Columbia University Medical Center

Viewpoint

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Jonas Gift: A Legacy for Children's Vision

About eight years ago, philanthropist and entrepreneur Donald Jonas received some devastating news from his doctor at Columbia's Department of Ophthalmology. "I hate to tell you this, Mr. Jonas," Stephen Tsang, M.D., Ph.D. told him. "but it looks like you're going blind."

Dr. Tsang diagnosed Mr. Jonas with Late Onset Retinal Dystrophy (LORD), a rare genetic eye condition that destroys the cells responsible for peripheral vision and depth perception. It was the beginning of a personal journey for Mr. Jonas and his wife, Barbara, that would have the potential to profoundly affect the lives of thousands of future patients facing vision loss.

Barbara and Donald Jonas

This fall, inspired by their personal experiences, the couple and longtime Columbia University donors announced the creation of **Jonas Children's Vision Care**, a first-of-its kind, integrated effort to prevent and treat blindness and other serious eye disorders in children. The project will, among other things, help establish a state-of-the art pediatric ophthalmic diagnostic and imaging center at New York-Presbyterian/Morgan Stanley Children's Hospital. "It's very tough losing a little more sight every year," says Mr. Jonas, a retired retail executive.

"I bump into people; I try to avoid crowds. It was important for me to do something."

The money to pay for the effort will come from the Barbara and Donald Jonas Family Fund along with matching funds from Columbia Ophthalmology to support the effort. The Barbara and Donald Jonas Family Fund was created in 2005 with more than $44 million raised through a Christie's auction of about half of the family's contemporary art collection. The collection included works by Willem de Kooning, Mark Rothko, and Franz Kline, among others.

Over the decades, the Jonases have supported a wide array of causes, including efforts aimed at improving mental health treatment, reducing nursing shortages, and helping veterans. The Jonases made their first vision-related gift in 2013, when they decided to support the research of Dr. Tsang, who, in addition to serving as Mr. Jonas' ophthalmologist, is the László Bitó Associate Professor of Ophthalmology and Pathology & Cell Biology at Columbia University Medical Center (CUMC).

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INSIDE

Columbia's Cutting-edge Cornea Care

These are busy and exciting times in the Department of Ophthalmology's Cornea Division at Columbia University Medical Center. Leading these efforts is Leejee H. Suh, M.D., the Miranda Wong Tang Associate Professor of Ophthalmology and the Director of the Cornea and Refractive Surgery Division and Cornea Fellowship Program. Dr. Suh, a graduate of M.I.T. and the N.Y.U. School of Medicine, received her ophthalmology training at the Wilmer Eye Institute at Johns Hopkins and cornea fellowship training at the Bascom Palmer Eye Institute in Miami. When she arrived at Columbia in 2012, she recognized a unique opportunity.

"We have a very vibrant clinical practice at Columbia, and we have an active basic scientist team that studies corneal conditions," Dr. Suh says.

"But there was no real integration between the two groups – basically they were doing their own research while we were seeing our patients." Dr. Suh opened up the lines of communication, establishing meetings with faculty in both groups, and looked for ways to help new technologies and ideas spread from the research bench to the clinic.

Leejee H. Suh, M.D.

One promising area of collaboration is in the study and treatment of Keratoconus, a condition which often strikes a young population and causes a progressive thinning of the cornea. Many of those affected by Keratoconus have a long history of eye rubbing with concomitant allergies, asthma, or other atopic conditions. In its early stages, Keratoconus can cause increasing

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View from the Chair

Dear Friends,

Every *Viewpoint* highlights a particular area, and I am pleased in this issue to feature the work of the Cornea and Refractive Surgery Division at Columbia Ophthalmology.

The cornea is on average just 11 mm across and 12 mm from top to bottom. But this tiny structure at the very front of the eye is, of course, essential to vision: even a small scratch of the cornea and vision is distorted or blocked all together.

The doctors who specialize in this part of the eye are often able to perform feats that can have immediate and profound consequences for the vision of their patients. This is something the Department's most recent hire, Danielle Trief, M.D., learned early on: she fell in love with the field during her residency after watching a young patient gaze upon her parents for the first time in years.

The arrival of Dr. Trief, an Assistant Professor of Ophthalmology in the Cornea and Refractive Surgery Division, is part of a revitalization in the Department under the leadership of Leejee H. Suh, M.D., the Miranda Wong Tang Associate Professor of Ophthalmology and Director of the Cornea and Refractive Surgery Division and Cornea Fellowship Program. In recent years, Dr. Suh has focused on expanding the program, while at the same time increasing collaboration between clinicians and basic scientists in the Columbia community.

Of course, cutting-edge science is not limited to the Cornea Division. We'll also take you into the labs of Janet Sparrow, Ph.D. As the Anthony Donn Professor of Ophthalmic Science and Pathology & Cell Biology, she is a pioneer in the study of a mysterious class of molecules known as "bisretinoids," which she has demonstrated can play a key role in diseases of the retina.

I'm thrilled to also highlight some of our generous donors, whose support makes much of this possible. As a longtime patient with a corneal condition, Anne Stean experienced the devastation of vision loss first hand. Her bequest will be used to fund research she hoped would help future patients with corneal disease.

Columbia donors Barbara and Donald Jonas were also inspired by personal experience to make a new gift. Mr. Jonas is afflicted with a rare eye condition that is slowly robbing him of vision. Their foundation will partner with Columbia Ophthalmology to create Jonas Children's Vision Care, a first-of-its kind, integrated effort to prevent and treat blindness and other serious eye disorders in children.

Please enjoy this issue of the *Viewpoint*. As always, we greatly appreciate your dedication to our work fighting vision diseases and disorders, and we value your generous support for our clinical, research, and educational efforts to advance ophthalmic medicine.

Sincerely,

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

Columbia's Cutting-edge Cornea Care *continued from page 1*

astigmatism and perturb the pristine light-bending shape of the cornea. In advanced stages, Keratoconus can cause scarring so severe it can require a corneal transplant.

Since 2008, the Cornea Division at Columbia University has become one of the first centers in the New York metropolitan area to perform an innovative new procedure known as "corneal collagen crosslinking (CXL)," spearheaded by Stephen Trokel, M.D., Professor of Ophthalmology. This technique, first developed in Germany, aims to avoid the need for corneal transplantation by hardening the collagen fibers of the cornea and halting its degeneration due to Keratoconus.

Over the last eight years, the Cornea Division has compiled a large collection of data on patients and outcomes that will provide material for future research. The success of the data compilation only drives home the importance of early detection, Dr. Suh says.

To that end, she has teamed up with the Department of Pediatric Allergy at Children's Hospital of New York (CHONY) to find early stage patients by identifying changes in the corneal map that are associated with clinical Keratoconus.

One of Columbia Ophthalmology's basic science faculty, Ronald Silverman, M.D., Professor of Ophthalmic Science, is working to develop ways of using ultra high-resolution imaging to detect the condition early in patients. Meanwhile, another physician-scientist in the Department, David Paik, M.D., Assistant Professor of Ophthalmic Science, is studying crosslinking treatments with topical drugs that are equally effective and less invasive than surgery.

Dr. Suh also hopes to improve care for patients afflicted by Fuchs' Endothelial Dystrophy and corneal edema (swelling) with innovative selective corneal transplantation called Endothelial Keratoplasty. Fuchs' dystrophy and corneal edema affect the cornea's inner layer, called the endothelium, which contains cells that guarantee its transparency. Any dysfunction can cause swelling, which may require corneal transplantation. Endothelial Keratoplasty allows for transplantation of the inner layers of the cornea to allow for faster visual recovery and better outcomes than the traditional full thickness corneal transplantation.

Dr. Suh has also applied the spirit of integration to Ophthalmology's fellowship program by joining forces with George J. Florakis, M.D., Professor of Clinical Ophthalmology, a well-known and experienced clinician at CUMC who had already been running the cornea clinic in the residency program. The fellowship program also expanded with the arrival of Danielle Trief, M.D., who joined the Department in 2015. (Please refer to the article on page 6.) Dr. Trief's extensive background provides residents and fellows with important additional training opportunities in the Cornea Division.

Columbia Doctors Ophthalmology physicians increased the number of corneal procedures such as corneal transplantation and laser refractive surgery (LASIK and PRK) with the 2012 arrival of Dr. Suh, an accomplished clinician and surgeon. In the months ahead, the Columbia University Laser Vision Center will relocate to the third floor of the Department's Midtown office, where it will house the newest laser technology and provide premium laser vision correction treatments for all patients. Dr. Suh brings an intensity and focus in her leadership of the Cornea Division, especially in the area of professional collaboration and translational medicine. With such inspirational management, excellence in science and clinical care is more tangible than ever before. ■

Anne Stean Bequest to Help Fight Corneal Disease

Anne Stean cherished and relied upon her sense of sight. Foremost among her interests was the stage pageantry of the opera, followed closely by her love of fashion, art, and literature.

So when a debilitating eye disease threatened to rob her of sight during the final decades of her life, Mrs. Stean showed an ironclad determination to fight it. She formed a bond with the team at Columbia's Ophthalmology Department, who would be there for her during difficult medical procedures. When Mrs. Stean finally succumbed to legal blindness at the age of 88, her relationship with the Ophthalmology Department blossomed into a fierce commitment to help the faculty care for other patients who, like her, were stricken with serious visual disorders.

Born in upstate New York on January 24, 1917, her story began long before her struggles with corneal disease. Mrs. Stean's professional life led her to serve as one of the first female department managers at IBM during World War II, in a unit that played a key role in foreign sales. In 1947, she met the man who would become her husband, Joshua Stein, M.D., an English physician, and she moved from New York City to London. (She later changed the spelling of her married name so that people would pronounce it the way it sounded).

Mrs. Stean was 60 when she first had the strange feeling that a small, foreign object was lodged in her eye. It soon intensified into a sharp pain. After seeing an ophthalmologist, she was diagnosed with what is today known as Fuchs' Corneal Dystrophy, a progressive hereditary condition that causes the outer layer of the eye, the cornea, to swell and cloud. Some cases were known to end in blindness.

Mrs. Stean received her first corneal transplant in her right eye at Moorfields Eye Hospital in London in the early 1980s. But complications arose due to the steroids that were prescribed to prevent her immune system from rejecting the implant. The reaction caused permanent damage to Mrs. Stean's optic nerve, resulting in the total loss of vision in her right eye. By 1995, the vision in her good eye had deteriorated so much that doctors recommended another corneal transplant. This one saved her vision.

Around this time, Mrs. Stean's husband passed away. She returned to New York City and made her first visit to Columbia Ophthalmology. There, she met the doctors she would rely upon in the years to come to ease her symptoms and advise her on how to safely navigate a bustling urban environment. It wasn't always easy.

"Even though the graft was successful in the left eye and she had vision with that eye, it wasn't great," says her nephew, George Weeks. "She had to sit in the first row for the opera, and she had difficulty reading and had to use magnifying glasses. And in New York City, you do a lot of walking. With the one eye and the blurry vision, she had to be particularly careful."

In 2005, at the age of 88, Mrs. Stean was crossing the street outside a supermarket on the Upper East Side when she tripped on an uneven sidewalk, fell, and injured her good eye. Her Columbia clinicians performed emergency surgery, and she was able to regain partial vision. But the injury had done its damage. In time, blindness overcame her. "The horrors of being blind at age 88 suddenly and quickly emphasized what she already knew, which is that she wanted very much to make this gift," Mr. Weeks says.

Sadly, Anne Stean passed away in August, 2015, at the age of 98. The bequest she left to Columbia Ophthalmology came with a mandate to research and develop new methods for easing suffering and improving patient treatments. "She wanted to do whatever she could with the resources she had to ensure an easier time for those with corneal difficulties," Mr. Weeks asserts. "She was particularly aware of the difficulty of poor vision. And she wanted to support the work of the doctors at Columbia."

Anne Stean

Leejee H. Suh, M.D., the Miranda Wong Tang Associate Professor of Ophthalmology at CUMC and Director of the Cornea and Refractive Surgery Division, got to know Mrs. Stean in her later years. "She was a very lovely person, with a generous heart," Dr. Suh recalls.

According to her nephew, Mrs. Stean's goal in making the gift was to improve the procedures and outcomes related to corneal disease and to prevent the loss of vision. "She was very excited," Mr. Weeks adds, "and extremely pleased and thrilled knowing that her small bit would do something to further the cause of those with corneal difficulties and would make their lives much easier than hers had been."

In keeping with Mrs. Stean's wishes, Dr. Suh says, the gift will be used to facilitate collaborations between researchers and clinicians and make innovations designed to improve patient comfort and care in the cornea division. The hope that these advancements engender will surely be something to cherish.

VIEWPOINT

Editor-in-Chief
Jane E. Heffner

Writing
Adam Piore/Max Gray

Graphic Design
David Sakla

Photography
Noelle Vallet/Noelle Pensec

Columbia: A History of Transformative Corneal Research

The long tradition of transformative corneal research at Columbia Ophthalmology has played a key role in advances in eye care over the past 80 years. These include corneal transplants, the discovery of the basic characteristics of corneal physiology and of dry eye disease, insights that have been crucial to the design of modern contact lenses and LASIK surgery. "The Harkness Eye Institute has produced significant medical advances in eye care," says Stephen Trokel, M.D., Professor of Ophthalmology and a pioneer of modern LASIK surgery. "Columbia has a lot to be proud of."

In 1931 Edward S. Harkness, a wealthy philanthropist, donated funds to support a separate eye institute at the newly built Columbia University Medical Center. That year also marked the arrival at Columbia of Ramon Castroviejo, M.D. In 1933, Dr. Castroviejo performed what is believed to be the world's first successful human corneal transplant, a procedure that marked the birth of modern keratoplasty.

The Harkness Eye Institute's own modern era began in the early 1960s under Arthur Gerard DeVoe, M.D., who served as chairman from 1959-1974 and was world-renowned for his expertise in corneal and cataract surgery. Dr. DeVoe was the first to use a ceiling mounted microscope for corneal surgery and to demonstrate that microsurgery was the standard for all corneal surgery.

R. Linsy Farris, M.D.

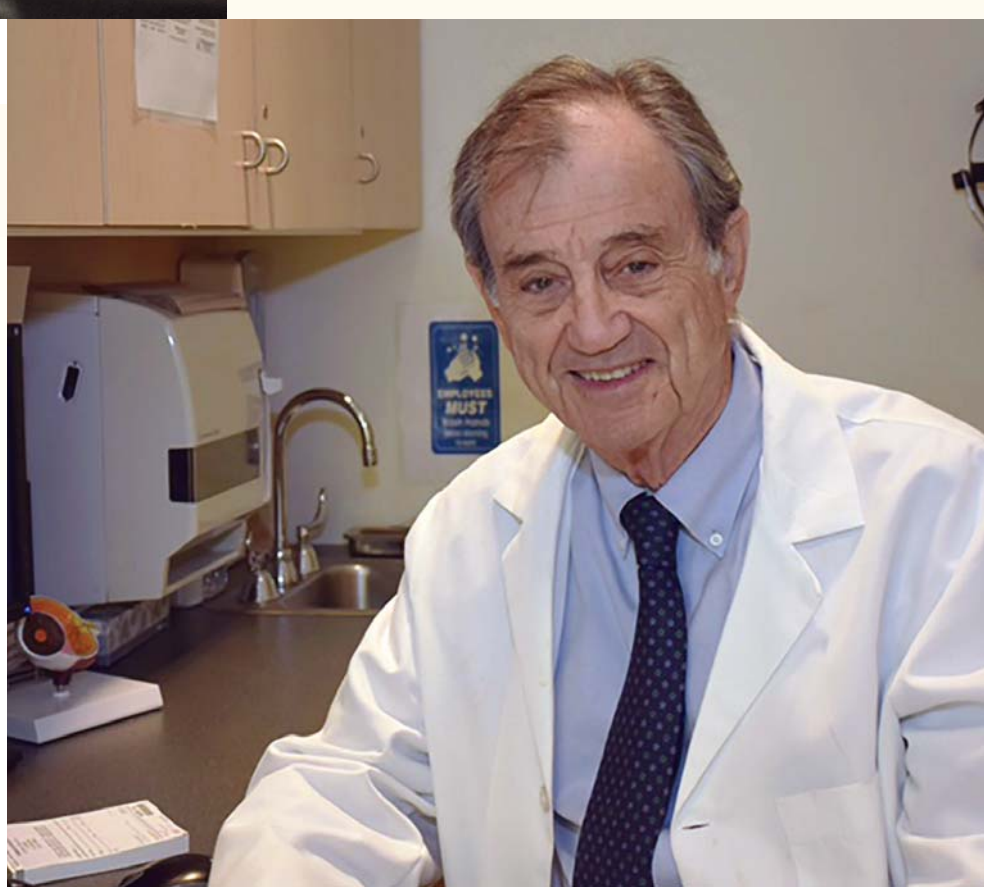
Anthony Donn, M.D., who later served as Department Chair, specialized in diseases of the cornea and helped develop specular microscopy to monitor endothelial cell health, which is essential for corneal clarity. Together, Drs. Donn and DeVoe built Columbia's clinical corneal research program at a dedicated corneal research center. It was at this center in 1965 that Hernando Cardona, M.D. introduced a Keratoprosthesis for advanced corneal diseases that were not suitable for transplantation. The following year, Saiichi Mishima, M.D. devised a widely used system to preserve the viability of donated human corneas until scheduled surgery.

R. Linsy Farris, M.D., Professor of Ophthalmology, conducted groundbreaking work on contact lenses and the human tear film in the mid 1960s through the late 1970s. Dr. Farris and his collaborators came up with new ways to measure oxygen flux across contact lenses placed on the cornea and demonstrated that corneal swelling, unexplained halos, and other visual artifacts were the result of insufficient oxygen passing to the cornea. This insight led to the adoption of rigid and soft contact lenses that allowed oxygen-bearing tears to circulate and prevent visual disturbances. It also enabled patients to wear contact lens more comfortably and for longer periods of time. Dr. Farris collected and analyzed the composition of tears from patients suffering from dry eye disease, a painful condition that occurs when the tears are deficient in quantity and quality. He discovered that increased salt content was characteristic of this condition and suggested that artificial tears could be designed to dilute the excessive salt. These findings have become the mainstay for the objective diagnosis of dry eye and the basis of artificial tear formulation.

In 1983, the Department was the site of Dr. Stephen Trokel's experiments that led to the creation of LASIK surgery. "I tried a variety of infrared lasers," Dr. Trokel says, "but the removal of tissue was irregular and rough, with extensive damage. Finally, I tried a newly developed UV laser. I can still feel that sense of wonder when I looked at the UV-exposed corneas. The edges were perfectly smooth and we had optical precision using a laser surgical technique. It was amazing and foresaw the development of new technology to correct refractive errors."

Today, the Department remains a center of innovation. In 2006, under Dr. Trokel's direction, it was the first in the New York area to perform corneal collagen crosslinking, a technique to treat keratoconus and prevent the need for corneal transplantation. Leejee H. Suh, M.D. is continuing the studies with different protocols for crosslinking. David Paik, M.D., a physician-scientist, has been looking at other ways to crosslink the cornea using eye drop topical treatments to achieve the same effect. He is also working on medications that can prevent the progression of myopia by stabilizing ocular growth. (For more information, please see the article on page 1).

Dr. Trokel, meanwhile, is currently working with Sinisa Vukelic, Ph.D., a faculty member at Columbia's Department of Mechanical Engineering, on a promising method of crosslinking using lasers that produce ionization fields in tissue. These fields can change the shape of the eye without requiring incisions, a long-sought innovation that is capable of changing the refraction of the eye. Columbia's tradition of transformative research remains a core departmental value for improving patient care. ■

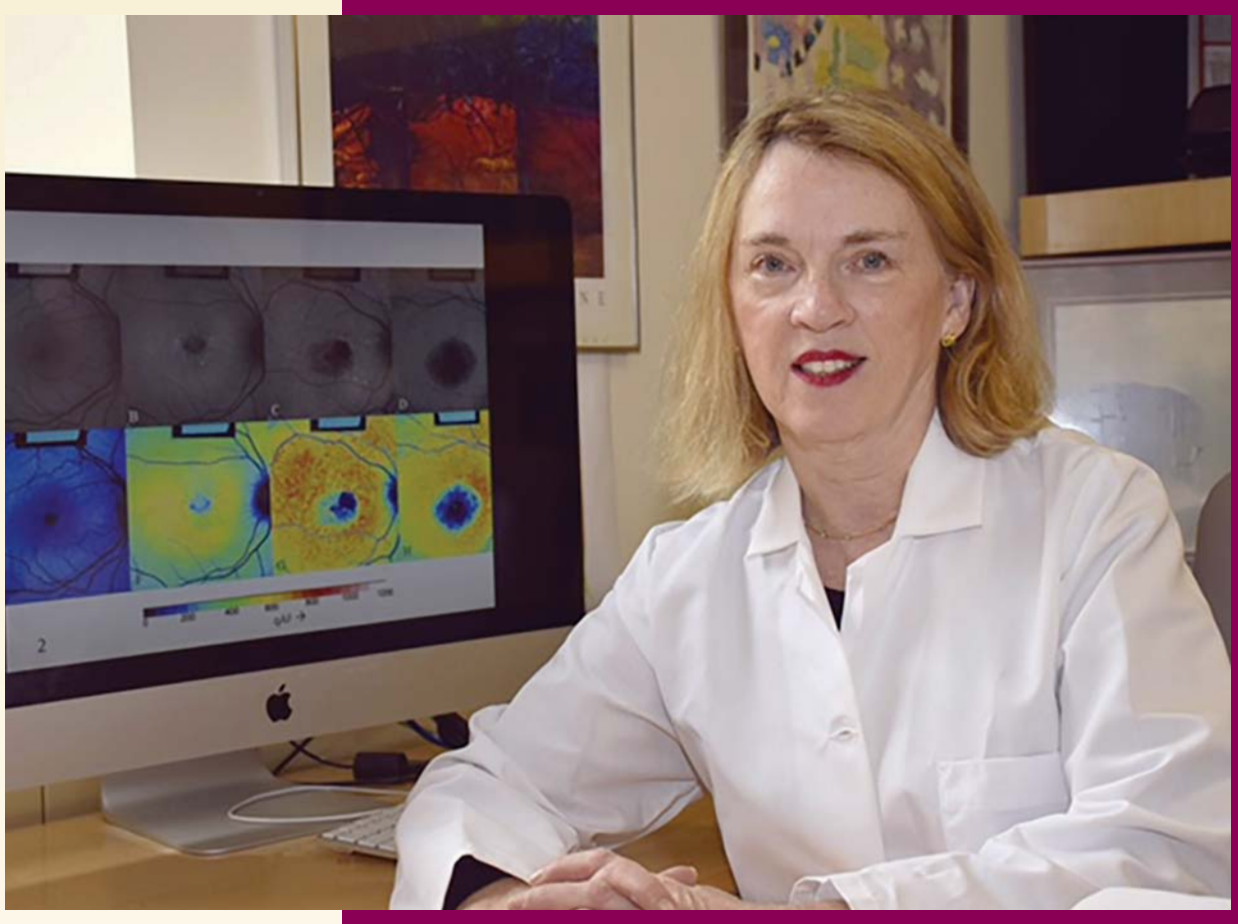


Stephen Trokel, M.D.

Research Spotlight:

Janet Sparrow, Ph.D. Solving Medical Mysteries

In her pioneering work in the Department of Ophthalmology, Janet Sparrow, Ph.D. is unearthing the causes behind the most common form of juvenile macular degeneration and other related conditions and searching for new ways to treat them. Dr. Sparrow studies a mysterious class of fluorescent molecules known as "bisretinoids." It has been well known that these compounds accumulate in the retina with age, but it was Dr. Sparrow who demonstrated the potential devastation bisretinoids can cause to human sight and who definitively linked them to Stargardt disease, an inherited form of macular degeneration that can cause progressive vision loss. Today, the Canadian-born scientist and Anthony Donn Professor of Ophthalmic Science and Pathology & Cell Biology is a world leader in the study of bisretinoids. "We now know that these compounds are definitely responsible for cell death in recessive Stargardt disease," Dr. Sparrow says, "and they probably also play a role in age-related macular degeneration."



Janet Sparrow, Ph.D.

Using a biochemical technique called high performance liquid chromatography (HPLC), Dr. Sparrow and colleagues demonstrated in their first breakthrough that it was possible to quantify the presence of a particular kind of bisretinoids, called A2E, in human eyes. The ability to precisely identify A2E's presence allowed her to prove its connection to eye disease and track its damaging properties. Dr. Sparrow also showed she could synthesize A2E as well as an entire family of related compounds that appeared to wreak havoc in the eye.

She then set out to answer the kinds of questions so crucial to helping the victims of eye disease. What is it about these compounds that causes cell damage? How might doctors better monitor their presence? And what might be done to get rid of them? "Our approach extends from single molecules to the human retina," Dr. Sparrow says. "Ultimately, by studying these compounds and developing ways to monitor them through imaging, we hope to be able to test treatment outcomes, treatment effects, and treatment success."

These complex investigations of the components of the eye have already yielded fascinating results. Normally, the contours and shapes of the outside world are imprinted on a fully functioning retina, which then transmits the images to visual processing areas in the brain for parsing. To absorb light, the retina uses specialized neurons known as photoreceptors that contain a chemical derived from vitamin A. Upon contact with light, this chemical temporarily changes shape, triggering a biochemical cascade. But Dr. Sparrow has demonstrated that sometimes molecules react inappropriately during this shape-shifting process, forming bisretinoids that the cells cannot utilize. These fluorescent molecules accumulate over time.

The exact mechanism by which bisretinoids adversely impact the eye is a focus of the work in Dr. Sparrow's laboratory. Her research has shown that, once present, bisretinoid molecules absorb the energy of light and transfer it to oxygen. This process changes the chemistry of compounds in ways that can harm and potentially kill cells in the retina.

These same light-absorbing processes, however, also cause the compounds to fluoresce — a reaction that can be used to a patient's advantage. Current research methods are attempting to measure this fluorescence with state-of-the-art imaging techniques in order to track the progression of both disease and treatment outcomes. Different patterns of fluorescence from bisretinoids are associated with specific retinal disorders, a feature that can also prove useful diagnostically.

Dr. Sparrow has explored ways to inhibit the formation of the bisretinoids, break them down, and intercept their damaging behaviors using antioxidants, an abundant substance that occurs naturally in fruits and vegetables. Even something as simple as encouraging patients with recessive Stargardt disease to wear yellow-tinted sunglasses could be advantageous. The compounds at work are stimulated by blue wavelengths that can be filtered by the yellow glass. "Corneal transplants are generally successful and the lens can be replaced," Dr. Sparrow adds. "But there are relatively few treatments for the retina. It can't be replaced, and obviously it's critical for sight."

She intends to continue her research in the hopes of making another breakthrough in the fight against vision diseases. Meanwhile, the medical community and patients can clearly see the successes Dr. Sparrow has already made.

Faculty Spotlight:

Danielle Trief, M.D.
The Elegant Art of Eye Surgery

Danielle Trief, M.D. recalls the exact moment she fell in love with ophthalmology: she was a young medical student, unobtrusively observing doctors at the Massachusetts Eye and Ear Infirmary remove the bandages from the eyes of a young woman who had received an artificial corneal transplant. The patient had been blind for years and her parents were in the room.

"She hadn't seen her family and friends for many years," Dr. Trief recalls. "My mentors replaced her natural scarred cornea with an artificial cornea, and literally, the next day, she could see everybody. It was very emotional. And I thought, okay, well, this is an amazing field!" Today it's Dr. Trief who is taking off the bandages. She joined the Columbia Department of Ophthalmology in September 2015, as an Assistant Professor of Ophthalmology in the Cornea and Refractive Surgery Division.

The cornea on which she focuses so intently comprises the eye's clear outer layer in front of the iris — the literal "window" into the "window of the soul." Like a camera lens that focuses light onto the film in the back of the camera, it's the spherical cornea that bends the light, focuses it to a central point, and projects it onto the retina at the back of the eye. The retina has cells called "photoreceptors" that convey the projected images directly to the brain for visual processing.

Any defect that perturbs the pristine light-bending shape of the cornea—such as scarring, clouding, or warping—can have major consequences for sight. At the same time, corneal problems are common because the front of the eye is exposed to the elements, common infections, and injuries. Ophthalmologic corneal surgery, Dr. Trief says, can be "very artistic," and delicate—even "beautiful."

"You're working in a really tiny part of an organ and under a microscope," she says. "The sutures that I'm using are one-third the size of a human hair. And if I'm doing a corneal transplant, I'll put 16 of these little sutures around the cornea. That takes a respect for the tissue. You need to think about tissue plains, amount of tension on the sutures, and then you have to think about the patient's eye shape. There's a lot of science, but the actual surgery is very elegant."

Although Dr. Trief sees a lot of adults for cataracts and corneal transplants in her practice, her passion is working with children. In children, she explains, diseases of the cornea are particularly urgent, because the brain is still developing, and if the eyes fail to transmit signals to the visual processing areas of the cortex during critical development periods, a child can have permanent vision loss, a condition called amblyopia. "If you're going to really make a difference and give someone vision," she says, "Columbia is the place to do it."

Danielle Trief, M.D.

A native of Tenafly, in northern New Jersey, Dr. Trief learned first-hand about the importance of sight. Her mother ran a pre-school for the blind. In middle school and high school, Dr. Trief volunteered during holidays to work with the kids. Though she knew she wanted to be a doctor, it wasn't until she witnessed the restoration of sight in patients during medical school that she realized she wanted to study ophthalmology. Dr. Trief received her M.Sc. in Neuroscience at Oxford University, her M.D. from Columbia University College of Physicians and Surgeons, and her B.A. from the University of Pennsylvania. After medical school, she spent time abroad, researching and practicing medicine in several countries, including Israel, Japan, India, and Niger.

While completing her residency at Harvard, Dr. Trief conducted research on pediatric anterior segment diseases and co-authored papers on pediatric traumatic hyphema, or anterior ocular bleeding, and pediatric medulloepithelioma, a rare tumor that occurs in children. She also worked with patients who had undergone implantation of the "Boston Keratoprosthesis," an artificial cornea used in the event of failed corneal transplants or severe corneal burns and scarring.

It was returning to Columbia University, however, that meant the most to Dr. Trief. "Columbia is where it all began for me," she says. "I went to medical school here and always hoped to return. When I received the job offer, I was ecstatic. I cannot think of any place I would rather be."

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He has been investigating two promising stem cell treatments, which he hopes might one day cure any number of degenerative retinal diseases, including LORD. Over the last year and a half, Mr. Jonas has been intensively researching other ways to help.

"Our way of doing philanthropy is not casual," Mrs. Jonas says. "We do extensive research; we speak to all the leaders of the field because we don't want to reinvent the wheel. So we spoke to many, many experts, and we spent a lot of time, just as we did with our nursing and our veteran's healthcare program. And in the end, Donald really narrowed it down."

This rigorous approach and the success of previous Jonas efforts bode well for the future of the new Children's Vision Care initiative, says G. A. (Jack) Cioffi, M.D., the Jean and Richard Deems Professor, Edward S. Harkness Professor, and Chairman of the Department of Ophthalmology. "Barbara and Donald Jonas," Dr. Cioffi says, "exemplify the philanthropic community in that they realize that they can have a worldwide impact on diseases that have been a direct threat to their family. And they are very smart about how they direct their funds."

In this case, the couple have chosen a cause with great potential. About 10 percent of preschoolers have eye or vision problems. Yet many of these problems go undetected because the children fail to receive needed screening. These vision problems can cause learning difficulties, delayed social development, impaired motor skills, and balance problems. "Children have their whole lives

Columbia Launches Pioneering Tele-Ophthalmology Effort

Columbia Ophthalmology is taking the fight against the leading causes of blindness out of the traditional clinic and onto the streets of New York City. Columbia's mobile tele-ophthalmology unit is soon to begin serving neighborhoods with populations at high-risk for eye disease. The mobile screening project strengthens the Department's commitment to combating sight-threatening eye diseases and disorders by testing patients in local communities that are most vulnerable and transmitting health information in real time. In an ambitious move, the mobile screening unit is expanding its area of influence to more neighborhoods in Upper Manhattan and the scope of vision problems treated will quadruple.

Under the leadership of Associate Professor Of Ophthalmology and glaucoma expert Lama Al-Aswad, M.D., M.P.H., the staff of the mobile unit expects to perform free screenings for at least 2,000 people a year at locations in the Bronx, Washington Heights, and Harlem for signs of the four leading causes of blindness: glaucoma, cataracts, macular degeneration, and diabetic retinopathy. Dr. Al-Aswad and her team will also screen patients for diabetes, hypertension, and obesity, all of which are common risk factors for eye disease. As the project progresses, the unit may also be deployed to New York's other boroughs.

"You can treat these eye conditions and prevent blindness, if they're caught early," Dr. Al-Aswad says. "But if they're caught late, they're harder to control, and people can go blind."

The unit's array of diagnostic equipment includes an Optical Coherence Tomography (OCT) machine, which images the structures of the retina and optic nerve, a fundus camera, Frequency Doubling Technology (FDT) that tests the peripheral field of vision, and an intraocular pressure device. Unlike in other mobile screening projects, Columbia's staff will use state-of-the-art diagnostic tools to communicate via WiFi with a reading center where data will be evaluated in real time. The clinicians will take advantage of a unique, digital database of records that boasts a secure transmission between the mobile unit and Columbia's Department of Ophthalmology. Real-time data transfer and video conferencing between patients and clinicians will make the project the first of its kind.

Over the past seven years, Dr. Al-Aswad and her team have tested over 8,500 individuals in high-risk communities for glaucoma alone as part of a screening effort launched by the Friends of the Congressional Glaucoma Caucus. Though healthcare providers have experimented in the past with data storage and later review off-site, this tele-opthalmology project will offer immediate and comprehensive screening for the symptoms of all four sight-threatening dieases and disorders. This expansion marks the first time that a tele-ophthalmology project will screen for cataracts, macular degeneration, and diabetic retinopathy. Thanks to the timely transmission of data, clinical care on board the mobile unit will be transformative for both patients and health care providers.

"It is more cost effective and efficient to detect and treat disease in its early stages," Dr. Al-Aswad says. "Our model pursues health management by targeting high-risk populations and screening them for diseases free of cost."

With the advent of the tele-ophthalmology project, Columbia is confidently pursuing the best practices of the future. The screening project's expanded scope, real-time testing, and high standard of clinical care demonstrate that the future for ophthalmic telemedicine is bright. Dr. Al-Aswad and her staff are pulling no punches in the street fight against eye disease. ■

Lama Al-Aswad, M.D., M.P.H.

Dr. Al-Aswad having a real-time conversation with a patient utilizing tele-ophthalmology technology.

Mobile Testing Station

ahead of them," Mr. Jonas says. "This might help give those with vision problems a better life."

Steven E. Brooks, M.D., the Anne S. Cohen Professor and Chief Of Pediatric Ophthalmology, believes this program could have a big impact. The amount of funding is "substantial," Dr. Brooks says, adding that "it will help build a solid foundation for a robust and enduring program encompassing research, patient care, advocacy, and teaching, all to the benefit of children."

Jonas Children's Vision Care is designed to help fill an important and underfinanced area because most vision programs are cross-generational and do not focus specifically on promoting children's visual health, notes Darlene Curley, CEO of the Jonas Family Fund. Overall, she notes, the program will take a five-pronged approach to protecting vision:

• **Clinical care and genetic testing**, including patient care services, gene sequencing, and genetic counseling for families with genetic mutations linked to vision problems;

• **Training/education** of clinicians and scientists investigating childhood blindness;

• **Clinical and scientific research** to develop novel treatments and cures for sight-threatening diseases in children, including precision medicine-based therapies for children with genetic mutations associated with blindness;

• **Collaboration with national organizations** committed to pediatric vision care such as the American Association for Pediatric Ophthalmology and Strabismus, the National Children's Eye Care Foundation, and Lighthouse Guild International;

• **Advocacy and resources** for low-income families, such as low-vision aids and glasses for infants.

The Jonas Children's initiative, Dr. Cioffi says, will draw upon Columbia Ophthalmology's many strengths. Those include strong clinical care from infancy throughout life, genetic testing of individuals with eye disease for diagnosis and treatment, the resources of a wide array of laboratories, and the University's many initiatives in an interdisciplinary field called translational research.

According to Dr. Cioffi, a major feature of the project lies in its combination of clinical care with the work of geneticists engaged in basic research. "We're going to tie it all together," he says, "through education, testing, advocacy, great basic science, and the delivery of outstanding clinical care." ■

In Memoriam

Columbia Mourns the Loss of Friend and Board Member, Ta Chun Hsu

Ta Chun Hsu

Ta Chun Hsu, a dear friend to the Department of Ophthalmology and a longstanding member of its Board of Advisors, died on December 27, 2015, at the age of 97. At the time of his death, he was President Emeritus and a Director of The Starr Foundation.

As President of The Starr Foundation for over three decades, Mr. Hsu advanced the mission of organizations dedicated to the arts and sciences throughout the world. In this capacity, Mr. Hsu provided support for Columbia Ophthalmology through the establishment of the Starr Research Scholars endowment in 2002 and the Starr Retina Research Unit in 2004.

The Starr Research Scholars program affords young medical investigators the opportunity to conduct their research under the supervision of senior faculty members. The Starr Retina Research Unit enables Columbia's clinician-scientists to conduct clinical trials and translate basic research into innovative treatments for vision diseases and disorders. Through these two ventures, Mr. Hsu helped to underwrite important clinical and scientific breakthroughs within the Department.

Born in Beijing in 1918, Mr. Hsu attended the University of Shanghai. He relocated to the United States during World War II and graduated from Haverford College in 1942 with a B.S. in Economics. He received a Master's Degree from the Columbia University School of Journalism in 1944.

Upon graduating, Mr. Hsu accepted a position within the news division of the Chinese Information Service in New York. Later, he moved to Shanghai to work on *The Shanghai Evening Post* and *Mercury*, newspapers owned by Cornelius Vander Starr, the founder and President of The Starr Foundation.

In 1964, Mr. Hsu returned to New York to work with Mr. Starr at The Starr Foundation. After Mr. Starr's passing in 1968, Mr. Hsu became President and served in that role for 31 years until 1999. As Stanley Chang, M.D., former Chairman of the Department and the K.K. Tse and Ku Teh Professor of Ophthalmology, notes, "T.C. was a truly kind and gentle man whose leadership at The Starr Foundation had a global philanthropic impact."

Viewpoint

Columbia University Medical Center

The Edward S. Harkness Eye Institute and
The Department of Ophthalmology
635 West 165th Street
New York, NY 10032-3797

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