RETINA RESEARCH FOUNDATION
# NEWSLETTER
Foresight for Sight **August 2018** Issue Number 2 / Volume 40

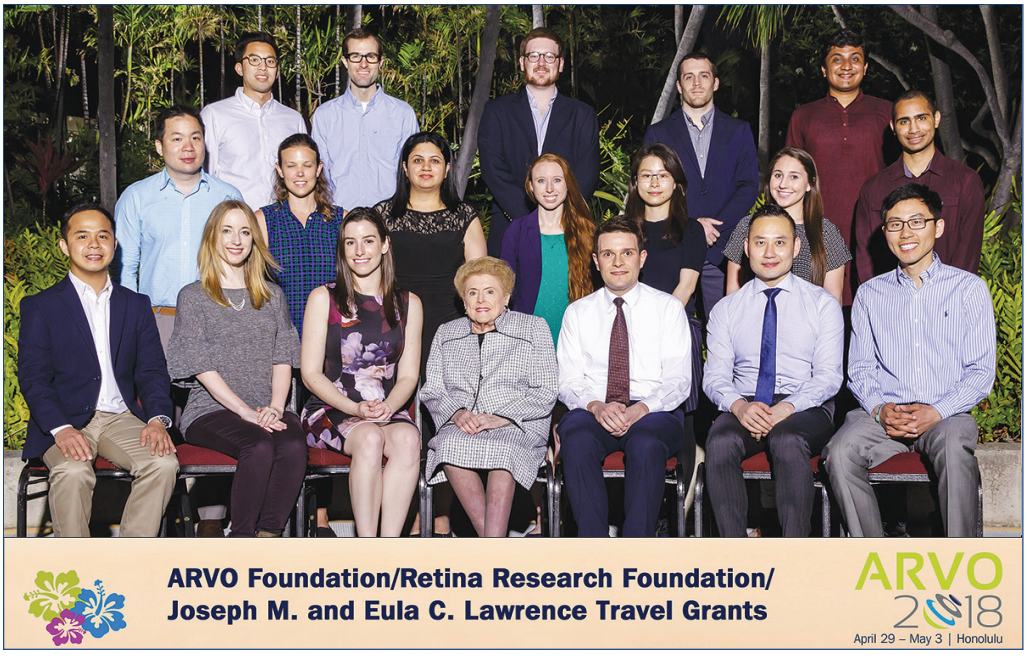
*Retina Research Foundation Newsletter is published three times per year: Spring, Summer and Fall.*

# Dr. McPherson Honored at ARVO Annual Meeting

Dr. Alice McPherson was honored at the 2018 Association for Research in Vision and Ophthalmology (ARVO) Annual Meeting for creating and funding the RRF Lawrence Travel Grants. She was one of three ARVO Foundation Honorees at the meeting, which was held in April in Honolulu, Hawaii. Honorees are recognized for their commitment to ARVO and the ARVO Foundation, including financial support, exemplary leadership of a Foundation initiative or dedication to endeavors that represent the mission of the ARVO Foundation. While at the meeting, Dr. McPherson met the 2018 RRF Lawrence Grantees. They were proud to have been selected and to have their photo taken with Dr. McPherson.

***Dr. Joan Miller, Dr. Alice McPherson, and Dr. D. Jackson and Jane Coleman***

Since 1993, RRF has contributed $524,000 to the RRF Lawrence Travel Grant program and made it possible for 623 young scientists to attend ARVO annual meetings to present their papers and posters. This was a pioneering program at that time and has caught on in a big way over the years. Founded in 1928, ARVO is the largest and most respected eye and vision research organization in the world. Their mission is to advance research worldwide into understanding the visual system and preventing, treating and curing its disorders. ARVO members include nearly 12,000 researchers from over 75 countries.

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# Dr. McPherson Honored At ARVO Annual Meeting

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Excerpt from a thank you note by one of the RRF Lawrence Grantees:

*I would like to wholeheartedly thank the Retina Research Foundation, Joseph M. and Eula C. Lawrence, for their generous support of my travel to ARVO this year. This support was crucial to my attendance to the conference and furthered my development as an ophthalmologist. The conference was a unique opportunity not only to disseminate my research but also meet and learn from ophthalmologists across institutions and countries. I used this opportunity to the fullest, taking time to learn more about my own research field and to explore the multitude of others represented at the conference. I look forward to attending ARVO again in the future with new research! Thank you so much for your support of myself and all of the other trainees who received grants; without your contributions, many of us would never be able to take advantage of this wonderful opportunity.*

**Isaac Bleicher, BS, MD** (to be awarded in 2019)
*Duke University, Durham, North Carolina*

# RRF Board Members Travel to Madison, WI

***Drs. David Gamm and D. Dan Huh***

Nine RRF Board members traveled to Madison, Wisconsin, on May 21 and 22, 2018, for events hosted by McPherson Eye Research Institute at the University of Wisconsin-Madison.

### The 6th Annual McPherson Endowed Lecture

Dr. D. Dan Huh of the Department of Bioengineering at University of Pennsylvania delivered the McPherson Lecture, and his title was "Microengineered physiological biomimicry: Human Organs-On-Chips." This innovation in creating engineered models that mimic human organs, including the eye, could reduce the time it takes for new drugs and innovative medical treatments to reach patients. A reception and dinner hosted by McPherson ERI were held that evening.

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## Dedication of Dr. McPherson's 2014 Gonin Medal Archival Display

The Gonin Medal was instituted in 1937 in memory of Swiss-born Jules Gonin, MD. It is the oldest and most prestigious medal in ophthalmology. Every four years, the International Council of Ophthalmology (ICO) Board of Trustees elects the gold medalist. The diploma of the medal is delivered during a special ceremony in Lausanne, Switzerland, and the gold medal is presented at the World Ophthalmology Congress.

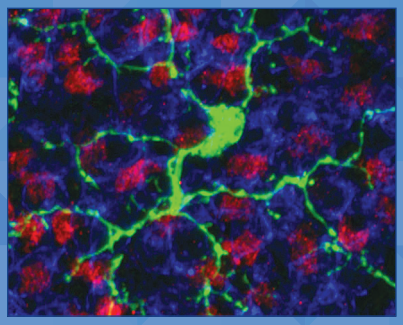
In 2014, Dr. McPherson was selected for this high honor in recognition of her lifetime accomplishments as physician, teacher, scholar, leader, and pioneer dedicated to the study and treatment of retinal diseases. Dr. McPherson has now donated her Gonin Medal and diploma to the University of Wisconsin-Madison. These historically important items are displayed in an archival exhibition case in the Mandelbaum & Albert Family Vision Gallery at the entrance to the McPherson ERI's offices and research labs. The display will be part of the permanent archives of the University.

***Dean Robert Golden, Dr. Alice McPherson, and Dr. David Gamm at the Dedication of the Gonin Medal Display Case***

***University of Wisconsin-Madison Chancellor Rebecca Blank and Dr. McPherson***

*All photos credit Andy Manis*

# Protecting Sensory Cells Needed For Vision after Retinal Detachment



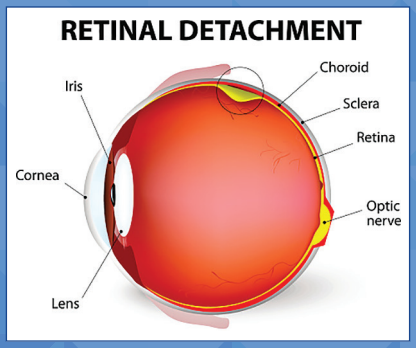
*Microglia*

In a report recently published in the online journal, *Proceedings of the National Academy of Sciences (PNAS)*, researchers describe that microglial cells in the eye play a beneficial role after retinal detachment — they migrate to the site of injury, protecting photoreceptors and regulating local inflammation. Photoreceptors are the major light-sensing cells in the eye, and retinal detachment and subsequent degeneration of the retina can lead to photoreceptor cell death.

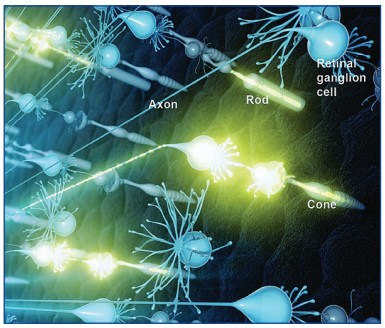
***Dr. Kip Connor***

The research team at Massachusetts Eye and Ear was led by senior author Kip Connor, PhD, Assistant Professor of Ophthalmology at Harvard Medical School, and the study's lead author Yoko Okuniki, MD, PhD, a postdoctoral fellow at Mass. Eye and Ear. Microglia, the primary immune cells of the brain and retina, were proven to play a protective role in response to retinal detachment.

"Our results provide clear evidence that microglia protect photoreceptors from cell death in acute retinal detachment," said Dr. Connor. "We found that microglial cells rapidly migrate into the injured retina, where they formed close connections with infiltrating immune cells and removed injured photoreceptors. These findings provide the first insight into how microglia respond and function during retinal detachment."




Retinal detachments are considered vision-threatening medical emergencies and can occur spontaneously as a result of blunt trauma or as a side effect of a variety of eye diseases. When the retina detaches from its normal position, it separates the blood vessels that supply oxygen to the eye, and photoreceptors begin to die away. Today's surgical techniques are highly effective in physically reattaching the retina, and surgical outcomes are generally positive.




***Neural activity in the retina***

Microglial cells were known to be activated in retinal detachment; however, it was previously unknown if these cells were harmful or protective against photoreceptor cell death. In this report, the researchers describe that in response to retinal detachment, microglia rapidly responded in a uniform migrating pattern, moving toward the affected area. When the researchers depleted microglia in the model, more of the photoreceptor cells died away. The authors on the PNAS report are hopeful that these findings suggest a new therapeutic avenue for preserving photoreceptors after retinal detachment.

"Clinically, in the context of retinal detachment, we think promoting these cells would be of significant therapeutic benefit — perhaps early on, when they can keep inflammation in check," said Dr. Okuniki. "This could prevent the initial photoreceptor cell loss, preserving vision longer after retinal detachment and providing an extended therapeutic window for surgery."

www.masseyeandear.org

# OCT Device Headed to International Space Station

One of the physical changes that astronauts experience during and after space flight is changes to the shape of their eyes. Vision deterioration is a serious physiological symptom caused by the effects of a zero-gravity environment. Detailed monitoring of the health of the crew's eyes during space missions is therefore a high priority.

*Optical coherence tomography (OCT)*

Optical coherence tomography (OCT) is an imaging technology that produces three-dimensional images of the retina, retinal nerve fibers and other eye structures and layers. Now NASA has launched an unmodified, commercially available OCT device to the International Space Station (ISS) as a demonstration, and the results will be used to assess the acceptability of the unmodified unit to operate effectively on ISS. The ability of the hardware to withstand launch conditions and operate within the unique ISS environment will be assessed. If the device does not function as needed, modifications will be implemented in the next generation device built specifically for ISS operations. If the device functions as required, it will be certified for medical operations and research use on board the ISS.

*Telemedicine*

These OCT devices monitor changes to the eyes of crew members during the progression of the mission. Knowledge gained from these in-flight measurements provides real-time medical evaluations and will be used to develop countermeasures to safeguard the vision of crew members.

## Other Applications

Patients with macular degeneration, retinitis pigmentosa and other eye diseases need regular eye exams, but patients living in remote rural areas may not have easy access to doctors. OCT devices can be used in telemedicine applications, so doctors can examine a patient at a distant location. The benefit to patients on earth is that telemedicine strategies, practices, and procedures will be improved through this remote monitoring of ISS crew members by investigators on the ground.

Developers are Heidelberg Engineering, Heidelberg, Germany; Wyle Laboratories, Houston, TX; and NASA Johnson Space Center, Houston, TX.

*ISS crew*

www.nasa.gov

# Stem Cell Therapies: The Hope and the Hype

## 10 Things to Know Before You Fall Victim to a Retinal Stem Cell Scam

*by David M. Gamm, MD, PhD*
*Humble Distinguished Director of McPherson Eye Research Institute at the University of Wisconsin-Madison*

*David M. Gamm, MD, PhD*

**1. The Hope is real:** Stem cell technology has created exciting new possibilities for understanding and treating diseases that have perpetually plagued humankind. But we have an overarching obligation to "first do no harm."

**2. The difference between Hope and Hype is a single letter and a compelling website.** Private stem cell clinics touting miracle cures can cause you to lose whatever vision you have left – or your entire eye – due to infection, tumor, or another catastrophic event. And even if the treatment causes no physical harm, it can result in significant financial damage, with costs often reaching into the tens of thousands of U.S. dollars.

**3. Confused? It's NOT the fault of you or your family.** Stem cell technology is complicated and new, and there are a growing number of private clinics that are attempting to financially capitalize on patients' desperation and confusion. You should know that in many cases, the "stem cells" that are now being transplanted in these for-profit clinics are from fat, bone marrow, or another source that has no proven ability to replace missing retinal cells.

**4. Be highly skeptical of any stem cell therapy that requires you to pay a fee or that claims to be a cure-all.** Almost all valid stem cell therapies are still in the clinical trial stage, or even earlier. Ethical scientists will enroll patients in these trials without asking for, or accepting, payment. If you have doubts, ask questions – and not just of the people trying to sell you the stem cell procedure, since they have an inherent conflict of interest.

**5. In order to avoid scams, it is important to understand what the retina is....** The retina is actually a complex "layer cake," with each layer containing specific types of cells that perform a precise job and connect to other cells to form a neural circuit. Deepest within the retina lies a layer of photoreceptors – rods and cones – that detect light and initiate a cascade of events that ultimately lead to our perception of vision, which occurs in the brain.

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**6. . . . and also to understand what happens when retinal cells die.** Some of the most devastating and incurable causes of blindness are rooted in the death of retinal cells, including photoreceptors and RPE cells (the layer which nourishes photoreceptors). These diseases include age -related macular degeneration (AMD), retinitis pigmentosa (RP), Stargardt disease, Best disease, and others. For the vast majority of those affected, there are no cures or successful treatments available.

**7. We are born with all the retinal "parts" we are ever going to have.** The human retina has no innate ability to replace these cells once they are lost – one reason why stem cells have drawn so much attention, as they can provide replacement parts by repurposing other types of cells.

**8. Stem cell therapies may provide an option to replace the lost cells** either by 1) getting the retina to fix itself **(regeneration)**, or 2) introducing new cells obtained from an outside source (**replacement** by transplantation). Scientists are working on both options, most commonly using pluripotent stem cells (PSCs) – grown in the laboratory – which can theoretically make any cell in the entire body. The "reprogramming" is complex, but there has been tremendous progress in recent years. Many highly differentiated and specialized cell types, including photoreceptors and RPE cells, can now be produced from human PSCs in a reliable manner.

**9. The "installation challenge" is formidable for all cell types**, and scientists are just beginning to tackle the question of developing truly effective methods of installing the new cells and getting them to connect properly and function. Stem cells cannot just be injected anywhere in the eye and then be expected to find where they need to go.

**10. There is no magic to stem cells,** but there is a great deal of excellent, well-designed, and well-intentioned research being performed in the stem cell field. Stem cells have unique but variable properties that, if thoughtfully tested and applied, may be of considerable help to some patients in the foreseeable future. We're optimistic about this future... and you should be, too.

For a more detailed version of this article, please contact the McPherson Eye Research Institute at (608) 265-0690, vision.wisc.edu.

https://vision.wisc.edu/resources/

***"There is nothing in life so irrational that good sense and chance may not set it to rights; nothing so rational that folly and chance may not utterly confound it."***

*– Johann Wolfgang von Goethe (German writer 1749 – 1832)*

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# NEWSLETTER
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AT&T employee (anonymous)

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### EMPLOYEE MATCH

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## Two New RRF Appointments at McPherson Eye Research Institute

**Daniel M. Albert Chair**
**Barbara Blodi, MD**

Professor, Dept. of Ophthalmology and Visual Sciences
Medical Director, Fundus Photograph Reading Center (FPRC)
McPherson ERI, University of Wisconsin-Madison, WI

Dr. Blodi is a medical retina specialist heavily involved in ophthalmic clinical trials through the FPRC and the Clinical Trials Unit. She has been an investigator or co-investigator on 54 clinical trials including the AREDS, SCORE, and CATT trials, and is an author on 75 papers.

**Rebecca Meyer Brown Professor**
**Mrinalini Hoon, PhD**

Assistant Professor, Dept. of Ophthalmology and Visual Sciences
McPherson ERI, University of Wisconsin-Madison, WI

Dr. Hoon's research combines high-resolution imaging, electron-microscopy, electrophysiological, gene-profiling and transgenic techniques to study how synapses in the inner retina are established and how this leads to stereotypic connectivity patterns between retinal neurons during development and maturation.

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.**