

“Massachusetts Charitable Eye Infirmary partly originated in the fact that one of its founders had the happiness of restoring a beloved father to sight by the operation for cataract. The tender relation in this case of surgeon and patient, becoming extensively known among the small population then composing our community, brought to his observation, a large number of Ophthalmic patients....The great majority of all these cases belongs to the humbler ranks of society; and have their prolific parentage in the various privations and sorrows unavoidably consequent upon poverty.”

— EDWARD REYNOLDS, MD, IN HIS ADDRESS AT THE DEDICATION OF THE MASSACHUSETTS CHARITABLE EYE AND EAR INFIRMARY, 1850¹

¹Snyder, Charles. Massachusetts Eye and Ear Infirmary: Studies on Its History. 1984. Massachusetts Eye and Ear Infirmary, Boston

REACHING OUT

Founded on the principal of caring for the community and inviting “the poor, afflicted with diseases of the eye to come there for gratuitous aid¹,” the Massachusetts Charitable Eye Infirmary was established in 1824 by Edward Reynolds, MD, and John Jeffries, MD. It would eventually grow into the Massachusetts Eye and Ear Infirmary and form the nucleus of the HMS Department of Ophthalmology. In 1824, Drs. Reynolds and Jeffries were at the cusp of great changes in medical education, including enormous advances in the diagnosis and treatment of eye diseases. By the 1870’s, HMS established subspecialty departments (including a Department of Ophthalmology), reflecting the enormous growth in medical knowledge and the increasing trend toward medical specialization. Today, the HMS Department of Ophthalmology comprises over 300 faculty and trainees who provide care to thousands in need—around the corner and around the globe.

The adage “charity begins at home” forms the cornerstone of the department’s community outreach mission. Every year, HMS physicians, fellows, and residents provide free care, information, and screenings to thousands of area residents. Collaboration is key to these efforts, and the department joins with numerous organizations to target populations in need of eye care but otherwise may not have access to ophthalmic services.

Since 1995, Mass. Eye and Ear and Children’s Hospital Ophthalmology Foundation (CHOF) staff have provided pediatric vision screenings to the Neighborhood Charter School in Dorchester, which is home to 400 children of diverse backgrounds. For the last two years, HMS staff members have provided vision screenings at Camp Harbor View, a summer camp held on Boston Harbor’s Long Island, for 600 at-risk, low-income youth. HMS staff also collaborates with Massachusetts Vision Coalition to provide eye exams to children at the West End House Boys and Girls Club in Allston, MA, as well as vision screenings to young adults in the *Year Up Boston* program, which prepares young urban adults for successful careers. Those in need of eyeglasses have received free pairs courtesy of Vision Coalition Massachusetts and the Mass. Eye and Ear Optical Shop. Each year, CHOF, Mass. Eye and Ear, and other affiliates join with the Massachusetts Lions Clubs to collect used eyeglasses for refurbishing and distribution in underserved or impoverished areas. CHOF staff also has provided free eye exams at the Children’s Museum Boston during Child Life Week, and visits local Girl Scout groups for informational presentations on eye health.

Mass. Eye and Ear staff participate in adult eye screenings at numerous community centers, such as the Harriet Tubman House in Boston’s South End, the Center for Adult Learning Experiences in Somerville, and the Blackstone Senior House in Boston. Businesses such as the Boston Omni Parker House Hotel have also arranged eye screenings for employees. HMS ophthalmologists give informational presentations at Massachusetts Lions Club meetings throughout the state, and participate in many of their mobile screening van programs. Vision screenings and “ask a doctor” sessions target regional health fairs such as Partners Health Expo and Runners Health Expo. HMS faculty members regularly provide free public lectures and presentations on topics such as glaucoma, age-related macular degeneration (AMD), and pediatric glaucoma. Open forums for the community feature a range of topics, such as “Update on AMD.”

Each year, as participants in the World Health Organization’s World Sight Day, Schepens Eye Research Institute and Mass. Eye and Ear provide screenings and raise awareness of gender inequities in vision loss. This international day of awareness, held annually in October, focuses on the global issue of avoidable blindness

and visual impairment. Schepens also invites the public to its annual Eye & Vision Research Symposia, which highlight the Institute’s latest research and current clinical advancements. These free symposia series are designed to empower patients and their families by providing the latest information about vision research and interventions for vision loss. A display of low vision aids is also provided. Events are held in Boston, Cape Cod, and in several Florida locations.

Joslin Vision Network reducing barriers to eye care

The Joslin Vision Network (JVN), a national telemedicine program targeting diabetic retinopathy, was pioneered by Lloyd M. Aiello, MD at the Joslin Diabetes Center. Dr. Aiello sought to mitigate the terrible consequences of diabetic retinopathy, in which abnormal

blood vessels proliferate, bleed, and detach in the retina, leading to cell death and blindness.

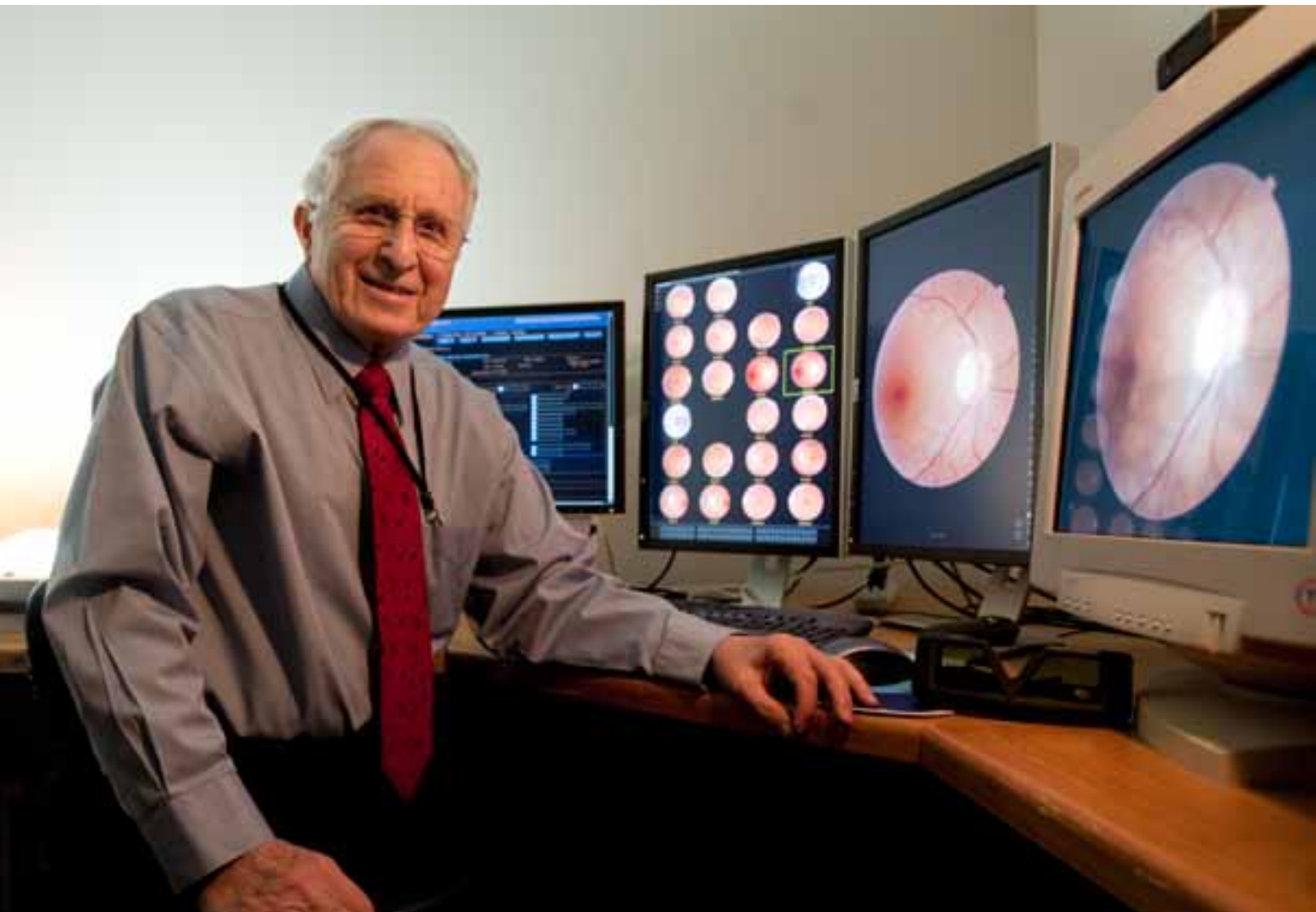
In the 1960s, Dr. Aiello worked with Dr. William P. Beetham to develop the pan-retinal laser treatment for diabetic retinopathy, and oversaw the clinical trials that showed the technique to have a 96 percent success rate in patients. Despite their success, however, diabetic retinopathy continued to be the leading cause of blindness in the United States, mostly due to a shortage of skilled diabetic eye care in many areas of the country. Dr. Aiello teamed with colleague Sven-Erik Bursell, PhD, who used video technology in his research laboratory at Joslin. The two developed a plan for a diagnostic system composed of a specialized camera to take retinal photographs, and a video transmittal system to send the images to Joslin’s highly skilled clinicians for reading and interpretation.

Today, the JVN utilizes custom software and a unique digital retinal-imaging device to screen and evaluate diabetes patients. The JVN systems are set up in central areas, such as medical center pharmacies, to optimize patient access. Imaging takes 15 minutes, and requires no pupil dilation. The brief encounter also permits patient education staff to reinforce the importance of medications, monitoring, and life-style modifications. The non-dilated diabetic eye evaluation (considered the gold standard of imaging), coupled with broad access to the JVN service and 48-hour turnaround for results and



AROUND THE CORNER





Lloyd M. Aiello, MD

Clinical Professor of Ophthalmology, Harvard Medical School
Founding Director, Beetham Eye Institute at Joslin Diabetes Center

Dr. Lloyd M. Aiello received his medical degree from Boston University, and completed postgraduate work at HMS and Mass. Eye and Ear. In 1971, he was appointed Director of Joslin’s Beetham Eye Institute, and in 2005 he was named Founding Director. From 1990 to 2001, Dr. Aiello headed the Section on Eye Research, which is now led by his son, Lloyd Paul Aiello, MD, PhD.

Dr. Aiello is the second of three generations of Joslin ophthalmologists. Working with his father-in-law, William P. Beetham, MD, Dr. Aiello revolutionized the diagnosis and treatment of diabetic retinopathy. Prior to the pioneering work of Drs. Aiello and Beetham, there was a 75 to 80 percent risk of blindness for patients with diabetic retinopathy. In 1967, Aiello and Beetham developed a pan-retinal laser technique that reduced the risk of blindness to less than two percent in patients diagnosed and treated early in addition to careful follow-up. The landmark paper, “Ruby Laser Photocoagulation in

Treatment of Diabetic Proliferating Retinopathy,” was published in 1969. For the next 25 years, Dr. Aiello would lead clinical trials and studies that set the standard of care for diabetic retinopathy, and save the sight of millions of people.

Dr. Aiello has authored more than 95 original articles and 37 book chapters and review articles. He has served as a Trustee of Joslin Diabetes Center, a member of the Executive Committee of the HMS Department of Ophthalmology, and President of the New England Ophthalmological Society. Dr. Aiello’s numerous honors include the Warren Alpert Foundation Prize, the David Rumbough Scientific Award of the Juvenile Diabetes Foundation International, the Lighthouse Pisart Vision Award, the Leo R. Breitman Excellence in Research Award from the Juvenile Diabetes Foundation Massachusetts Affiliate, the Massachusetts Society of Eye Physicians and Surgeons Man of the Year, the American Diabetes Association Outstanding Physician Clinician in Diabetes Award. In 2003, Dr. Aiello received the American Telemedicine Association President’s Award (for his contributions in the development of telemedicine and its advancement worldwide), and the Gertrude D. Pyron Award for Outstanding Achievement in Retina Research, recognizing his lifelong contribution to the understanding and treatment of diabetic retinopathy.

recommendations, has dramatically increased compliance among the diabetes population, especially in the early stages of disease (which are often asymptomatic). For thousands of patients, early detection and treatment has prevented devastating vision loss. In recent years, the JVN has expanded its reach across Massachusetts and to borders beyond.

Local: In an ongoing collaboration with Massachusetts Lions Clubs, Joslin staff provides diagnostic support and evaluation of retinal images acquired by the Massachusetts Lions EyeMobile service. The EyeMobile has logged more than 9,000 miles throughout western Massachusetts—traveling to over 180 Lions’ events and serving some 4,500 residents and visitors.

National: The Indian Health Service-JVN Teleophthalmology Program is leading the way to improve early identification of American Indians and Alaskan Natives at risk of vision loss due to diabetic retinopathy. These populations often live far from health care centers that provide nationally accepted standards of eye care, including eye exams that can diagnose high-risk candidates for diabetes-related blindness. The HIS-JVN Program addresses this health care gap by using telemedicine technology to reduce the incidence and severity of diabetes-related vision loss; to date, the program has imaged more than 21,000 patients.

Global: The JVN-Venezuela program was established in Caracas in 2006 through the Fundación M.M.G. with the support of Morella Mendoza Grossman, Joslin Diabetes Center Trustee, and Dr. Lloyd M. Aiello, JVN founder. The program is an American Telemedicine Association, category 3 ocular telehealth program, and has provided high-level diabetes eye care to more than 83 children. More recently, the program was expanded to include pregnant women and adult patients. The program serves as a model for the international eye care initiatives of the JVN, enabling extensive retinal image analysis in pediatric populations to identify novel retinal lesions. By potentially predicting future severe retinal diseases, this program may allow earlier interventions that protect against vision loss.

Teleretinal imaging program captures high risk patients

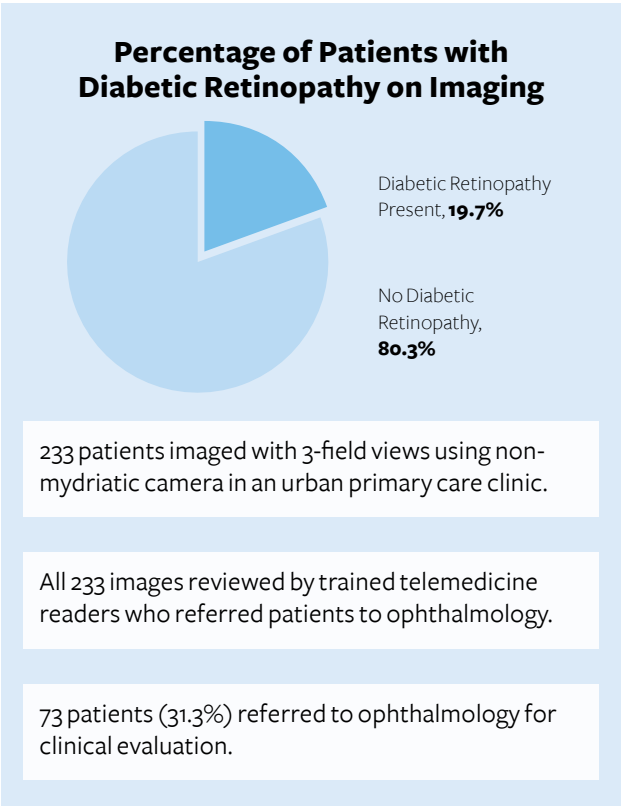
In 2008, Mass. Eye and Ear and Massachusetts General Hospital (MGH) collaborated to establish the Ocular Telemedicine Program at MGH’s Chelsea Health Center to screen high-risk, diabetic patients for diabetic retinopathy. The center serves an urban, indigent, and predominantly Hispanic population. As an ethnic group, Hispanics are far less likely to get regular annual screenings than other ethnic groups and also have an increased prevalence and more rapid progression of diabetic retinopathy.

On-site retina photographs are sent electronically to Mass. Eye and Ear and screened for diabetic retinopathy or other pathologies. Findings are posted securely using the Longitudinal Medical Record (LMR) system, which allows a network of shared information among Harvard’s 17 hospitals and affiliates. If results warrant, a clinical alert is sent to the patient’s primary care doctor who can refer patients to Mass. Eye and Ear or another facility for further diagnosis and follow-up. The LMR enables fast, accurate, and prompt medical decision-

making at every clinical level. For patients with diabetic retinopathy, the teleretinal program can mean early intervention and sight-saving diagnosis and treatment.

In a study conducted from 2008 to 2010, approximately 20 percent of the population evaluated through the teleretinal program presented with some degree of diabetic retinopathy; nearly five percent of these patients had indications of severe disease. According to Louis Pasquale, MD (HMS Associate Professor of Ophthalmology and director of Mass. Eye and Ear’s Ocular Telemedicine Program), the program is continually evolving in an effort to encourage patient compliance and follow-up. Patient screening is now offered five days a week. Health center staff members, who were initially trained to just take the images, have received additional training so they can identify and flag potentially high-risk candidates. In such cases, Mass. Eye and Ear’s expert clinician readers are notified promptly and, if warranted, results are relayed to patients within 24 hours.

“We continue to make improvements to the program by expanding its reach and dropping every barrier we can think of to ensure that patients with detectable diabetic retinopathy are notified by their PCP and get prompt follow-up and treatment,” says Dr. Pasquale. “Not only are we saving sight, but we’re also reducing the burden on the healthcare system by treating diabetic retinopathy in its early stages.”



More than ever before, the interconnected global community is bringing the plight of eye disease into sharp focus. The statistics are sobering; according to the World Health Organization, 314 million people suffer from visual impairment, and 45 million of them are blind. Nearly nine out of 10 people who suffer from blindness or visual impairment live in developing countries that have minimal or no access to quality, affordable healthcare.

trachoma are more prevalent in women, and in some areas of the world, social or economic factors can impede a woman's access to health care.

Beyond these troubling statistics is the fact that three-quarters of blindness and visual impairment is preventable, according to the World Health Organization. Recognizing the critical need for public advocacy and education, HMS Professor of Ophthalmology, Ilene Gipson, PhD, teamed with colleagues in the United

AROUND THE WORLD

Many HMS Department of Ophthalmology physicians, optometrists, and support staff are determined to change these statistics by joining volunteer medical missions that serve communities across the far reaches of the globe. Missions are wide-ranging and include: providing eye exams, performing sight-saving surgery, conducting vital skills-based training for local medical staff, and establishing self-sustaining ophthalmology clinics and programs. HMS faculty and staff have joined medical missions to El Salvador, Guatemala, Nicaragua, Cambodia, and in many other locations throughout the world. Here are some of their stories.



WomensEyeHealth.org envisions a better future for women

Earlier this decade, an analysis of 70 epidemiological studies revealed that two out of three people who are blind or visually impaired in the world are women. Reasons vary as to why women bear a greater burden of blindness and vision loss. In industrialized countries like the United States, women live longer than men; many potentially blinding eye diseases, such as age-related macular degeneration, increase in frequency with age. Statistics also show that some ocular conditions (such as dry eye) are more intrinsic to women than men; autoimmune diseases that affect the eye, such as Sjögren's Syndrome, may also be more prevalent in women. In developing nations, infectious diseases like

States and abroad to form WomensEyeHealth.org (WEH.org), an online education and advocacy group that raises public awareness about women's eye health, and supports blindness prevention research and programs.

The group's core mission is to alert women to their increased and disproportionate risk of eye disease; the organization also encourages life style changes and actions that optimize eye health, such as having regular eye exams and not smoking. The group promotes their message through their website (www.womenseyehealth.org) as well as a variety of outreach venues including health fairs, lectures, and literature campaigns. And word is spreading quickly: WEH.org chapters are being established in many U.S cities and in nations around the globe. Recently, chapters were formed in Spain, Portugal, and China.

"When we preserve sight, we improve life," notes Dr. Gipson, WEH.org Chair. "When we preserve a woman's sight, we improve the lives of her children, spouse, and community. We want women to know that they can take steps to optimize their eye health. And in parts of the world where women may be deprived of the best health care, we want to educate people that the precious gift of sight benefits them not only directly but also encourages more productive and supportive family situations in the community."

"When we preserve a woman's sight, we improve the lives of her children, spouse, and community. We want women to know that they can take steps to optimize their eye health."

—Ilene K. Gipson, PhD, Chair, Women's Eye Health.org



HMS ophthalmologist, Dr. Roberto Pineda II, MD, performs cornea surgery on a patient during an ORBIS mission to Myanmar in 2008.

HMS ophthalmologists on a mission to advance global health

HMS Assistant Professors Aaron M. Fay, MD, and Roberto Pineda II, MD, have made a commitment to improving global eye health as medical volunteers for ORBIS International. ORBIS was founded nearly three decades ago as a non-profit organization dedicated to saving sight and eliminating avoidable blindness worldwide. In 1982, its now-iconic Flying Eye Hospital—at the time a converted DC8 outfitted as an ophthalmic teaching hospital and surgical center—flew its first mission to Panama. Seventy-five countries and hundreds of flying missions later, ORBIS's unique and highly lauded program has evolved into a broad-based, "capacity building" effort that is dedicated to helping developing countries create sustainable, accessible, and affordable eye health care within their communities.

Central to the ORBIS mission are the services of a core group of 500 volunteer faculty members. Drs. Fay, Pineda and other ophthalmology experts provide high-level, hands-on surgical and clinical training to local staff. Dr. Fay, of Mass. Eye and Ear's Ophthalmic Plastic and Reconstructive Surgery Service, traveled with ORBIS to India to teach oculoplastics techniques. Dr. Pineda, director of Refractive Surgery at Mass. Eye and Ear, is a 12-year veteran of ORBIS. Since 1998, he has traveled on ten missions to remote communities in Ethiopia, Uzbekistan, Burma [Myanmar], India, China, Cuba and, most recently, Indonesia (Java). He has trained hundreds of local physicians in the techniques of cornea surgery (including corneal transplants), cataract surgery, and other anterior segment surgeries.

ORBIS's strong focus on educating and training a complete medical "core" of personnel—from doctors to nurses and OR staff—is a philosophy that appeals to academic clinicians like Dr. Pineda. "The ORBIS program is unique in that it's very comprehensive and very structured. As visiting volunteer faculty, my role is both clinician and teacher," says Dr. Pineda. I'm screening patients, doing surgical demonstrations, giving lectures, and teaching—even fixing equipment! Missions typically last just for a week, but my contributions have a high impact." There is continuity as well; local doctors can

continue to communicate and consult with Dr. Pineda once he returns to Mass. Eye and Ear through an on-site, web-based interface that allows them to share information and images.

Tapping the expertise of highly skilled clinicians like Drs. Pineda and Fay has multiple benefits. Pineda notes, for example, that lack of funds, government restrictions, and political strife may prevent most local doctors in these developing countries from traveling overseas for specialized training opportunities. "Our involvement fills a training gap by helping local doctors broaden their skill sets," he said. Dr. Pineda's commitment to ORBIS also has been a conduit for striking up new collaborations with other ophthalmologists. He notes that his involvement in establishing a keratoprosthesis clinic in Ethiopia came about as a direct result of his experience with ORBIS.

In November 2010, as a guest speaker at an ORBIS fundraiser in New York City, Dr. Pineda lauded the organization's broad social impact on global health. "ORBIS volunteers and staff work hand-in-hand with the unique requirements and customs of governments around the world," he says. "In doing so, they pull together all the elements needed to establish a working and sustainable health care infrastructure in developing communities. In this way, ORBIS heightens awareness of eye disease globally and at every level of government. I'm proud to be part of an effort that effects real and positive change around the world."



As Director of the Refractive Surgery Service at Mass. Eye and Ear, Roberto Pineda II, MD, regularly performs refractive surgeries and serves as co-investigator in excimer laser FDA clinical trials while also developing tools used in managing LASIK complications. His clinical interests also include complex reconstruction procedures, such as Descemet's stripping endothelial keratoplasty for toxic anterior segment syndrome. In collaboration with other Mass. Eye and Ear clinician scientists, including Drs. Ula Jurkunas and Claes Dohlman, Dr. Pineda is also developing strategies for reducing complications after various corneal procedures—including LASIK, PRK, and Boston KPro.



“These...simple interventions can have a huge, life-changing impact for a child who has a blinding eye disease but is otherwise healthy.”

— Danielle Ledoux, MD



Dr. Ledoux (far right surgery, back to camera) coaches a local Guatemalan ophthalmologist through a cataract surgery. Surgeries are run side by side in the same OR to maximize resources and save time, a medical practice forbidden in the US.

HMS ophthalmologist gives hope — and sight — to children around the world

Long before she became a pediatric ophthalmologist, Danielle Ledoux, MD, had a strong desire to serve children in underprivileged communities, which helped shape her future medical career. “I chose ophthalmology because I knew it would allow me to do the international work I wanted to do,” says Dr. Ledoux, whose busy pediatric ophthalmology practice at Children’s Hospital Boston is focused on cataract and strabismus surgery.

Her desire to be involved in global outreach was fueled during her pediatric fellowship at the Medical University of South Carolina (MUSC). She was mentored by M. Edward Wilson, MD, Chair of the Department of Ophthalmology at MUSC, who is well known in the international medical community for his longstanding outreach work in developing countries. Through Dr. Wilson’s collaboration with a private family foundation, Danielle had the perfect venue to put her skills—and her heart—to work. The U.S.-based foundation, which

funds several global outreach programs, established one of its most successful endeavors in Guatemala: a pediatric, cataract surgery program at Hermano Pedro Hospital in Antigua.

For the last five years, she has traveled to the hospital as part of a weeklong mission to perform cataract and, more recently, strabismus surgery on children from impoverished areas of that region. “These are relatively straightforward and simple interventions, but can have a huge, life-changing impact for a child who has a blinding disease but is otherwise healthy,” remarks Dr. Ledoux. “This is especially true of children from poor, remote villages whose life circumstances are already challenging.”

According to Dr. Ledoux, young patients are screened ahead of time by a local ophthalmology team to determine if they are candidates for surgery. The program’s original focus was cataract surgery, but has been expanded to include strabismus surgery. The cost for surgery, room and board, and short-term follow-up care, is fully funded through the foundation, which also subsidizes the travel expenses of family members who accompany patients. Dr. Ledoux is one of a team of three pediatric surgeons (including Dr. Wilson) who perform a total of about 50 surgeries during their weeklong stay.

The work is not without its challenges. Although Hermano Pedro hospital is clean and well run, it is not a full-service hospital; not only does it have limited inpatient facilities, but it also does double duty as the local orphanage. Lacking resources, staff, and technology that other hospitals in wealthier countries have readily at hand, Dr. Ledoux says she has to consider the implications of each surgery she performs knowing that the hospital has limited resources, and that most patients will return to a remote village with little or no access to long-term medical care. “Depending on the individual needs of each patient, my approach and methods may vary in order to ensure the best outcome possible,” she says.

Dr. Ledoux notes that the program also has helped cross a cultural divide. In past years, patients and their families have been reticent to seek treatment or follow-up care because of the stigma attached to these diseases. This is slowly changing, she explains, as the program builds momentum through education and word-of-mouth. “I’ve noticed more and more patients are willing to return for follow-up care and families of potential patients are seeking out our help,” says Dr. Ledoux. “It’s gratifying to see how the program is creating this continuity of care which, ultimately, will enable us to help more young patients.”

In February 2011, Dr. Ledoux put her experience and talent to work on a month-long mission at the Nepal Eye Hospital in Tripureshwor, Kathmandu. There, she worked with a local pediatric ophthalmologist who has established a pediatric ophthalmology department and



training program. She credits her outreach opportunities to the strong web of support she receives from the International Health Services Program at Children’s Hospital Boston—particularly to David Hunter, MD, PhD, the hospital’s Ophthalmologist-in-Chief. “I have received incredible support from the hospital, especially from Dr. Hunter, who has encouraged my outreach efforts from the beginning,” says Dr. Ledoux. These experiences have helped me grow personally and professionally. It’s simply an amazing feeling to have such a real and lasting impact on the health of children around the world.”

Vision on the go: global demand increases for boston keratoprosthesis

An estimated eight million people in the world are blind from corneal disease, and the majority of patients live in developing countries. For some patients, conventional cornea transplantation offers a successful and life-changing solution. But sometimes transplants fail, while other patients suffer from conditions that make them poor candidates for traditional transplantation. HMS Emeritus Professor of Ophthalmology, Claes H. Dohlman, MD, PhD, has devoted much of his life’s work to solving this problem. Dr. Dohlman, founder of the cornea specialty, invented the Boston Keratoprosthesis (KPro), which combines a corneal prosthesis with a synthetic supporting structure that sometimes can be used as a successful alternative to conventional cornea transplants. Approved by the FDA nearly two decades ago, the KPro is now used in 150 centers in the United

States and around the world, offering sight to thousands of people who would otherwise remain blind.

Pilot programs in developing nations around the globe are bringing KPro’s sight-saving benefits to these populations. Programs exist in India, China, Thailand, Central and South America, Africa, and, most recently, Sudan. Cornea experts James Chodosh, MD, and Roberto Pineda II, MD, also have worked to broaden the availability of the Boston KPro worldwide. Dr. Chodosh has performed and assisted with artificial cornea implantation surgery in India, Italy, England, and Israel. Recently, he began a project to develop a \$50 keratoprosthesis for use in underdeveloped countries.

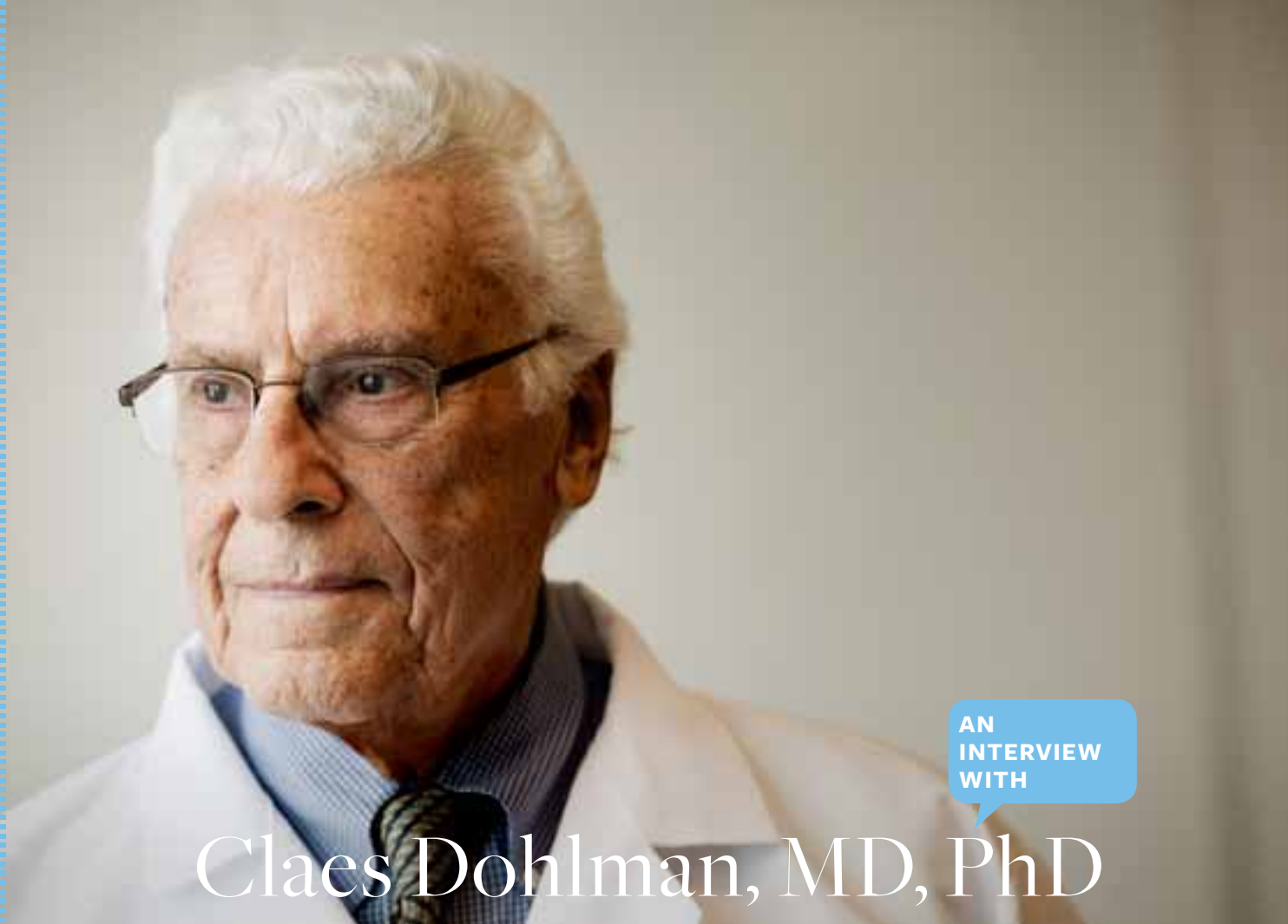
In 2008, Dr. Pineda led the effort to establish the first KPro center in Africa. His team traveled to Addis Ababa, Ethiopia to teach surgical implantation techniques to ophthalmologists and medical support staff. Dr. Pineda’s team also offers training on the follow-up care needed for successful outcomes. Establishing self-sustaining, long-term KPro clinics in poorer demographic areas like Addis Ababa is not without challenges. Scarcity of medications and advanced microbiology labs, along with maintaining rigorous patient protocols, can make an already-challenging task even more difficult. Dr. Pineda notes that careful up-front planning helped the process run smoothly. Today, the clinic is self-sustaining. Back in Boston, the KPro team is in the third year of a five-year longitudinal study to study the viability of the Boston KPro in developing countries and hone the program as needed.



Drs. Roberto Pineda and Aaron Fay with a Kpro patient in Ethiopia.



Patients and family members wait in line at Hermano Pedro Hospital to register for surgery.



AN
INTERVIEW
WITH

Claes Dohlman, MD, PhD

How does someone approach the formidable task of creating a new ophthalmic subspecialty?

You have to have a somewhat fanatical interest and focus. It's not a part-time undertaking, not something you do now and then. You have to stick with it because it's so time-consuming. It's not only a career but rather a life you live.

What were some of the challenges?

When I first came to the U.S. in 1958, there was no formal Cornea Service; it was just me for many years and that was the biggest challenge. I was fortunate in that, once I established the Cornea Service and a structured fellowship program, we were able to attract many students who had academic ambitions. Drs. Sweebe, Boruchoff, Martola and Wiedman were important early faculty collaborators. Over the years, the faculty has trained more than 200 clinical fellows. Eighty of those individuals have become full professors and more than 40 have become department chairs. We were very lucky to get great people who have gone on to become pioneering researchers and leaders in the field.

How did people react when you decided to develop an artificial cornea?

With a lot of skepticism—as I did! My original results, in the 50s and 60s, were pretty disastrous. We started to get some good outcomes after that but it wasn't until the 1970s that the prosthesis began to show promise. However, when I became chief and chair of the Department in 1974, I had to stop KPro research for 15 years simply because I had too many other commitments.

And what happened?

When I retired from my administrative duties in 1989 I decided to concentrate on something practical – the KPro – and the prosthesis has been the centerpiece of my work for the last twenty years. I'm glad I did because developing an artificial cornea has been very exciting. It has been a lesson in patience and perseverance – not just time consuming but fraught with complex and difficult challenges. As I said, it was years before we realized some promising outcomes.

You use the term “we.”

Absolutely. The clinical success of the KPro has required a great collaborative effort among Harvard's ophthalmic research community and close research partners at MIT. Turning the KPro into a viable, clinical reality for patients has required multi-disciplinary expertise not only in surgery but in biomaterials, bioengineering, optics, inflammation, bacteriology, glaucoma, retinal detachment, plastics and contact lenses. None of these disciplines are my areas of expertise so, over the years, I have enlisted the collaboration of numerous HMS faculty as well as partners like MIT.

Who are some key members of the KPro team?

Presently Dr. James Chodosh – who is an astute researcher on a professorial level – is addressing autoimmune issues; Drs. Ilene Gipson and Eli Peli from Schepens, are foremost experts in enzymes and optics respectively. Dr. Kathryn Colby is refining surgical development techniques; Dr. Irmgard Behlau, an infectious disease expert at Mass. Eye and Ear, examines bacteriology issues; Dr. Joseph Ciolino, has developed a drug

“What the developing world needs is a safe, long-term and inexpensive corneal prosthesis. Our goal with the KPro is simple: get it out there so it is doing some good and helping as many people as possible.”— Dr. Claes Dohlman

releasing contact lens in collaboration with several researchers from Professor Robert Langer's laboratory at MIT, supervised by Dr. Daniel Kohane who now runs his own lab at MIT. Dr. Roberto Pineda is our ambassador abroad and has established KPro clinics in some of the poorest nations. Dr. Samir Melki is developing telemetric techniques for measuring the intraocular pressure. I also have seven international research fellows working on KPro improvements. Of course, there are many other individuals here and abroad who have provided key guidance and expertise in helping us to develop the KPro and to spread the word.

What have been some of the KPro milestones?

There have been two primary ones in recent years. Historically, post-operative bacterial infections caused some disastrous failures, especially in patients with autoimmune diseases. In the early part of this decade, Dr. Marlene Durand (Director of Infectious Disease at Mass. Eye and Ear) suggested vancomycin prophylactically, which dramatically lowered infection rates. It was a revolutionary improvement in treatment. A second challenge we've addressed is tissue melt around the cornea. In 2000, we redesigned the KPro and added holes in the back plate of the collar button shaped prosthesis; this improves nutrition to the holding graft. We also started to use a soft contact lens to protect against dehydration. Both advances have mitigated tissue melt by almost 100 percent in non-autoimmune eyes.

What are the challenges that lay ahead?

Despite recent successes in improving clinical outcomes with the KPro, I temper my enthusiasm with the caveat that we are only halfway to the train station – we still have some significant challenges to overcome. Autoimmune disease and chemical burns remain problematic because they can lead to tissue disintegration. We're working on several fronts to address these issues. Another troubling KPro outcome is that it can trigger glaucoma, a complication that can be particularly vicious in patients with chemical burns. We have worked closely with Mass. Eye and Ear's glaucoma service, specifically Drs. Cynthia Grosskreutz and Lucy Shen who have helped us to develop new procedures, while one of my fellows at MIT is working on a new type of shunt.

You and your team have made a significant effort to promote the Boston KPro to some of the world's poorest nations. Why?

Most of the world's 8 million people with corneal blindness live in the developing world and they need a safe and inexpensive cornea prosthesis. Our goal with the KPro is simple: get it out there so it is doing some good and helping as many people as possible. That's why we've established self-sustaining KPro clinics in some of the poorest nations, most recently in Sudan and Ethio-

pia. Logistically, these efforts have gone remarkably well thanks to Dr. Pineda. Cost, unfortunately, still remains an issue.

Can you elaborate?

For many developing countries, the cost of the KPro procedure is prohibitively expensive. Even if the device were provided free of charge, there are additional costs associated with physician time, long-term medication, contact lenses, follow-up care, etc. We've mitigated this situation some by providing the KPro to some countries at a substantially reduced cost – in some cases for free – in order to make it affordable and available to those who need it. Even so, it remains out of reach for many people.

You've inspired thousands of fellows, students and colleagues through the years. Who inspired you?

As a fellow at the Wilmer Institute (Johns Hopkins) in the early 1950s, I had the good fortune to study under Dr. Jonas Friedenwald who, at the time, was one of the country's premier eye researchers. Another inspiration was Dr. Charles Schepens, renowned for his work on retinal detachment and for creating and building the Schepens Eye Research Institute into a foremost eye research facility. He had an enormous talent for focusing on a single problem, and then building up an organization, research, and fellowship training around it. His advice was invaluable to me after I arrived in Boston (1958) and began to build a cornea specialty and structured cornea fellowship program.

Now in your ninth decade, you remain an active member of the Cornea Service. How do you spend your time?

I teach and mentor, run a small, specialized KPro patient clinic and direct a program of clinical R&D. I also like to keep up with my colleagues and others who ask for my advice so I make an effort to answer my correspondence. I stopped operating in the spring (2010)—I'm 88 so I have a good excuse. I'm still having fun, though, and especially enjoy teaming up fellows with the right expertise to tackle the remaining KPro issues. Even though we've made a lot of progress there is still so much to accomplish. I am convinced that we will continue to have the most talented cornea team in the world, headed by Dr. Reza Dana, to carry on at Harvard when I eventually retire.

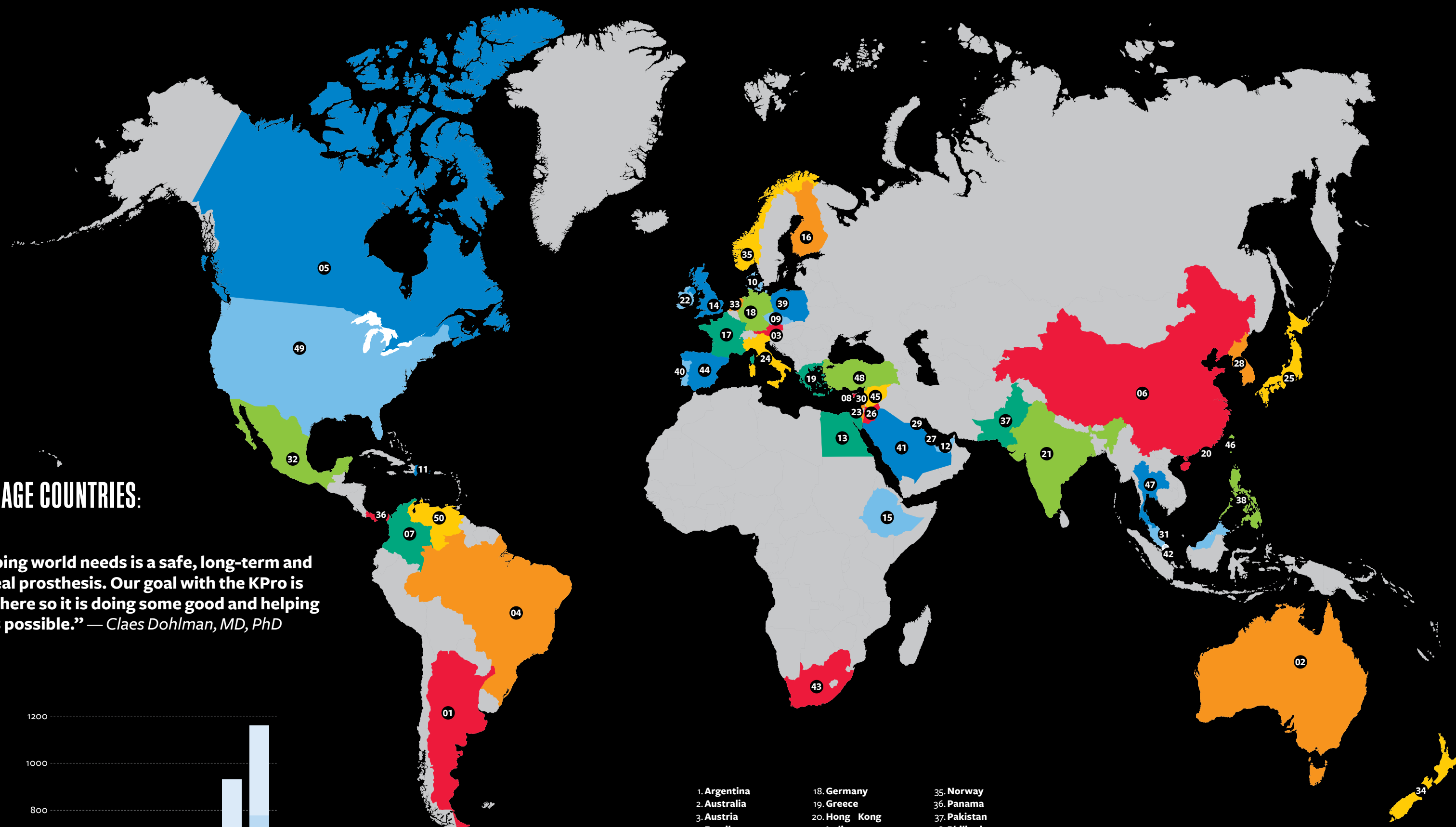
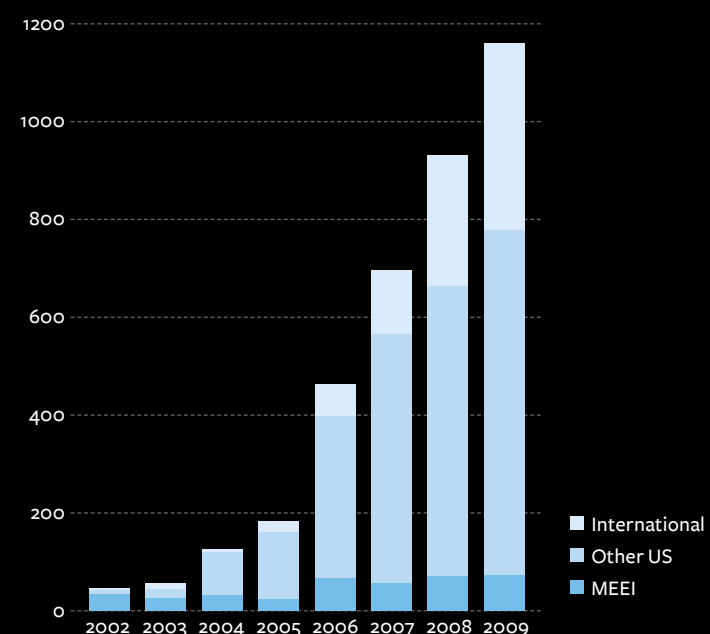
You've made indelible contributions to ophthalmic science and research. How do you want people to remember you? Your work?

I don't know. I have been very lucky in my work and I have always been happy doing it – never bored. I would like to pay tribute to my wonderful family who has been extraordinarily supportive. My great wife has done so much to support my career. I have a lot to be grateful for!

KPRO

USAGE COUNTRIES:

“What the developing world needs is a safe, long-term and inexpensive corneal prosthesis. Our goal with the KPro is simple: get it out there so it is doing some good and helping as many people as possible.” — *Claes Dohlman, MD, PhD*



- | | | |
|------------------------|------------------------|-------------------|
| 1. Argentina | 18. Germany | 35. Norway |
| 2. Australia | 19. Greece | 36. Panama |
| 3. Austria | 20. Hong Kong | 37. Pakistan |
| 4. Brazil | 21. India | 38. Philippines |
| 5. Canada | 22. Ireland | 39. Poland |
| 6. China | 23. Israel | 40. Portugal |
| 7. Colombia | 24. Italy | 41. Saudi Arabia |
| 8. Cyprus | 25. Japan | 42. Singapore |
| 9. Czech Republic | 26. Jordan | 43. South Africa |
| 10. Denmark | 27. Kingdom of Bahrain | 44. Spain |
| 11. Dominican Republic | 28. Korea | 45. Syria |
| 12. Dubai | 29. Kuwait | 46. Taiwan |
| 13. Egypt | 30. Lebanon | 47. Thailand |
| 14. England | 31. Malaysia | 48. Turkey |
| 15. Ethiopia | 32. Mexico | 49. United States |
| 16. Finland | 33. Netherlands | 50. Venezuela |
| 17. France | 34. New Zealand | |