National Glaucoma Research

National Glaucoma Research Report

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In This Issue

Developing Tools to Prevent Vision Loss

An innovative study by National Glaucoma Research–funded scientist Bingrui Wang, PhD, at the University of Pittsburgh, and her mentor Ian Sigal, PhD, will investigate axon deformation and its link to damage in the back of the eye. This will help researchers better understand glaucoma's causes and develop tools to prevent vision loss.

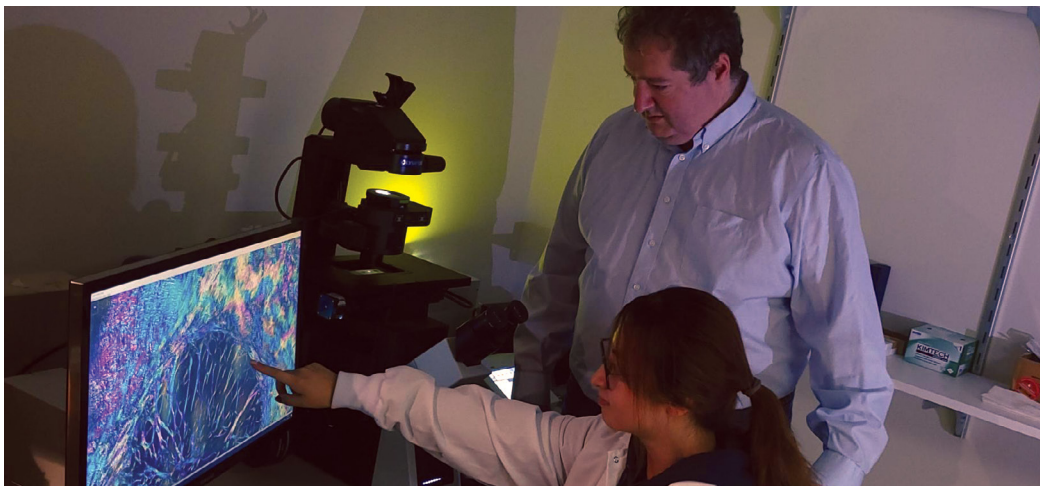
Blindness may occur due to high eye pressure that mechanically deforms the axons that carry visual information to the brain. However, the link between axon deformation and long-term damage has been unclear — until now.

Leveraging her engineering background, Dr. Wang approaches this challenge with innovative techniques that bridge biology and technology. A major focus of her work is to understand how elevated intraocular pressure damages neural tissue. Her interdisciplinary research opens doors to new therapeutic possibilities.

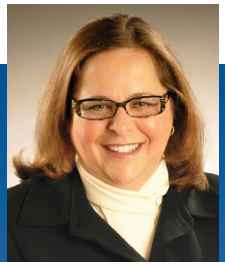
On a personal level, she finds it incredibly rewarding to contribute to research that could enhance the quality of life for millions of people. Her dedication to public health fuels her commitment to uncovering solutions for those impacted by glaucoma.

Donor support is vital in funding dedicated researchers like Dr. Wang who are passionately exploring new pathways to develop treatments and a cure.

Thank you for supporting critical research like this through your gifts to National Glaucoma Research.



Dr. Bingrui Wang (front) and Dr. Ian Sigal (behind) in the laboratory



President's Corner

As we welcome a new year, I'm filled with optimism about the scientific breakthroughs on the horizon. Thanks to your generosity and support from other dedicated donors, leading researchers are pushing the boundaries of science further than ever before.

For example, Dr. Bingrui Wang, alongside her mentor Dr. Ian Sigal, is exploring how axon deformation relates to long-term glaucoma damage. Their innovative study seeks to understand how elevated intraocular pressure affects the axons that transmit visual information to the brain, aiming to develop tools to prevent vision loss. By combining engineering and biological insights, Dr. Wang is paving the way for new therapeutic approaches.

Thank you for your unwavering support of National Glaucoma Research. **Together, we are funding vital studies that could lead to groundbreaking treatments and a potential cure for this leading cause of blindness.**

Stacy Pagos Haller

Experimental Drug Could Improve Vision

In glaucoma, mitochondrial dysfunction can damage neurons that transmit visual information from the eyes to the brain. Adriana Di Polo, PhD, at the University of Montreal Hospital Center and a National Glaucoma Research grant recipient, is investigating experimental small molecule drugs that aim to enhance mitochondrial function in retinal ganglion cells, which are crucial for vision.

In collaboration with Mitochon Pharmaceuticals, Dr. Di Polo's research focuses on how these drugs can prevent mitochondrial damage and improve energy production in neurons. Healthy mitochondria are vital for proper neuronal function, and their impairment can lead to significant vision loss.

The experimental drugs, known as mitochondrial uncouplers, work by improving mitochondrial efficiency while reducing harmful byproducts, such as excess calcium and free radicals. By clearing excess calcium and preventing oxidative damage, these drugs could promote the survival of retinal ganglion cells, potentially preventing vision loss in people with glaucoma.

If successful, this research could pave the way for new treatments that restore vision and improve the quality of life for the millions affected by glaucoma. Clinical trials may follow if the initial results are promising, bringing hope for effective therapies in the future.

NEW! Register for

Glaucoma Chats

Recently diagnosed with glaucoma? Know someone who has it? Join our FREE monthly phone call with doctors, researchers, and experts on glaucoma to receive valuable information. You can submit questions before or during the live event. Transcripts, audio recordings, and podcasts are available on our website.

To register, call **855-345-6647** or go to **brightfocus.org/NGRchats**.

RESEARCHER SPOTLIGHT: Xiaorong Liu, PhD

The Impact of Glaucoma on Light-Mediated Mood and Sleep Disorders

Xiaorong Liu, PhD, at the University of Virginia and a National Glaucoma Research–funded researcher, leads a team studying the link between glaucoma and mood and sleep disturbances. By focusing on intrinsically photosensitive retinal ganglion cells (ipRGCs), Dr. Liu aims to understand how glaucoma-induced damage to these cells affects mental health.

Xiaorong Liu, PhD

Dr. Liu and her colleague Ignacio Provencio, PhD, are investigating how changes in ipRGCs might contribute to sleep problems and anxiety-like behaviors in animal models of glaucoma. This research is crucial as it could lead to new therapies targeting the effects of glaucoma on mood and sleep.

Although still in its early stages, Dr. Liu's research lays the groundwork for future studies that may explore therapeutic options such as light therapy aimed at enhancing ipRGC function. "Understanding these neural pathways is essential for improving patient care and developing effective treatments," she says.

Your support helps fund innovative research like this that could help illuminate new paths for enhancing the well-being of people with glaucoma by addressing not just vision loss but also its broader impact on mental health.

Improved Lifestyle May Slow Glaucoma Progression

There are many ways to slow the decline of vision in glaucoma. While consistent medication and regular monitoring are crucial, lifestyle changes can also play a significant role. Currently, lowering eye pressure is the only proven modifiable risk factor for glaucoma, but many healthy habits can enhance overall well-being.

- Get Moving: Engaging in regular aerobic exercise is shown to lower eye pressure and benefit cardiovascular health. Studies indicate that increased physical activity correlates with slower visual field loss. Aim for 150 to 300 minutes of moderate activity weekly, adapting the exercises to ensure your safety—especially if your vision is affected.
- Mindfulness Meditation: Incorporating mindfulness practices, such as meditation, may help lower eye pressure. Research suggests that combining meditation with medication yields better outcomes compared to using medication alone.
- Dietary Research: Although no supplements have been clinically proven to treat glaucoma yet, promising studies on nicotinamide (vitamin B3) show potential for preserving retinal health.

Adopting these and other lifestyle changes not only supports glaucoma management but also enhances overall health. For more information about understanding glaucoma, treatments, and more, visit **brightfocus.org/NGRtips**.

Latest Updates in Eye Drops

Natasha Nayak Kolomeyer, MD, a glaucoma specialist and ophthalmologist from Wills Eye Hospital, joined us for a recent Glaucoma Chat to share the latest overview of available eye drops, featuring both new and traditional treatments, along with their benefits and side effects.

- **Prostaglandin Analogs** (Latanoprost, Bimatoprost)
  - Mechanism: Improve drainage
  - Side Effects: Redness, irritation, eyelash changes, and rare iris darkening
  - Usage: Once daily in the evening
- **Beta-Blockers** (Timolol, Betaxolol)
  - Mechanism: Decrease fluid production
  - Side Effects: Wheezing, fatigue, and low heart rate (those with asthma or COPD should avoid using it)
  - Usage: Typically twice daily
- **Carbonic Anhydrase Inhibitors** (Dorzolamide)
  - Mechanism: Lower fluid production
  - Side Effects: Metallic taste, possible irritation
  - Usage: Twice daily
- **Alpha Agonists** (Brimonidine)
  - Mechanism: Decrease fluid production and enhance drainage
  - Side Effects: Dry mouth, fatigue, headache
  - Caution: Not recommended for young children
- **Rho-Kinase Inhibitors** (Netarsudil)
  - Mechanism: Decrease fluid and improve drainage
  - Side Effects: Redness in some users
  - Usage: Once daily

Combination eye drops are also available through compounding pharmacies, reducing the number of bottles needed while maximizing the benefits. **To learn more about these options, you can listen to the recorded episode: brightfocus.org/NGRchats. Consult with your eye care specialist to determine the best approach for your needs.**

Your Charitable Gift Annuity Can Advance Research

A charitable gift annuity offers you a secure source of fixed payments for life while supporting critical research. By transferring cash to National Glaucoma Research, you'll receive regular payments and a charitable tax deduction for the gift portion of the annuity.

Not only do you secure financial benefits, but you also gain the satisfaction of furthering breakthrough research. If funded with cash, a significant portion of your annuity payments may be tax-free. You can also use appreciated securities to avoid capital gains tax. Contact us today to learn more about how a charitable gift annuity can benefit you and glaucoma research!

Visit **brightfocus.org/planned-giving**.

Thank you for supporting National Glaucoma Research!

Please share this newsletter with someone who might be interested in learning more about some of the latest advancements in research to diagnose, prevent, treat, and cure glaucoma. This newsletter is published by National Glaucoma Research, a program of BrightFocus Foundation®, a nonprofit organization located at 22512 Gateway Center Drive, Clarksburg, Maryland 20871, 301-948-3244, brightfocus.org.