THIS YEAR, WE’VE FUNDED $25.3 MILLION IN RESEARCH GRANTS TO SAVE MEMORIES AND SIGHT.

Cover: A mini human retina in a dish, derived from adult stem cells, provides a new model for studying AMD. (Courtesy of Maria Valeria Canto-Soler, PhD, University of Colorado)

Our Mission

BrightFocus funds exceptional scientific research worldwide to defeat Alzheimer’s disease, macular degeneration, and glaucoma, and provides expert information on these heartbreaking diseases.
Top left: Neurons in a mouse brain. (Courtesy of Ksenia Kastenanka, PhD, Massachusetts General Hospital)

Top right: Different types of immune cells are shown in the eye’s retina and choroid. (Courtesy of Jeremy Lavine, MD, PhD, Northwestern University)

Bottom left: Astrocytes, a type of cell that supports brain function, grown in a dish for studying Alzheimer’s. (Courtesy of Dominik Paquet, PhD, Ludwig Maximilian University of Munich, Germany)

Bottom right: An astrocyte in a person with frontotemporal dementia. (Courtesy of Elise Marsan, PhD, University of California, San Francisco)
Thank you.

Because of you, we are seeing – more than ever – the powerful impact of a generous, growing community of donors fueling the brilliance and the drive of scientists around the world working to save our memories and sight.

We are proud to report that this year BrightFocus awarded a record-high $25.3 million in grants to support 106 scientific projects, our tenth consecutive annual increase. Eighty percent of these were to early-career researchers, giving flight to new ideas, new approaches, and new faces in our shared mission to end Alzheimer’s, macular degeneration, and glaucoma.

The fruits of our funding philosophy are seen in two recent, exciting developments: the first widely-available blood test to identify early signs of Alzheimer’s; and the FDA giving “Breakthrough Therapy” status to a potential new drug that could better treat macular degeneration. Both are rooted in key, early funding from BrightFocus, our sowing the seeds of the bold “what-if’s” of science.

There has never been a more hopeful time for science. And our work is far from over. To tackle – and defeat – these diseases we must continue our innovative, strategic philanthropy and collaboration.

To the many donors and scientists, thank you.

Stacy Pagos Haller
President and CEO

Patricia McGlothlin Stewart, CFP
Chair, Board of Directors

Science that Makes a Difference

*Molecular Neurodegeneration,* the official BrightFocus scientific journal, saw its impact factor rise significantly in recent years. It is the top-ranked open access journal in its field.

“The meteoric rise of the journal’s impact factor – from a 5.3 when BrightFocus first began its support in 2010 to a 9.6 a year ago and now a

14.2

is a powerful testament to BrightFocus’ success in driving scientific collaboration and discovery.”

– Diane Bovenkamp, PhD, BrightFocus Vice President, Scientific Affairs
Women and Alzheimer’s: An Unmet Need

“This partnership with WHAM is pushing the field forward in the very important area of sex-based #Alzheimers research.”

– Sharyn Rossi, PhD
Director of
Scientific Programs,
Neuroscience
at @brightfocus.

“This is really about, for the first time, galvanizing the business community and other leaders to raise awareness around the importance of #WomensHealth.”

– Stacy Pagos Haller,
President & CEO of
@brightfocus, on the #WHAMReport.

BrightFocus and Women’s Health Access Matters (WHAM) recently announced a new partnership to increase funding for women-focused Alzheimer’s disease research. New data show investments in women’s health research, particularly in Alzheimer’s disease and related dementias, have a bigger impact than when Alzheimer’s research is not targeted to women.

BrightFocus Researchers Elected to National Academy of Medicine

Three leading researchers renowned for their scientific breakthroughs in Alzheimer’s, macular degeneration and glaucoma – and who were given key early support from BrightFocus – were recently elected as members of the prestigious National Academy of Medicine, the Congressionally-chartered body providing strategic guidance to the nation on these critically important research areas.

Above left to right: Randall Bateman, MD; Jeffrey Goldberg, MD, PhD; Tien Y. Wong, MBBS, PhD.
EVERY DAY MORE THAN 1,300 AMERICANS DEVELOP ALZHEIMER’S DISEASE.

In 2021, BrightFocus awarded $14.1 million in funding for 46 new Alzheimer’s research grants.
Alzheimer’s Disease in the United States

Recognition for Efforts to Better Treat Traumatic Brain Injury

BrightFocus received the inaugural Impact Award from the Medical Technology Enterprise Consortium (MTEC) for its work supporting the scientific development of better treatments for repeated mild traumatic brain injury (mTBI). MTEC is a public-private partnership with the U.S. Department of Defense and key research, advocacy, and corporate organizations.

Veterans who have experienced repeated mTBIs have been found to be at 2-5 times the risk for Alzheimer’s and other forms of dementia. “We are harnessing the power of science to better protect those who are protecting us,” said BrightFocus President and CEO Stacy Pagos Haller. “We are excited that this partnership with MTEC will bring the latest science and technology to improve the lifelong health of the dedicated men and women who serve our country.”

Opposite page: The brain’s immune cells play a role in Alzheimer’s. Here we see fats (red) accumulating in brain immune cells (green) surrounded by amyloid plaques (blue). (Courtesy of Christel Claes, PhD, University of California, Irvine)

#AlzDayofHope Shares Our 360-Degree Alzheimer’s Research Approach

BrightFocus recently held its first #AlzDayofHope event to raise funds and spotlight the many scientists who are working hard to find a cure. Our signature 360-degree approach to Alzheimer’s research is gaining a better understanding of the root causes of the disease, improving early detection and diagnosis, and developing new drugs and treatments.

Alzheimer’s Disease Research is kick-starting the most promising ideas in many key areas. By funding novel research, we are opening new pathways to a cure and a more hopeful future.
New Alzheimer’s Model Reveals Genetic Changes Associated With Aging

In groundbreaking research led by BrightFocus-funded Jerome Mertens, PhD, Salk Institute scientists successfully converted skin cells from people with Alzheimer’s directly into age-equivalent neurons for the first time. According to Mertens, “This research might hold exciting potential for personalized medicine approaches in the Alzheimer’s field.”

Right: Neurons derived from skin cells from different individuals with Alzheimer’s disease. (Courtesy of Sylvia Pelucchi, PhD, Mertens Lab, University of Innsbruck, Austria)

Exploring the Brian-Eye Connection and Beyond

At the 15th International Conference on Alzheimer’s & Parkinson’s Diseases, BrightFocus co-organized a workshop on the common and distinct features of neurodegenerative disease including diseases that affect the brain and the eyes. The virtual session held in March 2021, was led by Diane Bovenkamp, PhD, BrightFocus Vice President, Scientific Affairs; Adriana Di Polo, PhD, University of Montreal; Guojun Bu, PhD, Mayo Clinic, Jacksonville; and Todd Golde, MD, PhD, University of Florida. This is the third workshop held at the bi-annual AD/PD conference which is attended by hundreds of scientific researchers worldwide.

Left: The eye-brain connection.
Pioneering the First-Ever Alzheimer’s Blood Test

When researchers said that someday it may be possible to screen for Alzheimer’s through a blood sample – instead of expensive, invasive tests – BrightFocus seized the moment, giving flight to a potentially game-changing idea.

Through its Alzheimer’s Disease Research program, BrightFocus provided key, early funding to get this innovative idea off the ground. This bold bet is bearing fruit, as the PrecivityAD™ blood test is now in use in the U.S. and Europe, helping to boost early diagnosis and speed recruitment into clinical trials.

Behind it are a team of scientists at/from the Washington University School of Medicine in St. Louis, MO, and C₂N Diagnostics, the groundbreaking small biotech that developed the test for commercial use. They include C₂N scientific co-founders Randall Bateman, MD, and David Holtzman, MD, both of the Washington University neurology faculty, which Dr. Holtzman chairs; Joel Braunstein, MD, MBA, president, CEO, and another cofounder of C₂N Diagnostics; and Philip Verghese, PhD, C₂N director of Research, Development and Operations.

Dr. Bateman, who first pioneered techniques used in the test, expressed gratitude to BrightFocus. “Taking an idea, or a hypothesis, to the point where it has an impact on a disease is a long journey,” he said, “yet the rewards – in terms of earlier diagnosis and accelerating cures – were so substantial, we were invigorated to press on.”

“I appreciate BrightFocus for supporting my early discoveries, and for recognizing that this work would translate into real-world benefits,” he said. “It’s taken a lot of teamwork to get to this point, and we are grateful to BrightFocus and its donors for believing in our efforts.”

“The advantage of the blood sample is it’s just much easier.”

Randall Bateman, MD,
Washington University
School of Medicine
AGE-RELATED MACULAR DEGENERATION IS A LEADING CAUSE OF IRREVERSIBLE VISION LOSS IN THE U.S.

In 2021, BrightFocus awarded $6.2 million in funding for 20 new macular degeneration research grants.
Our Chat telephone call-in series features the latest news and advice for those living with vision loss in a free, monthly format. Researchers, clinicians, and low-vision specialists offer updates and answer questions from participants via phone or online. The Chats are archived at BrightFocus.org.

A recent discussion featured Emily Chew, MD, a leading vision researcher at NIH’s National Eye Institute. Dr. Chew shared the latest news, including her own research, on the role of diet and nutritional supplements in age-related macular degeneration.

Opposite page: This 3D model of the retinal pigment epithelium (RPE), a layer of cells that supports the retina and defends it against macular degeneration, shows RPE cell boundaries (pink), nuclei (blue), autophagosomes (green) and lysosomes (red). (Courtesy of Aparna Lakkaraju, PhD, University of California, San Francisco)
First-Ever 3D Cell Model of Human Eye Replicates AMD

Ruchira Singh, PhD, at the University of Rochester’s Flaum Eye Institute, was part of a team of medical researchers and bioengineers that developed a breakthrough, three-dimensional (3D) matrix model of wet age-related macular degeneration that can help with better understanding what causes the disease and in finding effective treatments. Singh’s research was supported by a grant from BrightFocus’ Macular Degeneration Research.

Above: Dr. Singh and colleague in her lab. (Courtesy of Ruchira Singh, PhD, University of Rochester’s Flaum Eye Institute)

Stopping AMD Before It Starts

Aparna Lakkaraju, PhD, studies how, drusen, small deposits made of lipid droplets that are a defining feature of AMD, are formed early in the disease. She and her team discovered that the levels of lipid droplets, the likely precursors to drusen, can be reduced with cholesterol-inhibiting drugs. Dr. Lakkaraju recently received the newly-created MDR Innovative Research award to support her novel work in macular degeneration.

Above: Image of an AMD eye.
“First-In” Science May Save Sight

Early in his career as a Columbia University chemist, Ilyas Washington, PhD, had a big idea, one of those “what-if’s” of science. At this critical, early moment, BrightFocus was there. Through its Macular Degeneration Research program, BrightFocus provided a grant that may now bear fruit toward treating not just one, but possibly two, vision diseases that can lead to blindness.

In his work, Dr. Washington investigates natural compounds that damage or protect the eye as it ages and undergoes stress. That led him to lipofuscin, a pigmented protein that accumulates and damages the retina in Stargardt’s disease, an inherited condition that resembles age-related macular degeneration (AMD).

Dr. Washington had noticed that vitamin A, which helps protect the eye, reacted to lipofuscin by changing its molecular form. He thought it might be possible to create a similar, modified form of vitamin A to slow lipofuscin build-up. This is where BrightFocus came in.

“BrightFocus was the first major funder of my academic lab. They gave me the opportunity – and the confidence – to believe that I could someday stop someone from losing their sight,” says Dr. Washington, who is now with Alkeus Pharmaceuticals, a company he helped found and developer of this potential new treatment.

This year, his proposed oral drug received a “Breakthrough Therapy” designation from the U.S. FDA. Given the disease’s scientific similarities to geographic atrophy, an advanced and currently untreatable form of AMD, there is great hope toward treating that as well.
GLAUCOMA IS THE MOST COMMON CAUSE OF IRREVERSIBLE BLINDNESS WORLDWIDE.

In 2021, BrightFocus awarded $4.9 million in funding for 17 new glaucoma research grants.
Glaucoma in the United States

Today, more than 3 million Americans have glaucoma. By 2050, it is estimated that the number will double to 6 million people.

BrightFocus Global Leadership in Vision Science

The annual meeting of the Association for Research in Vision and Ophthalmology (ARVO) is the world’s main stage for sharing bold ideas in vision science. By mingling disciplines and discoveries, it incubates innovative, collaborative research into treatments and cures. This year’s ARVO, held virtually due to the pandemic, brought together researchers from 75 countries – MDs, PhDs, and young scientists in training.

BrightFocus had a major presence. At least 60 presentations shared results from Macular Degeneration Research or National Glaucoma Research grant projects; and additional BrightFocus-funded research was referenced in hundreds of talks.

Preeti Subramanian, PhD, our Director of Scientific Programs, Vision Science, was recently invited to serve on two key ARVO committees to better promote diversity and inclusion of minority groups, women, and those with special needs in vision research.

Opposite page: In an eye with exfoliation syndrome, the discarded protein material (white spots) can block drainage and lead to glaucoma. (Courtesy of Karen Curtin, PhD, University of Utah)
Successful Cell Transplant Gives Hope for New Glaucoma Treatment

BrightFocus National Glaucoma Research-funded researcher Petr Baranov, MD, PhD, of the Schepens Eye Research Institute at Harvard Medical School, recently led a team of scientists in the first successful attempt to transplant retinal ganglion cells (RGCs) into the eyes of mice to find a cure for glaucoma.

Cell transplant experiments offer hope of restoring vision loss from glaucoma.

Revolutionary Concept in Glaucoma Care

Gregory Ksander, PhD; Meredith Gregory-Ksander, PhD; and their Harvard colleagues used gene therapy to “reprogram” eye tissue to a younger state in mice, restoring vision lost to glaucoma. They credit early funding from National Glaucoma Research for launching this bold idea which could transform treatment for glaucoma and age-related diseases.

Optic nerve regeneration.

RESEARCH IN BRIEF

RESEARCH IN BRIEF

Optic nerve regeneration.
Ji Won Bang, PhD, thinks science isn’t seeing the whole picture with glaucoma. She believes its roots extend beyond the eye, and that glaucoma should be studied from the perspectives of both the eye and brain.

Her innovative project, supported by a National Glaucoma Research (NGR) fellowship grant, will explore connections between the sleep disruption commonly experienced by glaucoma patients and neurodegeneration. “No studies have yet examined how the sleep-regulating systems are affected by glaucoma,” she says. The results may also prove helpful against Alzheimer’s, for which sleep disruption is a significant risk factor.

She’s being guided by two experts at New York University’s Grossman School of Medicine, both of whom also had early-career BrightFocus grants: Kevin Chan, PhD, who’s linked early glaucoma with eyebrain dynamics; and Dr. Chan’s own former mentor, Joel Schuman, MD, who was part of the team that developed the landmark optical coherence tomography (OCT) imaging, which has revolutionized vision care.

Dr. Bang, who is currently based in Dr. Chan’s lab, is hopeful for the future of her research in this area. Thanking donors to BrightFocus’ NGR program, she compared her grant to a seed: “The seed will grow its roots, it will turn into a sprout, and it will open up many beautiful flowers. Likewise, I believe that we are making the initial steps towards a better understanding of glaucoma and sleep disorder.”

“I believe that we are making the initial steps towards a better understanding of glaucoma and sleep disorder.”

Ji Won Bang, PhD
These new research awards that were offered total more than $25 million in 2021, part of our ongoing scientific portfolio of over 260 projects, a nearly $60 million investment in research worldwide in the past three years alone.
2021 BRIGHTFOCUS GRANTS AT A GLANCE

BASIC — Research that aims to better understand how a disease happens, and to obtain new ideas of how to stop the disease.

CLINICAL — Research involving volunteer participants to test the safety and effectiveness of drugs, devices, or other treatment candidates.

TRANSLATIONAL — Research to move findings from the lab bench to the “bedside” by testing potential treatments.

ALZHEIMER’S DISEASE RESEARCH

Restoring Sleep and Memory Deficits in Alzheimer’s Disease by Targeting Somatostatin Interneurons
Moustafa Algamal, PhD
MASSACHUSETTS GENERAL
Fellowship Mentor: Ksenia Kastanenka, PhD

Astroglial Inflammatory Signaling in Alzheimer’s Disease
Benedetta Assetta, PhD
BROWN UNIVERSITY
Fellowship Mentor: Yu-Wen Alvin Huang, MD, PhD

Characterization of Tau Pathology Heterogeneity Across the Alzheimer’s Disease Spectrum
Alexa Pichet Binette, PhD
LUND UNIVERSITY (SWEDEN)
Fellowship Mentor: Oskar Hansson, MD, PhD

Nucleus Incertus of the Brain: Mapping its Genomic Expression and Changes in Alzheimer’s Disease
Camila de Avila Dal Bo, PhD, MSc
MAYO CLINIC ARIZONA
Fellowship Mentor: John David Fryer, PhD

Single Cell Profiling of MAPT Splicing Mutation Ipsc-Derived Organoids and Brain Tissue
Kathryn Bowles, PhD
ICAHN SCHOOL OF MEDICINE AT MOUNT SINAII

APOE4 Gender-Dependent Regulation of Neutrophil-Microglia Cross-Talk in Alzheimer’s Disease
Oleg Butovsky, PhD
BRIGHAM AND WOMEN’S HOSPITAL

Molecular Mechanisms Of Axonal Pathology in Alzheimer’s Disease
Yifei Cai, PhD
YALE UNIVERSITY
Fellowship Mentor: Jaime Grutzendler, MD

Physical Interaction of TREM2 and C1q in Alzheimer’s Disease
Xiaofen Chen, PhD
XIAMEN UNIVERSITY (CHINA)

The Relationship Between Amyloid/Tau Pathology and Different Memory Processes Underlying Memory Aging
Xi Chen, Ph.D.
THE UNIVERSITY OF CALIFORNIA, BERKELEY
Fellowship Mentor: William Jagust, MD

The Microbiota Cell-Type Specific Regulation of AD Pathogenesis
Laura Cox, PhD
BRIGHAM AND WOMEN’S HOSPITAL

Effects and Mechanisms of APOE-Induced Meningeal Lymphatic Remodeling in Alzheimer’s Disease
Sandro Da Mesquita, PhD
MAYO CLINIC JACKSONVILLE

The Role of Brain Connectivity as a Mechanistic Link Between Amyloid and Tau Pathology Spread in Alzheimer’s Disease
Nicolai Franzmeier, PhD
LUDWIG MAXIMILIAN UNIVERSITY OF MUNICH (GERMANY)

Detecting Leaky Vessels in Cerebral Amyloid Angiopathy — a Novel Approach
Whitney Freeze, PhD
LEIDEN UNIVERSITY MEDICAL CENTER (NETHERLANDS)
Fellowship Co-Mentor: Louise van der Weerd, PhD
Fellowship Co-Mentor: Susanne van Veluw, PhD
HARVARD UNIVERSITY
Cerebral Organoids to Investigate Cellular and Neuronal Network Vulnerability in Alzheimer’s Disease and Progressive Supranuclear Palsy
Hongjun Fu, PhD
THE OHIO STATE UNIVERSITY

Targeting E3 Ligase IDOL to Mitigate Apoe4-Mediated Tau Pathology
Jie Gao, PhD
THE OHIO STATE UNIVERSITY

Transcriptional Dysregulation of the Endocytic Machinery in AD
Ulrich Hengst, PhD
COLUMBIA UNIVERSITY

Blood-Based Markers For Alzheimer’s Pathology in Cognitively Healthy Centenarians: Revealing Mechanisms Of Resistance And Resilience
Henne Holstege, PhD
VU UNIVERSITY MEDICAL CENTER (NETHERLANDS)

Immune Mechanisms of Synapse Loss in Alzheimer’s Disease
Soyon Hong, PhD
UNIVERSITY COLLEGE LONDON (UK)

Pathophysiology of sRNAs in Alzheimer’s Disease
Laura Ibanez, PhD
WASHINGTON UNIVERSITY IN ST. LOUIS

Lysosomal Signaling in Microglia and Alzheimer’s Disease
Harini Iyer, PhD
STANFORD UNIVERSITY

From Genetics to the Cellular Phase of Alzheimer’s Disease: Untangling the Role of Lipid Pathways in Microglia Responses to Amyloid Pathology
Renzo Mancuso, PhD
VIB (BELGIUM)

Tau Phosphorylation in Preclinical and Symptomatic Autosomal Dominant Alzheimer’s Disease
Karim Meeker, PhD
WASHINGTON UNIVERSITY SCHOOL OF MEDICINE Fellowship Mentor: Beau Ances, MD, PhD, MSc

The Role Of HIF-1a in the Microglial Response to Alzheimer’s Disease Pathology
Jonas J Neher, PhD
GERMAN CENTER FOR NEURODEGENERATIVE DISEASES (GERMANY)

Investigating the Role of Liver X Receptors in Control Of Alzheimer’s Disease Risk Genes and Lipid Clearance in Hipsc-Derived Microglia
Anna Podlesny-Drabiniok, PhD
ICAHN SCHOOL OF MEDICINE AT MOUNT SINAI Fellowship Mentor: Alison Goate, PhD

Protective Mechanism of APOE3-Christchurch in Alzheimer’s Disease
Ana-Caroline Raulin, PhD
MAYO CLINIC JACKSONVILLE Fellowship Mentor: Guojun Bu, PhD

From Genetics to the Cellular Phase of Alzheimer’s Disease: Examination of Nutrition Signaling and the Lysosomal System
Timothy Sargeant, PhD
SOUTH AUSTRALIAN HEALTH AND MEDICAL RESEARCH INSTITUTE (AUSTRALIA) Co-Principal Investigator: Julien Bensalem, PhD Co-Principal Investigator: Leonie Heilbronn, PhD; UNIVERSITY OF ADELAIDE (AUSTRALIA)

Detecting and Characterizing Preclinical AD Using AI And Structural MRI
Aristeidis Sotiras, PhD
WASHINGTON UNIVERSITY IN ST. LOUIS

Clock-Driven Sleep Fragmentations in Tauopathy
Masashi Tabuchi, PhD
CASE WESTERN RESERVE UNIVERSITY
The Brainstem Locus Coeruleus: Potential Bridge Between Sleep-Wake Disruption and Alzheimer’s Disease Pathogenesis
Maxime Van Egroo, PhD
MAASTRICHT UNIVERSITY (NETHERLANDS)
Fellowship Mentor: Heidi Jacobs, PhD

The Role of the Peripheral Immune-System in FTD-GRN; Increasing Understanding for Future Therapeutic Target Development
Rebecca Wallings, PhD
UNIVERSITY OF FLORIDA
Fellowship Mentor: Malu Tansey, PhD

Determining Mechanisms of Age-Related Cerebrovascular Dysfunction in a Genetic Model of Cerebral Small Vessel Disease
Xiaowei Wang, PhD
THE UNIVERSITY OF CALIFORNIA, SAN FRANCISCO
Fellowship Co-Mentor: Douglas Gould, PhD
Fellowship Co-Mentor: Tyson Kim, MD, PhD
Fellowship Co-Mentor: Scott Earley, PhD;
UNIVERSITY OF NEVADA

Understanding Tau-Induced Nuclear Transport Deficits in Alzheimer’s Disease
Susanne Wegmann, PhD
GERMAN CENTER FOR NEURODEGENERATIVE DISEASES (GERMANY)

The Role Of Peripheral apoE in the High Density Lipoprotein Fraction In Vascular Contributions to Alzheimer’s Disease
Cheryl L. Wellington, PhD
UNIVERSITY OF BRITISH COLUMBIA (CANADA)
Fellowship Mentor: Katerina Akassoglou, PhD

Fibrinogen-mediated Innate Immune Activation and Neuronal Dysfunction in Alzheimer’s Disease
Zhaoqi Yan, PhD
THE J. DAVID GLADSTONE INSTITUTES
Fellowship Mentor: Krzysztof Palczewski, PhD

APOE Genotype-Dependent Effects of Life-Style Intervention in Healthy Aging and Alzheimer’s Disease
Na Zhao, PhD, MD
MAYO CLINIC JACKSONVILLE

Characterizing the Role of Microglial GPR56 in Alzheimer’s Disease
Beika Zhu, PhD
THE UNIVERSITY OF CALIFORNIA, SAN FRANCISCO
Fellowship Mentor: Xiannhua Piao, MD, PhD

Understanding Bruch’s Membrane and their Relevance to the RPE Pathology in AMD
Rosario Fernandez-Godino, PhD
SCHEPENS EYE RESEARCH INSTITUTE, MASSACHUSETTS EYE AND EAR, HARVARD MEDICAL SCHOOL

Advanced Imaging Studies in a Model of Type 3 Neovascular AMD
Tyson Kim, MD, PhD
UNIVERSITY OF CALIFORNIA, SAN FRANCISCO
Co-mentors: Douglas Gould, PhD, Aparna Lakkaraju & Dan Schwartz, MD

Origin, Heterogeneity, and Function of Immune Cells in Wet AMD Model
Jeremy Lavine, MD, PhD
NORTHWESTERN UNIVERSITY FEINBERG SCHOOL OF MEDICINE
Co-mentors: Harris R. Perlman, PhD & Amani Fawzi, MD

Functional Characterization of Genetic Regulatory Effects of AMD Risk Variants
Rinki Ratnapriya, PhD
BAYLOR COLLEGE OF MEDICINE
Mentor: John Timothy Stout, MD, PhD

New Signaling Pathway in Blood Vessels as Target for Wet AMD
Benjamin Thomson, PhD
NORTHWESTERN UNIVERSITY

Transcriptional Regulation of Cellular Organelle Function in the Retinal Pigment Epithelium
Mallika Valapala, PhD
INDIANA UNIVERSITY

POST-DOCTORAL FELLOWSHIP AWARDS

New Model to Tracking the Development of Reticular Pseudodrusen and AMD
Brittany Carr, PhD
UNIVERSITY OF BRITISH COLUMBIA (CANADA)
Fellowship Mentor: Orson Moritz, PhD

CRISPR Genome Engineering in AMD Risk Alleles
Ya-Ju Chang, PhD
COLUMBIA UNIVERSITY MEDICAL CENTER
Fellowship Mentor: Stephen Tsang, MD, PhD

Novel Antibody-based Agonist for Neovascular AMD
Rony Chidiac, PhD
UNIVERSITY OF TORONTO, FACULTY OF PHARMACY (CANADA)
Fellowship Mentor: Stephane Angers, PhD

Addressing the Link Between Impairment in Phagosome Degradation and AMD
Antonio Escudero Paniagua, PhD
THE ELIZABETH ANDERSON AWARD UNIVERSITY OF CALIFORNIA, LOS ANGELES
Fellowship Mentor: David Williams, PhD
Understanding the Role of Inflammation in AMD
Sayan Ghosh, PhD
UNIVERSITY OF PITTSBURGH
Fellowship Mentor: Debasish Sinha, PhD

Integrated Immunogenomics to Develop Translational Treatment for AMD
Michelle Grunin, PhD
HEBREW UNIVERSITY OF JERUSALEM (ISRAEL)
Fellowship Co-mentors: Shai Carmi, PhD
Jonathan L. Haines, PhD, CASE WESTERN RESERVE UNIVERSITY

Exploring the Role of Lipid Metabolism in AMD Pathogenesis
Rohini M. Nair, PhD
UNIVERSITY OF PENNSYLVANIA
Fellowship Mentor: Venkata Ramana Murthy Chavali, PhD

Ciliary Lipids in RPE Repair: A Novel Target for AMD
Ke Ning, MD
STANFORD UNIVERSITY
Fellowship Co-mentors: Yang Sun, MD, PhD & Venit Mahajan, MD, PhD

Macular and Mid-Peripheral Specific iPSC-RPE Models to Discover Regional RPE Susceptibility in AMD
Davide Ortolan, PhD
NATIONAL EYE INSTITUTE, NIH
Fellowship Co-mentors: Kapil Bharti, PhD & Ruchi Sharma, PhD

Elucidating the Role of Metabolic Reprogramming in RPE Dysfunction and Inflammation in AMD
Daisy Shu, PhD
THE SCHEPENS EYE RESEARCH INSTITUTE, MASSACHUSETTS EYE AND EAR, HARVARD MEDICAL SCHOOL
Fellowship Mentor: Magali Saint Geniez, PhD

Structure-based Development of HTRA1 Specific Inhibitors for AMD
Young Joo Sun, PhD
STANFORD UNIVERSITY
Fellowship Mentor: Venit Mahajan, MD, PhD

Replenishment of MicroRNA Using Extracellular Vesicles for Treatment of AMD
Yvette Wooff, PhD
THE AUSTRALIAN NATIONAL UNIVERSITY (AUSTRALIA)
Fellowship Mentor: Riccardo Natoli, PhD

The Biomechanical Phenotype of Normal-Tension Glaucoma
Michael Girard, PhD
SINGAPORE EYE RESEARCH INSTITUTE, SINGAPORE NATIONAL EYE CENTRE (SINGAPORE)
Co-Principal Investigators: Aung Tin, MBBS, PhD & Monisha E, Nongpiur, MBBS, PhD

Mechanisms of Angle Development and Glaucoma
Revathi Balasubramanian, PhD
COLUMBIA UNIVERSITY MEDICAL CENTER

Deciphering the Local Effect of Glaucoma Risk Factors on Axonal Mitochondria
Romain Cartoni, PhD
The Thomas R. Lee Award DUKE UNIVERSITY MEDICAL CENTER

Artificial Intelligence Approaches to Better Understand Genetic Contributions
Puya Gharakhani, PhD
JOHNS HOPKINS UNIVERSITY
Co-Principal Investigator: Harry A. Quigley, MD

Mapping Scleral Fibroblasts and Their Significance in Glaucoma
Ian Pitha, MD, PhD
JOHNS HOPKINS UNIVERSITY
Co-Principal Investigator: Pengfei Zhang, PhD

In vivo Characterization of the Mechanical Properties of the Human Optic Nerve Head
Thao Nguyen, PhD
JOHNS HOPKINS UNIVERSITY
Co-Principal Investigator: Pengfei Zhang, PhD

New Neuroprotective Genes Against Axonal Damage and Glaucoma
Matthew Veldman, PhD
MEDICAL COLLEGE OF WISCONSIN

Accurate Prediction and Detection of Glaucoma Progression Using Advanced OCT Imaging
Zhichao Wu, PhD
CENTRE FOR EYE RESEARCH AUSTRALIA LIMITED (AUSTRALIA)
Co-Principal Investigators: Xavier Hadoux, PhD & Peter van Wijngaarden, MBBS, PhD

Validation of Novel OCT-based Imaging Tools for Noninvasive Monitoring
Robert Zawadzki, PhD
Dr. Douglas H. Johnson Award UNIVERSITY OF CALIFORNIA, DAVIS
Co-Principal Investigator: Pengfei Zhang, PhD

In vivo Characterization of the Mechanical Properties of the Human Optic Nerve Head
Thao Nguyen, PhD
JOHNS HOPKINS UNIVERSITY
Co-Principal Investigator: Harry A. Quigley, MD

Potential Role for New Sensors of Elevated Eye Pressure in Models of Glaucoma
Michael Reber, PhD
UNIVERSITY HEALTH NETWORK (CANADA)

Alterations of the Sleep-regulating Systems in Glaucoma
Ji Won Bang, PhD
NEW YORK UNIVERSITY SCHOOL OF MEDICINE
Fellowship Co-mentors: Kevin C. Chan, PhD & Joel Schuman, MD
Yuka Sasaki, PhD
BROWN UNIVERSITY
Hemodynamics and Biomechanics of the Lamina Cribrosa (LC)
Yi Hua, PhD
UNIVERSITY OF PITTSBURGH
Fellowship Mentor: Ian Sigal, PhD

Mechanisms Controlling Aqueous Humor Drainage in Mice
Ester Reina-Torres, PhD
IMPERIAL COLLEGE OF SCIENCE, TECHNOLOGY AND MEDICINE (UK)
Co-mentors: Darryl Overby, PhD William Daniel Stamer, PhD, DUKE UNIVERSITY

Investigating the Optic Nerve Head Remodeling in Glaucoma
Babak Safa, PhD
GEORGIA TECH RESEARCH CORPORATION
Fellowship Mentor: Christopher Ross Ethier, PhD

Transcriptional Regulation of Nerve Cell Survival and Axon Regeneration
Kimberly Wong, PhD
CHILDREN’S HOSPITAL BOSTON
Fellowship Mentor: Larry Benowitz, PhD

**SPECIAL THANKS TO DONORS SUPPORTING ONGOING AWARDS**

**ALZHEIMER’S DISEASE RESEARCH**
Investigating Neuropeptides as Biomarkers and Novel Therapeutics For Alzheimer’s Disease
Becky Carlyle, PhD
This award is made possible by the support from The Luminescence Foundation, Inc.

**MACULAR DEGENERATION RESEARCH**
Profiling of Immune Cell Subtypes in AMD Patients and Controls
Philip Ruzycki, PhD
The award is made possible by support from The Ivan Bowen Family Foundation
WASHINGTON UNIVERSITY IN SAINT LOUIS
Co-Principal Investigator: Rajendra Apte, MD, PhD

**A Novel Method for Treating Wet AMD Reversibly With Single Intraocular Injection**
Shushen Wang, PhD
This award is made possible by the support of Dr. H. James and Carole Free TULANE UNIVERSITY

**BROADENING DIVERSITY IN SCIENCE**

BrightFocus is committed to bringing together scientists from diverse backgrounds to foster creativity and innovation in addressing complex scientific challenges.

One of our new initiatives is to fund travel fellowships, a program that will provide under-represented minorities the opportunity to attend key research meetings, including our signature BrightFocus Fast Track conferences.

Fast Track brings promising young scientists together to collaborate with world-renowned experts in their field.
BrightFocus grantees have received numerous prestigious awards over the years.

compromised of renowned leaders in their fields, recommend new research opportunities for BrightFocus to advance our goal of defeating Alzheimer’s, macular degeneration, and glaucoma. The following experts have served on each committee within the preceding five years.

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Heping Xu, MD, PhD
QUEENS UNIVERSITY (UNITED KINGDOM)

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UNIVERSITY OF UTAH
Mary Wirtz, PhD
OREGON HEALTH & SCIENCE UNIVERSITY
Darrell WuDunn, MD, PhD
INDIANA UNIVERSITY
BRIGHTFOCUS WORKS CLOSELY WITH NONPROFIT AND CORPORATE PARTNERS ON ISSUES OF COMMON CONCERN
Global Network for Alzheimer’s

BrightFocus has worked with partners worldwide to advance research and provide public awareness of Alzheimer’s disease including:

**Belgium**
Stichting Alzheimer Onderzoek

**France**
Fondation Vancre Alzheimer

**Germany**
Alzheimer Forschung Initiative e.V.

**The Netherlands**
Alzheimer Nederland
BRIGHTFOCUS THANKS OUR DONORS FOR THEIR GENEROSITY

toward our three scientific and public awareness programs: Alzheimer’s Disease Research, Macular Degeneration Research, and National Glaucoma Research. The support of individual donors, family foundations, and corporate partners makes our work possible.

A wide range of contribution opportunities is available to accommodate resources and charitable goals. Each gift is important and needed to help us find a cure.

**INVESTING IN A CURE**

**Sowing the Seeds of Scientific Progress**

Thanks to our early support, most researchers go on to receive government and industry grants that, on average, are ten times larger than the original BrightFocus award, a **1,000%** return on investment.

**NeuroCare Live - A New Partnership**

BrightFocus is proud to serve as the patient advocacy partner for PlatformQ Health’s NeuroCare Live virtual programming about Alzheimer’s disease. The first two of this year’s three-part webinar series are available on the NeuroCare Live website, featuring Alzheimer’s research leaders Goldie Smith Byrd, PhD, Wake Forest School of Medicine, and Zaldy Tan, MD, PhD, FACP, Cedars-Sinai Medical Center; and Nancy Lynn, BrightFocus’ senior vice president for Strategic Partnerships, who talked about BrightFocus-funded research, information, and programs for families affected by Alzheimer’s disease.
Seth MacFarlane
Valentine’s Concert

BrightFocus and MPTF (Motion Picture & Television Fund) held a special virtual Valentine’s Day concert featuring the acclaimed, multi-talented Grammy-nominated vocalist Seth MacFarlane. The concert benefited both nonprofits working on research and care for diseases of aging. The concert was live-streamed at Variety.com connecting communities, music and mission.
Leading Actors and Award-Winning Chef Join BrightFocus Scientists at Virtual Gala

“Food is medicine.”
Aarón Sánchez
Leading actors William H. Macy and Peter Gallagher joined award-winning chef Aarón Sánchez for BrightFocus Foundation’s 6th Annual Gala. The virtual event featured leading scientists and advocates working with the foundation to drive some of the most exciting research around the globe to end diseases of mind and sight.

In a conversation led by acclaimed director/producer James Keach, Macy discussed his relationship with Alzheimer’s, both his father’s death and playing a character with dementia in the Showtime series *Shameless*. “It is important we shed light on the disease, ending stigma and increasing research.” Gallagher shared memories of his mother, a scientist who worked with Jonas Salk on the polio vaccine, and had Alzheimer’s disease for nearly 20 years before she passed away.

Sánchez discussed the critical role of food in healthy aging and vision. “I’ve seen firsthand how disease robs people of their quality of life, and I am honored to be a part of helping all of us live longer and healthier lives.”

BrightFocus-funded scientists whose work is the forefront of saving mind and sight shared their bold research and results including:

- Randall Bateman, MD, and David Holtzman, MD, Washington University School of Medicine, Philip Verghese, PhD and Joel Braunstein, MD, MBA, C²N Diagnostics, who are developing the first widely-available blood test to better diagnose Alzheimer’s;
- Dimitra Skondra, MD, PhD, at the University of Chicago, who is studying how diet impacts macular degeneration; and
- Ji Won Bang, PhD, of New York University, researching the role of sleep in glaucoma.

Above: Maddy Dychtwald, Age Wave co-founder, and BrightFocus Board Member, interviews Dimitra Skondra, MD, PhD, University of Chicago about her research studying how diet impacts macular degeneration.
INVESTING IN A CURE
BrightFocus Launches New Brain Health Education Series

BrightFocus’ Brain Info Live℠ is a new virtual education series that provides free, entertaining, interactive brain health programs on an ongoing basis over two years to diverse and underrepresented communities across the United States. Working collaboratively with local community leaders and partners, each live-streamed program will include culturally tailored information and resources and will generate a sustained dialogue that builds trust over time between community members, families, clinicians, researchers, and other health professionals.

Learn more at www.brightfocus.org/braininfolive.

Images from Brain Info Live, including (top left) musician Ashley Campbell, daughter of the late Glen Campbell, legendary singer and musician who passed away from Alzheimer’s; (bottom middle) a guest expert on Alzheimer’s, Goldie Smith Byrd, PhD, Wake Forest School of Medicine and (bottom right) Lucina Rodriguez, Los Cenzontles Cultural Arts Academy.
BrightFocus donors often have special connections to the scientific research programs they support. We are honored to share three of those stories with you.

Reginald and Margaret de la Cuesta met and married soon after serving their nation with great distinction in World War II – Reginald in the U.S. Army at Okinawa, earning a Bronze Star, Purple Heart and two Oak Leaf Cluster Awards; Margaret, one of the first women in the U.S. Army Air Corps, teaching Morse code and procedure to radio operators and Signal Corps ground forces.

Together, through their tireless, hard work, they built a fulfilling life and a meaningful legacy. They started a successful business building homes and communities, were married for 61 years and raised a family spanning four generations in southern California. Margaret, who was warm and loved connecting people, worked side-by-side with Reginald until her

“Our parents worked so hard and it is nice to see something come from their work that directly helps others.”

The de la Cuesta daughters
retirement. When she developed Alzheimer’s disease, the family took turns as caregivers. Due to the impact of Alzheimer’s on their family, Reginald and Margaret added a Charitable Lead Trust in their estate plans, directing that the Trust’s annual revenue would go to support Alzheimer’s Disease Research, a program of BrightFocus Foundation. This transformational gift has provided a steady stream of funding and upon maturation, is expected to have provided $10.7 million to significantly advance Alzheimer’s research and provide expert information on this heartbreaking disease.

BrightFocus Foundation is pleased to announce the creation of the de la Cuesta Legacy Society, recognizing the historic impact of the de la Cuesta family’s generosity. Daughters Pamela, Roberta, and Regina, four grandchildren, and three great grandchildren are proud of their parents and pleased that BrightFocus is recognizing their benefaction. The newly-named Society shares the family’s common bond of philanthropy to provide for the needs of future generations.

According to the de la Cuesta daughters, “Our parents worked so hard and it is nice to see something come from their work that directly helps others. We are so proud of them and we are hopeful for the work of BrightFocus Foundation and that their research is able to find the causes of Alzheimer’s disease and change lives in the future.”
Tuti and her husband, Pete DeMaagd, longtime residents of Grand Rapids, MI, moved to the small town of Douglas along Lake Michigan after retirement because they loved the beach community where everyone knows each other’s name.

Pete was a reporter for the Grand Rapids Press where he had a column called “Pete’s Day” and together they wrote a weekly column as restaurant reviewers entitled “Dining Out with Pete and Tuti.” Tuti also worked for many years for the superintendent of the local public school system. She loved to entertain, play tennis and be active in her community including serving on the Grand Rapids Community Council.

Following Pete’s passing a few years ago, Tuti now lives with her dog, Simone Suzette, a silver mini-poodle, the fourth mini-poodle she has had. Tuti also has the loving support of nearby friends and advocates.

In January 2021, she was diagnosed with macular degeneration. Tuti is now taking vitamin supplements and has new corrective glasses. She has also stopped driving.

She has been supporting Macular Degeneration Research ever since her diagnosis. “I believe in the power of first impressions and the staff of Macular Degeneration Research at BrightFocus Foundation have made a great impression on me. They keep me informed on the positive side of research and I listen to the monthly Chats,” said Tuti. “Surely, we all hope for a cure. A cure is in the hands of research and we all need to support them in any way we can.”

“A cure is in the hands of research and we all need to support them in any way we can.”

Tuti DeMaagd
Vince Scarafino of Canton, Michigan devoted his distinguished career to the Ford Motor Company after graduating from the University of Michigan with a degree in mechanical engineering. He spent over three decades working in computer science to improve vehicle emissions and oversaw technology improvements based on crash simulations. “I am proud to have pushed the envelope and helped to make a contribution to a safer world,” said Vince. Retired for over 10 years now, he continues to dabble with computers, is an avid car buff, and enjoys spending time with his nieces and nephews.

Vince has long known the impact of vision loss. He was first diagnosed with glaucoma in his 30s and his eyesight was managed with treatment, but after 30 years, the eye drops were no longer effective. After laser surgery to reduce his eye pressure, Vince had drainage tubes inserted in his eyes. Following cataract surgery last year, he now enjoys 20/20 vision without the need for corrective lenses.

When first diagnosed, Vince researched charitable organizations working on glaucoma and seeking a cure for the disease before becoming a donor to National Glaucoma Research (NGR), a program of BrightFocus Foundation. “It’s great that there was an alternative to my treatment. Without scientific breakthroughs the drainage tubes wouldn’t have existed,” said Vince. “It is important that we have been able to combat and treat the effects of glaucoma to provide people a chance to keep their eyesight.

Thanks to donors such as Vince, NGR continues to advance groundbreaking ideas, including recent support toward developing an implantable wireless device to help physicians with new ways to diagnose and monitor glaucoma.

“It is important that we have been able to combat and treat the effects of glaucoma to provide people a chance to keep their eyesight.”

Vince Scarafino
BrightFocus is a nonprofit organization designated under Section 501(c)(3) of the Internal Revenue Code. All contributions to BrightFocus and its programs are tax-deductible to the extent allowed by law. The Foundation is supported entirely by voluntary private contributions.

BrightFocus received in-kind donations to expand public health information outreach and these are included in Program Services expenses. This allowed the organization to reach millions of people with information about risk factors, treatments and caregiving.

A complete copy of financial statements audited by Marcum, LLP is available upon request from the BrightFocus Foundation, 22512 Gateway Center Drive, Clarksburg, MD 20871 or on our website at www.brightfocus.org.

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## CONSOLIDATED STATEMENT OF FINANCIAL POSITION
As of March 31, 2021 (in thousands of dollars)

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<th>ASSETS</th>
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<th>LIABILITIES</th>
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<td>Without Donor Restriction</td>
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<td>With Donor Restriction</td>
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<td><strong>TOTAL NET ASSETS</strong></td>
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| **TOTAL LIABILITIES AND NET ASSETS** | **$66,477** |

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## CONSOLIDATED STATEMENT OF ACTIVITIES
For the Fiscal Year Ended March 31, 2021 (in thousands of dollars)

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<th>SUPPORT AND REVENUE</th>
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<td>Rental &amp; Other Income</td>
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<th>EXPENSES</th>
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<td>Program Services</td>
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<td><strong>TOTAL EXPENSES</strong></td>
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<td><strong>CHANGE IN NET ASSETS</strong></td>
<td><strong>$7,642</strong></td>
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