

Karalis Johnson Retina Center

5-Year Community Report



UW Medicine
DEPARTMENT OF
OPHTHALMOLOGY



Creating 'a beacon of light'

Roger and Angie Karalis Johnson

As the office manager for her late husband Roger's ophthalmic practice in the historic Cobb Building in downtown Seattle, Angie Karalis Johnson saw personally how difficult eye disease was for his patients. She was determined to make a difference in vision research and treatment.

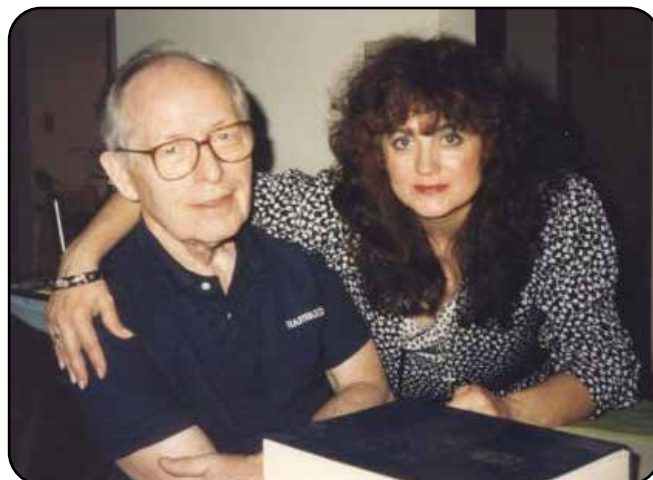
"I always had this in my mind that someday I can help some of these people to keep from going blind," she said. "I knew from working alongside Roger the potential of what this means - not just another center, but to create a beacon of light for those patients."

In 2018, Angie made a remarkably generous gift that helped to create the Roger and Angie Karalis Johnson Retina Center on the first floor of Building F at UW Medicine South Lake Union.

Her dedication to helping those with eye disease is phenomenal, said Russell Van Gelder, MD, PhD, Professor and Bucey Chair of the Department of Ophthalmology. "This is her vision. This is the work of Angie, Roger, and extends the legacy of Roger, and her late parents."

Roger Johnson graduated from the University of Wisconsin and trained at the Mayo Clinic. He set up his practice in 1945 and came to serve as a clinical professor on the University of Washington faculty; he was also a mentor and an eye researcher. Johnson established the eye clinic at Seattle Children's and volunteered his time to serve as chief of service for more than 40 years.

Angie and Roger were generous — and always interested in improving the health of eye patients. Nearly 40 years ago, they endowed the Roger Johnson Lectureship at Seattle Children's, which brings top pediatric ophthalmologists to Seattle and has become one of the most prestigious visiting lectureships



Roger and Angie Karalis Johnson shared a dream to alleviate suffering from eye disease.

in the specialty. Later, in 2001, they endowed the Roger H. Johnson Award for Macular Degeneration. This award is given to the scientist who has contributed significantly to understanding or treating age-related macular degeneration.

Angie had given the gift for the Retina Center a great deal of thought.

"If people are hurting, it affects me," she says. And the patients she'd seen with macular degeneration, often older people, had touched her deeply. "Quality of life is so important. They're losing a lot of life because they can't see," she says.

Angie has been very hands on during the first five years of the center. She meets regularly with all the clinicians and researchers and was intimately involved in the planning for the building.

Angie's dream for the Karalis Johnson Retina Center to become the world's leading center for the cure and treatment of retinal diseases is coming ever closer to reality.

Message from the Chair, Russell Van Gelder, MD, PhD

On behalf of the Department of Ophthalmology at UW Medicine, it is my pleasure to present our Community Report marking the five-year anniversary of the opening of the Roger and Angie Karalis Johnson Retina Center at South Lake Union.

This center, supported by a remarkably generous gift from Angie Karalis Johnson, opened in January 2019. In the past five years, it has supported more than 32,000 patient visits and an ambitious research program.

We continue to pursue our singular mission: to alleviate suffering from eye disease. We continue to do this through our robust research programs, outstanding patient care, educational programs to train the next generation of physicians, aided by gifts from generous donors like Angie and grateful patients.

Learn more in this report about how the Karalis Johnson Retina Center (KJRC) supports four pillars of research in its mission to eradicate retinal blindness: advanced optics imaging, computational ophthalmology, accelerating the therapeutic pipeline, and vision restoration research.

Our vision scientists are committed to improving diagnosis, treatment, and ultimately finding cures for diseases of the retina. Our department ranks third in the nation in NIH funding among ophthalmology departments, and the University of Washington is second for National Eye Institute funding. Most of this research is based at the Karalis Johnson Retina Center.

There are so many people who suffer with retinal disease who benefit from this center. We are at a point where the science can move treatment of these diseases. At the KJRC we have brought everything together in one place to optimize patient care and treatment.



Angie Karalis Johnson with Dr. Russ Van Gelder, chair of the Department of Ophthalmology and director of the Karalis Johnson Retina Center.

We serve as a major referral center, seeing patients at KJRC from the five-state WWAMI (Washington, Wyoming, Alaska, Montana, Idaho) region. We continue to provide many services not found in the community, including managing eye cancer (ocular oncology), uveitis, and medical and hereditary retinal disease.

Our faculty remain highly committed to the educational mission of the Department. We currently train three fellows in specialty training in retina and uveitis at the KJRC.

We appreciate our philanthropic partners, whose generosity accelerates our ability to conduct cutting-edge research, provide excellent patient care, and train the next generation of ophthalmologists. Philanthropic gifts help to accelerate innovation in the form of seed grants for our faculty research. We are honored and privileged to work with Angie Karalis Johnson and many other individuals as we aim to eliminate blinding eye disease and are happy to share our progress with you.

A handwritten signature in blue ink that reads "Russell Van Gelder".

Russell N. Van Gelder, MD, PhD
Boyd K. Bucey Memorial Professor and Chair
Department of Ophthalmology, University of Washington
Director, Karalis Johnson Retina Center
Director, UW Vision Science Center

PATIENT CARE

We take great pride in the quality of our care and our patients' satisfaction. At the Karalis Johnson Retina Center, we treat each patient as our own family member, applying compassionate, state-of-the-art medical care. Learn more about our patients.

Living with eye disease won't stop this young woman

It takes great courage to deal with eye disease as an adult, let alone as a child like Phoenix Fathers did when she was diagnosed with panuveitis, which is inflammation in both eyes that affects the retina.

Phoenix was a preteen who could only see about 20/400 due to the inflammation in both eyes when she first saw uveitis specialist Associate Professor Dr. Kathryn Pepple. Her treatment at the Karalis Johnson Retina Center was very aggressive and included injections, and infusions of anti-inflammatory drugs. The Karalis Johnson Retina Center is one of the very few places in the Northwest that provides this type of treatment.

But now, as she has turned 20, Phoenix is seeing about 20/40, drives, completed Running Start and earned her associate degree from Green River Community College, and completing coursework to get her real estate license.

"There have been many highs and lows along the way, but having Dr. Pepple by my side has made a huge difference," she said. "She has laughed and cried with me and celebrated the good times. She's amazing, and I am so grateful for her care."

Dr. Pepple is equally effusive in her praise of Phoenix.

"She is an amazing kid from an amazing family," she said. "Phoenix is very creative, smart, and generous in spirit. Her story is ongoing, which is typical for many patients with uveitis because



Phoenix Fathers has been a patient at the Karalis Johnson Retina Center since her early teens.

she will be managing her disease for many years."

Her family, including her parents and four brothers, has created a unique nonprofit, the 7 Wandering Backpacks, a traveling support group dedicated to helping animals and people in need worldwide. Preserving Phoenix's vision has helped her to help others.

Patients with diabetic retinopathy benefit from collaborative care at Diabetes Institute and Karalis Johnson Retina Center

As a youth basketball coach at the time, Eric Yates started noticing changes in his vision about 10 years ago when he noticed he couldn't see well out of his left eye.

Yates has had type 1 diabetes since childhood and initially had laser treatment. Later, when he experienced bleeding in the left eye, he was referred to retina specialist Kasra Rezaei, MD.

Receiving care at the Karalis Johnson Retina Center (KJRC) was a great opportunity for him to see Dr. Rezaei and his endocrinologist at UW Medicine Diabetes Institute in the same building. The proximity of the Retina Center and Diabetes Institute will provide excellent opportunities for caring for patients with diabetes and conducting advanced research.

Dr. Rezaei, an associate professor of Ophthalmology, performed vitreoretinal



Dr. Kasra Rezaei and patient Eric Yates at the Karalis Johnson Retina Center.

surgery on Yates and has been following him with regular visits to the KJRC.

"I met Dr. Rezaei at a scary time in my life, recognizing what losing vision could be like for me," Yates said. "I was relieved how quickly my vision came back."

He has his retina scanned with advanced imaging equipment available at the KJRC during his visits and can receive treatment if needed.

As a father of two children and an avid athlete, he was greatly reassured that his eye condition wouldn't affect playing with his kids or playing soccer, basketball, or golf.

"I so appreciate the high level of care here at Karalis Johnson Retina Center," Yates said. "The people here know who you are, and it's so convenient."



Dr. Rezaei examines patient Eric Yates.

Journey with eye disease turns patient into community advocate for research and treatment

Glaucoma, retinal detachments, and uveitis — Rahel Tesfahun's experience with eye disease has been a courageous journey. It has led her to become a dedicated advocate for ophthalmology research, patient care, and education.

She is chair of the UW Medicine Eye Institute's Community Action Board (CAB), which supports and furthers the UW Department of Ophthalmology's mission to alleviate suffering from eye disease in our region and worldwide.

Rahel came to the department for care 16 years ago as a student at Seattle University.

Her first retinal detachment occurred in her junior year. She had surgery in the community and subsequent treatment at Johns Hopkins near her family home in Maryland. It was there she was diagnosed with idiopathic uveitis and had surgery for a second retinal detachment.

When she returned for her senior year at Seattle U, she was referred to Bucey Memorial Chair Dr. Russell Van Gelder, a uveitis specialist, and subsequently to glaucoma specialist Dr. Philip Chen, Grace Hill Endowed Chair and Vice Chair for Clinical Services, and retina specialist Dr. Jennifer Chao, Bergy Professor and Vice Chair for Research.

Her journey with eye disease has included a third retinal detachment and repair, immunosuppressant medications, eye drops, laser surgery, and injections. However, her vision has significantly improved over the last two years, and her condition is now stable.

"My team here has been amazing," Rahel says. "I can see the real joy in Dr. Chen's eyes when he sees the improvement I have made because uveitic glaucoma is difficult to treat."

Now a parent of an eight-year-old son and three-year-old daughter, Rahel hopes others



Rahel Tesfahun, center, with her family; she is chair of the department's Community Action Board.

going through similar journeys can find hope at the Karalis Johnson Retina Center and the Eye Institute at Harborview Medical Center.

Tesfahun, who works in digital content strategy for DotDash Meredith, has been a member of the Community Action Board since 2019.

"Our team here in Ophthalmology is so talented, and it is an honor to support their research. Tesfahun says. "The Community Action Board is such a wonderful resource for the department. I hold that close to my heart.

"The doctors have become close friends, and using my personal story has been empowering to improve that experience and prevent others from going through this journey. I had to come to UW to get the right answers, and sharing that experience is really meaningful to me."

Physicians collaborate to ensure this patient can continue to enjoy travel

Bob Tenace had been through two discouraging years of multiple surgeries for recurrent retinal detachment in his right eye, before he finally came to the Karalis Johnson Retina Center.

"For me, it was one thing after another, eight surgeries over two years," Tenace said. "I was worried about losing my vision altogether in that eye."

Although he lives in Issaquah, it wasn't until after a visit to the emergency room during a trip to southern California that he was referred to UW Medicine.

He was experiencing very high pressure in his eye and was treated at a UCLA facility in Orange County, where doctors did a procedure to relieve the high pressure.

"After all I had been through, I was desperate to keep my vision; I asked them if they could care for me there," Tenace said. "They said, 'you can fly down here, but we know retina and glaucoma specialists near your home at UW, and you have excellent care there.'"

That was how he met retina specialist Associate Professor Lisa Olmos de Koo, MD, and glaucoma specialist Professor Philip Chen, MD.

"The minute I went to UW and the Karalis



Dr. Lisa Olmos de Koo with patient Bob Tenace.

Johnson Retina Center, it gave me confidence they were interested in my vision care," he said.

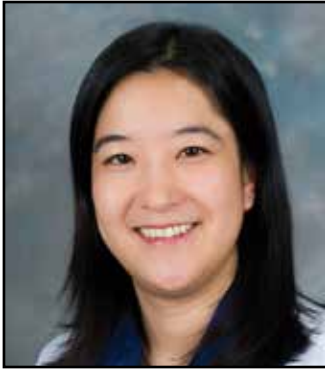
"Dr. Olmos de Koo did the surgery; my retina remains attached. I lost some vision over the years, but I want to keep the light coming in. All I can say is that I am getting the best care."

Bob retired several years ago from a position in technology sales but still works part-time.

With his vision conditions under control, Tenace and his wife look forward to more travel adventures. They previously walked the famous Camino de Santiago (Way of Saint James) pilgrimage 500 miles across Spain a few years ago.

PATIENT CARE

KARALIS JOHNSON RETINA CENTER PATIENT CARE FACULTY



Jennifer Chao, MD, PhD

Associate Professor
Gordon and Joan Bergy Professor
Vice Chair, Research

EDUCATION

BS, Stanford University
MD, Ophthalmology, Yale University
PhD, Yale University
Residency, USC/Doheny Eye Institute
Fellowship, Vitreoretinal Surgery - USC/
Doheny Eye Institute

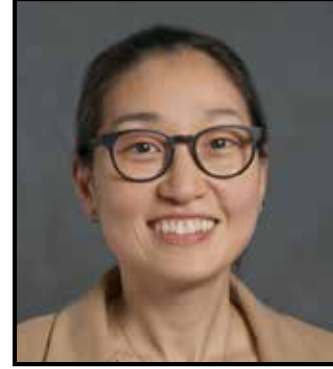


Christopher Fortenbach, MD, PhD

Assistant Professor

EDUCATION

BS, Biochemistry and Molecular Biology,
UC Davis
MD, UC Davis
PhD, Biochemistry, Molecular, Cellular,
and Developmental Biology, UC Davis
Residency: Ophthalmology, University of
Iowa Hospitals and Clinics
Fellowship, Vitreoretinal surgery,
Univeristy of Iowa Hospitals

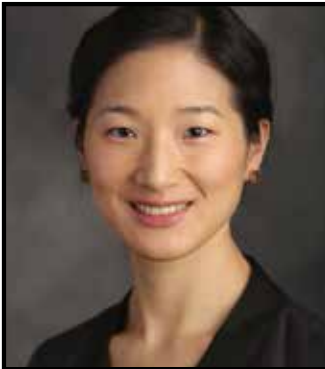


Cecelia Lee, MD, MS

Professor
Klorfine Family Endowed Chair

EDUCATION

BS, Emory University
MD, Emory University School of Medicine
Internship, Transitional, Emory University
Residency, Ophthalmology, Emory
University
Fellowships, Uveitis, Washington
University in St. Louis
Medical Retina, Moorfields Eye Hospital



Yewlin Chee, MD

Associate Professor

EDUCATION

AB, Princeton University
MD, University of Pennsylvania
Residency, Ophthalmology,
Harvard University
Fellowship, Vitreo-Retinal Disease
& Surgery, Harvard University



Aaron Lee, MD, MSCI

Associate Professor
C. Dan and Irene Hunter Professor

EDUCATION

BS, Biochemistry, MD, Washington
University School of Medicine
MS, Washington University School of
Medicine
Internship, Internal Medicine, St. John's
Mercy Medical Center
Residency, Ophthalmology, Washington
University School of Medicine
Fellowships, Medical Retina, Moorfields
Eye Hospital; Surgical Retina, UBC



Lisa Olmos de Koo, MD, MBA

Associate Professor
Division Director, Retina
Director, Retina Fellowship

EDUCATION

AB, Chemistry, Harvard University
MD, Baylor College of Medicine
MBA, Rice University
Internship, Transitional, Georgetown
University
Residency, Ophthalmology, Bascom
Palmer Eye Institute, University of Miami
Fellowship, Vitreoretinal Surgery, Bascom
Palmer Eye Institute, University of Miami



Kathryn L. Pepple, MD, PhD

Associate Professor
Director, Uveitis Fellowship

EDUCATION

BS, Microbiology, University of Oklahoma
MD, Baylor College of Medicine
PhD, Baylor College of Medicine
Internship, The Methodist Hospital
Residency, Ophthalmology, Duke University
Fellowships, Medical Retina, Duke University; Uveitis, University of Washington



Kasra Rezaei, MD

Associate Professor

EDUCATION

MD, Azad University, Tehran, Iran
Internship, General Surgery, Vanderbilt University
Residency, Vanderbilt Eye Institute, Vanderbilt University
Fellowship, Vitreo-Retinal Fellowship, Associated Retina Consultants



Russell N. Van Gelder, MD, PhD

Boyd K. Bucey Memorial Professor and Chair, UW Medicine Department of Ophthalmology,
Director, Karalis Johnson Retina Center
Director, UW Vision Science Center

EDUCATION

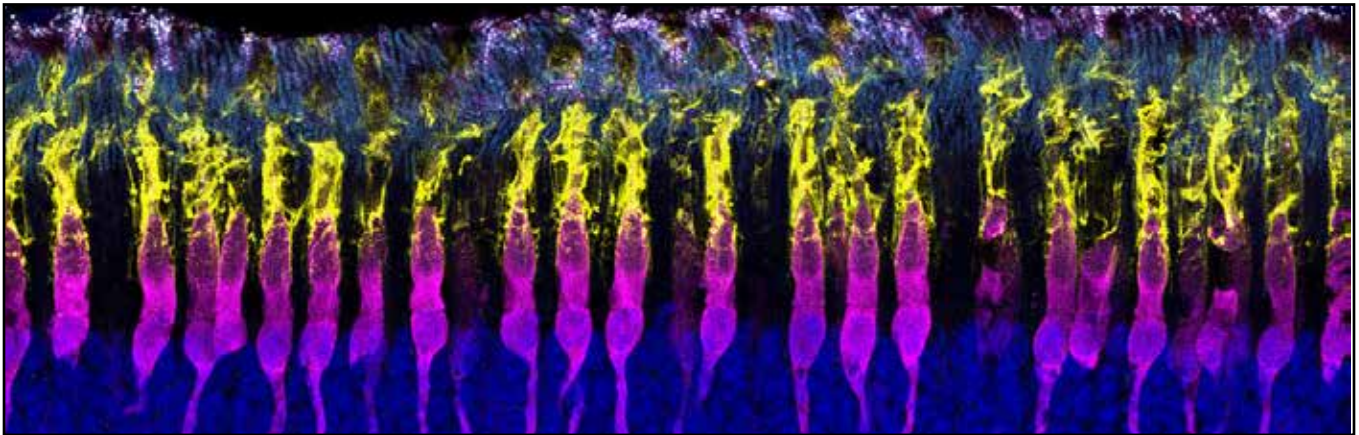
BS, Stanford University
MD, Stanford University School of Medicine
PhD, Stanford University Hospital and Veterans Administration Hospital
Residency, Barnes Retina Institute/ Washington University
Fellowships, Uveitis and Medical Retina Washington University

Cosmic Code, 2017

This work at the Karalis Johnson Retina Center was donated by artist Dennis Evans and his wife, Nancy Mee, both of whom have served on the Eye Institute Community Advisory Board. The artwork tells the story of the history of the universe from the point of view of matter.



RESEARCH



The Vision Science Center and the Karalis Johnson Retina Center support four pillars of research in its mission to eradicate retinal blindness: advanced optics imaging, computational ophthalmology, accelerating the therapeutic pipeline, and vision restoration research.

Advanced Imaging. The retina is the only visible component of the central nervous system outside of the human brain. This tissue-paper thin structure is essential to normal vision. Visualization of the retina has been central to diagnosis of retinal disease for over a century, but advances in digital optics and imaging allow unprecedented ability to detect and characterize retinal disease.

Associate Professor Ram Sabesan, PhD and his lab use adaptive optics imaging borrowed from astronomy to fully correct the optics of the eye, and image the retina at the level of single cells. **George and Martina Kren Endowed Chair of Ophthalmology Ricky Wang, PhD** and his lab developed the now widely-used technique of optical coherence tomography angiography. These two technologies are together advancing our ability to image the retina to single-cell resolution.

Computational Ophthalmology. The availability of huge datasets such as the American Academy of Ophthalmology's IRIS registry allows **C. Dan and Irene Hunter Endowed Professor Aaron Lee, MD** and **Klorfine Family Endowed Chair Cecilia Lee, MD** to determine real-world outcomes of treatments and identify risk factors and trends in disease on an unparalleled scale. Combined with machine learning approaches, we anticipate that personalized precision retinal medicine will become a reality – finding the best possible treatment options

for patients based on analysis of millions of similar cases.

Accelerating the therapeutic pipeline includes the work of **Gordon and Joan Bergy Professor Jennifer Chao, MD, PhD**. Dr. Chao's lab is able to take blood samples from patients affected by retinal diseases to create patient-specific stem cells, which they can then grow into small copies of the retina in the laboratory. These cells can then be tested with available drugs, or even nutritional supplements, to look for agents that might slow or stop degeneration. This technique also has potential for transplantation – repairing damaged tissues with the patient's own cells.

The work of **Dr. Kathryn Pepple, Associate Professor of Ophthalmology**, also accelerates the therapeutic pipeline, by characterizing animal models of ocular inflammatory disease which can be used for drug development.

Vision restoration describes methods to reintroduce light sensitivity to retinas blind from degeneration. Gene therapy approaches pioneered by **Bishop Professor Jay Neitz, PhD** and **Ray Hill Chair Maureen Neitz, PhD** have been shown to correct color blindness in animals and have potential for correcting other forms of blindness. Research from the laboratory of **Bucey Chair Russell Van Gelder, MD, PhD**'s laboratory is using small molecules to 'reanimate' the remaining cells in the degenerated retina to restore light responsiveness.

The Buhr Lab

Ethan Buhr, PhD
Research Associate Professor

The retina uses cones and rods as photoreceptors, or light detectors, for vision. In addition to this, the retina also contains non-visual photoreceptors for non-visual tasks. These tasks involve the regulation of sleep/wake behavior, control of pupillary constriction, and the timing of physiological events within the retina itself.

Molecular events within cells and between cells in the retina are coordinated based on the time of day. The coordination of this timing likely contributes to the retina's response to photo damage and long-term health. The Buhr Lab has identified the unique photoreceptors which allow for the cells within the retina to synchronize to sunlight. They found these



Research Associate Professor Dr. Ethan Buhr.

photoreceptors were completely distinct from visual photoreceptors, like an extra eye for the retina itself.

The Buhr Lab is trying to determine the breadth of the role this timing has on ocular health. An important next step is to understand the way that the signal is transmitted among the cells.

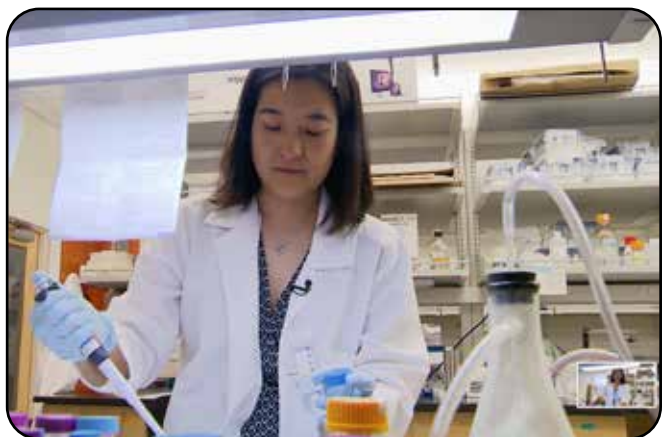
The Chao Lab

Jennifer Chao, MD, PhD
Associate Professor
Gordon and Joan Bergy Professor
Vice Chair, Research

Accelerating the therapeutic pipeline includes the work of Gordon and Joan Bergy Professor Jennifer Chao, MD, PhD.

This lab is able to take blood samples from patients affected by retinal diseases to create patient-specific stem cells, which they can then grow into small copies of the retina in the laboratory.

These cells can then be tested with available drugs, or even nutritional supplements, to look for agents that might slow or stop degeneration. Such interventions can then be



Jennifer Chao, MD, PhD is Vice Chair for Research.

tested in the clinic with the sensitive imaging techniques of the first pillar to identify promising treatments. This technique also has potential for transplantation – repairing damaged tissues with the patient's own cells.

Clinical research provides the foundation for new discoveries to help patients

As a nurse, Connie Ross has treated patients with mental health issues for more than 25 years. Now, she is dealing with a diagnosis of Alzheimer's with mild cognitive impairment.

Ross' desire to potentially help others through clinical research brought her to the Karalis Johnson Retina Center.

"My father was a physician, and I have a family history of Alzheimer's. I truly want to be a part of moving research forward," Ross said.

Ross traveled from her home in Port Townsend to participate in two studies led by Cecilia Lee, MD, MS, Professor and Klorfine Family Endowed Chair and Director of Clinical Research.

Because Ross has been diagnosed with cerebral amyloid angiopathy, which can cause bleeding in the brain, she was enrolled in the REPHRASE study.

This study is designed to validate a novel diagnostic test of a new device for detecting phenotypic changes in the retina in persons with cerebral amyloid angiopathy and Alzheimer's disease. The study objective is to characterize the performance of the diagnostic test in the target population of adult patients 50 years and older with cognitive impairment.

"The theory is that the device being developed will be able to pick up amyloid in the retina early rather than much later, giving patients a non-invasive test to be a diagnostic tool and someday a medication," Ross said.

Study participants come to the Karalis Johnson Retina Center for the eye imaging portion of the study. The Department of Neurology is coordinating the enrollment of subjects and schedules all three visits for the study (the neurological and ophthalmology evaluation and the brain imaging).

"I met with Dr. Lee and had an eye exam done to do the medical device test," Ross said. The



Connie Ross lives in Port Townsend and came to the Karalis Johnson Retina Center to be a study participant.

camera device shines a bright light into the eye for five seconds. The results are then compared with other neurological imaging. If it works, it has a lot of promise," she said.

She also participated in the EYERET study to establish whether the use of novel ophthalmic technology can aid in the better characterization of retinal health, which may allow better diagnosis and treatment options for many retinal conditions in the future.

In addition, novel imaging data may improve the understanding of how the retina may be linked to other common systemic diseases such as diabetes or Alzheimer's.

"Dr. Lee and the team were very caring and respectful," Ross said. "I was pleased with the experience and encourage others to consider volunteering for clinical research."

"Clinical trials and research provide the foundation for important discoveries such as new drugs or devices," Dr. Lee said. "We cannot thank patients like Ms. Ross enough for their willingness to participate in our clinical trials and research studies."

The Fortenbach Lab

Christopher Fortenbach, MD, PhD
Assistant Professor

Degenerative blinding diseases, such as age-related macular degeneration, are responsible for more than 200 million cases of vision loss worldwide. Among the diseases resulting in retinal degeneration, many cause gradual dysfunction and, ultimately, death of the light-sensing cells in the retina known as photoreceptors. While treatments to prevent degeneration remain under investigation, therapies to restore vision have begun to emerge.

Dr. Fortenbach's lab is investigating the therapeutic potential for photoswitches to restore vision in degenerated retinas. These light-sensitive small molecules bind to the degenerating retina and confer new light sensitivity to retinal cells. Photoswitches can be delivered via intravitreal injection, rather than requiring retinal surgery.



Dr. Chris Fortenbach recently joined the Department of Ophthalmology faculty.

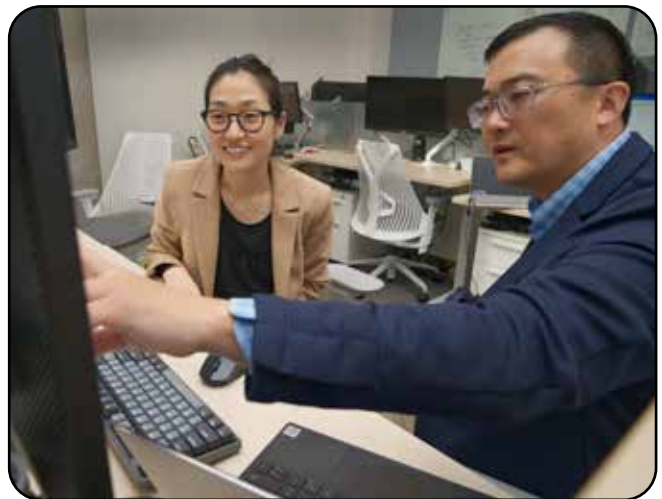
The Fortenbach Lab is researching the mechanisms by which photoswitches restore light-sensitivity and methods to improve visual outcomes among treated individuals. Overall, the lab's goal is to help develop a medication capable of restoring sight and improving the quality of life for patients with vision loss.

The Lee Lab

Cecilia Lee, MD, MS
Professor, Klorfine Family Endowed Chair
Aaron Lee, MD, MSCI
Associate Professor, C. Dan and Irene Hunter Endowed Professor

Aaron and Cecilia Lee collaborate on the mining of large clinical data sets and registries from around the world and unlocking the power of Big Data through recent breakthroughs in machine learning and artificial intelligence.

Their major research focuses include bioinformatics, deep learning, next generation sequencing, clinical epidemiology, and data visualization. The availability of huge datasets allows the Lees to determine real-world outcomes of treatments and identify risk factors and trends in disease on an unparalleled scale. Combined with machine learning approaches, the Lees anticipate that personalized precision



Drs. Cecilia and Aaron Lee.

retinal medicine will become a reality – finding the best possible treatment options for patients based on analysis of millions of similar cases. The Lee Lab's recent published work includes clinical outcomes research in age-related macular degeneration and diabetic retinopathy. Learn more at comp.ophtalmology.uw.edu.

RESEARCH

The Manookin Lab

Michael Manookin, PhD
Associate Professor

The Manookin lab is investigating the structure and function of neural circuits within the retina and developing techniques for treating blindness.

Many blinding diseases, such as retinitis pigmentosa, cause death of the rods and cones, but spare other cell types within the retina. Thus, many techniques for restoring visual function following blindness are based on the premise that other cells within the retina remain viable and capable of performing their various roles in visual processing. There are more than 80 different neuronal types in the human retina and these form the components of the specialized circuits that transform the signals from photoreceptors into a neural code responsible for our perception of color, form,



Dr. Michael Manookin

and motion, and thus visual experience. The Manookin lab is investigating the function and connectivity of neural circuits in the retina using a variety of techniques including electrophysiology, calcium imaging, and electron microscopy. This knowledge is being used to develop more effective techniques for restoring visual function following blindness.

The Mustafi Lab

Debarshi Mustafi, MD, PhD
Assistant Professor

The Mustafi lab is investigating the genetic basis of inherited retinal degeneration and potentials for therapeutic intervention to prevent progression of blindness.

Inherited retinal degenerations (IRDs) are a heterogeneous group of predominantly monogenic disorders that feature loss or dysfunction of photoreceptor cells as a primary or secondary event and have a prevalence of 1 in 2,000 to 1 in 3,000 individuals. In the pediatric population, IRDs are a major cause of visual impairment and can be one of the first presenting features of a syndromic condition.

Using isolated blood samples from affected IRD patients and their families, the lab is able to carry out genome sequencing to identify novel pathogenic variants of disease and reconstruct disease haplotypes, which has implications for the interpretation of disease risks in IRDs.



Dr. Debarshi Mustafi in his lab at the Vision Science Center at South Lake Union.

The isolated blood samples can also be used to generate patient-specific stem cells and retinal organoids. Overall, the goal of the lab is to uncover the mechanistic details of IRDs to allow development of targeted therapeutics to benefit patients. Learn more at mustafilab.org.

The Neitz Lab

Maureen Neitz, PhD
Ray Hill Chair

Jay Neitz, PhD
Bishop Foundation Professor

The Neitz lab is developing genetic tests and treatments for common vision disorders, and investigating the retinal circuitry for vision.

Jay and Maureen Neitz collaborate in their studies of the visual system, taking a multidisciplinary approach that uses techniques ranging from molecular genetics to human and animal psychophysics.

Major focus areas include developing gene therapy for cone-based vision disorders, investigating the role of genetic variability in the cone photo pigments in common eye diseases including AMD, myopia, and glaucoma, understanding the physiological



Maureen Neitz, PhD, Ray Hill Chair.

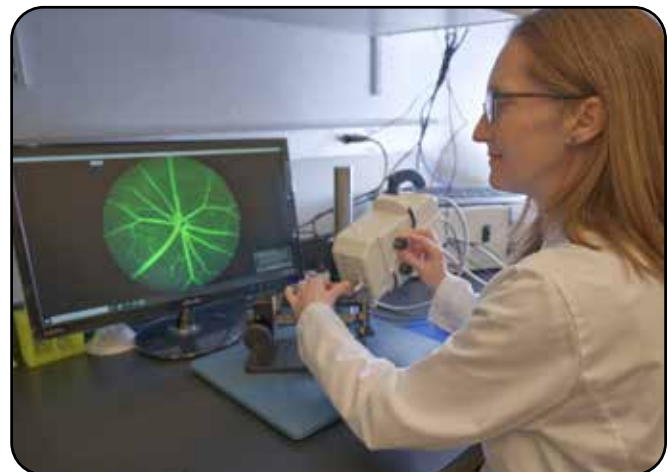
basis for color perception. The Neitz lab is also developing treatments for myopia, the most common vision problem globally. In addition, the Neitzes are developing genetic tests to identify individuals at risk for developing common eye diseases so that therapeutic interventions can be started before symptoms appear. Learn more at neitzvision.com.

The Pepple Lab

Kathryn Pepple, MD, PhD
Associate Professor

The Pepple Lab is investigating the role of the innate immune system in ocular inflammation and studying new anti-inflammatory treatments for patients with uveitis.

Ocular inflammation, or uveitis, is potentially blinding disease that can affect people of all ages. Using cutting edge molecular methods, including multiplex cytokine analysis, optical coherence tomography angiography, in vivo bioluminescence imaging, and multicolor flow cytometry, the Pepple lab is studying animal models of uveitis to determine the key mediators of ocular inflammation.



Associate Professor Dr. Kathryn Pepple

The lab is also testing compounds that target these key mediators to find promising new therapies for patients.

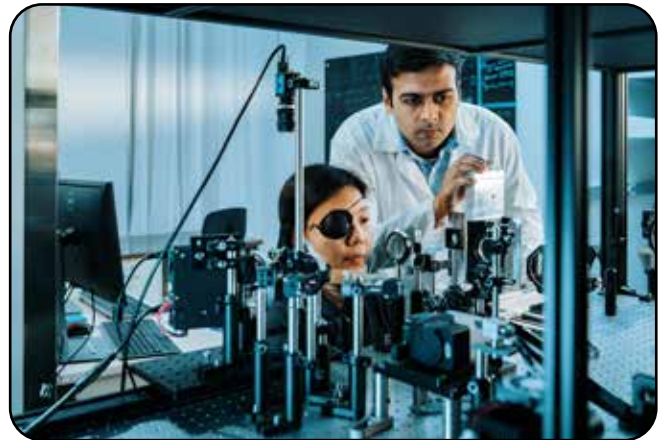
RESEARCH

The Sabesan Lab

Ram Sabesan, PhD
Associate Professor

The Sabesan lab investigates the functional mechanisms by which photoreceptors and their ensuing neural circuits mediate the most fundamental aspects of vision and how these visual capacities are affected by retinal diseases. To this end, the Sabesan lab develops and uses novel cellular imaging tools which enable the visualization of the structure and function of living retinal cells at unprecedented spatial scales.

The backbone of the methods pursued by the lab is a technology called adaptive optics – the same tool used by astronomers to peer at small objects in space. Using adaptive optics, one can overcome the optical imperfections that exist in the human eye, converting the eyeball essentially into a microscope objective. By combining adaptive optics with other microscopy techniques, one



Associate Professor Dr. Ram Sabesan.

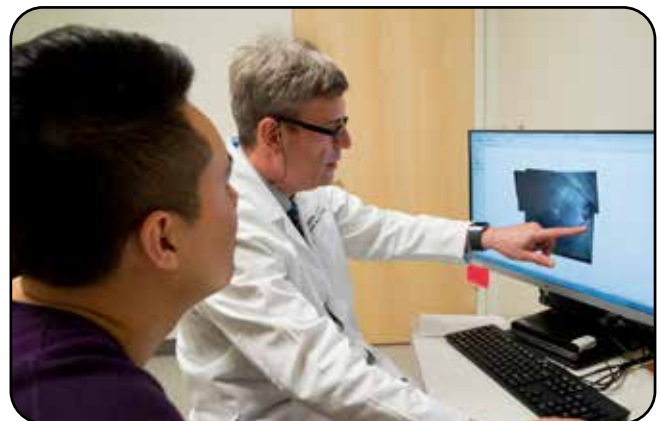
obtains the ability to probe living cells in the retina of humans. This allows the probing of retinal cells in diseased human eyes at high resolution, thus serving as sensitive biomarkers for early disease diagnosis and monitoring of cellular events involved in disease progression. Learn more at depts.washington.edu/sabaolab.

The Van Gelder Lab

Russell Van Gelder, MD, PhD
Bucey Professor and Chair

The Van Gelder Lab has three main interests:

- **Molecular diagnostics of ocular infectious disease.** Ocular infectious diseases, including microbial keratitis, conjunctivitis, and endophthalmitis, are significant causes of potentially blinding diseases. Most infectious organisms causing ocular disease originate in the ocular surface. Using cutting-edge molecular methods, including next generation sequencing, the Van Gelder lab is developing new techniques for rapid diagnosis of ocular infectious disease.
- **Vision restoration.** Degenerative blinding diseases, including age-related macular degeneration, are caused by the death of rods and cones. The Van Gelder lab is investigating the therapeutic potential of synthetic small molecule photoswitches for



Bucey Professor and Chair Dr. Russell Van Gelder.

restoring light sensitivity to degenerated retinas.

- **Non-visual photoreception.** The Van Gelder lab is also working to understand how light affects mammalian physiology outside the visual system. We are particularly interested in the 'non-visual opsins' including Opn3, Opn4, and Opn5 and their roles in circadian rhythm synchronization and wound healing.

VISION SCIENCE RESEARCH FACULTY & ASSOCIATES

Ethan Buhr, PhD
Research Associate Professor

Michelle Cabrera, MD
Associate Professor

Jennifer Chao, MD, PhD
Gordon and Joan Bergy Associate Professor

Christopher Fortenbach, MD, PhD
Assistant Professor

Murray Johnstone, MD
Clinical Professor

Jim Kuchenbecher, PhD
Acting Instructor

Aaron Lee, MD, MSc
C. Dan and Irene Hunter Endowed Professor Associate Professor

Cecilia Lee, MD, MS
Associate Professor Klorfine Family Endowed Chair

Mike Manookin, PhD
Assistant Professor

Debarshi Mustafi, MD, PhD
Assistant Professor

Jay F. Neitz, PhD
Bishop Professor

Maureen E. Neitz, PhD
Ray H. Hill Endowed Chair

Vimal Pandiyan, PhD
Acting Instructor

Kathryn Pepple, MD, PhD
Associate Professor

Ram Sabesan, PhD
Associate Professor



El Ojo De Dios (The Eye of God) is a 2015 artwork at the Karalis Johnson Retina Center donated by Christopher and Alida Latham, both of whom have served on the UW Medicine Eye Institute Community Action Board. Brothers Einar and Jamex de la Torre created this artwork, which draws from traditional Mexican folk art, pop-cultural and religious imagery and mythology.

Tueng T. Shen, MD, PhD
Graham and Brenda Siddall Endowed Chair

Russell Van Gelder, MD, PhD
Boyd K. Bucey Memorial Chair

Ruikang "Ricky" Wang, PhD
George and Martina Kren Endowed Chair in Ophthalmology

Yue Wu, PhD
Acting Instructor

ADJUNCT

Susan E Bockerhoff, PhD
Professor, Biochemistry

John I. Clark, PhD
Professor, Biological Structure

Ione Fine, PhD
Professor, Psychology

Jim Hurley, PhD
Professor, Biochemistry

Dirk Keen, MD, PhD
Professor, Pathology

Thomas A. Reh, PhD
Professor, Biological Structure

Frederick M. Rieke, PhD
Professor, Physiology and Biophysics

Kathryn Scherpelz, MD, PhD
Assistant Professor, Pathology

Rachel Wong, PhD
Professor and Chair Biological Structure

PUBLICATIONS

Karalis Johnson Retina Center faculty published over 60 papers during the 2022-23 academic year related to retina research.

Saraf SS, Leveque TK, Kim JB, Nash RW, Pepple KL, Olmos de Koo LC. **Idiopathic Penetration Of Cilia Into The Posterior Segment Presenting As Sectoral Scleritis With Progressive Intraocular Inflammation.** Retin Cases Brief Rep. 2022 Jul 1;16(4):452-456.

Kihara Y, Montesano G, **Chen A**, Amerasinghe N, Dimitriou C, Jacob A, Chabi A, Crabb DP, Lee AY. **Policy-Driven, Multimodal Deep Learning for Predicting Visual Fields from the Optic Disc and OCT Imaging.** Ophthalmology. 2022 Jul;129(7):781-791.

Yaghy A, **Lee AY**, Keane PA, Keenan TDL, Mendonca LSM, Lee CS, Cairns AM, Carroll J, Chen H, Clark J, Cukras CA, de Sisternes L, Domalpally A, Durbin MK, Goetz KE, Grassmann F, Haines JL, Honda N, Hu ZJ, Mody C, Orozco LD, Owsley C, Poor S, Reisman C, Ribeiro R, Sadda SR, Sivaprasad S, Staurengi G, Ting DS, Tumminia SJ, Zalunardo L, Waheed NK. **Artificial intelligence-based strategies to identify patient populations and advance analysis in age-related macular degeneration clinical trials.** Exp Eye Res. 2022 Jul;220:109092.

Rezeanu D, **Neitz M, Neitz J.** **How We See Black and White: The Role of Midget Ganglion Cells.** Front Neuroanat. 2022 Jul 5;16:944762.

Young LH, Kim J, Yakin M, Lin H, Dao DT, Kodati S, Sharma S, **Lee AY, Lee CS**, Sen HN. **Automated Detection of Vascular Leakage in Fluorescein Angiography – A Proof of Concept.** Transl Vis Sci Technol. 2022 Jul 8;11(7):19.

Olvera-Barrios A, Kihara Y, **Wu Y**, N Warwick A, Müller PL, Williams KM, Rudnicka AR, Owen CG, **Lee AY**, Egan C, Tufail A; UK Biobank Eyes and Vision Consortium. **Foveal Curvature and Its Associations in UK Biobank Participants.** Invest Ophthalmol Vis Sci. 2022 Jul 8;63(8):26.

Díaz NM, Gordon SA, Lang RA, **Buhr ED.** **Circadian Oscillations in the Murine Preoptic Area Are Reset by Temperature, but Not Light.** Front Physiol. 2022 Jul 22;13:934591. doi: 10.3389/fphys.2022.934591. PMID: 35957988; PMCID: PMC9361018.

Mustafi D, Hisama FM, Huey J, **Chao JR.** **The Current State of Genetic Testing Platforms for Inherited Retinal Diseases.** Ophthalmol Retina. 2022 Aug;6(8):702-710.

Müller PL, Kihara Y, Olvera-Barrios A, Warwick AN, Egan C, Williams KM, **Lee AY**, Tufail A; UK Biobank Eyes and Vision Consortium. **Quantification and Predictors of OCT-Based Macular Curvature and Dome-Shaped Configuration: Results From the UK Biobank.** Invest Ophthalmol Vis Sci. 2022 Aug 2;63(9):28.

Rim TH, **Lee AY**, Ting DS, Teo KYC, Yang HS, Kim H, Lee G, Teo ZL, Teo Wei Jun A, Takahashi K, Yoo TK, Kim SE, Yanagi Y, Cheng CY, Kim SS, Wong TY, Cheung CMG. **Computer-aided detection and abnormality score for the outer retinal layer in optical coherence tomography.** Br J Ophthalmol. 2022 Sep;106(9):1301-1307.

González-Gonzalo C, Thee EF, Klaver CCW, **Lee AY**, Schlingemann RO, Tufail A, Verbraak F, Sánchez CI. **Trustworthy AI: Closing the gap between development and integration of AI systems in ophthalmic practice.** Prog Retin Eye Res. 2022 Sep;90:101034.

Yuan A, **Mustafi D**, Banitt MR, **Rezaei KA.** **Long-term outcomes of modified glued versus flanged intrascleral haptic fixation techniques for secondary intraocular lenses.** Graefes Arch Clin Exp Ophthalmol. 2022 Sep;260(9):2887-2895.

Baxter S, **Van Gelder RN**, Cheung JC, Basiaga ML. **Simultaneous presentation of idiopathic uveitis in monozygotic 4-year-old twin boys.** Am J Ophthalmol Case Rep. 2022 Jul 19;27:101666.

Nath S, Korot E, Fu DJ, Zhang G, Mishra K, **Lee AY**, Keane PA. **Reinforcement learning in ophthalmology: potential applications and challenges to implementation.** Lancet Digit Health. 2022 Sep;4(9):e692-e697.

Rappon J, Chung C, Young G, Hunt C, **Neitz J, Neitz M**, Chalberg T. **Control of myopia using diffusion optics spectacle lenses: 12-month results of a randomized controlled, efficacy and safety study (CYPRESS).** Br J Ophthalmol. 2022 Sep 1;bjophthalmol-2021-321005.

Bang SP, Aaker JD, **Sabesan R**, Yoon G. **Improvement of neural contrast sensitivity after long-term adaptation in pseudophakic eyes.** Biomed Opt Express. 2022 Aug 3;13(9):4528-4538.

Bordt AS, Patterson SS, **Kuchenbecker JA**, Mazzaferri MA, Yearick JN, Yang ER, Ogilvie JM, Neitz J, Marshak DW. **Synaptic inputs to displaced intrinsically- photosensitive ganglion cells in macaque retina.** Sci Rep. 2022 Sep 7;12(1):15160.

Pandiyan VP, Nguyen PT, Pugh EN Jr, **Sabesan R**. **Human cone elongation responses can be explained by photoactivated cone opsin and membrane swelling and osmotic response to phosphate produced by RGS9-catalyzed GTPase.** Proc Natl Acad Sci U S A. 2022 Sep 27;119(39):e2202485119.

McKay KM, Apostolopoulos N, Chou B, **Leveque TK**, **Van Gelder RN**. Anti-adalimumab Antibodies in Patients with Non-infectious Ocular Inflammatory Disease: A Case Series. Ocul Immunol Inflamm. 2022 Oct-Nov;30(7-8):1721-1725.

Low L, Nakamichi K, Akileswaran L, **Lee CS**, **Lee AY**, Moussa G, Murray PI, Wallace GR, **Van Gelder RN**, Rauz S; West Midlands Collaborative Ophthalmology Network for Clinical Effectiveness & Research by Trainees (WM CONCERT). **Deep Metagenomic Sequencing for Endophthalmitis Pathogen Detection Using a Nanopore Platform.** Am J Ophthalmol. 2022 Oct;242:243-251.

Mustafi D, Bharathan SP, Calderon R, Nagiel A. **Human Cellular Models for Retinal Disease: From Induced Pluripotent Stem Cells to Organoids.** Retina. 2022 Oct 1;42(10):1829-1835.

Pepple KL, John S, Wilson L, Wang V, **Van Gelder RN**. **Systemic prime exacerbates the ocular immune response to heat-killed Mycobacterium tuberculosis.** Exp Eye Res. 2022 Oct;223:109198.

Baxter SL, Nwanyanwu K, Legault G, **Lee AY**. **Data Sources for Evaluating Health Disparities in Ophthalmology: Where We Are and Where We Need to Go.** Ophthalmology. 2022 Oct;129(10):e146-e149.

Ng CJ, **Sabesan R**, Barbot A, Banks MS, Yoon G. **Suprathreshold Contrast Perception Is Altered by Long-term Adaptation to Habitual Optical Blur.** Invest Ophthalmol Vis Sci. 2022 Oct 3;63(11):6.

Patterson EJ, Kalitzeos A, Kane TM, Singh N, Kreis J, Pennesi ME, Hardcastle AJ, **Neitz J**, **Neitz M**, Michaelides M, Carroll J. **Foveal Cone Structure in**

Patients With Blue Cone Monochromacy. Invest Ophthalmol Vis Sci. 2022 Oct 3;63(11):23.

Gunasekeran DV, Zheng F, Lim GYS, Chong CCY, Zhang S, Ng WY, Keel S, Xiang Y, Park KH, Park SJ, Chandra A, Wu L, Campbel JP, **Lee AY**, Keane PA, Denniston A, Lam DSC, Fung AT, Chan PRV, Sadda SR, Loewenstein A, Grzybowski A, Fong KCS, Wu WC, Bachmann LM, Zhang X, Yam JC, Cheung CY, Pongsachareonnont P, Ruamviboonsuk P, Raman R, Sakamoto T, Habash R, Girard M, Milea D, Ang M, Tan GSW, Schmetterer L, Cheng CY, Lamoureux E, Lin H, van Wijngaarden P, Wong TY, Ting DSW. **Acceptance and Perception of Artificial Intelligence Usability in Eye Care (APPRAISE) for Ophthalmologists: A Multinational Perspective.** Front Med (Lausanne). 2022 Oct 13;9:875242.

Arnegard S, Baraas RC, **Neitz J**, Hagen LA, **Neitz M**. **Limitation of standard pseudoisochromatic plates in identifying colour vision deficiencies when compared with genetic testing.** Acta Ophthalmol. 2022 Nov;100(7):805-812.

Chen A, Montesano G, Lu R, **Lee CS**, Crabb DP, **Lee AY**. **Visual Field Endpoints for Neuroprotective Trials: A Case for AI-Driven Patient Enrichment.** Am J Ophthalmol. 2022 Nov;243:118-124.

Iyer PG, Chu Z, Shen M, Shi Y, Trivizki O, Zhang Q, Feuer W, **Wang RK**, Gregori G, Rosenfeld PJ. **Change In Choriocapillaris Flow Deficits Within Tears Of The Retinal Pigment Epithelium Imaged With Swept-Source Optical Coherence Tomography Angiography.** Retina. 2022 Nov 1;42(11):2031-2038.

Wu Z, Zhou X, Chu Z, Gregori G, **Wang RK**, Rosenfeld PJ, Guymer RH. **Impact of Reticular Pseudodrusen on Choriocapillaris Flow Deficits and Choroidal Structure on Optical Coherence Tomography Angiography.** Invest Ophthalmol Vis Sci. 2022 Nov 1;63(12):1.

Teo ZL, **Lee AY**, Campbell P, Chan RVP, Ting DSW. **Developments in Artificial Intelligence for Ophthalmology: Federated Learning.** Asia Pac J Ophthalmol (Phila). 2022 Nov 1;11(6):500-502.

Jiang X, Liu T, **Pandiyan VP**, Slezak E, **Sabesan R**. **Coarse-scale optoretinography (CoORG) with extended field-of-view for normative characterization.** Biomed Opt Express. 2022 Oct 24;13(11):5989-6002.

Zhang Q, Shi Y, Shen M, Cheng Y, Zhou H, Feuer W, de Sisternes L, Gregori G, Rosenfeld PJ, **Wang RK**. **Does the Outer Retinal Thickness Around**

PUBLICATIONS

Geographic Atrophy Represent Another Clinical Biomarker for Predicting Growth? Am J Ophthalmol. 2022 Dec;244:79-87.

Nakamichi K, **Stacey A, Mustafi D. Targeted long-read sequencing allows for rapid identification of pathogenic disease-causing variants in retinoblastoma.** Ophthalmic Genet. 2022 Dec;43(6):762-770.

Schwartz R, Khalid H, Liakopoulos S, Ouyang Y, de Vente C, González-Gonzalo C, **Lee AY**, Guymer R, Chew EY, Egan C, Wu Z, Kumar H, Farrington J, Müller PL, Sánchez CI, Tufail A. **A Deep Learning Framework for the Detection and Quantification of Reticular Pseudodrusen and Drusen on Optical Coherence Tomography.** Transl Vis Sci Technol. 2022 Dec 1;11(12):3.

Hunt MS, **Chee YE**, Saraf SS, Chew EY, **Lee CS, Lee AY, Manookin MB.** Association of Environmental Factors with Age-Related Macular Degeneration using the Intelligent Research in Sight Registry. Ophthalmol Sci. 2022 Jul 12;2(4):100195. doi: 10.1016/j.xops.2022.100195. Erratum in: Ophthalmol Sci. 2023 Jan 13;3(1):100272.

Kihara Y, Shen M, Shi Y, Jiang X, Wang L, Laiginhas R, Lyu C, Yang J, Liu J, Morin R, Lu R, Fujiyoshi H, Feuer WJ, Gregori G, Rosenfeld PJ, **Lee AY.** Detection of Nonexudative Macular Neovascularization on Structural OCT Images Using Vision Transformers. Ophthalmol Sci. 2022 Jul 8;2(4):100197.

Nakamichi K, Akileswaran L, Meirick T, Lee MD, Chodosh J, Rajaiya J, Stroman D, Wolf-Yadlin A, Jackson Q, Holtz WB, **Lee AY, Lee CS, Van Gelder RN; BayNovation Study Group.** Machine Learning Prediction of Adenovirus D8 Conjunctivitis Complications from Viral Whole-Genome Sequence. Ophthalmol Sci. 2022 May 10;2(4):100166.

Pandiyan VP, Schleufer S, Slezak E, Fong J, Upadhyay R, Roorda A, Ng R, **Sabesan R.** Characterizing cone spectral classification by optoretinography. Biomed Opt Express. 2022 Nov 22;13(12):6574-6594.

Yuan A, Bonnell AC, **Rezaei KA.** Giant Intraoperative Corneal Bulla Managed with Bandage Lens Technique During Vitrectomy Surgery. Retin Cases Brief Rep. 2022 Dec 1.

Nikonov S, Dolgova N, Sudharsan R, Tochitsky

I, Iwabe S, Guzman JM, **Van Gelder RN**, Kramer RH, Aguirre GD, Beltran WA. **Photochemical Restoration of Light Sensitivity in the Degenerated Canine Retina.** Pharmaceuticals. 2022 Dec 3;14(12):2711.

Van Brummen A, **Mustafi D, Chee YE.** Focal Retinal Ischemia Revealed By Multimodal Imaging After Traumatic Partial Optic Nerve Avulsion. Retin Cases Brief Rep. 2023 Jan 1;17(1):70-73.

Babino D, Benster T, Laprell L, **Van Gelder RN.** Assessment of Murine Retinal Acuity Ex Vivo Using Multielectrode Array Recordings. Transl Vis Sci Technol. 2023 Jan 3;12(1):4.

Buhr ED. Tangled up in blue: Contribution of short-wavelength sensitive cones in human circadian photoentrainment. Proc Natl Acad Sci U S A. 2023 Jan 10;120(2):e2219617120.

Goyal M, Bordt AS, **Neitz J**, Marshak DW. Troglodytes of neurons and glial cells by microglia in a healthy adult macaque retina. Sci Rep. 2023 Jan 12;13(1):633.

Pramil V, de Sisternes L, Omlor L, Lewis W, Sheikh H, Chu Z, Manivannan N, Durbin M, **Wang RK**, Rosenfeld PJ, Shen M, Guymer R, Liang MC, Gregori G, Waheed NK. **A Deep Learning Model for Automated Segmentation of Geographic Atrophy Imaged Using Swept-Source OCT.** Ophthalmol Retina. 2023 Feb;7(2):127-141.

Wu Y, Olvera-Barrios A, Yanagihara R, Kung TH, Lu R, Leung I, Mishra AV, Nussinovitch H, Grimaldi G, Blazes M, **Lee CS**, Egan C, Tufail A, **Lee AY.** Training Deep Learning Models to Work on Multiple Devices by Cross-Domain Learning with No Additional Annotations. Ophthalmology. 2023 Feb;130(2):213-222.

Ashimatey BS, Zhou X, Chu Z, Alluwimi M, **Wang RK**, Kashani AH. Variability of Vascular Reactivity in the Retina and Choriocapillaris to Oxygen and Carbon Dioxide Using Optical Coherence Tomography Angiography. Invest Ophthalmol Vis Sci. 2023 Feb 1;64(2):9.

Mustafi D, Tom ES, Yang D. Rare Case Of Abiotrophia Defectiva Bleb-Associated Endophthalmitis. Retin Cases Brief Rep. 2023 Mar 1;17(2):186-188.

Mustafi D, Chao JR. Re: Yahya et al.: Late-onset autosomal dominant macular degeneration

caused by deletion of the CRX gene

(Ophthalmology. 2023;130:68-76). Ophthalmology. 2023 Mar;130(3):e9.

Batchelor A, Lacy M, Hunt M, Lu R, **Lee AY, Lee CS, Saraf SS, Chee YE**; IRIS Registry Analytic Center Consortium. **Predictors of Long-term Ophthalmic Complications after Closed Globe Injuries Using the Intelligent Research in Sight (IRIS®) Registry.** Ophthalmol Sci. 2022 Oct 28;3(1):100237.

Wilson L, Lewis KE, Evans LS, Dillon SR, **Pepple KL.** **Systemic Administration of Acazicolcept, a Dual CD28 and Inducible T cell Costimulator Inhibitor, Ameliorates Experimental Autoimmune Uveitis.** Transl Vis Sci Technol. 2023 Mar 1;12(3):27.

Sabesan R, Grieve K, Hammer DX, Ji N, Marcos S. **Introduction to the Feature Issue on Adaptive Optics for Biomedical Applications.** Biomed Opt Express. 2023 Mar 30;14(4):1772-1776.

Li J, Liu Z, Lu J, Shen M, Cheng Y, Siddiqui N, Zhou H, Zhang Q, Liu J, Herrera G, Hiya FE, Gregori G, **Wang RK,** Rosenfeld PJ. **Decreased Macular Choriocapillaris Perfusion in Eyes With Macular Reticular Pseudodrusen Imaged With Swept-Source OCT Angiography.** Invest Ophthalmol Vis Sci. 2023 Apr 3;64(4):15.

Yang P, **Mustafi D, Pepple KL.** **Immunology of Retinitis Pigmentosa and Gene Therapy-Associated Uveitis.** Cold Spring Harb Perspect Med. 2023 Apr 10:a041305.

Lee CS, Krakauer C, Su YR, Walker RL, Blazes M, McCurry SM, Bowen JD, McCormick WC, Lee AY, Boyko EJ, O'Hare AM, Larson EB, Crane PK. **Diabetic Retinopathy and Dementia Association, Beyond Diabetes Severity.** Am J Ophthalmol. 2023 May;249:90-98.

Legocki AT, **Lee AY,** Ding L, Moshiri Y, Zepeda EM, Gillette TB, Grant LE, Shariff A, Touch P, **Lee CS, Tarczy-Hornoch K, Cabrera MT.** **Multivariate Models to Diagnose Early Referral-Warranted Retinopathy of Prematurity With Handheld Optical Coherence Tomography.** Transl Vis Sci Technol. 2023 May 1;12(5):26.

Steren BJ, Yee P, Rivera PA, **Feng S, Pepple K,** Kombo N. **Gender Distribution and Trends of Ophthalmology Subspecialties, 1992-2020.** Am J Ophthalmol. 2023 May 2;253:22-28.

Ramesh S, Zhang QE, Sharpe J, Penne R, Haller J, Lum F, **Lee AY, Lee CS,** Pershing S, Miller JW,

Lorch A, Hyman L; IRIS® Registry Analytic Center Consortium; . **Thyroid Eye Disease and its Vision-Threatening Manifestations in the Academy IRIS Registry: 2014-2018.** Am J Ophthalmol. 2023 May 17;253:74-85.

Manookin MB, Rieke F. **Two Sides of the Same Coin: Efficient and Predictive Neural Coding.** Annu Rev Vis Sci. 2023 May 23. Cabral D, Fradinho AC, Zhang Y, Zhou H, Ramtohl P, Ramakrishnan MS, Pereira T, **Wang RK,** Freund KB. **Quantitative assessment of choriocapillaris flow deficits and type 1 macular neovascularization growth in age-related macular degeneration.** Sci Rep. 2023 May 26;13(1):8572.

Nakamichi K, **Van Gelder RN, Chao JR, Mustafi D.** **Targeted adaptive long-read sequencing for discovery of complex phased variants in inherited retinal disease patients.** Sci Rep. 2023 May 26;13(1):8535.

Oke I, Elze T, Miller JW, Lorch AC, Hunter DG, Traish AS; IRIS® Registry Analytic Center Consortium; Pershing S, Hyman L, Haller JA, **Lee AY, Lee CS,** Lum F, Miller JW, Lorch AC. **The prevalence and recurrence risk of bare sclera pterygium surgery in the United States.** Ocul Surf. 2023 May 29:S1542-0124(23)00048-4.

Kubsad D, Ohan MA, Wu JG, **Cabrera MT.** **Vitreoretinal biomarkers of retinopathy of prematurity using handheld optical coherence tomography: a review.** Front Pediatr. 2023 May 31;11:1191174. doi: 10.3389/fped.2023.1191174.

Micevych PS, Wong J, Zhou H, **Wang RK,** Porco TC, Carroll J, Roorda A, Duncan JL. **Cone Structure and Function in RPGR- and USH2A-Associated Retinal Degeneration.** Am J Ophthalmol. 2023 Jun;250:1-11.

Tang MY, Blazes MS, **Lee CS.** **Imaging Amyloid and Tau in the Retina: Current Research and Future Directions.** J Neuroophthalmol. 2023 Jun 1;43(2):168-179.

Kruper J, Benson NC, Caffarra S, Owen J, Wu Y, **Lee AY, Lee CS,** Yeatman JD, Rokem A; UK Biobank Eye and Vision Consortium. **Optic radiations representing different eccentricities age differently.** Hum Brain Mapp. 2023 Jun 1;44(8):3123-3135.

EDUCATION

TRAINING THE NEXT GENERATION OF PHYSICIANS AND VISION SCIENTISTS

Retina and Uveitis Fellowships

The Karalis Johnson Retina Center is a training site for the Department of Ophthalmology retina and uveitis fellowship programs. Fellows are physicians that have completed residency and are now doing specialty training. These fellowship programs are highly selective and attract candidates worldwide.

Kinyoun Retina Fellowship

This AUPO-approved two-year training program is designed to provide exposure to all aspects of medical retina disease, vitreoretinal surgery, uveitis, and ocular tumors.

Gensheimer Endowed Fellowship in Ocular Inflammatory Diseases

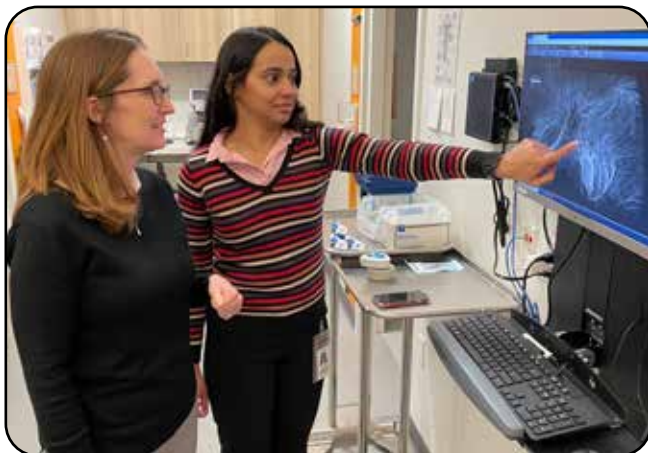
The University of Washington Department of Ophthalmology offers a one- or two-year, comprehensive AUPO FCC (Association of University Professors of Ophthalmology Fellowship Compliance Committee) approved uveitis and ocular inflammation fellowship.



Retina Fellow Dr. Nathan Agi examines a patient as Dr. Swati Agarwal-Sinha and Dr. Lisa Olmos de Koo look on.



Retina Fellowship Director Dr. Lisa Olmos de Koo, left, with fellows Dr. Swati Agarwal-Sinha and Dr. Nathan Agi.



Uveitis Fellow Dr. Yamini Attiku discusses a patient's condition with Dr. Kathryn Pepple, director of the Uveitis Fellowship Program.



Uveitis Fellowship Director Dr. Kathryn Pepple, and Uveitis Fellow Dr. Yamini Attiku.

ROGER AND ANGIE KARALIS JOHNSON RETINA CENTER 5-YEAR FAST FACTS

PATIENT CARE

32,390
Total Patient Visits

>93%
"Top Box" Patient Satisfaction
of Excellent ratings

CULTURE

5 permanent art installations



This beautiful artwork by Nancy Mee is installed in the entryway to the Karalis Johnson Retina Center.



FACULTY AND TRAINEES

27 clinical and research
faculty

3 fellows trained each year

RESEARCH

22,000 square feet of dedicated
lab space

\$15 million average annual
total grant funding during
the last three years

66 papers published during the
2022-23 academic year

8 active clinical trials at KJRC

UW Medicine

DEPARTMENT OF
OPHTHALMOLOGY

UW Medicine
Department of Ophthalmology
Box 359608
325 9th Avenue
Seattle, WA 98104-2499
ophthalmology.washington.edu

A World-Class Research Center and Clinic



The Roger and Angie Karalis Johnson Retina Center at South Lake Union is the realization of the vision of Angie Karalis Johnson. Angie was always interested in improving the health of patients. The UW Medicine Department of Ophthalmology is deeply grateful for Angie Karalis Johnson and her vision to find a cure for all types of retinal diseases.

Opened in 2019, the Center is both a state-of-the-art clinical facility and a leading research center in vision science with internationally renowned faculty. By locating our clinical facilities in direct proximity to our research laboratories, we can accelerate research while offering patients access to advances not yet available in the broader community.

Join Us!

Accelerate breakthroughs in research to prevent and treat the most serious blinding eye diseases. Some of the leading causes of blindness are retinal diseases, including macular degeneration, diabetic retinopathy, and inherited retinal diseases. **Give to the Karalis Johnson Retina Center Endowed Fund for Excellence.**

Expand access to high-quality eye care by training more physicians to diagnose and treat complex eye conditions. With advanced training in clinical care, fellowship-trained ophthalmologists can prevent vision loss and restore sight for those living with eye disorders. **Support the Rayment Endowed Fellowship in Ophthalmology, the James L. Kinyoun, M.D. Endowed Retina Fellowship or the Gensheimer Family Uveitis Fellowship.**

For more information, contact An Tran, director for philanthropy, antran03@uw.edu, 206-221-3286, or Michelle LaPierre, associate director for philanthropy, mlb18@uw.edu, 206-616-7713.

The Karalis Johnson Retina Center Community Report is published by the Department of Ophthalmology at the University of Washington

Publications Coordinator: Craig Degginger, craigd@uw.edu

ophthalmology.washington.edu