



Research Team Finds Genetic Clue to 'Emergency' Glaucoma

Could Strengthen Understanding of Angle-Closure Glaucoma

Jackson Laboratory researchers and their collaborators have reported their discovery of a gene implicated in an acute and severe form of glaucoma known as angle-closure glaucoma (ACG).

Most people with the more familiar open-angle glaucoma don't even know they have the disease until it's detected in an eye exam. The condition develops slowly and can usually be managed with eye drops and laser surgery.

But ACG can be another story: acute attacks of ACG are a medical emergency. Sudden, debilitating symptoms include severe eye pain, headache, blurred vision, nausea, and vomiting. Without prompt intervention to reduce pressure, very rapid loss of vision can occur.

ACG patients typically have eyes that are slightly smaller than normal, with a lens that is large for the size of the eye, and an abnormally short axial (front-to-back) length of the eye. The research team identified a mouse strain that has anatomical features similar to those seen in patients with ACG.

In these mice, they discovered that, depending on genetic background, a particular mutated gene (serine protease PRSS56) can cause variable reduction in axial length, ranging from modest to severe. In addition, the researchers found that a



mutation in the same gene in humans can cause severe reduction of axial length in people who have small eyes and extreme farsightedness.

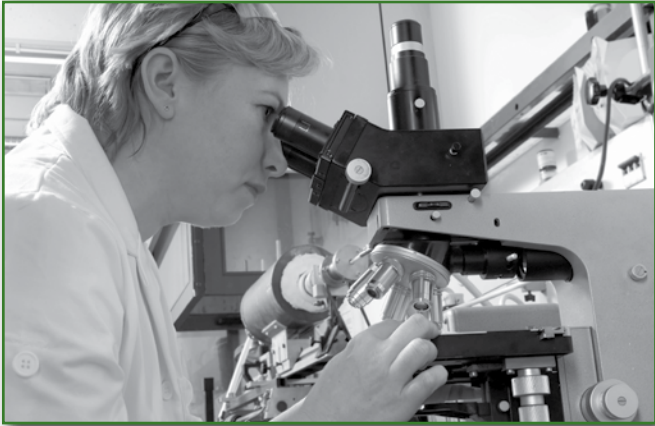
This is the first link between this gene and ACG, as well as eye development in infants. These mice represent an important and much needed tool to study this disease.

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Research Identifies Risk Factors Associated with Progression of Glaucoma



Elevated pressure inside the eye, cornea thinning, and visual field loss are all markers that glaucoma may progress, according to a report in the May issue of *Archives of Ophthalmology*, one of the JAMA/Archives journals.

Carlos Gustavo V. De Moraes, M.D., from the New York Eye and Ear Infirmary, and colleagues collected data from patients who were enrolled in the New York Glaucoma Progression Study and who had at least eight visits for visual field loss.

Researchers found that glaucoma was more likely to progress when peak intraocular pressure (IOP) was 18 mm Hg (millimeters of mercury) or higher. Other risk factors included thinning of the cornea, presence of disc hemorrhage (bleeding in the area where the optic nerve attaches to the retina), and atrophy in part of the eye.

Perhaps the most significant findings involved the effect of IOP. Since this is a simple measurement to take in the clinical setting, the findings “may help clinicians decide how aggressively to treat specific patients to slow the rate of glaucoma progression,” the authors write.

They also pointed to disc hemorrhage as “an indirect sign” of visual field loss that may already have occurred. They also stated erosion of the visual field as well as cornea thinning as predictors of glaucoma progression.

To learn more about this and other glaucoma research developments, please visit www.ahaf.org/glaucoma for the latest news.

Chairman's Corner


New Grants Awarded in the Fight against Glaucoma

Recently, National Glaucoma Research awarded 10 new grants to scientists who are engaged in the fight against glaucoma. These grants support a variety of projects. Two of the main areas of focus are on early detection of glaucoma and furthering our understanding of the role pressure in the brain plays in developing the disease.

This is exciting news, and I share this with you because you made this possible. Your donations and support enable us to fund critical research projects that offer new ways to look at this sight-stealing disease and that in turn could offer potential new prevention and detection methods, as well as treatments and—ultimately—a cure.

In this issue of *National Glaucoma Research Report*, you can read about the direct impact your gift has, like the study led by NGR grantee Carla Siegfried, M.D., that may explain why African Americans have a higher glaucoma risk. You can also read about NGR grantees Simon John, Ph.D., and Gareth Howell, Ph.D., who have made a groundbreaking genetic discovery that could help develop new treatments for glaucoma.

But most of all, as you read your newsletter, I hope you are impressed by the achievements you have helped make possible. We could not fund this work without you.

 Brian K. Regan, Ph.D.

Researchers Find Eye Development Error Causing Cataracts and Glaucoma

A team of researchers that includes NGR grantees Simon John, Ph.D., and Gareth Howell, Ph.D., has discovered that changes to a stress-buffer gene called TDRD7 promotes the development of both cataracts and glaucoma in mice and people. In mice with this disease, the lens doesn't develop properly, which causes cataracts. Also the eye's drainage system becomes damaged, which results in an increase in intraocular pressure that can lead to glaucoma later in life. This groundbreaking discovery has introduced a new target for developing future treatments for glaucoma.



Study Offers First Look at Asian Americans' Glaucoma Risk

Little has been known about glaucoma risks for Asian Americans until a National Eye Institute-funded study published recently in the journal *Ophthalmology*.

The rate of narrow-angle glaucoma (NAG) was higher in Asian Americans than in any other racial group in the study and highest of all among Chinese and Vietnamese Americans. The risk of normal-tension glaucoma (NTG) was three to 10 times higher in Japanese Americans than other Asian ethnicities studied, and nearly all of the Asian sub-groups were at higher risk than non-Asian Americans.

The results have implications for patient care. "For example, the inner eye angle anatomy of patients of Chinese or Vietnamese ancestry should be carefully examined," said Joshua Stein, M.D., Kellogg Eye Institute, University of Michigan, who led the study. "And since NTG won't be detected by simply measuring intraocular pressure (IOP), eye doctors need to assess the status of the optic nerve in patients whose ethnicity makes them more susceptible to this type of glaucoma," he added.



Women Who Are Obese May Have Lowered Risk of Developing Glaucoma, Study Cautiously Concludes

A 10-year follow-up research study, involving nearly 4,000 people from Rotterdam, Netherlands, concluded that women who were obese—with a high body mass index (BMI)—have a slightly lower risk of developing open-angle glaucoma (OAG) than women who weigh less.

In particular, the researchers conclude there is "a 7% reduction in risk of developing OAG for each unit increase in BMI in women." The reasons for this are not known, and the researchers suggested there could be confounding factors that account for this decrease. Nevertheless, they announced that their data are statistically significant and that these results confirm the findings of an earlier study completed by a separate team of researchers.



More Oxygen in Eyes of African Americans with Glaucoma

May Explain Why African Americans Face Higher Risk

National Glaucoma Research grantee Carla Siegfried, M.D., and her colleagues from Washington University School of Medicine in St. Louis have observed that oxygen levels in the eyes of African Americans with glaucoma and/or cataracts are significantly higher than those of Caucasians with the disease(s).

The researchers believe that the higher levels of oxygen or oxygen metabolites may damage the eye's drainage system, called the trabecular meshwork, which may lead to an increase in eye pressure. These researchers did not set out to look

specifically at African Americans, but the racial difference in oxygen levels was significant, and they believe this observation deserves further study.

The results are especially interesting, since it may help to explain why African Americans are more likely than other populations to get glaucoma, develop it earlier in life, and experience blindness from the disease. This National Glaucoma Research-supported study may provide an important clue concerning the apparent link between how the eye processes oxygen in different populations and the risk for developing glaucoma.

A Retirement Plan that Gives Back

Charitable gift annuities benefit givers and receivers alike

With a charitable gift annuity, you can set up a contract under which you transfer cash or other assets, such as stocks or bonds, to National Glaucoma Research. In exchange, you receive a fixed sum of money, paid out over a lifetime period.

An annuity can be made for a single party or for two parties—for example, a husband and wife, an aunt and a niece, or a father and a daughter. Often, a married couple will choose an annuity to ensure that both parties enjoy an income that they can rely on for life.

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- The option of receiving payments annually, semi-annually, quarterly, or monthly;
- Income tax benefits; and
- Competitive annuity payment rates

The minimum amount to establish a gift annuity is \$10,000.

For more information on this unique way of giving, contact June Marlin Falb, Director of Leadership Gifts, at 1-800-437-2423.

Thank you for thinking of National Glaucoma Research!

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