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 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.

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

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.

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 she will be managing her disease for many years."

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

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

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

Dr. Rezaei examines patient Eric Yates.

"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."

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.

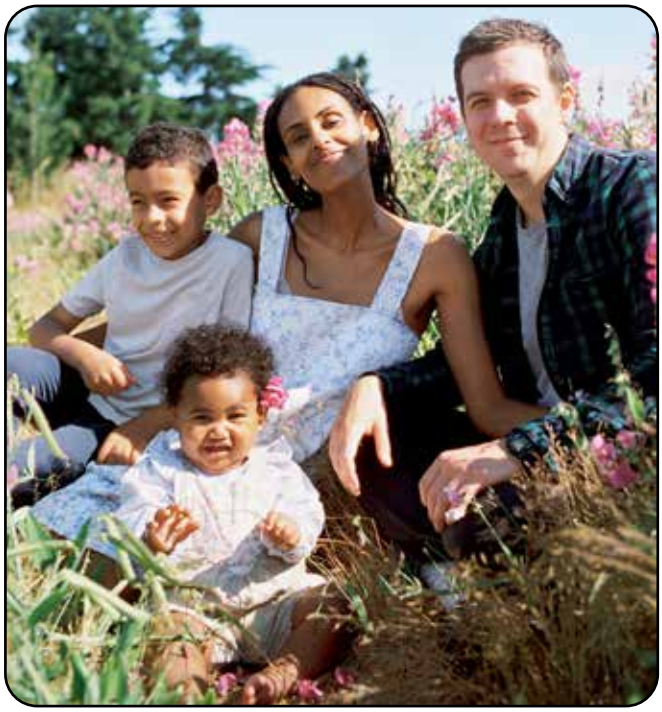
Her first retinal detachment occurred in her junior year. She had surgery in the community and subsequent treatment at Johns Hopkins near her family home in Maryland. It was there she was diagnosed with idiopathic uveitis and had surgery for a second retinal detachment.

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.

Dr. Lisa Olmos de Koo with patient Bob Tenace.

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.

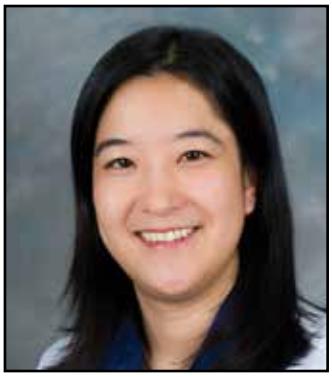
"The minute I went to UW and the Karalis Johnson Retina Center, it gave me confidence they were interested in my vision care," he said.

"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.

KARALIS JOHNSON RETINA CENTER PATIENT CARE FACULTY

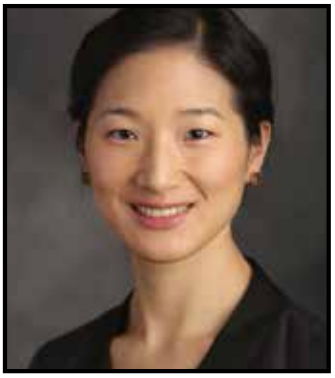


Jennifer Chao, MD, PhD

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



Yewlin Chee, MD

Associate Professor

EDUCATION

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

Christopher Fortenbach, MD, PhD

Assistant Professor

EDUCATION

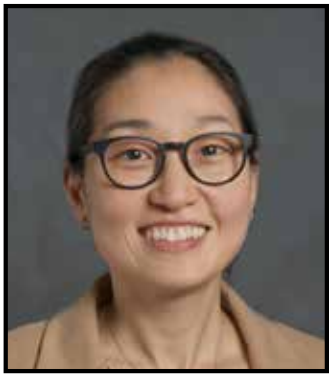
BS, Biochemistry and Molecular Biology, UC Davis
MD, UC Davis
PhD, Biochemistry, Molecular, Cellular, and Developmental Biology, UC Davis
Residency: Ophthalmology, University of Iowa Hospitals and Clinics
Fellowship, Vitreoretinal surgery, Univeristy of Iowa Hospitals

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



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

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, Microbiolology, 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

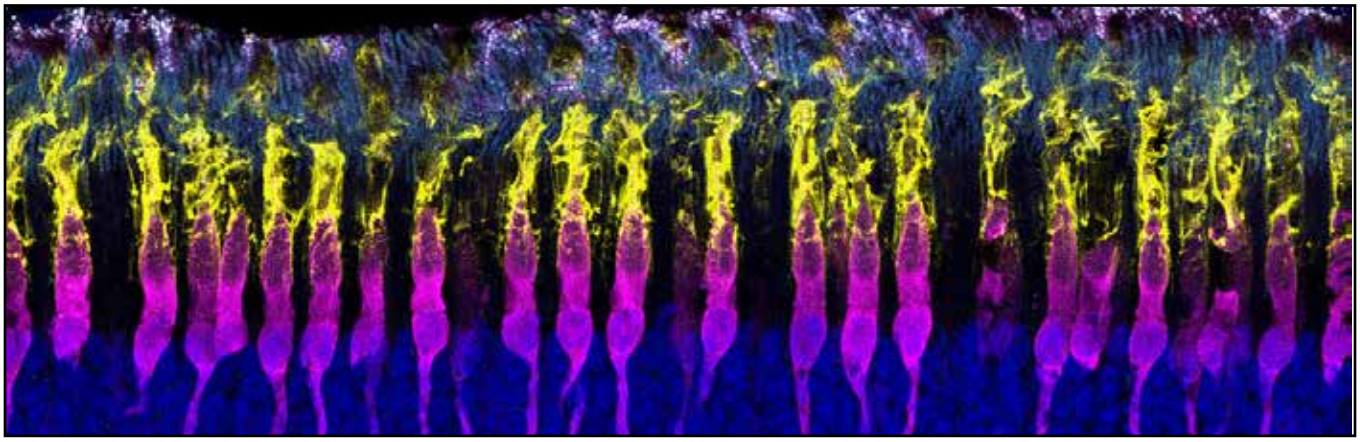
Residency, Barnes Retina Institute/ Washington University

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.

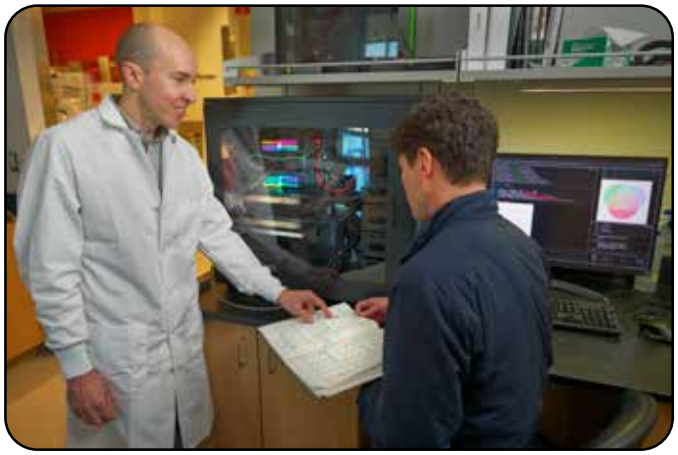
The work of **Dr. Kathryn Pepple, Associate Professor of Ophthalmology**, also accelerates the therapeutic pipeline, by characterizing animal models of ocular inflammatory disease which can be used for drug development.

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.



Research Associate Professor Dr. Ethan Buhr.

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

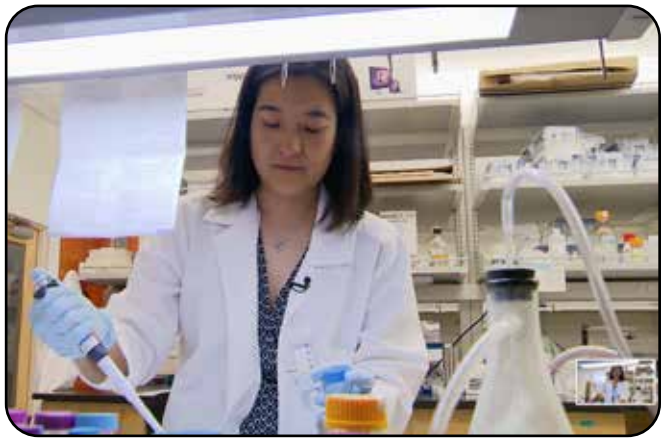
The Buhr Lab is trying to determine the breadth of the role this timing has on ocular health. An important next step is to understand the way that the signal is transmitted among the cells.

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.



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

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 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. information. 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.ophthalmology.uw.edu.

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, 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.

Dr. Michael Manookin

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 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.

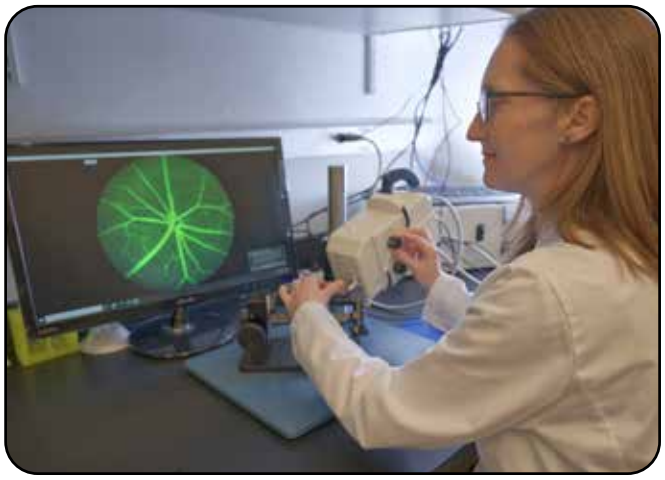
Maureen Neitz, PhD, Ray Hill Chair.

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



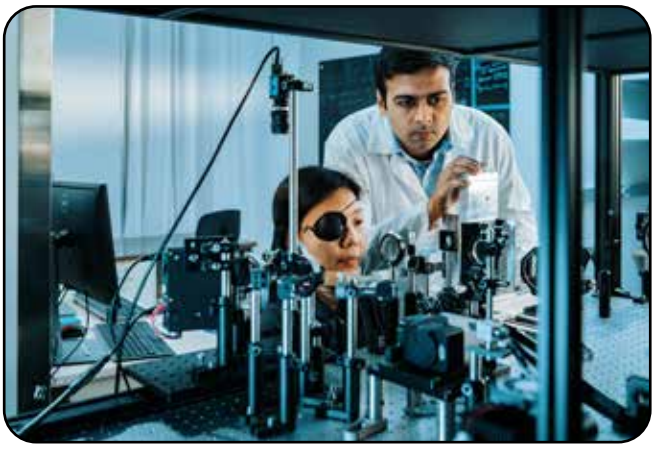
Associate Professor Dr. Kathryn Pepple

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 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.



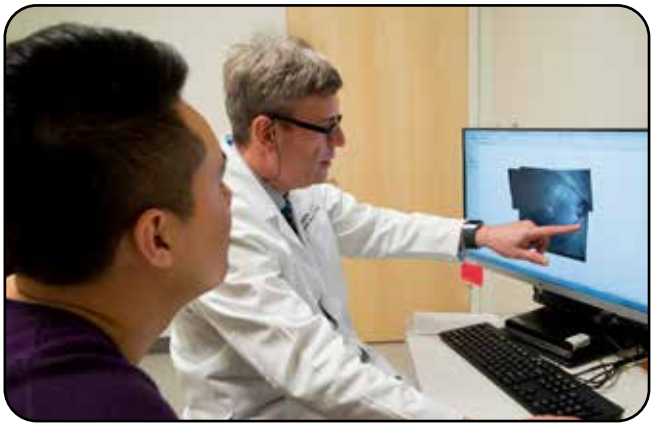
Associate Professor Dr. Ram Sabesan.

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 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.



Bucey Professor and Chair Dr. Russell Van Gelder.

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
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 Brockerhoff, 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.

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EDUCATION

TRAINING THE NEXT GENERATION OF PHYSICIANS AND VISION SCIENTISTS

Retina and Uveitis Fellowships

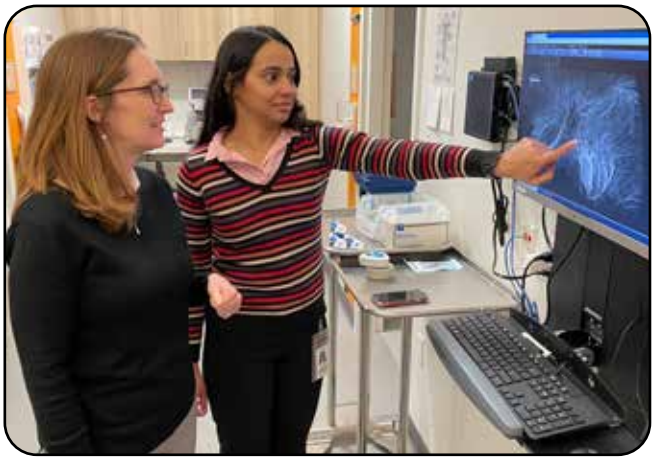
The Karalis Johnson Retina Center is a training site for the Department of Ophthalmology retina and uveitis fellowship programs. Fellows are physicians that have completed residency and are now doing specialty training. These fellowship programs are highly selective and attract candidates worldwide.

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.



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

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 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

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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

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