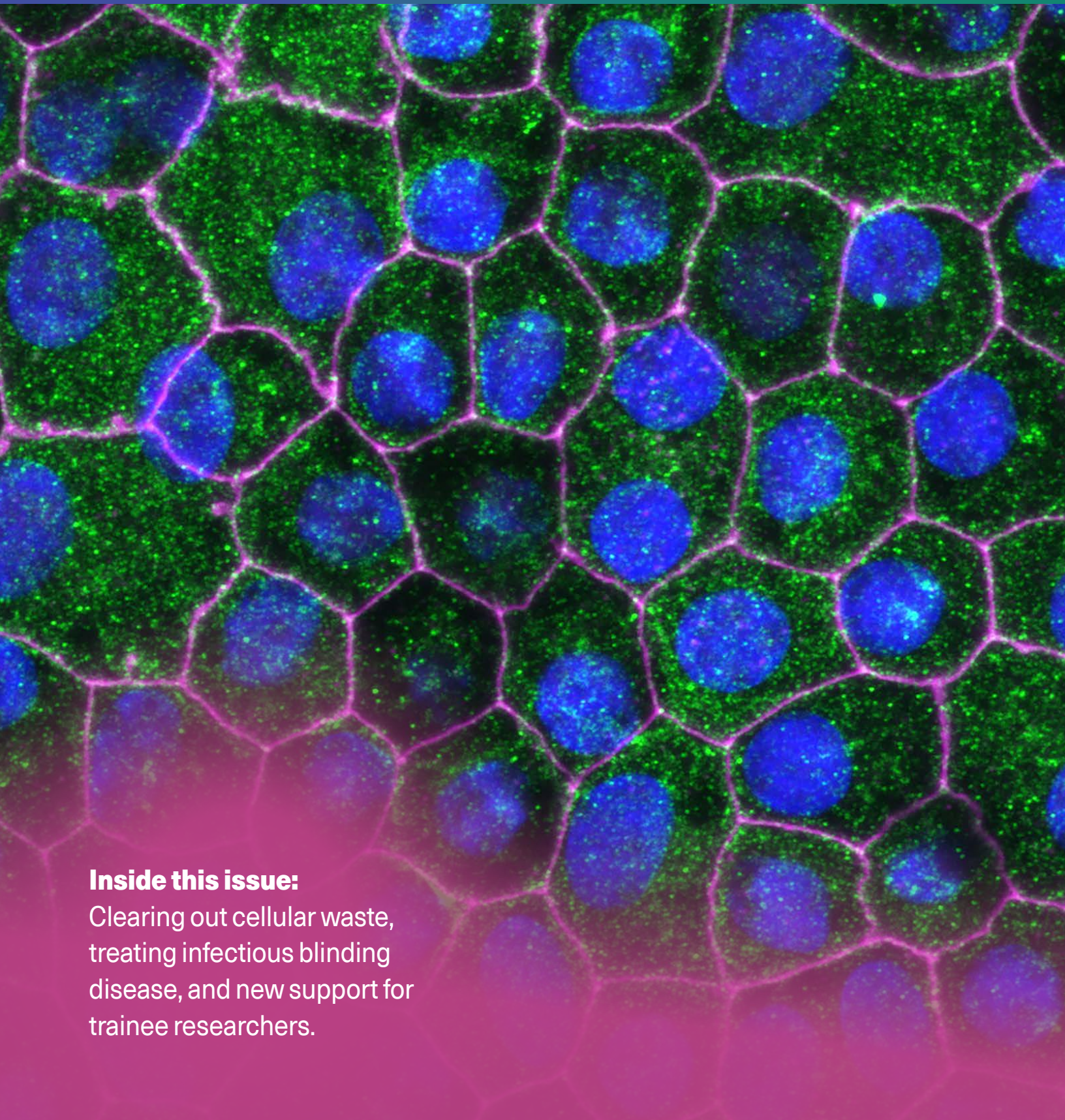




A fluorescence micrograph showing a dense layer of cells, likely retinal cells. The cell nuclei are stained blue, and the cell boundaries are outlined in green. The background is a dark, textured green.

Inside this issue:

Clearing out cellular waste,
treating infectious blinding
disease, and new support for
trainee researchers.



Dear Friends,

The eye is one of the most complex organs in the human body. It's an unsurpassed piece of biological technology, but as with any device, natural or otherwise, much can go wrong with its operation. Unlike human-made machines (e.g., cell phone cameras), however, we don't have a complete understanding of the eye's inner workings. In keeping with this analogy, the McPherson ERI is home to a vast array of "eye mechanics" who specialize in different parts of the visual system. But regardless of our individual interests and expertise, we work together to understand, protect, restore, and/or enhance vision. In this issue of *InSights*, you'll read about a variety of vision-threatening conditions and get to know the researchers determined to overcome them.

We are also pleased to introduce two new trainee research awards (see below) that will advance research on glaucoma and age-related macular degeneration. As you know, we value our trainees highly—they are the engines that bring our research ideas to fruition. But great trainees aren't created out of thin air; rather, they require dedicated, talented, empathetic mentors and welcoming, enriching laboratory environments. Thankfully, we have no shortage of either. As a particularly noteworthy example, McPherson ERI Associate Director Dr. Kevin Eliceiri was recently chosen as the inaugural recipient of the Association of Biomolecular Research Facilities (ABRF) Spencer Shorte Legacy Award, which honors one scientist per year (worldwide) who embodies the core values of community building, collaboration, and mentoring. We are thrilled and proud that Dr. Eliceiri, a renowned expert in biological image analysis, was recognized for his dedication to helping everyone reach greater heights in science, engineering, and medicine.

We're thankful, as always, for your interest.



David M. Gamm, MD, PhD

RRF Emmett A. Humble Distinguished Director, McPherson ERI
Sandra Lemke Trout Chair in Eye Research
Professor, Department of Ophthalmology and Visual Sciences

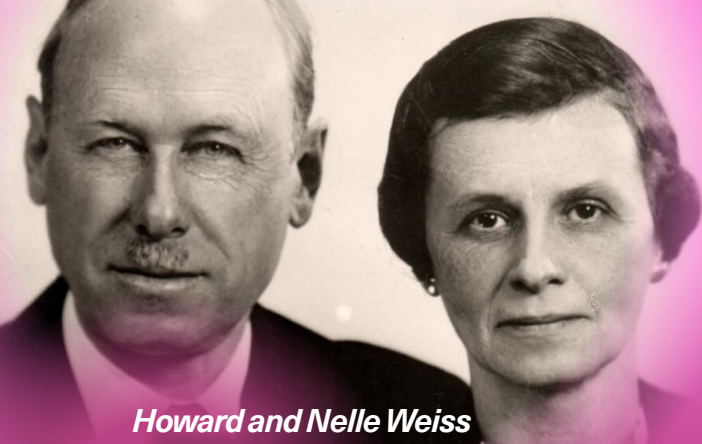


Ari Rosenberg, PhD, Named to the Gamewell Professorship

McPherson ERI is pleased to note the appointment of Ari Rosenberg, PhD, to the Retina Research Foundation Edwin and Dorothy Gamewell Professorship. Dr. Rosenberg, Professor in the Department of Neuroscience in the School of Medicine and Public Health at UW-Madison, is an established and distinguished computational neuroscientist and vision researcher. His lab uses a variety of methods to uncover algorithms and computations underpinning the interpretation of retinal signals.

A major focus of the Rosenberg lab is understanding how the brain transforms retinal images—which contain implicit clues about a scene's 3D structure and content, such as occlusion, foreshortening, and the size of visual elements—into explicit, behaviorally-relevant representations of the world.

The Rosenberg lab applies its basic science discoveries to translational research on autism and ocular disease. Dr. Rosenberg co-holds patents in both these areas, including one for a novel visual field device with the potential to enable earlier diagnosis of glaucoma and provide new insight into other ocular pathologies such as ischemic optic neuropathies. Ongoing work is fine-tuning that device with the goal of bringing it to market for widespread adoption.



Howard and Nelle Weiss



Karl H. Beyer, Jr

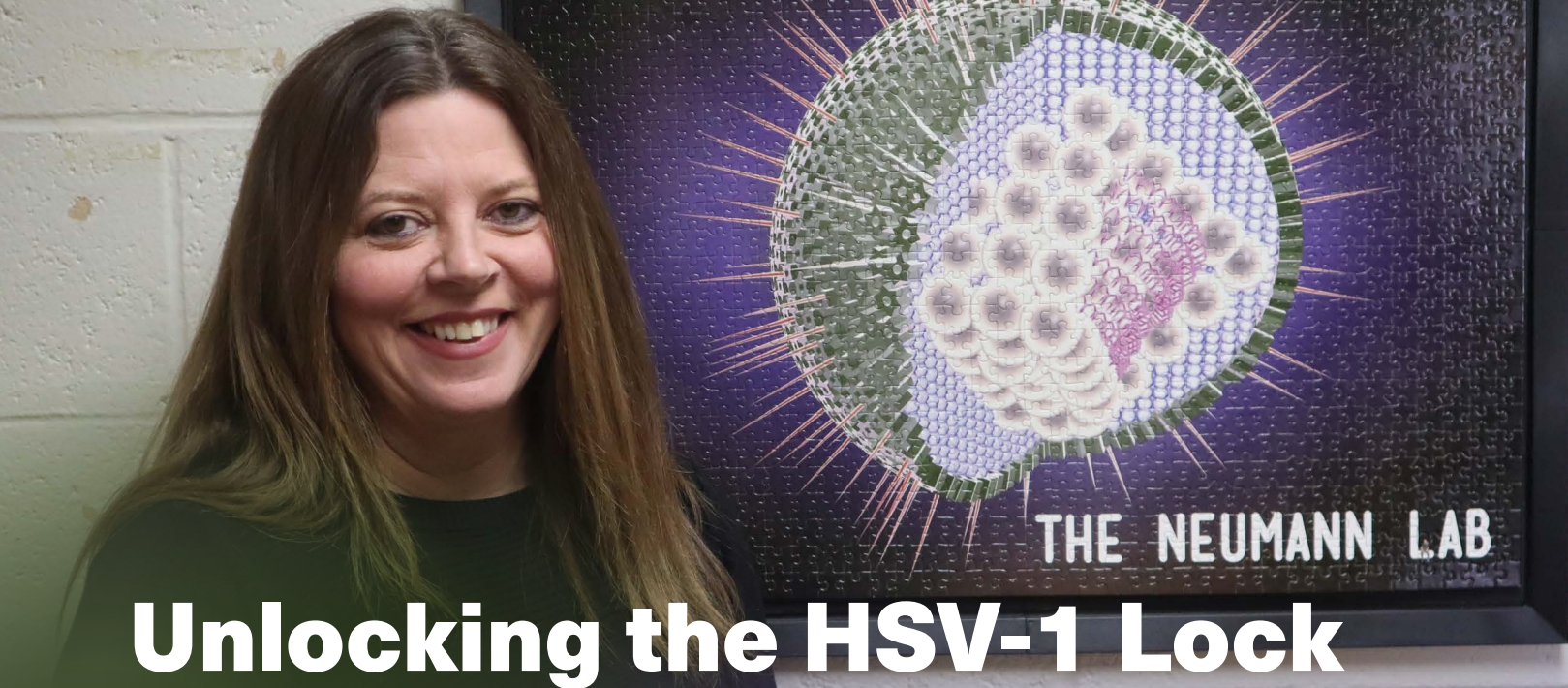
Generations of Badgers

A recent \$1 million gift to the McPherson Eye Research Institute from the Beyer family recognizes more than one hundred years of family connection to UW-Madison and will support graduate students and postdoctoral researchers in vision research for many years to come. The Beyer gift stems from a family interest in vision research and establishes two endowments, each for half a million dollars, that will fund early career vision scientists working on AMD or glaucoma research, two areas of intense concentration within the Institute.

The Howard F. and Nelle Weiss Graduate Student Eye Research Award commemorates the grandparents of the lead Beyer family donor. Howard and Nelle Weiss were prominent Madisonians in the first decades of the 20th century, before Howard's early and untimely death in 1940. (Nelle lived until the age of 101, dying in 1991). Howard Weiss was a nationally recognized engineer who served as Director of the Forest Products Laboratory, a national research lab of the United States Forest Service, at UW-Madison from 1912-1917. Weiss later worked for Burgess Laboratories in Madison, and in 1938 he founded the Research Products Corporation (RPC), a firm established to develop and provide indoor air quality solutions for homes and businesses.

The Karl H. Beyer, Jr., MD, PhD, DSc, Postdoctoral Fellow Eye Research Award is established in honor of the lead Beyer family donor's father, a groundbreaking pharmacology researcher whose work was largely responsible for the discovery of the thiazide class of diuretics marketed as Diuril and HydroDiuril, a landmark in treating hypertension. Dr. Beyer's team also developed probenecid, the first universally accepted drug for the treatment of gout. Coincidentally, Dr. Beyer received his PhD in physiology at UW-Madison in 1940, the year of Howard Weiss's death, followed by his MD from UW in 1943. That same year, he began a long career in pharmaceutical research at Sharp & Dohme, which a decade later merged with Merck and Co. Among many honors in the field of chemistry, Dr. Beyer received the Lasker Award, the Sollmann Award, and the Gairdner Award. He also received both the Distinguished Service Award of the Wisconsin Alumni Association in 1968, and an Honorary Doctor of Sciences Degree from UW in 1972.

Karl Beyer married Howard and Nelle Weiss's daughter, Annette—a link which extended the Beyer and Weiss families' UW connections through recent generations. In recognizing these earlier generations, who well knew the importance of supporting researchers at early stages in their careers, the Beyer family is continuing a legacy that will last far into the future.



Unlocking the HSV-1 Lock

Herpes Simplex Virus 1 (HSV-1) is a ubiquitous human virus that infects over 70% of humans for life. Most people think of HSV-1 as a nuisance virus that causes cold sores, but HSV also infects almost all tissues in the human eye, and almost every part of the eye is vulnerable to HSV infection. From the surface of the cornea to deeper ocular structures, the virus can infiltrate and persist, and while you may not have heard of ocular HSV, a startling fact is that HSV eye infections are very common. In fact, HSV is one of the leading infectious causes of blindness worldwide. What might begin as a minor irritation or redness in the eye can escalate into repeated infections, scarring, and permanent vision damage. Knowledge of how the virus does this has been elusive, though. Dr. Donna Neumann's lab is engaged in seeking the answers.

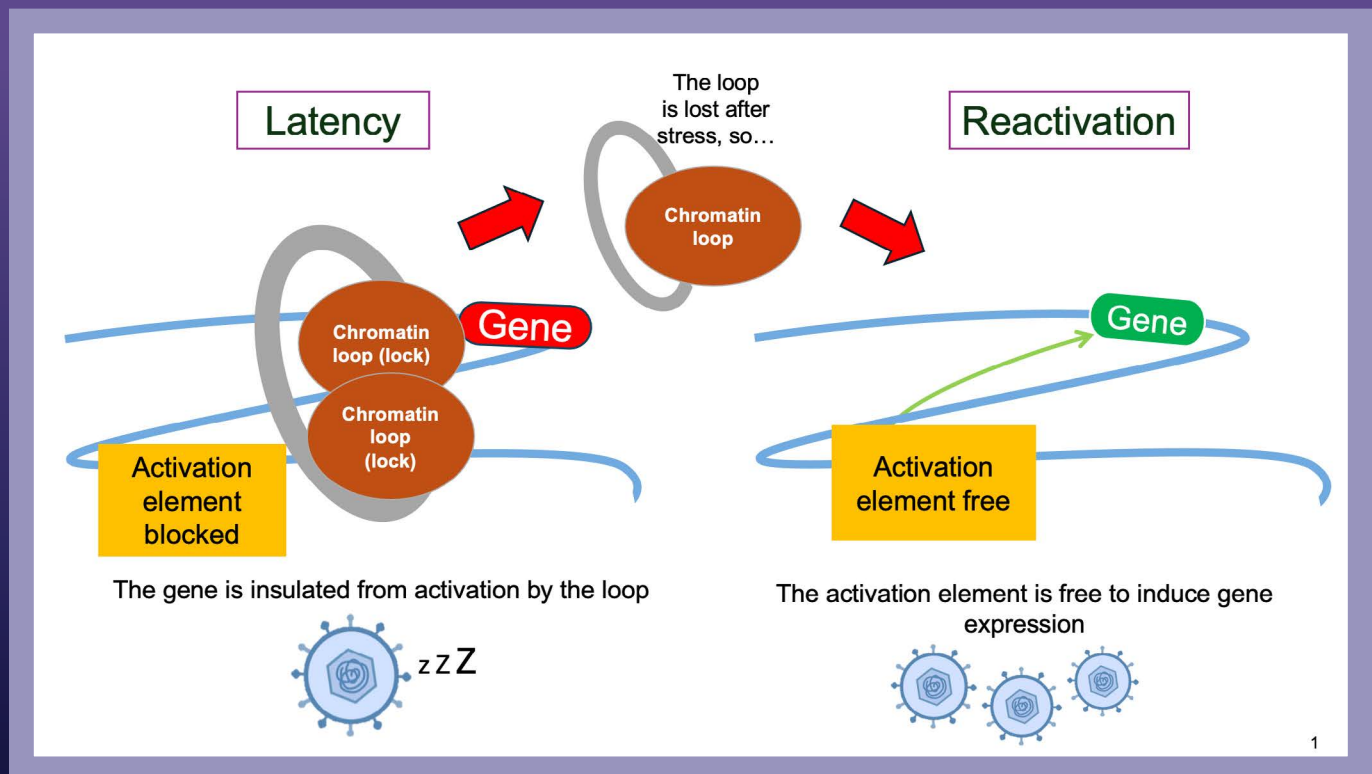
HSV-1 is notorious for its ability to hide silently inside sensory neurons in the peripheral nervous system. After the initial infection, the virus travels along nerve fibers into the nervous system, where it creates latent reservoirs—a biological hideout that allows the virus to evade the immune system and remain dormant for the life of the human host. During this silent phase, the virus expresses no proteins (which are normally good targets for antiviral drugs) and causes no clinical symptoms—but it remains dangerous, nonetheless. Cellular stressors like extreme temperatures, chemical stimulants or emotional stress can cause the virus to reactivate. When reactivation occurs, a small number of infected neurons begin producing infectious virus particles. These particles travel back down nerve pathways to the cornea, where they can trigger painful infections, scarring, and permanent blindness. Even worse, the newly produced virus can spread to other people, continuing the cycle.

Despite decades of research, scientists have struggled to answer a question that is crucial in formulating a target for an antiviral drug: What changes in the HSV genome that triggers the virus to wake up from those latent reservoirs? Using pilot funding from a McPherson ERI Grant Summit Program (GSP) award, the Neumann Lab optimized a cutting-edge human neuron research platform and an advanced genomic technology called Chromosome Conformation Capture circular-

sequencing to begin to solve this long-standing mystery. These technologies allow a detailed look into the spatial organization of the genome, which is critical to understanding its function.

In the GSP-funded pilot study, the Neumann Lab showed that the HSV-1 genome adopts advanced 3-dimensional chromatin structures known as viral chromatin loops to control gene expression. On the basis of this pilot data, the lab was recently awarded a 5-year R01 from NIH to dig deeper. Dr. Neumann's group has proposed that these viral chromatin loops use specialized genomic elements known as chromatin insulators as a molecular lock mechanism to keep viral genes switched off during latency to trap HSV-1 in its dormant state. But during times of stress, these locks weaken or disappear, allowing viral genes to turn on and the infection to resume. The result is an elegant method for HSV-1 to lie dormant in neurons and then awaken to initiate a reactivation episode.

But the most exciting part is that the lab is not stopping with understanding the virus. Combining this knowledge of the genome with cutting-edge viral delivery systems (rAAV), they aim to target and eliminate the latent viral reservoirs and permanently block reactivation. If successful, this work would be a major breakthrough in preventing painful eye infections, halting vision loss, and even blocking the virus from spreading to others. The goal, whenever possible, is prevention.



Below, a schematic showing the proposed latency and reactivation cycle of the HSV-1 virus within a sensory neuron. At left, during latency the chromatin loop structure acts as a lock that keeps the viral genes switched off and HSV-1 dormant. After stress, the loop is lost and (right) viral genes are activated, allowing the infection to resume. Image courtesy of Donna Neumann, PhD.



Celia Bisbach: On a Path to Saving Sight

When you talk to Celia Bisbach about her research, the first thing you notice is her excitement about her work. The Jefferson, WI native is a postdoctoral researcher in the Gamm Lab at UW-Madison, one of the world's leading centers for stem cell-based vision research.

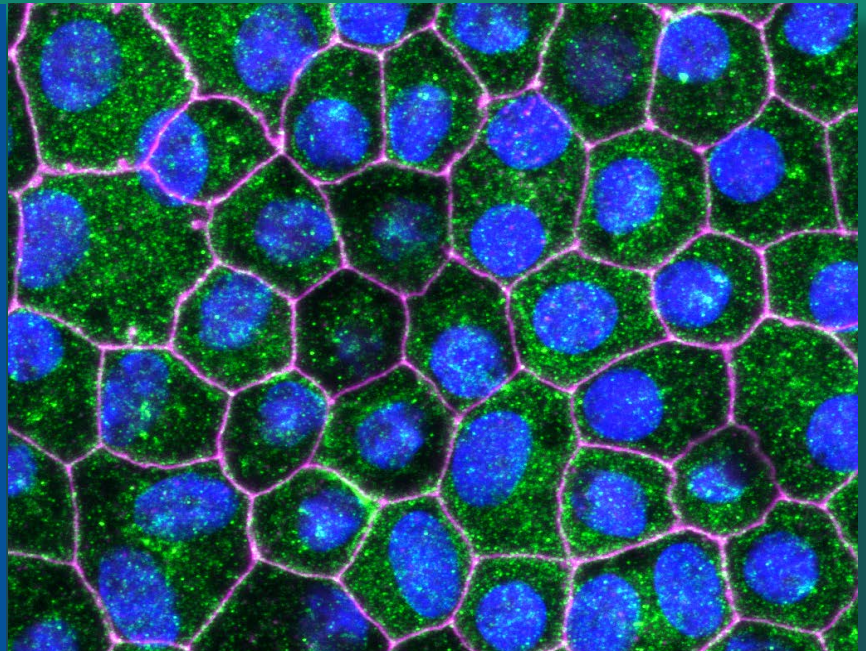
Dr. Bisbach did not always envision a career in science. She originally planned to become a veterinarian. While completing her undergraduate degree at UW-Madison, she worked in a cancer research lab caring for mice. As she began assisting with experiments, she realized she was more drawn to science than to veterinary work. She went on to earn her PhD in Biochemistry from the University of Washington in Seattle, where her research focus shifted from cancer biology to vision science.

"It's crazy that we can see," Dr. Bisbach said. "When you think about how much detail you can perceive—and that it's a cell that's converting light to energy—it's fascinating."

Her graduate work explored how photoreceptor cells power that process. Today, she studies what happens when those cells fail—and how they might be repaired.

After working for two years at a biotech firm, Dr. Bisbach realized she missed doing academic research. On the advice of her former PhD advisor, she reached out to Dr. Gamm. "I applied for a scientist position in his lab, and he sent me the nicest rejection email I've ever gotten," she recalled with a smile. But he invited her to talk further. She joined the Gamm Lab in 2024.

The expression of a candidate lysosomal trafficking protein (green) in hiPSC-RPE cells. A tight junction marker (pink) shows the borders between the RPE cells. Image courtesy of the Gamm Lab.



Pursuing Answers to Complex Retinal Diseases

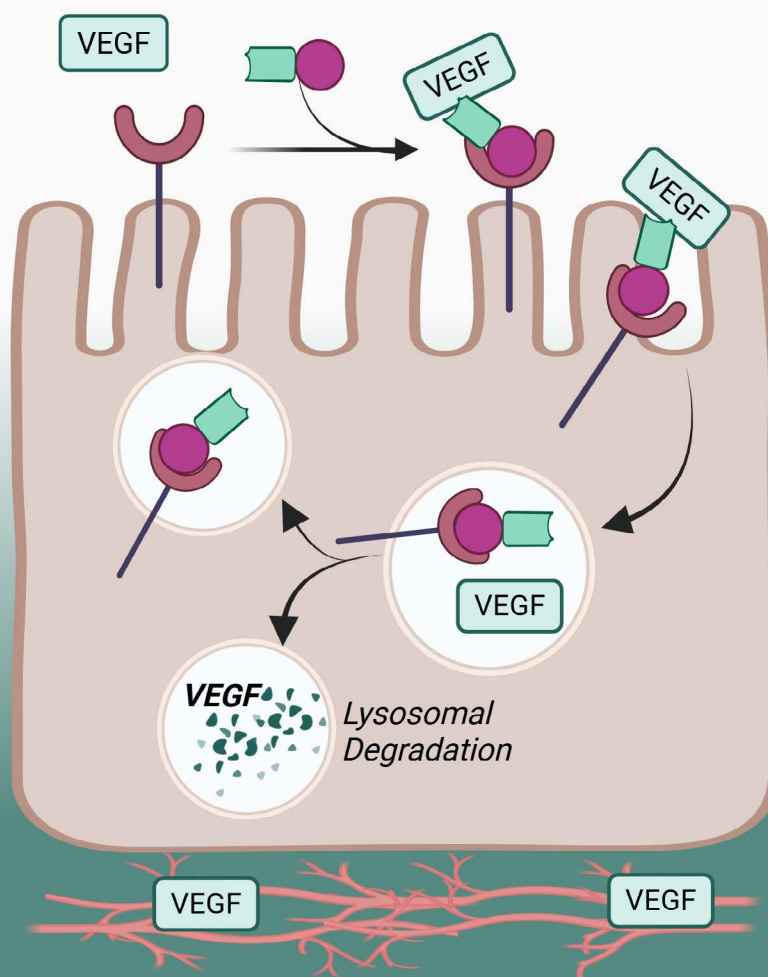
Dr. Bisbach's current work spans two major projects. The first builds on existing work exploring Usher Syndrome, a rare disorder causing combined deafness and blindness. For one common form of Usher Syndrome (USH1B), researchers have faced a frustrating problem: mouse models that carry the same mutations that cause USH1B in humans go deaf, but do not lose their vision. That has made studying how the disease affects the retina and testing potential treatments for vision loss very challenging. One goal of Dr. Bisbach's USH1B work in the Gamm lab is to develop human stem cell-derived retinal organoids in a dish as a new model system that can be used to better understand vision loss in USH1B and to test potential therapies. She helped sustain the project by working with Dr. Gamm to secure grant funding, a milestone she had set for herself.

Her other project draws directly from her industry experience. At her previous company, she supported teams developing therapeutics using targeted protein degradation—a strategy that hijacks the cell's natural “garbage collectors” to remove harmful or misfolded proteins.

“In many diseases, misfolded proteins accumulate and clog up the cell,” she explained. “You can't just inhibit a misfolded protein—it's still there. But if you can recruit it to the cell's waste disposal pathways, you can get rid of it.”

While this approach is widely explored in cancer research, Dr. Bisbach saw an opportunity to apply it to retinal disease. Her initial proof of concept work focuses on age related macular degeneration, testing whether targeted degradation could offer a new therapeutic strategy. She hopes that these degraders will have some benefits over current treatment options and provide a better long-term treatment option for patients. Looking ahead, Dr. Bisbach hopes to apply the same strategy to inherited retinal conditions like retinitis pigmentosa.

Above, a schematic illustrating the targeted degradation of VEGF mediated by a retinal pigment epithelial (RPE) cell. The therapeutic “degrader” (teal molecule with pink circle) draws VEGF to a Lysosomal Trafficking Receptor. This causes VEGF to be trafficked to the lysosome for degradation wherever the lysosomal trafficking receptor is present.



“Dr. Bisbach’s work takes on some of the biggest issues in our field,” said Dr. Gamm. “She investigates how, at a basic science level, different retinal degenerative diseases ultimately lead to cell death and blindness. She then takes that knowledge and devises new or better therapies to safeguard those cells.”

Dr. Bisbach had been conceptualizing her targeted protein degradation project for more than a year, long before joining the Gamm Lab. “I would wake up early, go to a coffee shop, and read and think for an hour,” she said. “Just planning how I would do it.” Now two years into her work at the Gamm Lab, she has made significant progress and secured funding to advance it further. The project was recognized with a prestigious Wisconsin Alumni Research Foundation Innovation Award in 2025.

Beyond the science, Dr. Bisbach is developing the skills required to run a research program: grant writing, project planning, resource management, and mentoring. She is still figuring out her long-term path—whether she wants to lead a lab like Dr. Gamm or pursue a more hands-on scientist role.

“People who run labs are very passionate,” she said. “At my industry job, I felt like something was missing, and I’ve been able to recapture that passion here.”

Adapted from, and with thanks to, Amy Pikalek and the Department of Ophthalmology and Visual Sciences.



14th Annual Alice R. McPherson Lecture

DEEP LEARNING APPLICATIONS IN OPHTHALMOLOGY

Aaron Y. Lee, MD, MSCI

Arthur W. Stickle Distinguished Professor and Chairman
• John F. Hardesty, MD Department of Ophthalmology and
Visual Sciences • Washington University in St Louis

**Health Sciences
Learning Center**

750 Highland Rd
UW-Madison

Dr. Lee will review key fundamentals in deep learning and computer vision, highlighting recent advances and the rapidly changing AI landscape in medicine. Lee's talk will also discuss the NIH Bridge2AI initiative and explore the rise of large language models and their growing impact on clinical care, research, and healthcare workflows.

Reception

3:00 PM, Atrium

Lecture

4:00 PM, Room 1325



Summer 2026, in the Mandelbaum & Albert Family Vision Gallery

INSIDE OUT — ART OF MEDICAL ILLUSTRATION

June 18th through September 30th, 2026

9th Floor, WIMR, 1111 Highland Ave

Please join us for our opening ice cream reception (with Babcock Dairy ice cream!) on Thursday, June 18th, 4:30-6:30 PM

InSights

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