Our donors play a critical role in supporting Kellogg’s mission to treat and cure blinding eye disease.
Your contributions to the Kellogg Eye Center Annual Fund and the Alumni Annual Fund are critical to the success of our research program. With your help, discoveries by our vision scientists are advancing research for the benefit of our patients and people around the world.

**Terry J. Smith, M.D.**
Frederick G.L. Huetwell Professor of Ophthalmology and Visual Sciences Professor, Internal Medicine
Endocrinologist Terry J. Smith, M.D., studies the connection between Graves’ disease and its ocular manifestations. Dr. Smith focuses on Graves’ eye disease, an autoimmune disorder characterized by swelling of the eyelids and tissue around the eye, a constant stare, bulging eyes, eyelid retraction, and loss of vision. “The eyes are particularly susceptible to Graves’ disease because the autoimmune attack often targets the eye muscles and connective tissue surrounding the eye,” says Dr. Smith.

Thanks to support from the Annual Fund, Dr. Smith and his team are investigating the molecular underpinnings of thyroid autoimmunity in the eye. “Our most recent findings suggest that in Graves’ disease, the orbit appears to be a partial recapitulation of the thyroid—in that cells from the bone marrow appear to invade the tissues around the eye and express a set of genes that were previously thought to be present only in the thyroid gland,” says Dr. Smith. “This presence of immune cells appears to occur uniquely in Graves’ disease.”

Identification of these immune cells potentially clarifies a number of outstanding questions related to how the disease develops and provides insight into novel therapeutic targets. These findings may also provide a unique ability to follow disease progression and to allow judging whether therapies are effective.

**Debra A. Thompson, Ph.D.**
Professor, Ophthalmology and Visual Sciences Professor, Biological Chemistry
Support from the Annual Fund has helped Dr. Debra Thompson to pursue the development of therapeutic approaches for the treatment of retinal degenerative diseases such as retinitis pigmentosa and age-related macular degeneration.

“An important aspect of our work is focused on pre-clinical studies of gene therapy outcomes,” says Dr. Thompson. “We are investigating strategies aimed at replacing individual genes that are defective as a result of inherited mutations, as well as more broadly targeted strategies aimed at improving cellular functions critical for cell survival.”

By studying the cellular pathways affected by disease, as well as the effects of strategic intervention in these pathways, Dr. Thompson and her research team aim to develop gene-therapy approaches that will improve visual outcomes in patients with retinal-degenerative diseases.

**Cagri G. Besirli, M.D., Ph.D.**
Assistant Professor, Ophthalmology and Visual Sciences
Thanks to support from the Annual Fund, Dr. Cagri Besirli and his team are studying how retinal cells die when under extreme stress. “Most blinding conditions, including macular degeneration and severe diabetic retinopathy, cause vision loss secondary to the death of a particular retinal cell type called a photoreceptor,” says Dr. Besirli. “Photoreceptors are indispensable for vision and are the primary cells that detect light in the eye.”

Dr. Besirli and his team are focused on understanding the very early steps that tell the photoreceptors to die or stay alive. “These early steps involve specific cellular signaling pathways. By careful dissection of the photoreceptor signaling pathways that are activated during stress, we are learning more about the basic mechanisms of cell death and survival,” says Dr. Besirli. “We have identified several proteins involved in photoreceptor survival by the detailed characterization of the pro-survival and pro-death signaling pathways. Our in-depth examination of how these proteins work in the cell will identify specific targets for new drugs. Our ultimate goal is to develop novel ocular therapies to prevent blindness.”
Dr. Thiran Jayasundera studies retinal dystrophies, a group of vision-robbing diseases that affect one in every 2,000 individuals. Over 190 genes and thousands of different mutations have been identified as the cause of different types of retinal dystrophies.

“Finding a causative genetic mutation is important because it can confirm diagnosis, provide guidance for testing other family members, inform clinical management, provide a more accurate prognosis, direct genetic counseling, and identify patients for whom gene therapy might be available,” says Dr. Jayasundera.

Thanks to support from the Annual Fund, Dr. Jayasundera and his team have created a diagnostic tool—called RetDegenDx—that incorporates a patient’s clinical data and image processing of the retina to create a fully automated system for diagnosing retinal dystrophies, as well as to provide information on the likely causative gene for molecular confirmation.

“This is a novel approach to diagnosing and researching retinal dystrophies,” says Dr. Jayasundera. “We will use computer-based applications to harness the power of advanced imaging capabilities—employing image processing techniques, computer vision, pattern recognition, and artificial intelligence to identify and quantify pathogenic features. The flexibility of this tool will keep pace with advances in genetics technologies.”

Support from the Annual Fund has also led to the creation of EyeAnalyze, a computer-based service that allows for quick, accurate, automated analysis of retinal fluorescein angiography and autofluorescence imaging.

“EyeAnalyze reduces the time spent interpreting images, increases work efficiency, and provides image analysis at a quality equal or superior to that of a clinical trial grader,” says Dr. Jayasundera. “By increasing the efficiency of image analysis, the patient’s disease progression can be identified early, making it possible for clinicians to adjust therapy.”

Dr. David Antonetti studies the disease processes of diabetic retinopathy (DR), a complication of diabetes that damages the retina and can lead to vision loss and even blindness. Every year, nearly 8,000 Americans between the ages of 20-74 go blind from DR.

“The cause of vision loss in diabetic retinopathy is complex and remains incompletely understood,” says Dr. Antonetti. “When tissue in the retina is damaged, the lining of small blood vessels becomes leaky and leads to increased vascular permeability, or fluid accumulation, in the retina. Changes in retinal vascular permeability may occur through a host of potential signaling pathways including changes in vascular endothelial growth factor (VEGF), tumor necrosis factor, and C-C chemokine ligand 2, among others.”

With continued support from the Annual Fund, Dr. Antonetti’s laboratory is working to understand the cellular and molecular mechanisms that lead to loss of normal vascular barrier properties during DR. “To this end, we have focused our research on understanding how VEGF alters the barrier properties of the endothelial cells that line the blood vessels. Our research has focused on the tight junction proteins and, in particular, occludin, which acts to regulate vascular permeability in a VEGF-dependent manner,” says Dr. Antonetti.

Their long-term goal is to contribute to the development of novel treatments to prevent or reverse the debilitating loss of vision from diabetic retinopathy. “We are also working on therapies that are focused on restoring normal barrier properties,” says Dr. Antonetti. “This research is novel and may lead to therapeutic approaches to save damaged vessels.”

Fundus photo shows small hemorrhages in the retina due to blood vessel damage in patient with diabetes
Founded in 1985, the W.K. Kellogg Eye Center is celebrating 30 years of growth and success—and the ability to do so much to treat, cure, and prevent vision loss in the next 30 years. As part of the Victors for Michigan campaign and our anniversary year, we are privileged to recognize the importance of critical gifts—those made as part of an individual’s estate-planning process.

Accomplished economist Jerome Jacobson suffered from glaucoma from a young age. He passed away in 2008, grateful that he had retained his sight throughout his lifetime. The foundation he established to continue his philanthropy this year announced it will create the Jerome Jacobson Professorship, which will be given to a faculty member who studies glaucoma, and the Jerome Jacobson Vision Research Fund. These endowments will enable us to make strides in perpetuity toward more effective treatments for glaucoma and other eye diseases.

This dedication and commitment to advance science is at the heart of our new Alumni Legacy Fund. Established to fuel vision research and educational innovation for the next 30 years and beyond, this forward-looking effort will be funded primarily through estate commitments from alumni and faculty.

Paul R. Lichter, M.D., Founding Director of the Kellogg Eye Center and former Chair of the Department of Ophthalmology and Visual Sciences for 34 years, and his wife, Carolyn, have made a planned gift to the Alumni Legacy Fund, as have current Kellogg Eye Center Director Paul P. Lee, M.D., J.D., and his wife, Jennifer. Dr. Lee is also the current F. Bruce Fralick Professor and Chair of the Department of Ophthalmology and Visual Sciences.

Our work would not be possible without such shared dedication to saving and restoring sight.

If you have made plans to support the Kellogg Eye Center through your estate or would like information on income-producing planned giving vehicles or including Kellogg in your will, please contact Becky Spaly, Associate Director of Development, at 734.763.0874 or bsp@umich.edu.