

# REPORT

*Better Health Through Research*

Winter 2007

## A Jump Start on Glaucoma

*New Technology Could Lead to Earlier Diagnosis and Treatment*

In a groundbreaking study, scientists in Atlanta have used magnetic resonance imaging (MRI) to probe the depths of the eye's retina—paving the way for the early detection and treatment of retinal degenerative diseases like glaucoma, retinitis pigmentosa, age-related macular degeneration and diabetic retinopathy.

“Currently available technologies for capturing images of the retina allow doctors to view only surface vessels and structures,” explains lead researcher Timothy Q. Duong, Ph.D., director of magnetic resonance research at the Yerkes National Primate Research Center and associate professor of neurology and radiology at Emory University. “The most serious retinal diseases that cause vision loss, however, attack various cellular levels *within* the retina. As a result, these diseases have often been diagnosed only in the late stages, after irreversible damage has occurred.”

Using state-of-the-art MRI technology on laboratory animals, Dr. Duong and his research team were able to penetrate the deep layers of the retina and produce clear images, with significant improvements in spatial resolution and sensitivity.

This new technology could lead to a breakthrough for the approximately 10 million Americans who experience retinal diseases. These include glaucoma, age-related macular degeneration and diabetic retinopathy.

“Because MRI technology is noninvasive and currently is used on people worldwide, extending this technology to imaging the retina should advance rapidly,” notes Dr. Duong. “Moreover, MRI has the unique advantage that it can provide useful physiological information, including structure, blood flow, oxygenation and function, in a single setting. The long-term goal is to bring this technology from the laboratory to the clinic where it can help prevent disease progression and vision loss through early diagnosis and intervention and better monitoring of treatment.”

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## President's Corner

*Investing in Knowledge—and Hope*

Nothing in the world of science happens overnight. The greatest medical advances come about through the steady, incremental acquisition of knowledge.

That's just what is happening in the world of glaucoma research. In these pages, you will read about some of the outstanding recent findings that offer so much promise to people with glaucoma and other retinal degenerative diseases.

You'll learn about an important new model for assessing glaucoma risk in people who haven't yet developed it. You'll see what scientists are discovering about a molecule named TNF-alpha that may be a critical link in arresting glaucoma's progression.

And you'll also learn about some amazing magnetic resonance imaging (MRI) technology that is allowing scientists to probe into the deepest layers of the retina. Such a tool could enable doctors to diagnose glaucoma and other illnesses far earlier, dramatically improving patients' long-term health prospects.

The work that National Glaucoma Research funds, with your support, is doing more than helping to ease the symptoms of glaucoma. It is helping to understand this disease from the inside out—the better to stop it in its tracks.

Because of your support, NGR was able to give nearly \$5,000 per day directly to glaucoma researchers last year. But the work is not done, and we are still striving to make future research efforts even more successful than those past.

Brian K. Regan, Ph.D.  
President

## Help Cure Glaucoma ... and Honor a Loved One

*Consider making memorial or honor gifts to National Glaucoma Research*

A gift to advance glaucoma research can be an even more special act when it honors someone you love and hold dear to your heart. For that reason, National Glaucoma Research provides opportunities for both memorial and honor gifts.

A *memorial gift* is a testimonial to the meaningfulness of a life that has passed on. An *honor gift* is a loving way to remember someone still living or a special occasion. Honor gifts are often given on special occasions, such as a friend's or relative's birthday, graduation, or anniversary. They are also appropriate gifts for holidays, for showing appreciation for someone's kindness, or

for recognizing someone's impact on your life.

With Valentine's Day and Easter approaching, an honor gift is a thoughtful way to recognize a loved one's compassion and kindness. Consider making a truly meaningful gift—consider a NGR honor gift.

National Glaucoma Research is especially proud of its honor and memorial program. We know how important it is that our loved ones be remembered and honored, and this program helps us to thank those who contribute through unselfish acts of kindness.

[www.ahaf.org](http://www.ahaf.org)

Simply click on the National Glaucoma Research link to learn more about what's new in the world of glaucoma research, as well as important information about risk factors for glaucoma and healthy choices that may help you minimize the risk of glaucoma.

# Research Update

## Model Can Predict Glaucoma Risk

Investigators at Washington University School of Medicine in St. Louis have developed a new risk assessment model for determining which patients are likely to develop glaucoma. The model, which draws on five glaucoma risk factors, makes it possible to determine an individual's risk of developing the disease during the next five years.

Michael A. Kass, M.D., national chair of the 22-center study and head of the Department of Ophthalmology and Visual Sciences at Washington University School of Medicine, believes the new model not only will help physicians decide which patients to treat aggressively but will arm patients with information to help them decide whether to go through with treatment.

“We hope this information will be used to help doctors and patients make good decisions about testing, examination and the possibility of preventive treatment,” says Kass. He cautions that the risk assessment model is a “work in progress” and will evolve as scientists learn more about genetic risks and other factors related to glaucoma.

## Study Opens New Treatment Possibilities

New research from Children's Hospital Boston and the Massachusetts Eye and Ear Infirmary (MEEI) may help explain how glaucoma causes blindness, revealing the chain of events that ultimately damage the optic nerve, preventing visual information from traveling from the eye to the brain.

The study, performed on mice, indicates possible targets for intervention, including an inflammatory molecule called tumor necrosis factor-alpha (TNF-alpha). “The end stage of glaucoma is a loss of retinal

ganglion cells,” says senior author, Dr. Larry Benowitz. “We now have good evidence that TNF-alpha plays an essential role in this loss.”

These findings suggest that drugs inhibiting TNF-alpha function might help stem the progress of glaucoma. Such drugs already exist—including antibodies and soluble receptors that soak TNF-alpha up and remove it from action—and are already used to treat inflammatory diseases like rheumatoid arthritis.

“These findings give a whole new approach to thinking about glaucoma therapy,” says Joan Miller, M.D., Chief of Ophthalmology at MEEI and a coauthor of the study.

## New Drug Approved for Easing Eye Pressure

In September 2006, the U.S. Food and Drug Administration (FDA) approved Travatan(R) Z (travoprost ophthalmic solution) for reducing elevated eye pressure in patients with open-angle glaucoma or ocular hypertension. The medication provides another option for people who have not experienced significant improvement with other medications.

Travatan(R) Z is a variation on Travatan(R) solution that replaces benzalkonium chloride (BAK) with Sofzia™, a preservative system that is gentle to the eye surface. Alcon developed this BAK-free version because long-term use of topical solutions containing BAK may compromise the eye surface and exacerbate conditions such as dry eye.

If you have questions about Travatan(R) Z, please contact your eye doctor.

## Answers to Your Questions

*Readers receive much-needed information about glaucoma*

### ***Q. Is one segment of the population more at risk for developing glaucoma?***

A. Glaucoma is a leading cause of blindness among African Americans and Hispanics in the United States. African Americans experience glaucoma at a rate three times that of Caucasians and experience blindness four times more frequently. The reasons contributing to the higher risks are still uncertain, although genetics are thought to be a factor. One in 50 Caucasians has the disease by age 70 compared to one in eight African Americans.

Also, people over 60 are at greater risk of developing glaucoma. Individuals with Japanese ancestry may be more vulnerable to normal-tension glaucoma, and people of Asian or Eskimo descent may carry a higher risk for closed-angle glaucoma.

### ***Q. Can you have glaucoma without having increased pressure inside the eye?***

A. Elevated eye pressure does increase the risk of developing glaucoma. However, the disease can occur in people with normal or even lower-than-normal eye pressure. In addition, there are individuals with elevated eye pressure who do not develop the symptoms of glaucoma.

“Normal tension glaucoma” (NTG) can be diagnosed by observing the optic nerve for any signs of damage. The shape and color of the optic nerve are evaluated by using an ophthalmoscope (a hand-held instrument that has its own light source and enables the physician to look through the pupil and observe the back of the eye). In addition, a visual field test can help determine if there is any current loss of peripheral vision. Sometimes patients with NTG are not aware that they have lost sight in certain parts of the visual field.

Research is ongoing to determine additional factors that contribute to the optic nerve damage and why certain individuals are more susceptible. In addition to lowering pressure inside the eye, the role of genetic factors and medications that will protect and preserve the optic nerve from damage are two areas that researchers are exploring. Currently, there is no “cure” for NTG; however, early diagnosis and treatment can control glaucoma before vision loss or blindness occurs.

### ***Q. How do eye doctors document optic nerve damage?***

A. When a patient has glaucoma or is at high risk for developing the disease, physicians may document how the optic nerve changes over time by making drawings, taking photographs or using a new technique called optic nerve imaging. Scanning laser polarimetry, confocal scanning laser ophthalmoscopy, and optical coherence tomography are all examples of optic nerve imaging techniques. The patient’s eye care professional can best determine which method or methods to use.

### ***Q. Can glaucoma be cured by laser techniques?***

A. Laser surgery can help control the symptoms of glaucoma; however, no treatments are currently available that will cure the disease. Several forms of laser surgery can help drain fluid from the eye or decrease the amount of fluid produced. These include trabeculoplasty, iridotomy, cyclophotocoagulation and SLT (selective laser trabeculoplasty). These techniques help maintain a normal eye pressure and minimize the risk of further damage to the optic nerve.

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