued produc-

The past year was also very productive for clinical research, as clinicians in the Department published a series of groundbreaking journal articles on the impact of the COVID-19 pandemic on ophthalmology practice and resident education. “Initially, there was no guidance for ophthalmic care in the context of COVID-19, and we created a lot of that guidance for our colleagues,” says Dr. Chen.

Major publications included a paper for the *Journal of Academic Ophthalmology* on rapid deployment of tele-ophthalmology; a report in *Ophthalmology* on changes to the approach to inpatient ophthalmologic screening in the COVID-19 era, co-authored with colleagues from Vanderbilt University and the Wilmer Eye Institute; and a survey documenting the risk to resident physicians during the phase when New York City was the epicenter of the pandemic. That paper, which appeared in the *Journal of Clinical Investigation* in September 2020, received significant news coverage and remains one of the only studies assessing specialty-specific risk for COVID-19.

Collaborating with Kenneth M. Prager, MD, Professor of Clinical Medicine, Director of Clinical Ethics and Chairman of the Medical Ethics Committee, Dr. Glass, Dr. Chen, Dr. Liebmann, Dr. Cioffi, and senior resident Marlene Wang, MD, also published a case-based examination of the ethics of ophthalmic care during COVID-19 in

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Rose to the Challenge of COVID-19

the *American Journal of Ophthalmology*. “The four cases we discussed in the article really affected the clinicians involved,” Dr. Liebmann says. “The ethical question of how you protect your patients while also being concerned for your own safety and that of your staff and your families—that was one of the hardest things we dealt with during the height of the pandemic.”

Caring for the Ophthalmology Family

The three “pillars” of academic medicine, at Columbia as well as in all other academic medical centers, are clinical care, education, and research. But there is a fourth pillar, without which the other three cannot be sustained: caring for the well-being of the extended “family” of the Department: the staff, faculty, residents, fellows, and patients.

When New York City was the epicenter of the pandemic, Department leaders were called upon to do more than just re-imagine clinical services, create new teaching models, and sustain essential research. They protected their people and provided them with constant communication and information at a time when fear and confusion reigned, while at the same time reaching out to serve the wider medical center and the community.

Beginning in March 2020 and continuing for months, Dr. Cioffi and Dr. Liebmann convened a series of virtual expert town halls, open to staff, faculty, patients and friends of the Department, to keep everyone informed about the latest research and other information regarding COVID-19. The first speaker was Magdalena E. Sobieszczyk, MD, MPH, Associate Professor of Medicine and Chief of the Division of Infectious Diseases. Other presenters included Dr. Prager, virologist David Ho, MD, Professor of Microbiology & Immunology, Clyde and Helen Wu Professor of Medicine and Director of the Aaron Diamond AIDS Research Center, and Lourival Baptista-Neto, MD, Vice-Chair of Clinical Services in the Department of Psychiatry.

“Those forums were so important,” says Department Operations Manager Marielle Goc-Jalloh. “We were able to hear the latest information from our own Columbia experts, learn what the plans were at the medical center, and get reassurance that we were going to get through this crisis and get back to some kind of new normal.” Executive Director of Development Jane Heffner agrees. “We didn’t have to rely on the news or social media, because Dr. Cioffi made sure we had access to the real experts in infectious disease, epidemiology and public health.”

In late April, as the pandemic wore on and front-line clinicians were depleted after weeks of round-the-clock shifts, physicians and nurses from other departments, including the Department of Ophthalmology, were called upon to redeploy to provide care in COVID ICUs and the Emergency Department. In his role as President of the ColumbiaDoctors faculty practice, Dr. Cioffi co-directed redeployment for the entire Medical Center. He decided that he would take the first ICU shift himself. “How could I ask them to do what I was not willing to do?” he says.

“He didn’t make a big deal of it,” says senior resident David Doobin, MD, who was a second-year resident at the time. “We just got an email from Dr. Chen that said ‘Dr. Cioffi’s taking the first one.’ It said a lot. And then he did a Zoom call with all the residents the night after his first shift to let us know what to expect. He had done something like eight arterial blood gas draws [a test to

measure oxygen and carbon dioxide in the blood], which is not hard, but it’s not the simplest thing to do either, especially if you haven’t done it in 20 or 30 years. I was very impressed! All the residents joked that we were going to beat him but none of us came close.”

Many Departmental faculty members, residents, and nurses volunteered to work in the Emergency Department (ED) and COVID ICUs, but those duties were entirely optional. Dr. Maeng praises the courage of the Department’s nurses who signed up for redeployment in COVID units. “They were used to taking care of ambulatory cataract patients, which is vastly different from working in an ICU, and had to go back to their training to care for seriously ill inpatients in a high-risk environment,” she says.

Dr. Maeng herself wanted to serve in the ED, but she was in the late stages of pregnancy at the time. “Dr. Cioffi, Dr. Chen and Dr. Glass put a hard stop on my clinical activities. I argued with them at the time,” she says. “A couple of months later, I read a newspaper article about an ED resident who was pregnant and felt unsafe, but her department made it her decision as to whether or not she should be excused from working on the front line. That’s a very difficult decision to make. You feel like you are betraying your patients and your fellow residents. I’m grateful that instead the decision was made for me. Everyone took our safety and health very seriously.” Dr. Maeng’s daughter, born in April 2020, is healthy and thriving.

It was a year no one in the Department will ever forget, one that required everyone to tap into their deepest reserves of courage, creativity, selflessness and resilience. Faculty and staff alike proved more than equal to the task.

“For six months, Dr. Cioffi and I were on nightly phone calls with other leaders in our Department, constantly trying to figure out how we could make things better the next day. As a result, we were able to innovate and develop new policies and procedures to adapt to the ebbs and flows of the COVID reality,” says Dr. Liebmann. “Whether the disease was highly prevalent, winding down, or ramping up again, our goal was always to keep everyone safe while still delivering essential ophthalmic care,

and we achieved that goal with the collaboration of the entire Department. We treat everyone here as one big family, and we are so proud of how our family took care of one another during this difficult time.”



New First years collage: Violet Lin, MD, upper left, Rahul Kapoor, MD, upper right, Emery Jamerson, MD, lower left, Jennifer Hu, MD, lower right



Graduating seniors 2020 left to right: Michelle Maeng, MD, Portia Sirinek, MD, Marlene Wang, MD, Carolina Adams, MD

Xin Zhang, PhD, Named Herbert and Florence Irving Professor

Xin Zhang, PhD, has been named the Herbert and Florence Irving Professor of Ophthalmic Sciences (in Ophthalmology and in Pathology and Cell Biology). “It is a particularly high honor to have a professorship named for the Irving family, who has given so much to our program and our medical center,” says Dr. Zhang, whose studies focus on ocular developmental biology. He currently has four major research grants funded by the National Institutes of Health, a distinction that places him among the top 1% of investigators in ophthalmology nationwide.

A major area of Dr. Zhang’s research involves the development of the lacrimal gland. Lacrimal gland dysfunction is the underlying cause of aqueous deficient dry eye diseases, such as Sjogren syndrome, which affect millions of people. “One of our studies explores the role of a cell signaling pathway called fibroblast growth factor (FGF) in the embryonic development of the gland, which is important to our understanding of the causes of lacrimal gland disease,” he explains. “A newer project focuses on what maintains the homeostasis, the stable equilibrium that supports normal function, in the mature gland. We are investigating the role of specific enzymes in maintaining or disrupting that steady state, and hope to determine whether there are residual stem cells in the gland that could serve as a model for repair when homeostasis is disrupted.”

FGF also plays an important role in Dr. Zhang’s efforts to understand how the eye’s lens develops on a molecular level. “Defective lens development is a major cause of congenital eye diseases, because the human lens is the culmination of elaborate cell proliferation, differentiation and processes that generate tissue organization and shape,” he says. “This requires precise regulation by cell signaling pathways such as FGF.”

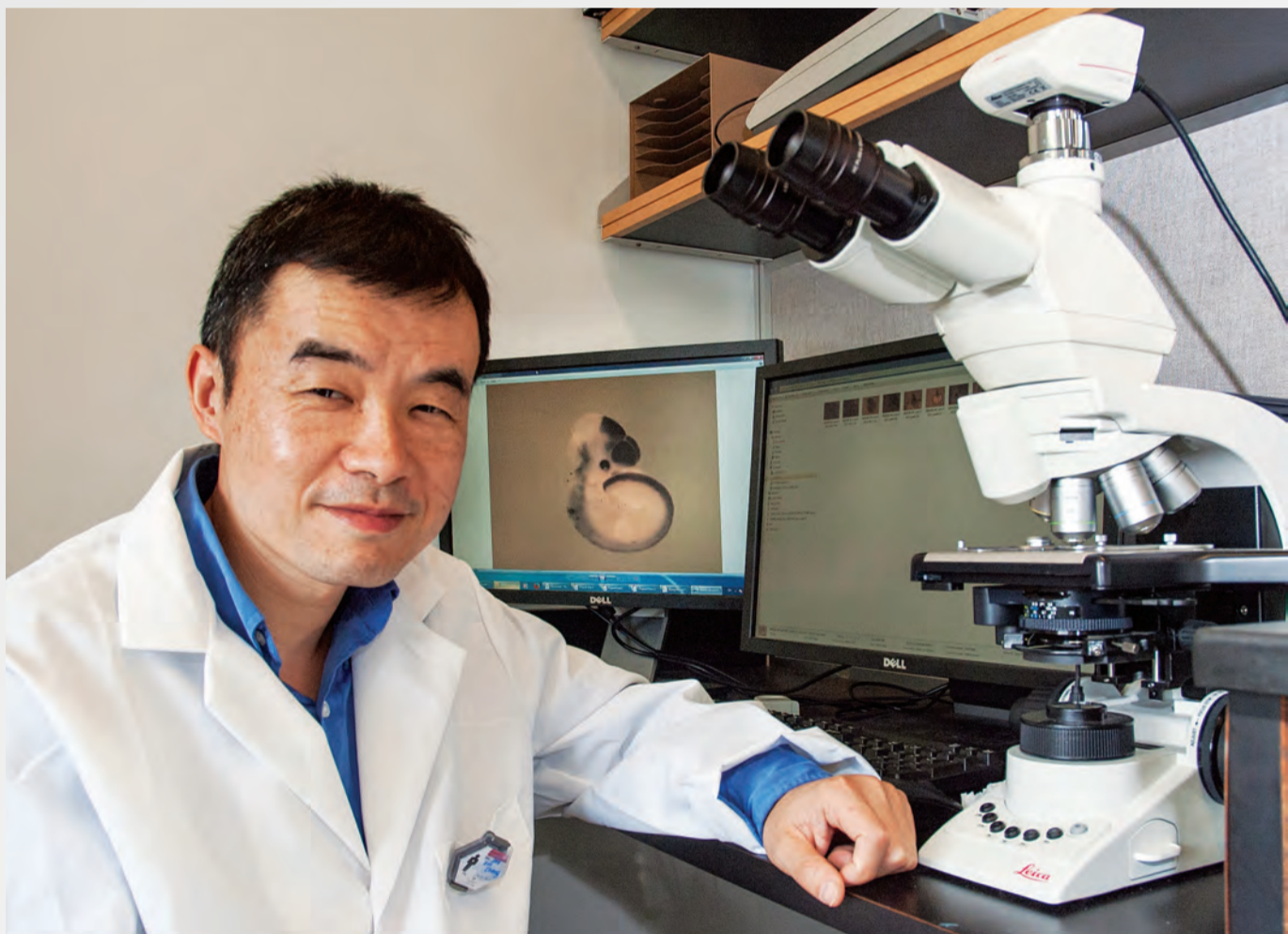
Using a mouse model, he is investigating how FGF signaling regulates the separation of the lens from the surface ectoderm—the embryonic structure that becomes the eye’s cornea and iris. That separation normally happens by about the sixth week of embryonic development; defects in that separation are thought to produce the congenital eye disease Peter’s anomaly, involves thinning and clouding of the cornea and attachment of the iris to the cornea, causing blurred vision.

Another recent project was inspired by discussions with clinical colleagues about the role of FGF in tumor signaling and potential cancer therapies. “There has been a great deal of interest in developing inhibitors for the FGF pathway to treat cancer,” he says. “However, when investigators tested those potent inhibitors in clinical trials, they noticed a side effect: these drugs can cause fluid accumulation under the photoreceptors. The buildup of fluid leads to vision-threatening

separation between the retinal pigment epithelium (RPE) of the macula and the photoreceptor cells that the RPE supports. This suggests that FGF signaling still plays a very important role in the adult function of the retina and the RPE.”

To study this relationship further, Dr. Zhang’s group is developing a mouse model to reproduce the side effect. “By studying this symptom in the mouse, we hope to be able to identify the cause and see whether there is something we can do to eliminate this side effect as these therapies move forward to treat cancer patients,” he says.

Dr. Zhang is also investigating the interaction between the lens and the ciliary body, a structure that controls the lens’s shape and also produces the fluid in the eye called the aqueous humor, which maintains normal ocular pressure. For those studies, he is now using pluripotent stem cells to developing a ciliary body



Xin Zhang, PhD

“in vitro” in the laboratory. If successful, these “ciliary bodies in a dish” will provide a new avenue to explore therapies for diseases associated with the ciliary body, ranging from hypotony, a loss of pressure within the eye that can cause retinal degeneration, to glaucoma.

“I have been so inspired by the amazing work happening here and by my interactions with my clinician colleagues and their patients,” says Dr. Zhang. “All of that has given me new ideas and incentives to pursue research, especially projects which have clear implications for clinical care.”

Retinal Pioneer Peter Gouras, MD, Dies at Age 90

Peter Gouras, MD, Professor of Ophthalmology at Columbia University Irving Medical Center for over 40 years, passed away on January 8, 2021. The Brooklyn-born Dr. Gouras was renowned for his pioneering work in retinal electrophysiology, retinal transplantation, and color vision.

After an undergraduate and medical education at Johns Hopkins, Dr. Gouras began his career in the Neurosurgical Division at the National Institutes of Health (NIH) in 1957. He then pursued a fellowship in electrophysiology of the retina at Cambridge University in the UK before returning to the NIH, where he ultimately rose to become chief of the Neurophysiology Section at the National Eye Institute from 1970 to 1978. During this time, Dr. Gouras introduced novel methods of monitoring retinal functions, and developed methods of using electroretinography that allowed for the separate examination of four photoreceptor mechanisms, leading to discoveries of novel retinal degenerations.

He returned to New York in 1978 to join the Columbia faculty, where he remained until his death. His research proved that the retinal pigment epithelium (RPE) can be transplanted, preventing retinal degeneration—the first demonstration that transplantation could be a viable method to treat degenerative conditions of the central nervous system. His

work laid the foundation for recent advances in retinal transplantation using stem cell technology, and also produced collaborations with other Columbia scientists using viral vectors for gene therapy that could cure monogenic diseases of the retina, such as Stargardt disease.

Between his scientific endeavors, he enjoyed throwing lab parties. He played accordion, sang folk songs, once hired a professional Irish dancer to entertain his lab on a St Patrick's day, and enthusiastically prepared Christmas presents for members of his and neighboring labs.

"Dr. Gouras was a legend in ophthalmology who kept innovating for 60 years," says G.A. (Jack) Cioffi, MD, Jean and Richard Deems Professor, Edward S. Harkness Professor, and Chairman of the Department of Ophthalmology. "He was vocal about his intention to continue research until the very end, which he effectively accomplished. We send our deepest condolences to his wife, Ute Keppler-Gouras, his children, and extended family."



Department Mourns Benefactor Bernard Brown

Bernard Brown, a visionary businessman and devoted philanthropist whose generosity has made possible some of the Department of Ophthalmology's most important initiatives, passed away in January 2021 at the age of 96.

Mr. Brown, the founder of National Freight, Inc., one of the oldest trucking companies in the United States and the predecessor to the third-party logistics leader NFI, believed deeply in giving back to the community. He and his wife Shirlee served on the Department's Board of Advisors for more than 15 years, and one of the causes most important to them was the battle against blindness from glaucoma. They endowed the Shirlee and Bernard Brown Professor-



ship in Ophthalmology, currently held by Jeffrey Liebmann, MD, and sponsored the Brown Glaucoma Laboratory. And with a generous five-year gift from the Brown Foundation, they helped to create the Brown Glaucoma Genetics Initiative, a major portfolio of investigative and therapeutic projects focused on the discovery of novel genes and genetic treatments for glaucoma.

"Bernard Brown was a great friend whose kindness, humor and wonderful stories will be greatly missed," says Dr. Liebmann. "Always a gentleman, he was totally devoted to his family, admired for his humanism and loved by all. We extend our deepest sympathies to Shirlee, his children, Anne, Ike, Sidney, and Jeffrey, and the extended family."

Pediatric Ophthalmologist Joins the Department

Continued from page 12

surgeries but you are also still monitoring general eye health and seeing kids as they grow up, which is so important to me," she says.

When she's not caring for children's vision, Dr. Talsania spends a lot of her time reading and participates in book clubs with friends. Her most recent read: *The Vanishing Half*, Brit Bennett's novel about twin sisters who run away from their small, southern black community at age sixteen. One returns to live in their town with her daughter, while the other passes as white with a husband who knows nothing of her past. "It's a fascinating book," Dr. Talsania says. "I really recommend it."

Returning to New York in the midst of the COVID-19 pandemic has been different than she originally expected. "I planned my move back excited about culture, museums and Broadway shows, but it's been nice just to enjoy the natural beauty of the city in places like Riverside Park and Central Park," she says. "I had really missed the seasons and the beauty of the Northeast when the leaves change. I also have a lot of family and friends here, so it's wonderful to be closer to them again."

Pediatric Ophthalmologist Joins the Department

The Department of Ophthalmology welcomes pediatric ophthalmologist Sonali Talsania, MD, an Assistant Professor of Ophthalmology at Columbia University Irving Medical Center and the New York-Presbyterian Morgan Stanley Children's Hospital. She joined the Columbia faculty in July 2020.

Dr. Talsania completed both her undergraduate and medical degree at Harvard and her ophthalmology residency at Boston Medical Center, where she was recognized for her work teaching medical students and received an award for research in orbital cellulitis in children. After pursuing a fellowship in pediatric ophthalmology and strabismus at the Duke Eye Center in North Carolina, she practiced at a multi-specialty ophthalmology group in Florida, where she was also the consulting ophthalmologist for Joe DiMaggio Children's Hospital.

"I missed the academic world and the opportunity to teach, and I also grew up in Westchester, so I was very excited to have the opportunity to come back to New York and work with residents as well as a broad and diverse group of faculty and patients," Dr. Talsania says. "It has been wonderful to share the management of more complicated patients with those who can provide a full spectrum of care for their conditions."

She divides her time between Morgan Stanley Children's Hospital of New York, Columbia's clinic at the Robert Burch Family Eye



Sonali Talsania, MD

Center at 250 West 64th Street, and the resident clinics at the Harkness Eye Institute and Harlem Hospital. "We provide care to a very diverse population, including families from the Washington Heights neighborhood as well as children whose parents may be affiliated with the university and the hospital," she says. "Prior to my coming on board, we had not offered pediatric ophthalmology at Harlem Hospital, and the families there are very appreciative of being able to have excellent pediatric eye care close to home, where they can also see their other doctors."

Dr. Talsania knew she wanted to work in a field with children after doing a pediatric rotation in medical school. "I have always been interested in working with kids," she says. "There is something really special about that. You have to be able to put kids at ease in a situation that can be kind of scary, and get the information you need from them. The kids are always fun, telling me about things like their favorite dinosaur. These are wonderful interactions you don't get with any other patient population. I don't think I'll ever get bored!"

During her surgery rotations, she also discovered that she enjoyed working with her hands and having the ability to offer surgical options to patients. "But I also liked longitudinal care, working with patients over years and building relationships, which you don't necessarily get in surgery," she says.

Her dilemma was solved after a rotation working with ophthalmologists at Boston Children's Hospital, when Dr. Talsania realized that she had found a subspecialty that combined everything she loved about medicine. "In pediatric ophthalmology, you perform

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IMPORTANT PATIENT CARE INFORMATION

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Viewpoint

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