BrightFocus® Foundation | Macular Degeneration Research



Powering Progress
Through Bold Science

2026 Macular Degeneration Research Projects

Macular Degeneration Research

Advancing the Future of Vision Research

Macular Degeneration Research is currently investing



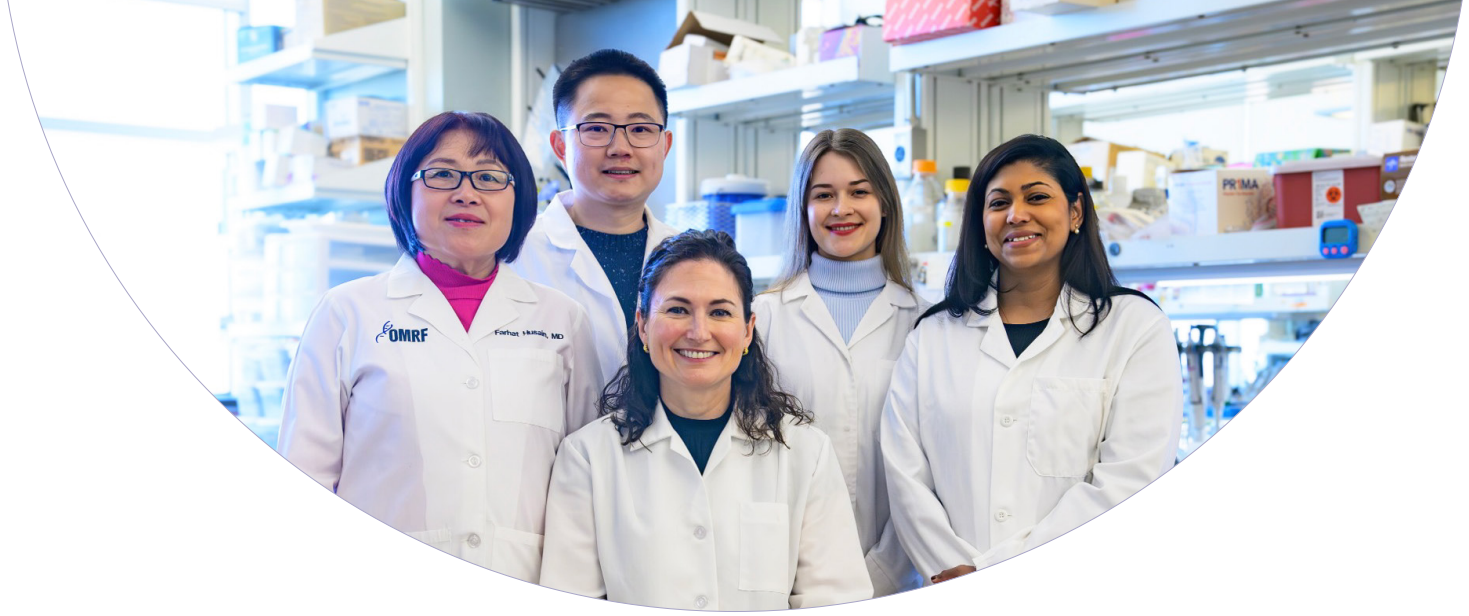
$14 million in **42** research projects across **8** countries.

Macular Degeneration Research, a BrightFocus Foundation program, funds groundbreaking research and shares trusted information about this sight-stealing disease impacting as many as 20 million U.S. adults.

By supporting innovative, early-stage research, we help scientists pursue promising new directions that may otherwise go unfunded. These investments lay the groundwork for discoveries that can transform how macular degeneration is understood, prevented, treated, and ultimately cured.

Explore our grants & trusted macular degeneration resources:

brightfocus.org/MDR



Turning Bold Ideas Into Vision-Saving Science

Thanks to your generosity, Macular Degeneration Research is advancing innovative science across all areas of discovery, from investigating the biological drivers of disease to exploring regenerative therapies, precision medicine approaches, and the role of nutrition and lifestyle in long-term eye health.

Because of you, promising ideas become groundbreaking studies. Researchers are empowered to test novel hypotheses, challenge conventional thinking, and pursue discoveries that could lead to earlier detection, more effective treatments, and better outcomes for people living with age-related macular degeneration (AMD).

This research portfolio highlights the work you make possible. Grants are selected through a rigorous review process conducted by leading experts in the field who serve on our Scientific Review Committee, ensuring support for the most promising science.

Together, we are moving closer to a future without macular degeneration. Thank you for helping drive the next generation of breakthroughs.

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This portfolio reflects awarded grants as of July 20, 2026. All grants will be awarded pending conclusion of contract negotiations.

Cell Metabolism

Grantees are examining the decline in cellular and mitochondrial energy production in the retinal pigment epithelium (RPE) at the back of the eye and other retinal cells as possible triggers of age-related macular degeneration (AMD). They are also exploring ways to restore health to the aging eye by improving cellular metabolism.



Storing Fat in the Eye: A Pathway for Tackling AMD

John Han, PhD | University of Michigan Medical Center
Mentor: Jason Miller, MD, PhD

Age-related macular degeneration (AMD) is characterized by the buildup of fatty deposits under the retinal pigment epithelium (RPE) cells at the back of the eye. Each day, the RPE consumes enormous amounts of fat, which is temporarily stored in lipid droplets inside the cell. In this project, researchers aim to understand how the RPE forms these lipid droplets and to manipulate them so that less fat is secreted from the RPE, thereby preventing the formation of toxic fatty deposits.



RPE Lipid Degradation and Secretion in Age-Related Macular Degeneration

Jason Miller, MD, PhD | University of Michigan Medical Center

Age-related macular degeneration (AMD) involves the buildup of toxic fatty deposits outside a cell layer called the retinal pigment epithelium (RPE). While the RPE handles significant amounts of fat as part of its normal function, researchers hypothesize that if they can force the RPE to degrade the fat it consumes, it will secrete less of the fat, which will lead to less toxic fatty deposits accumulating outside the cell. In this project, Dr. Miller's team will examine what happens to deposits when they promote RPE lipid degradation versus secretion.

This grant is made possible through the support of the Parr family.



Restoration of Crucial Retinal Lipids to Prevent Vision Loss in Age-Related Macular Degeneration

Lily (Wenjing) Wu, PhD | University of Oklahoma Health Sciences Center
Mentor: Martin-Paul Agbaga, PhD
Recipient, 2026 Elizabeth Anderson Award for Macular Degeneration Research

The project investigates whether very long-chain polyunsaturated fatty acids (VLC-PUFAs) are an essential fuel for the eye's maintenance cells, retinal pigment epithelium (RPE), which fail in age-related macular degeneration (AMD), leading to vision loss. The researchers hypothesize that VLC-PUFA loss is the cause of this critical failure. They will demonstrate this by using human RPE cells to map the metabolic pathway and, using gene therapy, protect retinal function in lab models. Success validates VLC-PUFA restoration as a new preventative treatment for early AMD.

Diet & Nutrition's Impact on Age-Related Macular Degeneration Risk

The current treatment for preventing the progression of intermediate age-related macular degeneration (AMD) is the AREDS2 supplement formula. Investigators are exploring ways to increase the eye's uptake of carotenoids (pigments that give fresh produce their bright red, yellow, and orange colors) and the benefits of lifestyle factors like sleep, exercise, and Mediterranean-style diet rich in fish, whole grains, fruits, and leafy green vegetables for eye health. Ideally, these findings will translate into clinical use and promote "vision-healthy" lifestyles.



The Role of Aging, Diet, and Inflammation in RPE Degenerative Processes

Ana Chucair-Elliott, PhD | University of Oklahoma Health Sciences Center

In age-related macular degeneration (AMD), the cells that process visual information (photoreceptors) degenerate and die. This is partly due to failure of the retinal pigment epithelium (RPE), the tissue that lies beneath the retina, to support normal tissue structure and visual function. Aging is the main risk factor for AMD, but diet and inflammation also increase risk. This project will study how aging and diet interact with immune cells to affect the RPE genetic programs and function for the discovery of candidate targets to treat AMD.



Role of Lack of Sleep in the Development of Age-Related Macular Degeneration

Anaïs Françon, PhD | Hôpital Maisonneuve-Rosemont (Canada)
Mentor: Mike (Przemyslaw) Sapieha, PhD

Age-related macular degeneration (AMD) is driven by genetic and environmental factors. An understudied factor that may predispose to neuroinflammatory conditions such as AMD is sleep deficiency, affecting nearly 30% of American adults. In this project, researchers investigate a potential role of sleep deficiency in choroidal neovascularization associated with AMD and how sleep deficiency reprograms the innate immune system toward destructive neuroinflammation.



How AMD Risk Factors Interact in Disease Development

Freya Mowat, PhD | University of Wisconsin-Madison

Researchers will characterize how genetics, age, and diet interact in age-related macular degeneration (AMD) risk as the basis for a tool for therapeutics development and testing. A novel aspect is the focus on how these factors affect DNA methylation, which has not been clarified, especially in early stages of the disease. Such a model could be used to test whether candidate therapies prevent accumulation of methylation changes associated with these risk factors.



Tracking Biological Responses to Lifestyle Changes in AMD Patients

Joëlle Vergroesen, PhD | Erasmus University Medical Center Rotterdam (Netherlands)
Mentor: Caroline Klaver, MD, PhD

Lifestyle factors like diet, smoking, and exercise impact the risk for age-related macular degeneration (AMD), but motivating change is challenging. This project uses biomarkers from blood and stool to show how lifestyle changes reduce AMD progression risk. Researchers will analyze data from over 13,000 participants, linking biomarkers to lifestyle and AMD outcomes. This research aims to create tools that predict risk, provide personalized feedback, and empower patients to make changes, ultimately preventing vision loss and reducing healthcare burdens.

Drusen Formation & Immune Response

As the eye ages, it becomes less efficient at removing waste, which can lead to a buildup of drusen and trigger an immune response. Increases in the number and size of drusen may cause the immune system to kick into overdrive and damage cells in the macula, which provides sharp central vision. Researchers are testing drugs that can clear the waste deposits that contribute to age-related macular degeneration (AMD).



Exosomes and Autophagy: Suspicious Partners in Drusen Biogenesis and AMD

Miguel Flores-Bellver, PhD | University of Colorado Anschutz Medical Campus
Mentor: Joseph Brzezinski, PhD

Age-related macular degeneration (AMD) affects a part of the retina called the macula, which is responsible for clear vision. Retinal pigment epithelium (RPE) and retinal cells secrete little vesicles called exosomes, which contain many cellular by-products. To understand how exosomes contribute to drusen formation and the progression of AMD, the research team will identify bioactive molecules released in exosomes that could serve as potential biomarkers for AMD.



How Aging of the Immune System Affects Age-Related Macular Degeneration

Masayuki Hata, MD, PhD | Kyoto University (Japan)

Immune cells, which play a pivotal role in the aberrant blood vessel growth during age-related macular degeneration (AMD), are dysregulated with aging. However, little is known about how aged immune cells impact disease development. Researchers will assess which types of immune cells are modified in a way that increases AMD risk during aging. This understanding will allow researchers to gain insight on mechanisms that cause AMD and potentially lead the way to developing targeted interventions.

This grant is made possible by the support of Karl and Yoriko McGillvray.



The Role of Heparan Sulfate in Controlling Protein Balance in Age-Related Macular Degeneration

Jaesoo Jung, PhD | University of California, San Diego
Mentor: Christopher Toomey, MD, PhD

Age-related macular degeneration (AMD) is marked by changes in Bruch's membrane (BrM), where drusen deposits disrupt macular function and lead to vision loss, particularly in the untreatable dry form. HTRA1, a key protein linked to AMD, interacts with heparan sulfate (HS), a molecule elevated in AMD-affected BrM. This study explores how HS impact HTRA1 function, contributing to AMD progression. Findings could guide new therapies targeting HS or enhancing HTRA1 to protect vision in AMD patients.



How Retinal Cells Drive Inflammation in Age-Related Macular Degeneration

Sarah Palko, PhD | Trinity College Dublin (Ireland)
Mentor: Sarah Doyle, PhD

Age-related macular degeneration (AMD) causes the loss of central vision as key retinal cells deteriorate. Inflammation plays a major role, and immune cells from the blood can enter the retina and worsen damage. This project will test whether support cells in the retina, called Müller glia, send signals that attract these immune cells. By blocking one of their major signaling pathways, researchers aim to reduce harmful immune cells from entering the tissue and reduce disease progression in models of AMD.



Uncovering the Hidden Link Between Liver Health and Macular Degeneration

Sunghee Park, PhD | Purdue University

Current treatments for age-related macular degeneration only slow progression and fail to address systemic drivers of disease. This project will develop a human liver–retina chip to uncover how age-related metabolic dysfunction in the liver triggers complement activation that damages retinal pigment epithelial cells. Understanding this cross-organ immune–metabolic axis will enable new therapeutic strategies to prevent vision loss and improve health outcomes in the aging population.



Microglia's Roles in AMD to Inform Therapies for Vision Loss Prevention

Nobuhiko Shiraki, PhD | Duke University School of Medicine
Mentor: Daniel Saban, PhD

Outer retinal diseases, like age-related macular degeneration (AMD), cause permanent vision loss due to damage to light-sensitive cells. While some immune cells help clear harmful debris, recent findings suggest distinct subtypes with different functions. Genetic analysis identified two subtypes in a

certain immune cell, one of which may worsen inflammation. Studies showed that reducing certain molecules in these cells reduced retinal damage after light exposure. This research aims to clarify the immune cell roles in AMD, aiming to inform therapies for prevention of vision loss in people with AMD..



Advancing AMD Diagnosis with Novel Spectroscopic Tools

David Veysset, PhD | Massachusetts General Hospital & Harvard Medical School

Mentor: Brett Bouma, PhD

Recipient, 2026 Dr. Joe G. Hollyfield New Investigator Award for Macular Degeneration Research

Age-related macular degeneration (AMD) is linked to harmful deposits beneath the retina. This project aims to combine two cutting-edge imaging techniques, optical coherence tomography (OCT) and Raman spectroscopy, to analyze both the structure and chemistry of these deposits. By identifying high-risk molecular profiles, the research seeks to improve early detection, guide treatments, and provide new insights into AMD progression. This innovative approach could transform how AMD and other retinal diseases are diagnosed and managed.

Genes & Age-Related Macular Degeneration

Most forms of macular degeneration are linked to various gene irregularities called single nucleotide polymorphisms (SNPs) rather than a single genetic mutation. SNPs, influenced by factors like age, health, and environmental exposures, can increase susceptibility to age-related macular degeneration (AMD). Targeted gene research aims to lower AMD risk by blocking or replacing harmful gene signals and defending retinal pigment epithelium cells against oxidative stress.



Linking Retinal Imaging and Molecular Changes in Age-Related Macular Degeneration

Petra Larsen, MD, PhD | German Center for Neurodegenerative Diseases (Germany)

Age-related macular degeneration may affect each person differently. This project combines detailed eye scans with genetic and blood-based molecular analyses to uncover the biological processes behind these differences. By linking genetic and molecular signals to changes in the retina, researchers

aim to identify people at highest risk, understand disease progression, and guide the development of personalized strategies to protect vision. The ultimate goal is to preserve sight, improve quality of life, and inform targeted interventions.



Studying the Role of Genes & the Tone of Our Eye Pigment in AMD

Ruchi Sharma, PhD | National Eye Institute
Mentor: Kapil Bharti, PhD

Researchers will use models created from patient stem cell-derived retinal pigment epithelium (RPE) and choroid to explore the cellular processes that make some people more vulnerable to age-related macular degeneration (AMD) while others resist it. The goal is to understand how pigmentation, certain genetic factors, and cellular processes contribute to the risk of AMD. This research will help uncover how some people resist AMD, which may lead to new drugs to treat or prevent the disease.

Geographic Atrophy

Some people with age-related macular degeneration (AMD) develop geographic atrophy, a severe form of dry AMD that can lead to permanent vision loss due to cell death in the retina. The first treatments for geographic atrophy were approved by the Food and Drug Administration in 2023, and several other promising treatments are in clinical trials. Macular Degeneration Research is funding innovative research into new drugs and management strategies for this complex condition.



Imaging Tiny Blood Vessels in the Eye for Markers of AMD

Yali Jia, PhD | Oregon Health & Science University

Researchers will develop an imaging device that tracks blood flow in the eye as a disease marker in age-related macular degeneration (AMD). With this cost-effective tool, researchers will identify features that undergo changes during progression of the disease to characterize biomarkers of the process. The tool is expected to allow prediction of development and progression of specific features of AMD, including geographic atrophy.

Innovative Approaches to Treatments

One day, early detection of age-related macular degeneration (AMD) may allow for preventative measures. Macular Degeneration Research is funding studies on protecting the retinal pigment epithelium and retina before sight damage occurs, including drugs to enhance immune function and improve the eye's ability to clear waste. New imaging techniques and gene therapy are also being explored to track and treat AMD progression.



Development of an Oral Treatment for Dry AMD Using Everyday Anti-Inflammatory Drugs

Marco Bassetto, PharmD, PhD | University of California, Irvine
Mentor: Philip Kiser, PhD

Numerous ocular barriers prevent the accumulation of drugs in the eye and limit the development of treatments for age-related macular degeneration (AMD). This project aims to leverage the natural transportation system of vitamin A in the eye to deliver anti-inflammatory drugs (i.e., aspirin, ibuprofen) selectively in the retina to suppress the inflammation associated with AMD. This method uses oral drug administration, avoiding the risks and burdens associated with eye injections, which are the standard method of drug administration for treating AMD.



Electronic Implants for Restoring Sharp Vision in Macular Degeneration

Mohajeet Bhuckory, PhD | Stanford University

In advanced age-related macular degeneration, the loss of the light-sensitive cells in the central retina, photoreceptors, leads to blindness. However, the remaining connecting neurons that relay visual signals to the brain stay mostly intact. Current electronic photoreceptors (ePR) can stimulate these neurons, restoring the flow of visual information to the brain. This project aims to significantly enhance the resolution by developing cutting-edge, cell-sized ePR implants, offering the potential to improve prosthetic vision beyond legal blindness and approach natural vision.

This grant is made possible by the support of Karl and Yoriko McGillvray.



Developing a New Treatment for Wet AMD: Targeted Removal of a Disease-Causing Protein

Celia Bisbach, PhD | University of Wisconsin-Madison
Mentor: David Gamm, MD, PhD
Recipient, 2026 Helen Juanita Reed Award for Macular Degeneration Research

Wet age-related macular degeneration (AMD) is caused in part by accumulation of a protein called VEGF in a region of the eye where its levels are normally low. Currently, wet AMD is treated by frequent eye injections of inhibitors that block VEGF function. The team is using a new strategy—targeted protein degradation—to physically destroy VEGF using the body's natural waste disposal system. The goal is to create a more effective, localized, and longer-lasting therapy for wet AMD that could improve patient outcomes and quality of life.

This grant is made possible through the support of Ms. Peterson.



A Novel Antioxidant to Prevent Vision Loss in Macular Degeneration

Suman Chaudhary, PhD | Schepens Eye Research Institute of Massachusetts Eye and Ear
Mentor: Patricia D'Amore, PhD

Late-stage dry age-related macular degeneration (AMD) affects the center of the visual field. Lipid accumulation during AMD promotes oxidative stress that accelerates cellular damage in retinal pigment epithelium (RPE). This study explores a novel chemical compound with potent antioxidant properties and the ability to reduce RPE degeneration. The aim is to identify and validate the key mechanisms involved in the therapeutic efficacy of PMC using cell and lab models.

This award is made possible by the support of the Free Family Foundation.



A Novel Implantable Device to Treat Wet Age-Related Macular Degeneration (AMD)

Charles DeBoer, MD, PhD | Stanford University

In this project, researchers will optimize a new implantable drug delivery device for wet AMD that is implanted in the suprachoroidal space and continuously releases drugs directly beneath the areas of pathological vessels. This would be the first device to both spatially target the pathology in wet AMD and provide a long-term continuous drug delivery solution.



Studying Blood Flow During Exercise to Understand the Origins of AMD

Mark Draelos, MD, PhD | University of Michigan

This project uses blood vessel mapping during exercise to understand how blood flow in the eye is involved in the development of age-related macular degeneration (AMD). Much like how an exercise stress test reveals disease in vessels in the heart, the researchers propose an ocular stress test to allow them to detect disease affecting the eye before vision loss develops. Researchers will first compare patients with and without AMD to evaluate how their blood vessels behave differently during exercise and then follow patients over time to understand how their blood vessels change as disease evolves.



What Squirrels Can Teach Us About Treating AMD

Sangeetha Kandoi, PhD | Johns Hopkins University School of Medicine
Mentor: Seth Blackshaw, PhD

The goal of this project is to trace how the squirrel eye rescues the retina from hibernation stress damage that is similar to age-related macular degeneration (AMD). Researchers will explore the molecular steps that the eyes of the 13-lined ground squirrel undergo for these repairs. The goal of this work is to develop therapies that could, as with these squirrels at each annual wakening, restore damaged vision.



Innovative Night Vision Tests for Age-Related Macular Degeneration

Maximilian Pfau, MD | Institute of Molecular and Clinical Ophthalmology Basel (Switzerland)

Age-related macular degeneration (AMD) causes devastating vision loss over time. However, best-corrected visual acuity—the most common vision test—does not reveal dysfunction in early AMD. Thus, clinical trials focus mostly on late AMD, despite the limited treatment potential. This project will establish vision tests that evaluate dark adaptation following exposure to bright light. Using retina tracking, researchers will test small retinal regions prone to subtle photoreceptor dysfunction in an unprecedentedly accurate manner, making disease progression measurable at the earliest stage.



Immune Cell Traps in Inflammation and Wet AMD

Matthew Rutar, PhD | University of Canberra (Australia)

The aim of this project is to explore the role of neutrophil extracellular traps, or NETs, in neovascular age-related macular degeneration (AMD). Researchers will use mouse models and donor tissues to test candidate inhibitors of NET activity. Current therapies are focused on limiting rogue growth of blood vessels, so identifying new targets related to inflammation offers new opportunities for treatment.



The Development of a Transplant-Independent Therapy for RPE Dysfunction

Shintaro Shirahama, MD, PhD | Schepens Eye Research Institute of Massachusetts Eye and Ear
Mentor: Bruce Ksander, PhD

Aging is a critical risk factor for developing age-related macular degeneration (AMD), which implies that young retinal pigment epithelium (RPE) cells can successfully combat the underlying causes of the disease. Conversely, as RPE cells age, they undergo alterations, rendering them more susceptible to AMD. The research team seeks to reverse the biological age of RPE cells so that these younger cells can successfully combat the disease, stopping further progression and restoring functional vision.

This grant is made possible by the support of the Free Family Foundation.



New Drug Delivery Approach to Transform Macular Degeneration Treatment

Daisy Shu, PhD | University of New South Wales (Australia)

Current treatments for wet age-related macular degeneration (AMD) help some but leave many without effective options. This project explores two innovative approaches: repurposing fumaric acid esters, including an FDA-approved drug, and testing microtubule inhibitors to target abnormal blood vessel growth and scarring. By developing nanoparticle-based injectable therapies, this research aims to enhance drug delivery, reduce treatment burden, and improve outcomes for people with AMD.



Stem Cell-Based Approaches to Identify New Drugs for Treating Dry AMD

Srinivasa Rao Sripathi, PhD | Retina Foundation of the Southwest

The aim of this project is to develop novel treatments for age-related macular degeneration (AMD) by utilizing stem cell-derived retinal pigment epithelium (RPE) cells to screen for molecules (potential drugs) that inhibit RPE damage and reduce epithelial-mesenchymal transition, to help RPE cells maintain their integrity.

Regenerating Damaged Cells

Unlike human skin, the eye's nerve cells do not typically regenerate after damage. However, new research aims to overcome this limitation by regenerating and reconnecting retinal cells damaged by age-related macular degeneration (AMD) and restoring retinal pigment epithelium cells. Grantees are using human induced pluripotent stem cell (iPSC) technology to recreate parts of the eye and studying cell regeneration in animal models for potential therapies in humans.



Preserving Cone Photoreceptors in Dry Age-Related Macular Degeneration (AMD)

Ryoji Amamoto, PhD | Massachusetts Eye and Ear Infirmary (Harvard)

The root cause of dry AMD is the degeneration of cone photoreceptors, cells that are essential for daylight color vision. Dr. Amamoto's team recently discovered a novel genetic target, the retinoic acid signaling pathway, that, when activated, can promote cone survival. In this project, they aim to determine whether activation of this signaling pathway could also promote cone survival in models of dry AMD.

This grant is made possible by the support of the Parr family.



Regenerative Response in Spiny Mice

Manas R. Biswal, PhD | University of South Florida

Degeneration of the neural retina and in the retinal pigment epithelium (RPE) is associated with the advanced atrophic form of dry age-related macular degeneration (AMD). Since photoreceptors in the neural retina and RPE cannot be replaced once they die, treatments boosting the endogenous factors to stimulate retinal tissue regeneration could be a novel therapeutic strategy. Researchers will study ocular regeneration following tissue injury in an animal model shown to have remarkable faster responses of wound closure and healing in models of skin injury. This could facilitate studies to develop potential treatments for dry AMD in therapies in humans.

This grant is made possible by the support of the Free Family Foundation.



Shaping of Neuronal Connections by Resident Immune Cells

Ashley Farre, PhD | University of Idaho
Mentor: Diana Mitchell, PhD

In late stages of age-related macular degeneration (AMD), light sensing cells (photoreceptors) in the eye die, leading to vision loss. We can potentially replace photoreceptors, but in order to work properly, these cells need to be able to communicate with other neurons in the eye that process light information and pass it to the brain. Researchers will determine how microglia could help new photoreceptors establish connections with other neurons, potentially making future AMD treatments more effective.

This grant is made possible by the support of Karl and Yoriko McGillvray.



The Generation of Cone Photoreceptor Outer Segments

Heike Kroeger, PhD | University of Georgia

The loss of cone photoreceptor cells during age-related macular degeneration (AMD) can lead to irreversible vision loss. Repairing these specialized cells could change the overall approach of AMD therapies and complement current treatment options. This research investigates how cone photoreceptor outer segments are formed and regenerated using novel research models. The team's findings will identify a new strategy and potential new therapeutic targets to improve and prevent loss of cone photoreceptor cell function during AMD.

This grant is made possible by the support of the Free Family Foundation.



Uncovering Immune-Related Factors Driving Retinal Pigment Epithelium Repair

Lyndsay Leach, PhD | University of Texas at Austin

In this project using zebrafish as a lab model of tissue damage repair, researchers will examine how the immune response affects retinal pigment epithelium (RPE) repair. They expect to uncover novel factors in regenerating RPE that, in turn, represent candidates for treating or even reversing tissue loss in age-related macular degeneration.



Killifish: A Novel Model of AMD

Nicole Noel, PhD | University College London (UK)
Mentor: Ryan MacDonald, PhD

This work provides a unique opportunity to develop killifish as a retinal aging model. With this model, researchers will determine the cellular mechanisms that lead to age-related macular degeneration (AMD). They will also assess how healthy retinal aging can be promoted in this model of age-related retinal degeneration.

Understanding Early-Stage Age-Related Macular Degeneration

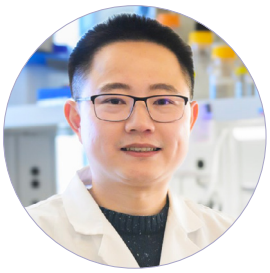
Age-related macular degeneration (AMD) is linked to many causes, with age being the strongest risk factor. AMD is believed to start in the retinal pigment epithelium (RPE), which helps to nourish the retina and dispose of waste. The RPE's function can be compromised by age, genes, oxidative stress, and inflammation. Macular Degeneration Research funds scientific exploration into the causes of AMD to open new and earlier treatments.



Investigating AMD-Like Disease in Animal Models

Brittany Carr, PhD | University of Alberta (Canada)

Age-related macular degeneration (AMD) research has been hindered by the lack of models that encapsulate its complex features. An important feature of AMD is retinal deposits of fat and protein debris, but researchers know little about where they come from and how they may confer an increased risk of severe AMD. To address this, researchers have created two animal models that develop two different types of AMD-associated retinal deposits. This work will provide significant insight into the deposit origin, treatments, and causative relationship to severe AMD.



Protecting Eye Blood Vessels to Slow Vision Loss in Macular Degeneration

Eric (Xiang) Ma, PhD | Oklahoma Medical Research Foundation
Mentor: Courtney Griffin, PhD

The choroid is a layer of blood vessels beneath the eye's light-sensing neurons that delivers the oxygen and nutrients needed for clear vision. In macular degeneration, these vessels slowly "wear out" under disease stress, much like tires that lose their tread over time. This process, called choroidal atrophy, deprives light-sensing cells of critical support and leads to vision loss. This project aims to uncover molecular pathways that protect these vessels from disease damage.



Understanding Early Molecular Events in Age-Related Macular Degeneration

Sandeep Moothedath Subrahmanian, PhD | Pennsylvania State University College of Medicine
Mentors: Michael Dennis, PhD; Alistair Barber, PhD & Jeffrey Sundstrom, MD, PhD

A significant challenge in addressing age-related macular degeneration (AMD) is the lack of understanding of the early molecular events that contribute to its development. This project aims to explore a novel molecular switch that plays a role in the failed antioxidant and inflammatory responses in retinal pigment epithelium with aging. The findings are expected to identify new targets for therapeutics that are preventative or provide interventions early in the development of AMD.



Exploring How NRF2 Protein Reduces RPE Cell Damage by Cigarette Smoke

Krishna Singh, PhD | Johns Hopkins University School of Medicine
Mentor: James Handa, MD

In age-related macular degeneration (AMD), retinal pigment epithelial (RPE) cells are damaged by oxidative stress. The NRF2 protein protects against oxidative stress; however, NRF2 signaling declines in AMD. Researchers propose to find a cause for NRF2 signaling decline, called acetylation, a process that modifies proteins to change how genes are produced. If successful, researchers will have a favorable strategy for treating AMD.



A Blood Test to Measure Genes Associated with Macular Degeneration

Jerzy Szablowski, PhD | Rice University

Scientists can gain a lot of information from excising a tissue and analyzing its biochemical behavior, such as expression of genes underlying disease. However, for the retina, such excision is impossible, as it would result in vision loss. Researchers are using a cutting-edge technology to measure gene activity within the retina with a blood test. Specifically, Dr. Szablowski's team is focusing on two genes suspected of increasing the risk of developing age-related macular degeneration. If successful, doctors could measure expression of patients' genes in the retina without damaging it.



Human Retina-on-a-Chip: A Next-Generation Model for Age-Related Macular Degeneration

Amir Vahabikashi, PhD | Northeastern University

The research team is creating a "retina-on-a-chip" that recreates how key cell types in the human eye—photoreceptors, retinal pigment epithelium, and tiny blood vessels—work together to support vision. Using stem-cell–derived tissues and a microfluidic device, this platform will model early events that lead to age-related macular degeneration, including the buildup of harmful deposits and loss of retinal function. By allowing real-time observation and testing of potential treatments, this technology aims to accelerate safer and more effective therapies for blinding diseases.

This award is made possible by the support of the Ivan Bowen Family Foundation.

Macular Chats

Stay Informed on the Latest Research

Recently diagnosed with macular degeneration? Know someone who has it? Receive helpful information from our free monthly phone call with doctors, researchers, and experts in the field on timely topics. You can submit questions before or during the event. Transcripts and audio recordings are available afterward on our website.

To register, call 800-437-2423 or go to **brightfocus.org/MacularChats.**

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