



EYE OPENERS

Mason Eye Institute • University of Missouri - Columbia
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LASIK Focus

Custom LASIK surgery is now available at Mason Eye Institute

Waking up in the middle of the night and not being able to see the time on the bedside clock is an experience of the past for patients who have undergone laser refractive surgery to improve their vision. The most commonly performed laser refractive surgery is LASIK, with as many as 1.5 million procedures performed annually in the United States. LASIK uses a laser beam to remove microscopic bits of tissue from the cornea and change its shape to improve the cornea's focusing power.

Mason Eye Institute has two ophthalmologists who perform laser refractive surgery. John Cowden, M.D., has been performing laser refractive procedures for 10 years, and Timothy McGarity, M.D., who joined MEI in 2006, is now expanding his practice to include LASIK and other refractive surgery. Laser refractive surgery is performed at Eye Institute East, MEI's clinic at 404 Portland St., near Columbia Regional Hospital. The clinic is now equipped to perform custom LASIK, one of the newest advances in laser refractive surgery. "Patients who are considering laser refractive surgery often want to have custom LASIK because laser reshaping of the cornea can be customized according to the curvatures of the patient's eye," Dr. McGarity said.

THE CORNEA AND REFRACTIVE ERRORS

The cornea is the clear front surface of the eye that helps focus light and images on the retina. The cornea and lens both play a role in the focusing power of the eyes. The cornea supplies about two thirds of the eye's focusing power, and the lens supplies about one third. Vision is blurred when the shape of the cornea is not perfectly round, preventing light and images from hitting the retina when they are in focus.

Imperfections in focusing power are called refractive errors. The main types of refractive errors are *myopia*, *hyperopia* and *astigmatism*. With *myopia*, or nearsightedness, a person has difficulty seeing objects at a distance. Myopia affects about one in four people. With myopia, the cornea is too steep, preventing light rays and images from falling on the retina. Instead, they fall in front of the retina because the distance is too great between the cornea and lens and the retina. Laser refractive surgery for myopia is performed to flatten the too-steep cornea.



Dr. John Cowden performing laser surgery on a patient

With *hyperopia*, or farsightedness, a person has difficulty seeing close objects because the cornea is not steep enough to allow proper focusing on the retina. Light rays and images are not in focus by the time they reach the retina because the distance is too short between the cornea and lens and the retina. Hyperopia is not the same thing as the changes in reading vision that begin to affect people as they enter their 40s. The change in reading vision in middle age is called *presbyopia*. Presbyopia occurs when the lens becomes less flexible and is unable to focus on close objects.

Astigmatism, the third type of refractive error, occurs when the curve of the cornea and sometimes the lens is uneven. The curve is steeper in one direction than another, causing distortion of the image on the retina. Many people have a combination of myopia or hyperopia and astigmatism.

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WAVEFRONT SCAN AND CUSTOM LASIK

LASIK stands for *l*aser-assisted *i*n situ *k*eratomi-l-*e*usis ("kerato" is the Greek word for cornea; "mileusis" means to change shape). It is the most common type of refractive surgery performed at Mason Eye Institute. "A LASIK procedure is an excellent choice for some people," Dr. Cowden said. "With a patient who has myopia and is having trouble with contact lenses, LASIK is an excellent possibility as a way to improve vision. In people with high degrees of myopia, LASIK may not result in 20/20 vision, but it will improve their uncorrected vision so that they will be able to see for distance activities without glasses or contact lenses."

A key to successful LASIK surgery is the measurement the ophthalmologist obtains to identify the refractive errors in the eye. This information guides the surgeon in determining what tissue needs to be removed to reshape the cornea. Now available at Mason Eye Institute is custom LASIK, which provides a detailed measurement of the refractive errors in the eye. Also known as wavefront LASIK, custom LASIK uses a wavefront device, called a wavefront aberrometer, that measures in detail the focusing imperfections of the eye. The wavefront scan is one of the eye tests performed during the preoperative evaluation for LASIK surgery. It only takes a matter of seconds to complete.

"The wavefront measurement is like a topographic map of the eye, showing how the eye focuses light," Dr. McGarity explained. "By using a beam of light that is sent through the eye and to the retina, the wavefront aberrometer scans the eye and measures very fine changes in the eye's refractive status. The data obtained during the scan are transferred to the laser used to perform LASIK surgery. The laser delivers the same wavefront scan to the cornea. This customizes the laser treatment. The irregularities on the corneal surface detected by the wavefront scan are eliminated by the laser."

PATIENT EXPECTATIONS FOR LASIK SURGERY

While laser technology for refractive surgery has made great strides since the original surgery in the early 1990s, perfect 20/20 vision is not possible in every patient. "Laser refractive surgery improves uncorrected vision but it may not make the vision 20/20," Dr. Cowden said. "Some patients are not good candidates for the surgery because their corneas are too thin or because their myopia is too severe. We perform a comprehensive eye examination to determine whether or not a patient is a candidate for LASIK. There are many factors to consider before LASIK is performed."

Eye on Faculty: TIMOTHY D. McGARITY, MD

Timothy D. McGarity, M.D., is Clinical Instructor at the Mason Eye Institute. He joined the faculty here in July 2006.

Dr. McGarity graduated with honors from the University of Arkansas in May 1997 with a BS in Microbiology. He earned his medical degree in May 2002 from the University of Arkansas for Medical Sciences and completed his residency in Ophthalmology at the Mason Eye Institute in 2006.



Dr. McGarity is American Board of Ophthalmology eligible and is a member of the American Academy of Ophthalmology (AAO) and the Missouri Society of Eye Physicians and Surgeons (MoSEPS).

His clinical practice focuses on comprehensive ophthalmology, cataract surgery and LASIK surgery. He also is a dedicated resident physician instructor, having trained numerous physicians.

A husband and the father of two children, Dr. McGarity is also active in outdoor activities such as gardening, canoeing and music festivals.

For more information regarding refractive surgery, Dr. McGarity or the Mason Eye Institute, please visit our website at www.muhealth.org/~ophthalmology.

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Mission of the Mason Eye Institute

The *Mason Eye Institute* is dedicated to providing the highest quality education, research and patient care in ophthalmology. The *Mason Eye Institute* provides leadership that sets standards for excellence in ophthalmology by developing well-trained, competent, compassionate ophthalmologists; expanding knowledge through basic science research and clinical investigations; and providing thorough, compassionate care to our patients, which includes the latest advances in medical eye care.

Thank you to those who have contributed to the furtherance of our mission through your generous gifts.

Linda G. Davis
Director of Development

GIVING SIGHT

THANK YOU for your support of the Mason Eye Institute. Gifts from grateful patients and other friends like you help to support important areas such as:

- Providing care for patients who cannot afford to pay for the cost of their health care.
- Enabling Mason Eye Institute to conduct important research on diseases like glaucoma, macular degeneration, cataract and diabetic retinopathy.
- Funding facilities and programs to train future ophthalmologists.

How You Can Help

There are many ways you can make a difference in the lives of people with vision-related illnesses or injuries. Please consider one of the following special needs:

Patient Care Fund

Mason Eye Institute provides eye care to mid-Missouri residents without regard to insurance status or ability to pay. But many of our less fortunate patients lack the resources to purchase appropriate glasses or low-vision aids. A gift of \$50, \$100 or more to our Patient Care Fund helps purchase these and other items for patients who will otherwise not have them.

Resident Education Fund

The future of ophthalmology lies in the hands of the young physicians who train in ophthalmology. Each year we have the pleasure of meeting three new doctors who have chosen ophthalmology as their specialty and who will train with our faculty physicians for the next three years. At all times, we have nine resident physicians on staff at the Mason Eye Institute. We must ensure that we pass on to these young people the most up-to-date medical information possible and provide them with state-of-the-art equipment with which to hone their skills. Your gift of \$1,000 or more to our Resident Education Fund helps purchase learning materials, equipment and seminar opportunities for budding ophthalmologists who may someday care for your eyes.

Special Equipment Fund

Remarkable new technology is available to dramatically improve the quality of patient care as well as research into the causes of vision loss. Unfortunately, revenue from patient visits is not sufficient to fund much of the latest and most important equipment. Private gifts are vitally important in helping our physicians and researchers provide more accurate diagnoses, treatment and cures. A detailed list of our current equipment needs is online at www.muhealth.org/~ophthalmology. A punctuated list of equipment needs is provided here:

Infrared video camera - together with a calibrated light simulator, data acquisition, processing computer and custom software will be used to build an instrument that will be able to measure the response of the pupil to light stimuli - pupillary light reflex (PLR) - which becomes altered with the presence of many eye diseases. With the use of this instrument, physicians and researchers will be able to measure PLR in various eye diseases and assess the efficacy of experimental therapies for restoring PLR to normal. The ability to measure PLR is important in developing new treatments for eye diseases. The approximate cost for this item is \$15,000.

Wavefront analyzer - is used to map "aberrations" in the eye. Several types of visual imperfections exist within the eye and can affect both visual acuity and quality of vision. To date, only lower-order aberrations such as myopia, hyperopia and astigmatism could be measured and treated with corrective laser surgery. However, these do not account for all potential vision imperfections. Higher-order aberrations can have a significant impact on one's quality of vision and are often linked to visual glare and halos that may cause night vision problems. The wavefront analyzer software performs complicated measurements and projects a precise map for the surgeon to evaluate. The data is transferred to the laser, which generates a "treatment table" or an outline of the patient's refractive error and higher order aberrations. Treating a patient with the information taken from the wavefront analyzer can result in greater clarity of vision and less complaints of glare or night halos. The approximate cost for this item is \$50,000. Mason Eye Institute currently leases a wavefront analyzer.

For more information on ways you can give, contact Linda Davis at (573) 882-1020 or davislg@health.missouri.edu.

Mason Eye Institute

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Mason Eye Institute Faculty

John W. Cowden, MD

Dr. Cowden is the chairman of the Department of Ophthalmology and specializes in cornea and external diseases of the eye. He performs cataract, refractive surgery and corneal transplant surgery.

Jeffrey M. Gamble, OD

Dr. Gamble joined the Mason Eye Institute as a clinical instructor in April 2007. He is an optometrist who specializes in contact lens fitting and keratoconus.

Joseph Giangiacomo, MD

Dr. Giangiacomo specializes in pediatric ophthalmology and pediatric and adult strabismus. He is also chief of staff for University of Missouri Health Care.

Dean P. Hainsworth, MD

Dr. Hainsworth specializes in retina and vitreous diseases. His current research includes macular degeneration and diabetic retinopathy.

Lenworth N. Johnson, MD

Dr. Johnson specializes in neuro-ophthalmology (diseases/disorders involving the eye and brain). As Residency Program Director, Dr. Johnson also oversees the education of the Ophthalmology resident physicians.

Martin L. Katz, PhD

Dr. Katz is currently involved in metabolic disease research, specifically in the study of neuronal ceroid lipofuscinosis (NCL), an inherited metabolic disease that affects nerve cells and ultimately causes blindness.

Bo Lei, MD, PhD

Dr. Lei specializes in electrophysiology (the electrical properties of cells), and his current research includes retinal degenerative diseases. He maintains a joint

appointment with the College of Veterinary Medicine.

Don Liu, MD

Dr. Liu specializes in oculoplastic surgery and orbital trauma. His clinical interests also include orbital and periorbital tumors, lacrimal disorders, eyelid reanimation, and socket reconstruction.

Timothy D. McGarity, MD

Dr. McGarity, featured in this edition of *Eye Openers*, began his practice in general ophthalmology at Mason Eye Institute and Moberly Eye Institute in July 2006. He covers resident physician staffing at the VA Eye Clinic, and his clinical interests are in cataract and refractive surgery.

Rajiv R. Mohan, PhD

Joining the Mason Eye Institute faculty roster in 2006, Dr. Mohan brought with him his research expertise in corneal gene therapy and corneal wound healing in association with refractive laser surgery. He has a joint appointment with the College of Veterinary Medicine.

Kristina Narfström, DVM, PhD

Dr. Narfström's research in veterinary ophthalmology concerns mainly the characterization of hereditary retinal blinding diseases in cats and dogs that have their counterparts in humans. Her recent work with microchips successfully implanted in the eyes of blind cats to help them see has enjoyed much publicity.

Beryl J. Ortwerth, PhD

Dr. Ortwerth has distinguished himself over the past 30 years with work he has performed as part of an

ongoing National Institutes of Health (NIH) grant for cataract research.

Lixing W. Reneker, PhD

Dr. Reneker's current research focuses on the molecular mechanisms that control lens and corneal development. Her interest is in using transgenic mouse models to understand pathogenesis of human ocular diseases.

Frank G. Rieger, III, MD

Dr. Rieger specializes in cornea and external diseases of the eye, as well as cataract surgery. He serves patients in Columbia and the outreach clinic in Boonville located at Cooper County Memorial Hospital.

Dan B. Schoenleber, MD

Dr. Schoenleber is a glaucoma specialist and has been with MEI for ten years. He is also the Mason Eye Clinic director.

K. Krishna Sharma, MSc, PhD

Dr. Sharma is director of research for the Department of Ophthalmology. His study involves understanding the molecular basis for lens transparency and cataract development.

Morton Smith, MD

Adjunct Professor Dr. Morton Smith is also professor emeritus at Washington University in St. Louis. Dr. Smith is an ophthalmic pathologist and continues with resident teaching and clinical-pathologic research projects.

Theodore E. Wills, MD

Dr. Wills has been a general ophthalmology specialist for 41 years. His main focus is oversight of associate physician training in the clinical setting.