

GLEAMS

A PUBLICATION FOR THE FRIENDS AND COLLEAGUES OF GLAUCOMA RESEARCH FOUNDATION
SEPTEMBER 2022 • VOLUME 40, NUMBER 1



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FOURTH CATALYST FOR A CURE TACKLES NEURODEGENERATION

MADE POSSIBLE BY VISIONARY DONORS, OUR LATEST RESEARCH INITIATIVE TARGETS THE SHARED ROOTS OF CONDITIONS THAT OCCUR WHEN NEURONS DETERIORATE AND DIE.

In July 2022, a new team of brilliant investigators met for the first time to kick off the *Melza M. and Frank Theodore Barr Catalyst for a Cure Initiative to Prevent and Cure Neurodegeneration*. This bold research endeavor — the latest in the Foundation’s flagship research program — advances the quest for a future free from glaucoma by investigating what glaucoma has in common with Alzheimer’s disease, Parkinson’s disease, and amyotrophic lateral sclerosis (ALS).

These and other complex conditions occur when nerve cells in the central nervous system — eye, brain, spinal cord — deteriorate and die, a process called neurodegeneration. “Neurodegeneration represents a promising but perplexing frontier in human health,” says Tom Brunner, President and CEO for Glaucoma Research Foundation. “Currently no therapies exist that can prevent or halt neurodegeneration or regrow healthy neurons and restore vision, memory, or other losses of function. We hope to contribute new insights that could lead to innovative treatments and cures for glaucoma as well as other neurodegenerative conditions.”

The Neurodegeneration Initiative was launched through a transformative \$2.4 million gift to GRF from the Melza M. and Frank Theodore Barr Foundation. Philanthropist and former GRF board member Frank Theodore (Ted) Barr and his wife Melza have supported the Foundation for 40 years and were significant investors in the inaugural *Catalyst for a Cure* consortium. (Read more about the Barrs on page 6).

Possibly the first biomedical research endeavor of its kind, the Neurodegeneration Initiative challenges conventional wisdom by applying the groundbreaking *Catalyst for a Cure* model of interdisciplinary teamwork across an entire family of diseases. By bringing together innovative investigators whose paths would not otherwise cross, the *Catalyst* model provides unique potential for outside-the-box scientific creativity — the kind of high-risk/high-reward research that rarely wins support from traditional funders.

With the Neurodegeneration Initiative under way, GRF is now funding two simultaneous *Catalyst for a Cure* consortia, each with the potential to change the lives of people with glaucoma. Ongoing since 2019, the *Steven and Michele Kirsch Catalyst for a Cure Vision Restoration Initiative* has made enormous strides that could soon result in the ability to protect, and even regenerate retinal ganglion cells — elements of the optic nerve that degenerate and die over time with glaucoma, causing blindness.

“The Neurodegeneration Initiative is one of the most exciting projects I’ve been involved with,” says Adriana Di Polo, PhD, Professor of Neuroscience at the University of Montreal, who is an award-winning neuroscientist, glaucoma pioneer, and scientific advisor for the new consortium. “It’s an unprecedented step forward — not just tackling glaucoma, but seeking cures for all neurodegenerative diseases.”

Meet the New Team of Investigators

The *Melza M. and Frank Theodore Barr Catalyst for a Cure Initiative to Prevent and Cure Neurodegeneration* will support creative collaboration by a team of four diversely talented young investigators. Trailblazers, pioneers, superstars in their chosen fields — all demonstrate creativity, a track record for innovative impact, a talent for collaboration, and a deep love of science.

Consortium members will start their work together by identifying promising avenues of investigation. The team will work together for an initial period of three years, guided by a group of expert scientific advisors.



Sandro Da Mesquita, PhD

*Assistant Professor, Department of Neuroscience
Meningeal Lymphatics and Neurological Disorders Lab
Mayo Clinic*

Dr. Da Mesquita's unique expertise is in the field of central nervous system blood vessel biology, which has implications for Alzheimer's and other neurodegenerative diseases.



Milica Margeta, MD, PhD

*Physician and Surgeon
Massachusetts Eye and Ear
Assistant Professor of Ophthalmology
Harvard Medical School*

Dr. Margeta is a glaucoma surgeon and a leader in the biology of microglia (immune cells of the brain and spinal cord) and in neuroinflammation.



Karthik Shekhar, PhD

*Assistant Professor, Department of Chemical and
Biomolecular Engineering
Faculty Scientist, Lawrence Berkeley Laboratory
Member, Helen Wills Neuroscience Institute
University of California Berkeley*

A leader in computational biology, Dr. Shekhar has played a key role in collaborations that span neuroscience, immunology, single cell genomics, genetics, and machine learning, with a focus on visual systems.



Humsa Venkatesh, PhD

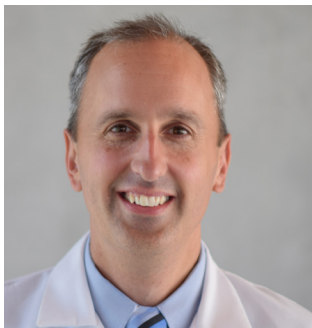
*Assistant Professor, Program in Neuroscience
Brigham and Women's Hospital
Harvard Medical School*

Dr. Venkatesh's discoveries have shaped the emerging field of cancer neuroscience, illuminating the nervous system's role in disease progression.

Q&A

Neurodegeneration Explained

What is neurodegeneration? And how will discoveries related to it affect people with glaucoma? Derek Welsbie, MD, PhD, Gleams Science Editor, explains.



Derek Welsbie, MD, PhD is an Associate Professor of Ophthalmology at the Shiley Eye Institute, University of California, San Diego, and a principal investigator in the Catalyst for a Cure Vision Restoration Initiative. His research is focused on neuroprotection and neurodegeneration in glaucoma.

The latest *Catalyst for a Cure* initiative builds on a paradigm-shifting discovery made by the first *Catalyst* team in 2006: More than a disease of the eye, glaucoma is a neurodegenerative condition, in the same family as Alzheimer’s disease.

Q: What is neurodegeneration?

A: Fundamental to many of these devastating illnesses, neurodegeneration occurs when nerve cells, the building blocks of the central nervous system, deteriorate and die. In glaucoma, neurodegeneration affects the retinal ganglion cells in the optic nerve, disconnecting the eye from the brain, and causing blindness over time. In Alzheimer’s, it affects nerve cells in the brain responsible for memory and cognition while in Parkinson’s, it affects nerve cells involved in movement and cognition. In many cases, these neurodegenerative diseases are thought to result from injury to nerve cell axons, the long, slender projections that conduct electrical impulses between nerve cells. Although multiple factors distinguish these diseases, understanding these common mechanisms that lead to axon

injury and/or cell death is the key to the fourth *Catalyst for a Cure* initiative.

Q: How will this initiative help people with glaucoma?

A: Glaucoma and Alzheimer’s may appear to be unrelated. After all, people with Alzheimer’s do not necessarily develop glaucoma, nor vice versa. However, both diseases share a common cause: neurodegeneration. Investigating how these illnesses are alike and how they are different may illuminate new treatments, preventative measures, and cures for multiple conditions that trace their roots to neurodegeneration.

Aging, injury, inflammation, genetics — these factors and more may play a role in neurodegeneration and could indicate potential targets for unprecedented treatments and cures for glaucoma and Alzheimer’s. First, however, we must understand why and how neurons die, key questions we will explore through the *Catalyst for a Cure Initiative to Prevent and Cure Neurodegeneration*.

IN APPRECIATION

We are grateful for the generous and loyal support from all our donors. Following is a listing of *recent* contributions and pledges at the \$1,000 level and above. Please note these are *new* contributions and pledges received between March 1, 2022 and June 30, 2022 and will not reflect a donor's cumulative giving for the year.

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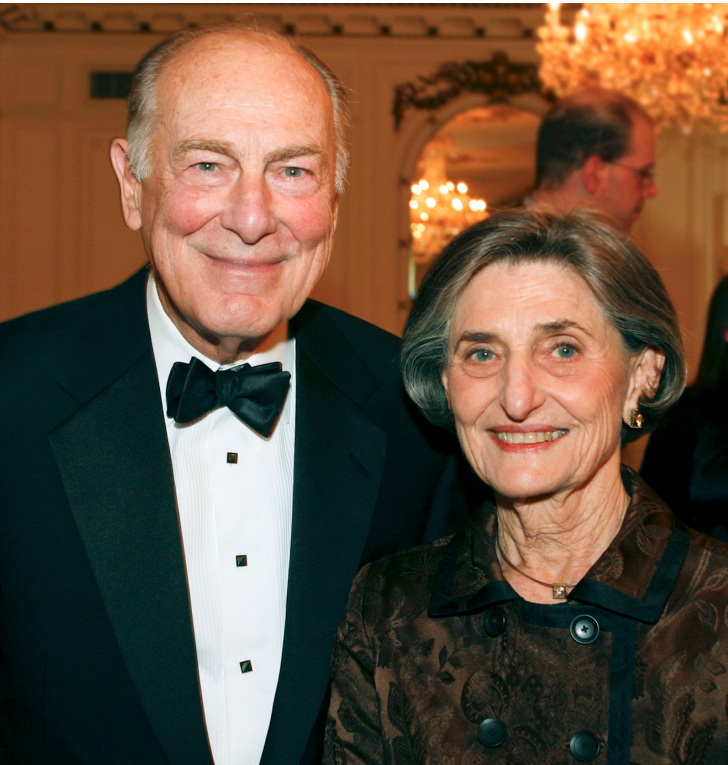
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Nancy M. Graydon, Executive Director of Development and COO at 415-986-3162 ext. 231 or ngraydon@glaucoma.org

Meet Renaissance Innovators Ted and Melza Barr

The *Catalyst for a Cure Initiative to Prevent and Cure Neurodegeneration* is the inspiration of longtime GRF supporters Ted and Melza Barr. “We had been thinking about the challenge of neurodegeneration ever since the first *Catalyst for a Cure* identified it as a factor in glaucoma,” says Ted. “We thought it was time to better understand neurodegeneration in a fundamental way and develop solutions based on that knowledge.”



Following their curiosity, in 2021, the Barrs came to GRF with a bold proposition: Why not invest in research that could catalyze a quantum leap in our understanding of all neurodegenerative diseases, moving us closer to solutions for glaucoma, Alzheimer’s disease, and related conditions? With the Barrs’ generous support, GRF convened a virtual meeting-of-the-minds among top researchers to identify promising avenues for exploration. Encouraged by the results, the Barrs decided to invest further. “We have great confidence in the *Catalyst for a Cure* approach,” Ted says.

True renaissance innovators, the Barrs are a family of visionaries and philanthropists. Ted’s successful career in petroleum exploration and production motivated the family to support the communities that had contributed to their business success. In West Africa, the Barrs have funded infectious disease and public health programs, and education efforts. In the United States, they have advanced medical science, geological and environmental sciences, and the arts through the Melza M. and Frank Theodore Barr Foundation, founded in 2003.

The Barrs first became involved with glaucoma research after Ted experienced vision challenges while working in Indonesia in the early 1970s. With eye pressures that were especially high, Ted was referred to Dr. Robert Shaffer in San Francisco, where he connected with Dr. Shaffer and his partners Dr. Dunbar Hoskins and Dr. Jack Hetherington who would go on to found Glaucoma Research Foundation.

Further demonstrating their passion for quantum leaps, the Barrs have made a major gift to address some of the biggest questions in planetary science. With their son, Terence, a CalTech alumnus, they have funded the Terence D. Barr Leadership Chair at the Caltech Center for Comparative Planetary Evolution. In a multidisciplinary model similar to GRF’s *Catalyst for a Cure*, the center unites scholars from astronomy, geology, and biology in exploring how planets form and evolve.

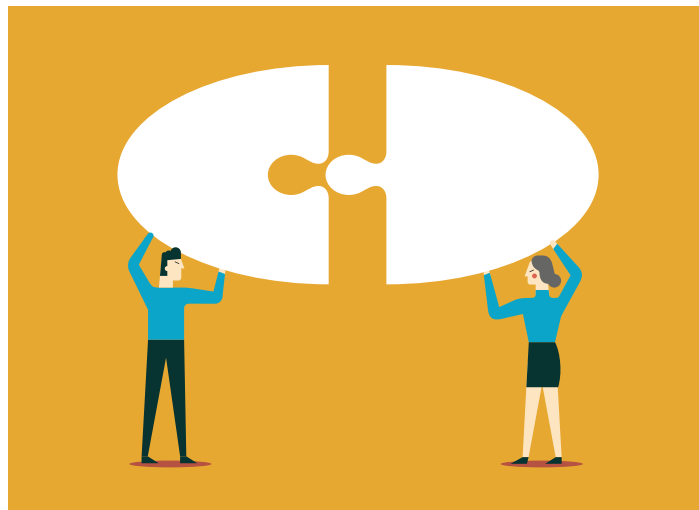
CATALYST FOR A CURE: A Synergistic Approach to Scientific Research

CATALYST FOR A CURE, GLAUCOMA RESEARCH FOUNDATION'S FLAGSHIP RESEARCH PROGRAM, TAKES A BOLD APPROACH TO DISCOVERY BY BREAKING DOWN TRADITIONAL RESEARCH SILOS AND BRINGING GREAT MINDS TOGETHER TOWARD A FUTURE FREE FROM GLAUCOMA.

Since 2002, GRF has introduced four *Catalyst* projects, each focused on a different aspect of glaucoma. For every initiative, scientific advisors select four top researchers from four leading institutions to form a consortium dedicated to eradicating glaucoma. Investigators start by partnering for three years. Based on progress, the GRF board may vote to extend a consortium's funding for additional years.

The *Catalyst* discovery model is unique in the world of research, says John G. Flanagan, PhD, FCOptom, Dean of the Herbert Wertheim School of Optometry and Vision Science at UC Berkeley and Chair of the GRF Research Committee. "Scientists tend to work individually, or with close collaborators from a similar background, with an emphasis on competing for grant money," Flanagan adds. In contrast, *Catalyst* investigators, working out of their own labs, pursue promising ideas together. "They are chosen to have different but complimentary skills and are tasked with answering research questions in partnership, report results as a team, and generate insights much more quickly than they could working alone," he says.

The latest *Catalyst* consortium, the Neurodegenerative Initiative, breaks new ground in more ways than one.



"First, top researchers rarely cross from one disease to another," says Flanagan. "This initiative expands on the *Catalyst* model to identify commonalities among multiple, related diseases." Second, the launch of the Neurodegeneration Initiative puts two *Catalyst* endeavors in motion at the same time. The two consortia

are complementary rather than competitive, Flanagan points out. "Both teams have the same overall goal of preventing vision loss from glaucoma;" he explains. The Vision Restoration Initiative is concerned with restoring vision lost through neurodegeneration. Meanwhile, the Neurodegeneration Initiative will look at how neuronal death can be prevented, stopped, or reversed.

Dr. Flanagan believes the result will be a uniquely synergistic approach to discovery. "Adding a second, simultaneous *Catalyst for a Cure* brings four more labs with different capabilities to work on curing glaucoma," he says. It also adds a second group of scientific advisors with different backgrounds to strengthen the effort. "We encourage collaboration between the two *Catalyst* teams and their advisors," says Flanagan. "Our hope, with this latest initiative, is that we will gain new insights by comparing the mechanisms of neurodegeneration in glaucoma and Alzheimer's diseases, with the aim of delivering both therapeutic and diagnostic advantages."

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Glaucoma is published three times a year by Glaucoma Research Foundation, 251 Post Street, Suite 600, San Francisco, CA 94108 Web: www.glaucoma.org Telephone: 415-986-3162 Toll Free: 800-826-6693 Email: gleams@glaucoma.org To unsubscribe, call 1-800-826-6693 or email "unsubscribe" to gleams@glaucoma.org.

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