



Research to Prevent Blindness

New Frontiers in Retinal Research

RPB-funded scientists pushing the boundaries of imaging, early detection, regeneration

Retinal degenerative diseases destroy the sight of millions of people worldwide, damaging the retina, the thin tissue lining the back of the eye where photoreceptor cells convert light into signals that the brain interprets as vision. Age-related macular degeneration (AMD) is a leading cause of vision loss in the U.S., especially among those over 60. Diabetic retinopathy is the leading cause of vision loss among working-age adults in the U.S.

There are no cures for these disorders, but advances in pharmaceutical and gene therapy treatments can preserve remaining sight, for some patients, for a while. Photoreceptor cell replacement holds the potential to restore sight. Advances in imaging and functional measurement technology, as well as precision medicine, are creating opportunities for earlier detection and more targeted interventions.

Research to Prevent Blindness (RPB)

presents three scientists at the forefront of these advances

David R. Williams, PhD, University of Rochester

CONTACT: david@mail.cvs.rochester.edu Lab: http://aria.cvs.rochester.edu/team/williams_d/

Dr. Williams is a pioneer in ophthalmic imaging who has taken technology from astronomy and created cameras that correct optical defects of the living eye far more accurately than previously possible. These adaptive optics (AO) cameras have improved laser refractive surgery and the design of contact lenses, and are revolutionizing researchers' ability to detect and track the progress of eye diseases and experimental treatments.

Williams received a 2014 RPB Stein Innovation Award to refine an AO retinal camera to track early manifestations of diabetic eye disease. The camera can see inside micro-aneurysms and tell whether blood is flowing or obstructed. Ophthalmologists may eventually be able to use it to better time the delivery of therapies. With collaborator Jesse Schallek, PhD, Williams has automated an AO camera to provide near real-time, blood flow measurements in hundreds of capillaries simultaneously, which is transformational in assessing overall retinal health and making rapid patient assessments.

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Budd A. Tucker, PhD, University of Iowa

CONTACT: dr.ba.tucker@gmail.com

Lab: <http://www.tuckerlaboratory.org/>

Dr. Tucker is a leading researcher in stem cell production, culture, isolation, differentiation and transplantation. His lab is advancing patient-specific retinal engineering techniques to restore sight lost to retinal degenerative diseases.

In 2014, Dr. Tucker received a RPB/International Retina Research Foundation Catalyst Award to develop a cell replacement strategy to treat dry AMD, for which there is no current therapy. His lab has developed methods for manufacturing three types of patient-derived, transplantable retinal cells in a low-cost environment, under current good manufacturing practices. He is investigating use of scaffolds made on 3-D printers to enhance transplant survival and integration into retinal circuitry.

Cynthia Owsley, PhD, University of Alabama at Birmingham

CONTACT: owsley@uab.edu

Lab: <http://labs.uab.edu/owsley/>

Dr. Owsley is a leading investigator into aging-related vision impairment and eye disease; how visual impairment impacts the safety and performance of older drivers; and improving eye care access and quality for underserved, vulnerable populations. She combines a variety of research techniques—including psycho-physical methods, epidemiology, clinical trials, and health services research—to address clinical and public health issues.

Dr. Owsley has used funds from RPB's Unrestricted Grant to the University of Alabama at Birmingham Department of Ophthalmology to support a 16-year pursuit of an early biomarker for AMD. She and colleagues recently published the first study to show that adults whose eyes are slow to adjust to the dark have a greater risk of developing AMD. They have developed a commercially viable device for eye care professionals to measure a patient's dark adaptation response time -- a tool that researchers also can use to quickly evaluate medications that might make a difference in AMD treatment.

Research to Prevent Blindness

www.rpbusa.org

RPB's mission is to preserve and restore vision by supporting research to develop treatments, preventives and cures for all conditions that damage and destroy sight. Since it was founded in 1960, RPB has channeled hundreds of millions of dollars into eye research, initiated and coordinated the creation of the National Eye Institute and fostered the development of the nation's leading vision labs and scientists. As a result, RPB has been identified with nearly every major breakthrough in vision research in that time.

FOR MORE INFORMATION

Matthew Levine

Director of Communications

Phone 212-752-4333; 1-800-621-0026

E-mail: mlevine@rpbusa.org

