

REPORT

Better Health Through Research

Summer 2010



Glaucoma Injury Begins in the Brain, Not the Eye, New Study Finds

Study supported by National Glaucoma Research opens new window for treatments

A groundbreaking study sponsored by National Glaucoma Research has shown that the first signs of glaucoma occur not in the eyes, as was previously thought, but in the brain.

“This is a paradigm shift in how we think about this disease,” says David Calkins, Ph.D., Director of Research and Associate Professor of Ophthalmology at the Vanderbilt Eye Institute. “This will have global implications. This information opens up an entirely new domain of nerve-derived therapeutics.”

Using animal models, Calkins and his research team found that, with the onset of glaucoma, axons in the optic nerve first lose their ability to communicate with the mid-brain region that provides sensory information about sound, heat, cold, pain and pressure.

“The degeneration works in reverse order,” explains Calkins. “It starts in the brain and works its way back to the retina so that in the very latest stages of the disease, the earliest structures, the ones nearest the eye, are the last to go.”

Traditional glaucoma therapies have focused on lowering pressure within the eye. However, the Vanderbilt findings suggest that therapies could successfully address the intersection of the brain and the optic nerve. Indeed, to improve or restore this neural pathway, Dr. Calkins’ researchers are now working with both synthetic compounds and natural nerve growth factors to find suitable drugs.

“People really thought we were crazy when we first suggested that the first signs of injury for glaucoma were in the brain,” says Calkins. “What this discovery does is to allow us to view this disease through the same lens that we view other age-related, neurodegenerative disorders,” he adds, including Alzheimer’s disease and Parkinson’s disease.

The Vanderbilt study, published in the *Proceedings of the National Academy of Sciences*, also raises the possibility that MRI scans could catch glaucoma in its early stages.

National Glaucoma Research contributed \$100,000 to Dr. Calkins’ work.

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Chairman's Corner

The eye-body connection

We all know glaucoma is a disease of the eye. What is becoming clearer and clearer is that it is also a disease of the body.

In this issue of *National Glaucoma Research Report*, you'll learn about an amazing study that traces glaucoma's damage to the very depths of the brain. These findings, made possible in part by National Glaucoma Research and its generous supporters, have given scientists a new way to think about glaucoma – and a crucial new window for the next generation of therapies.

But the findings also reinforce a message we have been trying to get across for some time now. To prevent or treat glaucoma, we have to take care of our entire bodies, not just our eyes.

These findings also remind us of another message: the importance of funding critical research. Thank you for being our partner in the search for a cure, for fighting with us to bring an end to threat of glaucoma in all of our lives.



Brian K. Regan, Ph.D.

To Treat or Not to Treat?

The majority of people with high eye pressure, but no glaucoma damage, do not require pressure-lowering eye drops, concludes a study by Washington University School of Medicine in St. Louis.

The study followed some 1,636 subjects over a 15-year period. Half received eye drops from the start; half were closely monitored but were not given any drops for seven years. For those with high pressure but otherwise at low risk, there was little difference in outcome between those who received eye drops at the beginning and those who received them seven years later.

Researchers did caution, however, that patients with additional risk factors are well-advised to seek preventive therapies.

"It's clear that people with high eye pressure and high risk of developing glaucoma do benefit from early medical treatment," says lead investigator

Michael A. Kass, M.D. "But we have learned that not everyone with high pressure is at high risk."

The study's conclusion supports Kass's earlier findings that elevated eye pressure is just one of the risk factors in glaucoma. Others include age, corneal thickness, cup/disc ratio (the amount of optic nerve that is visible inside the eye) and pattern standard deviation (a measurement from computerized visual-field tests).

"...not everyone with high [eye] pressure is at high risk."

Kass emphasizes the importance of regular eye exams in detecting eye pressure levels and assessing other risk factors. "And if an individual has high eye pressure and no glaucoma damage," he adds, "you should speak to your eye doctor about your risk for developing glaucoma and whether you might benefit from preventative treatment."

Research Roundup

Glaucoma tied to higher reading impairment



Glaucoma may increase reading impairment and slow spoken reading in older adults, say researchers with the Wilmer Eye Institute of Johns Hopkins University.

After surveying 1,154 people, scientists found that, while subjects with unilateral glaucoma showed similar reading speeds and odds of reading impairment as subjects without glaucoma, those with bilateral glaucoma read 29 words per minute slower than those without glaucoma and had roughly twice the odds of reading impairment.

The study, published in *Archives of Ophthalmology*, suggests that future studies are needed to sort out differences associated with race and lower levels of education.

Glaucoma medications could lower death risk

Glaucoma patients who take any kind of medicine for their condition appear to be at a lower risk of death than those who take no medicine, according to a study by the University of Michigan Kellogg Eye Center and School of Public Health.

The study, published in *Archives of Ophthalmology*, assessed more than 21,000 people aged 40 and over with glaucoma or suspected glaucoma. According to researchers, 75 percent of those using medications, either singly or in combination, were less likely to die over the course of this particular study than those who did not use any medication.

“Additional studies are needed to determine whether this result is best explained by a protective effect of the medications themselves or by other confounding factors, such as access to care or providers’ prescribing patterns,” the authors conclude.



Researcher Spotlight

Gareth Howell, Ph.D.
The Jackson Laboratory
Bar Harbor, ME

Determining the importance of
Endothelins in glaucoma

Award Amount: \$100,000

Summary:

No therapies are available that target neuronal death in glaucoma. Here, we assess an important pathway, the Endothelin System, to better understand the mechanisms of neuronal cell death. Endothelins are normally thought to influence blood pressure. However, this work could lead to the development of improved therapies for glaucoma.



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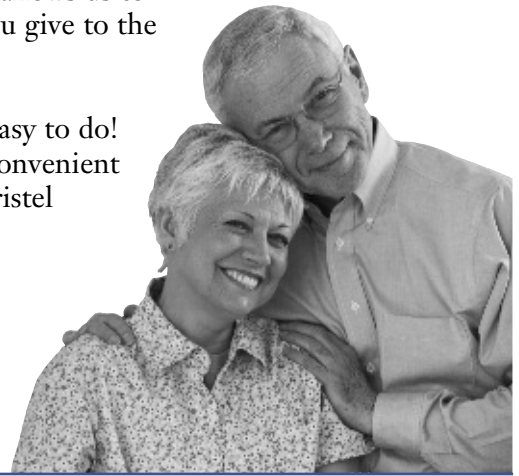
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Learn more online at
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Please visit the National Glaucoma Research website to learn more about what's new in the world of research, as well as important information about risk factors for glaucoma.

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