THE UNIVERSITY of WISCONSIN MADISON

McPherson Eye Research Institute
UNIVERSITY OF WISCONSIN–MADISON

InSights
FALL 2015

RESEARCH NEWS

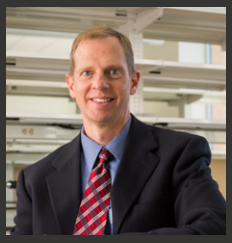
New Dimensions in Eye Research

WITH JEREMY ROGERS, PHD

Advances in optical imaging are critical in order to open the door for further understanding and treatment of eye diseases. The ability to image and quantify tissue architecture at nanometer length scales would be particularly useful. Harnessing light at such minute scales, with the intent of translating the necessary optical techniques and instruments into the clinic, requires expertise in engineering. In the Department of Biomedical Engineering at UW-Madison, Jeremy D. Rogers, PhD, Assistant Professor and the McPherson Eye Research Institute's Retina Research Foundation Edwin and Dorothy Gamewell Professor, has that expertise and is bringing it to focus in the discovery and development of novel optical tools that provide uniquely detailed images of nanoscale ultrastructural changes within cells. With his background in optics and his lab located in the McPherson ERI's Wisconsin Institutes for Medical Research area, Rogers is uniquely positioned at the interface of engineering and vision science—an area that stands to benefit immensely from the cross-pollination of ideas in different fields.

Of special interest to Rogers is the use of light scattering, or the way in which light deflects off objects. Light scattering is highly sensitive to small changes within cells that are not readily imaged with existing tools. Because small structural changes in cells may be indicative of disease, the power to resolve them could prove crucial to advancing disease detection, especially in the case of cancer, where disease-associated alterations have been found in cells located in tissues distant from the tumor itself. Optical technologies and instruments capable of detecting this phenomenon, known as field carcinogenesis, could (along with the discovery of cancer biomarkers) revolutionize cancer detection, particularly for malignancies of the pancreas and other tissues that are difficult to biopsy. Through collaboration with other McPherson ERI member labs, Dr. Rogers now has opportunities to work with experts in eye research to bring these cutting-edge optical methods to bear on problems of eye disease.

The tools that Rogers uses to image disease-related changes in the cellular architecture include enhanced backscattering spectroscopy, spectral microscopy, and endogenous fluorescence spectroscopy. By developing high-resolution imaging methods based on these optical phenomena, he and his National Eye Institute grant collaborators at the Medical College of Wisconsin anticipate a seamless translation to clinical and *in vivo* applications. Clinical translation is also the goal in another collaborative project that Rogers is exploring with veterinary ophthalmologist Gillian McLellan in the UW Veterinary School Department of Surgical Sciences. Together, the two are working to identify and develop new methods of screening for risk of vision loss with glaucoma. These exciting research directions are a direct result of MERI's ability to bring together experts from across disciplines.



FROM THE DIRECTOR:

Dear Friends of the McPherson Eye Research Institute,

Welcome to *InSights*, the McPherson ERI's newsletter sharing research advances and outreach efforts. With almost 170 member-researchers at work throughout Wisconsin – and an ongoing series of lectures, seminars, gallery openings, and other programs intended to bring their work to the attention of both fellow scientists and the general public – this newsletter touches on only some of our highlights. I encourage you to stay current with the Institute on a regular basis at our website, ***www.vision.wisc.edu.***

Our researchers are involved in many initiatives that cross the boundaries of laboratories, departments, and colleges. These collaborations are generated by incredibly talented and hardworking individuals, whose efforts and insights are shaping the present and future of vision research. This issue features Biomedical Engineering's Dr. Jeremy Rogers; in future issues, you'll meet other McPherson ERI researchers from UW-Madison and elsewhere.

It's a particular pleasure to connect donors to those whose work they support. In August, we were delighted to bring David and Nancy Walsh – whose advice and support of the McPherson ERI has been a constant in the life of the Institute – together with half a dozen young researchers whose work was supported by Walsh travel grants. Established in honor of David Walsh and supported by gifts from multiple donors including the Walshes, the David G. Walsh Research Fellowship allows graduate students and postdoctoral researchers to present research results at academic conferences – spurring future collaborations, and thus future discoveries. It is the type of funding that is critically important in the collaborative process.

For McPherson ERI researchers, commitment to the Wisconsin Idea is a core principle; we aim to share our work and our results in Wisconsin and beyond. We are highly aware that vision research is not an abstract scientific goal. The real-world needs, and current and potential applications of our work, motivate us every day. We know that we can make a difference, and we're very grateful for your interest.

DAVID M. GAMM, MD, PHD

RRF Emmett A. Humble Distinguished Director, McPherson ERI
Sandra Lemke Trout Chair in Eye Research

ANNOUNCEMENT

WIMR Conference Room Named in Honor of Monroe and Sandra Trout

In recognition of their extraordinary support for the McPherson ERI, the 9th floor conference room in the McPherson ERI's home space in the Wisconsin Institutes for Medical Research has been named in honor of Monroe and Sandra Trout. Early this year, the Trouts established the Director's Fund for Vision Research at the McPherson ERI. The fund, which will give discretionary support to the Institute for the next several years, will transition into the Monroe and Sandra Trout Professorship in Vision Research by 2019 (with the addition of matching funds from the recent John and Tashia Morgridge gift to UW-Madison). This professorship will join the previously-established Sandra Lemke Trout Chair in Vision Research; together, they will support the work of two distinguished vision researchers in the McPherson ERI.

Dr. and Mrs. Trout have a long career in philanthropy; their generosity has benefited many educational institutions, including Morehouse School of Medicine, Bloomfield College, Westminster College, Dickinson School of Law, UC-San Diego, and the University of the Cumberlands. In 2010 they endowed and established the Trout Museum of Art in Appleton, Wisconsin, presenting the museum with their private art collection. Formal naming of the Trout Conference Room took place at the spring Advisory Board meeting of the McPherson ERI and was warmly affirmed by board members in attendance.

ANNOUNCEMENT

Dr. Alice McPherson Awarded UW-Madison's Distinguished Alumni Award

Dr. Alice McPherson will receive UW-Madison's Distinguished Alumni Award, the highest honor bestowed by the university on its alumni. The award will be presented by the Chancellor at a ceremony in October 2015.

Dr. McPherson ('48, MD'51) is one of the foremost vitreoretinal specialists in the world, and studied under Dr. Charles Schepens, one of the founders of modern retinal surgery. In 1960, Dr. McPherson moved to Houston to begin practice as the world's first full-time woman vitreoretinal specialist, and established herself as one of the pioneers in the field. She founded the retina service at Baylor College of Medicine in conjunction with a private practice in retina, promoting several procedures that are now accepted as basic elements in retinal-detachment surgery and the treatment of diabetic retinopathy. In 1969, she founded the Retina Research Foundation (RRF) in Houston, Texas, dedicated solely to the eradication of retinal disease. Under her leadership as president and scientific adviser, the RRF has funded more than 1,000 grants and helped to launch the careers of many major vision researchers in the United States and abroad. The RRF has also established chairs and professorships at universities and research institutions, and it has provided advanced subspecialty programs to young scientists who then return to their native countries.

In 2005, her vision, inspiration, and support were critical in the establishment of the McPherson Eye Research Institute. She serves on its advisory board and has seen MERI gain international prominence as a center of excellence for vision research. McPherson's many other contributions to the University of Wisconsin are impressive. She served for 12 years on the UW Foundation Board of Directors; she was the founding president of the UW Ophthalmology Alumni Association; and she has been responsible for establishing endowed chairs and lectureships at the university. Dr. McPherson's numerous honors include receiving an honorary doctor of science degree from UW-Madison in 1997 and serving as commencement speaker in 1995. The UW School of Medicine and Public Health is divided into "houses" for study and social programs, and McPherson House is so named to recognize her contributions. A marble bust and portrait of Alice McPherson now grace the medical school.

We congratulate Dr. McPherson on this recognition from UW-Madison. (Niki Denison)

RESEARCH AND MEMBER NOTES:

Dr. Bikash Pattnaik recently published a study in *Human Mutation* (July 2015) confirming that particular mutations in a gene (KCNJ13) encoding potassium channel Kir7.1 cause a variant of Leber congenital amaurosis (LCA). The most common cause of congenital blindness, this retinal disorder is evident in the first few months of life. Confirmation of this molecular mechanism is an important step in understanding gene mutations associated with LCA, advancing the possibility of ultimately restoring a functional Kir7.1 channel using patient-derived retinal stem cells.

A recent paper in the journal *Molecular Therapy* (August 2015) described the results of a study from the lab of **Dr. David Gamm**, in which a team of researchers used a custom stem cell model from a patient with Best disease in order to test whether valproic acid, a commonly used drug, might offer hope for treatment. Best disease is a rare, inherited type of macular degeneration with no cure. But the study – led by **Dr. Ruchira Singh** – showed that "valproic acid was able to improve certain functions of retinal cells affected by Best disease," according to Dr. Gamm. The study also confirmed the usefulness of customized stem cells in testing the effects of drugs. (UW-Madison School of Medicine and Public Health News, Emily Kumlien)

Richard and Doris Dubielzig, longtime McPherson ERI members, have endowed the *Richard R. Dubielzig Professorship for Comparative Ocular Pathology* in the School of Veterinary Medicine. In 1983 Dr. Dubielzig, professor emeritus of pathobiological sciences, founded a veterinary ocular histopathology service and information bank named the Comparative Ocular Pathology Laboratory of Wisconsin (COPLOW). He served as director until his recent retirement. This new professorship, also supported by matching funds from John and Tashia Morgridge's UW-Madison gift, will ensure support for the current and future directors of COPLOW. (On Call, Jane Pruhs)

Dr. Ian Duncan, a professor of neurology at the University of Wisconsin-Madison School of Veterinary Medicine and a world leader in the study of myelin disorders of the central nervous system, has received the 2015 Lifetime Excellence in Research Award from the American Veterinary Medical Association (AVMA). The award honors a veterinary medical researcher for accomplishments in basic, applied or clinical research throughout his or her career. Duncan's work focuses on the development and disease of myelin, a material that covers and protects nerve fibers and is essential to the proper function of the central nervous system. Myelin deterioration is associated with debilitating diseases such as multiple sclerosis. (UW-Madison News, Nik Hawkins)

7th Annual Vision Science Poster Session & Lecture

TUESDAY, NOVEMBER 3, 2015
3:00PM - 5:30PM

Atrium, Health Sciences Learning Center (HSLC)
750 Highland Ave, UW-Madison

***Register to attend and/or to present @ www.vision.wisc.edu**

Distinguished Guest Lecture at 5:45pm, HSLC Room 1335

Professors Susana Martinez-Conde & Stephen Macknik
State University of New York (SUNY) Downstate Medical Center, Laboratory of Integrative Neuroscience

Sleights of Mind: What the Neuroscience of Magic Reveals About our Everyday Deceptions

Our perception of the outside world is generated indirectly by brain mechanisms, so all sensory perception—including vision—is illusory to some extent. The study of illusions is critical to understanding the basic mechanisms of sensory perception, and insights gained by magicians over centuries of informal experimentation have led to new discoveries in the cognitive sciences—neuromagic.

Cycle for Sight 2016

SATURDAY, MARCH 12, 2016

Go to ***cycleforsight.wisc.edu*** for up-to-date information on the McPherson ERI's annual indoor cycling fundraiser!

*To support the McPherson Eye Research Institute, please go to **vision.wisc.edu/giving**, or contact Michael Chaim at 608-265-0690.*

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