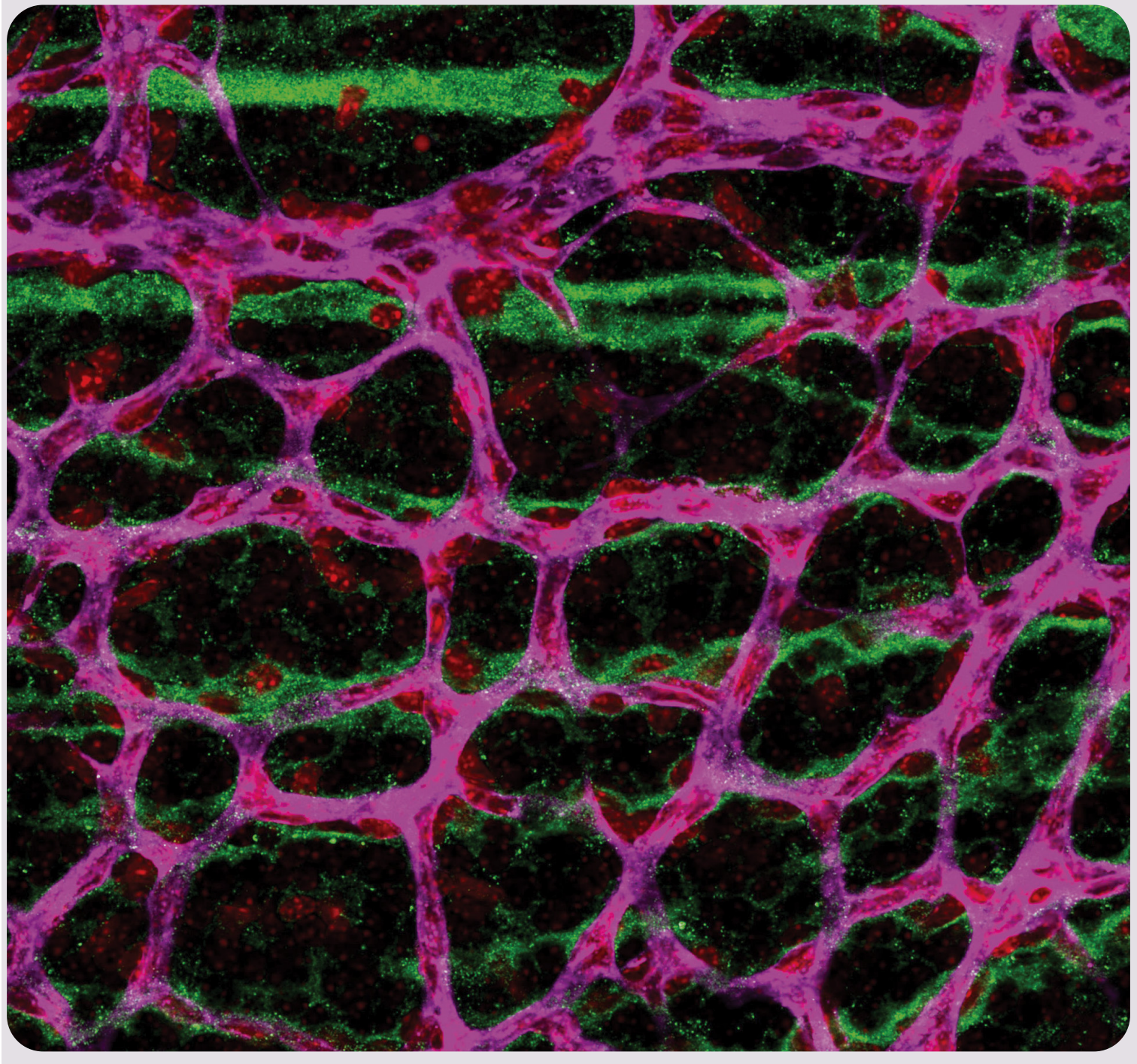
BrightFocus® Foundation | National Glaucoma Research

Research Today. Hope for Tomorrow.

2025 National Glaucoma Research Projects



National Glaucoma Research

Empowering the Future of Vision Research

National Glaucoma Research is currently investing

$5.6 million in
31 research projects across
5 countries.

National Glaucoma Research, a BrightFocus Foundation program, supports groundbreaking research and shares vital information about this sight-stealing disease impacting more than 4 million Americans.

We believe that by providing initial funding for highly innovative, bold research and creative ideas, we can spark revolutionary approaches and vision-saving breakthroughs for this "sneak thief of sight."

Learn more & explore glaucoma resources:

brightfocus.org/NGR

You Make Bold Science Possible

Thanks to your generosity, National Glaucoma Research is driving bold, innovative science on every front—from exploring new ways to regulate eye pressure to exploring efforts to protect and regenerate the optic nerve. Because of you, no promising idea goes unexplored in the search for better treatments, risk reduction strategies, and ultimately, a cure.

This research portfolio showcases the groundbreaking research you make possible. Grants are vetted through a rigorous evaluation process by the world's top scientists and clinicians who serve on our Scientific Review Committee.

Together, we are moving closer to a future without glaucoma. Thank you.

Contents

This portfolio reflects awarded grants as of July 15, 2025. All grants will be awarded pending conclusion of contract negotiations.

On the cover: This image shows the neurovascular unit of the developing retina. Blood vessels (red and magenta) are in close contact with retinal ganglion cell axons (green). This tight interaction allows the exchange of nutrients like oxygen and glucose carried by blood vessels and absorbed by neurons. Photo courtesy of National Glaucoma Research grant recipient Adriana Di Polo, PhD.

Controlling Eye Pressure in New Ways

Elevated intraocular pressure (IOP) is common in glaucoma when the aqueous humor cannot drain properly. Normally, this fluid drains through the trabecular meshwork into Schlemm's canal and into the bloodstream. Blockages, increased fluid volume, and trabecular meshwork stiffness can raise eye pressure. Grantees are investigating ways to regulate eye pressure, reduce stiffness, and control IOP.

How the Microenvironment Affects Schlemm's Canal Cell Behavior

Samuel Herberg, PhD | SUNY Upstate Medical University

Glaucoma is a leading cause of blindness worldwide, but exactly what causes the disease is unclear. Using a first-of-its-kind 3D fluid drainage tissue model system, the researchers seek to investigate the contributions of glaucomatous biomechanical cues in driving Schlemm's canal cell mechano-dysfunction. This work will set the stage for the identification of future glaucoma therapies targeting cellular biomechanics.

The Role of Microtubules in Glaucomatous Schlemm's Canal Mechanobiology

Haiyan Li, PhD | Georgia Institute of Technology
Mentor: C. Ross Ethier, PhD

Intraocular pressure is largely controlled by tissues at or near the Schlemm's canal inner wall endothelium, where reduced fluid conductivity occurs in glaucoma. This project aims to investigate the impact of microtubules, crucial components of the cytoskeleton, on Schlemm's canal cell mechanobiology and intraocular pressure, a key risk factor for glaucoma.

IOP-Related Gene Responses in the Optic Nerve Head and Trabecular Meshwork

Diana C. Lozano, PhD | Oregon Health & Science University
Co-Principal Investigator: Kate Keller, PhD

Elevated intraocular pressure (IOP) is a leading risk factor for primary open-angle glaucoma. Yet, the cellular events that comprise protective homeostatic IOP responses, or damaging events leading to tissue injury, are poorly understood. Researchers will investigate how mild and repeat IOP elevations modify the molecular mechanisms in ocular tissues implicated in glaucoma pathogenesis. This study will advance the understanding of how subtle IOP exposures can cumulatively develop into chronic glaucoma.

An Effective Tool for Understanding Dysfunctional Eye Drainage in Glaucoma

Weiming Mao, PhD | Indiana University School of Medicine

Researchers will develop a tool to assess eye drainage dysfunction in glaucoma that will allow for more straightforward investigations of how fluid buildup occurs. The tool is expected to support scientists in better understanding how glaucoma develops and offer a way to test candidate treatments.

Novel Mechanisms to Regulate Eye Pressure

Colleen McDowell, PhD | University of Wisconsin-Madison

Elevated pressure in the eye is a major risk factor for glaucoma and is due to fluid buildup and improper drainage in the eye. It is known that fluid drainage from the eye is not uniform circumferentially, and this study aims to study how these segmental differences in fluid flow are developed and regulated. These data will help identify novel mechanisms to lower pressure in the eye.

Long-Lasting, Nonsurgical Treatment for Eye Pressure in Glaucoma

Mark Prausnitz, PhD | Georgia Institute of Technology

The aim of this project is to test the safety and efficacy of an expanding gel to relieve fluid buildup in the eye in glaucoma. The injectable gel could offer a nonsurgical, nondrug treatment of eye pressure in glaucoma that could last months. Success will set the stage to move into clinical trials.

Developing a New Glaucoma Treatment That Avoids Daily Drops

Gavin Roddy, MD, PhD | Mayo Clinic, Rochester

Recipient, 2025 Dr. Douglas H. Johnson Award for Glaucoma Research

Current glaucoma treatments that require daily instillation of eyedrops to lower pressure cause side effects and fail to adequately treat many people with this disease. Dr. Roddy's lab developed a pressure-lowering drug that acts for 6 months with a single injection. They now seek to test this drug in a large animal in hopes of bringing forward a new therapy for the treatment of glaucoma.

Developing New Drugs for Glaucoma

Pete Williams, PhD | Karolinska Institutet (Sweden)

Current treatment strategies for glaucoma only focus on the management of intraocular (eye) pressure. There are no available therapies that target the degenerative processes in the retina and optic nerve themselves. The Williams lab is developing a first-in-class injectable formulation for glaucoma to prevent blindness at its root cause—neurodegeneration in the retina and optic nerve.

Imaging & Exploring the Eye-Brain Connection

Glaucoma causes tiny blind spots, or visual field defects, that can lead to vision loss and blindness, with progression varying among individuals. Early diagnosis is key, and advances in eye imaging now detect the tiniest changes preceding glaucoma. National Glaucoma Research grantees are developing new technologies to image retinal ganglion cells and are investigating cellular communication disruptions, aiming for earlier detection of the disease and new treatments.

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

Xiaorong Liu, PhD | University of Virginia

Co-Principal Investigator: Ignacio Provencio, PhD

A subset of retinal ganglion cells (RGCs), known as ipRGCs, transmit light information from the eyes to the brain for purposes beyond vision, such as regulating sleep and mood. Because people with glaucoma often suffer from light-induced sleep and mood disturbances, researchers aim to understand how ipRGCs control light's effects on mood and sleep.

Predicting Outcomes & Other Treatment Innovations

Approved glaucoma treatments mainly focus on lowering eye pressure through eyedrops or surgery, but these require consistency and carry risks. More reliable treatments addressing the underlying causes beyond eye pressure are needed. Grantees are developing drugs to lower eye pressure and protect nerve cells. They are also exploring genome-editing approaches to restore trabecular meshwork function, stem cell transplantation, lifestyle interventions, and strategies to communicate genetic testing with at-risk individuals.

Saving Sight: A Journey to Healing Without Scars

Jennifer Fan Gaskin , MBChB, MD, FRANZCO | Centre for Eye Research Australia (Australia)
Co-Principal Investigators: Elsa Chan, PhD & Roy Kong, PhD
Mentor: Keith Martin, DM, FRANZCO

Minimally invasive glaucoma surgery is an increasingly popular treatment to prevent ongoing vision loss from glaucoma. However, its success is limited by scarring, and the current use of anti-scarring cancer drugs carry serious long-term risks. This project aims to develop a more effective and safer alternative to improve long-term success of glaucoma surgery and to improve the quality of life for people with glaucoma worldwide.

An Optimal Form of Nerve Growth Factor as a New Neuroprotective Drug for Glaucoma

Silvia Marinelli, PhD | European Brain Research Institute (Italy)
Co-Principal Investigator: Francesca Malerba, PhD

For this project, researchers will dial down the negative effects of a naturally occurring molecule and boost its potential benefits as a glaucoma treatment. The optimized version of a "painless nerve growth factor" is expected to rescue retinal ganglion cells from progressive damage. The drug is already in clinical trials for other eye diseases.

Retinal Ganglion Cell Axon Degeneration in a 3D Microfluidic Hydrogel Model

Shruti Patil, PhD | Indiana University School of Medicine
Mentor: Jason Meyer, PhD

Retinal ganglion cell (RGC) axons traversing the optic nerve head are highly susceptible to glaucomatous damage, yet the link between optic nerve head biomechanics and RGC axonal degeneration remains poorly understood. To address this, researchers will implement 3D platforms integrating microfluidics and hydrogels with tunable stiffness to model biomechanical aspects affecting RGC axons in the optic nerve head. This offers hope for more effective glaucoma treatments.

Developing Communication Strategies for Genetic Risk Testing in Glaucoma

Emmanuelle Souzeau, PhD | The Flinders University of South Australia (Australia)
Mentor: Jamie E. Craig, DPhil, FRANZCO

Polygenic risk scores (PRS) for glaucoma make genetic testing an ideal strategy to identify at-risk individuals who can benefit from early management to reduce preventable blindness. However, the current lack in reporting strategies to efficiently communicate PRS s impedes the implementation of testing in clinical practice. Researchers aim to develop the first patient-friendly reports and assess delivery methods for risk communication of PRS for glaucoma, which will ultimately benefit at-risk individuals globally.

Harnessing Artificial Intelligence to Enhance Glaucoma Care

Benjamin Xu, MD, PhD | University of Southern California

A public health crisis is emerging due to the rapid rise in glaucoma prevalence, shortage of eye care providers, and glaring access and equity issues. Researchers will integrate teleophthalmology and artificial intelligence (AI) to enhance the delivery of high-quality, reproducible, equitable, resource-efficient glaucoma care.

Harnessing Artificial Intelligence to Improve Glaucoma Clinical Trials

Jithin Yohannan, MD, MPH | Johns Hopkins University School of Medicine

Researchers will deploy artificial intelligence to make glaucoma-related clinical trial enrollment and follow-up more efficient. Tools will be developed that can screen for individuals who are a good fit for the repeated tests most trials entail and are at high risk for disease progression. The findings are expected to make clinical trials of new glaucoma therapies faster and less costly, translating into quicker assessment and approval of candidate treatments for glaucoma.

Protecting & Regenerating the Optic Nerve

Unlike most cells, the nerve cells providing vision don't regrow once damaged. National Glaucoma Research supports efforts to protect and regenerate retinal ganglion cells (RGCs), which carry visual signals from the eye to the brain. Researchers are also developing neuroprotective drugs to nourish and support fragile RGCs for long-term viability.

Boosting Neuronal Energy to Improve Vision in Glaucoma

Adriana Di Polo, PhD | University of Montreal Hospital Center (Canada)

Researchers will test the effects of small molecules that can clear potentially damaging calcium buildup from retinal ganglion cells and keep the cells' mitochondria healthy and functioning efficiently. The small molecules are "mitochondrial uncouplers" because they uncouple mitochondrial processes that normally lead to the production of damaging by-products. If mitochondrial uncouplers show potential benefit, the project is expected to open the door to clinical trials of these drugs in glaucoma.

Preserving the Eye's Vision by Neuroprotecting Retinal Cells

Marco Feligioni, PhD | European Brain Research Institute (Italy)
Co-Principal Investigator: Rebecca Sappington, PhD, Wake Forest University Health Sciences

Neuroprotection is an unmet medical need. This project aims to investigate the properties of a new drug to protect against degeneration of retinal ganglion cells. Researchers will investigate the interaction of a pair of proteins previously implicated in damage to these cells. They will also use a mouse model to test whether a specific molecule they have identified can prevent these effects.

Hunting for Genes Controlling Optic Nerve Regeneration

Fangyu Lin, MD, PhD | Emory University
Mentor: Jiaxing Wang, PhD

The goal of this project is to identify the genes that could modulate optic nerve regeneration and find potential treatment targets for blindness due to optic nerve damage, such as glaucoma. The first goal is to identify the genes that are modulating the optic nerve regeneration in a mouse model. Once this is identified, researchers will test its function and see how it alters the regeneration response. This may lead to a clinical intervention for the treatment of blindness due to optic nerve damage.

Repurposing an Approved Diabetes Drug for Glaucoma

Kazuya Oikawa, PhD | University of Wisconsin-Madison
Mentor: Gillian McLellan, PhD, DECVO, DACVO, FARVO

For this project, researchers will repurpose an FDA-approved diabetes drug as an anti-neuroinflammatory therapy for glaucoma. The drug mimics a naturally occurring insulin-regulating hormone and targets myeloid cells, which are implicated in neuroinflammation in glaucoma. The group expects to demonstrate that this already-approved drug can be repurposed to target neuroinflammation in glaucoma.

Mapping the Pathways of Neurodegeneration in Glaucoma Using Artificial Intelligence

Karthik Shekhar, PhD | University of California, Berkeley

Researchers will use innovative molecular techniques, artificial intelligence approaches, and mouse models to tease apart how different cell pathways interact in cell destruction in glaucoma. Focusing on the death of retinal ganglion cells, which underlies vision loss in the disease, the team will create a detailed molecular map of how and where neurodegeneration occurs in these cells, opening the way to new treatment possibilities and use of these tools in human studies.

Role of IOP Elevation in Increasing Vulnerability of Retina to Stress

Dorota Skowronska-Krawczyk, PhD | University of California, Irvine
Co-Principal Investigator: Qing Nie, PhD

Aging, a process where damage accumulates in our cells over time, makes tissues more sensitive to elevated intraocular pressure (IOP). However, it is unknown how cells become more vulnerable as they age. This research will explore how retinas respond to IOP-related stress and the mechanisms behind this vulnerability, aiming to find new ways to protect retinal neurons from glaucomatous changes.

Repairing the Human Retina by Cell Reprogramming

Karl Wahlin, PhD | University of California, San Diego

Recipient, 2025 Thomas R. Lee Award for Glaucoma Research

Retinal ganglion cell neurons connect the eye to the brain, and when they die, whether through glaucoma or through acute trauma, this leads to permanent vision loss and blindness. Similar to how this occurs throughout the animal kingdom, researchers propose to develop the capability to do this in human retinal tissues through the conversion of existing Müller cells in the eye.

Pressure-Induced Axon Damage and Its Link to Glaucoma-Related Vision Loss

Bingrui Wang, PhD | University of Pittsburgh
Mentor: Ian Sigal, PhD

Blindness in glaucoma is caused by damage to axons that carry visual information to the brain. Damage often starts in the back of the eye and is due to high eye pressure, which mechanicallya deforms axons. However, the link between axon deformation and long-term damage is unclear. Using animal models, researchers will investigate axon deformation and its link to damage to understand glaucoma's causes.

Why Certain Retina Ganglion Cells Stay Strong in Glaucoma

Mengya Zhao, PhD | University of California, San Francisco
Mentor: Xin Duan, PhD

This project focuses on understanding the mechanisms underlying neuronal loss in glaucoma, which can lead to irreversible blindness. This disease variably impacts many eye neurons. Using a combination of cutting-edge techniques, researchers will investigate why certain neurons are more resilient than others. This work could unlock new treatments, offering a breakthrough in glaucoma therapy and eye care.

Understanding What Causes Glaucoma

Glaucoma threatens sight by damaging the optic nerve, primarily due to chronic elevated intraocular pressure (IOP) from improper fluid drainage. National Glaucoma Research funds studies on the genetics of glaucoma, including racial and ethnic disparities in its incidence, and more sensitive methods for detecting its onset. Scientists are also developing new research models to better understand glaucoma and create new therapies.

Assessment of Vascular Resistance in Glaucoma

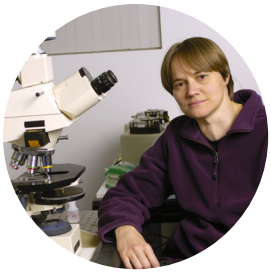
Brad Fortune, OD, PhD | Good Samaritan Foundation (Legacy Health System)

Abnormal blood flow within the eye is thought to be one factor contributing to the development and progression of glaucoma. However, questions remain about how and when this occurs. In this project, researchers aim to determine whether vascular resistance is elevated during early stages of glaucoma. Results will contribute important knowledge and useful diagnostic tools to the glaucoma research community.

The Genetics of Glaucoma in Individuals of Caucasian and African Ancestry

Michael Hauser, PhD | Duke University

Researchers will examine the expression levels of glaucoma-associated genes in individual retinal cells and the effects of different versions of these genes. The studies will yield basic information that will advance understanding and could lead to development of new glaucoma treatments. Most crucial, the team will follow up on new findings in African Americans, a group disproportionately affected by glaucoma.



Interleukin-10 as a Neuroprotective Factor in Glaucoma

Tatjana Jakobs, MD | Schepens Eye Research Institute of Massachusetts Eye and Ear

Visual impairment in glaucoma is caused by the degeneration and eventual death of retinal ganglion cells through mechanisms that are not fully understood. Retinal microglia can play neuroprotective and neurotoxic roles in glaucoma. Researchers have identified IL10 as a microglia-derived factor with potential neuroprotective effects on retinal ganglion cells. The team will test this with assays of visual function and microscopic analysis of ganglion cell morphology.

Defining the Role of a New Protein Target in Fluid Buildup in Glaucoma

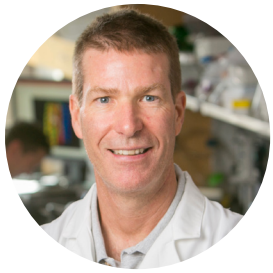
Rupalatha Maddala, PhD | Duke University School of Medicine
Co-Principal Investigators: Pratap Challa, MD & Vasantha Rao, PhD

In this project, researchers will assess the role of septins—proteins that are implicated in glaucoma—in fluid drainage from the eye. They will focus on the trabecular meshwork, which is where fluid drains from the eye, and how septins affect the function of this area. The findings will highlight specific features of septins and their role in fluid pressure in the eye that could be targets in glaucoma treatment.

Mitochondria in Retinal Ganglion Cells

Rob Nickells, PhD | University of Wisconsin-Madison

Retinal ganglion cells receive input from a tree-like dendritic arbor that exhibits pathology after optic nerve damage. This study examines the biology of energy producing organelles called mitochondria in arbor pathology, including how specialized cells called microglia participate in this process.



Role of a Key Gene, ANGPTL7, in Steroid-Induced Glaucoma

Dan Stamer, PhD | Duke University School of Medicine
Co-Principal Investigator: Guorong Li, MD

Glucocorticoids are widely used anti-inflammatory drugs that treat a variety of diseases, but long-term use often results in elevated eye pressure that can lead to glaucoma. Using the most advanced research technologies, researchers aim to understand how ANGPTL7, a glaucoma risk gene, is involved in elevating eye pressure after glucocorticoid treatment.

Understanding How Variants in LOXL1 Affect Pseudoexfoliation Glaucoma Risk

Hannah Youngblood, PhD | Georgia Institute of Technology
Mentor: Raquel Lieberman, PhD

Genetic variants in the LOXL1 gene can alter risk for pseudoexfoliation glaucoma (XFG), a blinding disease that affects more than 10 million people. This project seeks to determine how these variants alter the structure and function of the LOXL1 protein. Successful completion of this project will provide a better understanding of how LOXL1 variants contribute to XFG and provide the groundwork for therapeutic developme

BrightFocus® Foundation

Alzheimer's Disease Research
Macular Degeneration Research
National Glaucoma Research

Connect

BrightFocus Foundation
22512 Gateway Center Drive
Clarksburg, MD 20871
1-800-437-2423
brightfocus.org