HARVARD MEDICAL SCHOOL | DEPARTMENT OF Ophthalmology

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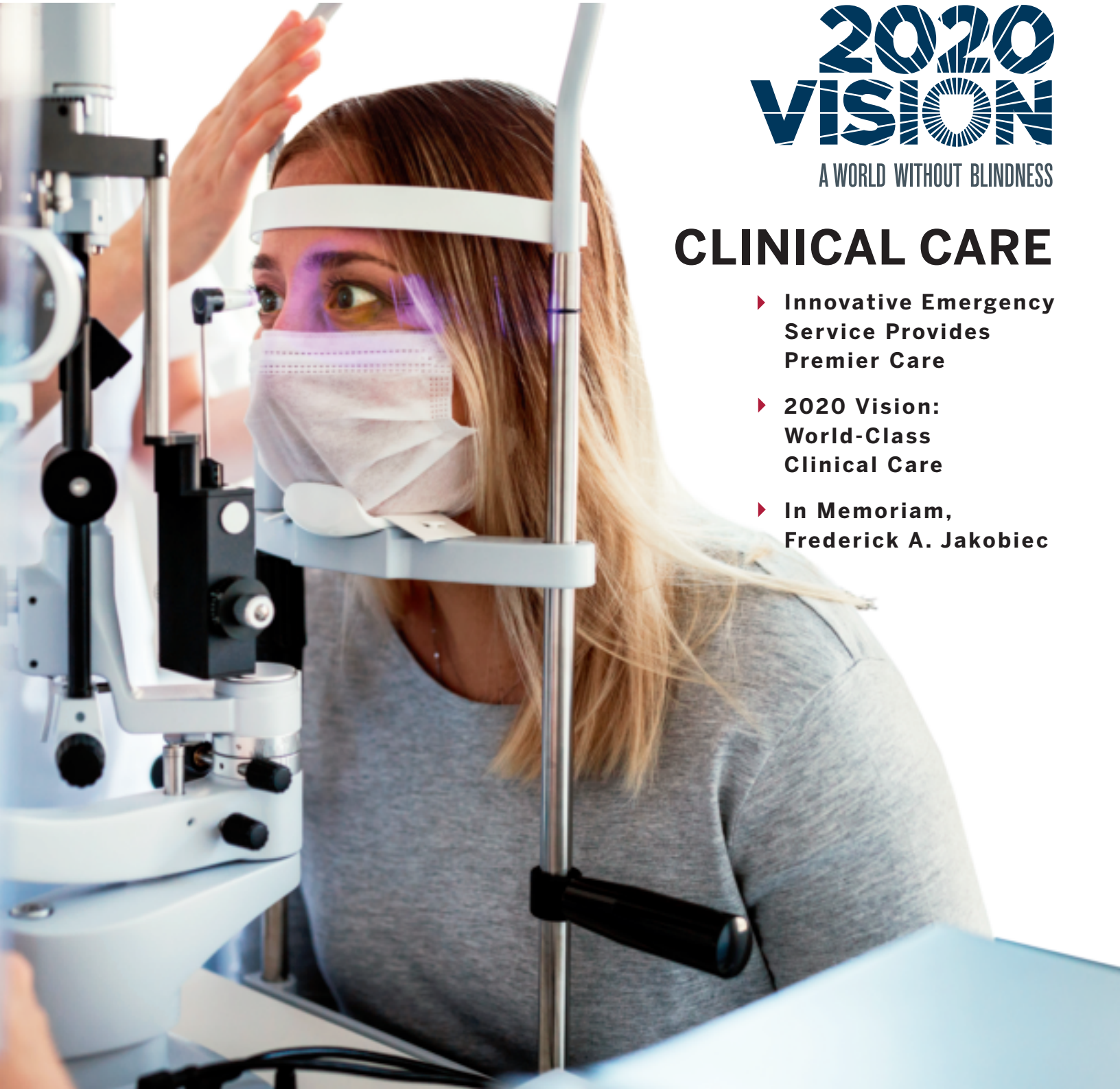
EYE WITNESS



2020 VISION
A WORLD WITHOUT BLINDNESS

CLINICAL CARE

Education, Research, and Reflection Provide Strong Foundations for Unrivaled Clinical Care

In this final installment of our 2020 Vision series, you will read about Harvard Ophthalmology's 20 years of groundbreaking advances and how they helped to define clinical excellence worldwide. These clinical innovations have a direct and meaningful impact on patient care and bring hope and healing to millions of people.

Advances made over the last 20 years pave the way for the future. As we highlight our many achievements of the past, we also provide a look into the promising future of ophthalmology. Today, our top-rated clinicians are constantly evaluating and utilizing innovative tools and techniques to move Harvard Ophthalmology forward.

Our Quality and Outcomes reports are unique to the field of medicine and provide our clinicians, researchers, and support staff with the ability to identify areas of improvement. This collection of data allows for reflection and growth as a community of medical professionals.

As we look to the future, we will continue to develop programs to increase diversity at Harvard Ophthalmology and within the global healthcare system. Our department leaders have put in place a multi-prong approach to recruit a more diverse pool of clinicians, researchers, and trainees while also promoting an inclusive and equitable environment. This includes several initiatives, such as incorporating unconscious bias training in the residency selection process and developing mentor and stipend programs that build a pipeline of support for underrepresented individuals in medicine to gain exposure to ophthalmology.

I hope you will enjoy reading about our past milestones and look to the future with excitement in anticipation of the many advances in vision science to come.

Joan W. Miller, MD
Chief and Chair

Innovative Ophthalmology Emergency Service Provides Premier Trauma Care and Resident Training Environment

The Mass Eye and Ear Ophthalmology Emergency Service is busier than ever. Now named the Ophthalmology Emergency, Consult, and Hospitalist Service, it is staffed by a team of providers who work alongside residents, fellows, and nurses in the only 24/7 ophthalmic emergency service in the region. The team provides inpatient as well as emergency department consult services to the founding Mass General Brigham (MGB) hospitals — Mass General Hospital, Brigham and Women's Hospital, and Brigham and Women's Faulkner Hospital — in addition to Mass Eye and Ear. It is at Mass Eye and Ear where the ophthalmic hospitalist model for care provision has been developed as a very successful way to staff this kind of service.

Service Leadership and Origins

Matthew Gardiner, MD, has led the Mass Eye and Ear Ophthalmology Emergency Services since 2003. With patient volume increasing annually, he and Carolyn Kloek, MD, former Director of the Harvard Ophthalmology Residency Program, established the Ophthalmology Hospitalist Program in 2017. The hospitalists staff the Mass Eye and Ear emergency department and, equally important, provide a consistent Mass Eye and Ear presence at other Mass General Brigham hospitals. An ophthalmic hospitalist provides emergency department care and attends to consultations for inpatient services. Within the emergency room, hospitalists and other attendings mentor and train residents and fellows by providing an increased level of supervision and a range of expertise. The hospitalists also provide consultations on eye care issues, supporting our medical and surgical colleagues in providing care to inpatients. This innovative model of care is key to our success and constantly evolving to meet the need for ophthalmic emergency care.

In 2020, the Emergency Service was renamed the Ophthalmology Emergency, Consult, and Hospitalist Service, and the leadership team was restructured to better meet the growing demands of the service. Dr. Gardiner oversees the new leaders, including Grayson Armstrong, MD, MPH, Medical Director of the Emergency Service, and Prashant Yadav, MD, Medical Director of the Consult Service. Today, the service has grown to include five ophthalmic hospitalists and four other attending ophthalmologists, coordinating with a network of subspeciality service attendings.

Adapting to Increased Patient Volume

Over the past 10 years the emergency department has seen a 30% increase in patient volume. We continue to evolve to meet patient needs, creating follow-up care clinics and adding additional treatment rooms and imaging equipment such as a Maestro optical coherence tomography (OCT) system to provide onsite imaging and improve the patient experience.

In addition to the many resources available at Mass Eye and Ear, our trauma service has access to the Mass General OR for complex trauma surgeries. Mass General recently purchased an ophthalmic surgery microscope for use in eye trauma at MGH.

"Increasing accessibility to treatment and follow-up care is a key component of our service. The leadership team is constantly evaluating and adapting our methods for treatment and offerings to improve patient outcomes," said Dr. Gardiner.

With increased volume, the learning experiences for our residents continue to expand. In this unique teaching environment residents participate in the care of patients with a wide range of pathologies first-hand while shadowing experienced ophthalmic hospitalists and other attending ophthalmologists.

As the only ophthalmic emergency department in New England, and one of only four in the country, the emergency service is constantly adapting, evolving, and improving to meet the needs of the community.

2020 Ophthalmic ED Patient Initial Encounters: 13,118

Top-5 Most Frequent Urgent Diagnoses in Ophthalmic ED in 2021:

Foreign Body in Cornea
Retinal Detachment
Iridocyclitis
Keratitis
Corneal Ulcer

Emergency Ophthalmology Service Members at Mass Eye and Ear:

Ophthalmic Hospitalists
Jo-Ann Haney-Tilton, MD, EMHL
Clifford Kim, MD
Jane Schweitzer, MD
Aisha Traish, MD
Prashant Yadav, MD

Additional Attending Ophthalmologists working in the ED
Grayson Armstrong, MD, MPH
Matthew Gardiner, MD
Alice Lorch, MD, MPH
Natalie Wolkow, MD, PhD

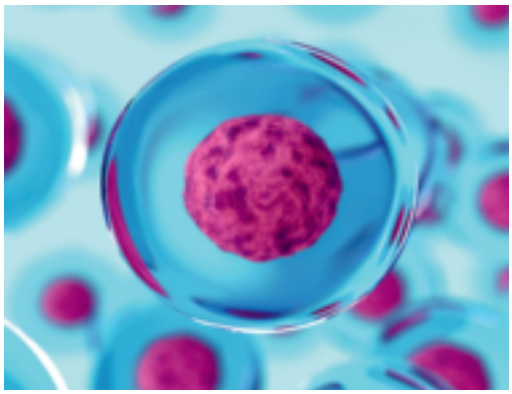
Turning Back the Clock on Aging Eyes

A team of researchers—including Bruce Ksander, PhD, and Meredith Gregory-Ksander, PhD—successfully restored vision in elderly mice by turning back the clock on their aged nerve cells in the retina to recapture their youthful function. These findings, published in Nature, demonstrate that it may be possible to safely reprogram complex tissues, such as the nerve cells of the eye, to an earlier age.

CALEC Technique

Surgeons at Mass Eye and Ear were the first in the United States to replace the eye surface of patients who each experienced chemical burns to one eye—by using their own stem cells taken from the other healthy eye—in a technique known as cultivated autologous limbal epithelial cell transplantation (CALEC).

"Using the patient's own stem cells is a big step for regenerative medicine," said lead researcher Ula V. Jurkunas, MD. "With this clinical trial, we hope to pave the way for better care for patients with corneal blindness, who have long needed better solutions for their condition."



CRISPR Gene Therapy Trial for Vision Loss

A landmark new clinical trial, co-led by clinician scientists Eric Pierce, MD, PhD; and Jason Comander, MD, PhD, used CRISPR-Cas9 gene-editing techniques to delete a mutation in the CEP210 gene that causes a rare condition called Leber congenital amaurosis 10 (LCA10), a leading cause of blindness. This trial represents the first use of CRISPR-Cas9 gene therapy directly in any patients for any condition, and the first therapeutic for LCA10.

"If we can use CRISPR gene-editing safely," said Dr. Eric Pierce, "we have the potential to help open an era of gene-editing for therapeutic use that could have impact in many aspects of medicine."

Subscribe to Advances in Motion for Research Updates

The Mass Eye and Ear/Mass General Department of Ophthalmology launched a specialty section on the *Advances in Motion* website. This website—geared toward healthcare professionals—showcases outstanding clinical innovations and research across the department, with the goal of expanding our presence on a national level. The ophthalmology section and news stories are shared widely via email to 20,000 ophthalmologists nationwide.

Recent Articles Include:

- Genetic Risk Factor for Alzheimer's Disease Linked to Reduced Glaucoma Risk
- Swept-Source OCTA Predicts Hemorrhage in Patients with Diabetic Retinopathy
- A Potential Path to Broadly Protective Covid-19 Vaccines Using T Cells

Read more and subscribe online: **advances.massgeneral.org/ophthalmology**

IRIS® Registry Reveals Insight on Ophthalmic Disease

In 2013, the American Academy of Ophthalmology established the Intelligent Research in Sight (IRIS®) Registry, the nation's first electronic health record-based comprehensive eye disease and condition registry. Clinicians and scientists can use this data to accelerate scientific innovation and enhance clinical knowledge. Combining data from both private optometry and ophthalmology practices and academic medical centers, the IRIS® Registry currently holds de-identified information for over 72 million unique patients and over 2 billion unique diagnoses.

Mass Eye and Ear was one of the four academic groups selected nationwide and awarded unique access to the IRIS® Registry. Recently, researchers at Harvard Ophthalmology have been using this database to answer large-scale questions about ophthalmic disease in the U.S. Below are some initial findings.

Tobias Elze, PhD, recently published a paper in *Ophthalmology Retina* confirming increased risk of retinal vascular occlusion (RVO) with age, as well as identifying RVO subtype-specific differences related to gender right-eye versus left-eye preference.

Nazlee Zebardast, MD, led a study published in *Ophthalmology Glaucoma* on the trends surrounding minimally invasive glaucoma surgery (MIGS) usage in the United States.

A third study, led by Jia Yin, MD, PhD, MPH, and published in *Ocular Surface*, analyzed patterns of chemical and thermal ocular burns in the United States with the goal of learning more about the incidence and longer-term visual outcomes of ocular burn injuries.

As we continue to invest in the growth of the Harvard Ophthalmology Clinical Data Science Institute, we will see an increased use of the IRIS® Registry and expansion of research into many different aspects of ophthalmic disease. Use of the clinical data in the IRIS® Registry goes hand-in-hand with Mass Eye and Ear and Harvard Ophthalmology's goal to improve delivery of care and patient outcomes, but also to support investigation, partnership, and collaboration Harvard-wide and beyond.

COVID-Based Research

In response to the global COVID-19 pandemic, Harvard Ophthalmology researchers quickly adapted to lead many innovative and collaborative initiatives aimed at investigating potential therapeutics, treatment-strategies, and vaccine development.

In a study published in *Cell Host & Microbe*, the gene-based AAVCOVID vaccine, led by Luk Vandenberghe, PhD, and Mason Freeman, MD, (MGH), was shown to be highly effective at eliciting neutralizing antibody responses and cellular immunity for up to one year following a single dose in nonhuman primates.

A study co-led by Elizabeth Rossin, MD, PhD, and published in *Cell*, identified mutually constrained SARS-CoV-2 epitopes that are likely to be stable in different variants of the virus. These epitopes could be used to create a T cell vaccine which may offer broad protection against new and emerging variants of SARS-CoV-2 and other SARS-like coronaviruses.

Leo A. Kim, MD, PhD; Joseph Arboleda-Velasquez, MD, PhD; and collaborators demonstrated in a preclinical model that inhibition of RUNX1 prevented development of lung inflammation and fibrosis. The results of this study, published in *The American Journal of Pathology*, could point to a possible therapeutic for treatment of lung pathology observed in severe COVID-19 infections.

Premier Clinical Care with Attention to Patient Experience

Alice Lorch, MD, MPH, consulting with a patient.

Harvard Ophthalmology continues to forge a future without blindness. With landmark breakthroughs in anti-VEGF therapies, surgical techniques, ocular imaging, laser surgery, pro-regenerative therapies, and gene therapy, the department's dedication to clinical innovation has established many new benchmarks in ophthalmic care. These advances are defining clinical excellence worldwide and bringing hope and healing to millions of people.

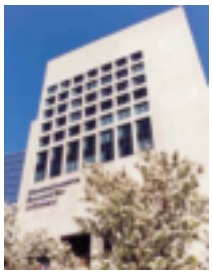
Clinicians collaborate across our nine affiliates to provide excellent care to each and every patient, as well as to set international standards for quality and clinical outcomes.

Each affiliate plays a vital role in strengthening our ability to provide unparalleled access to world-class care.

This third and final installment of our 2020 Vision series highlights our groundbreaking achievements and innovations in clinical care over the last 20 years (2000 through 2020). Fueled by our translational research, these seminal contributions have dramatically improved patient care worldwide, but we also recognize that much work remains. In this issue of *Eye Witness*, we provide an inside look at our plans to continue leading the way by innovating to meet unmet needs over the next 20 years.

Leadership Across Clinical Affiliates

Massachusetts Eye and Ear



Mass Eye and Ear is the primary teaching hospital for Harvard Ophthalmology, serving as a hub for the institution's research and training. Mass Eye and Ear is also home to New England's only 24/7 dedicated eye emergency department.

Leaders

- Joan W. Miller, MD, Chief of Ophthalmology
- Matthew Gardiner, MD, Associate Chief for Clinical Affairs, Ophthalmology
- Alice C. Lorch, MD, MPH, Associate Chief for Quality, Ophthalmology
- Han-Ying Peggy Chang, MD, Associate Chief for Regional Operations

Massachusetts General Hospital

Mass General Hospital, one of the nation's top-ranked hospitals, is adjacent to Mass Eye and Ear, allowing for seamless access to world-class, multidisciplinary care. The Mass General Department of Ophthalmology is led and staffed by Mass Eye and Ear clinicians.

Leaders

- Joan W. Miller, MD, Chief of Ophthalmology
- Alice C. Lorch, MD, MPH, Quality Chair for Department of Ophthalmology

Boston Children's Hospital

Home to the largest group of full-time practicing pediatric ophthalmologists in the United States. Boston Children's Hospital provides specialized services for children, including the treatment of strabismus, traumatic eye injuries, juvenile glaucoma, cataracts, and retinal degenerative conditions.

Leaders

- David Hunter, MD, PhD, Ophthalmologist-in-Chief
- Gena Heidary, MD, PhD, Director of Ophthalmology Fellowship Training at Boston Children's Hospital/Mass Eye and Ear
- Eric Gaier, MD, Site Director, Harvard Ophthalmology Residency Program at Boston Children's Hospital
- Linda Dagi, MD, Director of Ophthalmology Quality Assurance

Beth Israel Deaconess Medical Center

As one of the nation's preeminent academic medical centers, Beth Israel Deaconess Medical Center provides a wide range of care to patients. Subspecialty services include glaucoma, cataract surgery, neuro-ophthalmology, and cornea and external disease.

Leaders

- Nurhan Torun, MD, Chief of Ophthalmology
- Jae Young (Jane) You, MD, Director of Quality Improvement

Beetham Eye Institute at Joslin Diabetes Center

The Beetham Eye Institute provides comprehensive care for patients with or at-risk for diabetes-related eye disease. Faculty at the Beetham Eye Institute have revolutionized the diagnosis and treatment of diabetic eye disease for people around the world.

Leaders

- Lloyd P. Aiello, MD, PhD, Director
- Jennifer Sun, MD, Assistant Director and Chief of the Center for Clinical Eye Research and Trials

Brigham and Women's Hospital

Brigham and Women's Hospital works in tandem with Mass Eye and Ear to ensure that patients have convenient and direct access to best-in-class eye care.

Leaders

- Joan W. Miller, MD, Ophthalmologist-in-Chief
- Sheila Borboli-Gerogiannis, MD, Site Director, Mass Eye and Ear, Longwood

VA Boston Healthcare System

Provides veterans with access to a full complement of eye care services.

Leaders

- Nicholas Butler, MD, Acting Chief of Ophthalmology
- Matthew Leidl, MD, Site Director for Ophthalmic Education and Director of Glaucoma

Cambridge Health Alliance

An innovative healthcare system and a Harvard Teaching Hospital, Cambridge Health Alliance serves communities north of Boston and provides the full array of ophthalmic care.

Leaders

- Vincent Patalano II, MD, Chief of Ophthalmology

20 YEARS OF MAJOR CLINICAL INNOVATIONS

2000

Visudyne® is first FDA-approved treatment for neovascular age-related macular degeneration.

2003

Pegaptanib (Macugen®) is first FDA-approved anti-VEGF therapy for wet AMD. In 2006, Lucentis® is approved for the treatment of AMD, and in 2011, Eylea® is approved for the treatment of AMD.

2006

Mass Eye and Ear is first U.S. site to adopt the Wavelight Allegretto Wave Eye-Q laser.

Mass Eye and Ear and Joslin Diabetes Center are first in New England to acquire PASCAL® laser to treat diabetic retinopathy.

2009

Mass Eye and Ear and Boston Children's Hospital form partnership to deliver world-class eye care to children.

Mass Eye and Ear becomes the Department of Ophthalmology for Mass General Hospital.

2010

Mass Eye and Ear publishes its first *Quality and Outcomes Report*.

2011

Harvard Ophthalmology Ocular Genomics Institute is established.

2013

Grousbeck Center for Gene Therapy at Mass Eye and Ear was created to advance translational research in gene-based therapy.

Boston Children's Hospital was one of the first academic centers to adopt store-and-forward telemedicine for screening babies with retinopathy of prematurity.

2014

A leader in cornea and refractive surgery, Mass Eye and Ear is one of the first hospitals in New England to offer laser-assisted cataract surgery with the femtosecond LensSx® Laser. The same year, the first DMEK procedure at Mass Eye and Ear was performed to treat Fuchs' dystrophy.

2015

Harvard Ophthalmology faculty are the first to identify, characterize, and elucidate the cause of hemorrhagic occlusive retinal vasculitis.

2016

Mass Eye and Ear and ReNeuron Group—a leading UK-based stem cell therapy development company—treat the first patient in U.S. Phase I/II clinical trial for retinitis pigmentosa using technology developed at Mass Eye and Ear.

Boston Children's Hospital is the first pediatric hospital in the U.S. to offer corneal crosslinking to children.

FDA approves the pediatric vision scanner (Rebion blinq®), technology developed at Boston Children's Hospital, for detection of amblyopia and strabismus.

Boston Children's Hospital forms the first Multidisciplinary Concussion Clinic coordinating same-day neurological, sport medicine, psychological, otolaryngologic/vestibular, optometric, and ophthalmologic assessments to provide care for children and adolescents with chronic post-concussion symptoms.

2017

Ophthalmologists at Mass Eye and Ear are among first in the country to offer newly FDA-approved and minimally invasive laser vision correction surgery, SMILE, for treatment of nearsightedness.

Mass Eye and Ear is the first in New England and one of first in U.S. to adopt NGENUITY, an advanced 3D surgical visualization technology for retina surgery.

2018

The first FDA-approved Luxturna gene therapy procedure was performed on a patient with Leber Congenital Amaurosis (RPE65) at Mass Eye and Ear.

Mass Eye and Ear acquires two Zeiss Plex Elite Swept-source-OCTs. Mass Eye and Ear is home to the only device in New England and leads the country in the number of patients imaged.

A Mass Eye and Ear phase 1 study finds that methotrexate injections are a safe and potentially effective approach for the prevention of proliferative vitreoretinopathy in patients with retinal detachment.

The First CALEC procedure was performed after development and an ongoing clinical trial with Mass Eye and Ear, Boston Children's Hospital, and Dana-Farber Cancer Institute.

The Integrated Brain Health/Trauma Program launched to provide behavioral health services to patients with eye trauma receiving care at Mass Eye and Ear.

Boston Children's researchers identify the first gene to be associated with common forms of strabismus.

2019

Mass Eye and Ear is one of four academic groups awarded unique access to the IRIS® (Intelligent Research in Sight) Registry.

Mass Eye and Ear is first in country to acquire the Heidelberg SHIFT (MPOD) and first in New England to acquire a Heidelberg Spectralis designed to measure macular pigment optical density.

2020

Harvard Ophthalmology Clinical Data Science Institute is launched. Members of this multidisciplinary institute analyze clinical findings from a variety of databases, including the IRIS® Registry, Research Patient Data Registry, MGB Biobank, and Mass Eye and Ear Retina and Glaucoma Imaging.

Mass Eye and Ear takes leading role in a new CRISPR-CAS9 trial studying experimental gene therapy for reversing certain forms of inherited retinal disorders.

Mass Eye and Ear becomes a large-scale, early adopter of Tepezza®, the only FDA- approved drug for the treatment of thyroid eye disease.

Boston Children's Hospital expands telemedicine program and Mass Eye and Ear builds telemedicine program that includes hybrid visits.

2020 Vision: Commitment to Premier Patient Care and Clinical Innovation

Harvard Ophthalmology is dedicated to providing exceptional clinical care with enhanced patient access to world-class treatment across our affiliates and via the latest technologies. Advances made in the past 20 years are shaping the future of ophthalmic care by integrating the latest scientific findings and individualized treatment based on a patient's genetic makeup, risk factors, and ability to access care.

At the Ocular Genomics Institute, we are accelerating our research in gene-based medicine by utilizing clinical data and gene-editing techniques to work towards a personalized medicine model of care. This research provides clinicians with the latest advances in improving vision for patients with inherited blindness.

Our groundbreaking research in cell and biologic therapies for blinding eye diseases will reduce the need for transplants and surgeries.

COVID-19 accelerated opportunities to increase home-based care and assessments, including functional testing and digital health diagnostic apps. Emerging technologies in telemedicine and Home OCT are paving the way for patients to not only consult with their physicians, but also be evaluated virtually. These advances can increase access to care and continuity of care, potentially leading to better patient outcomes.

Retina

DEVELOPMENT OF PHOTODYNAMIC THERAPY FOR AMD

The entry of pharmacological treatments for retinal diseases has transformed the field of ophthalmology and improved vision outcomes and quality of life for millions of patients. Harvard Ophthalmology clinician scientists were instrumental in the development of verteporfin photodynamic therapy (Visudyne®), the first FDA-approved treatment for neovascular age-related macular degeneration (AMD). Approval of Visudyne® catalyzed a revolution in the treatment of retinal disease, moving toward pharmacological rather than surgical approaches, and paving the way for the development of other novel agents, in particular anti-vascular endothelial growth factor (anti-VEGF) therapies.

DEVELOPMENT OF ANTI-VEGF THERAPY FOR NEOVASCULAR EYE DISEASES

Researchers at Harvard Ophthalmology and in the Boston area worked in parallel and in collaboration to identify VEGF as the major trigger for angiogenesis in the eye. First, the group demonstrated that VEGF protein levels correlated with neovascularization in vivo. Next, they showed that elevated VEGF protein levels correlated with active retinal neovascularization in patients. The team then demonstrated that VEGF inhibition with an anti-VEGF antibody (the precursor to bevacizumab) completely prevented neovascularization. Finally, they were able to show that injection of VEGF into normal nonhuman primate eyes led to iris neovascularization and neovascular glaucoma, recapitulating the pathology observed clinically with retinal ischemia. Collectively, these studies showed that VEGF was both sufficient and necessary for intraocular neovascularization.

This series of translational breakthroughs led to a new class of ophthalmic anti-VEGF drugs, which have revolutionized patient care for neovascular age-related macular degeneration (AMD), diabetic macular edema and macular edema following retinal vein occlusion. VEGF inhibitors also treat a growing list of indications, including neovascular glaucoma and retinopathy of prematurity.

REGENERATIVE MEDICINE FOR TREATMENT OF RETINAL DISORDERS

In 2012, a prospective phase 1/2 clinical trial at Mass Eye and Ear demonstrated safety and tolerability of subretinal transplantation of human stem cell-derived (hESC) retinal pigment epithelium in patents with AMD and Stargardt's macular dystrophy. These results provided

the first evidence of medium- to long-term safety, graft survival, and possible biological activity of progeny from pluripotent stem cells in human disease of any kind, and highlighted the potential for hESC-derived cells to provide a safe new source of cells for the treatment of various unmet medical disorders requiring tissue repair or replacement.

Pre-clinical studies at Mass Eye and Ear provided the foundation for retinal implantation of human retinal progenitor cells (hRPC) to preserve existing photoreceptors and potentially reduce or halt further deterioration of vision. ReNeuron Group—a leading UK-based stem cell therapy development company—has developed an hRPC research program in collaboration with Mass Eye and Ear to test therapies for inherited retinal disorders. In 2016, ReNeuron and Mass Eye and Ear conducted the first-in-human U.S. clinical trial involving the company's first cell therapy candidate for retinitis pigmentosa.

AUTOIMMUNE RETINOPATHY/ CANCER-ASSOCIATED RETINOPATHY

Clinicians at Mass Eye and Ear have made important contributions to the ability to diagnose and treat this group of rare, but visually devastating conditions where antibodies attack the retina, causing retinal cell death. By highlighting the limitations of current anti-retinal antibody testing—the most frequently ordered blood test for this condition—emphasis has been shifted away from relying on this test for diagnosis and moved toward a more comprehensive approach to carefully rule out other disorders that can mimic this disorder.

Additionally, Mass Eye and Ear clinicians have published on the importance of acquiring genetic testing on these patients to rule out inherited retinal degeneration. Not only is this condition difficult to diagnosis, it is often difficult to treat. Our Mass Eye and Ear clinicians have been at the forefront of treating these patients with novel, aggressive approaches to prevent vision loss, such as using an

Mass Eye and Ear clinicians utilize NGENUITY 3D visualization system.

immunosuppressive agent (rituximab), which has shown efficacy in improving or stabilizing vision loss in a majority of patients.

BEETHAM EYE INSTITUTE AND DRCR NETWORK

Beetham Eye Institute at Joslin Diabetes Center has played a leading role in the Diabetic Retinopathy Clinical Research Network (DRCR.net)—the largest and most influential clinical trial group in diabetic retinopathy—since its founding in 2002. The DRCR.net provides most of the current care guidelines for this disorder and is expanding to all retinal diseases.

CHARACTERIZATION AND PREVENTION OF HEMORRHAGIC OCCLUSIVE RETINAL VASCULITIS

In 2015, Harvard Ophthalmology clinicians were among the first to recognize, characterize, and elucidate the cause of hemorrhagic occlusive retinal vasculitis (HORV), an exceedingly rare but devastating condition resulting in blindness after cataract surgery related to the use of intraoperative vancomycin. Thanks to this discovery, HORV is now almost non-existent as clinicians are now aware of the potential complications associated with vancomycin use during cataract surgery.

METHOTREXATE FOR THE PREVENTION OF PROLIFERATIVE VITREORETINOPATHY

Helio Vision, Inc. was founded in 2016 based on technology licensed from Mass Eye and Ear to develop a therapy for rare, fibroproliferative disorders that lead to abnormal scarring and blindness after retina surgery. In January 2019, the company was acquired by Alderya Therapeutics. In December 2019, the first patient was enrolled in the Alderya phase III GUARD trial of ADX-2191 for the prevention of proliferative vitreoretinopathy. In 2021, the FDA granted Orphan Drug designation and fast-track designation from the U.S. FDA for the of the treatment of retinitis pigmentosa and primary vitreoretinal lymphoma.

NGENUITY IMPROVES RETINA SURGERY

In 2017, Mass Eye and Ear enhanced care for adult and pediatric retina patients by becoming the first hospital in New England to use a new and innovative vitreoretinal surgical platform, known as the NGENUITY 3D Visualization System.

Designed to enhance the operating experience for retina surgeons and their patients, the “heads up” technology offers surgeons better visualization during surgery, fosters a more collaborative operating room environment, and helps reduce surgeon fatigue. Enhancing the operating room experience increases our ability to provide the best possible patient outcomes.

2020 VISION

While these advancements over the last 20 years have helped usher in pharmacological treatments for retinal disease, many areas of unmet need still remain. Our clinician scientists are working to clarify and better define AMD subtypes, as well as develop effective treatments for early/intermediate AMD, dry AMD, and neuroprotection to prevent vision loss.

Moreover, advances in gene therapy and stem cell transplantation for the treatment of inherited retinal disorders are poised to make a major impact on the field and provide treatments and therapies for patients with these disorders. (See Gene-Based Medicine on page 17)

Mass Eye and Ear continues to be at the forefront of retinal surgical advances and the investigation of novel imaging modalities and techniques with the goal of developing imaging biomarkers for retinal disease and prediction of disease progression. (See Imaging on page 18)

Cornea

MASS EYE AND EAR OFFERS THE MOST ADVANCED LASER VISION

Mass Eye and Ear surgeons were among the first in New England to offer the ReLEx SMILE procedure—the most advanced form of laser vision correction. This minimally invasive procedure, sometimes called “flapless LASIK,” was FDA approved for the treatment of nearsightedness in 2016 and offered at Mass Eye and Ear shortly thereafter.

During the procedure, a highly precise ZEISS VisuMax femtosecond laser reshapes the cornea by removing a small amount of eye tissue. The entire procedure takes just a few minutes and is considered one of the least invasive laser vision correction procedures available.

Jia Yin, MD, PhD, MPH, providing care to a patient.

LATEST SURGICAL TREATMENT FOR FUCHS'

Home to the conceptualization of the Boston keratoprosthesis (KPro), Mass Eye and Ear collaborates across Harvard Ophthalmology to continuously improve the technology for corneal transplantation.

Our clinicians provide the latest keratoplasty procedures for the treatment of Fuchs' dystrophy. In 2014, cornea surgeons performed the first DMEK (Descemet membrane endothelial keratoplasty) procedure to take place at Mass Eye and Ear. This advanced treatment allows for a partial corneal transplant in contrast to a traditional keratoplasty. Adopting this technique provides better outcomes for our patients with a decreased risk of rejection, quicker recovery, and improved vision.

In 2015, researchers at Harvard Ophthalmology published on a novel technique, called the S-Stamp, for use during the DMEK procedure. The S-Stamp graft eliminates the need for an upside-down graft implantation thus reducing the loss of endothelial cells during the procedure. As a result of this study, many corneal surgeons have adopted this technique with improved outcomes.

In 2018, clinicians in the Mass Eye and Ear Cornea Service published a technique of treating corneal edema with Descemet's stripping without endothelial keratoplasty (DWEK). This study paved the way for treating a subset of Fuchs' dystrophy patients without allogeneic tissue and avoiding the risks of corneal transplantation.

2020 VISION

Cell and biologic therapies are the future of clinical care for treatment of injuries to the cornea.

In a 2019 preclinical study, Harvard Ophthalmology faculty reported that an adhesive gel packed with light-activated chemicals could seal minor injuries or ulcers on the cornea and result in the regeneration of corneal tissue. The new technology, named GelCORE (Gel for COrneal REgeneration), could one day reduce the need for surgery to repair injuries to the cornea, including those that would today require corneal transplantation.

In 2020, surgeons at Mass Eye and Ear were the first in the United States to replace the eye surface of patients who each experienced chemical burns to one eye—by using their own stem cells taken from the other healthy eye—in a technique known as cultivated autologous limbal epithelial cell transplantation (CALEC). This novel technique was developed by researchers at Mass Eye and Ear, Dana-Farber Cancer Institute and Boston Children's Hospital.

Glaucoma

GENETIC RISK FACTORS IDENTIFIED FOR GLAUCOMA

Working with international collaborators from Australia, the United Kingdom, the Netherlands, Finland, Germany, Singapore, Japan, Nigeria, Ghana, South Africa, Switzerland, and Tanzania, Harvard Ophthalmology clinician scientists have identified over 120 novel genetic risk factors for various forms of glaucoma, including adult-onset primary open-angle glaucoma, pseudoexfoliation glaucoma, juvenile open angle glaucoma, and others.

This work has provided critical new insights regarding the biology of the disease and may ultimately lead to new treatment targets and screening tools. In 2013, Mass Eye and Ear/Harvard Medical School Department of Ophthalmology became the first location in the Northeast to offer a comprehensive genetic diagnostic test for inherited eye diseases, including some forms of glaucoma. Mass Eye and Ear is now evaluating the use of genome-wide polygenic risk score for disease screening and predictions of disease progression and vision loss.

DEVELOPED IMAGING ALGORITHMS TO IMPROVE DISEASE SCREENING

Harvard Ophthalmology clinician scientists have described and validated the use of spectral domain and 3D swept-source optical coherence tomography algorithms to detect retinal nerve fiber layer thinning, which can occur before clinically detectable, irreversible vision loss in glaucoma. Many of these 3D glaucoma algorithms are incorporated into commercially available spectral domain OCT machines throughout the world. (Learn more about our clinical innovations in imaging on page 18.)

MINIMALLY INVASIVE GLAUCOMA SURGERY

Over the last two decades, glaucoma specialists at Mass Eye and Ear have been at the forefront of the latest minimally invasive glaucoma surgeries (MIGS) for patients of all ages. MIGS are designed to lower intraocular pressure, and these procedures often involve shorter recovery times and fewer risks than standard glaucoma operations. Most MIGS procedures can be used

Glaucoma patient with Nazlee Zebardast, MD,MSc.

in combination with cataract surgery, and several can be performed as standalone procedures.

2020 VISION

Clinician scientists are working to develop new models for disease screening and risk prediction based on machine learning, fundus images, and genetic risk factors. Already, researchers have reported progress toward a computer algorithm that could detect worsening of glaucoma based on central visual field loss. (Learn more about our clinical innovations in imaging on page 18.)

Our clinicians are also investigating innovative models of care that include home-monitoring of visual fields and combining virtual visits with remote testing.

Our researchers have also made exciting discoveries about the pathogenesis of glaucoma, which may ultimately lead to new treatment strategies. Notably, faculty have shown that immune cells in the eye that developed in response to early exposure to bacteria are a key contributor to progressive vision loss from glaucoma. Additionally, our researchers have successfully restored vision in elderly mice by turning back the clock on their aged nerve cells in the retina to recapture their youthful function, suggesting that it may be possible to safely reprogram complex tissues, such as the nerve cells of the eye, to an earlier age.

Glaucoma specialists at Harvard Ophthalmology will continue to innovate in MIGS by testing safety and efficacy in a number of new and novel procedures, including use of the XEN® Gel Stent in normal-tension and juvenile open-angle glaucoma; the PEcK procedure, which combines cataract surgery, endoscopic cyclophotocoagulation (ECP), and Kahook dual blade; and the use of the augmented MicroPulse laser in patients with refractory glaucoma.

Ocular Oncology

ANTI-VEGF FOR RADIATION RETINOPATHY

In 2016, our investigators published a prospective study demonstrating the benefit of anti-VEGF injections for the prevention of vision loss from radiation retinopathy in patients with choroidal melanoma. Since this publication, the use of prophylactic anti-VEGF treatment has become more common, and a large-multicenter study examining this strategy is in planning.

TREATMENT OF CHOROIDAL MELANOMA

Mass Eye and Ear participated as a key site for the first-in-human trial of a novel therapy for choroidal melanoma in 2017. AU-011 (developed by Aura Biosciences) is a viral-like particle conjugated to a cytotoxic drug that is being evaluated as an alternative therapy to radiation for smaller tumors with the hope of providing better visual outcomes.

2020 VISION

Investigators in the Mass Eye and Ear Ocular Melanoma Center are collaborating with researchers at Mass General Hospital and the Broad Institute to develop a highly sensitive assay for circulating tumor DNA from uveal melanoma to serve as a biomarker of disease status.

Thyroid Eye Disease and Endoscopic Orbital Surgery

MINIMALLY INVASIVE SURGERY FOR ORBITAL TUMORS

Orbital apex tumors are among the most challenging cases for orbital surgeons. Traditionally, the surgical approach has been either transorbital or transcranial, but both approaches are technically challenging and pose significant risk to the eye or brain, respectively.

Multidisciplinary collaboration between Mass Eye and Ear rhinologic surgeons and orbital surgeons had previously included transnasal endoscopic surgery in areas adjacent to the orbit, including endoscopic orbital decompression and dacryocystorhinostomy. However, as challenging cases presented with tumors along the medial wall of the orbit, the team decided to take the collaboration further by intentionally entering the orbit endoscopically via the nose and resecting tumors. This has resulted in a formal collaboration with creation of a multidisciplinary Center for Thyroid Eye Disease and Orbital Surgery.

EARLY ADOPTER OF FIRST TREATMENT FOR THYROID EYE DISEASE

In March 2020, Mass Eye and Ear clinicians first prescribed and administered Tepezza®, the only FDA-approved drug to treat Thyroid Eye Disease. To date, over 100 patients have been treated with Tepezza® at Mass Eye and Ear.

2020 VISION

Investigators are looking to expand current endoscopic orbital surgery techniques to include tumors in 270 degrees of the orbit and applying it to more complex and adherent tumors. Researchers are also working to expand endoscopic orbital surgery to access other pathologies such as vascular malformations and more direct visual access for sclerotherapy.

A 2020 clinical trial is currently assessing the safety and tolerability of anti-VEGF injections in patients with acute thyroid eye disease.

Pediatric Ophthalmology

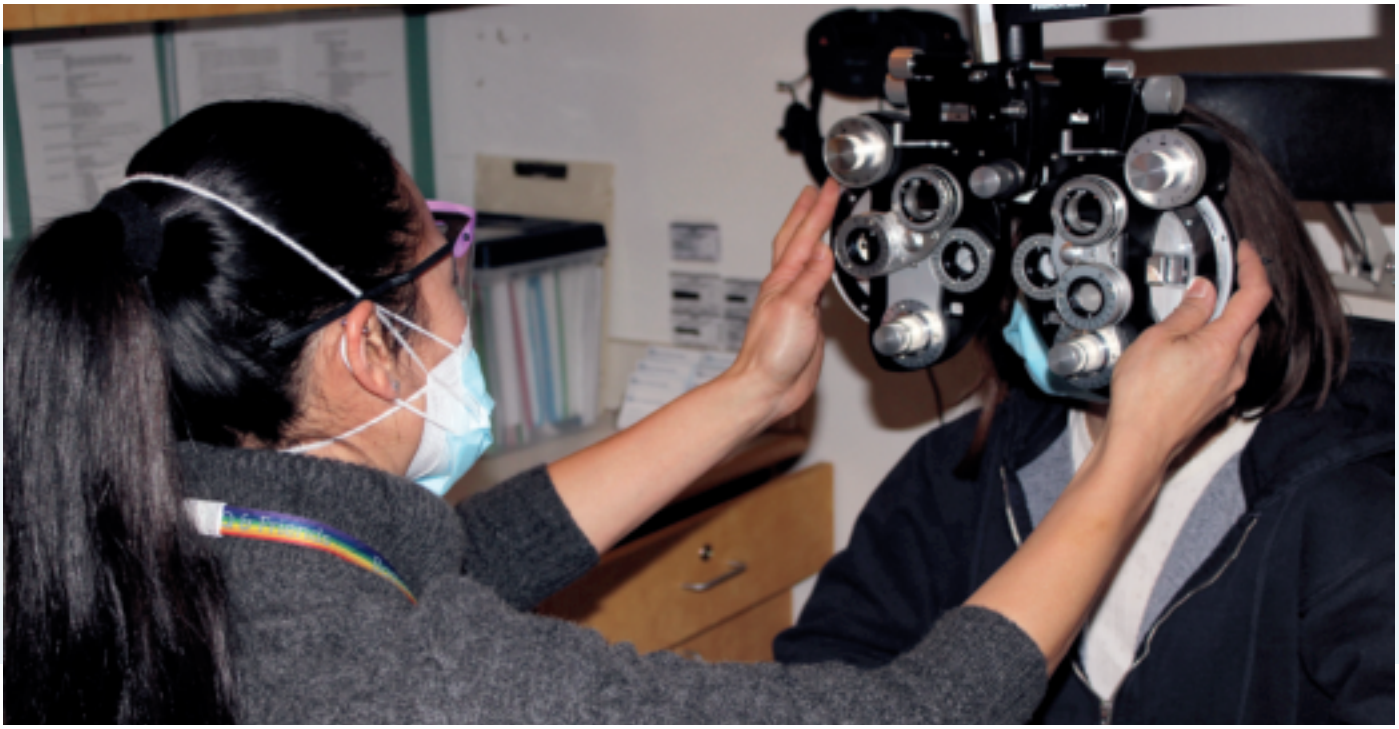
ADVANCING INCOMITANT STRABISMUS TREATMENT

In 2006, Boston Children's Hospital faculty publish the first case series of the superior rectus muscle transposition, which is now a standard treatment for incomitant strabismus.

BOSTON CHILDREN'S HOSPITAL AND MASS EYE AND EAR FORM PARTNERSHIP

In 2009, Boston Children's Hospital and Mass Eye and Ear integrated their pediatric services to offer general pediatric ophthalmology and highly specialized pediatric strabismus care at both institutions. Collaborating to advance diagnostic and therapeutic approaches for childhood ocular disorders, our clinicians provide the most comprehensive pediatric ophthalmology network in the country.

The Pediatric Ophthalmology and Strabismus Service, operated by the two hospital groups, has developed new surgical techniques for complex strabismus that are now disseminated nationally. The network's advanced



Kimberley Chan, OD, administering a pediatric exam at Boston Children's Hospital.

diagnostic services include a saccadic vector optokinetic perimeter device to evaluate visual field changes in young patients – the first use of this technology in the United States. New capabilities include Optus imaging and the world's only pediatric Adaptive Optics retinal imaging unit.

FIRST TO OFFER PEDIATRIC CORNEAL CROSSLINKING

In 2016, Boston Children's Hospital became the first children's hospital to offer corneal crosslinking for the treatment of keratoconus. Corneal cross-linking is currently the only treatment available that can slow or stop the progression of this blinding eye disease.

IMAGING AND EARLY DETECTION OF AMBLYOPIA AND MICRO-STRABISMUS

In 2016, blinq™, a pediatric amblyopia screening device created by Boston Children's Hospital Ophthalmologist-In-Chief, David S. Hunter, MD, PhD, was approved by the FDA. This device allows for early detection of amblyopia, the number-one cause of vision loss in children. Blinq® is the first device of its kind to conduct a 2-second neural performance scan to accurately detect binocularity associated with as little as 1-degree misalignment.

2020 VISION

Our clinician scientists are making progress toward using gene therapy to treat and reverse vision loss; applying precision medicine for early diagnosis of pediatric eye disease; re-opening brain plasticity to treat amblyopia in adults; and directly stimulating the visual brain to treat all forms of blindness.

Gene-Based Medicine

The accelerated pace of molecular discoveries during the past two decades, coupled with an evolving precision medicine model in healthcare, are shaping a new landscape in ophthalmology. Today, gene therapy now joins the list of innovative therapies used routinely at Mass Eye and Ear to treat patients.

MASS EYE AND EAR PERFORMS FIRST FDA-APPROVED GENE THERAPY PROCEDURE FOR INHERITED DISEASE

In March 2018, Mass Eye and Ear made medical history by performing the first FDA-approved gene therapy procedure for patients with inherited blindness.

The treatment, known as Luxturna™, was developed by Spark Therapeutics and approved in December by the Food and Drug Administration for patients aged 12 months and older. Luxturna™ has been shown to improve visual function in children and adults with inherited retinal disease caused by mutations in the RPE65 gene. It is the first and only FDA-approved gene therapy treatment for an inherited disease.

Mass Eye and Ear was selected as just one of eight medical centers in the United States and the only site in New England certified to offer this life-changing therapy to patients. This distinction underscores our long, successful history of developing and delivering translational retinal therapies, and our ongoing experience with developing gene and genetic therapies in the Harvard Ophthalmology Ocular Genomics Institute (OGI) at Mass Eye and Ear.

STRATEGIC AGREEMENT FACILITATES GENE THERAPY DRUG DEVELOPMENT

In 2016, a strategic agreement between Lonza Houston, Inc.—a global leader in viral gene and cell therapy manufacturing—and Mass Eye and Ear now provides scientific investigators around the world with the ability to in-license adeno-associated viral vectors (Anc-AAVs) for the clinical development and commercialization of novel gene therapies.

Anc-AAVs were first developed in the Grousbeck Gene Therapy Center at Mass Eye and Ear. These synthetic viral vectors have the potential to bring gene therapies to more patients than current generation viral vectors. Anc80, in particular, is a potent gene therapy vector that can target retina, liver, muscle, and other tissues without producing toxic side effects.

Following the hospital's agreement with Lonza, Mass Eye and Ear licensed Anc80 to Selecta Biosciences, Inc., a biopharmaceutical company that develops targeted antigen-specific immune therapies.

2020 VISION

Harvard Ophthalmology researchers are at the forefront of precision and gene-based medicine, allowing access to groundbreaking techniques for our patients.

The Harvard Ophthalmology Ocular Genomics Institute, based at Mass Eye and Ear, is leveraging its success

and research in the development of gene therapies to accelerate and make these groundbreaking therapies more accessible in a clinical setting. Several gene-based and gene-editing therapies are currently being tested at the Institute, led by Eric Pierce, MD, PhD, as well as at the Mass Eye and Ear Inherited Retinal Disorders Service, led by Jason Comander, MD.

Researchers are currently studying the gene-editing technique, CRISPR-CAS9, as a treatment for Leber congenital amaurosis. While the CRISPR technique is often used to edit genes outside of a patient's body, the technique being tested uses an adeno-associated viral vector to deliver genomic edits directly into the eye.

We look forward to continuing to build technologies for improving gene delivery and enabling genome editing to treat blindness.

Imaging

OPTIMAL COHERENCE TECHNOLOGY IMPROVES OUTCOMES AND EARLY DIAGNOSIS

First introduced in 1991, optical coherence tomography (OCT) marked one of the greatest advances in ophthalmic imaging, as it plays an important role in the early detection of eye disease in patients to prevent vision loss. Researchers at Harvard Ophthalmology developed the technology in collaboration with colleagues at Massachusetts Institute of Technology and Massachusetts General Hospital.

Early detection is critical to treatment of retinal diseases. At Mass Eye and Ear, we have access to multiple Swept Source OCT devices (including Zeiss Plex Elite), wide-field OCT- angiography capability, ultrawide-field fundus photography, and utilize a multitude of Spectral domain OCT and OCT-angiography devices.

Our researchers have also described and validated the use of spectral domain and 3D swept-source OCT algorithms to detect retinal nerve fiber layer thinning. Many of these 3D glaucoma algorithms are incorporated into

Ankoor Shah, MD, PhD, a pediatric ophthalmologist at Boston Children's Hospital, provides a virtual visit.

commercially available spectral domain OCT machines throughout the world.

OCT technology has supported our clinical research into various ophthalmic conditions, including AMD and glaucoma. Notably, OCT-angiography has been used to gain new insights into the choroidal vasculature, as well as optic nerve head and peripapillary microvasculature in primary open-angle glaucoma (POAG). Swept-source-OCT technology has also been used to identify choroidal defects, which may be important in retinal disease, as well as anatomic and imaging markers for POAG, such as prelaminar wedge defects.

ARTIFICIAL INTELLIGENCE

Clinician scientists are working to develop new models for glaucoma and retinal disease screening and risk prediction based on machine learning, fundus images, and genetic risk factors. Notably, researchers have used artificial intelligence to identify distinct patterns of glaucomatous visual field loss, and well as retinal nerve fiber layer loss. These computer algorithms can detect worsening of glaucoma based on central visual field loss. Our researchers have also created an artificial intelligence dashboard for monitoring glaucomatous functional loss, a device that has the potential to provide clinicians with a user-friendly tool for determination of the severity of glaucomatous vision deficit, the spatial extent of the damage, and a means for monitoring the disease progression.

Our clinicians are also investigating innovative models of care that include home-monitoring of visual fields and combining virtual visits with remote testing.

2020 VISION

Today, researchers are studying the latest imaging modalities in the hopes of providing earlier diagnosis and treatment for patients with blinding eye diseases, such as AMD, glaucoma, and diabetic retinopathy. Example projects include:

- Studying how the state-of-the-art Swept Source OCT-angiography can help us diagnose and prognosis of ocular and systemic diseases, such as diabetic retinopathy and age-related macular degeneration.
- Identifying novel biomarkers for patients with retinal and choroidal disorders to allow for early detection
- Applying artificial intelligence and deep-learning algorithms to retinal imaging and functional testing to help improve the diagnosis and prognosis of various eye diseases, such as glaucoma and diabetic retinopathy.
- Developing precision medicine approaches that combine background genetic risk and patient specific phenotypes to predict future disease course

Telemedicine

IMPROVING ACCESS TO CARE WITH VIRTUAL AND HYBRID VISITS

Clinicians across Harvard Ophthalmology continue to advance the use of telemedicine, including virtual visits and hybrid visits. The Joslin Vision Network at the Beetham Eye Institute—a telemedicine technology and clinical service developed in 1998—continues to provide remote and underserved communities with access to diabetic retinopathy screenings. provide screening

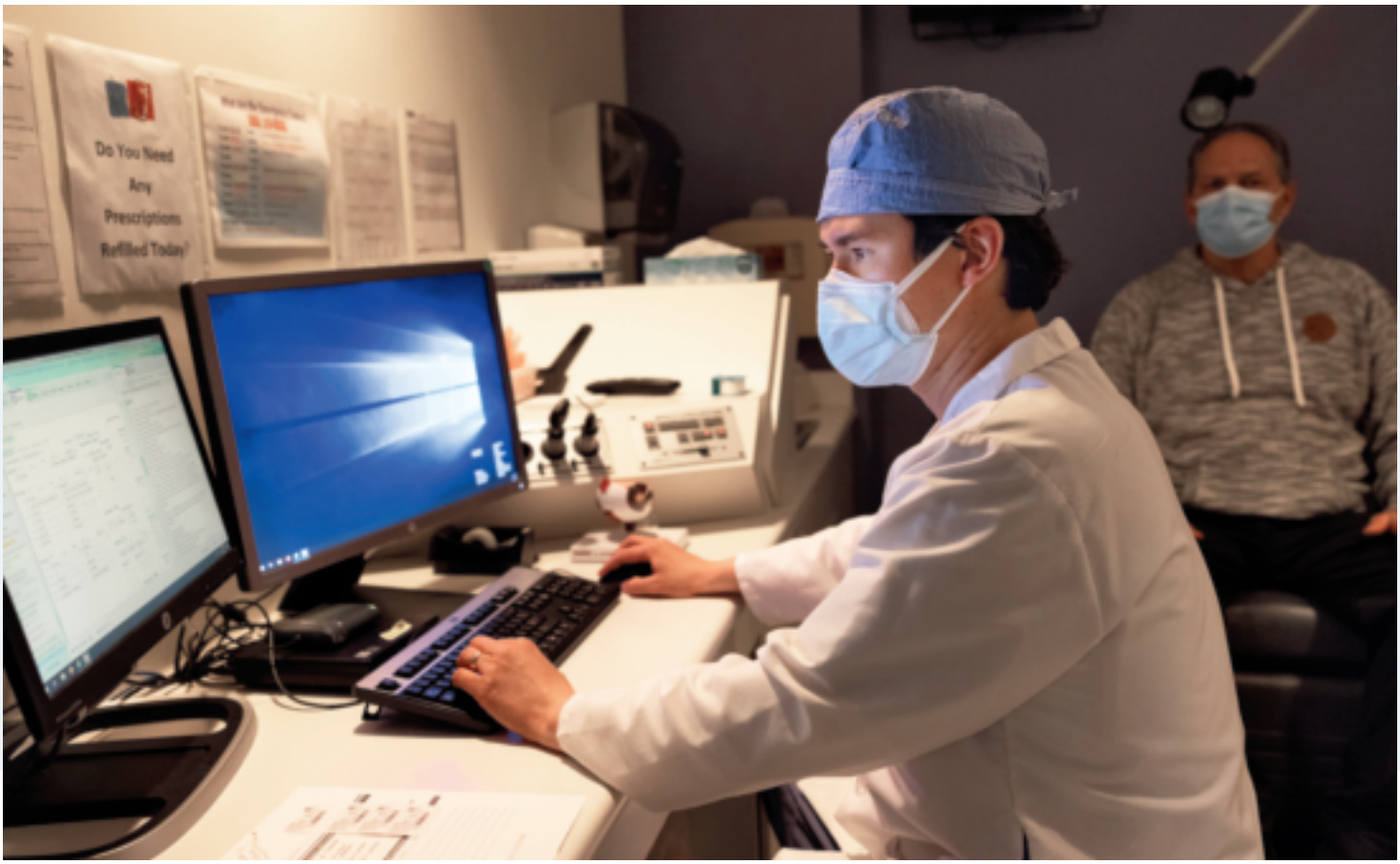
Boston Children's Hospital began its ophthalmology telemedicine program in 2016. This program is growing and has expanded to include screenings for amblyopia and strabismus. The Pediatric Vision Scanner is helping clinicians to detect these conditions much earlier, and therefore, improving outcomes.

In response to COVID-19, Mass Eye and Ear quickly implemented virtual eye care visits, as well as hybrid visits that combine remote imaging with video or telephone conferencing. This model has been very successful, allowing clinicians to meet patient care needs while maintaining convenience for the patient.

Our ability to monitor and manage disease via remote imaging provides a new level of convenience for patients and reduces the likelihood of cancelled appointments and delayed treatment.

2020 VISION

There are many exciting emerging technologies for remote care. For instance, home-based platforms—like devices that turn a smartphone into an ophthalmoscope or patient-operated optical coherence tomography (OCT) devices—could potentially revolutionize care for



Thomas Dohlman, MD, evaluates patient.

patients with certain chronic ophthalmic conditions. Although many of these devices have not yet received FDA approval, future implementation of these platforms could lead to more timely intervention, more customized treatment plans, improved clinician workflow, and reduced healthcare costs.

Quality and Outcomes

SETTING STANDARDS OF TRANSPARENCY AND ACCOUNTABILITY IN OPHTHALMOLOGY

Since 2010, Mass Eye and Ear has led the medical community in the development and measurement of quality and outcomes in the field of ophthalmology. Quality and outcomes play an integral role in advancements and accountability in the delivery of world-class clinical care.

Nationwide, there is a lack of public-facing quality and outcomes reporting in the field of ophthalmology. Realizing the need for objective reporting, Mass Eye and Ear established its Quality Program—an institutional initiative that focuses on outcomes, provider excellence, clinical incidents response, and process improvement. Today, Mass Eye and Ear publishes one of the most comprehensive outcomes reports in the world for every ophthalmic subspecialty.

By publishing these reports, we have defined important measures for ophthalmology that include the full spectrum of care that we provide—from routine to very complex procedures.

2020 VISION

By sharing and analyzing our clinical data, we hope to set standards of transparency and accountability in ophthalmology and inspire other centers around the country to engage in similar public reporting.

This process of continuous analysis and reporting has led to many quality improvement initiatives. For example, analysis of cases that did not achieve target refraction for cataract surgery led to procedures to ensure correct intra-ocular lens placement. In addition, analysis of all endophthalmitis cases led to protocols for more timely surgery for our trauma patients, in order to minimize infection risk.

Clinical Data Science Institute

LEVERAGING BIG DATA TO IMPROVE PATIENT CARE

Exciting advances in artificial intelligence and big data have the potential to transform patient care, and Harvard Ophthalmology is leading the way. In 2020, Harvard Ophthalmology established the Clinical Data Science Institute, which leverages big data to build stronger health profiles and predictive models so that we can improve the diagnosis and treatment of eye diseases.

Our faculty have access to a growing repository of databases, including the

- The American Academy of Ophthalmology's IRIS® Registry (Intelligent Research in Sight)— the nation's first comprehensive eye disease and condition registry
- The Mass General Brigham Research Patient Data Repository (RPDR)—a clinical data registry that gathers medical records from participating hospital system
- The Mass General Brigham Biobank—a repository of consented patient samples that are linked to the electronic medical record from and supplemented with health information and family history 100,000+ patients
- Mass Eye and Ear Retina, Uveitis, and Glaucoma imaging databases

LEADERSHIP

Lucia Sobrin, MD, MPH
Co-Director, Clinical Data Science Institute
Associate Chief of Clinical Data Science, Mass Eye and Ear

Tobias Elze, PhD
Co-Director, Clinical Data Science Institute

Joan W. Miller, MD
Co-Principal Investigator of IRIS® Registry Research Group, Mass Eye and Ear

Alice C. Lorch, MD, MPH
Co-Principal Investigator of IRIS® Registry Research Group, Mass Eye and Ear

Michael Ricci
Chief Information Officer and Vice President of Information Services, Mass Eye and Ear

Faculty and trainees have already made several important discoveries. Notably, researchers have discovered a potential link between low vitamin D levels and noninfectious uveitis. This finding has sparked additional research into uveitis risk factors, uncovering an association between hormone replacement and contraceptive therapy and uveitis risk. Other researchers have used artificial intelligence to identify central field patterns that improve the prediction of glaucoma prediction.

2020 VISION

This new frontier of research in ophthalmology involves the analysis of large datasets and integration of imaging modalities with clinical information to:

- Better understand the root cause of disease, with the ultimate goal of developing new treatments and cures
- Compare treatments for common diseases and improve treatment algorithms
- Identify progressive disease earlier—before vision loss occurs
- Better understand rare disease, which can lead to new treatments
- Identify disparities in the healthcare system in order to identify opportunities for intervention
- Identify wasted resources in the healthcare system in order to invest where resources are needed

Integrated Brain Health/Trauma Program

Launched in 2018, the Integrated Brain Health/Trauma Program offers behavioral health services to patients with eye trauma receiving care at Mass Eye and Ear. This collaborative program between Mass Eye and Ear and Mass General Hospital enables patients to meet with a clinical psychologist to help them adjust to their injuries and facilitate referrals to mental healthcare providers for ongoing care.

The idea for the program grew from discussions between Seanna Grob, MD, MAS, AY 2016-2017 Chief Resident and Director of the Eye Trauma Service at Mass Eye and Ear and oculoplastic surgeon Daniel R. Lefebvre, MD, during a complicated trauma case.

How It Works

The Chief Resident and Director of the Eye Trauma Service at Mass Eye and Ear identifies and refers patients into the program. Those patients are evaluated within the Eye Trauma Service at Mass Eye and Ear by a psychologist at Mass General Hospital. Based on the initial visit, the psychologist then determines whether the patient would benefit from continued mental healthcare at either follow-up visits with Eye Trauma or as a referral to outside clinical care.

Benefits to Patients

Complex eye trauma—sudden loss of vision, loss of an eye, and significant facial changes from lacerations and fractures—can often greatly affect patients' ability to work and manage daily activities due to loss of depth perception and difficulty dealing with a change in appearance. By having a behavioral health service integrated within an eye trauma clinic, patients can receive early intervention and, if necessary, continued mental healthcare with their eye care. Mass Eye and Ear hopes this unique program will inspire other centers to develop similar behavioral health services for eye trauma patients.

Brittany Mazza, OD, evaluating patient.

Highlights from the 2021 ARVO Virtual Meeting

The Association for Research in Vision and Ophthalmology hosted three virtual events in May 2021—the Annual Meeting, Imaging in the Eye Conference, and the new Bench-to-Bedside Meeting. Harvard Ophthalmology was well represented across its affiliates, with many faculty, trainees, and alumni participants.

Congratulations to the faculty and alumni who received ARVO awards for their outstanding contributions to vision research.

2020 Friedenwald Award
Lloyd Paul Aiello, MD, PhD

2021 Weisenfeld Award
Paul S. Bernstein, MD, PhD, alumnus

2021 Bert M. Glaser, MD Award
Yohei Tomita, MD, PhD, Boston Children's Hospital

2021 Cora Verhagen Award (Second Place)
Research fellow Rohan Bir Singh, MD

2022 Weisenfeld Award
Janey Wiggs, MD, PhD

Harvard Ophthalmology Hosts 2021 Annual and Alumni Virtual Meeting

On June 11, 2021 Harvard Ophthalmology hosted its Annual and Alumni Virtual Meeting with more than 180 faculty and alumni attendees from around the world. The three-hour event featured live and pre-recorded content, including a department update from Chair Joan W. Miller, MD, three-minute lightening presentations from faculty and alumni, dynamic live Q&A sessions, and three award lectures.

Congratulations to our 2021 achievement awardees and memorial Mariana D. Mead lecturer:

Mark C. Kuperwaser, MD
2021 Mariana D. Mead Lecturer

Assistant Professor of Ophthalmology at Harvard Medical School/Beth Israel Deaconess Medical Center

Hélène Boisjoly, MD, MPH
2021 Distinguished Clinical Achievement Awardee

Dean, Faculty of Medicine, Université de Montréal

Jean Bennett, MD, PhD
2021 Distinguished Research Achievement Awardee

F.M. Kirby Professor of Ophthalmology, Department of Ophthalmology, Perelman School of Medicine at the University of Pennsylvania

Thank you to our Co-Chairs–Joan W. Miller, MD; Joseph F. Rizzo, III, MD; Joseph B. Ciolino, MD; Gena Heidary, MD, PhD; and Rachel M. Huckfeldt, MD, PhD.

Save the date for our 2022 Annual Meeting and Alumni Reunion, June 24, 2022.

2021 Clinical Graduation

Harvard Ophthalmology held its clinical trainee graduation on June 17, 2021 at the Boston Museum of Science. The outdoor ceremony celebrated eight Harvard Ophthalmology residents, the AY2020–2021 Chief Resident, and two optometry residents, as well as 23 clinical fellows from Mass Eye and Ear, Joslin Diabetes Center, and Boston Children's Hospital.

"Based on the resiliency, compassion, and creativity that each and every one of our residents and fellows have shown—throughout their training and especially during COVID 19—I know that they will be thoughtful change agents who will help lead us into a brighter future," remarked Harvard Ophthalmology Chair, Joan W. Miller, MD.

Several faculty and staff were also honored during the ceremony with awards selected by ophthalmology residents. Sherleen Chen, MD, received the Simmons Lessell Excellence in Education Award. This award recognizes faculty who have made—and continue to make—sustained and profound contributions to education— just like Dr. Lessell. Prashant Yadav, MD, received the Clinical Teacher of the Year, and Roberto Pineda II, MD, received the Surgical Teacher of the Year Award. Ophthalmic technician Serafina Lawton received the Residency Appreciation Award. Graduating fellow Dr. Daniel Brill, MD, received the Fellow of the Year Award.

What's Next for Resident Graduates?

Six of our graduating ophthalmology and optometry residents—and our chief resident Marisa Tieger, MD—are now pursuing additional subspecialty training at top-ranking fellowship programs around the country. Four others—including our Chief Resident Marguerite Weinert—joined our faculty at Mass Eye and Ear.

AY2020-2021 Clinical Trainees at graduation in June 2021

Ophthalmology Residents	
Tedi Begaj, MD	Vitreoretinal Fellowship at Associated Retinal Consultants/Beaumont Health in Royal Oak, Michigan
Jenny Dohlman, MD*	Pediatric Ophthalmology and Strabismus Fellowship at Boston Children's Hospital/Mass Eye and Ear
Clifford Kim, MD	Part-time Lecturer in Ophthalmology at Harvard Medical School (HMS) Member of the Hospitalist Service at Mass Eye and Ear, Part-time/Healthcare Innovation Startup
Catherine Marando, MD	Glaucoma Fellowship at Mass Eye and Ear
Noam Rudnick, MD, PhD*	Medical and Surgical Retina Fellowship at Wilmer Eye Institute at Johns Hopkins University
Laurel Tainsh, MD, MHS	Instructor in Ophthalmology at HMS Member of the Comprehensive Ophthalmology Service at Mass Eye and Ear
Marguerite Weinert, MD	Harvard Ophthalmology Chief Resident for AY2021-2022 and Director of the Mass Eye and Ear Trauma Service
Chief Resident	
Marisa Tieger, MD	Vitreoretinal Fellowship at Mass Eye and Ear
Optometry Residents	
Grace Shin, OD	Instructor of Ophthalmology, HMS Member of the Optometry and Contact Lens Service at Mass Eye and Ear
Hannah Yoon, OD, MS	Specialty Contact Lens Fellowship at the University of Illinois in Chicago, Illinois

** Graduate is a recipient of a Heed Fellowship*

What's Next for Clinical Fellow Graduates?

Our clinical fellows are embarking on new careers across the country from Denver to New York. Six graduates joined the Harvard Ophthalmology faculty, and four others are pursuing additional training.

Clinical Fellow Graduates	
Bardia Abbasi, MD	Instructor in Neurology and Ophthalmology at HMS Member of the Neurology Service at Beth Israel Deaconess Medical Center and Neuro-Ophthalmology Service at Mass Eye and Ear
Inas F. Aboobakar, MD*	Research Fellowship at Mass Eye and Ear/Harvard Ophthalmology
Grayson W. Armstrong, MD, MPH*	Instructor in Ophthalmology at HMS Member of the Comprehensive Ophthalmology Service at Mass Eye and Ear
Brian Ballios, MD, PhD	Assistant Professor of Ophthalmology at the University of Toronto in Toronto, Canada
Faith Birnbaum, MD*	Glaucoma Specialist at Nashua Eye Associates in Nashua, New Hampshire
Daniel Brill, MD	Vitreoretinal Surgery Fellowship at Cincinnati Eye Institute in Cincinnati, Ohio
Kevin Chodnicki, MD	Senior Associate Consultant in Ophthalmology at Mayo Clinic Health System in Rochester, Minnesota
Devon A. Cohen, MD	Neuro-Ophthalmologist at Blue Sky Neurology in Denver, Colorado
Mohammad Dahrouj, MD, PhD	Instructor in Ophthalmology at HMS Member of the Retina Service at Mass Eye and Ear
Michelle M. Falcone, MD*	Assistant Professor at Bascom Palmer Eye Institute at the University of Miami in Palm Beach Gardens, Florida
Alireza Ghaffarieh, MD	Member of the Cornea & Refractive Surgery and Ophthalmic Pathology Services at Harvey and Bernice Jones Eye Institute at the University of Arkansas in Little Rock, Arkansas
Harald Gjerde, MD, FRCSC	Pediatric Ophthalmologist at the University of British Columbia in Vancouver, Canada
Dan Gong, MD*	Instructor in Ophthalmology at HMS Member of the Retina Service at Mass Eye and Ear
Victor Liou, MD	Oculoplastic Surgeon at Woolfson Eye Institute in Atlanta, Georgia
Loulwah O. Mukharesh, MBBS	Assistant Professor of Neuro-Ophthalmology and Neuroimmunology at the University North Carolina in Chapel Hill, North Carolina
Martin Mullen, MD	Attending Physician at Wheaton Eye Clinic in Wheaton, Illinois
Isdin Oke, MD	Instructor in Ophthalmology at HMS Ophthalmology Attending at Boston Children's Hospital
Tatiana Perepelkina, MD	Ophthalmology Resident at Louisiana State University in Shreveport, Louisiana
Abdulrahman Rageh, MB, BCh	Pediatric Ocular Oncology Fellowship at Duke Eye Center in Durham, North Carolina
Eva Raparia, MD	Medical Retinal Specialist at South Shore Eye Care in Massapequa, New York
Elizabeth J. Rossin, MD, PhD	Instructor in Ophthalmology at HMS Member of the Retina Service and K12 Scholar at Mass Eye and Ear
Portia Sirinek, MD	Glaucoma Specialist at Atrius Health in Boston, Massachusetts
Maryam Tahvildari, MD	Assistant Professor, Clinician-Scientist Track at Kresge Eye Institute at Wayne State University in Detroit, Michigan
** Graduate is a recipient of a Heed Fellowship*	

Welcome New Clinical Trainees

PGY-1 HARVARD OPHTHALMOLOGY RESIDENTS

July 2021, the Harvard Ophthalmology Residency Training Program converted to a four-year program thanks to a partnership with Newton-Wellesley Hospital. Prior to beginning their three-year residency program, trainees will be placed in the Newton-Wellesley Transitional Year Internship Program, which includes nine months of medicine and surgery training and a three-month rotation at Mass Eye and Ear.

- **Amee Azad, MD** – Stanford University School of Medicine
- **Enchi K. Chang, MD** – Harvard Medical School
- **Eileen Feng, MD** – University of Michigan Medical School
- **James Harris, MD** – Harvard Medical School
- **Lindsay Klofas Kozek, MD** – Vanderbilt University School of Medicine
- **Da Meng, MD** – Columbia University College of Physicians and Surgeons
- **Tatiana Rosenblatt, MD** – Stanford University School of Medicine
- **Melissa Yuan, MD** – Weill Cornell Medical College

PGY-2 HARVARD OPHTHALMOLOGY RESIDENTS

- **Rohan Bajaj, MD** – Johns Hopkins University School of Medicine
- **Saghar Bagheri, MD, PhD**– University of Düesseldorf
- **Bertan Cakir, MD**– University of Lübeck
- **Jonathan Lin, MD, PhD** – Washington University School of Medicine
- **Yifan Lu, MD** – Harvard Medical School
- **Scott Shuldiner, MD** – Kaiser Permanente Los Angeles Medical Center
- **Marta Stevanovic, MD** – Emory University School of Medicine
- **Jennifer Tran, MD** – Boston University School of Medicine
- **Yapei (Rosie) Zhang, MD** – Yale School of Medicine

CHIEF OPHTHALMOLOGY RESIDENT (AY 2021-2022)

In July 2021, Marguerite Weinert, MD, stepped into her role of Chief Resident and Director of the Eye Trauma Service at Mass Eye and Ear. She oversees and coordinates trauma coverage at Mass Eye and Ear/Mass General Hospital and Brigham and Women's Hospital. And as Chief Resident and Instructor in Ophthalmology, she is a vital mentor and peer resource for Harvard Ophthalmology's 32 residents.

OPTOMETRIC RESIDENTS IN OCULAR DISEASE AND CORNEA/CONTACT LENS (CLASS OF 2022)

- **Christina Cherny, OD** – State University of New York College of Optometry
- **Isabel H. Deakins, OD** – The University of Houston College of Optometry

CLINICAL FELLOWS

Cornea, External Disease, and Refractive Surgery, Mass Eye and Ear
Acting Program Director: James Chodash, MD, MPH
Associate Program Director: Jia Yin, MD, PhD, MPH
Catherine Liu, MD; Sana Qureshi, MD

Glaucoma, Mass Eye and Ear
Program Director: Lucy Shen, MD
Associate Program Director: Michael Lin, MD
Karen Hong, MD, MPhil; Catherine Marando, MD; Derek Mai, MD; Annie Wu, MD

Inherited Retinal Degenerations, Mass Eye and Ear
Program Director: Rachel Huckfeldt, MD
Sarah Chorfi, MD

Medical Retina, Mass Eye and Ear
Program Director: Deeba Husain, MD
Aaron Fairbanks, MD

Medical Retina, Beetham Eye Institute at Joslin Diabetes Center
Program Director: Lloyd Paul Aiello, MD, PhD
Ward Fickweiler, MD

Neuro-Ophthalmology, Mass Eye and Ear
Program Director: Dean Cestari, MD
Jeffrey Gluckstein, MD; Kiandokht Keyhanian, MD; Mary Tien Labowsky, MD

Ocular Immunology and Uveitis, Mass Eye and Ear
Program Directors: George Papaliodis, MD, and Lucia Sobrin, MD, MPH
Eileen Chang, MD

Ophthalmic Genetics, Boston Children's Hospital/ Mass Eye and Ear
Program Director: Anne Fulton, MD
Leyla Yavuz Saricay, MD

Ophthalmic Pathology, Mass Eye and Ear
Program Director: Anna M. Stagner, MD
Cynthia K. Harris, MD

Ophthalmic Plastic and Reconstructive Surgery (ASOPRS), Mass Eye and Ear
Program Director: Michael Yoon, MD
Jonathan Lu, MD

Pediatric Ophthalmology and Strabismus, Boston Children's Hospital/Mass Eye and Ear
Program Director: Gena Heidary, MD, PhD
Jenny Dohlman, MD; Lauren M. Hennein, MD; Alex K. Young, MD

Vitreoretinal Surgery, Mass Eye and Ear
Program Director: Dean Eliott, MD
Associate Program Director: John B. Miller, MD
Ishrat Ahmed, MD, PhD; Jose Davila, MD; Marisa Tieger, MD

Faculty Updates

LUCIA SOBRIN, MD, MPH, PROMOTED TO PROFESSOR OF OPHTHALMOLOGY

Lucia Sobrin, MD, MPH, has been promoted to Professor of Ophthalmology and named the Charles Edward Whitten Professor of Ophthalmology at Harvard Medical School. This dual honor reflects Dr. Sobrin's high level of expertise and international recognition for her work in uveitis epidemiology, diabetic retinopathy, and autoimmune retinopathy.

The Whitten Professorship was created in 2011 to honor Chair Joan W. Miller, MD, and her role in developing the first two treatments for neovascular age-related macular degeneration. The professorship is named initially after Dr. Miller's father. When she retires, it will become the Joan Whitten Miller Professorship of Ophthalmology. Evangelos S. Gragoudas, MD, served as the inaugural Whitten Professor of Ophthalmology for the past 10 years and has now transitioned to the Charles Edward Whitten Distinguished Professor of Ophthalmology.

Dr. Sobrin is a retina and uveitis specialist at Mass Eye and Ear who has developed a unique subspecialty interest caring for complex posterior uveitis and autoimmune retinopathy requiring systemic immunosuppression. Chair of the Genetics Committee for the DRCR.net, she has overseen several international consortia that have led to the discovery of multiple genetic variants linked to diabetic retinopathy. In the field of diabetic retinopathy genetics, she has led candidate gene, admixture mapping, and genome-wide association studies involving cohorts from across the world and identified genetic loci that impact the risk of developing retinopathy.

Dr. Sobrin is also Associate Chief of Clinical Data Science at Mass Eye and Ear. With extensive experience analyzing and managing large datasets for epidemiologic and genetic studies of uveitis and other retinal diseases, Dr. Sobrin is a key member of the research leadership team. She has also represented Mass Eye and Ear on the Research Patient Data Registry for its electronic medical records and Partners eCare and is a

site-principal Investigator for the Mass General Brigham Biobank at Mass Eye and Ear. She has been at the forefront of the autoimmune retinopathy field leading the innovations in how anti-retinal antibodies are detected, interpreted, and used in the management of patients as well as reporting on treatment for these patients in case series of this rare disease.

Dr. Sobrin has been recognized with several awards and honors including the Alcon Research Institute Young Investigator Award in 2015 for her work in diabetic retinopathy genetics, the ARVO/Alcon Early Career Clinician Scientist Research Award, the Tonseth-Joslin Fellowship, and the Secretariat Award from the American Academy of Ophthalmology.

She is also an exemplary mentor for faculty and trainees and was unanimously selected as the inaugural recipient of the Harvard Ophthalmology Excellence in Mentoring Award in 2019, in recognition of her inspiring mentorship of junior faculty.

DEMETRIOS VAVVAS PROMOTED TO PROFESSOR OF OPHTHALMOLOGY

An internationally recognized expert in age-related macular degeneration (AMD) and renowned vitreoretinal surgeon, Demetrios Vavvas, MD, PhD, was promoted to Professor of Ophthalmology and named the Solman and Libe Friedman Professor of Ophthalmology at Harvard Medical School.

This professorship was created in 2011 to honor the parents of Ephraim Friedman, MD, a former retina specialist and researcher in AMD and former president of Mass Eye and Ear who, together with his sisters, established a foundation to honor their parents' legacy.

Dr. Vavvas is Associate Director of the Mass Eye and Ear Retina Service, where he provides consultation and treatment for complex vitreoretinal diseases, including diabetic retinopathy, retinal detachment, and AMD. Notably, he was the first to describe the use of trans-conjunctival minimal invasive vitrectomy for the management of complicated cataract surgery and eye trauma, which is now the standard of care for these conditions.

An accomplished researcher and scholar, Dr. Vavvas' served as the first incumbent of the Monte J. Wallace Ophthalmology Chair in Retina at Mass Eye and Ear from 2016 to 2021. His research focuses on identifying the potential mechanisms of AMD, with particular focus on the modalities of neuronal cell death and neuroprotection, as well as the role of AMPK and LAMP2 in eye pathophysiology. His clinical research using high-dose statins to reverse certain hazardous AMD characteristics in a high-risk non-neovascular cohort was the first to suggest that AMD pathology could be reversed with potential functional benefits to the patient.

Dr. Vavvas has received many awards and honors, including the AAO Secretariat award in 2020, the Research to Prevent Blindness Stein Innovation award, and the ARI Young Investigator award.

Generous with his time and skills, he mentors and teaches numerous clinical and research fellows. Ten of his past trainees now have faculty positions as Assistant, Associate or Full Professors at top academic medical institutions around the world.

HMS APPOINTMENTS/PROMOTIONS MAY 2020-DECEMBER 2021

To Professor of Ophthalmology:
- Lucia Sobrin, MD, MPH, Mass Eye and Ear
- Demetrios Vavvas, MD, PhD, Mass Eye and Ear

To Associate Professor of Ophthalmology:
- Michael Boland, MD, PhD, Mass Eye and Ear
- Nahyoung Grace Lee, MD, Mass Eye and Ear
- Lucy Shen, MD, Mass Eye and Ear

To Assistant Professor of Ophthalmology:
- Thomas H. Dohlman, MD, Mass Eye and Ear
- Michael Lin, MD, Mass Eye and Ear
- Zhonghui Katie Luo, MD, PhD, Mass Eye and Ear
- Eric Moulton, OD, PhD, Boston Children's Hospital
- Hajirah N. Saeed, MD, Mass Eye and Ear
- David Solá-Del Valle, MD, Mass Eye and Ear
- Mengyu Wang, PhD, Mass Eye and Ear
- Nazlee Zebardast, MD, Mass Eye and Ear

To Instructor in Ophthalmology:
- Bardia Abbasi, MD, Mass Eye and Ear
- Mohammad Dahrouj, MD, PhD, Mass Eye and Ear
- Mohamed Elmasry, MBBCh, PhD, Beetham Eye Institute at Joslin Diabetes Center
- Dan Gong, MD, Mass Eye and Ear
- Clifford, Kim, MD, Mass Eye and Ear
- Austin Meeker, MD, Mass Eye and Ear
- Isdin Oke, MD, Boston Children's Hospital
- Alisa Prager, MD, MPH, Beetham Eye Institute at Joslin Diabetes Center
- Joseph Raevis, MD, Beth Israel Deaconess Medical Center
- Elizabeth Rossin, MD, PhD, Mass Eye and Ear
- Grace Shin, OD, Mass Eye and Ear
- Laurel Tainsh, MD, MHS, Mass Eye and Ear
- Marguerite Weinert, MD, Mass Eye and Ear

LEADERSHIP APPOINTMENTS MAY 2020-JUNE 2021

HARVARD MEDICAL SCHOOL

Grayson Armstrong, MD, MPH, Director of Ophthalmic Education in Core Medicine, Harvard Medical School

LEADERSHIP APPOINTMENTS/TRANSITIONS CONTINUED

BOSTON CHILDREN'S HOSPITAL

Eric Gaier, MD, Site Director of the Harvard Ophthalmology Residency Program, Boston Children's Hospital

Gena Heidary, MD, PhD, Director of Ophthalmology Fellowship Training, Boston Children's Hospital/Mass Eye and Ear

MASS EYE AND EAR

Grayson Armstrong, MD, MPH, Medical Director of Ophthalmology Emergency Service

Michael Gilmore, PhD, Chief Scientific Officer, Mass Eye and Ear

Michael Lin, MD, Associate Director of the Glaucoma Fellowship, Mass Eye and Ear

Anna M. Stagner, MD, Frederick A. Jakobiec Director of the David Glendenning Cogan Laboratory of Ophthalmic Pathology at Mass Eye and Ear

Jia Yin, MD, PhD, Associate Director of the Cornea Fellowship, Mass Eye and Ear

NATIONAL

Joan Miller, MD, named President-elect in 2021 and President in April 2022 of the Association of University Professors of Ophthalmology

Eric Pierce, MD, PhD, Chairperson of the Pathophysiology of Eye Disease – 1 Study Section at the Center for Scientific Review, National Institutes of Health

REGIONAL

New Members of the New England Ophthalmological Society

Thomas Dohlman, MD, Mass Eye and Ear

Nimesh Patel, MD, Mass Eye and Ear

Aisha Traish, MD, Mass Eye and Ear

Anna Stagner, MD, Mass Eye and Ear

Nandini Venkateswaran, MD, Mass Eye and Ear

Daniel Vu, MD, Mass Eye and Ear

Natalie Wolkow, MD, PhD, Mass Eye and Ear

Grayson Armstrong, MD, MPH, elected Vice President, Massachusetts Society of Eye Physicians and Surgeons, and Vice President, Middlesex District Medical Society

DEPARTURES MAY 2020-JUNE 2021

Kip Connor, PhD, a faculty member and researcher at Mass Eye and Ear, left the department to become Head of Ophthalmology at Biogen.

Gabriel Fickett, OD, a faculty member and member of the Optometry and Contact Lens Service at Mass Eye and Ear, relocated with his family to the Philadelphia area to be closer to extended family, where he joined the faculty at the Pennsylvania College of Optometry.

Shannon M. Bligdon, OD, a faculty member and member of the Optometry and Contact Lens Service at Mass Eye and Ear, relocated to her native Canada.

RETIREMENT MAY 2020-JUNE 2021

Francois C. Delori, PhD, Professor of Ophthalmology at Harvard Medical School and a Senior Scientist at Schepens Eye Research Institute of Mass Eye and Ear, retired on January 1, 2021.

Dr. Delori was born in Ghent, Belgium, the birthplace of Dr. Charles Schepens. In 1963, he traveled to Boston to work with Dr. Schepens at the Retina Foundation—now the Schepens Eye Research Institute—as a research fellow. After earning his MS and PhD in physics in 1971 from the Imperial College of Science and Technology in London, he returned to the Retina Foundation, where he has worked for nearly 50 years conducting research related to retinal disease. Dr. Delori has spent his career investigating the interaction of light with ocular tissues, beginning with the development of filters used in retinal cameras for imaging and retinal angiography.

He pioneered the study of autofluorescence, and although it took several decades for the vision community to recognize the importance of this feature, it is now an integral part of every retina evaluation. Dr. Delori is now recognized as an innovative leader in retinal imaging—he is a "rock star" in our field. Dr. Delori's contributions to ophthalmology have garnered many awards, including the Award of Merit in Retina Research from the Retina Research Foundation, the Roger H. Johnson Prize for Macular Degeneration Research, the Harvard Ophthalmology Distinguished Research Achievement Award, and the Alcon Research Institute Award.

In 2017, Dr. Delori and his wife Rosamond Castle Putnam established the Iraty Award for Research in Retinal Diseases as anonymous donors. This annual award, which includes a $100,000 prize, honors the life and work of Dr. Charles Schepens and is awarded to a Mass Eye and Ear faculty member who conducts research in retinal disease. Dr. Delori and Rosamond—recently unveiled as the generous donors for this award—are helping to advance the field of retina by supporting cutting-edge research.

Ilene K. Gipson, PhD, Professor of Ophthalmology at Harvard Medical School and a Senior Scientist at Schepens Eye Research Institute of Mass Eye and Ear, retired on February 1, 2021, after more than 40 years with the department.

During her prolific career as a leading researcher in ocular surface biology, she published more than 100 original papers and trained several outstanding scientists in the field.

Dr. Gipson received numerous awards for her research and mentorship efforts, including the prestigious Friedenwald Award from the Associate for Research in Vision and Ophthalmology and the Research to Prevent Blindness Senior Scientific Investigator Award. She also received an honorary Doctor of Science degree from Drury University.

Dr. Gipson was also the founder of the Women's Eye Health Task Force, an interinstitutional body that works to educate the public and healthcare professionals on the disproportionate number of women who have blinding diseases.

John I. Loewenstein, MD, Associate Professor of Ophthalmology at Harvard Medical School and Associate Clinical Chief of Ophthalmology at Mass Eye and Ear, retired in December 2020. A dedicated teacher throughout his career, he helped develop teaching tools to improve surgical competency in ophthalmology. Dr. Loewenstein was a key member of the department leadership for nearly two decades.

Fellowship-trained in retina, Dr. Loewenstein joined the faculty part-time in 1986.He quickly became a vital part of the training program for medical students, residents, and clinical fellows, and in 1994 he became full-time faculty. From 2002 to 2013, he served as Program Director of our Ophthalmology Residency Program, and in 2008, he was named Vice Chair for Medical Education at Harvard Ophthalmology and Associate Chief of Education at Mass Eye and Ear. During his tenure, Dr. Loewenstein has led numerous educational innovations that have improved the continuity of the residency experience and maximized clinical and surgical teaching.

Dr. Loewenstein has received numerous teaching awards, including the 1996, 2001, and 2015 Harvard Ophthalmology Teacher of the Year awards; and the 2019 Simmons Lessell Excellence in Education Award. In 2020, he was honored with the American Academy of Ophthalmology Unsung Hero Award.

David Sullivan, MS, PhD, Associate Professor of Ophthalmology at Harvard Medical School and researcher at Schepens Eye Research Institute at Mass Eye and Ear retired after 38 years with the department. His research focused on the regulation of the ocular surface and adnexa; the interrelationships among sex, sex steroids, and dry eye disease; and the role of lubricin on the ocular surface. His efforts led to the development of potential therapies for aqueous-deficient and evaporative dry eye disease.

Dr. Sullivan has received numerous awards for his contributions, including the Carel C. Koch Memorial Medal Award from the American Academy of Optometry and the Donald R. Korb Award for Excellence—the highest award for excellence from the American Optometric Association.

Awards and Grants

FACULTY AWARDS/HONORS MAY 2020-JUNE 2021

Inducted into the National Academy of Medicine in 2020
Anthony Adamis, MD, Mass Eye and Ear
Elizabeth Engle, MD, Boston Children's Hospital

2020 American Academy of Ophthalmology Outstanding Humanitarian Service Award
John H. Kempen, MD, MPH, PhD, MHS, Mass Eye and Ear

2020 American Academy of Ophthalmology Unsung Hero Award
John I. Loewenstein, MD, Mass Eye and Ear

2020 Anne Kilbanski Visiting Scholars Award
Alice Lorch, MD, MPH, Mass Eye and Ear

2020 Women in Ophthalmology Mentoring Award
Lucia Sobrin, MD, MPH, Mass Eye and Ear

2021 Association for Research in Vision and Ophthalmology Friedenwald Award
Lloyd Paul Aiello, MD, PhD, Beetham Eye Institute at Joslin Diabetes Center

2021 Harvard Ophthalmology Lifetime Achievement in Mentoring Award
Darlene Dartt, PhD, Schepens Eye Research Institute of Mass Eye and Ear

2021 McGovern Award Nomination
Marlene Durand, MD, Mass General Hospital
Mathew Gardiner, MD, Mass Eye and Ear

2021 Harvard Ophthalmology Excellence in Mentoring Award
Matthew Gardiner, MD, Mass Eye and Ear

2021 Iraty Award for Research in Retinal Diseases
Rachel Huckfeldt, MD, PhD, Mass Eye and Ear

2021 Anne Kilbanski Visiting Scholars Award
Grace Lee, MD, Mass Eye and Ear

2021 Association for Research in Vision and Ophthalmology Bert M. Glaser, MD Award
Yohei Tomita, MD, PhD, Boston Children's Hospital

2021 Macula Society 's Young Investigator Award
Jennifer K. Sun, MD, MPH, Beetham Eye Institute at Joslin Diabetes Center

2022 Association for Research in Vision and Ophthalmology Weisenfeld Award
Janey Wiggs, MD, PhD, Mass Eye and Ear

Boston magazine's Top Doctors 2021:

Beth Israel Deaconess Medical Center
Mark C. Kuperwaser, MD

Boston Children's Hospital
Linda R. Dagi, MD
David G. Hunter, MD, PhD
Melanie A. Kazlas, MD

Mass Eye and Ear
Reza Dana, MD, MSc, MPH
Dean Eliott, MD
David S. Friedman, MD, PhD, MPH
Jan A. Kylstra, MD
Brendan E. McCarthy, MD
Joan W. Miller, MD
Shizuo Mukai, MD
Roberto Pineda II, MD
Joseph F. Rizzo III, MD
Lucia Sobrin, MD MPH
David M. Wu, MD
Michael K. Yoon, MD
Lucy H. Young, MD, PhD

Part-Time Faculty
Jeffrey S. Heier, MD
Ernest W. Kornmehl, MD
Michael G. Morley, MD
Peter A. Rapoza, MD
Claudia U. Richter, MD
Bradford J. Shingleton, MD
Torsten W. Wiegand, MD

TRAINEE AWARDS JUNE 2020-MAY 2021

2021 Cora Verhagen Award from J. Wayne Streilein Foundation, Best Paper in Immunology (presented at the ARVO Annual Meeting)
Rohan Singh, MD, Research Fellow, Mass Eye and Ear

2021 Best Resident Research Award in Cornea and Refractive Surgery
Sila Bal, MD, MPH, PGY-4 Ophthalmology Resident

Japanese Ophthalmological Society's Young Investigator Award
Yohei Tomita, MD, PhD, Research Fellow, Boston Children's Hospital

GRAGOUDAS-FOLKMAN PRIZE (HARVARD OPHTHALMOLOGY)

$20,000 over one year **Nakul Singh, MD, MS, PGY-4 Ophthalmology Residen**t "Characterizing the biomechanics of how ERMs and test the effect of netarsudil on inhibiting contraction"

TRAINEES RECEIVE HEED FELLOWSHIPS

Seven out of 22 Heed Fellowships for AY2021-22 were awarded to current and recently graduated Harvard Ophthalmology trainees. This postgraduate fellowship is one of the most prestigious honors for ophthalmology trainees who are pursuing academic careers in ophthalmic patient care, education, and research.

Congratulations to:

- **Ishrat Ahmed, MD, PhD,** Vitreoretinal Fellow, Mass Eye and Ear
- **Jenny Dohlman, MD,** Pediatric Ophthalmology and Strabismus Fellow, Boston Children's Hospital/Mass Eye and Ear
- **Lauren M. Hennein, MD,** Pediatric Ophthalmology and Strabismus Fellow, Boston Children's Hospital / Mass Eye and Ear
- **Levi Kanu, MD,** Cornea and Refractive Surgery Fellow, Mass Eye and Ear
- **Noam Rudnick, MD, PhD,** Medical and Surgical Retina Fellow, Wilmer Eye Institute
- **Annie M. Wu, MD,** Glaucoma Fellow, Mass Eye and Ear

GRANTS (JUNE 2020-MAY 2021)

ALCON RESEARCH INSTITUTE

$75,000
Young Investigator Grant Award
Eric Gaier, MD, Boston Children's Hospital
"Leveraging Pre- and Post-synaptic Timing to Reverse Amblyopia"

$75,000 over one year
Young Investigator Grant
Mengyu Wang, MD, Mass Eye and Ear
"Statistical pattern-based progression detection in glaucoma"

AMERICAN ACADEMY OF OPTOMETRY

$200,000 over 2 years
Career Development Award
Aparna Raghuram OD, PhD, Boston Children's Hospital
"Objective assessment of vergence, accommodation, and higher-order visual processing in adolescents"

BOSTON CHILDREN'S HOSPITAL INTERNAL AWARDS

$150,000 over one year
Lois Smith, MD, PhD, Boston Children's Hospital
"Metabolic mapping of optic nerve head for early disease detection"

$50,000 over one year
Zhongjie Fu, PhD, Boston Children's Hospital
"Müller glial cell L-serine metabolism controls pathological retinal angiogenesis"

$50,000 over one year
Mary C. Whitman, MD, Boston Children's Hospital
"Creation of a genetic duplication associated with strabismus in iPSCs"

BRIGHTFOCUS FOUNDATION

$984,013 over three years
Magali Saint-Geniez, PhD, Schepens Eye Research Institute of Mass Eye and Ear
"Targeting metabolic reprogramming for the prevention and treatment of proliferative vitreoretinopathy"

EDWARD N. & DELLA L. THOME MEMORIAL FOUNDATION

$562,000 over two years
David Wu, MD, PhD, Mass Eye and Ear
"Interplay between the retina, RPE, and the development of early macular degeneration"

THE GLAUCOMA FOUNDATION

$60,000 over one year
Kin-Sang (Anson) Cho, PhD, Schepens Eye Research Institute of Mass Eye and Ear
"Role of IGFBPL1 on retinal ganglion cell survival in an IOP-independent injury model"

GOOD VENTURES

$4,000,000 over five years
Joseph F. Arboleda-Velasquez, MD, PhD, Schepens Eye Research Institute of Mass Eye and Ear
"Examine the function of a protective genetic variant described in a woman with high familial risk for early-onset Alzheimer's disease, but who has not yet developed the condition."
"Discover new genes and biological markers potentially associated with resistance to Alzheimer's in the world's largest population of familial Alzheimer's in Colombia"

KNIGHTS TEMPLAR EYE FOUNDATION, INC.

$70,000 over one year
Caitlin Collin, PhD, Mass Eye and Ear
"Development of base editing and prime editing approaches for ABCA4 associated Stargardt disease."

$70,000
Zhengping (Ping) Hu, MD, PhD, Schepens Eye Research Institute of Mass Eye and Ear
"Endomucin as a potential therapeutic target in the regulation of vascular endothelial growth factor (VEGF)-induced neovascularization"

MASSACHUSETTS COMMISSION FOR THE BLIND

$50,000
Anne Fulton, MD, Boston Children's Hospital
"Implications of increased incidence that cortical vision impairments could have on VR outcomes"

MASS GENERAL BRIGHAM UNITED AGAINST RACISM; MASS GENERAL EXECUTIVE COMMITTEE ON COMMUNITY HEALTH; DIGITAL FEDERAL CREDIT UNION; AND THE ALCON FOUNDATION

$430,000
Alice Lorch, MD, Mass Eye and Ear
"Providing comprehensive ophthalmic care in resource poor communities"

MASS GENERAL HOSPITAL CLAFLIN DISTINGUISHED SCHOLAR AWARD

$50,000
Jia Yin, MD, PhD, MPH, Mass Eye and Ear
"Research on the neuro-regulation of corneal angiogenesis"

NATIONAL EYE INSTITUTE

$729,401 over four years
Joseph F. Arboleda-Velasquez, MD, PhD, Schepens Eye Research Institute of Mass Eye and Ear
"Humanization of a Notch 3 agonist antibody for pre-clinical development of a CADASIL treatment"

$295,027 over four years
Pablo Argüeso, PhD, Schepens Eye Research Institute of Mass Eye and Ear
"Regulation of the immune cell glycome in corneal injury"

$441,318 over five years
Corinna M. Bauer, PhD, Schepens Eye Research Institute of Mass Eye and Ear
"Thalamo-cortical circuitry in periventricular leukomalacia"

$295,500 over two years
Yihe Chen, MD, Mass Eye and Ear
"Pathogenicity of memory Th17 cells in chronic autoimmune uveitis"

$295,500 over two years
Reza Dana, MD, MSc, MPH, Mass Eye and Ear
"Therapeutic function of alpha-melanocyte stimulating hormone (a-MSH) in acute injury and chronic degeneration of corneal endothelium"

$1,250,000 over five years
Zhongjie (Kira) Fu, PhD, Boston Children's Hospital
"Serine control of retinal neovascularization in retinopathy"

$443,250 over four years
Jae-Hyun Jung, PhD, Schepens Eye Research Institute of Mass Eye and Ear
"Monocular visual confusion for field expansion"

$295,500 over three years
Gang Luo, PhD, Schepens Eye Research Institute of Mass Eye and Ear
"Gaze scanning by walking people with visual field loss"

$275,008 over five years
Lotfi Merabet, OD, PhD, MPH, Mass Eye and Ear
"Neurophysiological correlates of visual motion processing in cerebral visual impairment"

$638,301 over four years
Eric Pierce, MD, PhD, Mass Eye and Ear
"The pathogenesis of RNA splicing factor associated retinal degeneration"

Harvard Vision Clinician Scientist Development Program (K12)
Elizabeth Rossin, MD, PhD, Mass Eye and Ear
$102,744 over two years

Sina Sharifi, PhD, Schepens Eye Research Institute of Mass Eye and Ear
"Generation of suturable artificial cornea from the integration of exfoliated graphene with gelatin glycidyl methacrylate"

$247,154 over three years
Mengyu Wang, PhD, Schepens Eye Research Institute of Mass Eye and Ear
"Relationship between glaucoma and the three-dimensional optic nerve head related structure"

$3.6 million over five years
Janey Wiggs, MD, PhD, Mass Eye and Ear
"The genetics of childhood glaucoma"
National Science Foundation

$85,400
Tobias Elze, PhD, Schepens Eye Research Institute of Mass Eye and Ear
"A pair of linked cartograph maps of our brain derived from clinical glaucoma data"

THERMO FISHER CANCER RESEARCH FOUNDATION

$78,000
Daisy Shu, PhD, Schepens Eye Research Institute of Mass Eye and Ear
"Changes in mitochondria and metabolism during retinal eye diseases, such as age-related macular degeneration"

RESEARCH TO PREVENT BLINDNESS

$75,000
International Research Collaborators Award
Kinga Bujakowska, PhD, Mass Eye and Ear
"Improving genetic diagnoses for inherited retinal degenerations and identifying modifiers of disease severity"

$300,000 over two years
Physician-Scientist Award
Lucia Sobrin, MD, MPH, Mass Eye and Ear
"Identifying genes that influence the risk of developing ocular hypertension after corticosteroid use"

New Faculty

SUMMER 2020

Grayson Armstrong, MD, MPH, joined the Mass Eye and Ear Comprehensive Ophthalmology and Cataracts Service as a full-time faculty member in July 2020 and was promoted to Medical Director of Ophthalmology Emergency Service in 2021. Dr. Armstrong attended medical school at The Warren Alpert Medical School of Brown University before completing his residency training at Harvard Ophthalmology, where he served as Chief Ophthalmology Resident for AY 2019-20. He then completed a Tele-ophthalmology Fellowship at Mass Eye and Ear.

Ryan A. Gise, MD, joined the Boston Children's Hospital Neuro-Ophthalmology Service in July 2020. He earned his medical degree from Boston University School of Medicine and then completed his residency training at the Montefiore Medical Center/Albert Einstein College of Medicine. Dr. Gise has completed two fellowships, one in Neuro-Ophthalmology at Mass Eye and Ear, and a second one in Pediatric Ophthalmology and Adult Strabismus at Boston Children's Hospital.

Haley Italia, OD, joined the Mass Eye and Ear Optometry Service in August 2020, after completing her Optometry Residency training at Harvard Ophthalmology. Dr. Italia earned her OD from the New England College of Optometry.

FALL/WINTER 2020

Michael V. Boland, MD, PhD, joined the Mass Eye and Ear in October 2020 as a member of the Glaucoma Service and Medical Director of Practice Innovation for Ophthalmology. In addition to his clinical practice, Dr. Boland provides expert guidance on needed innovations that will improve patient care and increase practice efficiency and safety across the department. Dr. Boland joined us from the Wilmer Eye Institute and Johns Hopkins University.

Michelle J. Sandler, OD, joined the Optometry and Contact Lens Service at Mass Eye and Ear in October 2020. Dr. Sandler earned her Doctorate of Optometry from MCPHS University and completed her residency training in Cornea and Contact Lenses at the New England College of Optometry. She joined us from Ophthalmic Consultants of Boston.

David Wu, MD, PhD, returned to Mass Eye and Ear in December. He first joined the Retina Service faculty in 2012 as a clinician scientist with research focused on the molecular mechanisms of retinal degeneration. Dr. Wu relocated last year to Johns Hopkins Wilmer Eye Institute for family reasons, and now, those same reasons brought him back to Mass Eye and Ear.

SPRING 2021

Mohamed Elmasry, MBChB, PhD, joined the faculty at Beetham Eye Institute at Joslin Diabetes Center in April 2021. Dr. Elmasry earned his MBChB from Alexandria University in Egypt and then went to London to complete his Fellowship of the Royal College of Ophthalmologists. He spent the next four years as a Clinical Fellow between Alexandria Faculty of Medicine in Egypt and Joslin Diabetes Center where he was under the supervision of Lloyd P. Aiello, MD, PhD. He earned his PhD from Alexandria University in 2020 based on his work in the collaboration between the Beetham Eye Institute at Joslin Diabetes Center and Alexandria University.

SUMMER 2021

Bardia Abbasi, MD, joined our faculty in July. He holds a primary appointment in Neurology at Beth Israel Deaconess Medical Center and sees patients one day a week at Mass Eye and Ear's Neuro-Ophthalmology Service. Dr. Abbasi earned his medical degree from Boston University School of Medicine and completed a neurology residency at Beth Israel Deaconess Medical Center. He then completed a Neuro-Ophthalmology Fellowship at Mass Eye and Ear.

Marc Bouffard, MD, joined our faculty part-time at Mass Eye and Ear's Neuro-Ophthalmology Service in July. He holds a primary appointment in Neurology at Beth Israel Deaconess Medical Center. Dr. Bouffard earned his medical degree from Tufts University School of Medicine and completed a neurology residency at Beth Israel Deaconess Medical Center. He then completed a fellowship in neurology at Mass General, followed by a fellowship in neuro-ophthalmology at Mass Eye and Ear.

Clifford Kim, MD, joined Mass Eye and Ear as a part-time Hospitalist in August, while also working at a healthcare innovation startup. He earned his medical degree from Harvard Medical School and completed his residency training here at Harvard Ophthalmology.

Joseph Raevis, MD, joined the Retina Service at Beth Israel Deaconess Medical Center in July. He earned his medical degree from Georgetown University School of Medicine. Dr. Raevis then completed his ophthalmology

residency at the State University of New York Downstate and recently graduated from a two-year Vitreoretinal Fellowship at University of Wisconsin, Madison.

Marguerite (Margot) Weinert, MD, joined the faculty for AY 2021-22 as Chief Resident and Director of the Mass Eye and Ear Trauma Service in July. Dr. Weinert earned her MD at Duke University School of Medicine, where she was inducted into the Alpha Omega Alpha Honor Society, and then came to Harvard Ophthalmology for her residency training.

FALL 2021

Mohammad Dahrouj, MD, PhD, joined the Mass Eye and Ear Retina Service in September. He earned his MD and PhD at American University of Beirut and the Medical University of South Carolina and then completed his residency training here at Harvard Ophthalmology. Dr. Dahrouj completed a two-year Vitreoretinal Fellowship at Mass Eye and Ear last spring.

Dan Gong, MD, joined the Mass Eye and Ear Retina Service in September. He earned his MD from Yale School of Medicine, followed by residency at Columbia University, where he served as Chief Resident. Dr. Gong then joined Mass Eye and Ear where he completed a two-year Vitreoretinal Fellowship.

Austin Meeker, MD, joined the Comprehensive Ophthalmology and Cornea Services at Mass Eye and Ear in September. He earned his MD at the State University of New York Upstate College of Medicine and completed his residency training at Wills Eye Hospital at Thomas Jefferson University where he also served as Chief Resident. Dr. Meeker completed a Cornea and External Disease Fellowship at Duke University School of Medicine last spring.

Isdin Oke, MD, joined Boston Children's Hospital as an attending in September. He earned his medical degree at Harvard Medical School and completed his residency training at Boston Medical Center. Dr. Oke completed a Pediatric Ophthalmology and Strabismus Fellowship at Boston Children's Hospital in June.

Alisa Prager, MD, MPH, joined the Glaucoma Service at Beth Israel Deaconess Medical Center this fall. She earned a dual MD/MPH at Columbia University College of Physicians and Surgeons. Dr. Prager then completed her ophthalmology residency training at Northwestern University, and stayed on at Northwestern to complete a Glaucoma Fellowship.

Elizabeth Rossin, MD, PhD, joined the Retina Service in the fall as a K12 scholar. She earned her MD and PhD from the Harvard-MIT Health Sciences and Technology Program and completed her residency training here at Harvard Ophthalmology, where she also served as Chief Resident. Dr. Rosson completed a two-year Vitreoretinal Fellowship at Mass Eye and Ear in June.

Grace Shin, OD, joined the Mass Eye and Ear Optometry and Contact Lens Service in September. She earned her optometry degree from the Michigan College of Optometry. Dr. Shin recently completed an optometry residency training program at Mass Eye and Ear in June.

Laurel Tainsh, MD, MHS, joined the Comprehensive Ophthalmology Service at Mass Eye and Ear in September. She earned her medical degree from Yale University School of Medicine and graduated from the Harvard Ophthalmology Residency Training Program in June.

Jae-Hyun Jung, PhD, joined Schepens Eye Research Institute of Mass Eye and Ear as an investigator. He earned his PhD from the School of Electrical Engineering at Seoul National University. His research focuses on vision rehabilitation and vision aids.

Alumni Corner

ALUMNI LEADERSHIP APPOINTMENTS

Appointed Chair of the Department of Ophthalmology at NYU Langone Health
Kathryn Colby, MD, PhD

Appointed President of the University of California
Michael V. Drake, MD

AWARDS AND HONORS

Inducted into the National Academy of Medicine in 2020
Julia A. Haller, MD

ALUMNI UPDATES

Promoted to Associate Professor at the University of Michigan Medical School
Rajesh Rao, MD

In Memoriam

Frederick A. Jakobiec, MD, DSc, passed away peacefully at the age of 78 on November 14, 2020. An international leader in eye pathology and the former Chair of Harvard Ophthalmology and Chief of Mass Eye and Ear Department of Ophthalmology, Dr. Jakobiec made many seminal contributions to the field, as well as our department.

Dr. Jakobiec's leadership and foresight was a catalyst for growth and reinvigoration within our department. His extraordinary commitment to our institution most recently culminated in an incredibly generous $5.5 million gift—by far the largest from a faculty member or alumnus in Mass Eye and Ear history—creating a lasting legacy that will be felt for generations.

Dr. Jakobiec spent the first 20 years of his career in New York City, where he became a leader in patient care, teaching, and research. From 1983 to 1989, he served as Chief of Ophthalmology and Director of Pathology at the Manhattan Eye, Ear & Throat Hospital and was Professor of Ophthalmology and Pathology at Cornell Medical College/New York Hospital.

In 1989, Dr. Jakobiec was recruited to Boston to be Chief of Ophthalmology at Mass Eye and Ear and Chair of Harvard Ophthalmology, a position which he held until July 2002. During that time, he grew the faculty, with a particular focus on increasing the number of women. He was also instrumental in bringing the Schepens Eye Research Institute into the Harvard family as an affiliate.

In 2007, Dr. Jakobiec rejoined the department as Director of the David G. Cogan Laboratory of Ophthalmic Pathology, where he resumed his prolific publication efforts and teaching of residents, fellows, and faculty.

Over the course of his illustrious 52-year career, Dr. Jakobiec published more than 500 peer-reviewed scientific articles and 60 book chapters and edited more than 20 volumes devoted to eye tumors and eye pathology.

A dedicated and gifted mentor, Dr. Jakobiec believed that teaching the next generation of ophthalmologists is essential— to both advance the field and to build upon our department's legacy for excellence. He recognized that even the most experienced clinicians can gain valuable insight from trainees. These beliefs are at the very foundation of our academic mission.

In 2019, Dr. Jakobiec made the incredibly generous decision to include Mass Eye and Ear in his will, with a gift of $4.5 million. The gift will support the following named endowments:

- Frederick and Thaddeus Jakobiec Chair in Ophthalmology
- Frederick A. Jakobiec Directorship of the David Glendenning Cogan Laboratory of Ophthalmic Pathology
- Frederick A. Jakobiec Visiting Professorship, Lectureship, and Medalist in Ophthalmic Diseases
- Frederick A. Jakobiec, MD, DSc, Resident and Fellow Education and Research Endowment

A lifelong learner and devoted educator, Dr. Jakobiec made an additional bequest of $1 million to support library renovations and an endowment to provide a significantly improved academic setting for the Mass Eye and Ear community to read, research, contemplate, and collaborate. This newly designed physical library space will be known as the Frederick A. Jakobiec, MD, DSc, Education and Information Center and will house the Lucien Howe Library of Ophthalmology, the LeRoy A. Schall Library of Otolaryngology, and the Abraham Pollen Archives.

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EDITOR-IN-CHIEF
Joan W. Miller, MD

PUBLICATIONS MANAGER
Jessica O'Donnell

CONTRIBUTORS
Jen Aspesi
Lily D'Anieri
Elizabeth DiVito
Melanie Frank
Christina Marko, PhD

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