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MEDICINE

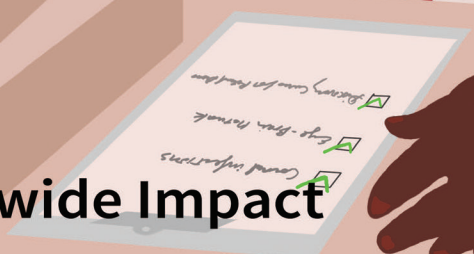
Byers Eye Institute
Department of Ophthalmology

VISION MATTERS



**Translating Research:
From Bench to Clinic to Worldwide Impact**

Stanford
OPHTHALMOLOGY
BYERS EYE INSTITUTE





VISION MATTERS: 2022 ANNUAL REPORT

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Take a tour of the cover:

The Byers Eye Institute at Stanford is devoted to moving great ideas to hospitals and clinics for the benefit of patients. That process is celebrated on this year's cover, from the three clinicians and researchers thinking up a big breakthrough (top right), to the start of a clinical trial (center) and those treatments making their way to patients across the globe (top left). The background is set on the back surface of the eye, known as the fundus, which is made up of the retina, macula, optic disc, fovea and blood vessels.

A note from our Chair



Every year I am reminded of what a privilege it is to work alongside talented colleagues at the **Byers Eye Institute at Stanford**, and 2022 was no exception. This year we saw COVID-19 cases decrease and a sense of normalcy resume with reinvigorated productivity in research, increased delivery of patient care across all our subspecialties, and renewed live attendance at educational events, a feat made possible by the steps we took as a team and as a community.

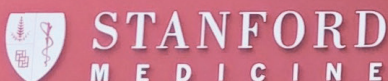
As I reflect on this past year, a few momentous achievements come to mind, including continuing to rank nationally in research funding and paving the way in creating innovative therapeutics through clinical trials (pages 4-9); hosting the **Optic Disc Drusen Hybrid Conference** (pages 14-15) and the **Bay Area Ophthalmology Course** (pages 30-31), both with in-person attendance for the first time since 2019; creating and hosting the inaugural **Program In Lasting Leadership and Academic Representation (PILLAR)**, which provided intensive, in-person mentorship for targeted ophthalmology residents who identify as underrepresented in medicine (pages 32-33); studying how to transfer high-quality, low-cost global ophthalmology patient care into our local communities (pages 28-29); and escalating our innovative research efforts at the **Mary M. and Sash A. Spencer Center for Vision Research at the Byers Eye Institute at Stanford** with renewed support of our generous philanthropic donors (pages 20-23).

It is an honor for me to witness daily the remarkable triumphs taking place here, and this department report will give you a glimpse into the devotion we pour into eye and vision healthcare for our patients, groundbreaking basic and translational research run by our clinician-scientists, and the training of the next generation of ophthalmologists and vision scientists.

With deepest gratitude, thank you to our donors, colleagues, staff, alumni, patients, and community for helping us build a preeminent department, as we strive to fulfill a reputation of excellence. It is a joy serving you!

Jeffrey L. Goldberg, MD, PhD

Blumenkranz Smead Professor and Chair of Ophthalmology
Byers Eye Institute at Stanford University



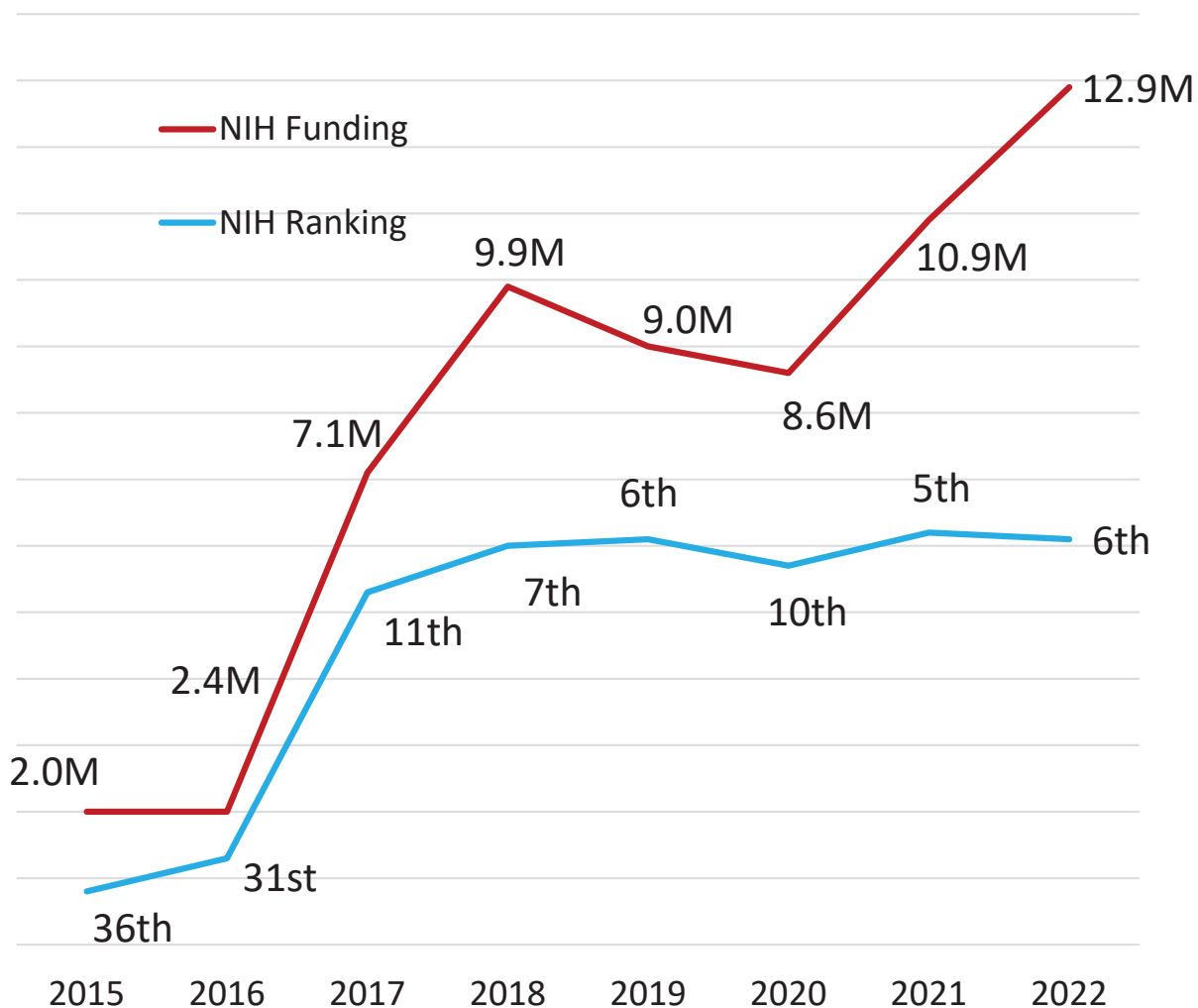
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BYERS EYE INSTITUTE AT STANFORD

Byers Eye Institute

by the numbers

RESEARCH GROWTH



2022 TOTAL
AWARDS

167

2022 TOTAL
NIH AWARDS

31

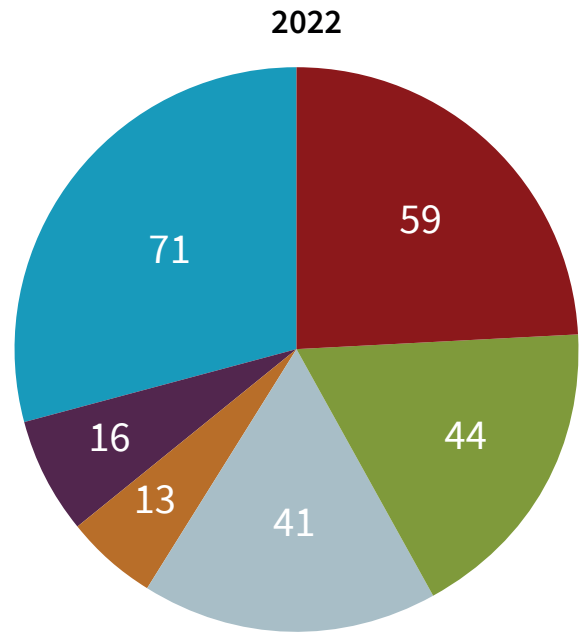
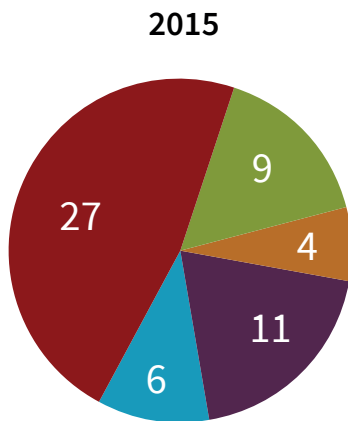
2022 CLINICAL
TRIALS

100

2022
PUBLICATIONS

206

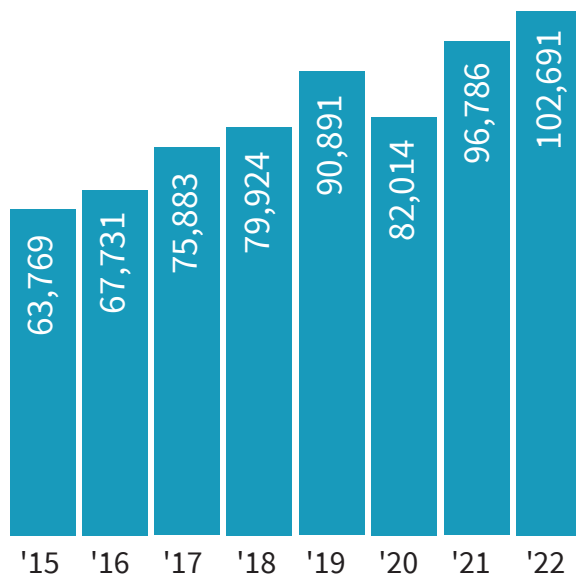
Our Growing Team



● Faculty
 ● Research staff
 ● Residents
 ● Clinical/Innovation fellows
 ● Administrative staff
 ● Postdoctoral researchers

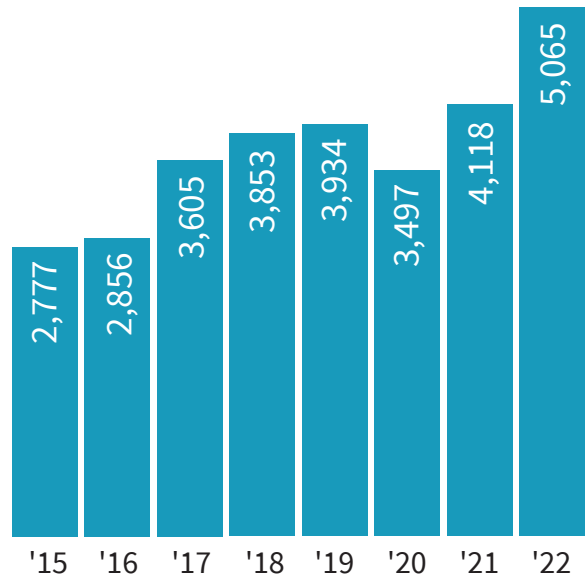
* Not counting adjunct and affiliate faculty

IN THE CLINIC:



Patient Visits

IN THE OR:



Surgical Cases

Translating research from bench to clinic

Stanford clinician-scientists lead the way in cutting-edge clinical trials

The road from laboratory-based discovery to approved patient therapy can be long and arduous, and too many promising discoveries never even start down that path. As part of the **Byers Eye Institute at Stanford's** commitment to advancing ophthalmic care and translating research into novel treatments for blinding conditions, the **Mary M. and Sash A. Spencer Center for Vision Research at the Byers Eye Institute** has served as a nidus for a visionary and revolutionary transformation through accelerating and facilitating clinical trials. These research studies are aimed at testing new treatments (including new drugs, devices, or other therapies) on human patients for safety and efficacy.

Many academic centers participate in clinical trials sponsored by the National Institutes of Health (NIH) and by pharma or biotech industry partners, but the Spencer Center at the Byers Eye Institute has leveraged philanthropic and foundation funding to accelerate first-in-class human research in areas of great unmet need, often pursuing diseases at a level not achievable in industry, and for a range of specialized areas such as therapies for the cornea, optic neuropathy, diabetic eye disease, and age-related macular degeneration (AMD).

"Clinical trials play a pivotal role when it comes to battling blindness and vision loss," **Vinit Mahajan, MD, PhD**, professor of ophthalmology and vice chair for research said. "We need doctors who are as comfortable in the laboratory as they are in the operating room and clinic, so that we can accelerate the discovery process."

Faculty's ability to propose and initiate clinical trials on their most promising diagnostic and therapeutic hypotheses is only possible by building out a departmental clinical research unit (CRU) with research patient coordinators, specialized photographers, data scientists, bioinformatics and biostatistics specialists,



Mariana Nunez leads the team of clinical research coordinators at the Spencer Center for Vision Research at the Byers Eye Institute. Pictured back row (L to R): Farheen Shaikh, Anisa Chaudhry, Mark Santos, Mariana Nunez, Zac Wennberg-Smith, Kenny Trang; front row (L to R): Aarushi Kumar, Mariella Saldares, Monique Nguyen, Lorraine Almeda.

all with expertise in navigating the U.S. Food and Drug Administration (FDA) and other processes that are needed to successfully run cutting-edge clinical trials. The CRU team is led by **Mariana Nunez**, clinical research manager, and **Heather Moss, MD, PhD**, associate professor of ophthalmology and director of clinical research.

"We are fortunate to have not only top faculty but also top staff in the CRU, all of whom are mission-driven to solve these problems," Moss said.

The success and breadth of these and other clinical trials are also reflected in the department being ranked in the top five for NIH-funded medical school departments of ophthalmology. Here we share a sampling of scientific breakthroughs taking place at Byers, providing patients hope for some of the most debilitating eye diseases and visual system disorders.

Testing a new cross-linking method for corneal infections

One such clinical trial effort is seen in the work of **Jennifer Rose-Nussbaumer, MD**, associate professor of ophthalmology, who has spent the past decade researching effective treatment for **corneal infections** and is currently leading clinical efforts focused on corneal ulcers.

A **corneal ulcer** is a painful, open sore that typically results from infection with bacteria, fungus or other pathogens. Fungal keratitis accounts for approximately 50% of ulcers in tropical regions, and while FDA-approved topical natamycin drops often are effective treatment, in serious cases, half of those patients will experience perforation or require corneal transplantation, which carries a high rate of rejection.

Rose-Nussbaumer collaborated with **N. Venkatesh Prajna, DO, DN, FRCO**, from Aravind Eye Hospital in southern India, and with the University of California, San Francisco, to discover alternative treatment methods. Together they found that out of two topical treatments, natamycin and voriconazole, natamycin-treated patients had better visual acuity. They then combined natamycin with a technology called corneal cross-linking with riboflavin that some clinicians have started using on patients, and found that it increased scarring

when used for fungal keratitis.

“There is an urgent need to discover new therapies so that patients don’t have to undergo corneal transplantation,” Rose-Nussbaumer said. “We have found that fungal corneal infections are harder to treat than bacterial infections and tend to have worse outcomes.”

To improve these outcomes, Rose-Nussbaumer and Prajna are now using funding from an NIH clinical research cooperative award to identify new treatments for corneal infections by testing patients in India with a new cross-linking treatment method for corneal infection called **rose bengal photodynamic antimicrobial therapy (PDAT)**. PDAT is an alternative method that looks at fungal infections in vitro. They will compare PDAT’s effectiveness to PDAT combined with the topical natamycin treatment to see if it improves or worsens visual acuity outcomes.

“With this study, we can gain an understanding and then implement our findings quickly,” Rose-Nussbaumer said.

The eye-brain network

Our vision depends on more than our eyes. In fact, the brain and the optic nerve, which transmits visual images from the eye to the brain, together play a vital role in vision. Damage to this visual pathway, known as optic neuropathy, can affect visual acuity and if left untreated, can lead to vision loss.

Joyce Liao, MD, PhD, professor of ophthalmology and neurology, is leading and collaborating on various clinical trials aimed at understanding disease progression and treatment for optic neuropathies.

In a first-of-its-kind study, Liao is the principal investigator for a Stanford trial of over 400 study participants, examining the natural history and risk factors for ischemic optic neuropathy, optic disc drusen, and mitochondrial optic neuropathies, compared to control patients with no diseases.

“Our goal is to gain a deeper understanding of patient details with optic neuropathy damage so that we can better comprehend who is more likely to have fast disease progression and then develop treatment accordingly,” Liao said.



Jennifer Rose-Nussbaumer, MD (center), collaborated with N. Venkatesh Prajna, DO, DN, FRCO (at right), from Aravind Eye Hospital, India, to find topical treatments for corneal ulcers.

Liao, who is the director of the **Stanford Center for Optic Disc Drusen at the Byers Eye Institute**, has spent the past three years recruiting patients and collaborating with her colleagues at the Spencer Center for Vision Research at the Byers Eye Institute at Stanford. Together, they have done a deep phenotyping on patients who have lost vision from optic nerve diseases by examining biomarkers, including advanced imaging techniques as well as the molecular signatures found in bodily tissues and fluids that indicate the body's response to disease and to disease treatment.

"Imaging allows us to see scans of the optic nerve in microscopic detail, and hopefully determine who is at risk of vision loss," Liao said.

By extending their research to include analysis of patients' blood, they can better understand the patient's genetic constitution and metabolism.

"When we look at a patient's metabolic state, we find there are proteins in the energy pathway that when deficient, can correlate with vision loss," Liao said.

"We are now translating those findings into a clinical trial—to combat vision loss, we are testing a particular combination of vitamins and antioxidants to protect the optic nerve."

Liao's team has also identified several promising novel genes that may be responsible for familial optic neuropathies, specifically dominant optic disc drusen. This was achieved after sequencing the genome of hundreds of patients, totaling over 11 trillion DNA base pairs. The combination of deep phenotyping of the disease and detailed genotypic analysis can provide a complete profile of disease and risk factors, leading to precision health and treatment to protect or restore vision.

"Moving forward, our hope is that these trials can move into treatment," Liao said. "Ultimately, this work would not be possible without the support of generous donors and patients who have traveled long distances to participate in our studies."

Discovering cures for retinal diseases

Yasir Sepah, MBBS, assistant professor of ophthalmology, is leading studies and collaborating with other department faculty on research related to retinal diseases, including **diabetic retinopathy** and **AMD**.

Sepah has spent the last eight years targeting **diabetic macular edema**, which occurs when high blood sugar causes continuous damage to blood vessels in the retina. Diabetic macular edema leads to loss of vision and is the leading cause for vision loss in diabetic retinopathy patients.

Currently, monthly eye injections are used to treat these patients, but only two-thirds of the patients respond well to it.

In collaboration with **Quan Dong Nguyen, MD, MSc**, professor of ophthalmology and **Carolyn Pan, MD**, clinical associate professor of ophthalmology, they are investigating disease pathology in molecular biomarkers to better understand why some patients are non-responsive to current therapies. They are initiating a new study to discover additional targets for therapy. One of these targets is **interleukin 6 (IL-6)**, a protein that is produced in response to infections and tissue damage.

"IL-6 has shown to be responsible for the signs and symptoms of diabetic retinopathy in patients who do not respond to their current individual therapies that are out there," Sepah said. "If we can identify what patients will develop vision-threatening diseases at an earlier stage, then we can intervene before the disease progresses too much. Studying IL-6 therapy for eye disease is a great example of how we're moving discoveries into therapeutic testing at Stanford."

Prosthetic chip provides a breakthrough for macular degeneration patients

Nearly 20 years ago, **Daniel Palanker, PhD**, professor of ophthalmology, set out on a mission to restore vision for AMD patients. His solution was a **photovoltaic retinal prosthesis** he created, called **PRIMA**.

The PRIMA prosthetic system includes a microchip implant—which is self-sustaining and needs no wires for external power supply—inserted under the central retina. Each pixel in the implant converts light projected

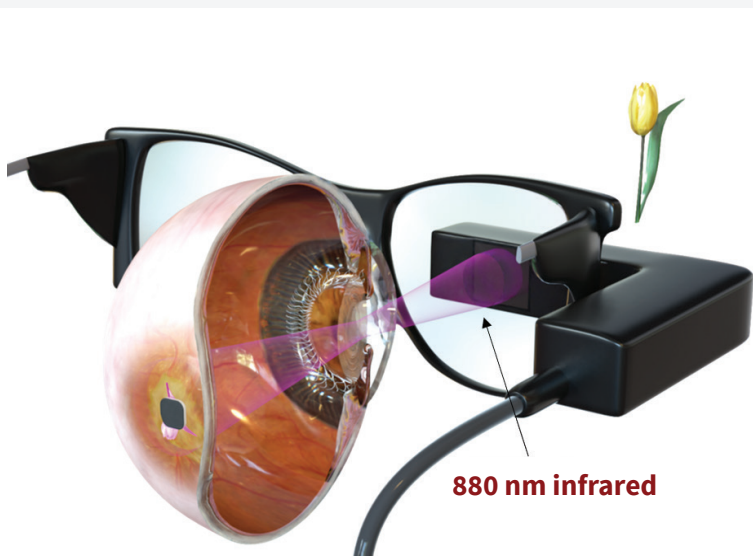


Diagram of PRIMA, the photovoltaic retinal prosthesis created by Daniel Palanker, PhD.

from transparent augmented-reality (AR) glasses into electric current to stimulate the inner retinal neurons, restoring vision in patients' central blind spot.

Over the years, Palanker and his collaborators in the departments of ophthalmology and electrical engineering at Stanford have fine-tuned the implant, testing it ex vivo and in animal models of retinal degeneration.

In a clinical feasibility study published earlier this year, they found that AMD patients not only regained central vision in the blind spot, but their prosthetic visual perception was integrated with the natural peripheral vision. Prosthetic visual acuity closely matched the 100-micrometer pixel size of the implant, reaching up to 20/438, allowing them to see large letters. Using electronic magnification on AR glasses, visual acuity exceeded 20/100.

"These findings are remarkable," Palanker said.

"We demonstrated feasibility of restoring form perception with a photovoltaic substitute of the lost photoreceptors."

Steven Sanislo, MD, clinical professor of ophthalmology, who previously collaborated on macular degeneration research with Palanker, is now a primary investigator alongside **Theodore Leng, MD, FACS**, associate professor of ophthalmology, on a clinical trial utilizing the PRIMA system.

This study is sponsored by Pixium Vision, which commercialized the device. It is a second phase trial that builds off the above-mentioned feasibility trial. The study now includes three U.S. sites, and they are currently enrolling patients with visual acuity below 20/460.

"As Dr. Palanker continues to make improvements to the prosthetic chip, I am hopeful that the implant will not only help patients with macular degeneration, but other retinal diseases as well," Sanislo said. Particularly, Sanislo would like to see the chip benefit those with retinitis pigmentosa, a group of rare genetic disorders that affect the retina in various ways. The most common symptoms include losing night vision and gradual peripheral vision loss, followed by the loss of central vision and color perception.

Palanker's lab is working on the next generation of the implant with 20-micrometer pixels, aiming for visual acuity of 20/100 prior to any electronic magnification. "Success of the first-generation implant in patients and of the new chip with five times higher resolution in preclinical testing provide hope for patients, so we are excited and motivated to move forward," Palanker said.

Stem cells show healing properties for macular degeneration

Leng is also leading other clinical trials focused on macular degeneration, including a new treatment approach using stem cells to restore lost vision.

Leng is studying a form of late-stage dry AMD known as **geographic atrophy (GA)**. GA typically first begins in

the central vision and causes the retina cells to waste away, resulting in a visual blind spot. Pharmacological drugs that can slow the growth of GA are on the cusp of coming to market, but they can only slow vision loss and cannot restore visual function.

In hopes of not only halting GA but reversing the effects of it, Leng is involved in three different research efforts looking at improving cell function.

The first is a research project at Stanford on product and cell development through grant funding from the California Institute of Regenerative Medicine.

“We have harvested neural stem cells from brain tissue,” Leng said. “We are going through the process of manufacturing the cells in a manner compliant with the Good Manufacturing Practices as defined by the FDA, so that they can be used in human clinical trials.”

They are also testing the survivability and the functionality of the cells, finding that these cells can successfully restore visual function. Moving forward, they hope to enter a phase 1 human trial by 2024. This would entail doing surgery on enrolled patients by injecting these cells underneath the retina.

“The injected cells would secrete tiny hormones and growth factors that would restore function to the dying retinal nerve cells, allowing patients to see better again,” Leng said.

Leng is also leveraging his experience and expertise to help lead two phase one, first-in-human clinical trials replacing the cells from the outermost layer on the retina, the **retinal pigment epithelium (RPE)**, and investigating ways to increase cell survival. RPE are responsible for keeping the light sensing cells functioning in the retina, but degenerate when a patient has GA. They began enrolling their first subject in fall of 2022.

“I am hopeful for all three of these studies,” Leng said. “For decades, cell-based therapies have shown to be

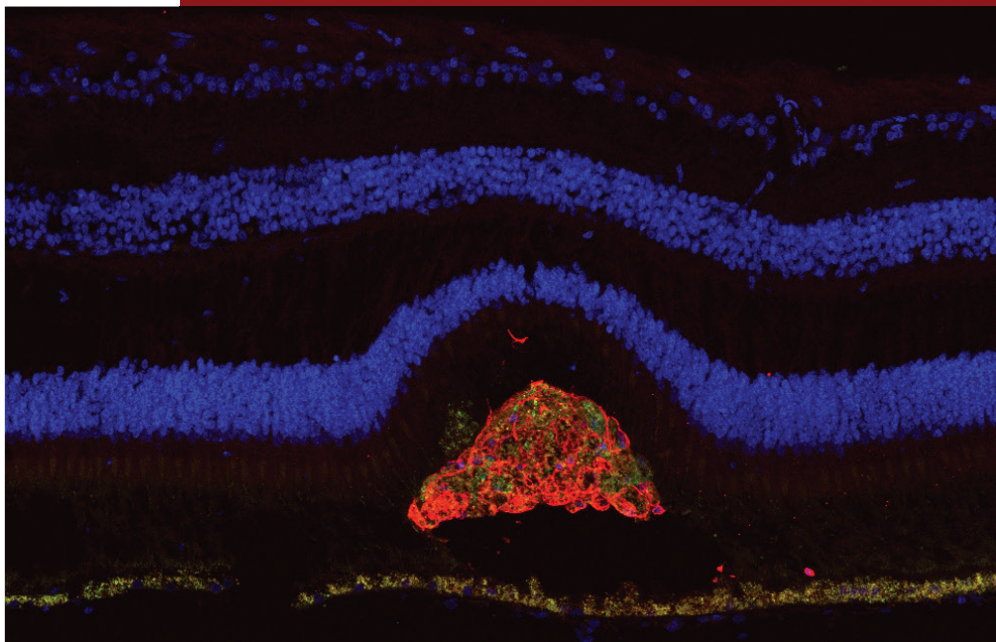
effective for blood transfusions in hematologic oncology patients. This shows we have the technologies and methods to do cell-based therapies, we just have to transfer the same restorative patterns to the eye successfully.”

Light therapy for dry age-related macular degeneration

Diana Do, MD, professor of ophthalmology, has over 17 years of experience leading clinical trials geared towards developing cutting-edge treatment for retinal diseases. Recently, Do has devoted a significant portion of her research effort to developing more effective treatments for AMD.

“When a person loses their central vision to AMD it can make it harder to read, see faces, or drive,” Do said. “The global prevalence of AMD is estimated to increase to 243 million by 2030, which is why my research team is committed to discovering further treatment routes.”

A new, promising therapy Do is testing is **photobiomodulation (PBM) light therapy** for dry AMD.



An immunofluorescence image of adult human neural stem cells (orange) that have successfully survived under the retinas of non-human primates, from the lab of Theodore Leng, MD, FACS.

This therapy uses low-level red and near infrared light to promote tissue healing, stimulate cellular function, and reduce inflammation. PBM light therapy can reduce both acute and chronic pain, and has been used in physiotherapy, arthritis, and wound repair.

Do is collaborating on this LIGHTSITE III clinical trial with other retina specialists and the medical device company LumiThera, serving as the principal investigator.

Together they conducted the trial at the Byers Eye Institute and nine additional collaborating U.S. retinal centers. They enrolled 100 subjects with intermediate dry AMD and an average age of 75 in a 2:1 ratio of PBM to sham (inactive) treatment.

“Around month 13 our data showed a significant difference between our PBM group versus our sham group,” Do said. “We found that PBM provided a sustained and improved best corrected visual acuity—a very exciting step towards therapy for patients everywhere.”

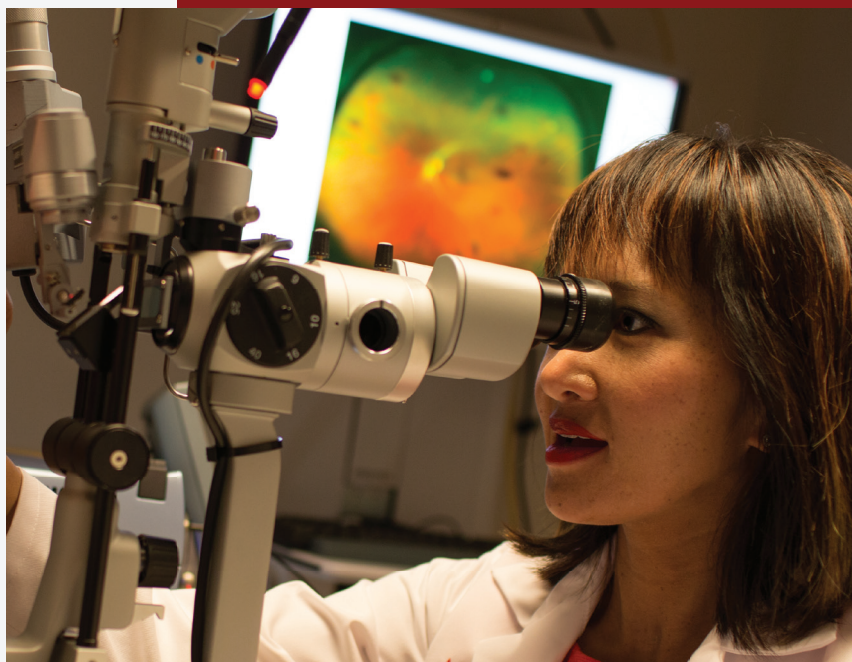
Encouraged by these positive findings, Do and her collaborators plan to conduct additional studies to further evaluate PBM in AMD and other retinal disorders.

Introducing a new laser for LASIK surgery

Edward Manche, MD, professor of ophthalmology, has more than 27 years of experience conducting ophthalmic device and drug studies in the field of cornea and refractive surgery.

Laser surgery is commonly used as an alternative for patients who find that the use of glasses or contacts interfere with their quality of life, and can be used to address varying severities of nearsightedness, farsightedness, and astigmatism. Less appreciated, laser surgery is also used to correct and even prevent certain corneal diseases from progressing.

While laser and refractive surgery are well-established, Manche continues to be involved with clinical trial and



Diana Do, MD, is working to develop more effective treatments for age-related macular degeneration.

research efforts aimed at identifying treatment advances, having conducted more than 25 U.S. FDA studies involving devices and drugs.

His most recent project is focused on a new excimer laser (a form of ultraviolet laser) from Carl Zeiss Meditec, Inc. known as the MEL-90 excimer laser.

“This is the first new excimer laser being tested for use in the U.S. in more than 15 years,” Manche said. “The laser has been used successfully internationally for several years but needs to undergo a formal FDA trial to demonstrate safety, efficacy, and stability of the LASIK treatments.”

Nine sites are involved in the clinical trial, but Manche's study represents the only academic site in the group. Patient enrollment in the clinical trial is nearly complete with 404 patients enrolled to date.

While nothing has been published yet, the data is being collected and will be analyzed and submitted to the FDA for review, with an anticipated approval in 2023. Upon approval, the laser can be commercially launched and available to treat patients in the U.S.

“So far our findings are promising, and I am hopeful that the new technology will improve patient outcomes with an excellent safety profile,” Manche said.

Solving the mysterious links between multiple sclerosis, optic neuritis and vision loss

Multiple sclerosis (MS) is a mysterious disease. Women with this debilitating inflammatory condition can go from feeling fairly healthy one day to struggling to walk the next, as a person's immune system attacks the myelin sheaths that insulate nerve cells in the brain.

In North America and Northern Europe, MS is the most common cause of optic neuritis (inflammation of the optic nerve), and MS patients often experience visual disturbances since our eyes are connected to the brain via the optic nerve.

One of the most intriguing mysteries to **Heather Moss, MD, PhD**, associate professor of ophthalmology and neurology, and director of clinical research, is how and why MS affects the eyes in a subset of patients.

Not all patients with MS develop optic neuritis, and some of those who have visual disturbances do not show the same clinical signs of optic neuritis as others. When imaging the eyes and brain using common techniques, Moss said she was often unable to account for these differences in vision among her patients.

She teamed up with **May Han, MD**, a neuro-immunologist and associate professor of neurology and neurological sciences; **Lucas Kipp, MD**, a neuro-immunologist and clinical assistant professor of neurology and neurological sciences; and **Alfredo Dubra, PhD**, professor of ophthalmology. Together, the researchers set off to see what they could learn about the different causes of visual disturbance in people with and without MS—and at the same time discover a better way to measure the disease and predict who is at risk for vision loss.



Heather Moss, MD, PhD, aims to better identify and understand neurologic diseases such as multiple sclerosis and optic neuritis to provide better treatments for patients.

Optic neuritis and MS

Optic neuritis can be one of the earliest signs of MS, emerging before a patient even receives an MS diagnosis.

“Optic neuritis is a condition that causes vision loss in one or both eyes, which is understandably alarming to people and brings them to seek immediate medical care,” Moss said.

For many patients, the inflammation will go away on its own or with the help of corticosteroids, and their vision will return. But for some patients, more doses or additional treatments may be needed. “We want to figure out upfront what type of optic neuritis or eye disease people have, so that we can treat them

appropriately, and also understand their long-term disease potential and prognosis,” Moss said. “This can be critical, as if you use aggressive treatments on every patient, and they do not need it, someone may end up with side effects or a complication of treatment, which can itself be devastating.”

MS in the retina


Moss, Dubra and their team used adaptive optics imaging, which employs a highly-focused light and detector system Dubra helped invent, to get the highest-resolution, most detailed images of the backs of the eyes of people with MS. Even though MS is thought to affect the optic nerve behind the eye, they were surprised to find characteristic changes in the patients’ retinas.

“These changes have not yet been associated with MS, so this is really exciting because we might finally answer this clinical question of why some MS patients can’t see as well as others,” Dubra said.

After examining the eyes of a broad cohort of MS patients, the team published a paper in 2021, and received additional funding from the Department of Defense to continue the work. So far, the patients have been studied mere months, but since MS progresses slowly over years and decades, it will be crucial to get more data from the same patients over an extended period to understand how their retinas may change.

Other causes of optic neuritis

Moss has also applied this approach to better understand rare variants of optic neuritis. In 2007, scientists discovered that a small number of patients diagnosed with optic neuritis have a specific biomarker, myelin oligodendrocyte glycoprotein (MOG), that other patients don’t have. Initially, researchers believed that MOG was associated with MS, but they soon found that MOG is found in a completely separate disease process, dubbed myelin oligodendrocyte glycoprotein antibody-associated disorder (MOGAD).



These changes have not yet been associated with multiple sclerosis, so this is really exciting because we might finally answer this clinical question of why some MS patients can’t see as well as others.

ALFREDO DUBRA

The disease is so rare that it is hard to study in a way that provides reliable answers. Moss’s lab has since teamed up with collaborators from across the world to amass 64 MOG and 50 MS patients, and are actively working on identifying ways to differentiate MOGAD optic neuritis from other types, and determine optimal treatments.

As Moss and other researchers learn more about the different causes of optic neuritis and the prognosis for each classification, they hope to ultimately design treatments that can improve eyesight and quality of life for every type of patient. “Finally moving towards better understanding of the disease will give us a chance to better and more specifically treat our patients—this is the ultimate goal of delivering precision medicine and precision health,” Moss said.

Pressure point

Liu lab seeks to identify the eye's pressure sensors and how they drive glaucoma

Eye pressure is a major risk factor for glaucoma. Whether starting with high eye pressure or even “normal” eye pressure, something about the eye pressure causes ongoing damage to the optic nerve leading to vision loss in patients with glaucoma. Current medications and surgeries for the disease address the production and drainage of fluid from the eyes to help lower this pressure. But no one knows how eye pressure leads to optic nerve degeneration.



Wendy Liu, MD, PhD, and her team are looking at how genetic variants might alter the course of glaucoma.

Stanford researchers, led by physician-scientist **Wendy Liu, MD, PhD**, assistant professor of ophthalmology, are seeking a way to understand the fundamental element of eye pressure in this disease, and thereby develop new therapies.

“Rather than working so hard to externally control

the eye pressure, if we could target the eye's pressure sensors to teach the eye to set the pressure lower by itself, it would be a completely new way of thinking about treating glaucoma,” Liu said. “We need to find the eye's pressure sensor and discover how to adjust it.”

In addition to pressure sensors in the eye having the potential to better control the eye pressure, as yet unknown molecular sensors in the eye must also be transducing pressure into damage. “If we can discover the fundamental mechanisms by which the eye or optic nerve degenerates in response to pressure in some patients, we could shut off that path and make patients resistant,” Liu said.

What are the pressure sensing genes and proteins, then? Using data from the NEIGHBORHOOD Consortium for glaucoma genetics, Liu and her team, in collaboration with **Janey Wiggs, MD, PhD**, professor of ophthalmology at the Massachusetts Eye and Ear Infirmary, analyzed genetic variants associated with glaucoma in 3,853 people with primary open-angle glaucoma and 33,480 controls. The team identified variants in mechanosensitive ion channel genes that may be the target they are seeking.

“Mechanosensitive ion channels are basically molecular pressure sensors, and now we have some genetic data showing that certain variants of these genes are associated with the risk of developing glaucoma,” Liu said.

In ongoing research, Liu and her team are testing the function of these genes in cell culture and animal models of glaucoma. Liu's research collaborators include **Jeffrey Goldberg, MD, PhD**, Blumenkranz Smead professor and chair of ophthalmology; **Stephen Baccus, PhD**, professor of neurobiology; and other faculty from these departments. Pilot funding for the project comes from the American Glaucoma Society, Research to Prevent Blindness, and a Stanford KL2 Career Development Award.

"If we show that these variants alter the course of glaucoma in animal models, that would provide supporting evidence that this would be a viable drug target for glaucoma," Liu said.

Ultimately, the research findings could lead to new targeted therapies for glaucoma that could alter the function of these pressure sensors to prevent disease progression.

Post-surgical scarring

In other research, Liu and her colleagues are looking to solve a more downstream problem in glaucoma care: post-surgical scarring. Trabeculectomy is considered the gold standard glaucoma surgical procedure for lowering eye pressure, but the most common reason that trabeculectomy fails over time is scarring.

In trabeculectomy, the surgeon creates a new drainage channel in the sclera, creating a fluid pocket (called a "bleb") beneath the conjunctiva to reduce pressure and prevent further vision loss. But if a scar forms between the conjunctiva and the sclera, a common complication

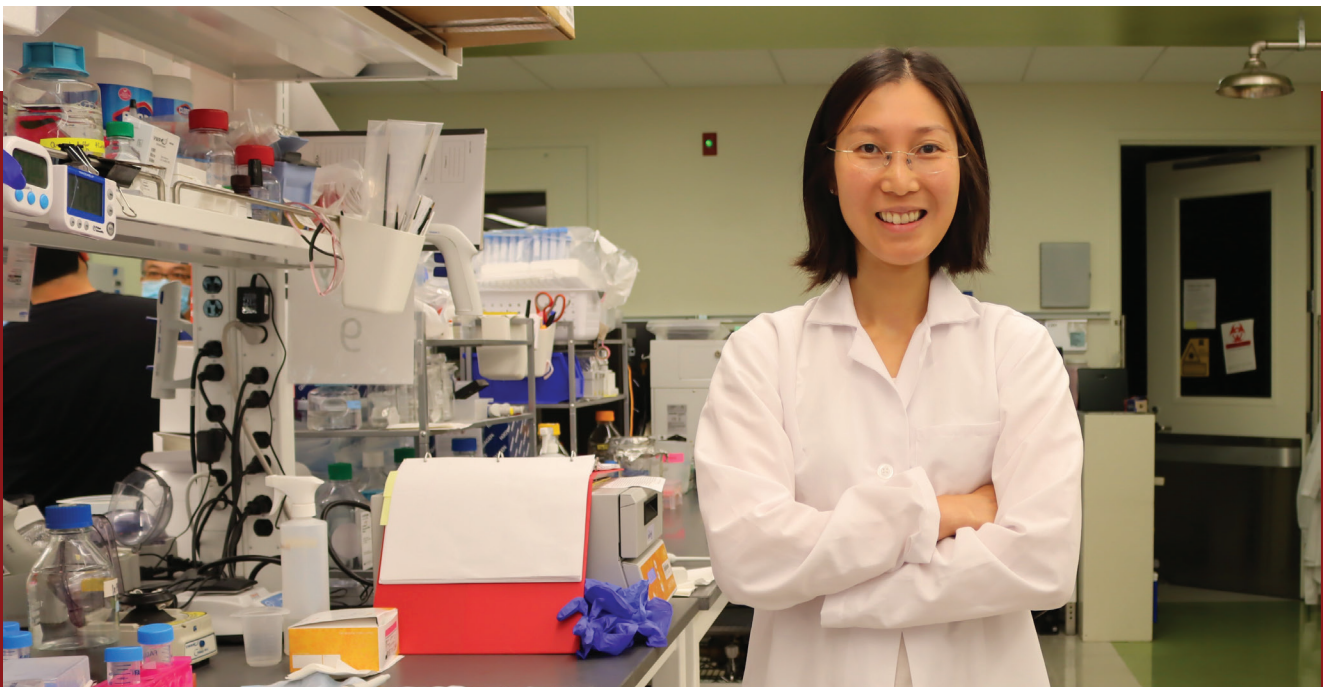
that can occur months or years after surgery, the drainage channel can no longer effectively lower intraocular pressure.

In a project funded by Stanford's SPARK program, which provides grants to generate proof-of-concept data as well as access to specialized knowledge and technical expertise regarding drug development to support translational research, and the American Glaucoma Society, Liu and her team are testing a new drug to determine whether it might help prevent post-surgical scarring in glaucoma patients.

"If it works, we could prolong the survival of glaucoma surgeries and improve outcomes for patients," Liu said.

As a physician-scientist, Liu looks forward to a time when discoveries made in her lab will benefit patients in her clinic.

"Hearing patients' stories in the clinic motivates me to discover more about the disease," Liu said. "Hopefully we can take this clinically relevant data and translate it into discoveries and eventually treatments that can help patients maintain their vision for a lifetime."



Wendy Liu, MD, PhD, hopes that her research will help improve trabeculectomy outcomes for patients by preventing post-surgical scarring.

Stanford Center for Optic Disc Drusen hosts its first in-person symposium

Joyce Liao, MD, PhD, professor of ophthalmology and neurology, is devoted to treating patients with **optic disc drusen (ODD)**, a condition that affects the optic nerve and vision. While it is a disease almost as prevalent as glaucoma, there is still much unknown about the disease and how to prevent or treat resulting vision loss.

In ODD, calcium-containing deposits at the optic nerve head are associated with damaged optic nerve axons. Affecting 2% of the general population, ODD can lead to both progressive or sudden irreversible vision loss.

With no current cure for ODD, Liao knew that more needed to be done, and in 2019 that need was met when a visionary donor provided a significant gift to establish the **Stanford Center for Optic Disc Drusen at the Byers Eye Institute**.

With a goal of uniting ODD researchers from around the world in this quest, Liao, with her faculty and staff collaborators from Stanford and other institutions, held two first-of-their-kind ODD conferences virtually due to the COVID-19 pandemic. The conferences have provided new opportunities for clinicians and

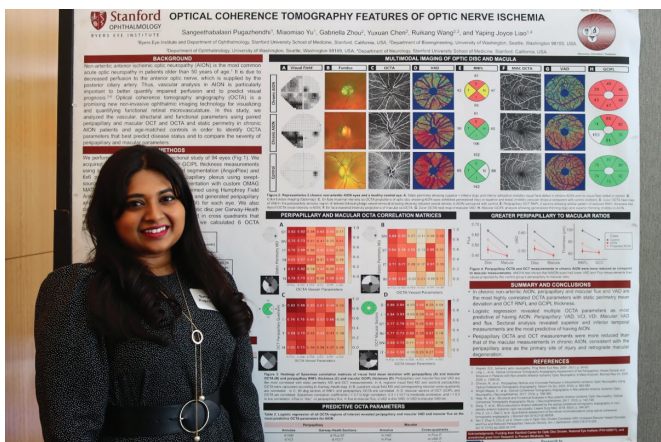


Dr. Steffen Hamann of Denmark giving a talk on the international Optic Disc Drusen Studies Consortium and the NARROW clinical trial.

scientists to share their laboratory and clinical findings, discover breakthroughs in translational research, and also educate the public about the state of ODD research. This year, the international conference was finally able to allow in-person attendance, though it was still held in a hybrid format.

“Traditionally, researchers wait to release their findings until they have something published, but the conference serves as a means for the Center to get these ODD discoveries out in order to raise awareness for this important condition,” Liao said. “It has been very gratifying to hear patients say how excited they are to learn that such intense research efforts are ongoing.”

A series of major findings have now been released in this format. One significant advance arising from ODD Center research was that patient skin fibroblasts show evidence of mitochondrial dysfunction, opening a new research direction which could lead to diagnostic and



Sangeetha Pugazhendhi, MD, with her award-winning poster.

therapeutic discoveries. In a second set of experiments, ODD Center researchers discovered that they could use cells from patients to reproduce ODD-like calcification in a dish. “Having the right amount of calcium, not too little and not too much, could be an important indicator



Attendees participate in discussions during presentations at the ODD symposium.

for ODD treatment,” Liao said. “We are looking forward to discovering further advancements in this area, and we hope to start new clinical trials based on these steps forward.”

This was also the first year that an in-person poster session was held, with 32 scientific presentations.

The top four posters were awarded a prize:

Sangeethabalasri Pugazhendhi, MD; Karanvir Kaushal, PhD; Barbara Rangel da Silva, PhD, from Stanford, and **Lea Lykkebirk, MD**, an ophthalmologist at the University of Copenhagen, Denmark.

“I am grateful for the entire team who has made this conference possible for three years in a row,” Liao said. “It is encouraging to see we are working together for one sole purpose—to help patients—and the collaboration and progress the Center has brought forward is what excites me most about our next steps.”

For more information, see: <https://med.stanford.edu/optic-disc-drusen.html>



Pictured (L to R): Joyce Liao, MD, PhD, Lea Lykkebirk, MD, Steffen Hamann, MD, PhD, Heather Moss, MD, PhD.

Discovering neural repair genes for glaucoma

Glaucoma is one of the leading causes of blindness for individuals over the age of 60. It occurs when the optic nerve, which connects the eye to the brain, is damaged from high eye pressure—a process called neurodegeneration.

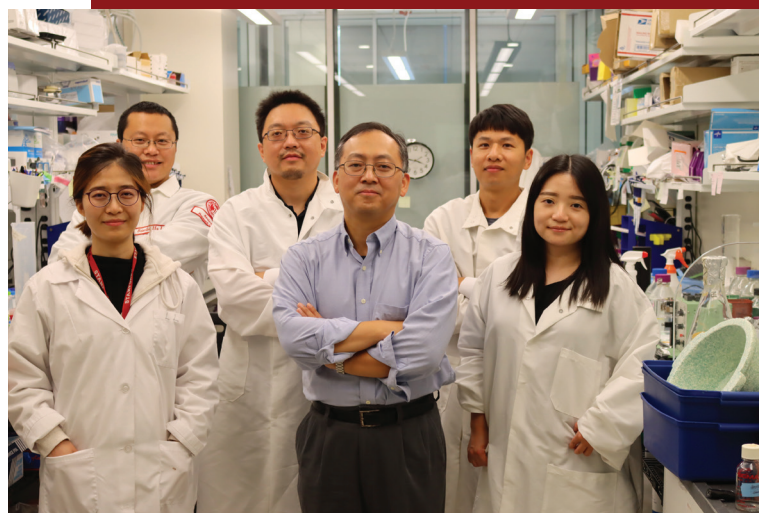
The symptoms of glaucoma can start slowly, for example affecting patients' peripheral vision first, causing the disease to often go unnoticed. While there is no current cure to reverse the damage of glaucoma, methods like lowering eye pressure are used to slow or prevent the progression of total vision loss.

"While lowering intraocular pressure is the standard treatment for glaucoma, there are no therapies that directly treat the optic nerve neurodegeneration and loss of vision," said **Yang Hu, MD, PhD**, associate professor of ophthalmology. "Repair genes that lead to neuroprotection and even regeneration are desperately needed."

In the early part of the COVID-19 pandemic, Hu and his collaborators finally experienced a breakthrough in their findings. These collaborators included multiple members from Hu's lab in the **Mary M. and Sash A. Spencer Center for Vision Research at the Byers Eye Institute at Stanford: Liang Li, PhD, Fang Fang, MD, PhD, Xue Feng, PhD, Haoliang Huang, MSc, Liang Liu, Pingting Liu, PhD, Adam Z. Xu, and Pei Zhuang, PhD.**

They also collaborated with **Stanley Qi, PhD**, associate professor of bioengineering, and **Le Cong, PhD**, assistant professor of pathology and genetics.

The group knew that when the gene Pten is deleted in retinal ganglion cells (RGCs), this promotes optic nerve regeneration. However, only a small percentage of cells have the potential to regenerate. The team's initial breakthrough came when Fang discovered a surgical technique that allowed them to identify those few regenerating RGCs. The group's findings were recently



Pictured (L to R) Back row: Liang Li, PhD; Stanley Qi, PhD, collaborator and associate professor of bioengineering; Haoliang Huang, MSc. Front row: Xue Feng, PhD; Yang Hu, MD, PhD; Xiaoshu Xu, PhD.

published in the high-impact journal *Neuron*.

In parallel experiments, the team has uncovered gene therapies and even small molecule drug therapies that stand to protect against degeneration further. "Another group of findings led us to discover that interfering with retinal neurons' stress response blocks these cells from dying," Hu said. His team is now exploring how to best formulate and even combine therapies to initiate a translational research program that can move into human testing.

"We are thrilled by these findings because they show great potential that we are on the brink of creating a promising neuroprotection therapy for glaucoma patients," Hu said.

Their long-term goal is to move these research findings into clinical trials, and until then, they will continue to study cell development.

Providing premier service for eye misalignment in adults

The **Byers Eye Institute at Stanford** provides a premier specialty clinic for adult strabismus patients. Strabismus, also known as eye misalignment, can occur due to issues with restriction—eye muscles not functioning properly—or with paresis—when the nerves to the eye muscles are not functioning properly. It can lead to double vision, poor depth perception, and social problems. Adult strabismus patients can encounter symptoms from a residual childhood diagnosis, or it can onset for the first time in adulthood. Depending on the cause, management approaches vary.

At the Byers Eye Institute, strabismus patients are treated under the supervision of any one of our specialists on the adult strabismus team, including **Euna Koo, MD**, clinical assistant professor of ophthalmology; **Andrea Kossler, MD, FACS**, associate professor of ophthalmology; **Scott Lambert, MD**, professor of ophthalmology; and **Ann Shue, MD**, clinical assistant professor of ophthalmology.

“The most common treatment for adult strabismus is using prisms ground into or attached to eyeglass lenses, injecting botulinum toxin into an eye muscle, or eye muscle surgery,” Lambert said. “Strabismus surgery is generally performed on an outpatient basis by repositioning the eye muscles. In some cases, fine adjustments are made to the position of the eye muscles in the recovery room to optimize the alignment of the eyes.”

A non-surgical treatment route

Mari Takino, MBA, always defined herself as career-oriented, a go-getter, traveling around the world for her education and career. She grew up in the United Kingdom, then after a stint in finance in Hong Kong, she moved to the Bay Area to attend the **Stanford Graduate School of Business**.



Mari Takino graduating from the Stanford Graduate School of Business.

On paper, Takino was excelling professionally, but she was fighting vision problems not always apparent to others. Around the age of 18 years old, she noticed the first signs of strabismus.

“Every now and then, I would wake up with crossed eyes,” Takino said. “I also noticed that dim lighting or focusing my eyes on certain angles for extended periods of time triggered them.”

Initially, Takino could realign her eyes within 20 to 30 minutes, but as her strabismus worsened, she spent up to an hour every morning realigning her eyes. She avoided environments that triggered her eyes to cross, such as concerts and movie theaters. Even with an abundance of caution, her eyes still crossed often, causing her to shy away from others’ attention and avoid photos.

“It affected my life in small ways that built up psychologically because I’d constantly stress about my eyes even if they weren’t crossed,” Takino said. “The breaking point was when I attended an admit weekend for a graduate school; my eyes crossed after a presentation in a lecture room so I hid in the bathroom for hours to get them to align but to no avail. I knew then I needed to seek medical attention.”

PATIENT SPOTLIGHT: CLINICAL EXCELLENCE

Takino was referred to Stanford and seen by **Euna Koo, MD**, for her treatment. Koo diagnosed Takino with intermittent esotropia, a type of strabismus common in nearsighted people where the eye(s) intermittently turn inward.

“After discussing various treatment options, including incisional surgery and Botox, Mari elected to try Botox,” Koo said. “Given that her strabismus was only intermittent and Mari’s hesitancy to proceed with surgery, Botox was elected as the initial management approach.”

Koo injected Takino’s eye muscle with Botox twice, with each injection’s effects lasting about three months. The effects were immediate. Takino’s eyes no longer crossed, and she felt liberated from the stress and anxiety she had been carrying for years.

For the first time in seven years, she went to a movie theater. She trekked across Patagonia in Chile with her Stanford classmates for a week. Not once did her eyes cross. She graduated from Stanford Graduate School of Business in summer 2022.

“I appreciate Dr. Koo’s ability to understand needs and preferences specific to my condition and busy lifestyle,” Takino said. “This treatment gave me back more than my normal visual function; it improved my life. I now feel more confident to tackle my career and day to day life.”

Merging specialties for patient care

Lorinda Lahiff is no stranger to long drives, as she commuted daily between Cupertino and Livermore for work, and often would take long roadtrips to go snowboarding with her family. But about three years ago, Lahiff had to take a hiatus from her beloved hobby and long distance driving when she began experiencing double vision and eye pain.

“I was walking into doorways and running into people when snowboarding. Depth perception was becoming an issue, and driving through toll booths or any other confined spaces was very difficult,” Lahiff said. “My double vision became a safety issue and daily life routines were a challenge.”



Lorinda Lahiff smiles for a photo two months post-surgery



Lahiff is back to snowboarding with her family

When her vision started to affect her ability to drive, she went to Stanford and was diagnosed with thyroid eye disease (TED) and strabismus, related to persistent Graves’ disease, her hyperthyroid condition that she had been treating with medication for approximately two decades. After a thyroid biopsy, she underwent surgery to remove her thyroid.

At the Byers Eye Institute, Lahiff was seen by **Andrea Kossler, MD, FACS**, co-director of the multidisciplinary Thyroid Eye Disease Clinic. Lahiff was treated with a new biologic therapy, known as Tepezza, for her TED. Prior clinical studies demonstrated improvement in eye bulging, double vision, eye pain, redness, and swelling.

Lahiff noticed improvement in her TED symptoms, however she was still in need of strabismus surgery to correct her double vision. Koo performed strabismus surgery, and Lahiff proceeded with postoperative eye drops and follow-up appointments.

“After surgery, the results were almost immediate,”

Lahiff said. “I was able to cautiously resume my daily activities, including snowboarding a few months after the surgery, and completed a 16-hour drive to Colorado for our daughter’s snowboard competition. That type of drive with twists and turns through canyons would not have been possible a few years ago.”

“Multiple family members of mine have had excellent care at Stanford,” Lahiff said. “Both Drs. Koo and Kossler were exceptional in listening to my story and tailoring treatment to my specific needs. I’m grateful to them for restoring not only my vision, but my quality of life.”

A family’s journey

When **Zila Horvitz** and her husband **Uri** both began experiencing eye misalignment at their home in Israel, they set out to find the best physician for their care. They visited four different ophthalmologists in Israel to treat Zila’s symptoms as hers were the most severe, yet none could promise a full recovery following operation, and suggested that two operations may be needed.

“I was seeking a full recovery,” Zila said. “At that point my Graves’ disease and strabismus were causing my eyes to swell.” As a retired high school literature teacher, reading was one of Zila’s favorite pastimes, and she hadn’t been able to read or drive confidently for two years.

Their son, **Omer** was living in San Francisco and reached out to a friend who had been a patient of **Mark Blumenkranz, MD, MMS**, H.J. Smead professor emeritus of ophthalmology. Blumenkranz recommended **Scott Lambert, MD**, for their care.

Zila and Uri often would travel to the states to visit Omer, and decided to make the trip from Israel to California to receive consultation at the Byers Eye Institute. “When we first met with Dr. Lambert, he asked why we would travel so far for a consultation,” Zila said. “I told him I read about him and was assured he was the best in the world. He was the only doctor that I felt confident could ensure us full recovery and correction in one surgery.”

Four days later, Zila went into surgery and three weeks

later she was fully recovered. Seeing the success of his wife’s operation, Uri, who was experiencing headaches from his strabismus, went in and confirmed that he too had strabismus. He later went in for surgery, and reached the same successful results.

“What Dr. Lambert did for us truly felt like a miracle,” Uri said. “Zila can read and drive again, and I was able to return to work just days after surgery. Dr. Lambert was efficient and professional.”

“I am eternally grateful to the entire Stanford institution,” Omer said. “Having my parents get their vision and life back is priceless. I think I speak for all of us in that when you brush into someone for a few months, and they change the course of your life, it’s magic. We are very happy we ended up at Stanford and very grateful to the team for what they did.”



Zila Horvitz poses for a photo before her surgery at Byers Eye Institute at Stanford.



Horvitz smiles fully recovered in a photo after her surgery performed by Scott Lambert, MD.

Investing for impact

Donor's giving fueled by desire to advance the standard of care for glaucoma

Mary Jane (MJ) Elmore, MBA, established an impressive reputation as one of the first women partners in the Bay Area venture capital community. For the past 37 years, she has invested in start-up companies with a heart for innovation and entrepreneurship.

Her career accolades were highlighted in the book *Alpha Girls*, written by award-winning journalist Julian Guthrie, to showcase four women who paved the way for other women in the venture capital field.

In addition to MJ's successful investment career and her many interests, she is passionate about making a difference through philanthropy, having funded efforts aimed at teen mental health, women in STEM fields, visual arts, longevity, and homelessness. Most recently, MJ expanded her generous giving to support the advancement of the cutting-edge glaucoma research conducted by **Jeffrey Goldberg, MD, PhD**, Blumenkranz Smead professor and chair of ophthalmology, and his

collaborators at the **Mary M. and Sash A. Spencer Center for Vision Research at the Byers Eye Institute at Stanford**.

"Being located in Silicon Valley has placed me at the heart of innovation," MJ said. "I have been blessed with the opportunity to fund exceptional entrepreneurs and companies. Whether I am investing or giving a philanthropic gift, I seek to find people who are focused on making the biggest impact in their local community and world, and Stanford Ophthalmology is on that track with glaucoma research and development."

MJ's path to Stanford from the corn fields of Indiana included earning a BS in Mathematics from Purdue University. She then received an MBA from Stanford University, and later joined the venture capital firm Institutional Venture Partners, located in Menlo Park, California.

Currently, MJ is a private angel investor working with the investment group The Broadway Angels, comprised of an impressive group of all-women business executives and investors. Together, they have backed many companies that are founded and led by women.

"With both investing and giving, my desire is to see the world become a better place for the next generation," MJ said. "I saw that potential when it came to supporting Dr. Goldberg's research at Stanford Ophthalmology. I resonated with his desire to merge science and innovation together, as they seek to discover cures for eye diseases in transformative ways."

MJ and her family have had their own personal vision struggles. Her paternal grandmother and father both had glaucoma, and she watched their vision deteriorate as their glaucoma progressed. Her brother and sister both also have glaucoma.

"I was driven to make a difference, because so many of my family members have been impacted by this eye

I seek to find people who are focused on making the biggest impact in their local community and world, and Stanford Ophthalmology is on that track with glaucoma research and development.

MJ ELMORE



MJ Elmore

disease,” MJ said. “Supporting this work also appealed to me because I saw it as a way to help both my loved ones and the many others with the disease.”

While there is no current cure for glaucoma, there are a variety of treatments that focus entirely on lowering intraocular pressure. MJ’s father was given eye drops and underwent trabeculectomy surgery so that the fluid inside the eye could drain more easily and his pressure could be lowered.

“Most of the treatments offered for glaucoma then are still the standard of care today, which begs the need for more research and clinical trials to find alternative, effective therapies,” MJ said. “I was encouraged when I came to Stanford as a patient myself to find out there was so much research and reason to be hopeful of potential breakthroughs.”

Currently, no glaucoma treatments exist that directly target the degeneration that causes vision loss (which cannot be reversed once damage is done). Goldberg decided to address these core deficits. He has built the leading regenerative and neuroprotective research program at Stanford and his leadership was recently recognized by his election into the prestigious National Academy of Medicine. He and a team of researchers are focused on neuroprotection and regeneration of retinal

ganglion cells and the optic nerve, including novel stem cell approaches designed not only to protect one’s vision, but even restore it if it has been lost. Even rarer in the field, they have expanded beyond laboratory research and are conducting a variety of clinical trials, including the only FDA-approved phase 2 clinical trial to slow down vision loss.

While Goldberg’s lab receives National Institutes of Health funding, additional funding from MJ and other generous donors allows them to accelerate scientific discovery into patient therapies.

“When I spoke with Dr. Goldberg, I was impressed by his entrepreneurial approach,” MJ said, “and that he is tackling glaucoma from multiple perspectives - early detection and measuring disease, and vision preservation and restoration for glaucoma patients. I knew that this was something I wanted to support, because I saw possibility for real change in the next 10 years.”

“These kinds of opportunities don’t present themselves everywhere,” MJ said. “I cannot pass up a chance to make a lasting improvement for generations to come. I am proud to team up with Stanford on this. In my business as a venture capitalist, you back your winners and that is how this feels to me.”

Philanthropic gift inspires research excellence

Dr. Michael Kapiloff named inaugural Reinhard Family Professor

Eli and **Jeanette Reinhard** have a long history of Stanford connections. Jeanette, a fifth generation Northern Californian, is a Stanford-trained economist and money manager. Eli is a successful real estate developer who came to Palo Alto from Tucson to attend Stanford and ultimately set down roots in San Jose. They met through finance and real estate but quickly realized they shared a deep appreciation for what Stanford has meant in their lives and in the local, national and global communities in which they operate.

Aligning with the Stanford University vision to “promote the welfare of people everywhere,” the Reinhards have supported different aspects of campus life for years through their time and philanthropic giving. Jeanette serves on Advisory Boards for the Stanford Institute for Economic Policy Research and the Institute for Research in the Social Sciences, and Eli has been highly involved in the Taube Center for Jewish Studies and the Green Library Judaica and Hebraica Collection.

“I learned from my late father that you should invest in your local community and that if you have the means, you should live a life of giving,” Eli said. “Jeanette and I have always tried to give with a posture of humility and respect, but also with meaningful intent.”

The Reinhards turned their attention toward supporting the School of Medicine, specifically the department of ophthalmology, after they met **Michael Kapiloff, MD, PhD**, who is now the Reinhard Family professor of ophthalmology.

Jeanette and Eli met Kapiloff and his family at their local synagogue shortly after the Kapiloff’s moved from Miami. As he discussed his research in both cardiology and ophthalmology—always a curiosity-provoking combination—Jeanette and Eli became more and more interested in both the scope of the research in the department of ophthalmology and the vision of

its leader, **Jeffrey Goldberg, MD, PhD**, Blumenkranz Smead professor and chair of ophthalmology. Concurrently, **Quan Dong Nguyen, MD, MSc**, professor of ophthalmology and world-renowned expert in uveitis, provided much-needed care for a dear friend of the Reinhards. They ultimately also came to know **Diana Do, MD**, professor of ophthalmology, who performed a complicated surgery for the same friend.

“Going forward, we hope this endowment will be a reminder of the faith we have not only in Dr. Kapiloff, but in the entire Stanford Medicine system.”

JEANETTE REINHARD

Then, through attending *Eye-Opening Conversation* gatherings, which highlight the ophthalmology department’s mission to improve treatments for patients with eye disease and blindness, and to quickly move research into patient care, they gained a broader view of the innovative research taking place in the department and the urgency of its work.

“When you are closer to something, you start to feel a part of it and develop the confidence and assurance that it’s worth backing,” Eli said.

The Reinhards devoted time to learning more about Kapiloff’s research, which focuses on the basic molecular



Pictured (L to R): Jeffrey Goldberg, MD, PhD, Jeanette Reinhard, Eli Reinhard, and Michael Kapiloff, MD, PhD

mechanisms that control how cells in the eye and heart respond to disease. His lab is working on new gene therapies to treat optic nerve and cardiac damage. Importantly, they also became more acquainted with the role of individual labs, the challenges of attracting and retaining top-tier researchers and professors, and Goldberg's goals for Stanford Ophthalmology.

"We were especially fascinated by the interdisciplinary nature of Dr. Kapiloff's research and the unlikely connections between the heart and vision," Jeanette said. "His research has the potential to treat diseases like glaucoma and heart failure, which, unfortunately, touch so many of our lives. But we were equally impressed with Dr. Goldberg's own stellar career, his contributions to science and ophthalmology, and recognitions including his recent election to the National Academy of Medicine. Both of them exemplify for us what it means to be a transformative leader."

"We have had the pleasure of not only getting to know Dr. Kapiloff, but we have also formed a close relationship with Dr. Goldberg, growing a deep respect for his department's leadership," Eli concurred.

Afforded this insight, the Reinhards decided to work with Goldberg to identify the best way to both support and

reward the work of the department of ophthalmology. The end result was the establishment of the endowed Reinhard Family professorship based in the department of ophthalmology with Kapiloff as the inaugural holder. The goal of the endowed professorship is to provide dependable long-term financial resources to fill the gap where federal or foundation grants are unavailable, giving research flexibility and more opportunities to accelerate scientific and translational efforts.

However, the Reinhards acknowledge that there is an additional, less-quantifiable, purpose to their gift. Research can be an up-and-down process of projects sometimes succeeding, sometimes failing, and it is almost always exhausting. They hope their gift will inspire Kapiloff and his collaborators both to raise the bar and to persevere.

"This gift is really validation for the hard work he has already done," Jeanette said. "And going forward, we hope it will be a reminder of the faith we have not only in him, but in the entire Stanford Medicine system. We are well aware that to continue being a top-tier institution, Stanford must continue to attract and retain top talent like Dr. Kapiloff, and we are proud to support him."

Celebrating Dr. Kuldev Singh

Kuldev Singh, MD, MPH, professor of ophthalmology, well-known for his outstanding clinical care, visionary research, and mentorship at the **Byers Eye Institute at Stanford**, celebrated his 30th anniversary with the institute in 2022. To honor this milestone, **Jeffrey Goldberg, MD, PhD**, Blumenkranz Smead professor and chair of ophthalmology at Stanford, hosted a special gathering of colleagues, friends and family.

Singh's professional peers have recognized him as one of the world's most influential ophthalmologists and have bestowed upon him the highest achievement awards. His ambitious research goals include speeding

new drug development, delivering "precision health" medical and surgical glaucoma options, and bringing new focus on patient-reported outcomes. As an educator, he is dedicated to training the next generation of talented glaucoma clinicians and researchers.

We look forward to many more years of Singh's superb service at the Byers Eye Institute at Stanford. Thank you to all those who attended this special celebration and to those who generously made gifts to a 30th anniversary fund in honor of Singh to support his ongoing work in the years ahead—improving care for glaucoma patients.



Kuldev Singh, MD, MPH, recognized by professional peers as one of the world's most influential ophthalmologists, celebrated 30 years with the Byers Eye Institute at Stanford in 2022.



Why give?

Nearly 2.2 billion people worldwide live with severe vision impairment or blindness, and with an aging population, these numbers continue to escalate steeply. Further, many people living with vision loss do not have access to even basic eye care. These factors contribute to a serious unmet need globally in diseases such as age-related macular degeneration, glaucoma, and corneal degeneration, as well as in rare but debilitating eye diseases caused by genetics, inflammation, tumors, or other conditions.

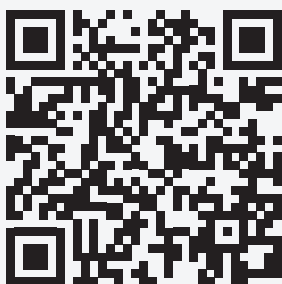
Our vision at the Byers Eye Institute at Stanford is to address this urgent problem head-on, with the goal to eliminate blindness and ocular disease in our community and abroad. To achieve that, we have assembled a comprehensive multidisciplinary research endeavor with the support of our generous community.

Recent breakthroughs in neuroscience, genetics, imaging, stem cell medicine, and technology have given us real opportunity to cure these as-yet incurable diseases and to reverse the vision loss they cause.

Stanford's unmatched depth and breadth of expertise in each of these fields and our unique ability to leverage these breakthroughs makes us optimistic that cures are on the horizon. But finding cures isn't enough. We must get them to patients faster, so at the Byers Eye Institute we are focused on accelerating the development of therapies and expediting clinical trials.

From discovery to delivery, we have brought together the best minds and the best technologies and are determined to combat blindness and vision loss. If you believe in our vision and want to support our research efforts, please contact:

To make a gift online visit
med.stanford.edu/ophthalmology/giving



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Fighting infant blindness in sub-Saharan Africa

In sub-Saharan Africa, thousands of premature newborn babies go blind annually from **retinopathy of prematurity (ROP)**. ROP is an eye disease that occurs when blood vessels in the eye begin growing abnormally, leading to weakened or leaking vessels that can cause retinal detachment.

Babies with ROP are at high risk of partial or full retinal detachment and, even with successful surgeries, live with lifelong visual impairment. Several stressors, including high oxygen delivered in the hospital after premature birth and other oxygen stresses are associated with ROP, although even without these stressors, ROP may still present.

We will train the staff at these sites so that they can become self-sufficient in providing patient care.

SCOTT LAMBERT

Caught early enough, ROP can be reversed and the lifelong visual compromise lessened, but in sub-Saharan Africa many premature babies live a life of unnecessary blindness because a shortage of equipment and training prevents these babies from being diagnosed and treated. Sadly, the numbers of newborn babies with ROP are increasing at an alarming rate. As more premature infants survive in neonatal intensive care units (NICU), it is estimated that 31,200 African infants may develop ROP annually.



Muhimbili National Hospital (Dar es Salaam, Tanzania) Pictured (L to R) Dr. Celina Mhina (ophthalmologist), Dr. Martha Mkony (SIBA Co-Chair and neonatologist), Sarthak Shah.

To tackle this tragic increase in untreated ROP, **Scott Lambert, MD**, professor of ophthalmology, serves as co-chair for **Stop Infant Blindness in Africa**, a project that seeks to provide much-needed training and equipment for ROP in sub-Saharan Africa's NICU.

The project will provide to the doctors in sub-Saharan Africa oxygen blenders and sensors to regulate and keep oxygen levels from getting too high, thus decreasing the chance for ROP development. This equipment costs less than \$2,000 in total and can be used repeatedly.

Lambert is collaborating with **Sherwin Isenberg, MD**, a professor of ophthalmology at the UCLA Jules Stein Eye Institute; **Dupe Popoola**, a pediatric ophthalmologist in Nigeria; and **Martha Mkony**, a neonatologist from Tanzania. Together with a committee of about 30 people, they will oversee the startup of three initial centers in Kampala, Uganda; Port Harcourt, Nigeria; and Kigali, Rwanda.

“We will train the staff at these sites so that they can become self-sufficient in providing patient care and eventually expand to additional sites in other parts of sub-Saharan Africa,” Lambert said.

Lambert has also teamed up with **Sarthak Shah**, a second-year Stanford medical student, to gather data on how improved oxygen management practices and technology effects the monitoring of ROP. Their study is funded through the Department of Ophthalmology and the 2022 Global Health Seed Grant provided by **Stanford’s Center for Innovation in Global Health**.

Shah began conducting surveys to collect data on possible additional sites virtually, but it became apparent that traveling to Africa in person would be beneficial for gaining a deeper understanding of necessary equipment for each site.

“A lot of these sites are not equipped to treat ROP patients, so patients have to travel to other hospitals, which can be risky as ROP must be treated urgently before a patient goes blind,” Shah said.

As the number of babies with ROP skyrockets in Africa, the need for not only equipment but trained staff also grows. The sites Shah visited were understaffed, with most sub-Saharan Africa countries having two or fewer pediatric ophthalmologists for the entire population. To address this, they plan to train nurses to assess ocular images and then use telemedicine resources to send their notes to an ophthalmologist for final evaluation, thus optimizing workflow.

Shah, who plans to specialize in ophthalmology after graduating from medical school, has a passion for helping ROP patients because his own uncle went blind from untreated ROP. At the time, not much was known about ROP, but through family support his uncle was able to excel in his career and other endeavors. However, Shah noted that families may not have the same resources to adequately care for a child with ROP, which may cause a great burden on them.

Shah spent a little over two weeks in Africa, finding it was a valuable experience for information exchange.

“While I traveled to Africa with hopes of helping the hospitals, I felt I equally learned from them,” Shah said. “The hospitals may have space limitations, but they come up with creative solutions to still provide adequate care in an efficient manner.”

Lambert and Shah are eager to see how this research project could help shape the future for ROP patients in sub-Saharan Africa and by extension around the world.

“By equipping the different sites, we estimate we could see a change in a short time, and we are eager to play a role in helping these patients,” Lambert said.



*Moi Teaching and Referral Hospital
Ophthalmology OR (Eldoret, Kenya)
Pictured (L to R): Hospital Staff, Sarthak
Shah, Dr. Ernest Ollando (pediatric
ophthalmologist), Dr. James Bett (head of
department, ophthalmologist)*

Bringing advances in global eye care locally

The World Health Organization reports that of the 2.2 billion people globally with vision impairment, more than half could have been prevented or could still be addressed, with cataracts and refractive error topping the list of most common vision-related ailments. In an effort to reduce the number of people suffering from cataracts around the world, **Geoffrey Tabin, MD**, Fairweather Foundation professor of ophthalmology and global medicine, has perfected the delivery of high-quality, low-cost cataract surgeries abroad through his work with the nonprofit foundation CureBlindness, which he co-founded as the **Himalayan Cataract Project (HCP)** with **Sanduk Ruit, MD**, in 1995. With Tabin joining the Stanford faculty over five years ago, Stanford became the academic home for the

foundation, with faculty, fellows, and now residents joining Tabin on his global vision-restoring missions. This work has dramatically reversed the incidence of cataract-related blindness in countries across Asia, and is now making progress in Africa.

Learning from their global experience, Tabin and his Stanford collaborators are now working to introduce lower-cost eye care in the U.S. by replicating some of the same cost-effective patient practices used abroad. While most patients receive excellent eye care in the United States, certain low-income populations, including Medicaid-eligible, uninsured and undocumented adults and children, do not have adequate access to routine eye exams or follow-up care to prevent or reverse needless low vision and blindness.

“With HCP, we harnessed Ruit’s method of small incision cataract surgery to start reversing cataract blindness in Asia and Africa,” Tabin said. “The procedure takes less than 10 minutes and costs just \$25 in materials. Now we want to see how we can transfer approaches to U.S. patients in need of access to low-cost, high-quality care.”

Discovering cost-saving methods

A generous gift from a donor made possible a joint study between Tabin and the **Stanford Clinical Excellence Research Center (CERC)**, including **Arnold Milstein, MD, MPH**, professor of medicine and CERC director; **Kevin Schulman, MD, MBA** professor of medicine and CERC director of industry partnerships and education; and **Mary-Grace Reeves, MD, MBA**, a former Stanford student.

The group studied the transferability of international surgical efficiencies amid U.S. regulatory, cultural, and economic factors, with their initial analyses and findings published in the *New England Journal of Medicine Catalyst*.



Geoffrey Tabin, MD, is working to bring high-quality, low-cost eye care to serve low-income and remote populations across Northern California communities.

Tabin noted that part of the additional costs in the U.S. are unavoidable. Supplies and medications tend to cost more in the U.S. than those used in less industrialized parts of the world. Staffing costs are also higher in the U.S., with nurses and doctors earning a larger salary than their counterparts in other countries.

Other differences between U.S. costs and those abroad are attributable to differences in regulations—whether federal, state, or local. For example, whether nurses or other staff can give medications or patient instructions differs state to state, and federal HIPAA regulations in the U.S. require separate operating rooms for patients, rather than operating on two patients per room.

“We want to implement efficient and effective care,” Tabin said, “yet we experience a higher level of waste in the states. For example, we use a new bottle of medication for each patient and throw it away when only a tenth of it may be used. That bottle could be used for multiple patients. If permitted, we could also add in more cases per hour to utilize our staff’s time more effectively.”

Mobile care for Northern California

The joint studies with CERC have served as the foundation to optimize delivery of care in the U.S., leveraging such learnings from comparisons of costs and regulations. One approach the team has mapped out is to launch a mobile clinic to serve low-income and remote populations where they live, for example directly in Northern California communities. The planned mobile clinic will provide cataract surgeries and other medical care, including screenings for glasses and for treatable eye diseases like diabetic retinopathy. With philanthropic support, the group aims to establish the first preventable blindness-free zone in Northern California.

“We identified an unmet need for patients in Northern California who live in more rural areas or are part of an unhoused population, who may have a harder time traveling to receive care,” Tabin said. “Our mobile clinic goes directly to those communities in need.”

Stanford’s global ophthalmology fellow, **Kanwal Matharu, MD**, will help launch the program, together with support from **Jude Alawa** and **Cyrus Buckman**, Stanford medical students who are collaborating on the project through the **Medical Scholars Research Program (MSRP)**. The MSRP funds medical student research efforts in a variety of settings including those in the local community.

“Once we have a proof of concept in Northern California, we aspire to expand our mobile model to other geographic locations with the greatest need, potentially partnering with other academic medical centers and organizations,” Tabin said. “Ultimately, we envision creating a model that can be replicated across the U.S.”

Using telemedicine tools to improve diagnosis

In addition to improving access to cataract care in the U.S., Tabin is also collaborating with colleagues in the ophthalmic innovation program to use technology to deliver improved care for other eye conditions. For example, **David Myung, MD, PhD**, associate professor of ophthalmology, developed a special camera that allows patients to be remotely screened for eye diseases. An assessment can then be made as to whether the patient needs to be referred to an ophthalmologist for treatment.

“The heart behind all of these projects is to ensure that patients can receive the same level of care locally, no matter their insurance coverage or ability to pay,” Tabin said. “If patients don’t have access to care, they may not know they even have visual problems until it’s too late.”

Tabin’s goals are to move the above efforts into implementation as soon as possible to alleviate the suffering of those with eye disease who are currently not receiving adequate care. “Collaborating with Stanford colleagues across the campus, in medicine, business and engineering,” Tabin said, “will allow us to lead in delivering low-cost, high-quality eye care globally, and in transferring those learnings to improve eye care for people locally.”

Expanding the Bay Area Ophthalmology Course

Since 1970, the **Bay Area Ophthalmology Course (BAOC)** has been offered by the Bay Area Ophthalmology Consortium and **Stanford University School of Medicine** as a premier, intensive education in all things eye- and vision-related. Initially a resource for ophthalmology residents' education, it has morphed in recent years into a comprehensive program for ophthalmologists, residents and medical students, and now many others in the medical and vision research communities who seek intensive instruction in the fundamental sciences underlying ophthalmic practice and research. Topics bridge ophthalmic pathology, optics, epidemiology, genetics, immunology, pharmacology, and other areas of science and innovation, and span ophthalmologic areas including orbit and oculoplastics, neuro-ophthalmology, corneal and refractive surgery, cataract surgery, glaucoma, pediatric ophthalmology and strabismus, and retinal disease.

About six years ago, faculty at Stanford began to investigate how the program could reach a broader audience. Under program directors **Steven Sanislo, MD**, clinical professor of ophthalmology, and **Wen-Shin Lee, MD**, clinical assistant professor of ophthalmology, the BAOC broadened its curriculum, for example adding hands-on experience through laboratory sessions and surgical training offered in pathology, optics, phacoemulsification, and glaucoma. "We also realized our curriculum would be valuable not just for ophthalmologists in training or in practice, but also for undergraduate students, medical students, vision scientists in academia or industry, as well as physicians in related fields such as neurology," Lee said.

After holding BAOC entirely virtual over the past two years due to the pandemic, 2022 was the first year BAOC was offered both in-person and virtually. In-person attendees traveled from around the nation and the world.



Pictured (L to R): Chi Pham, MS, Abed Baiad, Miguel Hernández-Delgado, MD, and Lorena Torres Acosta, MD were attendees at this year's BAOC program.

Committed to ensuring that the field of ophthalmology and vision research is representative of the diverse population of patients, BAOC also expanded to offer diversity scholarships.

"Ophthalmology is an early match, so often students learn about their subspecialty later in their training or not at all," **Bettina Canuto-Len, MAOB**, BAOC program manager said. "As such, we invite undergraduate students from diverse backgrounds—broadly defined to include participants who are underrepresented in medicine, first generation higher-education students and professionals, LGBTQ+, and people with disabilities—to apply to the BAOC course." Canuto-Len serves alongside **Brianna Bennett**, BAOC program manager, in running the course.

The vital role of diversity in medicine

By offering diversity scholarships, attendees like **Chi Pham, MS**, were able to attend. Pham, a second-year medical student at Touro University in Vallejo, California, immigrated to the U.S. from Vietnam. She attended BAOC in hopes of exploring the ophthalmology field, which she plans to specialize in for residency. Pham said that diversity in medicine starts with valuing everyone's culture and connecting with people's shared experiences.

"As a Vietnamese immigrant, my journey to medical school was not a straightforward path. Through my experiences and struggles, I am inspired to assist those patients facing obstacles when accessing the healthcare system," Pham said.

Abed Baiad, a second-year medical student at McGill University in Montreal, Quebec, Canada, also attended this summer. Baiad, who grew up in Syria, interned at Stanford two years ago doing basic science research for the Department of Biochemistry. At the time of the internship, Baiad was not a Canadian citizen, and with a national travel ban in place, it caused complications in getting to Stanford.

"Now that I'm a Canadian citizen, traveling to BAOC was significantly easier," Baiad said. "This gave me perspective, as some patients are born into locations with limited travel or resources. As physicians, we see patients of diverse backgrounds and I am grateful that BAOC is a strong supporter of diversity in medicine."



David Guyton, MD, teaching BAOC students in an optics lab teaching session.

Lorena Torres Acosta, MD, a second-year ophthalmology resident at the Instituto Nacional de Oftalmología Francisco Contreras Campos in Lima, Peru, was excited to finally attend BAOC this year for the first time, as her institution sends one second-year resident to attend annually. Torres Acosta's favorite part of BAOC was innovation day and getting to meet attendees from all over the world. "It was exciting to learn about innovation advancements alongside a diverse attendee group," Torres Acosta said. "Diversity is important in medicine because it helps healthcare providers to have adequate communication skills, identify health beliefs, and understand barriers in healthcare access."

Leaving a legacy

Another BAOC attendee was **Miguel Ángel Hernández-Delgado, MD**, from Mexico City, who identified himself as a "BAOC legacy" —his mother is a practicing ophthalmologist and attended BAOC in 1997. Since his mother recommended BAOC to him, they have enjoyed discussing how the course has evolved since she attended.

"I am proud to be carrying on a family tradition, because not only am I the second in my family to attend BAOC, but I will also be a third-generation ophthalmologist, as my grandfather is an ophthalmologist too," Hernández-Delgado said.

"I especially enjoyed attending the glaucoma session because that disease is very prevalent in Mexico," Hernández-Delgado said. "I am excited to learn from prestigious doctors and transfer the skills I learned to help my patients back home."

While faculty and staff put in many hours of planning to run the event that totals 23 days of lectures and 11 laboratory sessions, they also feel like they receive positive impact from the program.

"I love getting to meet people from all over the world and hear about their unique backgrounds and experiences, their passions, and what brought them to this course," Bennett said. "It is rewarding to see how eager our attendees are to show up to each session."

Inaugural PILLAR retreat provides mentorship for residents underrepresented in medicine

This year, we were proud to help create and host the inaugural **Program In Lasting Leadership and Academic Representation (PILLAR)**. This intensive, in-person mentorship program hosted ophthalmology residents from around North America who self-identify as **underrepresented in medicine (URiM)** in a two-day retreat, with discussions ranging from the various career pathways within academic ophthalmology, how residents can successfully navigate into fellowship and academic careers, the joys and challenges of these career pathways, and other topics such as negotiating for a job, academic promotion, and work-life integration.

A commitment to **diversity, equity, inclusion and belonging (DEIB)** has been a consistent philosophy of the **Byers Eye Institute at Stanford**. This commitment is reflected in initiatives like a residency program of 30% to 45% URiM trainees; research into how race and ethnicity impacted access to eye care during the recent pandemic; a study on how residency application screening or faculty recruitment face unconscious bias; and patient care by developing first-in-class programs in global ophthalmology.

PILLAR was co-created with the **National Medical Association**, Ophthalmology Section, a sponsor of the **Rabb-Venable Excellence in Ophthalmology Program**, which supports medical students, residents, and fellows in ophthalmology who are underrepresented in medicine, or who desire to work in underserved communities. Co-directors for PILLAR included **Jeffrey Goldberg, MD, PhD**, Blumenkranz Smead professor and chair of ophthalmology at Stanford; **Mildred MG Olivier, MD**, associate dean of the Ponce Health Sciences University School of Medicine; **Eydie Miller-Ellis, MD**, professor of clinical ophthalmology at the Scheie Eye Institute/University of Pennsylvania and vice chair for faculty affairs and

diversity; and **Ahmara Ross, MD, PhD**, assistant professor of ophthalmology and neurology at Penn Medicine.

“Our topics focused on mentorship of residents who have just completed their internship year of residency since they are at a point in training where they may not have solidified their fellowship choice or next career steps, and we wanted to provide the information they need to both make a choice and also excel in doing so,” Goldberg said.

Nearly two dozen esteemed ophthalmology faculty from institutions around the country were also invited to speak to the resident trainees at the retreat. One invited speaker, **Caroline Fisher, MD**, clinical associate professor of ophthalmology, is the director of diversity and inclusion at Byers Eye Institute as well as the Stanford Ophthalmology specialty career advisor, and she spoke on what it meant to her to be



Faculty and attendees of the inaugural PILLAR retreat outside the Byers Eye Institute at Stanford, including Jeffrey Goldberg, MD, PhD, Caroline Fisher, MD, and Eydie Miller-Ellis, MD (front row, L to R).



Residents were able to connect one-on-one with faculty presenters during small group sessions at PILLAR.

Latina in academia, along with her experiences with DEIB leadership in the academic setting. “I have found that as residents and as faculty, we are fortified by the community and support we create for each other,” Fisher said.

After the two-day, fully packed agenda, the residents left with a new sense of community and a network of colleagues and faculty they could reach out to for career guidance and resources.

“The residents were so appreciative and found the information enlightening as they were unaware of the broad options available in academic medicine,” Miller-Ellis said.

Goldberg hopes that this event will go down as a seminal event in ophthalmology and in medicine for its contributions to truly changing how we resource and encourage residents to succeed in—and help improve—academic ophthalmology. Planning is already underway for the second annual retreat next fall, as well as the creation of enduring content and pathways for ongoing, continuous mentorship that can be carried through the year.

PILLAR joins other Stanford ophthalmology avenues in support of DEIB efforts, such as the **Stanford Clinical**

Opportunity for Residency Experience (SCORE)

Program, which brings fourth-year medical students from URiM backgrounds to Stanford for a month-long residential clinical training program. Students are matched with faculty, resident mentors, and research advisors who focus on empowering trainees into successful careers in medicine. **The Committee on Ophthalmology Diversity, Equity, and Inclusion (CODE-I)**, formalized in 2020, also remains an ongoing presence in the department, encouraging dialogue about diversity and inclusion freely and openly for faculty and staff across the department. It is co-chaired by Fisher, who collaborates with **Bettina Canuto-Len, MAOB**, DEIB project manager, to organize DEIB events and training opportunities.

“Diversity is a core pillar for our department, because having different life experience and backgrounds within the medical field strengthens our ability to better understand patients of various backgrounds and provide them with the optimal care they deserve,” Fisher said. “I am eager to see how we will continue to grow our DEI efforts at Byers. These programs are just the starting point for paving the way to a diverse future workforce and to a broader vision of medical care for all.”



Meet our residents and fellows

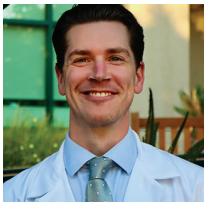
CLINICAL FELLOWS CLASS OF 2023



Amal Al-Lozi, MD
Pediatrics



Gala Beykin, MD
Glaucoma



Randy Brown, MD
Neuro-Ophthalmology



Charles DeBoer, MD, PhD
Vitreoretinal



Irmak Karaca, MD, FEBO, FICO, MRCSEd
Uveitis



Kanwal Matharu, MD
Global



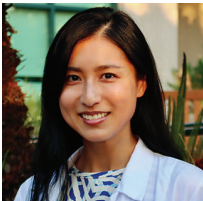
Suzanne Michalak, MD
Vitreoretinal



Vikram Shankar, MD
Glaucoma

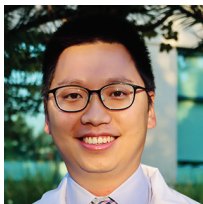


Alice Shen, MD
Cornea



Michelle Sun, MD
Glaucoma

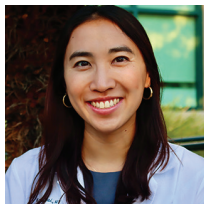
CLINICAL FELLOWS CLASS OF 2024



Bryce Chiang, MD, PhD
Glaucoma



Austen Knapp, MD
Vitreoretinal



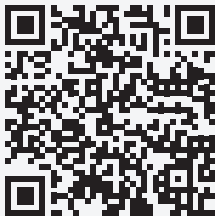
Karen Wai, MD
Vitreoretinal

Congratulations class of 2022!

To see where our graduates are headed next, scan the QR codes below.

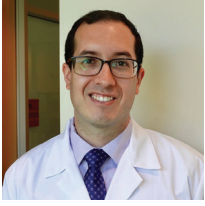


RESIDENT ALUMNI

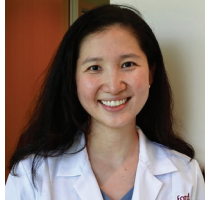


CLINICAL FELLOW ALUMNI

RESIDENTS CLASS OF 2023



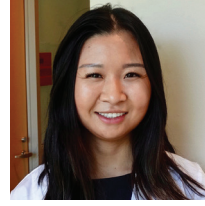
Alejandro Arboleda,
MD



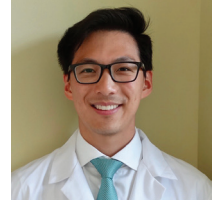
Lucie Guo, MD, PhD
SOAR Program



Muhammad
Hassan, MD

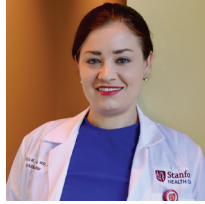


Tracy Lu, MD

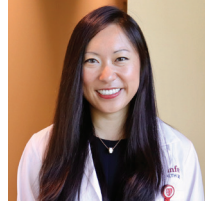


Michael Yu, MD

RESIDENTS CLASS OF 2024



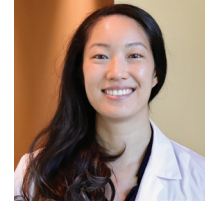
Caity Logan, MD, PhD
SOAR Program



Louisa Lu, MD



Andrea Naranjo, MD

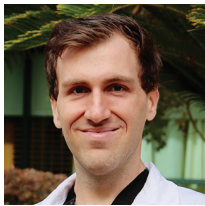


Elaine Tran, MD

RESIDENTS CLASS OF 2025



Aneesha Ahluwalia,
MD



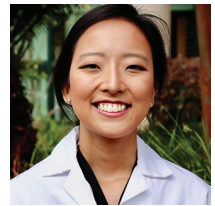
Arthur Brant, MD



Brian Soetikno, MD, PhD
SOAR Program



Sean Wang, MD
SOAR Program



Gina Yu, MD

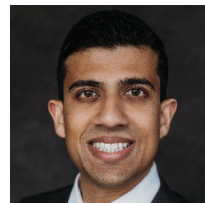
RESIDENTS CLASS OF 2026



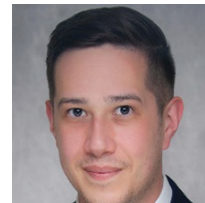
Lyna Azzouz, MD



Anna Bettina Toth,
MD, PhD
SOAR Program



Sahil Shah, MD, PhD
SOAR Program



Gabriel Velez, MD, PhD

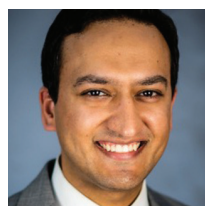


Cindy Zhao, MD, MBA

RESIDENTS CLASS OF 2027



Alec Bernard, MD, MS
SOAR Program



Arnav Moudgil, MD, PhD
SOAR Program

SELECT AWARDS AND HONORS

David Myung, MD, PhD, helped organize the **2022 Collaborative Community on Ophthalmic Imaging conference**, which also featured the following Stanford faculty and trainee: **Mark Blumenkranz, MD, MMS**; **Theodore Leng, MD, FACS**; and **2021-22 Ophthalmic Innovation Fellow, Eliot Dow, MD, PhD**. Myung also hosted the **2022 BAOC Innovation Symposium**.



After 15 years of service at the Byers Eye Institute at Stanford, we wished **Henry Kistler, MD**, a happy retirement (pictured above L to R: **Mark Blumenkranz, MD, MMS**; **Henry Kistler, MD**; **Jeffrey Goldberg, MD, PhD**).

Wendy Liu, MD, PhD, received the following awards: **Stanford KL2 Career Development Award**, **Spark Translational Research Award**, **American Glaucoma Society Young Clinician Scientist Award**, and **Research to Prevent Blindness Career Development Award**.



Scott Lambert, MD (pictured), was the co-author of the sixth edition textbook of *Taylor and Hoyt's Pediatric Ophthalmology and Strabismus* published by Elsevier Science.

Theodore Leng, MD, FACS, received the following awards: **Castle Connolly Top Doctor** and **America's Most Honored Doctors**.

Heather Moss, MD, PhD, was elected as **Secretary of the North American Neuro-Ophthalmology Society**.

David Myung, MD, PhD, received three awards: an **R01 award from National Eye Institute**, the **Harrington Scholar-Innovator Award**, and the **Department of**

Defense Vision Research Program (VRP) research grant.

Andrea Kossler, MD, FACS, (pictured below) received the **2022 Women in Ophthalmology Emerging Leader Award**, which recognizes individuals who have demonstrated leadership potential and excellent patient care. Kossler also serves on the **Executive Board of the LATINOUS society** for Latin American Ophthalmologists in the US and is the Program Chair for the **North American Society for Academic Orbital Surgeons**.



Theodore Leng, MD, FACS, co-chaired the 2nd annual **Ophthalmic Artificial Intelligence Summit**, and **David Myung, MD, PhD**, and **Eddie Korot, MD**, were faculty speakers. Leng also became a founding board member of the Digital Ophthalmic Society and organized the first ever Ophthalmic Scientific Meeting in the Metaverse.

Led by the Byers Eye Institute at Stanford, **2022 Innovate Retina** was held on September 29 in conjunction with the 2022 Annual Meeting of the American Academy Ophthalmology. The co-directors of Innovate Retina (pictured below from L to R): **Prithvi Mruthyunjaya, MD, MHS**; **Stephen Smith, MD**; **Diana Do, MD**; and **Quan Dong Nguyen, MD, MSc**.



Edward Manche, MD, received the following awards: the **2022 Lans Distinguished Award** from the International Society of Refractive Surgery and the **Best Paper of Session Award** at the American Society of Cataract and Refractive Surgery Meeting. The paper was on “Wavefront-guided LASIK compared to SMILE surgery: Final results of a prospective study.”

Alfredo Dubra, PhD, was elected as a **2022 optica fellow** by the Board of Directors of Optica (formerly Optical Society of America).



Robert Chang, MD, helped lead the inaugural **Biodesign Israel Executive Bootcamp** alongside a talented team of other doctors in the field in Tel Aviv (pictured above).

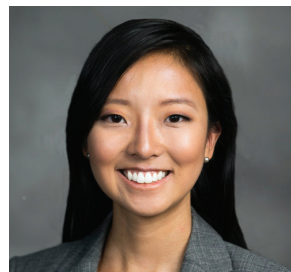


Monica Sophia Diaz-Aguilar (pictured), a research fellow under the supervision of **Jonathan Lin, MD, PhD**, received a **Research to Prevent Blindness Medical Student Eye Research fellowship**. She was awarded a travel

grant from The Association for Research in Vision and Ophthalmology (ARVO) and presented at the ARVO conference in May 2022. She also presented at the Society of Neuroscience conference in November 2022.

Charles DeBoer, MD, PhD, received the department **Fellow Teaching Award of the Year** for 2021-2022 and the **2022 Ronald G. Michels Fellowship Foundation Award**.

Brian Soetikno, MD, PhD, received the **2022 Knights Templar Eye Foundation Career Starter Grant** for developing quantitative biomarkers for optic disc drusen using deep learning-based image segmentation and macrophage imaging. He also received the **2022 Shaffer Grants for Innovative Glaucoma Research** to support fundus-tracking visible-light optical coherence tomography to measure inner plexiform layer sub-laminae in glaucoma.



Gina Yu, MD, (pictured) received the **Future Icons Grant Scholarship (FIGS)** for sharing her story of why she is pursuing ophthalmology and her hopes to improve medical literacy accessibility.

Jen Haensel, MS, PhD, a postdoctoral research fellow in the lab of **Tawna Roberts, OD, PhD**, received **postdoctoral support** from the **Stanford Maternal and Child Health Research Institute**.



Julian Wolf, MD, a postdoctoral scholar in the lab of **Vinit Mahajan, MD, PhD**, received the **Helmholtz Research Award** (pictured) at the Annual Meeting of the German Ophthalmological Society in Berlin

in late September 2022. Wolf's study focus is on transcriptomics and proteomics in vitreoretinal disease.

Arthur Brant, MD, won the Best Research by Trainee Award for his IRIS work with **Suzann Pershing, MD**, at the **American Association of Ocular Oncology and Pathology (AAOOP)** annual meeting.

COMPREHENSIVE OPHTHALMOLOGY AND CATARACTS



Artis Montague, MD, PhD
clinical professor



Suzann Pershing, MD
associate professor



Susan Ryu, MD
clinical assistant professor

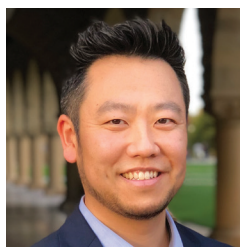
CORNEA AND REFRACTIVE SURGERY



Charles Lin, MD
clinical associate professor



Edward Manche, MD
professor



David Myung, MD, PhD
associate professor*



Bethlehem Mekonnen, MD
clinical assistant professor



Jennifer Rose-Nussbaumer, MD
associate professor



Christopher Ta, MD
professor



Geoff Tabin, MD
Fairweather Foundation
professor



Charles Yu, MD
assistant professor

NEURO-OPHTHALMOLOGY



Shannon Beres, MD
clinical associate professor



Khizer Khaderi, MD, MPH
clinical associate professor

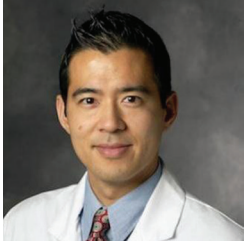


Joyce Liao, MD, PhD
professor



Heather Moss, MD, PhD
associate professor

GLAUCOMA



Robert Chang, MD
associate professor



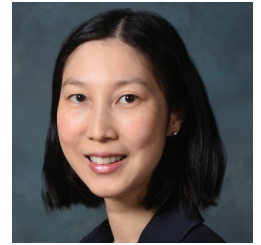
Caroline Fisher, MD
clinical associate professor



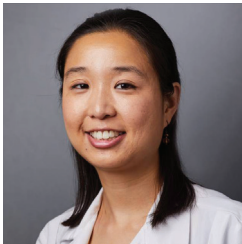
Jeffrey Goldberg, MD, PhD
Blumenkranz Smead
professor & chair



Wen-Shin Lee, MD
clinical assistant professor



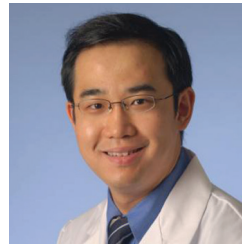
Wendy Liu, MD, PhD
assistant professor



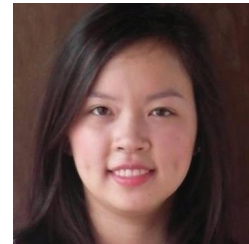
Ann Shue, MD
clinical assistant professor
(adult & pediatric)



Kuldev Singh, MD, MPH
professor



Yang Sun, MD, PhD
professor*

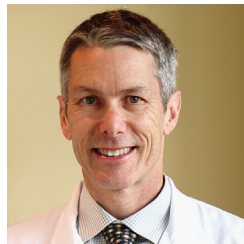


Sophia Wang, MD
assistant professor

OPTOMETRY



Jill Beyer, OD
clinical assistant professor



Steven Binder, OD
clinical assistant professor



Zheng Chen, OD
clinical assistant professor



Tawna Roberts, OD, PhD
assistant professor



Gayathri Srinivasan OD, MS
clinical associate professor*



Katherine Warner, OD
clinical assistant professor

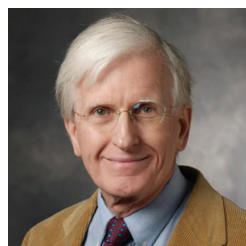
RETINAL AND MACULAR DISEASES AND SURGERY



Natalia Callaway, MD, MS
clinical assistant professor



Diana Do, MD
professor



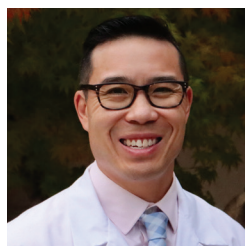
Michael Gaynon, MD
clinical professor
(pediatric)



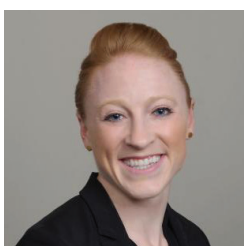
Hashem Ghoraba, MD
clinical instructor* (uveitis)



Theodore Leng, MD, FACS
associate professor



Loh-Shan Leung, MD
clinical assistant professor



Cassie Ann Ludwig, MD, MS
assistant professor*



Vinit Mahajan, MD, PhD
professor*



Darius Moshfeghi, MD
professor (adult & pediatric)



Prithvi Mruthyunjaya, MD, MHS
professor (ocular & orbital oncology)



Ramsudha Narala, MD
clinical assistant professor*



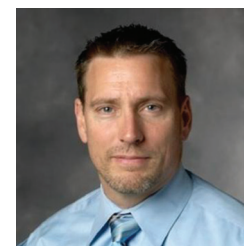
Quan Dong Nguyen, MD, MSc
professor (uveitis)



Chris Or, MD
clinical assistant professor* (uveitis)



Carolyn Pan, MD
clinical associate professor



Steven Sanislo, MD
clinical professor



Ruwan Silva, MD, MPhil
clinical assistant professor



Stephen Smith, MD
clinical assistant professor

RESEARCH



Alfredo Dubra, PhD
professor
(optical engineering)



Yang Hu, MD, PhD
associate professor
(glaucoma & optic nerve)



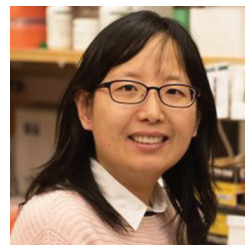
Michael Kapiloff, MD, PhD
Reinhard Family
professor (glaucoma
& optic nerve)



Daniel Palanker, PhD
professor (engineering &
experimental physics)



Yasir Sepah, MBBS
assistant professor*
(precision health)

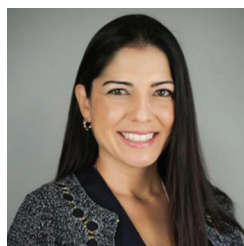


Sui Wang, PhD
assistant professor
(retinal disease)

OCULAR AND ORBITAL ONCOLOGY | OCULOPLASTICS



Natalie Homer, MD
assistant professor*



Andrea Kossler, MD, FACS
associate professor*



Clara Men, MD
clinical instructor*



Albert Wu, MD, PhD, FACS
assistant professor



Jonathan Lin, MD, PhD
professor

OPHTHALMIC PATHOLOGY

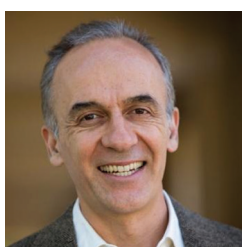
PEDIATRIC OPHTHALMOLOGY AND ADULT STRABISMUS



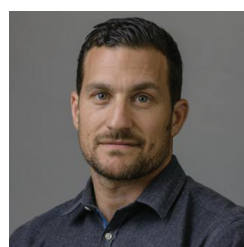
Euna Koo, MD
clinical assistant professor



Scott Lambert, MD
professor



E.J. Chichilnisky, PhD
John R. Adler professor
(neurosurgery)



Andrew Huberman, PhD
associate professor
(neurobiology)



Daniel Rubin, MD
professor (biomedical data
science, radiology, medicine
[biomedical informatics])



Creed Stary, MD, PhD
associate professor
(anesthesiology, perioperative
& pain medicine)



Douglas Vollrath, MD, PhD
professor (genetics)*



Brian Wandell, PhD
Isaac and Madeline Stein
Family professor
(psychology)

OTHER VISION SCIENCE FACULTY WITH APPOINTMENTS IN OPHTHALMOLOGY

★ CONGRATULATIONS ON AN APPOINTMENT OR PROMOTION IN 2022-2023!



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Adult Operating Rooms

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Stanford Children's Health Pediatric Ophthalmology, Los Gatos

14601 S. Bascom Ave, Suite 200

Los Gatos, CA 95032

Stanford Children's Health Pediatric Ophthalmology, Palo Alto

Mary L. Johnson Specialty Services Building

730 Welch Road, 1st Floor

Palo Alto, CA 94304

For adult clinical appointments, call (650) 723-6995.

For pediatric clinical appointments, call (650) 723-1143.

RESEARCH:

Mary M. and Sash A. Spencer Center for Vision Research: Basic/Translational Research

1651 Page Mill Road

Palo Alto, CA 94304

Mary M. and Sash A. Spencer Center for Vision Research: Clinical Trials and Translational Research

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