Technology will be crafted to study glaucoma, other neuroscience diseases through two gifts

June 11, 2012 College News - Two of the world’s leading organizations supporting vision research have awarded funding to a Medical College of Wisconsin faculty member to expand and develop new technology to better visualize the living cells of the eye and to investigate early signs of disease.

Alfredo Dubra, PhD, Assistant Professor of Ophthalmology and of Biophysics, recently received a $600,000 Catalyst for a Cure grant from the Glaucoma Research Foundation and a $250,000 Career Development Award grant from Research to Prevent Blindness (RPB). Dr. Dubra specializes in the development and use of non-invasive optical methods for visualizing the retina with high resolution.

-- Dr. Alferdo Dubra makes adjustments to one of the adaptive optics systems in the Medical College's Eye Institute.

“Researchers are viewing parts of the eye never before seen, due to the pioneering work of Medical College faculty,” said John R. Raymond, Sr., MD, President and CEO. “These substantial gifts from two esteemed organizations will create new opportunities for helping patients with vision disorders by further developing our expertise in advanced ocular imaging.”

Through adaptive optics instrumentation, Dr. Dubra can correct for the normal, yet assorted imperfections in the eye that prevent a conventional imaging system from taking a clear picture of the cells within. Dr. Dubra and colleague Joseph Carroll, PhD, Associate Professor of Ophthalmology, led a team last year that was the first ever to capture images of the tiny light-sensing rod photoreceptor cells in the living retina.

These and future advances will enable Dr. Dubra to investigate biomarkers, or early indicators, of glaucoma and other diseases that affect the eye. The research may even have relevance to diseases like Alzheimer’s and Parkinson’s, which also result from the deterioration of neurons, the family of specialized nerve cells necessary for sight as well as brain and spinal cord function.

Early diagnosis can have a major impact on blinding diseases because, unlike most neurons, when cells of the retina and optic nerve die, they are not replenished. Early intervention could mean the preservation of a significant number of cells and a patient’s sight.
“In the clinic for glaucoma, there is essentially one thing physicians can do, and that is to lower the intra-ocular pressure. If detected in time, that is often effective enough to slow down the disease’s progression so that no major consequences occur,” Dr. Dubra said. “With today’s treatments alone, many more people could be helped if we could detect it earlier. Currently, by the time you see any noticeable deterioration in the clinic, the patient might have already lost 30 to 40 percent of the ganglion cells in the retina.”

The Catalyst for a Cure grant received by Dr. Dubra is part of the Glaucoma Research Foundation’s effort to unite scientists with diverse skill sets so they may develop unique approaches to diagnosing or treating glaucoma. The foundation selected Dr. Dubra to bring his adaptive optics expertise to a four-member, nationwide team dedicated to identifying biomarkers for glaucoma.

“Identifying new biomarkers will allow us to identify the disease early on and tell us if therapies are working,” said Thomas M. Brunner, President and CEO of the San Francisco-based Glaucoma Research Foundation. “We thought Alf’s skills, the person he is, and his background would fit well on a collaborative team to help find these biomarkers.”

In addition to Dr. Dubra, representing the Medical College of Wisconsin Eye Institute, the team consists of faculty members from University of Miami’s Bascom Palmer Eye Institute, the University of California-San Diego, and Harvard Medical School. They have already begun meeting.

The Career Development Award from Research to Prevent Blindness, headquartered in New York, will provide key funding for the creation and advancement of adaptive optics technologies that will enable scientists to discover new information about diseases of the retina and optic nerve. RPB has provided more than $4 million in research funding to the Medical College.

“RPB is pleased to provide extended, flexible support to Dr. Dubra in this early phase of his research career,” said Diane S. Swift, RPB Chair. “We hope his proposed work in the area of high resolution imaging technology will provide new diagnostic tools for clinicians and assist other researchers in their investigations. These goals, along with his collaborative approach involving other departments and other schools, advance RPB’s broad mission to catalyze vision research.”

The award will support creation of a team of optics, computer and software engineers who will endeavor to make adaptive optics technology more accessible in the clinic. The Medical College is already an international leader in this burgeoning field, but Dr. Dubra sees even greater days ahead.

“We are now demonstrating that adaptive optics works and has a lot to offer, and we are working to make it even more amenable to the clinic,” he said. “We are one of a handful of institutions in the world to have such imaging equipment embedded in the clinic, and we are building two more systems to expand the scope of our research. It doesn’t matter how early you detect disease – you’ll always want to do better.”