WELCOME TO MEDICAL EDUCATION

"This is a program where learning is valued and the educational experience is tangible. You will learn a vocation, but it differs from many other schools in that HMS is a very academic environment. This is a place where a trainee can approach a faculty member and count on getting help. People coming from other institutions are simply struck by the emphasis we place on medical education."

— Simmons Lessell, MD, Director of Ophthalmic Medical Student Education, Harvard Medical School

Innovate. Train. Mentor. Inspire.

Medical education is integral to the HMS Department of Ophthalmology's mission, and trainees receive the finest ophthalmic education in the world. The department supports full-time faculty in every ophthalmic subspecialty, giving residents a comprehensive grounding in ocular disease and management. Moreover, fellows have the opportunity to gain further clinical expertise or pursue in-depth research in one or more of nine subspecialty areas. Under the exceptional leadership of John I. Loewenstein, MD, HMS Ophthalmology Vice Chair for Medical Education and Director of the HMS Department of Ophthalmology Residency Training Program, recent program innovations have continued to strengthen the department's continuum of medical education. These distinctions culminate in a superb educational experience that offers remarkable depth and breadth to the department's cadre of medical students, residents, and fellows.

The department's greatest asset is its dedicated community of educators. Through their wealth of collective experience, HMS faculty strive to create a supportive and stimulating learning environment at every opportunity: as teachers in the classroom, clinic or lab, and as mentors to students and trainees in their day-to-day interactions. Through close teamwork—and by serving as roles models of effective leadership—their goal is to graduate well-rounded academicians and outstanding clinician scientists who become tomorrow's leaders in ophthalmic medicine, science and education.

SETTING STANDARDS FOR MEDICAL STUDENT EDUCATION

Within the ophthalmology community, there is general consensus of a need to improve the quality of ophthalmic education for medical students, residents, and primary care physicians. Even so, statistics show that ophthalmic education has fallen victim to tightening budgets and shifting priorities in many academic medical schools in the United States. According to a 2004 survey by the Association of University Professors in Ophthalmology, only 30 percent of medical schools nationwide require a formal ophthalmology rotation[1]. Because physicians in many surgical and medical specialties often need to perform eye exams—especially if they are to appropriately manage and triage patients who have ophthalmic complaints—this lack of formal ophthalmic training is of grave concern.

Diverging from this unsettling trend, the HMS Department of Ophthalmology continues to hone its medical student education program. In recent years, major innovations have been implemented, largely due to efforts championed by Simmons Lessell, MD, HMS Director of Ophthalmic Medical Student Education, and Deborah Jacobs, MD, Director of the Core Medicine Clerkship for Harvard Medical School students. Today, the program's revitalized core and elective curriculum emphasizes a dynamic, integrated format that combines didactics with hands-on clinical and research training under a mentor's watchful eye. Core requirements begin in the 2nd year of medical school, when students learn to perform the basic eye exam and use the direct ophthalmoscope in a small-group setting. During their 3rd year internal medicine rotation, students directly engage in clinical activity.

Augmenting these activities, a revitalized Introductory Elective teaches fourth year medical students the principles of basic ophthalmology through hands-on clinical instruction, rather than a traditional lecture-based curriculum. This unique, modified apprenticeship system pairs each student with two active ophthalmic clinicians in different subspecialties, both of whom provide student supervision and feedback. During the four-week rotation, students accompany their mentors in a busy outpatient setting, in the operating room, and at conferences. Early in their rotations, students work in tandem with residents in the 24/7 emergency eye department and trauma center.

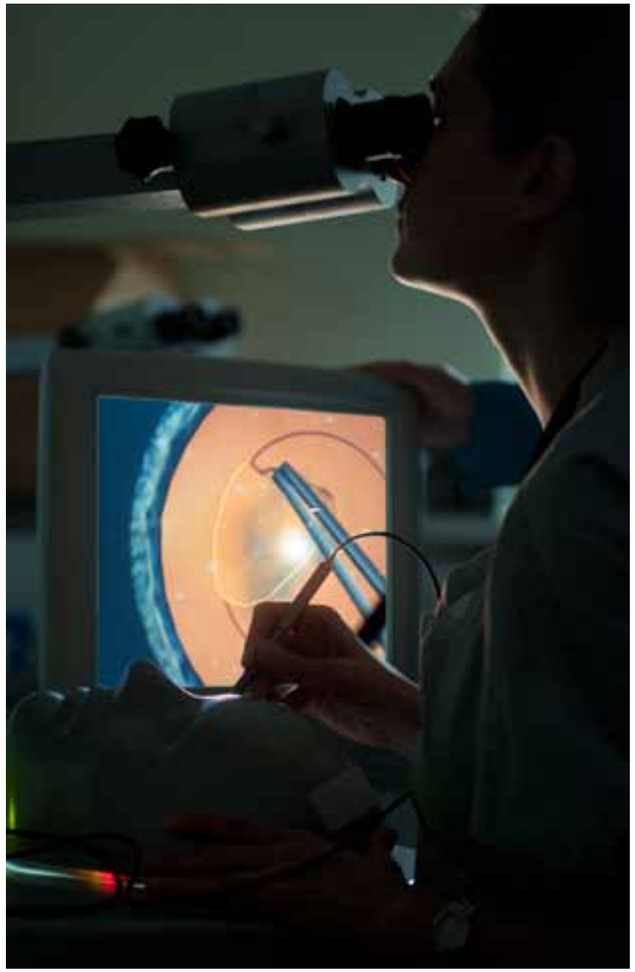
Closely supervised by faculty, students have the opportunity to evaluate, triage, and manage patients, and learn how to use specialized ophthalmic equipment, including the slit-lamp biomicroscope, the tonometer and the ophthalmoscope. Students are also loaned a set of basic ophthalmology textbooks and encouraged to attend Grand Rounds and department lectures to reinforce their training. Faculty guidance and feedback throughout the rotation is an important part of the learning process. A pediatric ophthalmology elective is also available at Children's Hospital Boston for interested students, and directed by Ophthalmologist-in-Chief, David Hunter, MD, PhD.

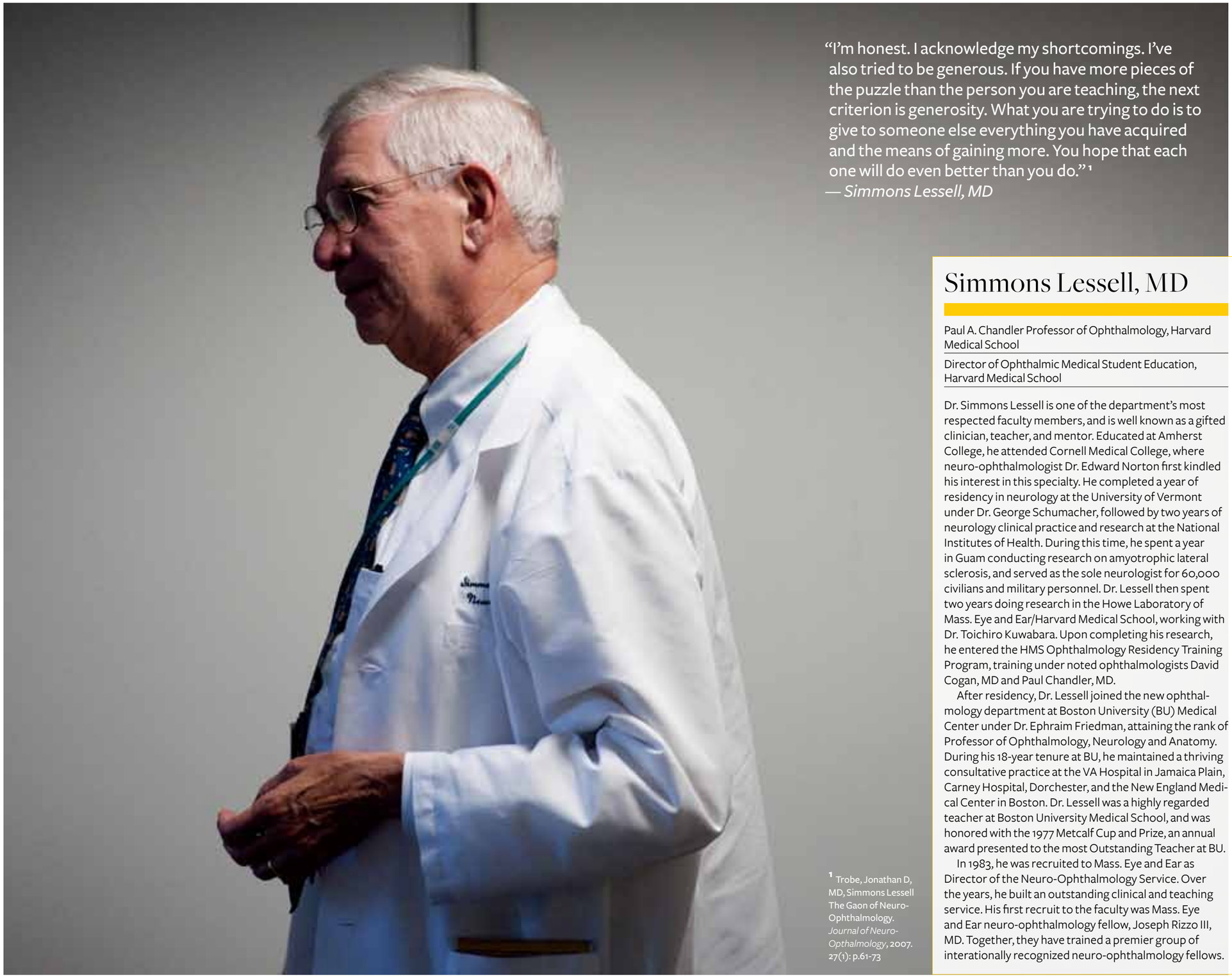
Students who satisfactorily complete the Introductory Elective may choose to take a four-week minimum Advanced Ophthalmology course. At this level, more than 30 electives representing a robust, cross-section of ophthalmic subspecialties are open to students who wish to participate in a focused clinical or laboratory investigation. Students may choose from many exciting areas of study. Some examples include:

- Pathogenesis of age-related macular degeneration (wet or dry)
- Antibiotic resistant bacterial infection
- Human and molecular genetics research with an emphasis on understanding the role of genes in the development of glaucoma
- Behavioral and imaging research to assess visual impairment and monitor progression of retinal diseases
- Diseases of the surface of the eye, including infections and dry eye diseases
- Glyobiology – an expanding field at the forefront of the biomedical sciences that studies the structure and function of the carbohydrate chains (or glycans) present in all living organisms.
- Ocular immune privilege and the pathogenesis of autoimmune uveitis
- Visual functions and developing technologies for visual rehabilitation

According to Dr. Lessell, modified apprenticeship electives excite students about the principles of ophthalmology through "real-life" clinical and research exposure and one-on-one faculty guidance. Students gain first-hand knowledge of the field, giving them an opportunity to decide whether or not ophthalmology is an area of medicine they would like to pursue. Elective rotations also provide excellent training for students who may choose a "sister" specialty such as neurology or neurosurgery. Program feedback from medical students has been highly positive, with approximately 30 students choosing an Introductory Elective each year.

Today, about 1 in 6 ophthalmology department chairs in academic institutions across the U.S. and Canada conducted postdoctoral training at HMS.





"I'm honest. I acknowledge my shortcomings. I've also tried to be generous. If you have more pieces of the puzzle than the person you are teaching, the next criterion is generosity. What you are trying to do is to give to someone else everything you have acquired and the means of gaining more. You hope that each one will do even better than you do."[1]
— Simmons Lessell, MD

[1] Trobe, Jonathan D, MD, Simmons Lessell The Gaon of Neuro-Ophthalmology. *Journal of Neuro-Opthalmology*, 2007. 27(1): p.61-73

Simmons Lessell, MD

Paul A. Chandler Professor of Ophthalmology, Harvard Medical School

Director of Ophthalmic Medical Student Education, Harvard Medical School

Dr. Simmons Lessell is one of the department's most respected faculty members, and is well known as a gifted clinician, teacher, and mentor. Educated at Amherst College, he attended Cornell Medical College, where neuro-ophthalmologist Dr. Edward Norton first kindled his interest in this specialty. He completed a year of residency in neurology at the University of Vermont under Dr. George Schumacher, followed by two years of neurology clinical practice and research at the National Institutes of Health. During this time, he spent a year in Guam conducting research on amyotrophic lateral sclerosis, and served as the sole neurologist for 60,000 civilians and military personnel. Dr. Lessell then spent two years doing research in the Howe Laboratory of Mass. Eye and Ear/Harvard Medical School, working with Dr. Toichiro Kuwabara. Upon completing his research, he entered the HMS Ophthalmology Residency Training Program, training under noted ophthalmologists David Cogan, MD and Paul Chandler, MD.

After residency, Dr. Lessell joined the new ophthalmology department at Boston University (BU) Medical Center under Dr. Ephraim Friedman, attaining the rank of Professor of Ophthalmology, Neurology and Anatomy. During his 18-year tenure at BU, he maintained a thriving consultative practice at the VA Hospital in Jamaica Plain, Carney Hospital, Dorchester, and the New England Medical Center in Boston. Dr. Lessell was a highly regarded teacher at Boston University Medical School, and was honored with the 1977 Metcalf Cup and Prize, an annual award presented to the most Outstanding Teacher at BU.

In 1983, he was recruited to Mass. Eye and Ear as Director of the Neuro-Ophthalmology Service. Over the years, he built an outstanding clinical and teaching service. His first recruit to the faculty was Mass. Eye and Ear neuro-ophthalmology fellow, Joseph Rizzo III, MD. Together, they have trained a premier group of interationally recognized neuro-ophthalmology fellows.

In 2004, Dr. Lessell retired as Director of the Neuro-Ophthalmology Service, and was appointed Director of Ophthalmic Medical Student Education for Harvard Medical School. During his tenure, he has transformed the HMS ophthalmic curriculum by radically redesigning the elective program to emphasize faculty mentorship, conference participation, and emergency room training. He is a master at leading weekly Grand Rounds, and has gained nearly legendary status for his keen insight and quick wit during his presentations.

Dr. Lessell ranks among the top neuro-ophthalmologists in the world, and is frequently sought for consultation by patients and physicians in the U.S. and abroad. During his career, he received RO1 funding from the National Institutes of Health for 13 consecutive years, an objective indicator of his deep intellect and prolific contributions to his field. His depth of knowledge and clinical insight are unmatched, even while he maintains an approachable bedside manner and endearing sense of humor. He demands the best from his residents and fellows, and makes it his personal mission to improve their analytic and diagnostic skills. In describing Dr. Lessell, one resident stated: "To spend a [clinical session] with Dr. Lessell is to see the rare example of an ophthalmologist taking a thorough history and performing a complete exam. In the age of technicians, support staff, and shortcuts, Dr. Lessell knows only to do things completely and accurately himself."

Dr. Lessell embodies the attributes of his teacher, Dr. Chandler, as a physician who exemplifies the highest standards of teaching and patient care. He received the Outstanding Teacher Award in 2004, and in 2006 he was honored as a Distinguished Alumnus at the HMS Department of Ophthalmology Annual Meeting. In 2006, when the Department of Ophthalmology completed funding for the Paul A. Chandler Professor of Ophthalmology, Dr. Lessell was named the first incumbent, reflecting a lifetime of major accomplishments and unparalleled excellence in academic medicine. Dr. Lessell has authored over 200 publications, chapters and reviews, and serves on the editorial board of two premier peer-reviewed journals, *Archives of Ophthalmology* and *Journal of Neuro-Ophthalmology*. At 78 years of age, he remains busy with clinical practice, teaching, and educational administration.

THE HMS RESIDENCY PROGRAM: TRAINING OPHTHALMOLOGISTS, TURNING OUT LEADERS

The HMS Department of Ophthalmology Residency Training Program, directed by John Loewenstein, MD, and Associate Director, Carolyn Kloek, MD is ACGME accredited and ranked by *Ophthalmology Times* as one of the top five programs in the country. With the program's stellar reputation, securing one of the department's eight junior residency slots is highly competitive. Each year, the program attracts an average of 450 elite physician applicants from around the globe.

Mentored by some of the finest educators in ophthalmology, residents receive superb comprehensive and subspecialty training. Many faculty members are renowned internationally for their specialized expertise in ocular melanoma, macular degeneration, retinal degenerations, keratoprosthesis, diabetic eye disease, ocular surface disease, glaucoma, ocular genetics, amblyopia, and ocular pathology. In this rich and dynamic teaching environment, our gifted academicians and clinician scientists nurture, inspire, and challenge residents at every turn while carefully balancing the needs and safety of their patients. Residents complete this synergy by bringing vital contributions, energy, and insight to bear across the department.

Residents work closely with junior and senior faculty to pursue novel scientific and clinical investigations; their efforts often lead to publication of scholarly papers in peer-reviewed journals. Residents also give presentations at national meetings and conferences such as Association for Research in Vision and Ophthalmology (ARVO) and American Academy of Ophthalmology. In 2011, 70 percent of HMS ophthalmology residents were invited to present at ARVO's annual spring meeting.

HMS Department of Opthalmology national rankings

U.S. News & World Report
#4 "America's best hospitals" (2011–12)

Ophthalmology Times
#5 "Overall best program"
#3 "Best research program" (2010–11)

BROAD PATIENT EXPOSURE

With a strong emphasis on leadership development, the residency program is structured to give trainees broad patient exposure and increasing responsibility during their three years of training. Residency training is firmly integrated into all aspects of patient care so that trainees gain expertise in diagnosing and treating an extensive array of ocular conditions.

Residents develop finely tuned surgical and clinical skills as they rotate through the comprehensive and subspecialty programs of our world-class HMS affiliates, including Mass. Eye and Ear, Massachusetts General Hospital, Children's Hospital Boston, Beth Israel Deaconess Medical Center, the VA Boston Healthcare System, and the Cambridge Health Alliance. Residents also provide inpatient consultations and 24/7 emergency eye care and trauma coverage to patients at Mass. Eye and Ear, and many Harvard-affiliated hospitals. Additional clinical and surgical experience is gained through senior rotations at the Togus VA in Maine and elective rotations at Aravind Eye Hospital in India.

With 11 affiliate and partnering institutions, HMS's broad-based organizational structure brings tremendous educational value to our residency program. Diverse patient populations give residents exposure to a myriad of pathologies and the opportunity to provide highly specialized care to patients both young and old. Residents directly benefit from the international reputations of our faculty; patients come from around the world seeking specialized care, and residents work in tandem with faculty to diagnose and treat some of the most difficult and unusual ocular pathologies. Each affiliate setting is unique, and residents gain valuable insights from the varied philosophies of treatment and surgical techniques of individual institutions and their faculty.

HMS resident graduate statistics

A Five-Year Review: Academic Years 2007–2011

97% seek fellowship training

57% choose HMS fellowships

60% pursue academic careers after fellowship

24/7 Emergency Department

The Mass. Eye and Ear Emergency Department (ED) is one of only three dedicated eye facilities in the country, and New England's only specialized referral center for eye trauma. This busy facility handles an average of 12,000 patient visits each year, and provides a tremendously valuable teaching environment for residents, complementing their already robust clinical exposure. During ED rotations, junior residents learn to function independently and manage the medical and surgical care of patients with various ocular pathologies, conditions, and injuries. By year three, senior residents perform open-globe repairs on patients under the supervision of the Chief Resident - who also serves as Director of the Eye Trauma Service — and supervise junior residents in minor procedures.

Aravind Eye Hospital, India

During senior year, most residents choose to do an international elective at the Aravind Eye Hospital in India. This unique opportunity allows HMS ophthalmology residents to broaden their clinical and surgical experience in an international setting.

At Aravind, residents witness an impressive international health care system that delivers high-quality eye care to a large volume of patients in a cost-efficient manner. Residents have the opportunity to participate in the cornea, glaucoma, and uveitis clinics with exposure to end-stage inflammatory and infectious diseases that are uncommon in the United States. Residents also spend half of each day in the operating room, and serve as primary surgeons for cataract surgeries (both extra-capsular and phaco-emulsification).

HANDS-ON LEARNING

Numerous program innovations have created a more effective learning environment for trainees. State-of-the art training tools and technology enable residents to fine-tune their surgical skills outside of the operating room.

Progressive surgical curriculum

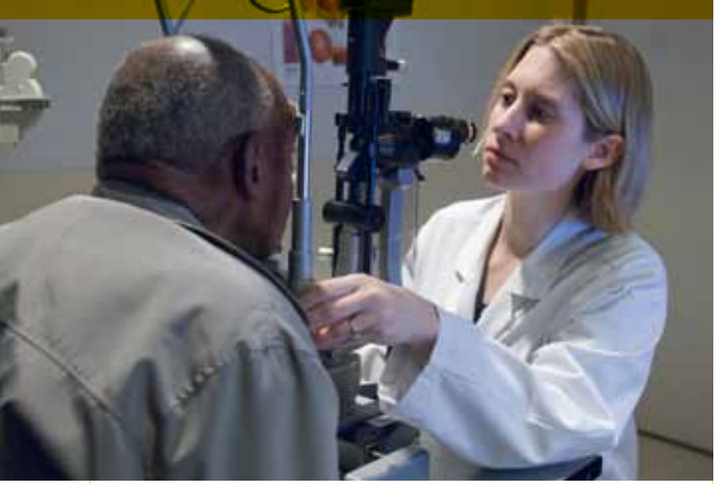
Beginning in the first year of residency, a progressive surgical curriculum provides a graduated learning process for trainees, as well as greater surgical exposure with a cataract rotation in Year 2. "We're always looking at ways to give our residents the best experience possible," says Carolyn Kloek, MD,

HMS residency highlights

Year 1: (PGY-2)
- Ophthalmology fundamentals gained through daily lectures, core clinical rotations, and "high-value" exposure in the Emergency Department and Eye Trauma Service
- Observe in the operating room and serve as primary surgeon for several operative cases

Year 2: (PGY-3)
- Refine exam, diagnostic, and surgical skills rotating through subspecialty clinics
- Independently consults for HMS affiliates (w/attending supervision)
- Emphasis on surgical skills (oculoplastics, strabismus, vitreoretinal, and cataract surgeries)
- Perform intravitreal injections, as well as retina and glaucoma laser procedures

Year 3: (PGY-4)
- Refine knowledge, judgment, technical skills, and professional maturity
- Intensive ophthalmologic surgical training in cataract, glaucoma, anterior segment, open-globe, and retina surgeries
- Elective surgical rotation at Aravind Eye Hospital, India



Carolyn E. Kloek, MD

Associate Director, Residency Program in Ophthalmology, Harvard Medical School

Instructor in Ophthalmology, Harvard Medical School

Editor-in-Chief, *Digital Journal of Ophthalmology*

Dr. Carolyn Kloek is a comprehensive ophthalmologist at Mass. Eye and Ear who provides consultation and treatment for cataracts, eye injuries, and various other ocular disorders. A *magna cum laude* graduate of Dartmouth College, Dr. Kloek received her MD from Harvard Medical School and completed an internship in Internal Medicine at Brigham and Women's Hospital. Dr. Kloek completed her ophthalmology residency at Mass. Eye and Ear, where she served as Chief Resident.

Dr. Kloek is actively involved in medical student and resident education. She routinely serves as a lecturer at HMS, and is a preceptor for medical students rotating in ophthalmology at Mass. Eye and Ear. As Associate Director of the HMS Residency Program in Ophthalmology, Dr. Kloek assists residency program director, Dr. John Loewenstein, in the administrative leadership of the program, and serves on several HMS committees, including the Graduate Medical Education Committee and Residency Selection Committee. She developed and implemented the progressive Harvard Ophthalmology Residency surgical curriculum to improve the learning experience for trainees. She also spearheaded a 360-degree evaluation system for HMS residents. She continues to teach ophthalmology residents in both the clinic and operating room; in 2008, Dr. Kloek was selected by Harvard ophthalmology residents to receive the HMS Teacher of the Year Award, reflecting her outstanding mentoring skills and efforts in medical education.

Dr. Kloek's research activities complement her dedication to teaching and focus on advancing ophthalmology education. She served as co-Principal Investigator for a study assessing residency experience for the progressive surgical curriculum, which was presented at the 2011 annual Educating the Educators meeting. For Academic Year 2009-10, she received the HMS Shore Fellowship to support her contributions to develop the innovative Mass. Eye and Ear Cataract Surgery Mentor. She is also collaborating with faculty at the Division of Sleep Medicine at Brigham and Women's Hospital to investigate the effect of sleep deprivation on the learning of surgical skills on a simulator. Recently, she was honored with a prestigious Harvard Medical School Rabkin Fellowship in Medical Education to develop a standardized online ophthalmology curriculum designed to enhance the training of U.S. medical school students, and to prepare graduates to more effectively triage and manage a wide variety of ophthalmic diseases. The case-based program will feature a series of guided interactive modules on topics covered in *Basic Ophthalmology*, a textbook published by the American Academy of Ophthalmology.

"Our goal with the Mass. Eye and Ear Cataract Surgery Mentor is to minimize clinical risk while providing residents with the best "real-life" experience possible for learning cataract surgery. We fully expect this virtual training tool to boost skills and confidence, and to better prepare residents for their experience in the operating room." *—John Loewenstein, MD*

Associate Director of the Residency Program. In collaboration with Dr. Loewenstein and Lynn Poole Perry, PhD, MD, Dr. Kloek has worked over the last several years to enhance the curriculum. "These enhancements redistribute the traditional third-year 'blast' of surgical training so that residents get surgical exposure much earlier in their careers," explains Dr. Kloek. "Gradual exposure allows time to reinforce core surgical principals and to build key skills that trainees can scale up over time. It's a more effective way to learn."

Another program improvement that complements clinic experience is a structured schedule of customized wet lab sessions, which are formally proctored by faculty and fellows. In 2009, the department also invested in a state-of-the-art wet lab that is equipped with the most advanced teaching tools available. Trainees can now hone their surgical skills 24/7 using an Eyesi Virtual Reality Simulator and other high-tech training tools.

Step-wise phacoemulsification

Drs. Loewenstein and Kloek have also introduced modular stepwise training of phacoemulsification surgery beginning in Year 2. This has made the intricacies of cataract surgery, one of the most difficult and complex to master, easier for second-year residents to grasp. In lieu of having residents perform the procedure from start to finish for each surgery, they execute individual steps (such as lens insertion) for every case that day guided by the attending physician. By the end of their 7-week cataract rotation, residents have mastered every step of phaco. A recent survey of trainees indicates that the new stepwise model helps them learn more efficiently, improves recall of surgical steps, and creates a more relaxed environment for residents and attendees. The new model has also led to an increase in cataract surgery numbers in Year 2, and better prepared senior residents for busy cataract rotations at the Togus VA and, if elected, Aravind Eye Hospital.

VIRTUAL SUCCESS:

The Mass. Eye and Ear Cataract Surgery Mentor

Cataract surgery—one of the most frequently performed eye surgeries in the United States—is notoriously difficult to master. Residents typically train in a "wet lab" scenario before moving directly to live patients. Making this leap can potentially cause surgeons-in-training and their teachers a good dose of anxiety. Moreover, finding good teachers and patients who will agree to let a resident participate in their surgery so they can gain real-life training experience can be challenging. Several years ago, HMS Residency Program Director John Loewenstein, and Bonnie Henderson, MD, FACS, former Director of Comprehensive Ophthalmology and Cataract Consultation Service at Mass. Eye and Ear, set out to find a better way to ameliorate some of these hurdles and better prepare residents for the operating room."

The "better way" that emerged was the Mass. Eye and Ear Cataract Surgery Mentor, a virtual reality training tool being developed by Drs. Henderson and Loewenstein. Adam Neaman, PhD was instrumental in the conception of the program, and several other Mass. Eye and Ear cataract surgeons have made significant contributions. The simulator contains a screen that shows surgical animations and videos of real surgical examples, complete with expert discussions on details of the surgery. There is also a help and reference section, and at any given moment, questions may pop up that are specific to that step in the surgery. The self-guided, interactive program not only anticipates typical questions that a beginner would ask, but also allows users to access a full reference section.

Text options for actions in the surgery appear during the training session; these actions are then illustrated on the central video portion. If the surgeon-in-training makes a serious error, the program provides immediate feedback in the form of an expert video, explaining how the problem occurred, what to do to fix it, and how to avoid making the same mistake again. This essentially allows new surgeons to master life-like surgery without risking injury to a patient. Moreover, the computer simulation tool allows residents to practice surgery at any time, even without a teacher or instructor present. This promotes more rapid learning while drastically reducing a host of issues, such as cost, management, and scheduling. "We want to make sure that future ophthalmologists can be taught in a safer and more effective manner," says Dr. Henderson.

To test the effectiveness of the Mass. Eye and Ear Cataract Surgery Mentor, Drs. Henderson, Loewenstein and colleagues conducted a prospective, multi-center, single-blind, controlled trial using ophthalmology residents from seven academic institutions. The residents received traditional surgical training along with either written teaching materials or training using the Mass. Eye and Ear Cataract Surgery Mentor. The residents who utilized the computer simulation tool scored significantly higher on post-training tests, and rated the tool more enjoyable to use and more likely to be used repetitively. This study, published in the February 2010 issue of the journal *Ophthalmology*, demonstrates that the Mass. Eye and Ear Cataract Surgery Mentor could be an effective supplement to traditional teaching.

"Our goal with the Mass. Eye and Ear Cataract Surgery Trainer is to minimize clinical risk while providing residents with the best "real-life" experience possible for learning cataract surgery," says Dr. Loewenstein. "We fully expect this virtual training tool to boost skills and confidence, and to better prepare residents for their experience in the operating room." The developers are now exploring licensing the program that would make it accessible to training programs and practitioners nationwide.

CAROLYN E. KLOEK, MD

SPOTLIGHT:

THE EXPERIENCE OF ONE HMS RESIDENT

Rajesh Rao, MD

"The retina has long fascinated me. Here, a thin sheet plastered to the back of the eye seethes with millions of bustling, firing neurons that translate light to information we use to understand and interact with the world around us."
—Dr. Rajesh Rao, HMS Department of Ophthalmology Resident, class of 2011

Determined to improve the lives of patients through scientific and clinical innovation, Dr. Rajesh Rao was drawn to the HMS Department of Ophthalmology's Residency Training Program for a number of reasons: high-caliber programs, broad clinical exposure, and extensive research and educational opportunities—all delivered by a world-class faculty mostly comprised of clinician scientists. Dr. Rao was chosen from an impressive pool of more than 500 applicants to fill one of eight highly competitive residency slots for the Class of 2011.

Dr. Rao graduated this spring, and by his account, the HMS residency program exceeded his expectations—not only in gaining exposure to wide-ranging subspecialty areas and patient populations, but also in opportunities to pursue novel research. In the laboratory of Dong Feng Chen, PhD, an internationally renowned Schepens researcher, Dr. Rao had a rare opportunity to carry out independent investigations in the burgeoning new field of retinal epigenetics. Dr. Chen underwrote the expense of his experiments and provided generously of her time and other resources. Dr. Rao's original research yielded several presentations and a publication in the December 2010 issue of the journal *Investigative Ophthalmology and Visual Science*. It also garnered him a Retina Research Foundation Award at the 2011 Association for Research in Vision and Ophthalmology meeting. Dr. Rao's research has yielded so much promise that Dr. Chen has continued this new direction of investigation in her laboratory.

Dr. Rao considers clinical and surgical mentoring to be one of the great strengths of the HMS residency program. As he progressed in his residency, Dr. Rao was entrusted with gradually increasing roles in clinical eye care. He also mastered increasingly complex and delicate surgical procedures through the newly implemented surgical training block for second-year residents, complete with state-of-the art training equipment, including an Eyesi virtual reality simulator. In every facet of training—clinic, classroom, lab, OR, and ED—his mentors provided an exceptional learning environment.

In Dr. Rao's final year of residency, the line between trainee and ophthalmic professional continued to blur as he fine-tuned his clinical, surgical, and leadership skills. Like his colleagues, he often began his day with an early meeting or Grand Rounds presentation. He gained experience in patient advocacy, ethics in patient practice, and issues with transparency and conflict-of-interest, underscoring the department's firm commitment to providing a leadership-driven education. At least once a month, he typically presented clinical or research topics at one of several scheduled conferences, rounds or symposia. Despite a brimming schedule, Dr. Rao continued to pursue his sophisticated and productive investigative work at Schepens.

From the start of residency, he found a supportive and congenial cohort among his fellow HMS trainees. This support network created a sense of community for Dr. Rao and other trainees—many of whom are far from home, family, and friends, and all juggling heavy workloads with rigorous training demands. He credits the support of his peers as one of the most important factors in his success.

"Dr. Rao enjoyed a stellar career at HMS," notes residency program director, John Loewenstein, MD. "He has a deep-seated appreciation for the challenges and complexities of retinal pathophysiology, and relishes the opportunity to contribute his energy, expertise, and compassion to improve the lives of his patients. I know he will contribute immensely to his chosen field of retinal medicine and science."

Like nearly all of his residency classmates, Dr. Rao has parlayed his exceptional skills and considerable knowledge into fellowship training so he can delve more deeply into the nuances of ophthalmic retinal diseases. For the next two years, he will be training as a vitreoretinal fellow at Barnes Retina Institute (BRI) at Washington University in St. Louis. Ultimately, he aims to have an academic career that combines clinical practice, teaching, and research – the three-fold mantra of a clinician scientist. In his view, the possibilities are enticing. "The retinal field is poised to benefit from recent pharmacological, regenerative, and surgical innovations that may soon cure retinal disease, not just slow disease progression," he says.

For Dr. Rao, the promise of HMS's residency program is all about putting theory into action, working with world-class teachers and mentors, pursuing original research, and utilizing his clinical training to treat a breadth of patients and pathologies. "Doctors typically help one patient at a time," he notes. "However, as a clinician scientist, you can potentially help thousands more by deciphering the critical mechanisms of a disease." As a fellow at BRI, Dr. Rao will continue to pursue his passion—refining his skills and knowledge that one day may punctuate a new generation of discoveries.

As a clinician scientist, his journey is just beginning.

A DAY IN THE LIFE

CLINICAL FELLOWSHIP PROGRAMS OFFER UNRIVALED OPPORTUNITIES

The Ophthalmology Fellowship Programs of Harvard Medical School are comprised of nine clinical subspecialty programs at several affiliate hospitals. Together, these individual programs pursue a single goal: to train superb specialists in ophthalmology. These programs not only prepares fellows to evaluate and manage the most difficult clinical cases, but also provides an atmosphere that fosters professional development through teaching and research. This unrivaled breadth of opportunity serves to mold the next generation of educators and leaders in the field of ophthalmology.

Organization and facilities

The following clinical fellowship programs are available within the Harvard Medical School Department of Ophthalmology:

- Cornea, Refractive Surgery, and External Disease Fellowship
- Glaucoma Fellowship
- Oculoplastic and Reconstructive Surgery Fellowship
- Ophthalmic Pathology Fellowship
- Neuro-Ophthalmology Fellowship
- Ocular Immunology and Uveitis Fellowship
- Vitreoretinal Fellowship
- Medical Vitreoretinal Fellowship
- Pediatric Ophthalmology and Adult Strabismus Fellowship

All eligible fellowship programs are either currently certified or pending certification by the Association of University Professors of Ophthalmology. Of the 30 clinical fellows enrolled in the Ophthalmology Clinical Fellowship Program for Academic Year 2011-12, 24 are based at Mass. Eye and Ear, three are based at the Beetham Eye Institute of Joslin Diabetes Center, and three are based at Children's Hospital Boston. These fully equipped and state-of-the-art institutions enable fellows to master innovative diagnostic and surgical techniques.

Exceptional clinical experience

During training, fellows will care for patients with a wide variety of complex ocular conditions, advancing their clinical skills for a diverse array of ophthalmic disorders. Fellows participate in all aspects of patient care including routine examinations, patient consultation, emergency and on-call services, and surgery. The devotion to teaching and mentoring of our accomplished faculty members provides a rich academic and clinical experience for fellows.

Unparalleled research opportunities

The HMS Department of Ophthalmology Fellowship Training Program strives to complement its extensive clinical fellowship experience with academic stimulation and research. Abundant and unparalleled opportunities for clinical collaborations exist at several HMS affiliate hospitals and other universities in the Boston area. Ophthalmology clinical fellows who demonstrate strong research potential are given careful consideration for competitive career development grants that offer junior faculty status and protected time for research.

Excellence in education

Historically, HMS Ophthalmology fellows have played an active role in the education of residents and medical students. In addition to serving as attending staff in the Emergency Department, fellows help organize conference cases, write didactic reviews for ophthalmology textbooks and journals, and deliver presentations to residents, students, and other fellows. This tradition of excellence in education not only enriches the academic experience of ophthalmology fellows, but is also appreciated and recognized by their trainees. Each year, students and residents honor this tradition of teaching excellence with the Fellow of the Year Award. Fellows are also encouraged to attend and present at national and international meetings, and travel reimbursements and awards are available.

CLINICAL FELLOWSHIP OPPORTUNITIES

Chair, Fellowship Committee, Dean M. Cestari, MD

Cornea, Refractive Surgery, and External Disease Fellowship

Program Director: Reza Dana, MD, MPH, MSc

Founded in 1958 by Dr. Claes Dohlman, the Cornea, Refractive Surgery, and External Disease Fellowship is an intensive one-year program that equips fellows with advanced diagnostic and surgical skills for the entire spectrum of corneal and external eye disorders. Fellows care for a wide variety of patients with complex disorders in the Cornea Service of Mass. Eye and Ear and at nearby Mass General Hospital. Conferences and teaching activities provide forums for ongoing education and collaboration. Numerous graduates of this fellowship go on to serve in positions of clinical and academic leadership throughout the world. An optional second year is offered in cornea research.

Oculoplastic Fellowships

Program Directors: Suzanne K. Freitag, MD and Aaron M. Fay, MD

The Ophthalmic and Orbital Plastic Surgery Service at Mass. Eye and Ear offers three training programs: 1) a two-year Oculoplastic Fellowship that is accredited by the Accreditation Council for Graduate Medical Education (ACGME) 2) a two-year Oculoplastic Fellowship that is accredited by the American Society of Ophthalmic Plastic and Reconstructive Surgeons (ASOPRS), and 3) a one-year Oculoplastic International Fellowship that provides exceptional training opportunities to applicants from underserved areas of the world. Each program has a comprehensive orbital and oculoplastic surgery curriculum that includes clinical and surgical care, academic research and writing, and cosmetic surgery. Research is mandatory in these rigorous training programs, and there are many opportunities for interdepartmental collaboration.

Glaucoma Fellowship

Program Director: Louis R. Pasquale, MD

The Glaucoma Fellowship Program is an intense one-year training program conducted at the Glaucoma Service of Mass. Eye and Ear. In this full-service facility, outfitted with state-of-the-art diagnostic and surgical equipment, fellows learn the medical management of glaucoma cases, as well as the pre- and postoperative care of surgical cases. In addition, fellows can explore career development at Mass. Eye and Ear through teaching and research. While 80 percent of the fellow's time is dedicated to patient care, many opportunities for clinical, basic science, and translational research exist in collaboration with investigators of the Howe Laboratory of Mass. Eye and Ear.

Ophthalmic Pathology Fellowship

Program Director: Frederick A. Jakobiec, MD, DSc

The Ophthalmic Pathology Fellowship at Mass. Eye and Ear is an interdepartmental curriculum coordinated between the David G. Cogan Ophthalmic Pathology Laboratory, the Ophthalmic and Orbital Plastic Surgery Service, and the Mass General Hospital Department of Pathology. In the Ophthalmic Pathology portion of the curriculum, fellows receive training in eye anatomy and histopathology. In the Ophthalmic Pathology and Oculoplastics portion, fellows learn to evaluate patients with conditions

Dean M. Cestari, MD

Assistant Professor of Ophthalmology, Harvard Medical School

Chair, Fellowship Committee, Massachusetts Eye and Ear Infirmary

Dr. Dean Cestari is one of the few ophthalmologists worldwide who is board-certified in both neurology and ophthalmology. A graduate of Colgate University in Hamilton, NY, Dr. Cestari received his MD from the Sackler School of Medicine of Tel Aviv University in Israel. He completed an internship in internal medicine and a residency in neurology at New York Presbyterian/Weill Cornell Medical College. After a one-year fellowship in neuro-ophthalmology at Mass. Eye and Ear, Dr. Cestari returned to New York Presbyterian/Weill Cornell Medical College. There, he completed a residency in ophthalmology, serving as Chief Resident in his final year. Dr. Cestari then rejoined the HMS Department of Ophthalmology and Mass. Eye and Ear in 2006 as Instructor of Ophthalmology, and became Assistant Professor in 2008.

Dr. Cestari's primary clinical interests include optic nerve disorders, strabismus, and intracranial hypertension of unknown causes. An integral member of Mass. Eye and Ear's Neuro-Ophthalmology Service, he runs an active medical and surgical practice, performing medical and surgical intervention for adult strabismus and evaluating patients with various neuro-ophthalmic disorders. Also an active clinician-scientist, Dr. Cestari hopes to elucidate the underlying mechanisms of optic nerve disease. His efforts to develop preclinical models and novel neuro-protective strategies for optic neuropathies are supported by a Harvard Medical School Catalyst Grant.

As Assistant Professor of Ophthalmology at HMS, Dr. Cestari is committed to training and mentoring students, residents, and fellows. He has been invited to participate in several training programs, including the Lancaster Course in Ophthalmology and the Kevin Hill Seminar in Ophthalmology. Dr. Cestari is also recognized for his leadership skills. Since 2007, he has served on the Digital Media Committee of the American Academy of Ophthalmology and on the Curriculum Development Committee of the North American Neuro-Ophthalmology Society. At Mass. Eye and Ear, he chairs the Clinical Fellowships Committee and leads the Clinical Fellowship Program, which spans nine sub-specialties.

of the eyelids, conjunctiva, orbit, and periorbital compartments using advanced techniques. This one—to two-year program imparts the skills necessary to rapidly and differentially diagnose rare and complex eye disorders. Alternatively, fellows may choose to complete a one-year program dedicated exclusively to Ophthalmic Pathology.

Neuro-Ophthalmology Fellowship

Program Director: Joseph F. Rizzo III, MD

The Neuro-Ophthalmology Fellowship at Mass. Eye and Ear provides intense training in both ophthalmology and neurology. Fellows learn to evaluate and manage a broad spectrum of neuro-ophthalmic cases, including optic neuritis, ischemic optic neuropathy, various other neurological or neuromuscular conditions that affect the eye, and cases of unexplained vision loss. Working closely with the neurologists and neurosurgeons of Mass General Hospital, fellows provi⁰ de services for inpatients on a regular basis. World-renowned for its strong translational research, the Neuro-Ophthalmology Service of Mass. Eye and Ear also provides cutting-edge research opportunities for fellows in this program.

Ocular Immunology and Uveitis Fellowship

Program Co-Directors: George N. Papaliodis, MD and Lucia Sobrin, MD, MPH

The Ocular Immunology and Uveitis Fellowship, conducted at multiple clinics within Mass. Eye and Ear and Mass General Hospital, is an intensive one-year program that provides advanced diagnostic, therapeutic, surgical, and research training for ocular inflammatory disorders. Various assigned clinics provide the necessary skills for delivering high-quality and comprehensive patient care. Through collaborations with the Rheumatology Department of Mass General Hospital, Ocular Immunology and Uveitis fellows may gain clinical experience in the non-ophthalmic effects of inflammatory disorders. Ample research opportunities are also available at Schepens Eye Research Institute, where ongoing research projects are delineating immunological and inflammatory responses within the eye.

Vitreoretinal Fellowship

Program Director: Shizuo Mukai, MD

Established in 1977, the Vitreoretinal Fellowship is offered through Mass. Eye and Ear's Retina Service, a fully equipped clinical facility with advanced clinical technology. Here, fellows receive comprehensive training in the surgical and medical management of diseases of the retina, vitreous and choroid. The program includes strong components in ocular tumors and pediatric retina. The two-year fellowship provides a uniquely intense clinical experience that allows ample time for academic pursuits. As a result, this program produces vitreoretinal specialists with significant experience in basic or applied ophthalmic research. Many graduates go on to serve as professors of ophthalmology, private-practice retina specialists, retina service directors, and academic leaders.

Medical Retina Fellowship

Lloyd Paul Aiello, MD, PhD

Conducted at the Joslin Diabetes Center, the Medical Retina Fellowship allows exceptional research opportunities along with strong clinical training in the management of diabetic eye disorders. State-of-the-art diagnostic and therapeutic technology is readily accessible in this full-service diabetes eye treatment and research center, which is located in the heart of Boston's Longwood Medical Area. Fellows receive excellent training in the history, diagnosis, and treatment of diabetic retinopathy, and interact daily with internationally recognized experts. In addition to attending diabetes and ophthalmology clinics within the local medical community, fellows also have ample opportunities to participate in national and international meetings.

Pediatric Ophthalmology and Strabismus Fellowship

Program Director: Deborah K. Vanderveen, MD

The Pediatric Ophthalmology and Strabismus Fellowship is a one-year fellowship program conducted at Children's Hospital Boston. The clinical experience includes broad exposure to every aspect of pediatric ophthalmology, including innovative procedures for pediatric oculoplastic surgeries, cataracts, strabismus, and glaucoma. This fellowship also provides comprehensive training for the clinical management of complex adult strabismus. Fellows have access to advanced diagnostic equipment, as well as the broad research activity and academic stimulation of the Longwood Medical Area. Mandatory research projects are conducted under the guidance of the diverse and internationally respected faculty of Children's Hospital Boston.

Community-based clinical fellowships

The Department of Ophthalmology sponsors four additional clinical fellowship opportunities with several distinguished community ophthalmologists who hold part-time academic appointments at Harvard Medical School, and practice privately in the Boston area. As experienced mentors and teachers, they offer trainees an outstanding clinical fellowship experience in the following subspecialties:

Glaucoma Fellowship:
Preceptor: Mark A. Latina, MD (Reading Health Center)

Ocular Immunology and Uveitis Fellowship:
Preceptors: C. Stephen Foster, MD and David Hinkle, MD (Massachusetts Eye Research and Surgery Institute)

Retina Fellowships(2):

- *Preceptors: John J. Weiter, MD, PhD, and Sheldon M. Buzney, MD (Retina Specialists of Boston)*
- *Preceptors: Arnold J. Kroll, MD (Zero Longfellow Place, Charles River Park), Peter L. Lou, MD (Andover Eye Associates), Edward A. Ryan, MD (microsurgical eye consultants), and Tatsuo Hirose, MD (Boston Eye Group)*

PEDRAM HAMRAH, MD

RESEARCH FELLOWS IN OPHTHALMOLOGY

At any given time, the Department of Ophthalmology trains approximately 100 research fellows who represent a new generation of clinician scientists. Integral to the translational work of the department, our research fellows embody the department's focus on bench-to-bedside research.

Research fellows may be actively involved in both the basic science and clinical aspects of translational studies—bridging investigations between the laboratory and the clinic. As a research fellow working with Dr. Reza Dana, Mohammad Dastjerdi, MD, conducted the initial laboratory investigations of bevacizumab for corneal neovascularization; he then tested the antiangiogenic regimen in prospective human studies, and further refined his therapeutic strategies in the laboratory before additional clinical trials. Research fellows like Dr. Dastjerdi are key players in each stage of the translational research process—from experimental design to clinical evaluation to publication and implementation.

In the Department of Ophthalmology, there are also research fellows who work exclusively on human studies; as such, fellows may work with a variety of scientists and clinicians to implement new and innovative interventions. For example, research fellow Andrea Cruzat, MD, worked with Dr. Pedram Hamrah to study the use of *in vivo* confocal microscopy in patients with different corneal pathologies. Their work has revealed many new applications for this technology—greatly influencing ophthalmic research and practice, and further strengthening the Ocular Surface Imaging Center of the Mass. Eye and Ear Cornea Service.

Research fellows may have far-reaching impact that extends beyond the department. The therapeutic regimens designed by Dr. Dastjerdi are now used throughout the world in clinical testing and practice; similarly, the information gained from Dr. Cruzat's research has been central to the growing use of corneal imaging worldwide in both laboratory and clinical investigations. Research fellows also serve as liaisons between multiple groups—not only working with primary investigators, but also with patients, other scientists in different fields, and even pharmaceutical companies. Research fellows in the Department of Ophthalmology thus fill a fundamental niche in the concept of translational medicine—within our department and beyond.

HIGH-VALUE EDUCATION PROGRAMS

A robust didactic curriculum comprises ophthalmology Grand Rounds, symposia, lectures, workshops, conferences, courses, and special events. This structure offers exceptional breadth and depth of discussion for residents, fellows, and faculty. Program offerings span enduring educational venues such as the Lancaster Course in Ophthalmology - now in its 65th year – to the department's new AMD International Symposium, which draws faculty from around the world to discuss emerging trends in AMD research.

International symposia
AMD International Symposium NEW
International Cornea Conference

Ophthalmology Grand Rounds
(CME credit available)

Visiting Professors and Invited Lectures
Paul A. Chandler Visiting Professorship
Cornea Visiting Professor Lecture Series
Ephraim Friedman Lecture
Murphy/Chylack Lecture
Harvard Visiting Professorship & Residents' Course
Boston Ophthalmic Pathology Lecture Series
Pediatric Ophthalmology Visiting Professor Lecture Series
Schepens Distinguished Lecture Series

Special Courses, Workshops, Lectures & Seminars
Macula Conference
Mass. Eye and Ear Resident Lecture Series
Pathology Rounds
Dr. Pei-Fei Lee Lectureship in Ophthalmology NEW
Monthly Cornea Conference
Neuro-Ophthalmology Fall Festival
Annual Harvard Vitrectomy Course NEW
Annual Harvard Intensive Cataract Surgical Training Course
Lancaster Course in Ophthalmology
Weekly VA Journal Club
Weekly VA Surgical Conferences
Molecular Bases of Eye Diseases Course
Cornea Research Seminars and Conferences
AMD Journal Club
Glaucoma Focus Group NEW
Surgical Retina Conference (twice monthly)
Longwood Medical Area Ophthalmology Conferences (monthly, September-June)
New Frontiers in Corneal Disease NEW
Biennial SportVision Conference

Continuing Medical Education
Presentation of the Red Eye (HMS on-line)
Genetics: Macular Degeneration (HMS on-line) NEW

International
Digital Journal of Ophthalmology

Department of Ophthalmology Annual Meeting & Alumni Reunion
Frederick A. Jakobiec Lecture in Ophthalmology
Mariana D. Mead Lecture
Distinguished Alumni Awards and Lectures

HIGHLIGHTS

Ophthalmology Grand Rounds & Visiting Professor Lecture Series at Mass. Eye and Ear, Schepens Eye Research Institute, and Children's Hospital Boston feature more than two dozen lectures each year, including many named or honorary lectures taught by distinguished HMS Faculty and lecturers from around the world. Grand Rounds presentations at Mass. Eye and Ear are moderated by Simmons Lessell, MD, the Paul A. Chandler Professor of Ophthalmology. The department has also utilized videoconferencing to conduct international Grand Rounds with colleagues at Aravind Eye Hospital, and Shanghai Eye and ENT Hospital at Fudan University. More of these collaborative venues are planned for the future.

Annual **Mass. Eye and Ear Vitrectomy Course,** co-developed by HMS Ophthalmology Vice Chair for Medical Education, John Loewenstein, MD, and HMS Assistant Professor of Ophthalmology, Demetrios Vavvas, MD, PhD, is designed exclusively for first-year vitreoretinal surgical fellows. This unique and comprehensive one-day workshop course gives beginning fellows a brief but comprehensive introduction to techniques in vitreoretinal surgery, and prepares them for fellowship OR experience. Consisting of lectures, wet labs, and "dry labs" using virtual reality simulators, the course is taught by renowned faculty from the U.S. and abroad and features a 2:1 student/teacher ratio. Dean Eliott, MD, is course director.

"This meeting was a great platform to engage colleagues from all over the U.S. and abroad, and an opportunity to collaborate with some of the best minds in AMD research. Having speakers on hand from related disciplines added to the breath of discussion and gave the meeting a very unique flavor."
-Anthony P. Adamis, MD, Vice President and Global Head of Ophthalmology, Genentech, Inc.

The Department's first **AMD International Biennial Conference**, launched in 2010, drew a distinguished and diverse group of clinicians and researchers from around the U.S. and abroad to discuss current topics and challenges in AMD research. The interactive format engaged participants in thought-provoking discussion on numerous topics including genetics, inflammation, stem cells and tissue engineering, imaging, animal models, and neurodegenerative disease. Participant feedback spoke to the depth of discussion and meaningful dialogue with colleagues. Plans for the 2012 event are in progress. For more information, visit www.schepens.harvard.edu/amd_symposium


SIMMONS LESSELL, MD

The Biennial Cornea Conference, now in its 27th year, explores current basic and laboratory research developments of the cornea and ocular surface, building links between this exciting new information and the numerous disease entities that afflict this portion of the eye. Two days of lectures typically feature some 30 national and international speakers. Session topics include Ocular Pain and Sensation, Dry Eye and Ocular Surface, Infection, Inflammation and Angiogenesis, Stem Cells and Regenerative Medicine.

The **Annual Harvard Intensive Cataract Surgical Training Course** is the premier cataract surgery training course for ophthalmology residents in the United States. Founded in 2005 by Bonnie An Henderson, MD, FACS the course has been co-directed since 2006 by Dr. Henderson, Sherleen Chen, MD, and Roberto Pineda II, MD. The course attracts distinguished faculty from across the country, and offers a complete preparatory program covering all aspects of cataract surgery to more than 100 second-year residents each year. The course is unique in several respects. First, distinguished faculty from around the country are nominated by their respective department chairs as the best representative cataract surgeon/teacher of their institution so the level of instruction is unsurpassed. Additionally, the course consists of lectures and a 20-station wet lab so residents receive focused instruction on each step of cataract surgery while learning varying techniques from preceptors. The course is also foundation-sponsored and free to participating residents.

The Department of Ophthalmology launched a reinvigorated and expanded **Annual Meeting & Alumni Reunion** in 2011. The 3-day weekend features a new integrated format that combines scientific exchange with networking events and social activities for faculty, alumni and newly graduated residents and fellows. The department's Annual Meeting - launched in 2004—leads the festivities with a day of featured speakers, including the traditional Mariana D. Mead Lecture, and Distinguished Alumni Awards and Lectures. The inaugural Alumni Reunion was dedicated to ten graduating classes from 1961 to 2006, and featured the observations and career achievements of a representative from each five-year anniversary class. Participants were treated to a celebratory dinner, toured new Mass. Eye and Ear facilities, and capped off their weekend with visits to the Museum of Fine Arts and Fenway Park.

DAVID G. COGAN LABORATORY OF OPHTHALMIC PATHOLOGY

The Eye Pathology Service, housed in the David G. Cogan Laboratory of Ophthalmic Pathology, serves as a regional and national diagnostic center, and is an integral part of training physicians and researchers in ocular pathology. The Cogan Laboratory has access to a wide spectrum of ancillary supports, such as flow cytometry, histochemical and immunoperoxidase staining, and electron microscopy facilities. To provide the best care possible, the Eye Pathology Service utilizes a variety of clinical ophthalmology services to assist in diagnosis and case management. The laboratory collaborates extensively with the Massachusetts General Hospital Pathology Service to evaluate challenging cases, provide enhanced diagnostic services,

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- Original research
- Grand Rounds case reports
- Knowledge review
- Patient information
- 2,000 registered users from 100 countries

Frederick A. Jakobiec, MD, DSc

Henry Willard Williams Professor of Ophthalmology, Emeritus, Harvard Medical School

Professor of Pathology, Emeritus, Harvard Medical School

Director, David G. Cogan Laboratory of Ophthalmic Pathology, Massachusetts Eye and Ear Infirmary

Frederick Jakobiec, MD, DSc, graduated from Harvard College magna cum laude in 1964. He received his MD from Harvard Medical School in 1968 and a DSc from the College of Physicians and Surgeons at Columbia University in 1971. He interned at Stanford University Medical Center, and completed residencies in both pathology and ophthalmology at Columbia Presbyterian Medical Center. His fellowship in ophthalmic pathology was conducted at the Armed Forces Institute of Pathology in Washington, D.C.

Dr. Jakobiec served as Chief and Chair of Ophthalmology at Harvard Medical School/ Mass. Eye and Ear from 1989 until 2002 when, because of ill health, he stepped down. Upon his recovery, he was welcomed back in 2007 as Director of the David G. Cogan Laboratory of Ophthalmic Pathology at Mass. Eye and Ear, where he also serves as an attending surgeon and pathologist. Dr. Jakobiec's clinical and research interests have centered on inflammation and tumors of the eye and surrounding tissues. As a clinician he advanced cryotherapy for conjunctival melanomas and squamous carcinomas as well as concentrated on orbital tumors, particularly lymphomas, and was responsible for a 450 page chapter on orbital diseases in Spencer's four volume definitive textbook on *Ophthalmic Pathology*.

Throughout his career, Dr. Jakobiec has focused much of his efforts on ophthalmology education. He has served a myriad of visiting lectureships and professorships at over 50 institutions and societies, and has been given numerous awards and medals. For ten years, he was the course director for the Lancaster Course in Ophthalmology, which is the largest and most distinguished curriculum for ophthalmology residents. He also participated in the Armed Forces Institute of Pathology Course in Ophthalmic Pathology for two decades. Since 2007, Dr. Jakobiec has served as Program Director for the HMS/Mass. Eye and Ear Clinical Ophthalmic Pathology Fellowship, and offers daily supervision and teaching of residents, clinical fellows, and medical students, rotating in the Ophthalmic Pathology Laboratory.

As director, Dr. Jakobiec continues to enhance eye pathology education in the department. He developed a pathology-based, visiting professor lecture series covering all aspects of ophthalmic pathology. This popular teaching venue, now in its fourth year, attracts speakers who are national leaders in ophthalmic pathology; lectures are open to all HMS and BU Medical School residents and fellows in ophthalmology and pathology. Dr. Jakobiec also conducts Ophthalmic Pathology Rounds for trainees and faculty from all HMS affiliate institutions. Held monthly, the rounds are comprised of a comprehensive review of cases presented by residents and fellows on all subspecialty services. They are offered as "unknowns" to Dr. Jakobiec who covers the clinical features, differential diagnosis, pathological features, and management issues of each case.

In addition to his exceptional clinical and scientific leadership, Dr. Jakobiec has written over 300 journal articles and book chapters, and has edited more than 20 volumes devoted to eye tumors and eye pathology. He was Co-Editor of Albert and Jakobiec's *Principles and Practice of Ophthalmology*, which is now in its third edition and is considered the gold standard of ophthalmology reference texts.

train residents and fellows, and pursue clinico-pathology research projects.

Founded by Benjamin Joy Jeffries in 1868 and dedicated to David G. Cogan in 1982, the Cogan Laboratory is one of the oldest ocular pathology facilities in the United States. Starting as a simple cabinet that held pathological specimens and drawings, the Cogan Laboratory has grown to include an extensive slide collection, an eight-head teaching microscope, digital photography capabilities, and numerous reference books. Future enhancements include acquisition of a twelve-headed microscope, a plasma screen for viewing slides by large groups, conferencing abilities, and TeleMed sessions.

Frederick Jakobiec, MD, DSc, Director of the Cogan Laboratory, has been preceded in this role by a distinguished list of directors including Drs. Frederick Verhoeff, David Cogan, Taylor Smith, Daniel Albert, and Thaddeus Dryja.

FOCUS ON FACULTY

Dedicated to every facet of their work, faculty receive first-rate and well-deserved support from Department of Ophthalmology executive leaders. Equally requisite support comes from Jeffrey S. Flier, MD, HMS Dean, Faculty of Medicine, and the leadership of HMS affiliate institutions. Since taking the helm in 2003, HMS Ophthalmology Chair Joan Miller, MD, has championed a progressive and rewarding 21st century workplace environment for HMS faculty While these actions require a substantial investment of resources and leadership, Dr. Miller anticipates that future returns—in the form of advances in "personalized" patient care, accelerated research and discovery, an increasingly collaborative learning environment, and top-notch faculty recruitment—will be well worth the investment. Some of these newest efforts have led to:

- New funding & mentoring supports
- A streamlined promotion and reappointment track
- Expanded programs for professional development
- A faculty mentorship program
- Establishment of five fully funded HMS professorships in the last two years
- Gender-neutral policies that promote women to leadership roles
- Numerous venues for professional recognition

A few of these efforts are highlighted in the following pages.

HMS Ophthalmology Today

Faculty and Trainees by the numbers

- 235 Faculty
  - 140 Full-Time
  - 34 Full Professors
- 24 Residents
- 43 Clinical Fellows
- 100 Research Fellows
- Postdocs (some overlap with research fellows)
- PhD students, Medical Students

20 percent of full-time HMS Ophthalmology faculty holds the title of Professor

MATTHEW F. GARDINER, MD

STAYING ON TRACK

Guided by HMS Ophthalmology Vice Chair for Promotions and Reappointments, Dr. David Hunter, the department has made a concerted effort to streamline the promotions and appointment process. Since 2008, 12 faculty members have been honored with promotions to Professor of Ophthalmology or Clinical Professor of Ophthalmology.

- Mark B. Abelson IV, MD, CM
- Lloyd P. Aiello, MD, PhD
- Larry I. Benowitz, PhD (secondary appointment)
- James Chodosh, MD, MPH
- Robert J. D'Amato, MD, PhD
- Reza Dana, MD, MPH, MSc
- Anne B. Fulton, MD
- David G. Hunter, MD, PhD
- Andrius Kazlauskas, PhD
- Deborah P. Langston, MD
- Joseph F. Rizzo III, MD
- Lois M. Smith, MD

HMS Ophthalmology Clinician Scientists Receive Broad Funding Support

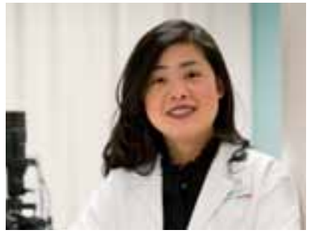
The road of a clinician scientist can be a difficult one to traverse. On one hand, clinician scientists possess unique skills and perspectives; they help forge multidisciplinary collaborations in translational medicine, and bridge the efforts of academia and industry to expedite treatments and cures. On the other hand, they face the challenge of fluctuating government and industry funding, which is often compounded by increasing financial pressures to boost clinical productivity in many U.S. academic medical institutions. These added demands can make it difficult for rising young investigators to find the time and resources to pursue investigative work. Not surprisingly, the ophthalmology community has questioned the viability of this career path, even though its rewards often prove rich in scientific discovery and patient care.

The HMS Department of Ophthalmology has a long history of successfully sustaining the efforts of its clinician scientists. Examples include: the introduction of cataract surgery to New England by Mass. Eye and Ear co-founder, Dr. John Jeffries; development of the cornea subspecialty and a corneal prosthesis (Kpro, Dr. Claes Dohlman); and the development of photodynamic therapy and anti-VEGF therapies to treat AMD (HMS Angiogenesis Research Group). This commitment has remained rock solid and, since 2004, the department has made substantial headway to broaden funding supports so that junior faculty members are encouraged to pursue research careers. HMS clinician scientists now receive support through a number of sources, including the K12 program, Scholar funds, endowed chairs, as well as multi-purpose funding to boost salaries, create programs and fund individual academic pursuits. Some of these efforts are described here.

MEET OUR SCHOLARS

On average, researchers receive their first RO1 or equivalent award at the age of 42, a statistic that underscores the critical need for intermediary funding between mentored K awards and independent funding. Scholar funds are a new funding mechanism designed to address this need and maintain momentum in our overall research efforts.

In 2011, six exceptional faculty members were named to funded scholar positions in retina, cornea and glaucoma. The program is supported primarily through the award and continuing royalties to Mass. Eye and Ear from the department's successful QLT judgment – itself the outcome of successful translational research in the field of wet age-related macular degeneration. Additional multi-purpose funding helps support individual research programs throughout the department, including stem cell studies and other translational research projects in the cornea, glaucoma, and retina services.



Ivana K. Kim, MD

Evangelos S. Gragoudas Distinguished Scholar in Retina Research

Director, AMD Unit, Mass. Eye and Ear

Dr. Kim joined the full-time faculty of Mass. Eye and Ear's Retina Service in 2003. As a key member of the HMS angiogenesis research group (HMSARG), she has been involved in numerous clinical and translational studies directed toward the development of new therapies for age-related macular degeneration (AMD) and other ocular conditions involving choroidal neovascularization. Her preclinical research utilizes genetic analysis to identify both risk factors and new pathways associated with pathological disease processes investigating both melanoma and macular degeneration. One area of recent focus explores the use of animal models to study the pathophysiology and progression of dry AMD to geographic atrophy and blindness. She is also working with colleagues to test the safety and efficacy of antiangiogenic therapies for various other ocular diseases.

Demetrios G. Vavvas, MD, PhD

Joan W. Miller Scholar in Retina Research

Dr. Vavvas is on the full-time faculty of Mass. Eye and Ear's Retina Service. His laboratory research spans neuroprotection, ocular cancer, angiogenesis, and retinopathies of prematurity and diabetes. He is participating in ongoing studies to find safer and less toxic therapies for treating retinoblastoma in infants, and aims to develop therapies that prevent the growth of primary and metastatic tumors in uveal melanoma. In collaboration with Dr. Joan Miller, he is also pursuing neuroprotection strategies that can prevent photoreceptor death, and potentially preserve vision in many retinal diseases. Together with Drs. Miller and Kim, he is also developing the first dry AMD primate model.

Ula V. Jurkunas, MD

Department of Ophthalmology Scholar

Dr. Jurkunas is a full-time member of Mass. Eye and Ear's Cornea and Refractive Surgery Service and Assistant Scientist at Schepens Eye Research Institute. Her studies focus on translational research related to corneal dystrophies and stem cell-based therapies for other diseases of the cornea. In 2006, she was one of the first HMS junior clinician scientists to receive a K12 Harvard-Vision Clinical Scientist Development Program award, monies that supported her award-winning research into the pathophysiology of Fuchs' Endothelial Corneal Dystrophy (FECD). In addition, her translational research to bring corneal stem cell therapy into clinical practice has been accepted by the Production Assistance in Cellular Therapies program of the National Heart Lung and Blood Program.

Pedram Hamrah, MD

Henry Allen Cornea Scholar

Dr. Hamrah is a full-time faculty member of Mass. Eye and Ear's Cornea and Refractive Surgery Service. He directs the newly formed Ocular Surface Imaging Center in the Cornea Service, where he is interested in

Lucia Sobrin, MD, MPH

Department of Ophthalmology Scholar

K12 Grant Gives HMS Clinician Scientist Time to Grow

Dr. Lucia Sobrin is a full-time clinician scientist with the Retina and Uveitis Services. She completed her ophthalmology residency training at Bascom Palmer Eye Institute in 2003, followed by a medical and surgical retina fellowship at the Mass. Eye and Ear in 2005 and a uveitis and ocular immunology fellowship at the Massachusetts Eye research and Surgery Institute (MERSI) in 2006. That year, she joined the Department's Retina and Uveitis Services as one of the Department's first Harvard Vision Clinical Scientist Research Program (K12) recipients, receiving a four-year grant to study the genetics of macular degeneration and diabetic retinopathy under the mentorship of David Altshuler, MD, PhD, Joan Miller, MD, and Johanna Seddon, MD, ScM.

One of Dr. Sobrin's primary research interests is elucidating the genetics of diabetic retinopathy in African Americans. She was the first ophthalmologist to be awarded funding under the HMS Catalyst Grant Program, and is principal investigator for a study entitled, "Epidemiology and Genetics of Diabetic Retinopathy in the Jackson Heart Study." In 2011, she was honored with the ARVO/Alcon Early Career Clinician Scientist Research Award.

Here, Dr. Sobrin describes her experience as a K12 recipient.

Has the K12 program enabled you to advance your career as a clinician scientist?
Yes, it gave me protected time so I could learn the field of complex disease genetics. I didn't have a background in genetics apart from what I learned in medical school. With salary support and protected time to attend seminars and courses in genetics and biostatistics, I was able to gain the skills I needed to do research effectively in this field. It also provided me with time for on-the-job learning of statistical genetics, which is very time consuming. Finally, it provided me with the funds to start the study of diabetic retinopathy in African Americans that I have initiated in the Jackson Heart Study.

How has K12 support directly benefitted your research efforts?
The K12 funded a study coordinator and fundus photography for the initial year of our diabetic retinopathy study. It also supported my tuition for a Masters in Public Health at the Harvard School of Public Health. In a nutshell, the K12 funded my education so I could pursue the research and then funded the essentials of getting the study started.

Did the K12 award influence your decision to join the MEE retina and uveitis services in 2006?
It did. I wanted a position that would support me in my initial years of trying to become a clinician scientist. I still needed training in research techniques, specifically biostatistics and genetics, in order to become an effective clinician scientist. The K12 gave me the time and resources to complete this training while allowing me to continue my clinical work.

Has the K12 program met your expectations?
Definitely. It's given me the protected time necessary to train in biostatistics and genetics, and under the mentorship of some of the best minds in science – Drs. David Altshuler, Joan Miller, and Johanna Seddon. It has also supported my early stage research and subsequent scientific work that has been the basis for applications for independent funding. I've been able to train to become an independent investigator while also continuing to see and treat patients in one of the largest and most prestigious academic medical school environments in the world.

developing live imaging techniques and using *in vivo* confocal microscopy for image-guided therapy. Dr. Hamrah's research focuses on immune cell trafficking in immune and infectious diseases of the cornea, including viral and microbial keratitis, corneal transplant tolerance and rejection, neurotrophic keratopathy, and ocular surface disease. From 2008 through May 2010, his research was supported by a K12 Harvard-Vision Clinical Scientist Development Program award. Recent research funding includes a Grant-in-Aid award from Fight for Sight, two grant awards from Alcon Research, LTD, and a Research to Prevent Blindness Career Development Award.

Louis R. Pasquale, MD
Distinguished Scholar in Ophthalmology

Dr. Pasquale is the director and a full-time faculty member of Mass. Eye and Ear's Glaucoma Service. Dr. Pasquale's research focuses on primary open-angle glaucoma (POAG), and seeks to improve early detection of the disease and improve the understanding of its pathogenesis. He is principal investigator of several NIH-funded studies that examine gene-environment interactions related to POAG. Together with Janey Wiggs, MD, PhD, Dr. Pasquale is co-leading the NEIGHBOR Consortium—a multi-center cohort study that includes 8,000 glaucoma cases and controls gathered from Mass. Eye and Ear, the Nurses' Health Study (NHS), the Health Professionals Follow-up Study, and eight other institutions. Funded through the National Human Genome Research Institute, this work has generated the largest known group of POAG cases, and seeks to eventually identify the full complement of gene-gene and gene-environment interactions associated with POAG.

SHATTERING THE GLASS CEILING

More than at any other time in the department's history, HMS women faculty are achieving an unprecedented array of leadership positions in patient-care, teaching, research, and administration. Guided by the vigorous support and gender-neutral policies of department chair, Joan Miller, MD, significant resources have been directed to ensure academic and professional advancement of women faculty, and to redress the inherent balancing act of career and family. This support has come in many forms - administrative policy changes, financial support and scholarship awards, and encouragement and mentorship - to enrich the careers and lives of many outstanding HMS women faculty. Since 2009, the department reached several milestones:

- Established the first short-term disability program for medical leave for professional staff at Mass. Eye and Ear
- Awarded three of six Mass. Eye and Ear Scholar Funds to women faculty
- First women appointed to the following positions at Mass. Eye and Ear:
  - Vice Chair for Basic Research
  - Associate Chief for Clinical Research
  - Associate Director of the Howe Lab
  - Director of the Genetics Diagnostics section of the new Ocular Genomics Institute
  - Associate Director of the HMS Ophthalmology Residency Training Program
  - Chief Quality Officer in Ophthalmology for Mass. Eye and Ear.
- Promoted two women physicians to full Professor with a third in the pipeline
- Created the first HMS Professorship that will be named for a woman: The Joan Whitten Miller Chair (to be named upon Dr. Miller's retirement; currently named in honor of her father, Charles Edward Whitten).

HMS ENDOWED CHAIRS

In part through the establishment of endowed chairs, the HMS Department of Ophthalmology attracts and supports the endeavors of world-class clinician scientists and investigators. Endowed chairs offer research and training support to incumbents while giving them the freedom to pursue independent research without the burden of financial risk. These endowments are a wonderful tribute to the past success of their namesakes, and serve as a building block for future endeavors. They are also powerful recruiting tools, attracting visionary leaders whose contributions historically have forged many paths in medicine and science. Prior to 2008, just four chairs had been completed; today, that number has shot to 12 thanks to generous department and institutional support, private foundations, and the philanthropy of HMS ophthalmology friends and alumni. These gifts will help ensure that generations of outstanding HMS ophthalmology faculty thrive in perpetuity.

Endowed Chairs in Ophthalmology	Incumbent 2011	Completed
Henry Willard Williams Professorship	Joan W. Miller, MD	1893
David Glendenning Cogan Professorship**	Richard H. Masland, PhD	1969
William Frederick Chatlos Professorship	Eliot L. Berson, MD*	1978
Paul Austin Chandler Professorship	Simmons Lessell, MD*	1986
Charles L. Schepens Professorship	Vacant	2008
Sir William Osler Professorship	Michael S. Gilmore, PhD*	2003
Claes Henry Dohlman Professorship	Reza Dana, MD, MPH* MSc	2008
David Glendenning Cogan Professorship (2)	In process	2010
David Glendenning Cogan Professorship (3)	In process	2011
Charles Edward Whitten Professorship	Evangelos S. Gragoudas, MD*	2011
Stelios Evangelos Gragoudas Professorship	In process	2011
Solman and Libe Friedman Professorship	In process	2011

*signifies inaugural incumbent
**The David Glendenning Cogan Professorship was divided into three chairs in 2010 and 2011.

GIFTS PAY TRIBUTE TO EPHRAIM FRIEDMAN, MD (1930-2011)

Dr. Ephraim Friedman, ophthalmologist and past President of the Massachusetts Eye and Ear Infirmary, passed away on June 18, 2011. He was a friend to many within the HMS Ophthalmology community, a loving family man, skilled clinician and retinal surgeon, sculptor, educator, researcher, and administrator.

Dr. Friedman was drawn to ophthalmology while serving as a captain in the Air Force, and completed his residency at Harvard Medical School/Mass. Eye and Ear under Dr. David Cogan in 1961. For the next four years, he was a research fellow at the Howe Laboratory of Ophthalmology at Mass. Eye and Ear. The author of 36 scholarly articles focusing on circulation in the eye, Dr. Friedman developed the vascular model for the pathogenesis of age-related macular degeneration (AMD), the leading cause of blindness in the developed world. He served as Dean of the Boston University Medical School (1970-1974) and Dean of the Albert Einstein College of Medicine (1974-1983) before returning to the Mass. Eye and Ear as President (1983-1990). A life-long sculptor, Dr. Friedman retired from administration in 1990 to spend more time with his art, family, research, and the log home he built in Maine.

In 2006, a gift from Friedman Family Foundation initiated the Ephraim Friedman Lecture in honor of Dr. Friedman's extraordinary teaching, research, and service to the field of ophthalmology and AMD. On the occasion of his 80th birthday in 2011, another family legacy gift was established: the Solman and Libe Friedman Professorship in Ophthalmology at Harvard Medical School. Named for Dr. Friedman's parents, the professorship was made possible through a very generous gift from the Friedman Family Foundation with contributions from additional donors and the Foundation of Mass. Eye and Ear Infirmary.

"Generations of HMS ophthalmology faculty and trainees will benefit from these gifts as they endure through the 21st century and beyond," said Dr. Miller. "They commemorate dedication to learning that is a Friedman family hallmark, and create a lasting tribute to a man who gave so much to our institution, our profession and our patients."