RETINA RESEARCH FOUNDATION
NEWSLETTER
Foresight for Sight
Number 2/2012

RRF Site Visit To University Of Wisconsin-Madison

Eight members of Retina Research Foundation's Board of Directors, two Advisory Trustees, five members of the Helmerich family, two RRF guests, and two staff members traveled with Alice McPherson, MD, from Houston, Texas, and Tulsa, Oklahoma, to Madison, Wisconsin, for a comprehensive site visit. RRF supports four Chairs and three Professorships at the University of Wisconsin, so the visit by the Board members was an outstanding opportunity for them to get to better know both the scientists and their projects first-hand.

Interim Chancellor David Ward and Judith Ward hosted a luncheon at their home, the historic Olin House, and renamed the McPherson Eye Research Institute (MERI) at that time. Formerly the UW-Eye Research Institute, the McPherson Eye Research Institute was renamed in honor of Dr. McPherson's lifelong dedication to vision research.

Activities planned for the group included an afternoon of scientific presentations by nine of the over 100 MERI scientists and scholars, plus a hard-hat tour of the new Wisconsin Institutes for Medical Research II (WIMR II). The top floor of this second tower of the medical research complex will be home to the laboratories of MERI scientists when completed near the end of 2013.

The move-in process itself will be carefully planned and executed to ensure ongoing research projects will not be compromised. Every detail, including quarantining of laboratory animals for safe transport, has been incorporated into the plan.

(continued on page 2)

1. McPherson Eye Research Institute
UNIVERSITY OF WISCONSIN-MADISON

2. 

1. *McPherson Eye Research Institute (MERI) logo*
2. *Alice R. McPherson, MD (photo courtesy of John Maniaci / University of Wisconsin Hospital)*

(continued from page 1)

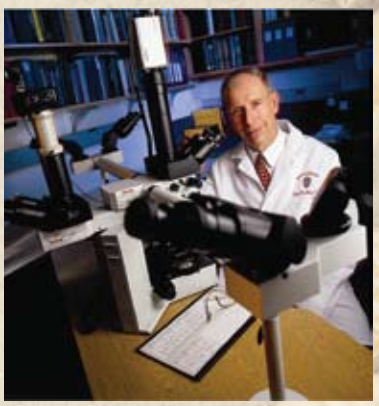
McPherson Eye Research Institute

Dr. David Gamm has been named the Emmett Humble Distinguished Director of the McPherson Eye Research Institute (MERI) and began his new role effective July 1 upon Dr. Dan Albert's retirement. Dr. Gamm's laboratory has recently created retinal tissue from induced pluripotent stem (iPS) cells produced from both human skin and blood cells.

Dr. Albert is founding Director of the UW-Eye Research Institute. He has built an environment in which scientists of diverse disciplines work in collaboration to find novel approaches to the goals of curing blindness and preventing vision loss. Researchers focus on understanding the mechanisms of blinding diseases and also on developing strategies for the prevention or treatment of eye disorders.

Future home of MERI in Tower II of Wisconsin Institutes for Medical Research

Laboratory space under construction



3. David M. Gamm, MD, PhD (photo by Andy Manis)

4. Daniel Albert, MD

Paul Kayser International Award

Robert E. Anderson, MD, PhD has been selected for Retina Research Foundation's Paul Kayser International Award in Retina Research. Dr. Anderson is Department of Cell Biology Chair and Professor of Ophthalmology at Dean McGee Eye Institute in Oklahoma City, Oklahoma.

This award will be presented at the International Society for Eye Research (ISER) Biennial Meeting in July, 2012 in Berlin, Germany. Named in honor of Paul Kayser's belief in and support of global solutions to retinal disease, the purpose of this award is "to foster greater awareness of the need for intensive study of the retina, its role in the visual process, and the retinal diseases that threaten and/or destroy eyesight by recognizing outstanding achievement and sustaining meritorious scientific investigations worldwide." (www.iser.org)

Dr. Anderson was one of the original RRF grant recipients, beginning in 1974 when he was affiliated with Baylor College of Medicine and continuing for 20 years until he left for Oklahoma. The major focus of Dr. Anderson's clinical research is studying biochemical mechanisms of retinal degenerations, such as signaling pathways in the retina that provide neuroprotection from light and mutational stresses. Dr. Anderson's recent studies show the insulin receptor is present in rod and cone outer segments, is activated by light, and protects against stress-induced retinal degeneration.

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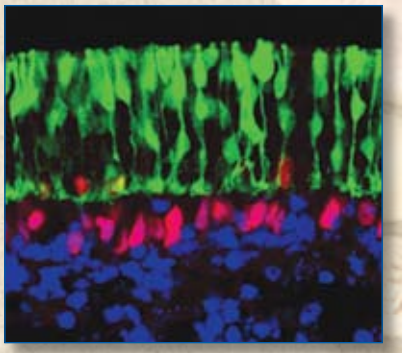

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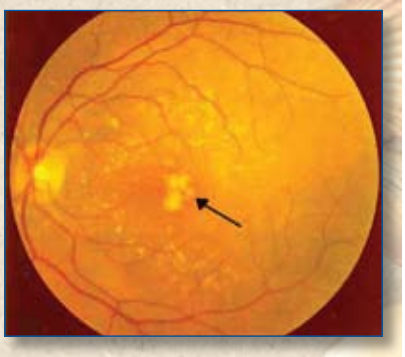
Boosting IL-18 Levels in the Retina May Help Prevent Wet AMD

Researchers at Trinity College in Dublin, Ireland, have demonstrated that drusen, which accumulate in the macula during the early stages of age-related macular degeneration (AMD), activate the NLRP3 inflammasome and cause secretion of interleukin-1β (IL-1β) and IL-18. Their studies in mouse models then directly implicated IL-18 in the regulation of laser-induced choroidal neovascularisation (CNV) development and indicated a protective role for NLRP3 and IL-18 in progression of the disease. This notion was supported further by the finding that mice deficient in NLRP3 more readily developed CNV.

In essence, the reported studies indicate that a small amount of drusen accumulation isn't necessarily detrimental because the IL-18 production induced prevents the abnormal growth of blood vessels characteristic of the wet form of AMD. However, once a threshold level of drusen accumulation is reached, the scales are tipped in favor of disease progression.

These findings indicate that boosting levels of IL-18 in the retina could represent a new therapeutic strategy for AMD and prevent patients with dry AMD from progressing to the wet form of the disease. This study, published in *Nature Medicine*, was led by Matthew Campbell, MD, and Sarah Doyle, MD.

www.genengnews.com



7.

5. Robert E. Anderson, MD, PhD

6. Photoreceptors

7. Drusen

Adhesion May Play a Role in Maintaining the Retina's Structure

A mailing mishap in which a donated human retina from an eye bank was shaken during shipping gave Abbas Shirinifard of Indiana University's Biocomplexity Institute the idea that led to discovery of a previously undetected mechanism causing a type of macular degeneration called choroidal neovascularization.

Examining the shaken eye, Dr. Shirinifard found that regions of the retina with invading blood vessels had separated from their underlying membrane, while regions that had stayed attached showed much less invasion. This observation suggested that adhesion might be an essential but overlooked mechanism in maintaining the retina's structure.

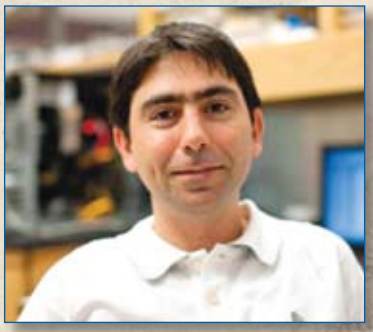
Studying the effects of adhesion defects, Dr. Shirinifard said, "The simulations showed that reduced adhesion in the retina could indeed lead to its invasion by blood vessels. But the complex structure of the retina meant that many types of adhesion could be important—the three most prominent being between the pigmented retinal cells and Bruch's membrane (the substrate that supports the retina), between adjacent pigmented retinal cells, and between pigmented retinal cells and the overlying photoreceptors."

Simulations of adhesion defects caused by reduced adhesion between pigmented retinal cells and Bruch's membrane—the type of CNV typical of aging—produced a pattern and frequency of invasion agreeing with that in the clinic. Similarly, reduced adhesion between neighboring pigmented retinal cells, typical of inflammation due to severe infection, produced a pattern of invasion agreeing with that seen in young adults.

By combining thousands of simulations, Dr. Shirinifard was able to produce maps that related defects in each type of adhesion to the risk of each type of invasion. In turn, he could show that cell adhesion is key to keeping blood vessels out of the retina and that combination defects in the different types of adhesion are sufficient to determine the probability, pattern, and rate of progression of CNV.

The full results of one of the most complex tissue evolution models ever deployed are published in *PLoS Computational Biology*, co-authored by Biocomplexity Institute Director James Alexander Glazier. Co-authors on the paper contributed from Indiana University, Emory University, Georgia State University, and Los Alamos National Laboratory.

www.futurity.org



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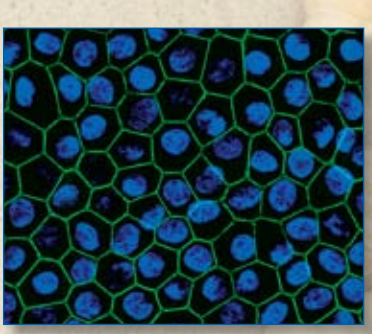

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8. Abbas Shirinifard, PhD

9. RPE Cells

Genetic Basis for Age-Related Macular Degeneration (AMD)

A new peer-reviewed research study published in BioMed Central's journal *Genome Medicine* has identified genes whose expression levels can identify people with age-related macular degeneration (AMD), as well as tell apart AMD subtypes. Risk factors include inheritable genetic risk, smoking, and exposure to UV light. Genome-wide studies have indicated that genes involved in the innate immune system and fat metabolism are involved in this disease.

A team of researchers at the University of California Santa Barbara, the University of Utah John Moran Eye Center, and the University of Iowa working in collaboration discovered over 50 genes that have higher than normal levels in AMD. The top 20 of these genes were able to predict a clinical AMD diagnosis. Genes over-expressed in the RPE-choroid (a tissue complex located beneath the retina) included components of inflammatory responses. Researchers found retinal genes with expression levels that matched the disease severity for advanced stages of AMD.

Dr. Monte Radeke, one of the project leaders, explained, "Not only are these genes able to identify people with clinically recognized AMD and distinguish between different advanced types -- some of these genes appear to be associated with pre-clinical stages of AMD. This suggests that they may be involved in key processes that drive the disease. Now that we know the identity and function of many of the genes involved in the disease, we can start to look among them to develop new diagnostic methods, and for new targets for the development of treatments for all forms of AMD."

www.sciencedaily.com

"Science is built up of facts, as a house is built of stones; but an accumulation of facts is no more a science than a heap of stones is a house."

Henri Poincaré, *Science and Hypothesis* (1905)

10.

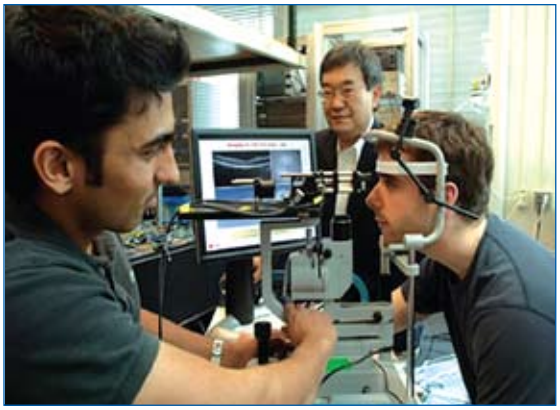
11.

10. Monte Radeke, PhD

11. Computer rendering of DNA double helix

New 30-Second Retina Scan Could Help Identify Heart Risk

A study at the University of Edinburgh will look at retina scans of 1,000 patients in order to find a way to identify those with heart disease. High-definition images taken of their retinas will be checked for changes to blood vessel widths or unusually branched blood vessels. Retina scans using this pioneering procedure could reveal any problems with the blood vessels without the need to carry out invasive procedures such as biopsies or angiograms, where catheters are used to identify vessel and organ damage.



Retina Scan

Dr. Tom MacGillivray, a research fellow at the university and manager of its image analysis laboratory in the Clinical Research Imaging Centre (CRIC), said, "We know that problems in the eye are linked to conditions such as diabetes and that abnormalities in the eye's blood vessels can also indicate vascular problems in the brain. This could help identify people who would benefit from early lifestyle changes and preventative therapies." The project also involves the University of Dundee, Princess Alexandra Eye Pavilion, Edinburgh, Ninewells Hospital, Dundee, and London's Moorfields Eye Hospital.

www.dailymail.co.uk

"Scientific principles and laws do not lie on the surface of nature. They are hidden, and must be wrested from nature by an active and elaborate technique of inquiry."

John Dewey, *Reconstruction in Philosophy* (1920)

"Science does not know its debt to imagination."

Ralph Waldo Emerson (1803 – 1882)

RRF Website

www.retinaresearchfnd.org

For the most current information about RRF research programs, we hope you will take a look at our redesigned website.

Home Page

The first view when opening up RRF's website is filled with easy-to-access entrances into whichever part of the site you're particularly interested in seeing.

1. Type in a name or word in the search box at the top of the page, hit "enter" and you will be directed to where on the site that may be found.
2. Hover your mouse over the words on the royal blue ribbon to see the drop-down menus below, then just click on your selection. Clicking on "Home" will always take you back to the home page from wherever you are on the site.
3. Three button photo boxes and six categories below the photo boxes will also take you directly to that information.

4. There is a small "Change Font Size" feature that allows you to change the size of the text for either viewing or printing.
5. The home page will be frequently updated to feature announcements of RRF research news and activities.

Look for descriptions of other new features of our website in future newsletters.

Retina Research Foundation

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It's…

- Easy
- Colorful
- Packed with information

… and best of all, it's accessible 24/7!

RETINA RESEARCH FOUNDATION
NEWSLETTER

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Retina Research Foundation is dedicated to the eradication of retina disease through programs in research and education.

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FREE MATTER
FOR THE
BLIND OR
HANDICAPPED

SPECIAL REMEMBERANCES

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Radford P. and Betty Laney

Elizabeth Anne Gipson
Radford P. and Betty Laney

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Radford P. and Betty Laney

IN HONOR OF

Dr. Candace Gunnarsson –
Please get well soon!
Ann Neuer

RRF accepts credit cards for donations securely online at www.retinaresearchfnd.org
Call the office for more information: 713-797-1925

Additional memorials received will appear in the next issue.