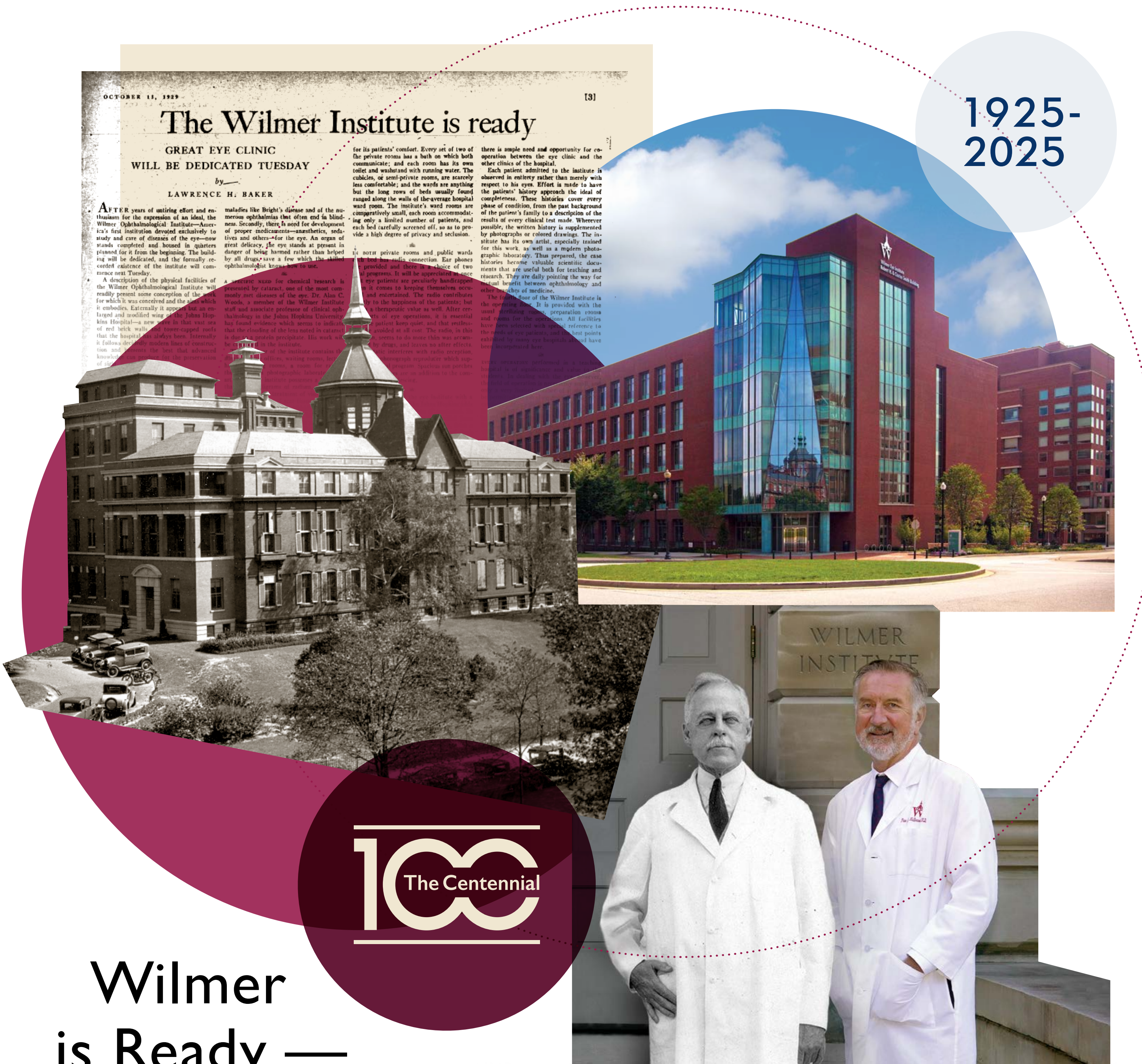
SUMMER 2025

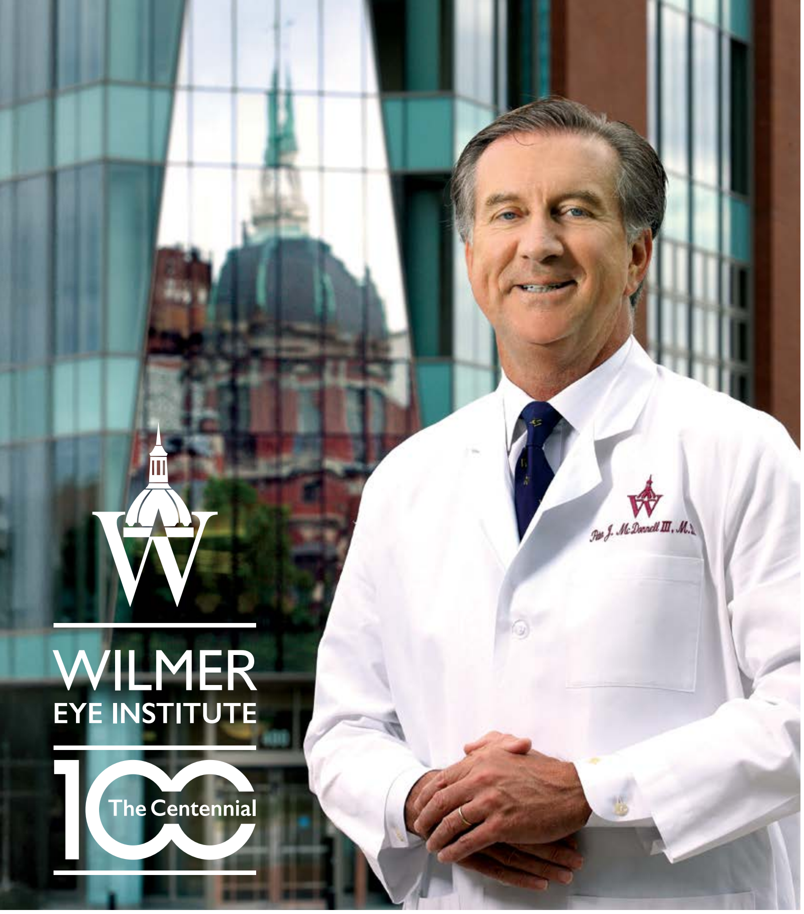
# Wilmer

Wilmer Eye Institute




## Wilmer is Ready — *for the Future.*

The institute has been built in order that their effectiveness may be extended to the greater benefit of humanity.




# As I See It …

ONE HUNDRED YEARS AGO, WHEN AIDA BRECKINRIDGE RAISED THE FUNDS TO ESTABLISH THE WILMER OPHTHALMOLOGICAL INSTITUTE, SHE DID SO TO ENSURE THAT THE KNOWLEDGE AND EXPERTISE OF DR. WILLIAM HOLLAND WILMER WOULD BE PASSED ON TO THE NEXT GENERATION. FOR AIDA, IT WAS AN INVESTMENT IN THE FUTURE.

Today, the Wilmer Eye Institute is world-renowned. It has the largest clinical faculty of any eye hospital in the country, recognized for its breadth of subspecialties as well as a research program that is second to none.

Wilmer is not only at the forefront in research and development, but also in terms of advancing access to care — because we know that by identifying eye disease early, we can treat it and prevent exacerbation which then leads to loss of vision. That's especially important as our population ages, and it's why in the last 10 years, we've expanded our clinical practice by nearly half. We've established a same-day appointment program that allows patients immediate access to care on request. We're implementing artificial intelligence in diagnostic imaging, screening, research and education — all aimed at increasing efficiency so that we can reach more patients.

We're working toward a future where no one goes blind from preventable causes, where patients can access care when and where they need it, where subspecialists are available to treat even the most complex conditions, and where — just as Aida dreamed 100 years ago — we continue to train the next generation of ophthalmology leaders.

In this commemorative edition of Wilmer magazine, we share stories and insights from the past and present, while looking ahead to what promises to be a very exciting future.

Peter J. McDonnell

**PETER J. McDONNELL, Director**

# Inside






# History

One can only imagine what the people who experienced the earliest days of the Wilmer Ophthalmological Institute would think of this grand institution today. What began a century ago with an idea has — through imagination, curiosity, thoughtful planning, dedication and hard work — become the world-renowned leader in ophthalmology training, research and patient care that Wilmer is today. In the pages that follow, we share perspectives on and from those who have led this storied institution over the past century, and we take you on a trip down memory lane as we explore some of the historical artifacts and milestones that reflect Wilmer's rich history.

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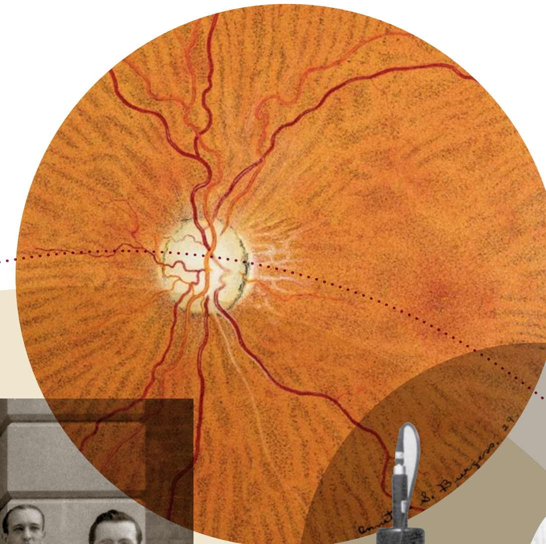
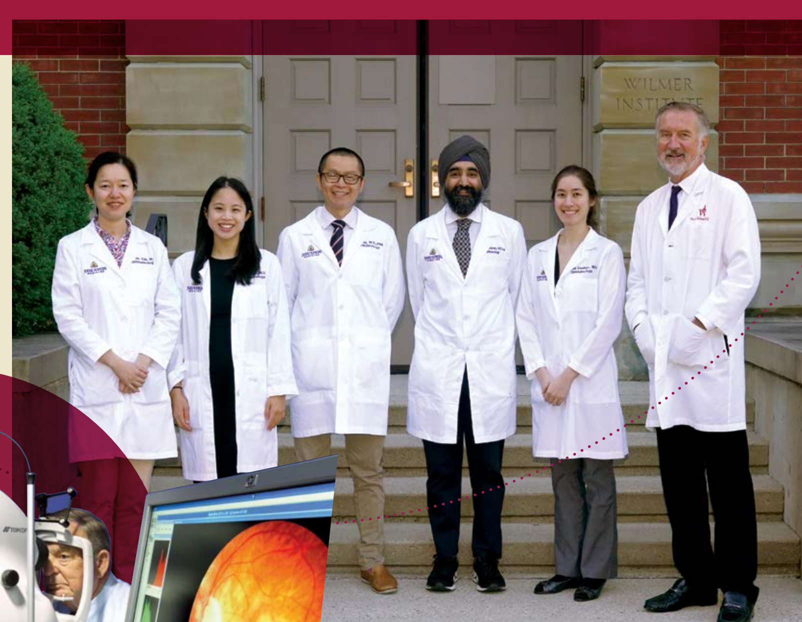
On the opposite page, clockwise from top left: William Holland Wilmer, center front, and the Wilmer Ophthalmological Institute house staff, 1928–1929; Ed Maumenee (top) and Arnall Patz (seated) pioneered the use of fluorescein angiography; Peter McDonnell, right, and the Wilmer class of 2022; Neil Bressler examines a fundus image.



# IMAGINATION




## DIRECTORS' CORNER

*With only six directors in its 100-year history, the Wilmer Eye Institute, Johns Hopkins Medicine, stands as a testament to the strength of its founding principles and steadfast leadership. In the pages that follow, Wilmer's current director and its immediate past director provide a glimpse of the challenges encountered and accomplishments achieved by Wilmer directors in the institution's first ten decades.*

## 1925–1989

# THE EARLY YEARS

**By Peter J. McDonnell, M.D.**

The son of a clergyman, **William Holland Wilmer, M.D.**, was born in the middle of the Civil War in Powhatan County, Virginia. He received his medical degree from the University of Virginia in 1885, interned at Mount Sinai Hospital in New York City, worked for three years as assistant to eminent ophthalmologist Emil Gruening and opened a practice in Washington, D.C., in 1889. Wilmer entered the Medical Reserve Corps in 1911 and ran an American Expeditionary Force hospital in Issoudon, France, during World War I — for which he was recognized with the Distinguished Service Medal in 1919 and membership in the French Legion of Honor in 1924.

In 1922, the trailblazing philanthropist Aida de Acosta Root Breckinridge traveled from New York to consult Wilmer for her deteriorating vision. He diagnosed her glaucoma, and prompt surgery preserved her sight. Grateful for her own care and impressed by the surgeon's service to patients coming to him from far and wide, she shared with Wilmer her plan to raise the funds to establish a larger, better-equipped institute to meet patients' needs and to allow him to pass his skills on to young doctors.

As Breckinridge later related to the audience at the dedication of the Wilmer Ophthalmological Institute, "Dr. Wilmer admitted that such an institute was very much needed but was horrified at the suggestion that the financial aid of his patients be requested. He not only refused to provide a list of his patients, but he said he would block every attempt to compile such a list."

The strong-willed Breckinridge was not to be deterred. She said she "obtained by various methods" a list of 700 patients, and a remarkable 338 of them contributed to make the Wilmer Ophthalmological Institute a reality in 1925. As the institute's first director (1925–1934), Wilmer would spend the next nine years establishing the patient care, research and teaching programs for which the institute has become famous.

*Above:*
William Holland Wilmer

*Opposite Page:*
Aida Breckinridge, far left, and William Holland Wilmer, right

Alan Woods

In 1934, **Alan Churchill Woods Sr., M.D.**, became Wilmer's second director (1934–1955). His undergraduate and medical school degrees were obtained at Johns Hopkins, followed by training in medicine at Peter Bent Brigham Hospital in Boston and a fellowship at the University of Pennsylvania, where he became fascinated with allergy and immunity. In 1925, he was named assistant director to William Holland Wilmer, and he began an active clinical and research program focused on eye disease characterized by inflammation, including inflammation caused by tuberculosis, syphilis and sympathetic ophthalmia. As much as anyone, Woods played a major role in establishing what is today an acknowledged subspecialty field of uveitis and ocular immunology.

In 1941, Woods found himself in the role of patient when his own vision deteriorated due to cataracts. Determined to "eat his own cooking," Woods had his surgery performed by a newly graduated resident, Jack Guyton, M.D. The outcome was perfect.

In many ways, Woods was a larger than life personality — Norman Ashton, D.Sc., a professor at the University of London, described him as "a sort of human Sherman tank riding roughshod through life, caring only for the truth as he saw it and very little for the world's reactions to his views."

A. Edward Maumenee

The first Wilmer director to be a product of the institute's training program, **Alfred Edward Maumenee, M.D**., (known to many as Ed) began his residency in 1938. He was also chief resident at Wilmer, and a medical officer in the U.S. Navy from 1944–1946. In 1948, he left Wilmer to become chair of the ophthalmology department at Stanford University before returning to Wilmer in 1955 for a 24-year term as director (1955–1979).

Maumenee loved performing surgery and was unusual (by today's standards) in that his knowledge was all encompassing — he had major publications in almost all areas of ophthalmology and a willingness to go toe-to-toe with colleagues who were "specialists" in only one part of our field. The one exception was neuro-ophthalmology, about which he would defer to his colleague Frank Walsh, M.D., who founded the field.

Maumenee was a charismatic leader, and a contemporary noted that he "has been president of nearly every ophthalmic group to which he has belonged." When he stepped down as director of Wilmer, his scientific contributions included popularizing the use of fluorescein angiography as a new diagnostic technique for retinal disease, and descriptions of immunologic corneal graft rejection and the basis of congenital glaucoma.

Arnall Patz

**Arnall Patz, M.D.**, grew up in Georgia and attended Emory University as an undergraduate and medical student. While serving in the military at Camp Lee, Virginia, he visited the eye department at what is now named the Walter Reed National Military Medical Center and became excited about a career in ophthalmology. Post World War II, an epidemic of blindness in children occurred due to retrolental fibroplasia (now called retinopathy of prematurity). Patz suspected the problem was related to the pure oxygen given to premature babies in hospitals and applied for a grant to test his idea. The grant was rejected and Patz was harshly criticized for proposing to study this, but he persisted in his gracious way and was proven correct. Helen Keller presented him with a Lasker Award (known as the American Nobel Prize) in 1956.

Patz went on to be a pioneer in the use of the argon laser (laser iridotomies and retinal photocoagulation) to treat eye disease and received the Presidential Medal of Freedom in 2004 from President George W. Bush. Like Ed Maumenee before him, Patz was tapped to serve as president of key organizations such as the American Academy of Ophthalmology and the Macula Society, and today, the Arnall Patz Medal is awarded by the latter organization to an outstanding contributor to the field of retinal diseases.

During his term as Wilmer's director (1979–1989), Patz dramatically increased the institute's size and scope. The addition of the Maumenee Building provided modern space for clinics, operating rooms and research, and the growth of the faculty included creation of new specialty areas (such as the Retinal Vascular Center, which Patz led, and the Dana Center for Preventive Ophthalmology, led by Alfred Sommer, M.D., M.H.S.). Patz's residents saw in him a kind and humble man without the ego that often accompanies such a track record of accomplishment and public recognition. ●

When he was presented with the Presidential Medal of Freedom in 2004, Patz was acclaimed by President George W. Bush as "the man who has given to uncounted men, women and children the gift of sight."

## 1989–2003

# REMINISCENCES OF 14 YEARS AS DIRECTOR

By Morton F. Goldberg, M.D.

Morton F. Goldberg

In 1970, after completing my residency and serving as chief resident at both the Wilmer Eye Institute and Yale University, I joined the University of Illinois, where I spent 19 happy and productive years as a professor and chairman of the ophthalmology department. Despite my wonderfully gratifying experience in Chicago, the allure of the Wilmer directorship proved irresistible. Accepting an invitation from the Johns Hopkins dean and hospital president, I returned to my dear alma mater in 1989 for an action-packed and fulfilling 14 years.

Upon arriving at Wilmer, I experienced a series of unforeseen challenges that quickly became a "trial by ordeal." Medicare and other insurers stopped reimbursing for overnight stays for eye surgeries, cutting our hospital income and compromising residents' daily inpatient education. Moreover, managed care companies diverted patients to lower-cost practitioners, reducing patient volumes and reimbursements even further. Several senior surgeons left, taking their lucrative practices and creating a $2 million deficit in the Wilmer practice plan. The promised $5 million for a building expansion was pulled, forcing me to threaten immediate resignation to secure the funds. Then, during construction of two new Maumenee Building floors, a leaky roof caused water damage to brand new ceiling-mounted operating microscopes, with torrents cascading downward inside the ocular lenses' support pieces. What a sight!

In 1990, we were in deficit mode. To stabilize the department and restore financial stability and faculty enthusiasm, a comprehensive strategic plan was needed that would expand patient volumes, cut costs, improve information systems, recruit additional faculty, raise private donations and complete numerous renovations.

To help reverse the tide, I hired a terrific chief financial officer, a billing/collections expert, an extraordinary development officer and an experienced departmental administrator. A full-court press ensued to reduce the number of personnel and programs, yet at the same time create new dollars from every conceivable private and public source. Although the cost-cutting measures were exquisitely painful, they were necessary for survival and, eventually, major new growth. With faculty support, the plan succeeded.

To generate new income, the faculty and I applied for many research grants. Soon, Wilmer had more major research grants than any ophthalmology department in the country. Individual philanthropic gifts also skyrocketed, enabling support of new programs and recruitments and renovations designed to attract new patients and increase faculty hires.

These efforts led to a turnaround of $2.7 million within two years. Between 1989 and 2003, fundraising activities resulted in 20 new endowed professorships and numerous large private gifts, increasing Wilmer's endowment from $21 million to over $110 million and solidifying our financial stability and global reputation.

In the early to mid-1990s, with the two new floors in the Maumenee Building completed, we began to modernize all other patient areas and consolidate nursing units. Wilmer at Green Spring Station, with its ultramodern surgicenter (the first at Johns Hopkins), opened in 1994 and was followed by several other Wilmer satellites throughout Maryland. The Wilmer dome was transformed into a museum featuring the original examining chair that Dr. Wilmer used to care for eight U.S. presidents. By 1999, Wilmer had outgrown these expansions, and I was pleased to work with Dr. McDonnell to help build the spectacular Smith Building, containing both laboratory and surgical facilities.

Wilmer faculty earned numerous prestigious awards during this period, including the Lucien Howe Medal in Ophthalmology, the Helen Keller Prize for Vision Research and the Lasker Award. Many faculty members served as presidents of major national and international ophthalmic organizations, and several became chief editors of leading journals. Wilmer consistently ranked as the top U.S. eye department, earning recognition from *Ophthalmology Times*, *U.S. News & World Report* and others. Our peerless residency system continued its highly successful educational programs, and our residents continued to assume chairmanships of ophthalmology departments and medical deanships at more than 100 institutions.

Throughout my directorship, I was privileged to work with a dedicated team of highly skilled faculty and a superlative administrative, support and technical staff. Wilmer's nurses deserve special recognition for their pivotal role in providing expert clinical care and in training residents in the intricacies of modern eye surgery. In addition, my wife, Myrna, provided invaluable advice, particularly in assessing residents and faculty members with uncanny insight.

The year 2000 marked Wilmer's 75th anniversary, a milestone celebrated with record-breaking achievements. Wilmer secured more grant money for eye research than any other department globally, performed 11,000-plus laser surgeries, realized a 90% increase in major surgical procedures and provided outpatient care for over 110,000 people. These accomplishments led Florida Congressman Cliff Stearns to commemorate our achievements in the Congressional Record on Nov. 1, 2001.

Our 75th anniversary theme, "Expectation of Greatness," epitomized Wilmer's ethos and mission for the immediate and long-term future. ●

## 2003–PRESENT

# THE SIXTH DIRECTOR

By Peter J. McDonnell

Peter J. McDonnell

After graduating from Dartmouth College, I had the good fortune to be accepted to medical school at Johns Hopkins. My father, a general surgeon who had completed a fellowship at Johns Hopkins before serving as a trauma surgeon in the U.S. Army during World War II, had been so impressed with Johns Hopkins that he wanted me to apply only to that school. Fortunately, that advice proved wise, and after four years of medical school, I found both a wonderful wife (my classmate, Jan) and a pathway to the incredible field of ophthalmology.

Prior to my medical training, I had never seriously considered ophthalmology as a career. Observing and interacting with such Wilmer faculty as Arnall Patz (my chairman), Ed Maumenee, Stuart Fine, Dick Green, Walter Stark, Ron Michels, Al Sommer, Allan Jensen, Bob Welch, Neil Miller, Harry Quigley — the list goes on — was exciting and inspiring. There was so much to learn, but my professors, my chief residents and my fellow residents were always there to encourage me and help make sure I kept up. After Wilmer, I was fortunate to work for another inspirational figure, Stephen Ryan, who had trained at Wilmer before becoming a department chair in Los Angeles. In 1999, I had the honor of chairing the ophthalmology department at UC Irvine. Then, in 2003, I returned to Wilmer as its sixth director.

During my training, I became interested in the nascent field of keratorefractive surgery, which reshapes the cornea to improve vision, and this became the focus of my clinical career. New laser technologies allowed us to precisely reshape the front of the eye, reducing or eliminating the need for glasses or contact lenses, and millions of people subsequently have elected to have these procedures.

Taking on the role of leading this institute, an international treasure, is a big responsibility. Fortunately, I had two of Wilmer's former directors on my faculty (Arnall Patz and Mort Goldberg) to provide sage advice, as well as the great support of the Wilmer board of governors, with the leadership of my outstanding board chairs (Rick and Sandy Forsythe followed by Sanford and Susan Greenberg).

My time as director has been characterized by tremendous growth of the institute, driven by a seemingly endless demand for our services to meet the needs of the burgeoning population of aging Americans. The creation of Wilmer's statewide network of clinics has allowed us to grow our faculty, reduce the wait for appointments and limit the need for patients to travel long distances for care.

Securing the funding for the Robert H. and Clarice Smith Building, which opened in 2009, enabled us to grow not only our clinical practice but also our surgery and research programs, including large engineering initiatives. All funds for the new building came from grateful Wilmer patients and generous Wilmer alumni. Our generous friends have also provided funding to support care for uninsured patients.

New research centers have developed at Wilmer to explore today's emerging fields including artificial intelligence, nanotechnology, stem cells and genetic eye disease. We've seen roughly a tripling of research grant funding and a dramatic increase in the number of annual publications in scientific journals, from an average of 125 to over 700 papers, which speaks to the increasing productivity of Wilmer's researchers. An important goal has been to encourage entrepreneurship, with 14 companies founded on technology developed in Wilmer's laboratories.

We have also seen an increase in the number of endowed professorships, from 20 to 80. These professorships provide funds to allow our faculty members to pursue their best ideas in a timely manner. Unique to Wilmer was the launch of the Rising Professorships Program in 2020, aimed at supporting assistant professors just launching careers in their pursuit of revolutionary ideas (see page 52). I am grateful that of the 80 Wilmer professorships, 14 are rising professorships for our brilliant young colleagues.

"Unique to Wilmer was the launch of the Rising Professorships Program in 2020, aimed at supporting assistant professors just launching careers in their pursuit of revolutionary ideas."

As we continue Wilmer's legacy of training the next generation of leaders, our creation of leadership development and executive coaching programs helps prepare faculty members for key roles within and outside of Wilmer. I am delighted to note that we have trained more women in our residency program and added more women to the faculty over the past two decades than in the combined tenures of all previous Wilmer directors.

The COVID pandemic presented a monumental challenge during my time as director, especially because ophthalmologists were among the top three medical specialties likely to be infected (since we work so closely to our patients' faces). At a time when most ophthalmology offices were closed in the country, so many of our faculty and residents courageously stepped up to provide care.

Not everyone can claim to have the best possible job in their field. I am one person who can. ●

# CENTURY OF WILMER

**The Wilmer Eye Institute, Johns Hopkins Medicine, is incredibly fortunate to have retained many of the books, articles, awards and artifacts resulting from Wilmer activities over the last century.** These historical treasures help tell the compelling story of how one woman, Aida Breckinridge, recognized the genius of one man, ophthalmologist William Holland Wilmer, and took it upon herself to ensure that his work would live on in the generations of students that followed. They tell the story of some of the biggest breakthroughs in ophthalmology during the institute's 100-year history — and of the exceptional dedication, discovery and innovation that remain hallmarks of Wilmer today.

*Opposite Page:*

1. *New York Times* article from October 1925
2. William Holland Wilmer
3. Original home of Wilmer Eye Institute at Johns Hopkins Hospital
4. Arc Perimeter
5. Gertrude Rand
6. HRR Color Test, developed by Gertrude Rand and colleagues

## 1920s-1930s

### GRAND OPENING

The Wilmer Ophthalmological Institute is established on the Johns Hopkins University medical campus on Oct. 11, 1925. William Holland Wilmer, one of the country's most influential ophthalmologists, is selected as its founding director.

### DEVELOPMENT OF THE ARC PERIMETER

During the 1920s and 1930s, Clarence Ferree and Gertrude Rand, director and assistant director, respectively, of the Research Laboratory for Physiological Optics at Wilmer, develop the Ferree-Rand perimeter for determining light sensitivity and color discrimination in the visual field. Rand and colleagues would go on to develop the HRR color test.

### DEVELOPING TECHNIQUES OF GLAUCOMA AND CATARACT SURGERY

Spanning the William Holland Wilmer era and that of his successor, Alan Woods, the institute develops surgical techniques for treatment of glaucoma and cataracts, and publishes protocols for the benefit of patients everywhere. The institute's first paper, by senior resident Cecil Bagley, is published in 1926.

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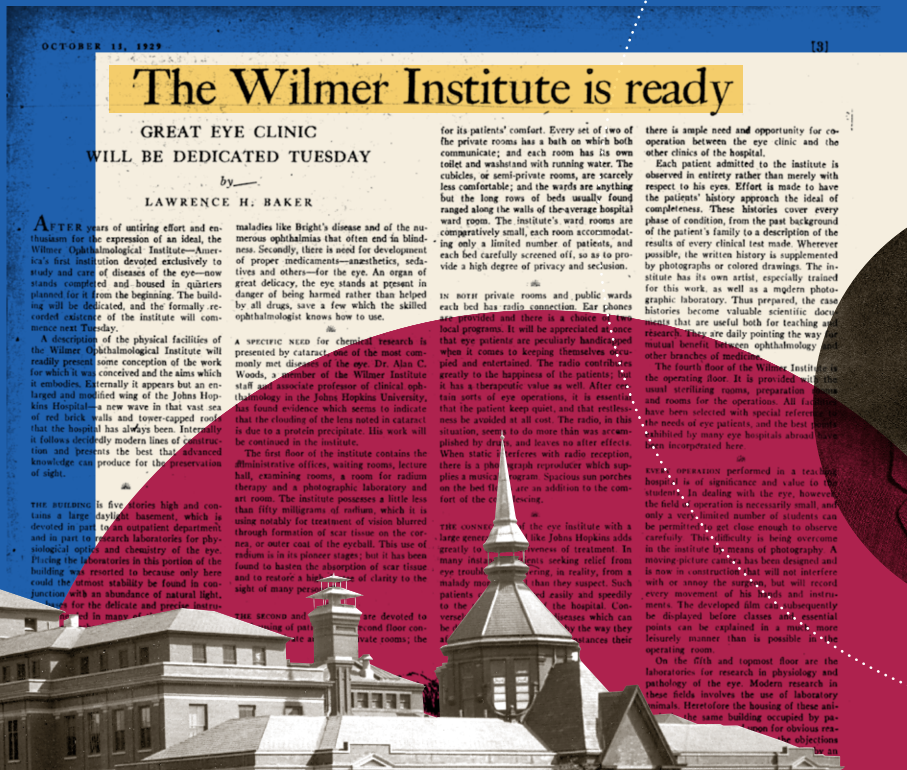

OCTOBER 11, 1929 [3]

# The Wilmer Institute is ready

GREAT EYE CLINIC
WILL BE DEDICATED TUESDAY

*by*
LAWRENCE H. BAKER

AFTER years of untiring effort and enthusiasm for the expression of an ideal, the Wilmer Ophthalmological Institute—America's first institution devoted exclusively to study and care of diseases of the eye—now stands completed and housed in quarters planned for it from the beginning. The building will be dedicated, and the formally recorded existence of the institute will commence next Tuesday.

A description of the physical facilities of the Wilmer Ophthalmological Institute will readily present some conception of the work for which it was conceived and the aims which it embodies. Externally it appears but an enlarged and modified wing of the Johns Hopkins Hospital—a new wave in that vast sea of red brick walls and tower-capped roofs that the hospital has always been. Internally it follows decidedly modern lines of construction and presents the best that advanced knowledge can produce for the preservation of sight.

THE BUILDING is five stories high and contains a large daylight basement, which is devoted in part to an outpatient department and in part to research laboratories for physiological optics and chemistry of the eye. Placing the laboratories in this portion of the building was resorted to because only here could the utmost stability be found in conjunction with an abundance of natural light, [illegible] for the delicate and precise instru[illegible] needed in many of [illegible]

maladies like Bright's disease and of the numerous ophthalmias that often end in blindness. Secondly, there is need for development of proper medicaments—anæsthetics, sedatives and others—for the eye. An organ of great delicacy, the eye stands at present in danger of being harmed rather than helped by all drugs, save a few which the skilled ophthalmologist knows how to use.

A SPECIFIC NEED for chemical research is presented by cataract, one of the most commonly met diseases of the eye. Dr. Alan C. Woods, a member of the Wilmer Institute staff and associate professor of clinical ophthalmology in the Johns Hopkins University, has found evidence which seems to indicate that the clouding of the lens noted in cataract is due to a protein precipitate. His work will be continued in the institute.

The first floor of the institute contains the administrative offices, waiting rooms, lecture hall, examining rooms, a room for radium therapy and a photographic laboratory and art room. The institute possesses a little less than fifty milligrams of radium, which it is using notably for treatment of vision blurred through formation of scar tissue on the cornea, or outer coat of the eyeball. This use of radium is in its pioneer stages; but it has been found to hasten the absorption of scar tissue and to restore a high [illegible] of clarity to the sight of many perso[illegible]

THE SECOND and [illegible] are devoted to [illegible]using of pati[illegible] second floor con[illegible] [illegible]ate a[illegible] [illegible]vate rooms; the

for its patients' comfort. Every set of two of the private rooms has a bath on which both communicate; and each room has its own toilet and washstand with running water. The cubicles, or semi-private rooms, are scarcely less comfortable; and the wards are anything but the long rows of beds usually found ranged along the walls of the average hospital ward room. The institute's ward rooms are comparatively small, each room accommodating only a limited number of patients, and each bed carefully screened off, so as to provide a high degree of privacy and seclusion.

IN BOTH private rooms and public wards each bed has radio connection. Ear phones are provided and there is a choice of two local programs. It will be appreciated at once that eye patients are peculiarly handicapped when it comes to keeping themselves occupied and entertained. The radio contributes greatly to the happiness of the patients; but it has a therapeutic value as well. After certain sorts of eye operations, it is essential that the patient keep quiet, and that restlessness be avoided at all cost. The radio, in this situation, seems to do more than was accomplished by drugs, and leaves no after effects. When static interferes with radio reception, there is a phonograph reproducer which supplies a musical program. Spacious sun porches on the bed floors are an addition to the comfort of the convalescing.

THE CONNEC[illegible] of the eye institute with a large genera[illegible] like Johns Hopkins adds greatly to [illegible]iveness of treatment. In many insta[illegible]ents seeking relief from eye troubl[illegible]ering, in reality, from a malady mor[illegible] than they suspect. Such patients [illegible]ed easily and speedily to the [illegible] the hospital. Conversel[illegible] diseases which can be d[illegible] by the way they a[illegible] instances their

there is ample need and opportunity for cooperation between the eye clinic and the other clinics of the hospital.

Each patient admitted to the institute is observed in entirety rather than merely with respect to his eyes. Effort is made to have the patients' history approach the ideal of completeness. These histories cover every phase of condition, from the past background of the patient's family to a description of the results of every clinical test made. Wherever possible, the written history is supplemented by photographs or colored drawings. The institute has its own artist, especially trained for this work, as well as a modern photographic laboratory. Thus prepared, the case histories become valuable scientific documents that are useful both for teaching and research. They are daily pointing the way for mutual benefit between ophthalmology and other branches of medicine.

The fourth floor of the Wilmer Institute is the operating floor. It is provided with the usual sterilizing rooms, preparation rooms and rooms for the operations. All facilities have been selected with special reference to the needs of eye patients, and the best points exhibited by many eye hospitals abroad have been incorporated here.

EVERY OPERATION performed in a teaching hospital is of significance and value to the students. In dealing with the eye, however, the field of operation is necessarily small, and only a very limited number of students can be permitted to get close enough to observe carefully. This difficulty is being overcome in the institute by means of photography. A moving-picture camera has been designed and is now in construction that will not interfere with or annoy the surgeon, but will record every movement of his hands and instruments. The developed film can subsequently be displayed before classes and essential points can be explained in a much more leisurely manner than is possible in the operating room.

On the fifth and topmost floor are the laboratories for research in physiology and pathology of the eye. Modern research in these fields involves the use of laboratory animals. Heretofore the housing of these ani[illegible] the same building occupied by pa[illegible] [illegible]upon for obvious rea[illegible] [illegible]the objections [illegible]by an

# 1920s

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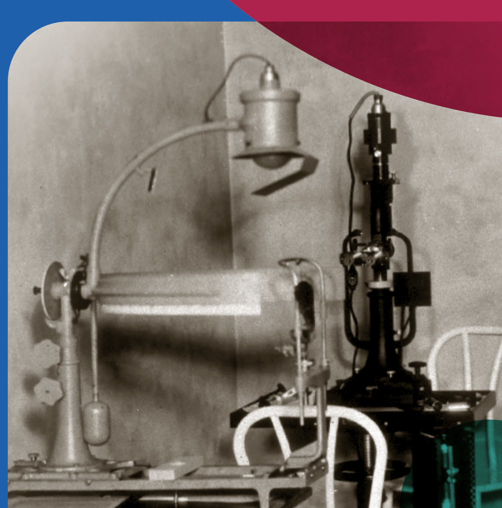

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# 1930s

# 1940s

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Clinical Neuro-Ophthalmology

BY

FRANK B. WALSH, M.D., F.R.C.S (Ed.)

Associate Professor of Ophthalmology
The Johns Hopkins University



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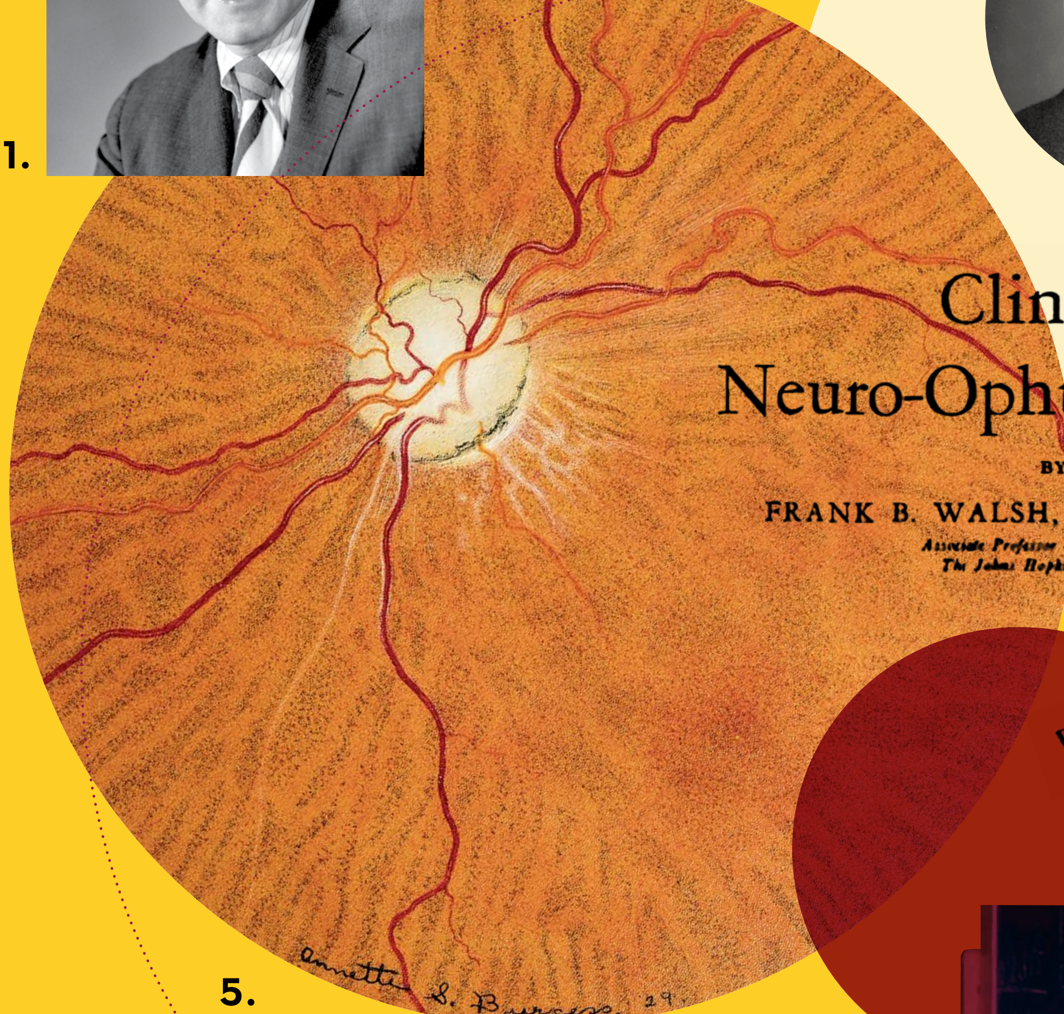


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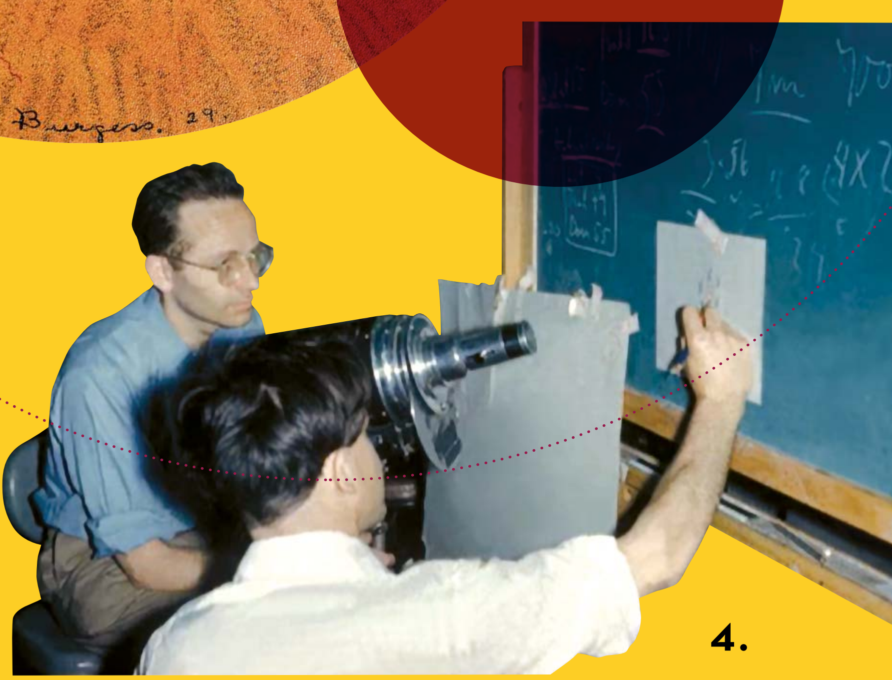
# 1950s



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# 1940s-1950s

1. Carl Kupfer, who trained at Wilmer, became the first director of the National Eye Institute. *Credit: Office of NIH History and Stetten Museum, National Institutes of Health*

2. Wilmer trainee Charles Iliff developed beta irradiation therapy for pterygium.

3. *Clinical Neuro-Ophthalmology* by Frank B. Walsh remains the foremost textbook on neuro-ophthalmology.

4. David Hubel and Torsten Wiesel at the Wilmer Eye Institute. The pair would go on to share the 1981 Nobel Prize in Physiology or Medicine for their discoveries concerning information processing in the visual system.

5. Fundus image depicting optic neuropathy hand-illustrated by Annette Smith Burgess

## DEVELOPMENT OF CORNEOSCLERAL SUTURES

In a 1940 article in *Archives of Ophthalmology*, Wilmer fellow John McLean describes a suture developed at Wilmer as the ideal suture for closing cataract wounds and includes a detailed description of the technique.

## IRRADIATING PTERYGIUM

In 1946, Charles Iliff develops beta irradiation therapy for pterygium, a common benign growth on the conjunctiva — the clear membrane on the surface of the eye — that can grow to cover the eye's surface and cause discomfort or vision impairment.

## NEURO-OPHTHALMOLOGY — A NEW SUBSPECIALTY

In 1947, Frank B. Walsh establishes neuro-ophthalmology as a subspecialty and writes the foremost textbook on the subject, Walsh & Hoyt's *Clinical Neuro-Ophthalmology*.

## LAYING THE GROUNDWORK FOR A NOBEL PRIZE

Research on the visual cortex by David Hubel and Torsten Wiesel during the 1950s identifies a critical period during which the visual system develops in mammals and shows that impairment of the system during that time will affect lifelong vision. Their work will greatly impact the understanding of how a dominant eye is established in early childhood, and how ophthalmologists treat many cases of vision loss in children. The pair share the 1981 Nobel Prize in Physiology or Medicine for their discoveries.

## TREATMENT BREAKTHROUGH FOR RETINOBLASTOMA

In 1953, Carl Kupfer discovers the first pharmacological treatment for retinoblastoma — the most common type of eye cancer in children — with intravenous nitrogen mustard. Kupfer goes on to become the first director of the National Eye Institute (NEI), serving in that position from 1970–2000 — a critical time that shaped vision research in the U.S. During his time at NEI, Dr. Kupfer served under six U.S. presidents.

## AN ORAL TREATMENT OPTION FOR GLAUCOMA

As a resident, Bernard Becker notices that cardiac patients given the drug acetazolamide to control fluid buildup around the heart appear to receive another benefit: It often lowers the intraocular pressure associated with glaucoma. In 1954, while working as chief resident with Jonas Friedenwald and Alan Woods, Becker establishes acetazolamide as the first effective oral treatment for glaucoma. It is still used today.

# 1960s-1970s

### PIONEERING FLUORESCEIN ANGIOGRAPHY

A. Edward Maumenee, Wilmer's director from 1955–1979, demonstrates the significance of fluorescein angiography as a powerful diagnostic tool for diseases of the retina.

### SPOTLIGHT ON LOW VISION

Louise Sloan, a pioneer in developing methods and technology for treating low vision, invents a series of magnifiers that provide greater clarity and a wider field of vision for people with low vision than do commercially available devices.

### SETTING THE STANDARD FOR EYE CHARTS

From the 1950s through the 1970s, Louise Sloan develops and validates the American Medical Association standard letters for visual acuity charts. The "Sloan letters" are the standard on which today's visual acuity charts are based. Sloan's lifetime of work contributes to clinicians' ability to diagnose numerous ophthalmic conditions.

### RETINAL VASCULAR CENTER ESTABLISHED

In 1970, Arnall Patz founds the Retinal Vascular Center at Wilmer, which quickly becomes the world leader in studying and treating retinal diseases. Patz's early contributions to ophthalmology also include discovery of the cause of retrolental fibroplasia, an affliction of premature infants that once was the most common reason for childhood blindness.

### A FIRST FOR GENETIC EYE DISEASE

In 1972, Irene Maumenee establishes the Johns Hopkins Center for Genetic Eye Diseases — the first center in the U.S. with that focus. Today, the Wilmer Genetic Eye Disease Center continues the mission by researching stem cell therapies and gene editing to overcome some of the most challenging genetic eye diseases.

### A BOOST FOR PREVENTIVE OPHTHALMOLOGY

The Dana Center for Preventive Ophthalmology, a leader in global and domestic research on blindness prevention and the only World Health Organization collaborating center in the United States, is established in 1979. Alfred Sommer is its founding director.

1. The Sloan letters, developed by Louise Sloan, became the standard on which today's visual acuity charts are based.

2. Louise Sloan, a pioneer in developing methods and technology for treating low vision

3. Ed Maumenee, top, and Arnall Patz, seated, pioneered the use of fluorescein angiography as a diagnostic tool for diseases of the retina.

4. Al Sommer, founding director of the Dana Center for Preventive Ophthalmology at Wilmer

5. A diagram depicting the many facets of the Retinal Vascular Center, which was established by Arnall Patz

6. Irene Maumenee established the first center in the nation focusing on genetic eye disease.

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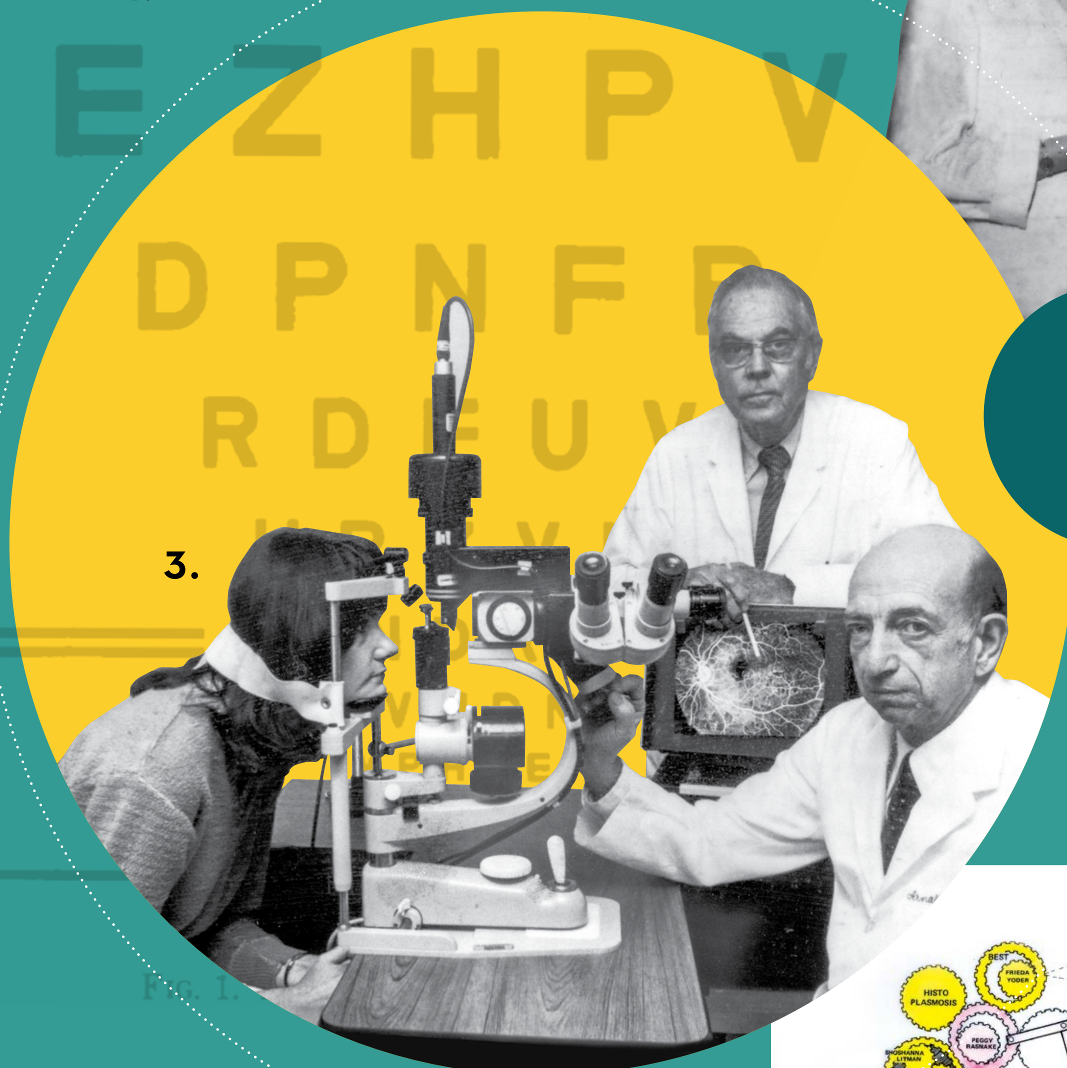


# 1960s

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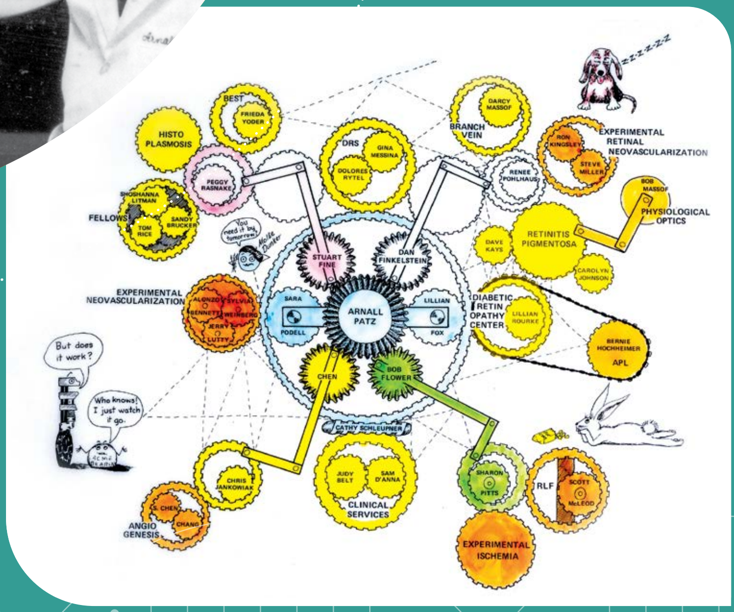


# 1970s

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Treatment of Cytomegalovirus Retinitis—1992

Cytomegalovirus (CMV) retinitis is the most frequent opportunistic ocular infection in patients with the acquired immunodeficiency syndrome (AIDS),[1-6] and, when left untreated, ultimately leads to blindness.[4] Approximately 20% of patients with AIDS develop CMV retinitis at some time in their lives.[1-5] With the advent of the AIDS epidemic,[7] there may be as many as 20 000 to 30 000 new cases of CMV retinitis in

have not yet been proven efficacious in patients infected with HIV.

To prevent the systemic side effect ganciclovir, the problem of catheter inf inability to use "full-dose" zidovudi with ganciclovir, some investigators ha retinitis with intravitreal ganciclovir.[21] intravitreal ganciclovir has been est hours.[21] Therefore, induction therapy ganciclovir generally consists of two to per week for 2 to 3 weeks; maintenance

# 1990s

# 1980s-1990s

1. Alfred Sommer's discovery that vitamin A capsules not only prevent blindness but also cut death rates in malnourished children is estimated to have saved some 6 million lives.

2. Oliver Schein's work showing the risk of extended-wear contact lenses led to changes in FDA policy and government safety standards for contact lenses.

3. Douglas Jabs discovered that a drug that treats a vision-threatening infection in patients with AIDS also prolongs their lives.

4. The 25-gauge vitrectomy system developed by Eugene de Juan Jr. makes retinal surgery safer and becomes the new standard.

## REDUCING CHILD MORTALITY WITH VITAMIN A

In 1983, Alfred Sommer, founding director of the Dana Center for Preventive Ophthalmology at Wilmer, discovers that vitamin A capsules, which prevent blindness from xerophthalmia, also cut death rates in malnourished children by 30%. In 1997, Sommer wins a Lasker Award for this work, which by some estimates has saved 6 million lives.

## TRANSFORMING GLAUCOMA SURGERY

Irvin Pollack and Arnall Patz perform the world's first laser iridotomies and trabeculectomies at Wilmer, launching the era of scientific medicine in the glaucoma field. These techniques remain in wide use today.

## MAKING CONTACT LENSES SAFER

In 1989, Oliver Schein and colleagues demonstrate excessive risk to the cornea from extended-wear contact lenses, leading to changes in Food and Drug Administration (FDA) approval of contact lenses. Schein's subsequent testimony before Congress, in 2005, helps craft a law strengthening safety standards for lenses purchased through the internet.

## DISCOVERY OF A LIFESAVING DRUG

A study led by Douglas Jabs in 1991 finds that the drug ganciclovir not only treats cytomegalovirus, a vision-threatening infection in many patients with AIDS, but also prolongs their lives.

## A NEW STANDARD FOR RETINAL SURGERY

In the late 1990s, Eugene de Juan Jr. develops the 25-gauge vitrectomy system that operates through self-sealing wounds. Use of the system, which makes retinal surgery safer and more controlled, becomes the new standard.

# 2000s-2010s

### TOP HONORS FOR ARNALL PATZ

In 2004, President George W. Bush presents the Presidential Medal of Freedom to Arnall Patz in recognition of his pioneering work in prevention of retinopathy of prematurity and treatment of diabetic retinopathy.

### ON A MISSION TO ERADICATE TRACHOMA

In 2007, following her discovery that azithromycin prevents recurrence of severe trichiasis after trichiasis surgery, Sheila West receives $10 million from the Bill & Melinda Gates Foundation to eradicate trachoma — the infectious disease that causes trichiasis. In 2020, West is honored with the Helen Keller Prize for Vision Research. Her research has informed all aspects of the present World Health Organization guidelines for trachoma control.

### ROBERT H. AND CLARICE SMITH BUILDING OPENS

Funded entirely by grateful Wilmer patients, the Robert H. and Clarice Smith Building opens in 2009, making possible tremendous growth of Wilmer's research programs and surgical practices. The 207,000-square-foot building houses seven state-of-the-art operating rooms and five floors of open and glass-enclosed research labs designed to facilitate collaboration among Wilmer researchers.

### SPEEDING DISCOVERIES TO PATIENTS

In the 2010s, Wilmer faculty establish 10 companies with the aim of translating laboratory discoveries into therapies to benefit patients — including novel products that more effectively deliver medication to the eyes and new therapies for systemic treatment of age-related macular degeneration (AMD) and diabetic retinopathy.

### RETINAL PROSTHESIS RESTORES PARTIAL SIGHT

In 2013, the FDA approves the Argus II electronic retinal prosthesis, which is based on technology developed by Wilmer faculty. The device partially restores vision for patients who are completely blind. Wilmer becomes one of the few places where the prosthetic vision of people with these implants is studied.

### "RETINA IN A DISH"

In 2014, Wilmer researchers use human stem cells to create a "retina in a dish" and show that the retinal cells are able to detect light. The research team is the first to grow advanced tissues that contain all the major cell types of the retina and that duplicate the retina's layered structure and its gently arcing, cuplike shape.

1. Arnall Patz, President George W. Bush, and Peter McDonnell. President Bush presented Patz with the Presidential Medal of Freedom for his pioneering work.

2. A Wilmer research team used human stem cells to create a "retina in a dish" and demonstrated that the retinal cells are able to detect light.

3. The Robert H. and Clarice Smith Building, reflecting the iconic Johns Hopkins dome, opened in 2009.

4. Laura Ensign, vice chair for research at Wilmer

5. Sheila West in Niger. West's research has informed all aspects of the World Health Organization guidelines for trachoma control.

# 2000s

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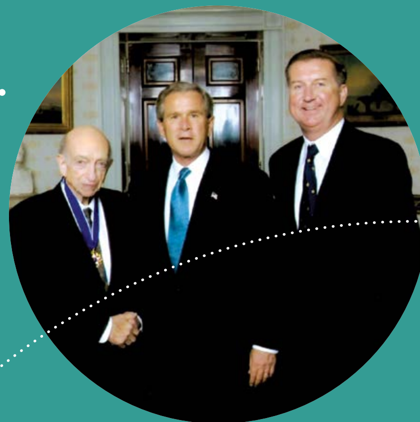

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# 2010s

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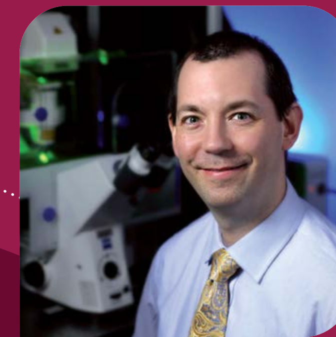

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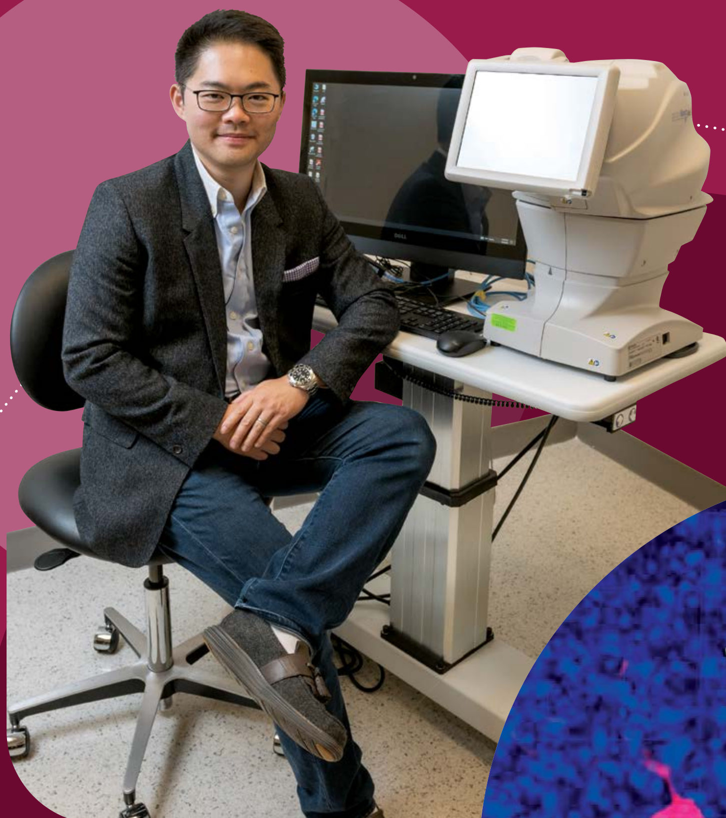

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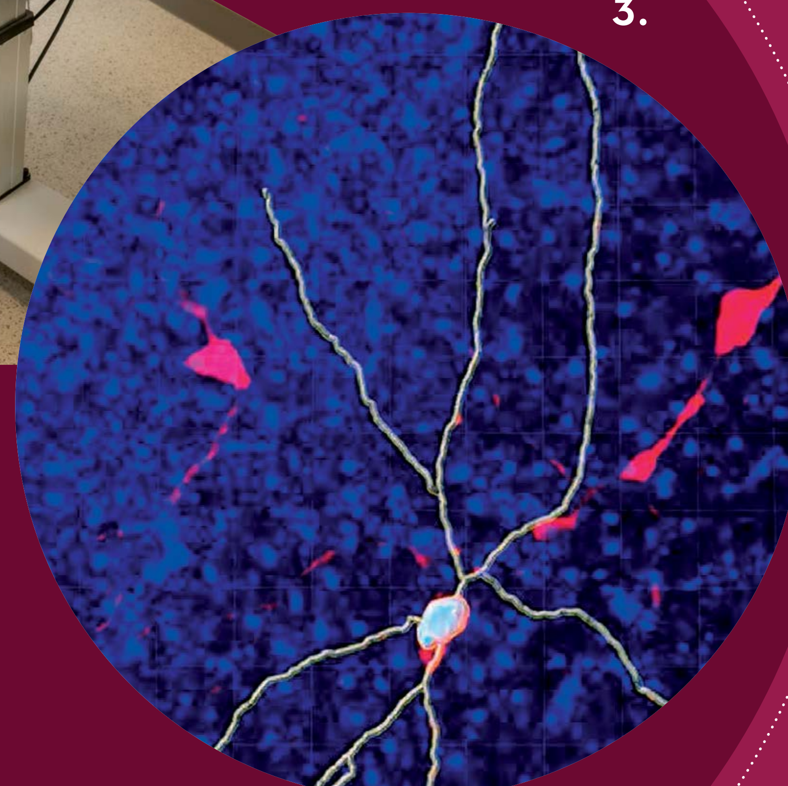

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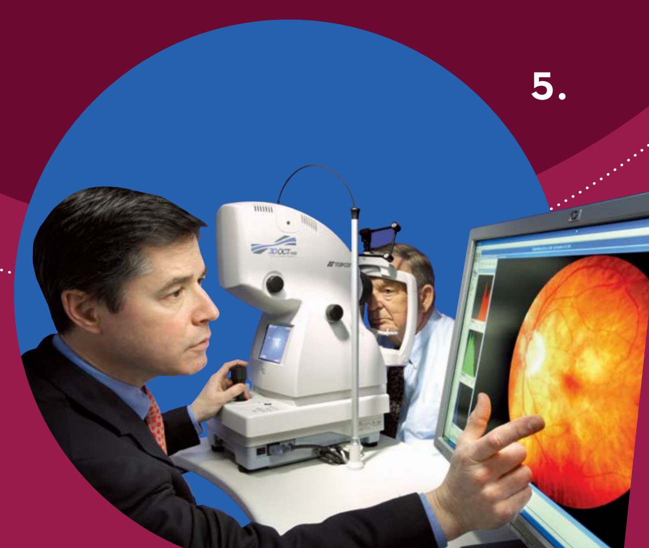

# 2020s

1. T.Y. Alvin Liu, inaugural director of the James P. Gills Jr., M.D., & Heather Gills Artificial Intelligence Innovation Center at Wilmer

2. Thomas V. Johnson, the Shelley and Allan Holt Rising Professor of Ophthalmology

3. A human stem cell-derived retinal ganglion cell integrated into the retina following transplantation. Produced in the laboratory of Thomas V. Johnson, the ultimate goal of the research is to restore vision lost to diseases such as glaucoma.

4. Graduate student Kimberly Bockley

5. Neil Bressler examines a fundus image of the retina for very high myopia — a condition recognized only in the past 10 years as the next global epidemic in ophthalmology.

# 2020s

## JUMP-STARTING JUNIOR FACULTY

In 2020, Wilmer Director Peter J. McDonnell establishes the first-of-its-kind Rising Professorships Program to support the work of junior faculty who have novel ideas. The program equips early-career faculty members with up to seven years of funding to accelerate their careers and their impact on patients.

## CENTER TO END BLINDNESS DEBUTS

In 2021, Wilmer establishes the Sanford and Susan Greenberg Center to End Blindness, with the goal of eliminating blinding eye diseases. The center raises funds from philanthropic contributions to support development of innovative strategies to treat and prevent blindness.

## ACCELERATING ARTIFICIAL INTELLIGENCE

In 2024, having already established that AI can be used to predict risk of disease progression, estimate best-corrected visual acuity from fundus photographs and engineer peptides for improved drug delivery, Wilmer establishes the James P. Gills Jr., M.D., & Heather Gills Artificial Intelligence Innovation Center to accelerate the use of this new technology in ophthalmology. The center will bring together clinical, scientific and infrastructure resources for investigators to apply artificial intelligence in research, medical education and patient care.

“The goal of rising professorships is to add years of productivity to the careers of young researchers, whose work will benefit patients today and into the future.”

— PETER J. MCDONNELL

# Life-Changing Research

Our founder, William Holland Wilmer, understood that knowledge is key to advancing patient care. This is evident from his insistence that the mission of the Wilmer Ophthalmological Institute include not only clinical care but also research and education.

Wilmer understood that research informs clinical care. It allows us to find what works and what doesn't work, to understand impacts and limitations, and to identify new questions and promising avenues of study that will, in the end, lead to innovation — to new cures and ways to make life better for our patients and for people everywhere. Wilmer trainees' exposure to ongoing research equips them with an education that puts them at the forefront in providing the most advanced care for their patients.

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On the opposite page: While today's state-of-the-art labs feature modern, cutting-edge technology and equipment, the goal remains the same as it was 100 years ago: Discovering the best therapies and treatments to preserve and protect vision and eye health for people everywhere.

# INNOVATION

*Innovative, collaborative and well-resourced, Wilmer's researchers continue to lead the way in the bold quest to cure blinding eye disease.*

By Andrew Myers

## AT THE VANGUARD

For 100 years, the Wilmer Eye Institute, Johns Hopkins Medicine, has been at the vanguard of ophthalmology — thanks in large part to the institute's commitment to research excellence.

"Wilmer sets itself apart with a uniquely expansive and collaborative approach to innovation in eye research," says **Peter J. McDonnell, M.D.**, Wilmer's director and the William Holland Wilmer Professor of Ophthalmology. He notes that Wilmer's greatest strengths are its interdisciplinary approach and an eagerness among researchers to collaborate — among themselves and beyond. Wilmer's faculty members, who are leaders in their disciplines, can tap into expertise across the entire Johns Hopkins research ecosystem, from the Whiting School of Engineering to the Applied Physics Laboratory and across the broader medical and scientific community.

"In the future, research advances will become less and less the result of the individual work of some lone, brilliant scientist in his or her lab and more the result of teams of people working together," says McDonnell.

Case in point: **T.Y. Alvin Liu, M.D.**, was nominated by McDonnell to be the nexus of artificial intelligence (AI) efforts across Wilmer. Liu was recently named to lead the James P. Gills Jr., M.D., & Heather Gills Artificial Intelligence Innovation Center at Wilmer, which was launched through a $10 million endowment from the Gills family. The center will foster collaboration among clinicians and AI researchers and provide shared computing resources and outreach to tech industry leaders.

Liu is also using AI to autonomously screen patients for diabetic retinopathy, rolling out these services, which are approved by the Food and Drug Administration, across Johns Hopkins Medicine's primary care clinics to

improve screening rates and bring earlier diagnoses to underserved populations. In another research trajectory, Liu is using cutting-edge vision-language models to enable novel pathway discovery regarding age-related macular degeneration.

"By combining images, genomic data and deep learning models, we are entering a new era of AI-driven discovery in ophthalmology," says Liu, the James P. Gills Jr., M.D., and Heather Gills Rising Professor of Artificial Intelligence in Ophthalmology.

Fueling many new advances is Wilmer's Center to End Blindness. The center was established in spring 2021, when Sanford and Susan Greenberg called on Wilmer and its philanthropic community to raise $100 million to end blindness. This audacious goal could only be accomplished at Wilmer.

"Our goal is to eliminate eye diseases one by one," says McDonnell. Much of the center's budget is targeted to training and research, and McDonnell notes that new technology represents an area for particular optimism. Current projects include the use of implants in the brain to stimulate the visual cortex to allow patients to "see" again.

"While that work is still in the early stages, it's already showing the tremendous promise of the center's ability to end blindness no matter the cause," McDonnell says.

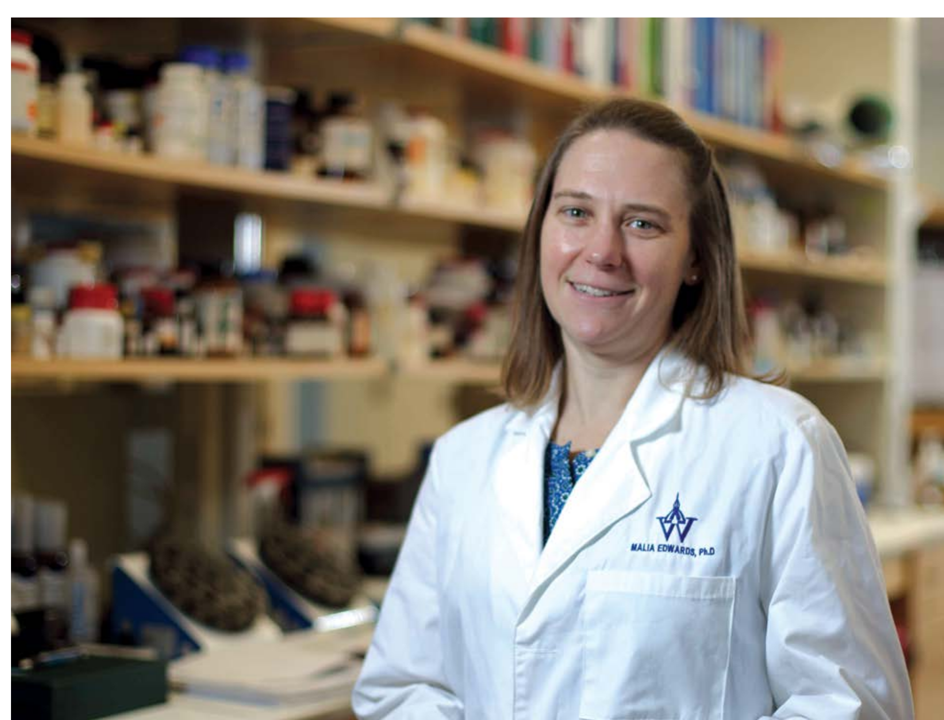
Very often, real progress begins at the smallest of scales. Consider the work of **Malia Edwards, Ph.D.**, who combines advanced medical imaging and molecular investigation to explore a lesser studied cell type — retinal glia cells, known as Müller cells — and their role in diseases such as age-related macular degeneration (AMD).

Müller cells were once overlooked and considered only support cells. "Retinal glial cells may not be the primary defects in [most] conditions, but they are critical players," Edwards says. Her research on Müller cells includes detailed microscopic analyses of human donor eyes and comparison of medical imaging with molecular insights from the lab.

"We need [to see] all these cells talking together and working together to truly understand and treat retinal diseases," Edwards says of her long-term goal for her work.

*Left:*
T.Y. Alvin Liu

*Below:*
Malia Edwards



Mira Sachdeva

Just down the hall from Edwards' lab, **Mira Sachdeva, M.D., Ph.D.,** the Wilmer Rising Professor of Ophthalmology, studies the effects of diabetic retinopathy on neurons. Often, she says, by the time retinopathy is diagnosed, the neurons are already damaged. Understanding early changes is crucial to prevent vision loss.

"Often by the time retinopathy is diagnosed, the neurons are already damaged. Understanding early changes is crucial to prevent vision loss." — MIRA SACHDEVA

Sachdeva is looking for the causes and biomarkers of retinal neurodegeneration in patients with diabetes, focusing on how diabetes damages the retinal ganglion cells — the same cells that are lost due to glaucoma. Through work with her collaborators at the Institute for Cell Engineering at Johns Hopkins, she determined that synaptic regulatory proteins in the eye decline in patients with diabetes before visible retinal damage occurs. Sachdeva hopes to investigate these proteins as markers to track early disease progression and as possible targets for new treatments.

"We have a really good handle on treating the blood vessel problems, but we have zero way of protecting the retinal neurons," Sachdeva explains. "That's what ultimately leads to irreversible vision loss, not only in diabetes but many other eye conditions."

As he surveys the vast array of research unfolding each day across Wilmer, McDonnell brims with hope.

"Rather than trying to predict the next big breakthrough, our strategy is to explore all possibilities," McDonnell says. "By fostering an environment where our researchers are free to explore their deepest intuitions and collaborate openly with experts from complementary fields, Wilmer will be at the cutting edge of eye care for the foreseeable future." ●

Laura Ensign

## DESIGNER DRUGS

**Laura Ensign, Ph.D.**, the Marcella E. Woll Professor of Ophthalmology, is a chemical and biomolecular engineer who specializes in biomaterials, particularly nanoscale drug delivery systems that help drugs make it to their intended targets, leading to greater efficacy and fewer side effects. These systems, often biodegradable and based on biomaterials, range from eye drops to implantable devices.

"We straddle the translational space between basic science — trying to understand how things work and why — and clinical research, making sure what we learn and develop can actually reach patients," explains Ensign, who is vice chair for research at Wilmer. "We're not just making better drugs; we're engineering smarter ways to deliver them — ways that work with the body rather than against it."

One of Ensign's recent major projects is a startup currently conducting clinical trials on a type of eye drop that, once in the eye, forms a gel that coats the target area and lasts longer than a traditional liquid drop that might be required several times each day, such as those that treat glaucoma and other eye diseases. By reducing the frequency of application, patient adherence to drug regimens could be significantly improved, she says.

On a different but related angle, Ensign is using machine learning to engineer new peptides — a family of short amino acids that are the building blocks of longer proteins — for sustained drug delivery. These designer peptides are not drugs, but they attach to drug molecules to improve their efficacy. Ensign has demonstrated a peptide-enhanced delivery method in which peptides bind to melanin in the retina and are released over extended periods of time.

"With our peptide approach, we can sustain drug activity in the eye for weeks instead of hours without using implants or polymers," Ensign says. "Machine learning doesn't magically invent solutions, but when trained on the right data, it allows us to design peptides unlike any in nature, opening up potential new ways to treat disease."

Beyond drug delivery, Ensign and her colleagues are now bringing their biomaterials expertise to the world of cell regeneration research. She hopes to build what she calls "scaffolds" of biomaterial, like the steel skeleton of a skyscraper, that support transplanted healthy cells that have been regrown in the lab from stem cells. This approach is a significant step toward restoring vision for patients who have already suffered vision loss.

"The next big step isn't just preventing vision loss but reversing it — bringing back sight through regenerative strategies," she says. "This combination of biomaterials engineering and AI-driven drug design offers some promising solutions to some of the most pressing challenges in eye care." ●

## KEEPING MITOCHONDRIA HEALTHY

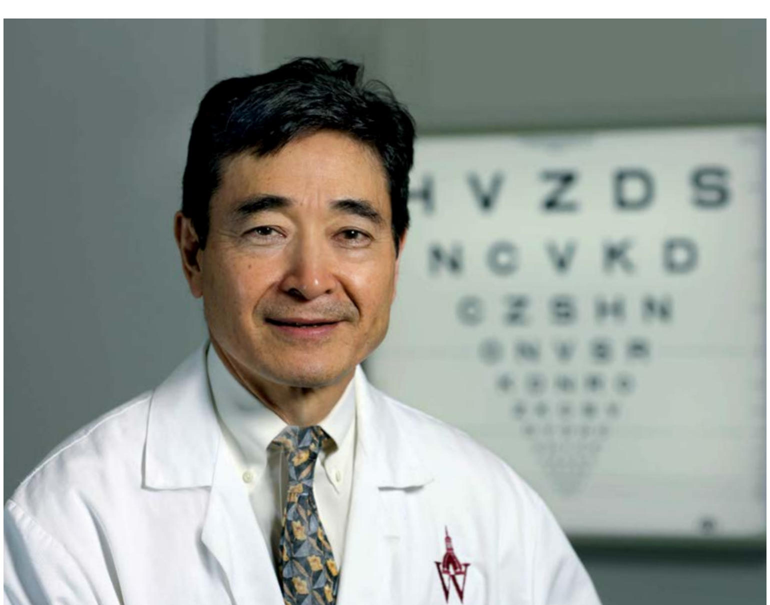
**James Handa, M.D.**, the Robert Bond Welch, M.D., Professor of Ophthalmology, explores how the normal aging of the eye transitions to age-related macular degeneration (AMD), which causes damage to the macula and is the leading cause of blindness among older adults. AMD affects some 300 million people worldwide.

"That's almost as many people as those who live in the United States," says Handa. And yet, "AMD is largely untreatable in its early stages."

In particular, Handa has homed in on the role of cigarette smoking, which is the strongest environmental risk factor for AMD.

"We found that cigarette smoke accelerates aging at the cellular level, particularly in the retinal pigment epithelium (RPE), the key cell type involved in AMD, pushing healthy retinal cells toward disease much faster," he says.

James Handa




Using single-cell transcriptomic sequencing, Handa's team identified healthy and diseased RPE cells in mice that were exposed to cigarette smoke. A key observation involved mitochondria, the powerhouses of cells. While young RPE cells initially respond to smoke exposure by increasing mitochondrial gene production to counteract the stress, aged cells are unable to compensate. They become damaged, and die.

A major breakthrough came when Handa was able to show that bioactive fragments of mitochondrial transfer RNA (tRNA) get released when these retinal cells are damaged. These fragments gather in extracellular vesicles — small biological sacks that can travel to neighboring cells and spread disease by damaging their mitochondria. Handa presented the findings at the 2024 meeting of the International Society for Eye Research.

One of Handa's key goals is to determine whether mitochondrial damage among smokers is similar to that of nonsmokers with AMD, and, if not, how it differs. He says this could reveal new therapeutic targets and help differentiate environmental from age-related disease mechanisms.

Handa plans to study whether cells can recover if patients quit smoking. If cells can regain function, that could be an even stronger public health message about the benefits of quitting smoking. His lab is also exploring specific molecular pathways involved in cells that survive damage from smoking to identify potential interventions that could rejuvenate damaged retinal cells and keep them alive to prevent AMD progression.

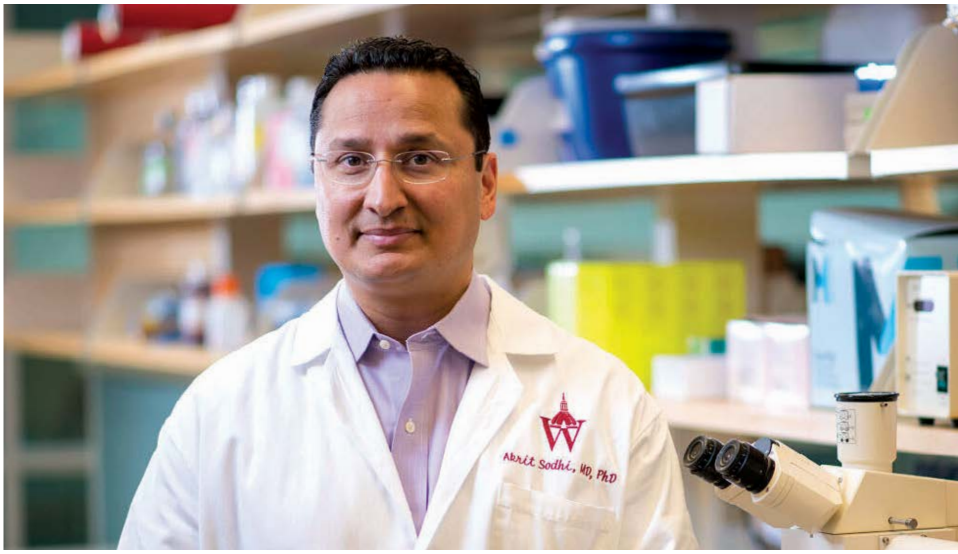
Regarding whether these pathways can be restored, Handa is investigating specific molecular pathways that promote cell survival and regeneration. If he and his team can identify ways to bring back mitochondrial function, it could lead to a breakthrough treatment.

"If we can understand how to keep mitochondria healthy and find the pathways that prevent aging," Handa says, "we may find a way to prevent AMD before it begins." ●

## CONFRONTING PARADOXES

Diabetic retinopathy, which damages blood vessels in the retina, is a complex and elusive disease, says Wilmer ophthalmologist **Akrit Sodhi, M.D., Ph.D.**, the Branna and Irving Sisenwein Professor of Ophthalmology. His research focuses on identifying novel biomarkers and potential treatments for diabetic retinopathy and other conditions, such as age-related macular degeneration (AMD).

An enduring conundrum that has perplexed researchers about diabetic retinopathy is why initial efforts to help patients with diabetes control blood sugar with insulin often cause accelerated injury to the blood vessels in the retina, resulting in leakage of fluid into the retina and worsening damage.




Akrit Sodhi

"One paradox of diabetic retinopathy is that aggressive glucose control can initially make things worse before they get better — our research helps explain why," Sodhi says. His team has shown that a physiological response to low glucose can also "lead to a pathologic increase in proteins that encourage blood vessel growth and leakage that the average healthy person tolerates very well, but someone with diabetes does not," he says.

In their studies, which have drawn much attention in the medical press, Sodhi and his team have found that hypoglycemic episodes (periods of low blood sugar) trigger increases in two proteins that promote blood vessel growth and leakage: vascular endothelial growth factor (VEGF) and angiopoietin-like 4 protein (ANGPTL4). He also says this phenomenon is tied to hypoxia-inducible factor 1-alpha (HIF-1α), a protein that helps the body respond to conditions of low blood oxygen.

Sodhi thinks, in essence, that the lower blood sugar produced by aggressive treatment with insulin results in transient episodes of hypoglycemia (low glucose). The retina responds to these episodes the same way it responds to a lack of oxygen, by increasing HIF-1α. This helps the retina adapt to the low glucose, but it also causes an increase in the growth and leakage from retinal blood vessels, which then cause retinal cell damage.

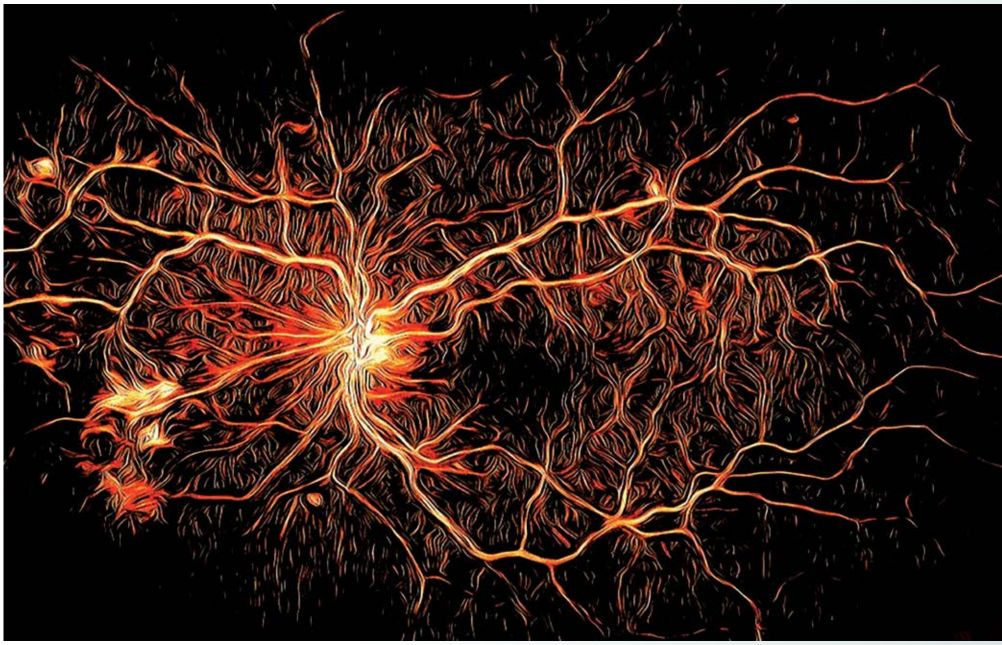
"This response helps explain why newly diagnosed diabetic patients just beginning insulin treatment initially experience worsening retinopathy," Sodhi explains. "It turns on genes that regulate blood vessel growth and leakage, mimicking the response to low oxygen."

Sodhi has taken things a step further by blocking HIF-1α to prevent leakage from retinal blood vessels, yielding a potential therapy. His group has also shown that this therapy is effective for treatment of later stages of diabetic retinopathy as well as the wet form of AMD, which is also the consequence of the abnormal growth of blood vessels. In tests of mouse models, HIF-1α inhibitors have proven to be at least as effective in stopping new vessels from forming as the anti-angiogenic approaches that block VEGF, which are currently the gold standard for treating patients with both diabetic retinopathy and wet AMD.

Another confounding question for Sodhi is why some patients respond better than others to current therapies targeting VEGF. Sodhi and his team have studied various proteins and discovered a distinct biomarker that predicts which patients with wet AMD will respond well to anti-VEGF treatment, and which will not.

"The Achilles' heel of anti-VEGF therapy is that it promotes a paradoxical increase in HIF-1α, which we believe prevents some patients from responding well," Sodhi says. "This insight could allow us to tailor therapies more effectively based on patient response."

Sodhi and his mentor, Nobel Prize laureate **Gregg Semenza, M.D., Ph.D.**, at the Johns Hopkins Institute for Cell Engineering (Semenza discovered HIF-1α) have co-founded a company to develop HIF-1α inhibitors as potential new drugs for treatment of eye disease and cancer. ●



Artistic rendition of diabetic eye disease highlighting vascular changes (i.e., retinal neovascularization) observed in patients with proliferative diabetic retinopathy. *Image credit: Isabella Sodhi, McDonogh School*




## FACULTY START-UPS

By Sue DePasquale

**Kannan Rangaramanujam, Ph.D.,** co-director of the Center for Nanomedicine at Wilmer Eye Institute, Johns Hopkins Medicine, is brimming with excitement as he shares the recent results of a phase IIa clinical trial of an innovative, systemic, precision nanomedicine that he and his team pioneered through Ashvattha Therapeutics, a startup company he co-founded.

"It's a rather stunning proof of concept," says Rangaramanujam, the Arnall Patz Distinguished Professor of Ophthalmology, about the dendrimer-drug targeted treatment model. When delivered monthly through an injection in fatty tissue, the treatment showed a 67% reduction in the need for intravitreal injections (i.e., shots in the eye) for patients with wet age-related macular degeneration and diabetic macular edema. What's more, the impact was systemic — both eyes, including the noninjected eye, benefitted.

By reducing the need for costly eye injections, such subcutaneous treatments, delivered at home, could vastly expand access to sight-saving therapy for people around the world, he says. Also critical: Treatment can begin during earlier stages of the disease, before damage to eyesight has occurred.

Rangaramanujam, who holds more than 150 patents and is launching three other new companies, is just one of dozens of faculty entrepreneurs at Wilmer. These faculty members are employed full time at Johns Hopkins as researchers and clinicians, but they work with the university and oversight committees to create companies to bring their treatments to market. They are supported by Johns Hopkins Technology Ventures (JHTV), launched in 2014, which offers research space in its two FastForward accelerators — one in East Baltimore, the other near the Homewood campus — as well as guidance on licensing and patent filing.

"Faculty members can use this incubator space to launch their startup companies away from their scientific research — in a different laboratory, where the company is doing the work needed to try to turn the discovery into a product that addresses an important, unmet medical need," says Wilmer Director **Peter J. McDonnell, M.D.**, the William Holland Wilmer Professor of Ophthalmology. To date, teams of Wilmer faculty entrepreneurs have created 14 such companies, with more being formed — by far

Justin Hanes

“As faculty members, when we create something we think has value and could potentially be helpful to people and transformative to medicine, we want to make sure that it doesn't get wasted.”

— JUSTIN HANES

more than in other ophthalmology departments, McDonnell says.

**Laura Ensign, Ph.D.**, the Marcella E. Woll Professor of Ophthalmology and vice chair for research at Wilmer, who co-launched Novus Bio and Novus Vision with **Justin Hanes, Ph.D.**, the Lewis J. Ort Professor of Ophthalmology, says the licensing support provided through JHTV is critical.

“If you license the technology to an existing company, there’s no guarantee that it will be developed into a product that reaches patients,” she says. “We want these treatments that we’re working on in the lab to get to the clinic in the fastest way possible. Many times, that’s done if the people who believe in it and are the most passionate about it are the ones who are driving it.”

Hanes, director of the Center for Nanomedicine, has started eight companies and has over 100 inventions. He points out the importance of securing patents for faculty-led innovations.

“As faculty members, when we create something we think has value and could potentially be helpful to people and transformative to medicine, we want to make sure that it doesn’t get wasted,” he says. “If there’s no patent protection or if a patent is abandoned, then you can be sure that its impact would be greatly diminished or lost.”

Rangaramanujam, whose closest collaborator is his wife, **Sujatha Kannan, M.D.**, vice chair for research for anesthesiology and critical care medicine, says together they have raised more than $200 million in investor and National Institutes of Health funding to bring their discoveries to market — thanks to Johns Hopkins’ support for faculty innovators.

“It enables people to focus on what is really important: impacting human health, while collaborating with superstars at Wilmer — and elsewhere at Hopkins — who are also focused on the larger cause,” he says. ●

Justin Hanes,
Laura Ensign

# BY THE NUMBERS

## Inventions Disclosed by Wilmer Faculty:

**SINCE 1978**

605

**SINCE 2014**

305

## Royalty distributions for inventions since FY2020:

$1.97 MILLION

**FOR WILMER INVENTORS**

$2.17 MILLION

**FOR ALL JOHNS HOPKINS SCHOOL OF MEDICINE DEPARTMENTS / DIVISIONS**

32,000 SQUARE FEET

Combined amount of co-working, office, conference and lab space provided by JHTV's two FastForward accelerators

# Outstanding Patient Care

Each year, hundreds of thousands of patients and families come to the Wilmer Eye Institute seeking care for everything from routine eye exams to the most complex conditions imaginable. Here, patients and families find specialists and specialty teams with the training and experience to address critical problems, and where Wilmer's collaboration with world-class experts from across Johns Hopkins means patients will receive the best, most comprehensive care available anywhere. Wilmer's history comprises a rich tapestry of advances in patient care exemplified by stories of those whose sight and lives have been enhanced by the care they've received here. In the pages that follow, we invite you to explore some of these advances and their impact.

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On the opposite page, clockwise from upper left: The Sloan Letters visual acuity chart; Courtney Kraus connects with a young patient; Ed Maumenee in the operating room; David Guyton examines one of Wilmer's littlest patients; James Handa in the operating room.

# IMPACT

## EVOLUTION OF EXCELLENCE

For the past century, researchers at the Wilmer Eye Institute, Johns Hopkins Medicine, have driven groundbreaking advances in ophthalmology, including pioneering earlier diagnoses, revolutionizing treatments and transforming patient outcomes.

By Jennifer Walker

Some of the most pivotal breakthroughs include: In 1979, **Harry Quigley, M.D.**, made a sight-saving discovery when he learned that nerve cells are the key factors in earlier diagnoses of glaucoma. More recently, **Peter Campochiaro, M.D.**, led a study that determined the efficacy of an implant that provides continuous treatment for wet age-related macular degeneration. And **Divya Srikumaran, M.D.**, has led studies using big data to help diagnose corneal diseases and assess complication risk after corneal transplants. That work is still evolving — and advancement in artificial intelligence (AI) offers exciting possibilities for the future.

In the stories that follow, we shed new light on each of these game-changing contributions.

## EARLIER DIAGNOSES FOR PATIENTS WITH GLAUCOMA

By the mid-1970s, experts knew that glaucoma is a chronic disease that causes increased eye pressure, which ultimately leads to vision loss and blindness. However, diagnosing the disease was a challenge, because early-stage glaucoma does not cause symptoms and vision loss is gradual. Ophthalmologists used an ophthalmoscope to look for a cupped appearance in the center of the optic nerve disc, but this indicated an advanced stage of glaucoma. As a result, patients often were not diagnosed until their vision was irreversibly affected.

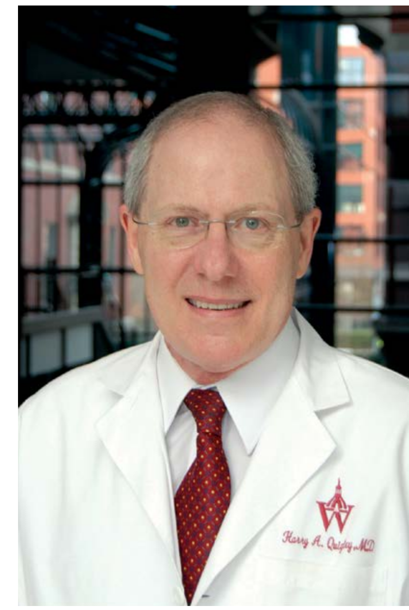
That changed in 1979, with publication of a landmark study led by **Harry Quigley, M.D.**, now the A. Edward Maumenee Professor of Ophthalmology, which provided new insight into how early glaucoma was evading diagnostic methods. In collaboration with Wilmer pathologist W. Richard Green, Quigley authored "The Histology of Human Glaucoma Cupping and Optic Nerve Damage: Clinicopathologic Correlation in 21 Eyes," which the journal *Ophthalmology* honored as one of the seven most influential papers in its history. For Quigley, this was the beginning of decades of glaucoma research — research that has contributed to earlier diagnosis and timelier, sight-saving treatment.

Quigley notes that when he began his investigations in the mid-1970s, research on the mechanisms of glaucoma centered on studying eyes from pathology labs that had been removed after becoming painful and the patient was blind in that eye, but not from people with typical primary glaucoma.

"None of the research was meaningful in terms of actually understanding glaucoma, because we weren't collecting eyes from people who had the typical disease at its various stages," Quigley says. Few researchers were focused on understanding the time course of glaucoma blindness. Quigley became one of them.

In 1975, Quigley, who had recently completed his residency at Wilmer, started a two-year glaucoma research fellowship at the Bascom Palmer Eye Institute in Miami, at the encouragement of then Wilmer director Edward Maumenee. At Bascom Palmer, while researching glaucoma on animal models, Quigley gained access to a valuable resource: an eye from a patient who had glaucoma for many years, donated by his family. This was the first time Quigley was able to investigate the effects of primary glaucoma on a human eye for which clinical findings during the donor's life were available. This eye became part of his landmark study.

After his fellowship, Quigley returned to Wilmer, where he collaborated with Green by gathering eyes to study after autopsies and from eye




Harry Quigley

*Opposite page:*
Clinic exam room, 1929

banks and surgical departments. When Quigley had 21 eyes from patients who had chronic glaucoma, he looked at the structure of the eyes' cells and tissues using standard light microscopy and electron microscopy along with the donors' clinical records — a method known as clinical-pathological correlation.

From this, Quigley and Green learned that the loss of retinal ganglion cells — nerve cells that transfer data from the retina to the brain through the optic nerve — was occurring much earlier than ophthalmologists believed. Further, the reason for the cupped appearance in the center of the optic nerve disc was that ganglion cells were dying. "We essentially redefined the initiation of the disease to an earlier phase," Quigley says.

During the next decade, he and Wilmer colleagues **Neil Miller, M.D.**, who would lead Wilmer's neuro-ophthalmology division, and **Alfred Sommer, M.D., M.H.S.**, founding director of the Dana Center for Preventive Ophthalmology at Wilmer, pursued the theory that the number of dying cells could be measured by looking at the nerve fiber layer — an area in the retina where nerve cell fibers pass down toward the optic nerve. That finding ultimately led to daily use in every ophthalmology office of instruments and techniques, including optical coherence tomography (OCT), to quantitatively measure the number of nerve fibers remaining in the retina to stage glaucoma and follow its course.

Timely detection of the disease is key. A preliminary nerve cell loss of 30%-40% indicates that glaucoma has started. Finding this loss leads to earlier treatments than had previously been possible. Vision can be preserved if a patient is treated with eye drops, lasers or surgery during the early stages of glaucoma. "That's where this paper went," Quigley says. ●

## WET AMD: BRINGING A NEW TREATMENT TO MARKET

Age-related macular degeneration (AMD) damages the macula in the center of the retina, leading to vision loss that affects the ability to recognize faces and perform everyday activities such as driving, reading and cooking. In the United States, 11 million people primarily over the age of 60 have either wet or dry AMD.

Wet AMD — which accounts for 90% of AMD cases that lead to legal blindness — occurs when changes in dry AMD, such as deposits under the retina, are accompanied by increased production of vascular endothelial growth factor (VEGF) by retinal cells. VEGF is a protein that causes abnormal blood vessels to grow under the retina and leak fluid into the macula, which reduces vision.

Since the early 2000s, treatment for wet AMD has included frequent injections of antibodies or other proteins that block

VEGF. The injections are effective at preserving vision, but the proteins exit the eye within a short amount of time. Patients must receive repeated injections, often every four to six weeks, to keep fluid from re-accumulating and maintain their vision — a challenging schedule to sustain, notes **Peter Campochiaro, M.D.**, the George S. and Dolores D. Eccles Professor of Ophthalmology.

"It can be difficult for patients to get back to the doctor's office that frequently," Campochiaro says. "But if treatments aren't given in a timely manner, the leakage comes back and can produce scarring, and vision can gradually decrease."

An implant developed by Forsight Vision Care and Genentech was designed to address this challenge, explains Campochiaro, an adviser to Genentech. The implant contains ranibizumab, an antibody fragment that is slowly released into the vitreous cavity in front of the retina and that blocks surplus VEGF. The implant, which is inserted during a 15-minute surgical procedure, spans from under the conjunctiva to the inside of the eye. Patients only need to have the implant refilled every six months — a much more manageable schedule.

Campochiaro helped bring the implant to market by leading a phase II clinical trial that determined its efficacy and safety. The Food and Drug Administration approved the implant in 2021.

For the phase II study, 220 people received the implant with one of three doses of the antibody fragment. The study looked at the length of time it took for fluid to build up in the macula again with each dose. In more than 95% of the group that had the highest dose, the fluid started to come back in six months. This dose of antibody fragment is used now in the implant.

"The implant was the beginning of this new wave of long-term treatments." — PETER CAMPOCHIARO

Today, the implant is widely available. It offers the first successful approach to sustained, long-term suppression of VEGF for patients with wet AMD, one that has stimulated the development of other long-term treatments, Campochiaro notes. For example, gene therapy, which is currently in clinical trials, involves the one-time injection of a gene under the retina, which then causes the retinal cells to continuously make a protein that blocks VEGF.

"The implant was the beginning of this new wave of long-term treatments for wet age-related macular degeneration that is improving outcomes and reducing burden for this disease," says Campochiaro. ●

Peter Campochiaro

Divya Srikumaran

## HARNESSING BIG DATA AND AI TO IMPROVE OUTCOMES FOR CORNEAL TRANSPLANTS

During the first half of the 1900s, patients who needed surgery due to a damaged cornea had a full-thickness corneal transplant, during which the entire cornea was replaced with healthy donor tissue. But this procedure requires long recovery periods, and graft rejection occurs in up to 30% of cases. About 70 years ago, ophthalmologists started to consider replacing only the diseased portion of the cornea. **Charles Tillet**, then a Wilmer resident, performed the first partial corneal transplant in 1956. This was groundbreaking, and it took another 40 years for use of partial corneal transplants such as DSEK (Descemet stripping endothelial keratoplasty) and DMEK (Descemet membrane endothelial keratoplasty) to gain traction.

Researchers at Wilmer are continuing to advance care for patients who need corneal transplants by leveraging big data and AI to diagnose corneal diseases and assess patients' risk of post-transplant complications.

These procedures are now commonly performed, and researchers at Wilmer are continuing to advance care for patients who need corneal transplants by leveraging big data and AI to diagnose corneal diseases and assess patients' risk of post-transplant complications in order to avoid corneal rejection and other complications. The risk of graft rejection at any stage after a corneal transplant is about 18%-21%.

"In a randomized controlled trial, it takes a while to get the data and then you're limited as to how many variables you're able to collect," says **Divya Srikumaran, M.D.**, the Walter J. Stark, M.D., Professor of Ophthalmology and chief of the Division of Cornea, Cataract and External Disease. "Big data and AI can help supplement the analyses because you can use information on patients from a larger range of practice settings and more diverse patient populations."

For her research on corneal transplants, Srikumaran uses big data — complex data sets that can include text, images and graphs — from sources such as the American Academy of Ophthalmology's Intelligent Research in Sight (IRIS) registry to look for insights into the factors involved in successful corneal transplants. These factors could include the types of donor tissue used and the surgeons' experience level. The IRIS registry contains data on more than 70 million patients — representing about

21% of the U.S. population — from more than 15,000 ophthalmologists and 2,900 optometrists.

Using this data, AI algorithms can then be created to help with diagnosis of corneal diseases. Keratoconus, which is characterized by a cone shape on the cornea that leads to blurred vision and requires a corneal transplant in up to 20% of cases, has traditionally been diagnosed by ophthalmologists who look for the cone shape on images of the cornea. But the images can be hard to interpret and there is no consensus on the criteria for diagnosis.

"There's a lot of 'noise,' and sometimes we can't ascertain the diagnosis or confirm if there is progression," Srikumaran says. "But with AI, we would be able to have a computer help us more accurately determine which patients have keratoconus and are progressing so we can tailor our therapy and follow up accordingly."

AI can also be helpful in assessing the risk of graft rejection (when the body recognizes the graft as a foreign entity and attacks it). Physical symptoms usually indicate that a donor cornea is close to rejection, including swelling of the cornea, redness in the eye and lung sensitivity. But AI could make this determination before the physical symptoms appear by sifting through detailed images of the cornea that display the endothelial cells. A reduction in these cells indicates a graft might be about to fail.

"Perhaps then we could up their steroids or treat them before the acute rejection happens and the patient becomes symptomatic," Srikumaran says, adding that rejection could be reversed.

Srikumaran sees AI becoming an assistive tool for ophthalmologists that supports their diagnostic and follow-up approaches and allows them to provide better patient care.

Srikumaran sees AI becoming an assistive tool for ophthalmologists that supports their diagnostic and follow-up approaches and allows them to provide better patient care. AI has already been used to optimize intraocular lens selection for cataract surgery, which is the most common surgery performed in the U.S. It will also help expand access to care in rural areas of the U.S. and globally, she says.

"AI may be used in low-resource settings to screen populations of patients and target who needs to be referred to an ophthalmologist for a higher level of care," Srikumaran says. "There are so many ways that AI can help us." ●

# Sleuthing to Identify a Very Rare Eye Disease

**In 2020, near her home in Pennsylvania, Laura Styles had routine surgery for glaucoma. But two days later, Styles' left eye swelled nearly shut, and she developed painful, itchy lesions on her eyelid. She went to an ocular surgeon, who scraped away the lesions, but they soon grew back. Styles, a home health care aide, also had reduced vision. This forced her to stop driving at night, but sometimes patients needed care then.**

**By Jennifer Walker**

"There were also times when I'd be walking, and I'd just have to be very careful," she says. "I missed being able to put makeup on and look my best. It was frustrating."

Styles' ocular surgeon referred her to the Wilmer Eye Institute, Johns Hopkins Medicine, where **Nicholas Mahoney, M.D.**, the Earl D.R. Kidwell Jr., M.D., Professor of Ophthalmology and chief of the Division of Oculoplastics, and **Charles Eberhart, M.D., Ph.D.**, director of neuropathology and ophthalmic pathology, spent more than a year gathering data. After several biopsies, a few nondefinitive leads and a review of the scientific literature, they landed on a very rare diagnosis — one that neither of them had seen in their careers.

The doctors' detective work started in the fall of 2022, when Styles first saw Mahoney because of his experience with amyloidosis, a disease that occurs due to buildup of the amyloid protein. Styles' previous ophthalmology team suspected she might have this condition. The clinical picture wasn't a perfect fit, so Mahoney performed Styles' first biopsy at Wilmer by removing a large segment of her upper eyelid, which he reconstructed afterward.

The specimen went to Eberhart, Wilmer's Charlotte A. Wilson and Margaret K. Whitener Professor of Ophthalmology, who determined

Nicholas Mahoney and Laura Styles

the results were inconsistent with amyloidosis. The sample also showed an increase in cell numbers consistent with another rare disease that he and Mahoney had treated before: immunoglobulin G4-related disease (IgG4-RD), which causes inflammation on the eyelids. But the increase wasn't drastic enough for Eberhart to definitively make this diagnosis. Styles was treated with anti-inflammatory medications, primarily steroids in various forms, which eased her symptoms but had the side effect of worsening her glaucoma. The lesions always grew back.

In spring 2024, Mahoney decided to try an injection of a medication to spare Styles from the side effects of steroids while still controlling the inflammation. When Styles returned to Wilmer to check on a new mass that had appeared on her eyelid, it looked dense, thick and woodlike — a different appearance than the lesions had in the past. Mahoney performed another biopsy.

With this new specimen, Eberhart was able to rule out amyloidosis, and the increased cells from the previous biopsy that suggested IgG4-related disease weren't present.

"At that point, we dug into the literature and started reading a lot about what sort of really rare diseases might look like this," Eberhart says. "We turned up the possibility of ligneous conjunctivitis." The ultra-rare genetic disease has affected only about 250 people worldwide to date and can flare up after surgery.

Mahoney, who is the scientific symposium director for the American Society of Ophthalmic Plastic and Reconstructive Surgery, recalled reading an abstract that had been submitted for review about using Ryplazim, which is derived from human plasma, to treat plasminogen deficiency, which is the cause of ligneous conjunctivitis. After additional blood tests to confirm Styles' diagnosis, Mahoney became the first ophthalmologist in the world to prescribe Ryplazim, which is administered by injection, for ligneous conjunctivitis.

"After my first infusion, my eyes started to heal up within hours," Styles says. "I felt better almost immediately."

Styles' left eye opened, the itching and pain stopped, and her vision returned to normal. The medication also improved her bleeding gums and hearing and sinus problems — all systemic symptoms that can be caused by plasminogen deficiency.

Today, Styles takes Ryplazim — either by administering it herself or with the help of her husband or nurses — every five days by injection. Mahoney has talked to her about decreasing the frequency or having an in-dwelling port placed to eliminate the need for frequent injections. But for now, Styles is taking the intense medication schedule in stride, and she is grateful to the team at Wilmer for uncovering her diagnosis.

"They were always prepared and helpful, and they made me comfortable and tried to get answers," she says. "They really worked hard to put the puzzle together." ●

# Wilmer in the Community


By Amy Entwisle

Since its founding, the Wilmer Eye Institute, Johns Hopkins Medicine, has worked to meet the growing demand for eye care by expanding its services and accessibility. Today, Wilmer's modern "satellite system" features 10 clinical locations including, most recently, at Johns Hopkins Care in Arlington, Virginia. In 2024, Wilmer clinicians provided more than 15,000 same-day appointments for patients with urgent needs. Wilmer's clinician-scientists are studying applications of artificial intelligence to reach an ever-larger number of patients — in clinics, patient homes and rural villages — having demonstrated AI's ability to screen for eye and other diseases, predict disease progression, measure visual acuity and more.

From neighborhoods in Baltimore to Latin America and Southeast Asia, Wilmer's clinicians are leading groundbreaking initiatives to address critical needs in both developed and underserved regions.

Research fellow Zainab Rustam, left, sees patients as part of the free diabetic screening program.

*Above right:* Wilmer at Johns Hopkins Care, Arlington, Virginia

On the first Thursday of every month in Wilmer's Patient Access Center for the Eye (PACE), retina specialist **Cindy Cai, M.D.**, the Jonathan and Marcia Javitt Rising Professor of Ophthalmology, provides eye exams to some 20 patients with diabetes as part of a **free diabetic screening program**. People with diabetes are at increased risk of developing cataracts, glaucoma and diabetic retinopathy — the leading cause of vision loss in adults in the U.S. — so it's crucial to provide an avenue for patients who are uninsured and diabetic to have a screening eye exam, says Cai, whose team members include a research coordinator, four undergraduate students, an ophthalmic technician, a resident and a research fellow.

As a graduate of the Wilmer residency program herself, Cai says she is privileged to mentor and contribute to the education of young ophthalmologists. "It's a great opportunity for them to learn how to do diabetic retinal screening, as well as improve their triage skills," says Cai.

**Vision Screenings in Our Neighborhoods (ViSION)**, an organization driven by Johns Hopkins University School of Medicine students, conducts free vision screenings for community members. Collaborating with organizations such as the Esperanza Center and CASA (Court Appointed Special Advocates), a nonprofit organization that provides services to immigrant and working-class families, ViSION typically conducts eight or nine vision screening events per year, bringing them right to the community. The program — which includes faculty sponsors and about 70 medical student volunteers annually — screens over 400 patients each year. Some are referred to Wilmer for follow-up evaluation or eyeglasses.

ViSION co-director **Patrick Nnoromele**, an M.D./Ph.D. candidate at Johns Hopkins, says the group would like to expand its reach to include young people. "While there are school-based programs for children, once they reach high school they're out of luck," says Nnoromele, who hopes to change that through additional outreach efforts.

Left to right, ViSION co-director Patrick Nnoromele, medical student volunteer Alex Zhu, co-director Divya Manikandan and Thomas Johnson, who founded the community screening program in 2011 as a medical student.

In 2023, Wilmer optometrists launched a free **comprehensive community eye clinic** that has now served more than 400 immigrants and refugees. Working with CASA and the Maryland Optometric Association, **Bryce St. Clair, O.D., M.P.H.**, secured volunteers and donated exam equipment so he could convert a storage closet at CASA's Baltimore office into a full-fledged clinic for performing comprehensive eye exams. Together with fellow Wilmer optometrists and optometry and preoptometry students from The Johns Hopkins University, the group screens patients and the doctors advise them about whether they need glasses, a second opinion about conditions such as glaucoma or referrals to Wilmer specialists for surgical intervention.

Bryce St. Clair, second from left, with optometry resident May Eiampikul (in scrubs) and students at CASA.

St. Clair says an eye screening can also help identify larger health issues, such as diabetes and high blood pressure, that disproportionately impact underserved communities. "Now more than ever, we need to ensure the availability of eye care for the most vulnerable among us," he says.

Megan Collins, right, is working to roll out the successful Vision for Baltimore model nationwide.

Under the direction of **Megan Collins, M.D., M.P.H.**, the Allan and Claire Jensen Professor of Ophthalmology, a highly collaborative program that began in Baltimore in 2016 is now poised for implementation in underserved communities throughout the U.S. **Vision for Baltimore** is a districtwide, school-based program operated in partnership with Baltimore City Public Schools, the Baltimore City Health Department, The Johns Hopkins University, Vision to Learn and Warby Parker. To date, the program has provided free screenings, eyeglasses if needed and eye exams to some 20,000 Baltimore schoolchildren.

Collins and colleagues have studied the program's impact and determined that it improves reading and math scores. With philanthropic support, they are now working to roll out the program model nationwide.

Neil Bressler, center, and members of the care team at Chiang Mai University in Thailand.

Across **Thailand**, a primary cause of childhood blindness is retinopathy of prematurity (ROP), an eye disease that occurs in some premature babies when their early birth disrupts the growth of blood vessels in the retina. While ROP can be countered with proper treatment, too often the condition goes underdiagnosed. "Doctors in NICUs throughout Thailand may not have the equipment needed to facilitate its recognition, so the babies go blind before you can treat them," says **Neil Bressler, M.D.**, the James P. Gills Professor of Ophthalmology. A collaboration that Bressler is leading among physician-scientists at The Johns Hopkins University and Chiang Mai University in Thailand aims to change that. The group is training practitioners to obtain images using a sophisticated camera in Chiang Mai University's neonatal intensive care unit. The physicians will confirm their interpretation of the images by sharing them with world ROP experts in Shanghai, China.

If this system works successfully, Bressler plans to approach hospitals in other regions that do not have pediatric retina expertise with a cost-effective blueprint for improving ROP diagnosis by sending images to a central image reading center for interpretation and disease management. "There will be broad implications for trying to reduce childhood blindness in similar locales," says Bressler.

In 2006, **Nakul Shekhawat, M.D., M.P.H.**, then a 19-year-old college student, spent a few weeks volunteering at an ophthalmology hospital in an impoverished rural area of **northern India**. Cataracts are the leading cause of blindness in India, and Shekhawat saw firsthand how having access to eye care, particularly cataract surgery, was transforming the lives of rural villagers.

Now Shekhawat, the Stephen F Raab and Mariellen Brickley-Raab Rising Professor of Ophthalmology at Wilmer, has partnered with Aravind Eye Hospital in India — as well as biomedical engineers and public health researchers at Johns Hopkins — to develop a telemedicine platform that will provide virtual eye screenings to rural villagers in India. This will ease the significant travel burden for patients while offering much needed ophthalmology care, he says.

Nakul Shekhawat is working to develop a telemedicine platform that will provide virtual eye screenings to rural villagers in India.

Recognizing the growing need for eye care in the United States due to aging of the population, Shekhawat and his team are also working to deploy this technology to help patients in rural U.S. areas. “Every week at Wilmer, we see patients who travel several hours to receive eye care at Johns Hopkins,” Shekhawat says. “Our hope is that these novel telemedicine technologies can offer patients convenience, cost savings and improved care access while maintaining safety and quality of care.”

Over the past 11 years, pediatric ophthalmologist **Courtney Kraus, M.D.**, has gone on 12 international missions to provide eye care to children in underserved countries, including **Guatemala**, **Peru** and — most recently — **Belize**, performing comprehensive eye examinations for more than 100 children and anywhere from 25–40 surgeries (pediatric cataract, strabismus and oculoplastic procedures). “My experience traveling to Belize has been both incredibly rewarding and one that I look forward to every year,” says Kraus. “It is a country that does not have subspecialty pediatric eye care, and by traveling there annually, I am able to perform a necessary and valuable service. It is energizing to return to a place where I can see children I operated on six years prior return for a comprehensive checkup, and be doing great. I enjoy that this long-term relationship has allowed me to offer the same level of care and follow-up that I do here in the States.” ●

Pediatric ophthalmologist Courtney Kraus provides eye care to children, including eye exams and surgeries, during annual mission trips to underserved countries.

# Mentoring & Education

If you were to ask those who trained at Wilmer from its earliest days why they wanted to learn ophthalmology at the Wilmer Eye Institute, chances are excellent they would provide some variation on "I wanted to learn from the best." Whether it was the first class of residents studying under William Holland Wilmer, or those who trained under the leadership of A. Edward Maumenee (or any of our subsequent directors), Wilmer residents and fellows have long benefitted from the teaching, mentorship and support of some of the world's most influential ophthalmologists.

That remains true today, as Wilmer's passionate, dedicated clinicians and scientists continue the legacy — of sharing their knowledge, experience and guidance with the next generation of ophthalmology leaders.

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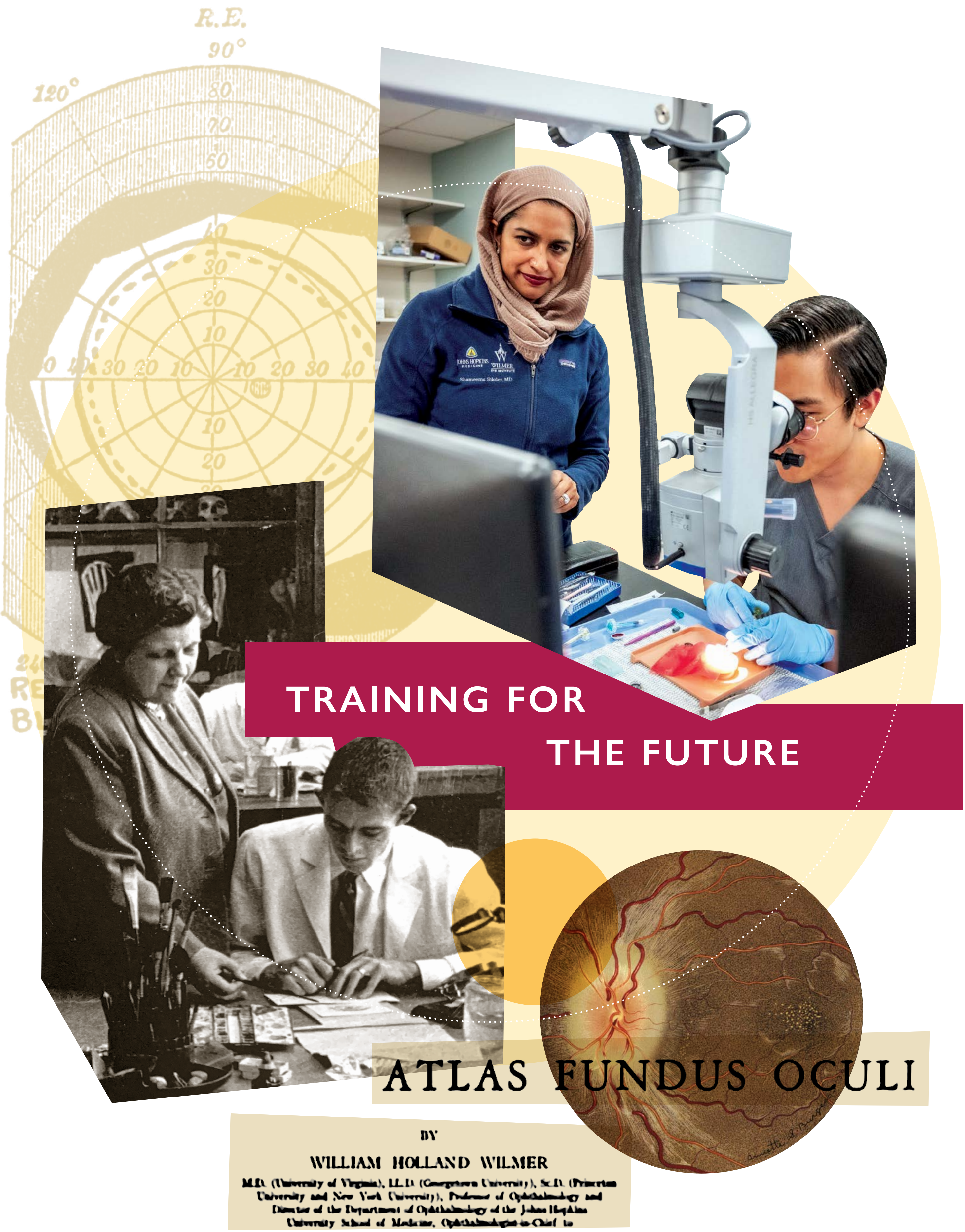
On the opposite page: Clockwise from upper right: Shameema Sikder oversees surgical training in the Center of Excellence for Ophthalmic Surgical Education and Training (OphSET); the *Atlas Fundus Oculi*, by William Holland Wilmer, features 100 color plates of the fundus, hand painted by Annette Smith Burgess between 1926-1933; Annette Smith Burgess, the first ophthalmic illustrator and the first medical illustrator at the Wilmer Eye Institute. Over her 35-year career, Burgess painted and drew practically all of the illustrations that appeared in medical publications of the work and research done at Wilmer.

# TRAINING FOR THE FUTURE



By Karen Blum

## RISING PROFESSORSHIPS JUMP-START RESEARCH CAREERS

During its century-long history, the Wilmer Institute, Johns Hopkins Medicine, has been known as the place where promising young people join the faculty, promptly make important contributions to advancing ophthalmology and emerge as the leaders of their field. The leadership development strength is exemplified by the 136 Wilmer trainees who have gone on to become department chairs at institutions across the country and around the world (see p. 66). But while it was once commonplace for young investigators to start their careers with significant research grants (the most common is called an R01) from the National Eye Institute or other funding organizations, today, the average age to receive a first large federal research project grant is 44.

In 2020, Wilmer alumnus **Jonathan Javitt, M.D., M.P.H.**, called his old friend, Wilmer Director **Peter J. McDonnell, M.D.**, to discuss the need to support junior faculty pursuing novel research. They hatched Wilmer's Rising Professorships Program, which provides young faculty members with up to seven years of funding they can use to pursue their new ideas, build their laboratories and garner the pilot data needed to establish themselves as physician-scientists while applying for larger grants such as R01s and developing their leadership skills.

The program has grown from four rising professors named in 2021 to 16 today, McDonnell says, with additional donors showing interest in providing support. "We're seeing these rising professorships funded faster than the regular, traditional professorships, because clearly the idea resonates with a lot of people who want to see high-risk and exciting projects being pursued," he says.

"This has never been done before," Javitt explains, noting that historically, endowed chairs are given to people who are senior in their careers to recognize their past accomplishments. "We focused on putting support under incredibly promising young people who are going to be the next generation, if they just have the resources to do it."

A committee of senior faculty members vets the junior colleagues and advises McDonnell regarding most deserving candidates. One of the first faculty members to receive the honor was **Thomas Johnson III, M.D., Ph.D.**, who holds the Shelley and Allan Holt Rising Professorship in Ophthalmology. He is working to restore vision for people impacted by optic nerve diseases such as glaucoma.

"It's a really great program," Johnson says. "When you're a junior faculty member, you don't have a lot of funding. It's always a catch-22 because in order to apply for [larger] grants, you have to include preliminary data … and without grant funding, it's hard to produce that pilot data."

In people with diseases of the optic nerve (the nerve connecting the eye to the brain), retinal ganglion cells can die, resulting in permanent vision loss. Johnson's lab aims to turn stem cells into replacement retinal ganglion cells, and transplant those back into the eye to re-form connections between the eye and the brain.

"If we can do this successfully, we'd be able to actually restore vision," he says. His larger goal is to create a commercially available cellular product that could be offered to patients with optic nerve diseases.

"We focused on putting support under incredibly promising young people who are going to be the next generation, if they just have the resources to do it." — JONATHAN JAVITT

*Opposite Page:*
Landon King, Allan Holt, Shelley Holt, Thomas Johnson, Charles P. Scheeler, Peter McDonnell at a celebration marking the dedication of the Shelley and Allan Holt Rising Professorship in Ophthalmology and the installation of Johnson as its inaugural recipient

*Top:* Bryn Burkholder, the Antoinette R. Schifanelli Rising Professor of Ophthalmology, and Peter McDonnell

*Below:* Marcia Javitt and Jonathan Javitt

The Rising Professorship, generously funded by the Holts, has helped significantly accelerate the pace of his work, Johnson says. His team, which grew from two to 15 people, expanded from testing the cells in retinal cultures in a petri dish to testing them in mice and rats, and now in a large animal model. "We're starting to bridge the gap to clinical translation," Johnson says.

Johnson has published papers about the work in journals including *Stem Cell Reports*, and he presented at large ophthalmology meetings and to groups in Austria, Pakistan, India and Chile. He has parlayed his lab results to obtain additional research funds, including a grant from the National Eye Institute, and he is part of a consortium of eye centers managing a $10 million grant from the Advanced Research Projects Agency for Health for a study on eye transplantation.

Allan Holt says he couldn't be more pleased about the impact the Rising Professorship has had. "I thought it was a spectacular idea," says Holt, a member of the Wilmer board of governors, and a senior partner and managing director of the Carlyle Group, a global investment firm. "The idea of allowing a young physician to set up their own lab and have the funding to do proper research was really just great."

For Holt, the decision was partly personal. His father had diminished peripheral vision and difficulty walking as a result of nonarteritic anterior ischemic optic neuropathy (NAION), a disruption of blood flow to the optic nerve. The elder Holt received care from Wilmer neuro-ophthalmologist **Neil Miller, M.D.**

Javitt and his wife, a leading academic radiologist, donated funds to create the **Jonathan and Marcia Javitt Rising Professorship**, which is held by retinal specialist **Cindy Cai, M.D.**

Cai is studying how social determinants of health, such as food insecurity and lack of transportation, impact care for people with diabetic retinopathy, a complication of diabetes that damages blood vessels in the retina and leads to vision loss.

"Diabetes is still the leading cause of vision loss among working-age adults in the U.S., which is crazy to think about because we have great treatments," Cai says. "The reason patients are still losing vision is that they don't come in for vision-saving therapies, or they do come in and then they don't come back for a really long time. That's the problem we're trying to tackle."

With funds from the professorship, Cai hired a data analyst to help her sort through more than 100,000 records from people with diabetic retinopathy who were seen at Wilmer, in addition to national U.S. census data on neighborhood statistics such as the percentage of people who live below the poverty line. One project, published in *Ophthalmology Science*, describes a method to identify when patients with diabetes have a lapse in their eye care. Cai plans to add that type of information into patient electronic health records, so clinicians will be alerted in real time when this happens. Then they can contact those patients and take any necessary steps to get them back into care to preserve their vision.

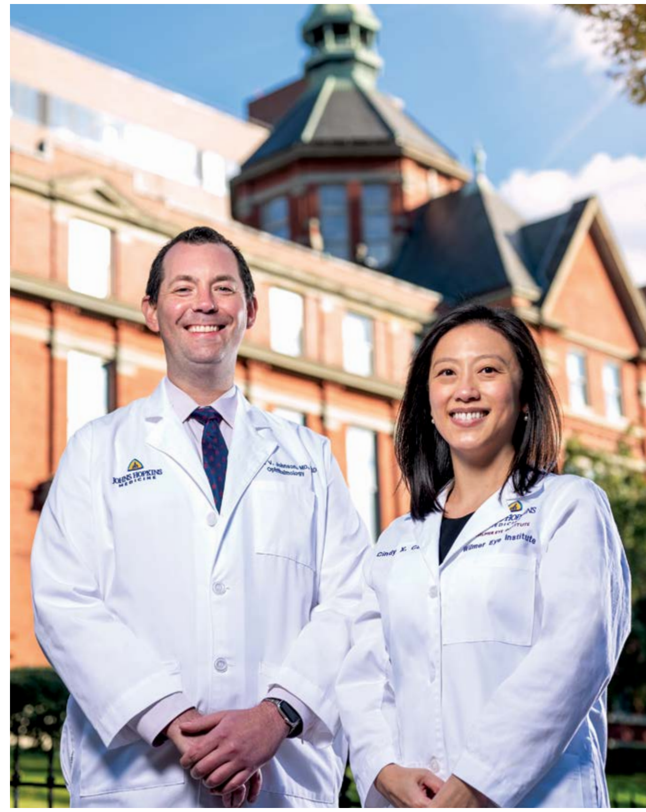
The professorship "lessens the pressure and the need to spend my time going after other sources of money … and just focus on the work," says Cai, who has received a prestigious Research to Prevent Blindness Career Development Award and is now applying for an R01.

The rising professorships also have a key mentorship piece, says McDonnell, with recipients matched to senior faculty members who offer insight and guidance. Additionally, rising professors attend sessions focusing on business skills topics including effective leadership, task delegation, directing lab groups and conducting annual performance evaluations.

"Within Wilmer, my colleagues are extremely supportive of the rising professorships, and it makes me wish we'd come up with the idea a long time ago," McDonnell says.

One generous donor read about the program in an annual report, was convinced of the wisdom of this approach and sent a check. When a grateful patient of glaucoma specialist **Harry Quigley, M.D.**, asked how he and his spouse could express their appreciation for his care, Quigley encouraged them to fund a rising professorship for a glaucoma specialist, and they have indicated they will do so. Other departments at Johns Hopkins have followed suit, establishing rising professorships in neurosurgery, pathology and basic sciences.

"My expectation for the future is that every stellar young recruit to Wilmer will benefit from this program," says McDonnell. "Everyone will know that if they want to pursue a career in academic ophthalmology, our institute is the place to do it because they will hit the ground running instead of treading water for a decade or so before they obtain that first big grant. Things will happen faster at Wilmer." ●



Thomas Johnson and Cindy Cai

T.Y. Alvin Liu and James Gills

## SUPPORTING AI RESEARCH

In September of 2024, the Wilmer Eye Institute, Johns Hopkins Medicine, celebrated **T.Y. Alvin Liu, M.D.**, as the inaugural recipient of the James P. Gills Jr., M.D., and Heather Gills Rising Professorship of Artificial Intelligence in Ophthalmology. The rising professorship is one of three recognized last fall.

Funding for the AI in ophthalmology rising professorship is part of a larger gift that also established in 2024 the James P. Gills Jr., M.D., & Heather Gills Artificial Intelligence Innovation Center at Wilmer. James Gills completed a residency at Wilmer in 1965 and has since made gifts to the institution totaling more than $20 million. Liu, an associate professor who completed his residency and retina fellowship at Wilmer in 2018 and who has been a driving force in research and development of AI applications in ophthalmology, will be the center's inaugural director.

AI-related projects at Wilmer encompass everything from precision medicine to surgical training to drug discovery, with many patients and faculty members benefiting from the unique, collaborative environment at Johns Hopkins.

"What sets Wilmer apart from other academic eye centers is the breadth of projects using artificial intelligence," says Liu. "We also have a deep bench of investigators involved in the entire life cycle of AI projects, from fundamental model design to translating data into useful AI clinical decision tools, and from implementation of FDA-approved AI tools on a health system level to the ethical and societal considerations of AI technology."

Since 2020, Johns Hopkins Medicine has deployed an autonomous AI screening device, approved by the Food and Drug Administration (FDA), for diabetic retinopathy in primary care physicians' offices, with Wilmer playing a pivotal role in the implementation process. A research team at Wilmer led by Liu studied the effectiveness of these devices and concluded that they improve screening rates, access to care and health equity for underserved populations.

"Fortunately, we're living in an era in which technology provides a catalyst to solve some of the toughest challenges to curing and preventing blinding eye diseases," says **Peter McDonnell, M.D.**, Wilmer director and the William Holland Wilmer Professor of Ophthalmology. "Thanks to the generosity of people like James and Heather Gills, we're harnessing this technology to extend our reach and our impact." ●

"Thanks to the generosity of people like James and Heather Gills, we're harnessing this technology to extend our reach and our impact." — PETER J. MCDONNELL

## OVERCOMING SENSORY DEFICITS

**Yingzi Xiong, Ph.D.**, was named the inaugural Barbara E. Simerl Rising Professor of Low Vision last October.

"It's thrilling and I'm deeply honored," Xiong says of the appointment, which supports her work at the Lions Vision Research and Rehabilitation Center at the Wilmer Eye Institute, Johns Hopkins Medicine.

The funding will allow Xiong to build on the groundbreaking research at her XYZ Sensory Lab. The research is aimed at improving and systematizing rehabilitation for patients with low vision and other sensory deficits.

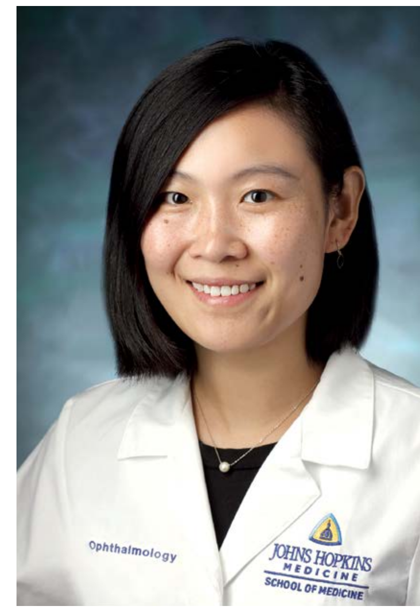
"There is a lot of exciting science we're doing," says Xiong. "There are incredible technical advances that can help people [with low vision] read again or navigate their environments, using everything from 'smarter' smartphones to artificial intelligence."

To reach more people with low vision, Xiong recently launched a vision accessibility initiative. "The people we are studying are among the most reluctant to participate," she says. "Perhaps they can't drive, or they are intimidated by public transportation." The initiative will provide transportation for patients and even make home visits by clinicians possible. "I want more [patients with] low vision to realize how important they are — that we can't advance the research and rehabilitation for low vision without them."

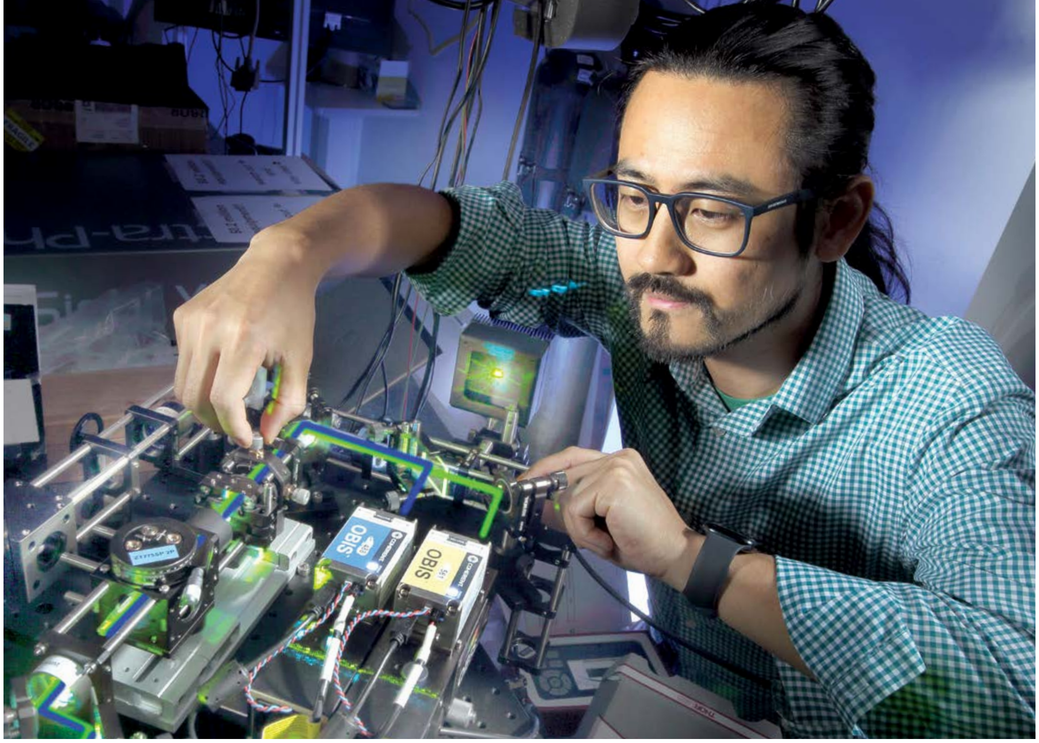
Xiong says funding for the professorship was an unexpected and exceptionally generous gift from a grateful patient. Barbara Simerl, who died June 26, 2022, at age 102, was devoted to her Wilmer doctor, **Judith Goldstein, O.D.**, the Dr. Arnall Patz Endowed Professor for the Lions Low Vision Center, and to Goldstein's work as director of the Lions Vision Research and Rehabilitation Center.

Goldstein and her team helped Simerl adapt to her declining vision and learn to use tools that kept Simerl active and engaged in her many hobbies and activities — from reading to knitting to hosting daily afternoon tea. In the process, Simerl and Goldstein became good friends.

Goldstein says she is grateful for Simerl's faith in the low vision program, and for her gift that "will enable us to recruit young clinician-scientists and researchers dedicated to the field and to further the work of identifying and developing new treatment strategies to improve our patients' lives." ●




Yingzi Xiong




Ji Yi

## MAKING HIGH-TECH IMAGING WIDELY ACCESSIBLE

A leader in the field of ophthalmic imaging, bioengineer **Ji Yi, Ph.D.**, was named a Boone Pickens Rising Professor of Ophthalmology in November.

"I am honored and excited," says Yi. He says the professorship's substantial funding and institutional support will help him realize his dream of moving groundbreaking imaging technologies that he has pioneered out into the world.

Some of his most exciting work has been, as a postdoctoral fellow, developing a new engineering approach to make visible light optical coherence tomography — which produces 3D images of the retina in detail once thought impossible — available for practical use by clinicians. The process is noninvasive, so it is very patient-friendly. And it allows ophthalmologists to observe subtle changes in retinal cells, helping them detect and perhaps more effectively treat retinal diseases (such as age-related macular degeneration, diabetic retinopathy and inherited disorders like retinitis pigmentosa) in their early stages. Other imaging innovations in Yi's repertoire are also helping researchers better understand and develop new strategies for preventing, treating and even reversing eye disease.

"If we can help even one patient, it means everything. Having said that, my dream is to make our work available to clinicians everywhere," says Yi, who oversees a team of more than a dozen researchers in his lab and collaborates with colleagues including **Amir Kashani, M.D., Ph.D.**, a retina specialist and surgeon at the Wilmer Eye Institute, Johns Hopkins Medicine. Kashani holds the Boone Pickens Professorship in Ophthalmology.

Last year, Yi — who joined Wilmer in September 2020 — was awarded $1.25 million by the Maryland E-Nnovation

"If we can help even one patient, it means everything. Having said that, my dream is to make our work available to clinicians everywhere." — JI YI

Initiative Fund, a state Department of Commerce program that encourages basic and applied scientific and technical research through grants to Maryland universities and colleges. The grants match privately raised funds, such as the $1.5 million Boone Pickens Rising Professorship endowment.

"Everything just came together," Yi says.

Yi never met T. Boone Pickens, the storied oil magnate and philanthropist who died in 2019, but last year, he met Pickens' daughter, Liz Cordia, a member of the Wilmer board of governors who is helping to continue her father's legacy through the T. Boone Pickens Foundation. The foundation has made gifts to Wilmer totaling more than $28 million, including a $20 million gift announced in August 2023.

A grateful Wilmer patient, Pickens was able to retain his vision, despite macular degeneration, until his death at age 91, thanks to a care team that included **Walter Stark, M.D.**, the pioneering Wilmer ophthalmologist who died last year at age 81. Stark was named the inaugural Boone Pickens Professor of Ophthalmology in 2005.

Stark and Pickens "became fast friends," said Cordia in a 2024 article announcing the $20 million gift that helped create the rising professorship. "Walter Stark, like my dad, had deep Oklahoma roots," she said.

Yi says he is incredibly moved by the generosity of Cordia and her family.

"I met her last year and she has such passion, such curiosity about new technologies and how they can impact clinical practice," he says. "I am just so grateful for Liz and her family, and for their commitment to advancing research here at Wilmer." ●


# The Wilmer Residency: A 'Jet-Fueled Liftoff'

Strolling through the "residents hall" of the Wilmer Eye Institute, Johns Hopkins Medicine, at The Johns Hopkins Hospital, visitors gaze upon photo after photo of Wilmer's residency classes — a sea of young ophthalmologists in training, all on the cusp of influential careers.

*Opposite Page:*
Fasika Woreta

"I remember as a resident at Wilmer, looking in awe at the 'wall of fame' and at the generations of Wilmer residents and assistant chiefs of service who came before me," says **Fasika Woreta, M.D., M.P.H.**, the Eugene de Juan, Sr., M.D., Professor of Ophthalmic Education and director of Wilmer's ophthalmology residency program. "Many went on to become internationally recognized leaders in our field. Having trained at Wilmer myself, and training others in these hallowed halls, reinforces for me the history and continuity of this amazing place."

Indeed, throughout its 100-year history, Wilmer has been recognized for providing one of the nation's top ophthalmology training programs — a program renowned for the quality of its faculty mentors and for its relatively small size, which allows each trainee to receive unparalleled mentoring and guidance.

"My Wilmer residency was a phenomenal, jet-fueled liftoff for the trajectory of my clinical career, as well as my career in academic medicine," says trailblazing retinal surgeon-scientist **Julia Haller, M.D.**, Wilmer's first female chief resident (class of 1985), who enjoyed a standout career at Johns Hopkins before joining Wills Eye Hospital in Philadelphia in 2007 as ophthalmologist-in-chief.

Among the comprehensive array of opportunities that comprise the Wilmer ophthalmology residency today:

- The Patient Access Center for the Eye (PACE), formerly the General Eye Service, is where Wilmer residents follow their own patients throughout the three years of their residency — honing exam skills, performing surgeries and pursuing advanced pathologies with gradual autonomy.
- Rotation through eight subspecialty clinics, many of which are the largest such programs in the United States.
- Wilmer's location within The Johns Hopkins Hospital, home of the region's only designated eye trauma center, means residents can see one of the highest volumes of eye trauma cases in the country. And they learn how to manage complex ocular injuries associated with facial burns at the Johns Hopkins Burn Center at Johns Hopkins Bayview Medical Center.
- World-class research facilities are located in the Robert H. and Clarice Smith Building, which offers five floors of collaborative research space and an ophthalmologic pathology lab. Each resident receives funding to conduct research, which can unfold at one of Wilmer's dozen-plus research centers, including the Center for Nanomedicine, the Center for Stem Cells and Ocular Regenerative Medicine and the Dana Center for Preventive Ophthalmology, a leader in global blindness prevention efforts.

Shameema Sikder

"We wanted to tap into the latest advances in technology to improve the surgical training experience for residents and fellows, and for practicing surgeons who come here to train." — SHAMEEMA SIKDER

## THE OR OF THE FUTURE

During the first two years of their Wilmer training, residents hone their microsurgical skills at the high-tech Center of Excellence for Ophthalmic Surgical Education and Training (OphSET), which was created at Wilmer in 2015 under the direction of **Shameema Sikder, M.D.**, the L. Douglas Lee and Barbara Levinson-Lee Professor of Ophthalmology.

"We wanted to tap into the latest advances in technology to improve the surgical training experience for residents and fellows, and for practicing surgeons who come here to train," explains Sikder.

OphSET is home to a six-station state-of-the-art wet lab. "We call this our 'operating room of the future,'" Sikder says. The wet lab features actual OR microscopes with high-definition, 3D projection and recording capacity. "We also have a revolutionary surgical simulator with tactile feedback," Sikder notes.

Another key element of OphSET, says Sikder, is an innovation and demonstration lab where Wilmer surgeons, Johns Hopkins engineers and industry partners collaborate to rapidly advance surgical techniques and technology. Sikder is pioneering the use of artificial intelligence to improve how surgeons are trained. She and her team developed Circlage, a cloud-based platform that incorporates surgical videos and artificial intelligence to assess a surgeon's performance. Their goal: to elevate surgical care globally.

Key to Wilmer's success in training the next generation of surgical innovators, says Sikder, is the faculty's commitment to sharing its wisdom through the time-honored educational model of see one, do one, teach one.

That faculty commitment to mentoring excellence permeates every aspect of the residency experience at Wilmer, says **Divya Srikumaran, M.D.**, the Walter J. Stark, M.D., Professor of Ophthalmology (class of 2009). Srikumaran was vice chair of education from 2017-2024, when she became chief of the Division of Cornea, Cataract and External Diseases.

Once a Wilmer resident herself, Srikumaran says "there's no greater opportunity to have an impact in ophthalmology, overall, than in training the future leaders of ophthalmology." ●


Bradley Salus

## OPTOMETRY RESIDENCY DEBUTS

In July 2023, the Wilmer Eye Institute, Johns Hopkins Medicine, welcomed its first optometry resident, **Bradley Salus, O.D.**, to a new program that prepares residents for careers in primary care optometry and provides an additional teaching opportunity for Wilmer's optometry faculty.

During his one-year residency, Salus worked closely with **Amanda Crum, O.D.**, **Lee Guo, O.D.**, and **Bryce St. Clair, O.D., M.P.H.**, seeing patients and receiving specialty training in contact lens evaluations for a broad array of medical indications.

Crum says an advantage of participating in a residency program rather than entering private practice after optometry school is that residents obtain high-volume exposure in their specialty during the one-year program. "If you went out into private practice, you might eventually be exposed to all of those same cases, but it could take you five or 10 years to get to that level of efficiency," she says.

In addition to providing clinical care, optometry residents participate in Grand Rounds with their ophthalmology residency peers at Wilmer, and Grand Rounds and a journal club with optometrists. They also make presentations at the local, state and national levels.

"Our goal for this training program is that we will train the best and brightest optometry residents each year and hopefully keep many of them at Wilmer," says Wilmer Director **Peter McDonnell, M.D.**

"Our goal for this training program is that we will train the best and brightest optometry residents each year and hopefully keep many of them at Wilmer." — PETER MCDONNELL

That was the outcome for Salus. "The residency cemented my interest in a career path in an academic medical center," notes Salus, who completed the program in July 2024. The following month, Salus joined the Wilmer faculty in the comprehensive division, where he provides specialty contact lens care, glaucoma care and routine medical eye care at Wilmer's Bethesda and Frederick satellite clinics. ●


Omnia Hassan

“We’ve found our administrative residents to be excellent partners.”

— CATHY KOWALEWSKI

## PREPARING TOMORROW’S HEALTH CARE LEADERS

Given the complexities of our nation’s health care system, it’s more important than ever to equip future health care executives with the skills they need to lead adeptly, says Wilmer administrator **Cathy Kowalewski, M.B.A.**

That’s why she is inspired to serve as a Wilmer mentor for the Master of Health Administration program offered by the Johns Hopkins Bloomberg School of Public Health. Participants first complete one year of full-time coursework at the Bloomberg School before moving on to an 11-month compensated administrative residency. The residency gives them hands-on experience and the expertise to lead in hospitals and health care systems, the health insurance industry and consulting firms.

Over the years, Kowalewski says, “we’ve found our administrative residents to be excellent partners in their work on complex projects and observational opportunities.”

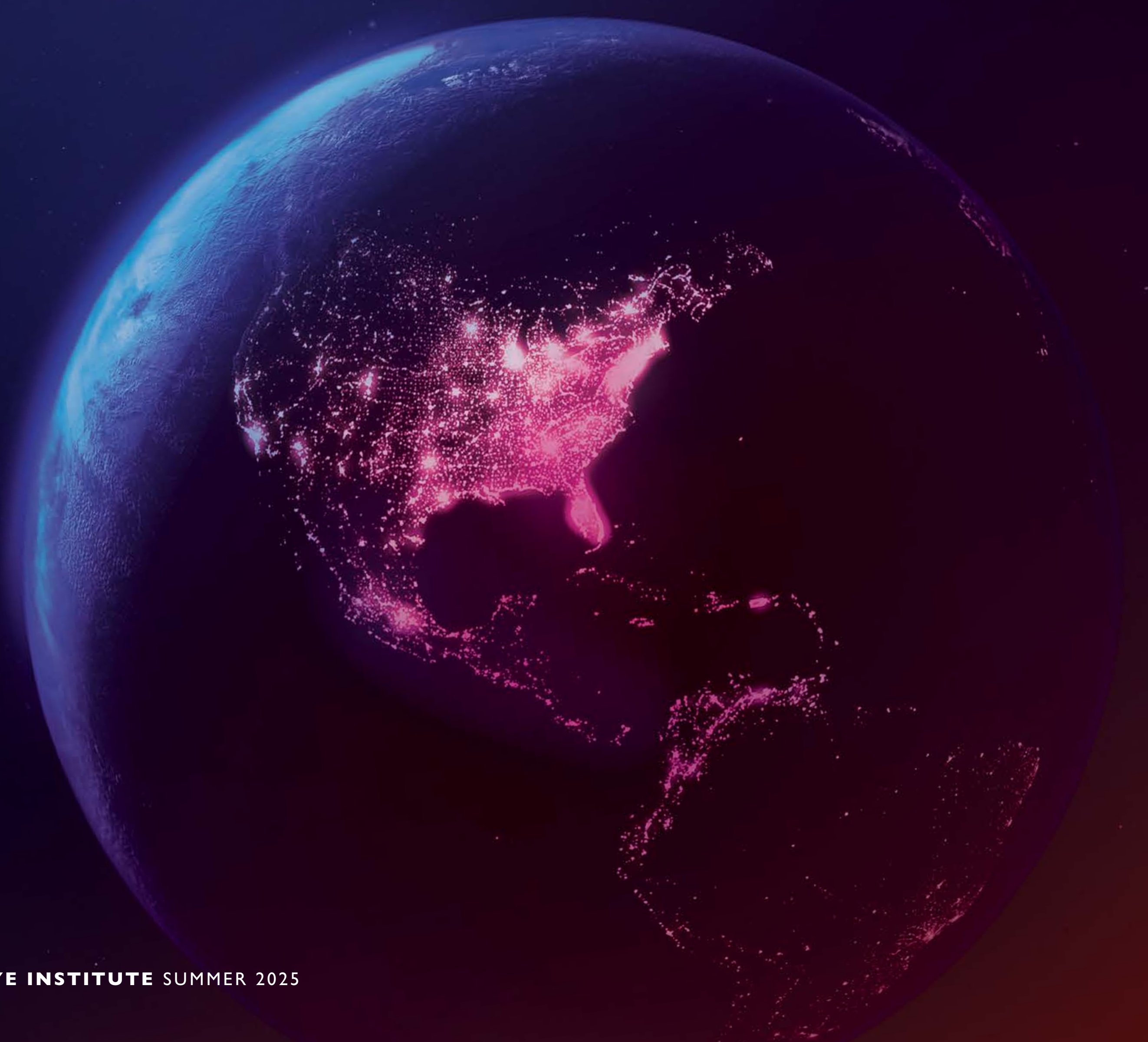
**Omnia Hassan**, who is nearing completion of her M.H.A. residency experience at Wilmer, has worked closely with Kowalewski and co-mentor **Rahul Shah**, also an M.H.A. program graduate.

Hassan has participated in meetings on topics ranging from the physician compensation model to prospective faculty interviews and planning for Wilmer’s centennial celebration. Many of her tasks are project-based. For example, she has analyzed the efficiency and flow of Wilmer’s East Baltimore clinics with the goal of optimizing the patient experience.

“I’ve come to realize the nuances more and more as I work through this project and understand how each clinic is different,” Hassan says. “Hopefully we can come up with something that will work well for everyone.” ●

# WILMER'S REACH

In its 100-year history, the Wilmer Eye Institute has produced more ophthalmology leaders than any other eye hospital, spreading Wilmer's influence across the country and around the world.



## INTERNATIONAL IMPACT

Twenty-one Wilmer trainees have gone on to become department chairs in 11 countries outside the United States (Australia, Brazil, Chile, China, England, Germany, Israel, Lebanon, Mexico, Saudi Arabia, Turkey) across five continents (Asia, North America, South America, Europe, Australia).

## HIGHEST NUMBER OF CITATIONS

700+ peer-reviewed papers published in 2024. A study published in *JAMA Ophthalmology* identified Wilmer as having the most highly cited ophthalmic journal articles of any institution.

## RESIDENT APPLICATIONS

With over 600 resident applications received annually, Wilmer remains a much sought-after institution of study for trainees today.

## PATIENT CARE

Over 263,000 patient visits and 14,000 surgeries took place at Wilmer's 10 clinical locations throughout Maryland, Virginia and Washington, D.C., in 2024.

## CARING FOR OUR COMMUNITY

Wilmer's Vision for Baltimore program has provided 20,000 eye exams and thousands of pairs of glasses to improve the outlook of schoolchildren in Baltimore.

## THERE'S NO PLACE LIKE HOME

While many Wilmer trainees have gone on to become faculty members, division chiefs and ophthalmology department chairs at institutions throughout the world, many have also spent their careers at Wilmer.

Some have pursued fellowships at other institutions or left for careers elsewhere before returning to Wilmer as faculty members, division chiefs and even department chairs. Here, they have the opportunity to collaborate with their colleagues in Wilmer's subspecialty clinics, in the open and glass-enclosed research labs of the Robert H. and Clarice Smith Building, and with the clinicians and scientists in the unparalleled setting of Johns Hopkins University.

They come back to Wilmer to assume leadership positions, pursue vital research, provide state-of-the-art patient care — and help train the next generation of ophthalmology leaders.

**21**
DEPARTMENT CHAIRS IN 11 COUNTRIES OUTSIDE THE UNITED STATES, ACROSS FOUR ADDITIONAL CONTINENTS

**13**
HAVE BEEN PRESIDENT OF THE ASSOCIATION FOR RESEARCH IN VISION AND OPHTHALMOLOGY (ARVO)

**7**
HONORED WITH THE AMERICAN ACADEMY OF OPHTHALMOLOGY LAUREATE RECOGNITION AWARD, RECOGNIZING INDIVIDUALS FROM AROUND THE WORLD WHO HAVE MADE EXCEPTIONAL SCIENTIFIC CONTRIBUTIONS TO THE BETTERMENT OF EYE CARE

**2**
BECAME NATIONAL EYE INSTITUTE DIRECTORS, INCLUDING CURRENT DIRECTOR MICHAEL CHIANG

**8**
RECIPIENTS OF THE PROCTOR MEDAL, WHICH HONORS OUT-STANDING RESEARCH IN THE BASIC OR CLINICAL SCIENCES AS APPLIED TO OPHTHALMOLOGY

**11**
RECEIVED THE FRIEDENWALD AWARD HONORING OUTSTANDING RESEARCH IN THE BASIC OR CLINICAL SCIENCES AS APPLIED TO OPHTHALMOLOGY

**5**
WERE PRESIDENT OF THE PAN-AMERICAN ASSOCIATION OF OPHTHALMOLOGY (PAAO)

**15**

HAVE ESTABLISHED OPHTHALMOLOGY DEPARTMENTS IN OTHER INSTITUTIONS

**68**

HAVE BECOME CHAIRS OF OPHTHALMOLOGY DEPARTMENTS THROUGHOUT THE UNITED STATES

**136**

WILMER TRAINED RESIDENTS AND FELLOWS HAVE BECOME CHAIRPERSONS AT OTHER INSTITUTIONS AND PRESIDENTS OF PROMINENT ORGANIZATIONS

**10**

HAVE HELD MORE THAN ONE DEPARTMENT CHAIR IN OPHTHALMOLOGY

**14**

PRESIDENTS OF THE AMERICAN ACADEMY OF OPHTHALMOLOGY (AAO), INCLUDING CURRENT PRESIDENT MICHAEL X. REPKA

Wilmer Eye Institute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"I've been the beneficiary of Wilmer's superb care for almost 50 years, through successive generations of skilled doctors. It is that history that inspires Lori and me to include Wilmer in our estate planning so that scientific research, like that conducted by Dr. Shameema Sikder, will aid people who we do not know, in times that we will not experience."

– JONATHAN SALLET

Many friends choose to leave a lasting legacy of support to the Wilmer Eye Institute with a gift through their will, trust, or retirement plan, while retaining control and use of their assets during their lifetime. If you have already included Wilmer in your estate plans or would like to learn more about ways to do so, please contact the Wilmer Development Office at 410-955-2020 or wildev@jhmi.edu.

John Hopkins
LEGACY SOCIETY

# Wilmer

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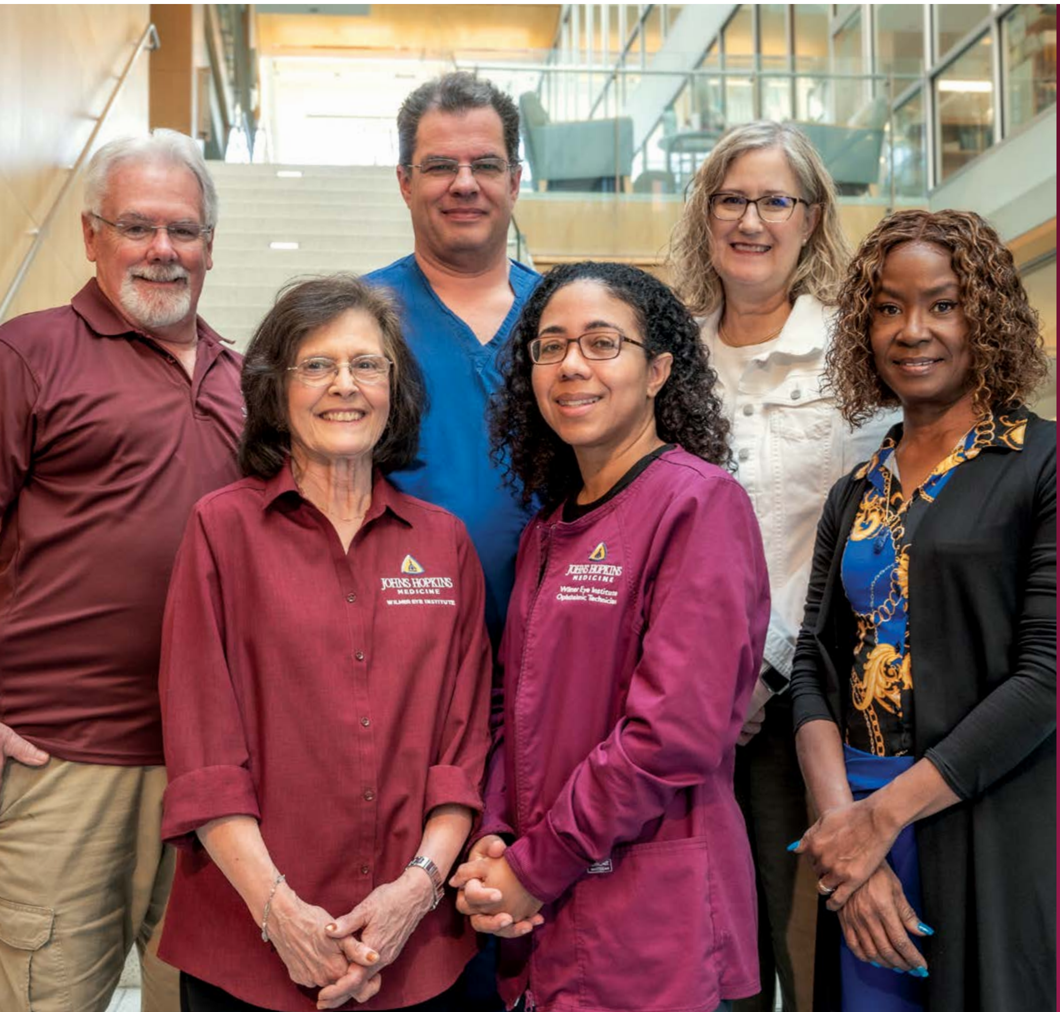

## CELEBRATING 100 YEARS OF EXCELLENCE – THANKS TO YOU!

For a century, our success has been built on the dedication of our team members at the Wilmer Eye Institute. From lab managers, HR and administrative staff to the caregivers working directly with patients, each of you play a vital role. Thank you for 100 incredible years — we couldn't have done it without you!

Pictured from left to right are Terrance Larkins, Facilities Maintenance; Rita Dziecichowicz, Guest Relations Coordinator, Ophthalmology Registration; Simon Hill, Nurse Manager; Nidia Adames, Ophthalmic Technician and Ophthalmic Technician Training Program Manager; Mary Ellen Pease, Research Associate, Glaucoma Division and Manager, Microscopy Laboratory; and Adriane Smith, Administrative Specialist, Chairman's Office.