



UPMC **EYE CENTER**

2011 Year in Review

UPMC LIFE
CHANGING
MEDICINE

Chairman's Message

I am pleased to share with you this Year in Review presented by the UPMC Eye Center. In 2011, we remained steadfast in our dedication to the Eye Center's mission of improving quality of life through the preservation and restoration of vision. I am proud of the success we achieved individually and collectively.

Academic medicine is often described as resting on three foundations: clinical care, research, and teaching. I am glad to report noteworthy accomplishments in all of these domains during 2011, reflecting the UPMC Eye Center's ongoing commitment to advancing the highest standards of excellence across the spectrum of ophthalmology.

- We welcomed six new members to our clinical faculty. These physicians specialize in comprehensive ophthalmology, glaucoma, and medical uveitis and retinal disorders.
- We achieved an all-time high in our basic research funding for a total of \$6.89 million.
- The Ophthalmology CORE grant was renewed and is now in its 24th year of providing research support to basic and clinical investigators. Since 2000, the department has received more than \$7 million in CORE grant support, which has been documented in 362 publication citations.
- Through our Guerrilla Eye Service, we provided eye care services to underserved populations, blending education with community service.
- We introduced a new chief of Pediatric Ophthalmology, Strabismus, and Adult Motility, Kanwal 'Ken' Nischal, MD, FRCOphth, internationally renowned ophthalmic surgeon.



Joel S. Schuman, MD, FACS

- We presented the world's first images of outflow structures in the living eye using ultrahigh resolution optical coherence tomography.
- Our director of Orbital, Oculoplastics, and Aesthetic Surgery, S. Tonya Stefko, MD, worked as an integral part of UPMC's interdisciplinary skull base surgery team, which is pioneering the development of minimally invasive approaches to surgery within the skull base, brain, and orbit.

I am very proud of our team's accomplishments this year. It is a privilege to lead such an amazing group of faculty and researchers, who strive daily to meld clinical excellence with scientific innovation. I look forward to continued growth in the year to come.

Joel S. Schuman, MD, FACS

*Eye & Ear Foundation Professor and
Chairman, Department of Ophthalmology*

Director, UPMC Eye Center

Interim Director, Louis J. Fox Center for Vision Restoration

Guerrilla Eye Service

'Traveling Light' to Save Sight

Call it a "Groundhog Day moment."

Every year, medical students would visit the office of Evan "Jake" Waxman, MD, PhD, director of undergraduate medical education and ophthalmology residency programs at the University of Pittsburgh School of Medicine, expressing a desire to help the less fortunate in their community obtain eye care.

"They would organize an eyeglasses drive or a vision screening at a health fair," says Dr. Waxman. "The following year, another group of students would come in with the same idea."

As in the movie *Groundhog Day*, in which actor Bill Murray's character kept waking up to relive the same day, Dr. Waxman found a way to maximize the benefits of a recurring experience.

"We send our residents on an annual eye-care mission to Honduras," he explains. "I decided we could also do a mission in our own back yard." Thus was born the Guerrilla Eye Service, a mobile clinic that provides professional services to underserved populations who face barriers to ophthalmic care in Pittsburgh and the surrounding area.



Medical students and residents get hands-on training by treating the underserved.

With support from the Lion's Club and several local foundations, Dr. Waxman purchased mobile ophthalmology equipment that could be transported in his car. "The idea was to be a sort of commando eye squad--to travel light and save sight," he says.

That was five years ago. Since then, faculty and resident physicians of the UPMC Eye Center have performed more than 500 eye exams at primary care clinics, health centers, and other locations serving people who would otherwise have difficulty obtaining eye care. Guerrilla Eye Service "missions" take place two or three times each month.

Providing eye care in a primary care setting facilitates continuity of care, says Dr. Waxman. Patients return for follow-up appointments, and the ophthalmologists can communicate easily with the patients' primary care physicians. "If I see a patient with diabetic retinopathy, I want their primary care doctor to know this is someone who needs extra attention," he says.

The concept has an educational component as well. All those involved volunteer their time. Participating medical students, some very early on in their medical careers, have the opportunity to gain practical, hands-on experience while earning community education credits. It is not unusual to see young medical students working alongside senior residents and clinicians.

"I think very often future docs who come into medical school are very idealistic, but by the time they finish their training they're cynical, and one of the things I'm trying to do is counteract that," explains Dr. Waxman.



Evan Waxman, MD, helps medical students and residents understand the importance of providing eye care in a primary care setting.

For Matt Kaufman, MD, volunteering with the Guerrilla Eye Service provided the experience he needed to decide he wanted to specialize in ophthalmology. He began participating in the service as a second-year student at the University of Pittsburgh School of Medicine and is now a first-year resident physician at the UPMC Eye Center.

Dr. Kaufman says he's never forgotten a particular patient he saw on one of his first Guerrilla Eye Service missions. The man had poorly controlled diabetes and had not received an eye exam for many years. "When we did his eye exam we found he had severe diabetic retinopathy. Dr. Waxman arranged for him to get laser treatment. He explained to me that we had probably saved the patient's vision. It made a big impact on me to realize how important it was that we were doing this."

"People sometimes have the idea that today's younger generation cares mostly about themselves," Dr. Waxman says. "None of that is true. Our students give four or five hours a night, three nights a month, and they get paid in pizza."



Minimally invasive endoscopic orbital surgery

A new approach to a challenging diagnosis

Patients with complex disorders of the orbit and skull base are benefitting from advanced surgical techniques using minimally invasive endoscopic approaches that are being pioneered and refined by UPMC surgeons.

One such patient, who presented with proptosis and eyelid displacement, was diagnosed with a slow-growing osteoma in the left frontal sinus. Before coming to UPMC, surgeons at the patient's local hospital recommended removal of the tumor via a craniotomy. The invasive nature of that procedure prompted him to do an Internet search, and he learned that UPMC has experience with the multidisciplinary management of exactly this type of problem.

"The mass was pushing the patient's entire eye socket down," explains neuro-ophthalmologist, S. Tonya Stefko, MD, director of Orbital, Oculoplastics, and Aesthetic Surgery at the UPMC Eye Center. She, along with colleagues in neurosurgery and otolaryngology, constitute UPMC's multi-disciplinary, minimally invasive skull base surgery team.

The team determined that a minimally invasive endoscopic approach, which eliminates the need for large scalp incisions, craniotomy, and brain retraction, was the best surgical option for this patient. An approximately 3 cm incision hidden in the left eyebrow gave direct access to the tumor and a 360-degree view, after insertion of an endoscope.

This minimized complications, such as damage to the brain or optic nerve. The successful surgery left the patient with only a faint scar, barely visible in his eyebrow.

The endoscopic approach "is most useful for masses that are medial or inferior and that are pretty far back in the orbit toward the brain," says Dr. Stefko. "Those are masses that traditionally have been very difficult to remove because of their proximity to the optic nerve."

Benefits of the minimally invasive approach for the patient typically include a shorter surgery time, a shorter hospital stay, a quicker overall recovery, less pain, fewer complications, and a faster return to normal activities, she says. "There is a lot less disruption of tissue than in conventional surgery. Using the endoscopic approach, we can complete the surgery in less time and the patient often goes home the next day."

Minimally invasive surgery requires a high level of mutual trust among the members of the surgical team. "It's a very different way of working than most ophthalmologists are accustomed to," Dr. Stefko says. "You are standing at the elbow of another surgeon and you are doing the surgery collaboratively. You have to be able to talk to each other and — probably even more importantly — listen to each other."

The strength of the interdisciplinary approach lies in combining the knowledge, experience, and technical abilities of the surgeons on the team, she says. "We can accomplish so much more working together than any one of us could do on our own."



S. Tonya Stefko, MD, is part of a multidisciplinary team that specializes in minimally invasive skull base surgery.

Pediatric ophthalmology

A vision for world-class care



Kanwal 'Ken' Nischal, MD, FRCOphth, has a vision and a plan to make Pittsburgh a world-class center for pediatric ophthalmology.

Internationally renowned as one of the world's foremost pediatric eye specialists and a pioneer in pediatric ophthalmic surgery, Dr. Nischal joined the UPMC Eye Center as chief of Pediatric Ophthalmology, Strabismus, and Adult Motility, and professor, Department of Ophthalmology, in November 2011. Prior to joining UPMC, he was an ophthalmic surgeon at Great Ormond Street Hospital for Children in London.

Dr. Nischal is a passionate advocate for and a practitioner of evidence-based, protocol-driven clinical care. His research has contributed to the establishment of new standards of care for conditions across the spectrum of pediatric ophthalmology, including, but not limited to, dry eye syndrome, pediatric glaucoma, pediatric cataracts, strabismus, and corneal transplants.

Evaluation of treatment approaches and documentation of what works and what doesn't are the foundation for the delivery of high-quality clinical care, according to Dr. Nischal.

"When there are differences in the way doctors treat a particular condition, that presents an opportunity to do a

prospective study to find out which approach works best," he says. "My vision is to deliver outstanding, quality care that is based on documented best practices."

Dr. Nischal's long-term goal is to make Children's Hospital of Pittsburgh of UPMC a premier location for pediatric ophthalmic care. He is an advocate of interdisciplinary collaboration, because experience has shown that new therapies often come about when different disciplines work together. He also is looking to establish a pediatric ophthalmology fellowship and to expand National Institutes of Health research at Children's Hospital.

Dr. Nischal plans to develop a comprehensive center for the treatment of visually impaired children that will provide parents with developmental health and educational support for day-to-day care. Children's Hospital, which opened in its new location in 2009, is the ideal location for a state-of-the-art pediatric ophthalmology center. Situated on 10 acres with more than 1.5 million square feet of usable space, Children's is among the first fully digital hospitals in the country. The campus utilizes breakthrough technology, enhanced research facilities, and an intelligent design to maximize efficiency in patient care.



Documented best practices and strong interdisciplinary collaboration will help Children's remain a leader in pediatric ophthalmology.

Dr. Nischal is the author of more than 80 published research articles and is an international expert in complex anterior segment surgeries. His findings, which have helped change the way pediatric eye disease is treated, include the following:

- Eighty-eight percent of children with severe congenital glaucoma do well when treated with a combined trabeculectomy/trabeculotomy.
- Topical anti-inflammatory glucocorticoid fluorometholone can be used in children's eyes for as long as seven years without causing complications.
- Punctal plugs are a safe and effective treatment for dry eye syndrome in children and do not cause infections.

"We are delighted that Dr. Nischal chose to join our team here in Pittsburgh," says Joel S. Schuman, MD, chair of the Department of Ophthalmology. "I am confident that with his leadership, our pediatric patients will receive vision care that is second to none in the world and we will continue to develop innovative ways to make this world-class care even better."

Ultrahigh resolution OCT

World's first images of Schlemm's canal in living subjects

The ability to understand the outflow pathways of aqueous humor in the eye has been hampered by the inability to visualize the pathways in the living eye — until now.

Using ultrahigh-resolution optical coherence tomography (OCT), Larry Kagemann, PhD, research assistant professor in ophthalmology and bioengineering at UPMC Eye Center, has produced the world's first noninvasive 3D images of Schlemm's canal and its connective outflow pathways in living human eyes — a "canalogram" of sorts.

In the healthy eye, aqueous humor flows from the ciliary body into the anterior chamber and is filtered through the trabecular meshwork, with most flowing into Schlemm's canal. From there the aqueous humor is carried through collector channels into venous plexi before draining into the episcleral veins. Any resistance to aqueous outflow — caused, for example, by abnormalities in the trabecular meshwork — can raise intraocular pressure, setting the stage for the development of glaucoma.

"Nobody has ever seen these outflow structures as they function," says Dr. Kagemann. "If you think of the outflow structures in the eye as water pipes in a house, what we have done is develop a technique that makes the walls of the house disappear so we can just see the pipes. You could call this 'canalogy.'"

While OCT is widely used to image the retina, its use to visualize these structures at the front of the eye is novel. In

collaboration with scientists at the Massachusetts Institute of Technology, Dr. Kagemann and his colleagues have developed ultrahigh resolution OCT devices capable of visualizing the three-dimensional morphology of the outflow structures.

Unlike ultrasound imaging, which is able to "see" behind other structures, OCT "sees" relatively translucent tissues within only 2 mm of the surface of the eye, explains Dr. Kagemann. "Because the outflow structures of interest are in the limbus, they are viewable with minimal penetration from the surface," he says.

Once ongoing validation studies are complete, noninvasive measurement of aqueous outflow structures could help to elucidate the pathophysiology of aqueous outflow in glaucoma and to better understand how glaucoma

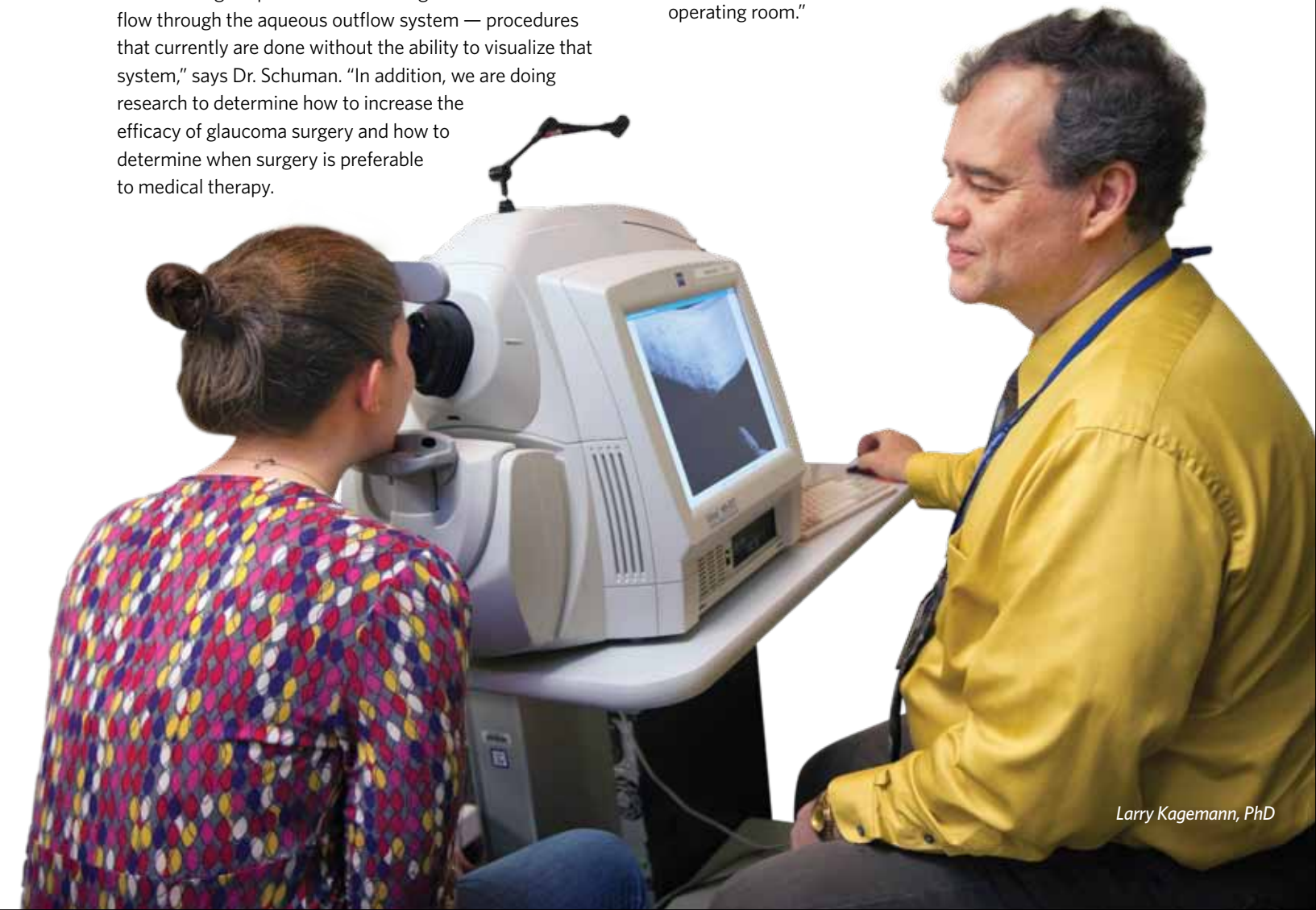
therapies modulate aqueous outflow. Measurements of aqueous outflow also may be useful in presurgical planning, according to Joel Schuman, MD, chair, Department of Ophthalmology, and leader of the UPMC Eye Center's glaucoma imaging group.

"Several surgical procedures are designed to enhance flow through the aqueous outflow system — procedures that currently are done without the ability to visualize that system," says Dr. Schuman. "In addition, we are doing research to determine how to increase the efficacy of glaucoma surgery and how to determine when surgery is preferable to medical therapy.

"The ability to image the aqueous outflow system will provide important information, such as whether the existing outflow structure is totally insufficient, or is viable but defective, to inform these decisions. Canalogy may provide surgical guidance, potentially decreasing complications and increasing success in the operating room."



Ultrahigh-resolution OCT enables ophthalmologists to visualize Schlemm's canal.



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Director, Neuro-Ophthalmology Service

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Director, Ocular Trauma Service

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Retinal Development Laboratory

Gadi Wollstein, MD

Associate Professor of Ophthalmology
Director, Ophthalmic Imaging Research Laboratories

UPMC Eye Center Residents and Fellows

UPMC Eye Center Fellows

Brandon Cho, MD — *Oculoplastics Service*
Lama Khatib, MD — *Pediatric Service*
Farhad Sarfi, MD — *Retina Service*
Jeremy Wingard, MD — *Glaucoma Service*

Third-Year Residents

Nancy Buchser, MD
Audrey Chan, MD
Wendy Chen, MD
Rachel Davis, MD
Emily Deschler, MD
Veeral Shah, MD

Second-Year Residents

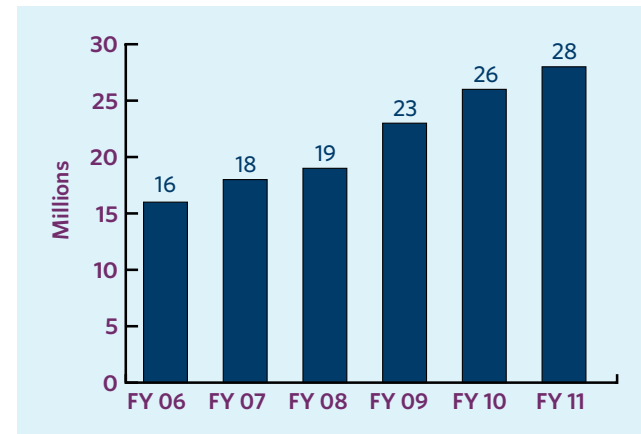
Peter Brennen, MD
Angela Elam, MD
Anna Gushchin, MD
Matt Kaufman, MD
Jessica Kovarik, MD
Carlos Medina, MD

First-Year Residents

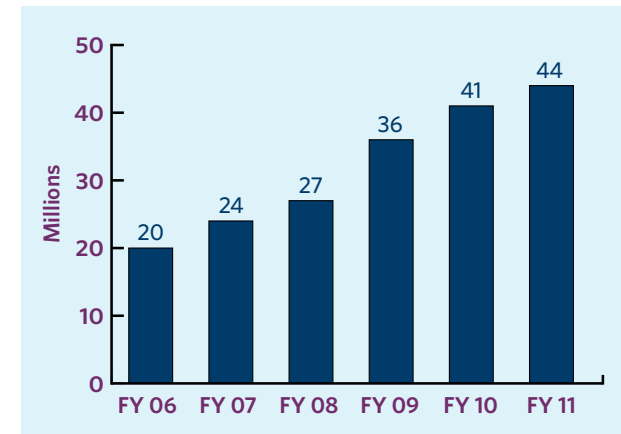
Salwa Abdel-Aziz, MD
Victoria Chang, MD
Jared Knickelbein, MD
Jacek Kotowski, MD
John Legarreta, MD
Alison Zambelli, MD

UPMC Eye Center by the Numbers

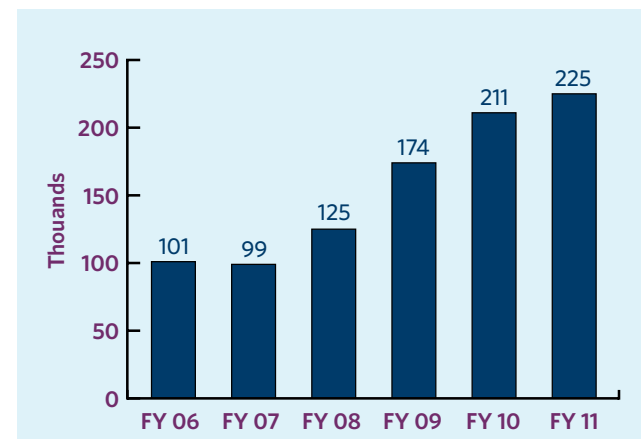
Consolidated Revenues



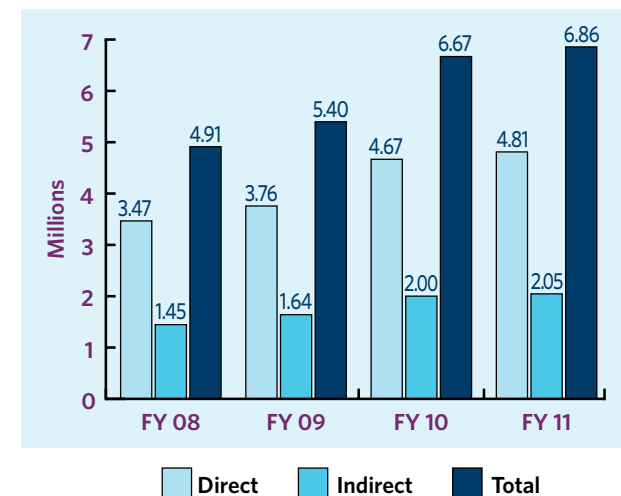
Gross Professional Charges



Total Transactions Billed



UPMC Eye Center Research Funding



UPMC Eye Center Locations

UPMC Eye Center

Eye & Ear Institute
203 Lothrop St.
Pittsburgh, PA 15213
Director: Joel S. Schuman, MD, FACS

UPMC Eye Center

Eye Care & Optical
3616 Forbes Ave.
Pittsburgh, PA 15213
Director: Amy C. Nau, OD

UPMC Eye Center Bethel Park

1300 Oxford Drive, Suite 1-A
Bethel Park, PA 15102
Director: Kari Eisley, MD

Children's Eye Center

Children's Hospital of Pittsburgh of UPMC
45th St. and Penn Ave.
Pittsburgh, PA 15201
Director: Kanwal K. Nischal, MD, FRCOphth

Children's North

2599 Wexford Bayne Road
Sewickley, PA 15143

UPMC Eye Center McKeesport

1605 Lincoln Way
White Oak, PA 15131
Director: Norman L. Edelstein, MD

UPMC Eye Center Mercy

1400 Locust St., Suite 3103
Pittsburgh, PA 15219
Director: Evan L. Waxman, MD, PhD

UPMC Eye Center Monroeville

125 Daugherty Drive, Suite 320
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Director: Deepinder K. Dhaliwal, MD, LAc

UPMC Eye Center St. Margaret

100 Delafield Road, Suite 201
Pittsburgh, PA 15215
Director: Marshall W. Stafford, MD

UPMC Eye Center Wexford

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For more information about our clinical programs, a physician referral, or consult, please call **1-800-446-3797**, or visit **UPMC.com/EyeCenter**.

For information about clinical programs, research activities, and continuing medical education, visit **UPMCPhysicianResources.com/Ophthalmology**.

UPMC Eye Center Services

- Aesthetic Surgery
- Contact Lens and Low Vision
- Cornea
- Glaucoma
- Laser Center
- Louis J. Fox Center for Vision Restoration
- Neuro-Ophthalmology
- Ocular
- Orbital and Oculoplastics Surgery
- Pediatric Ophthalmology
- Laser Vision Correction (Refractive Surgery)
- Retina and Vitreoretinal
- Visual Electrophysiology and Psychophysics

About the Eye & Ear Foundation

For more than 100 years, the Eye & Ear Foundation of Pittsburgh has had a single goal: to advance medical care and research for patients with disorders of the eye, ear, nose, throat, head, and neck. From its beginnings in 1895 as a charitable dispensary, the foundation has evolved into an organization that provides essential philanthropic support for the academic, research, and outreach programs of the Eye & Ear Institute.

In 2011, the Eye & Ear Foundation contributed nearly \$2 million to support research and education at the Departments of Ophthalmology and Otolaryngology at the University of Pittsburgh School of Medicine. Its efforts improve the lives of patients and bring closer the day when cures for these debilitating conditions are possible. To learn more about the foundation or to contribute to support its work, please visit **www.eyearandear.org**.



UPMC EYE CENTER

Eye & Ear Institute
203 Lothrop St.
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