

GLOBAL LEADERSHIP IN SAVING SIGHT



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ANNUAL REPORT



DEPARTMENT OF
Ophthalmology
and Visual Sciences
UNIVERSITY OF WISCONSIN
SCHOOL OF MEDICINE AND PUBLIC HEALTH

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OUR VISION

Global leadership in saving sight

OUR MISSION

To improve vision-related quality of life by collaboratively creating, integrating, transmitting and applying knowledge in ophthalmology and visual sciences



FROM THE CHAIR

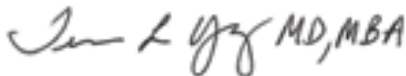
Welcome friends, to our University of Wisconsin-Madison Department of Ophthalmology and Visual Sciences 2016 Annual Report. You'll find heartwarming stories of grateful patients with complex issues who sought and received the highest level of care within our institution. You'll learn of our growing family with new faculty recruits and alumni board members. You'll read of the wide array of ophthalmic educational opportunities (formal sessions to community education) that will inspire you and hopefully ignite your passion for learning with us.

Our culture of inquiry, open discussion and collaboration is evident by the high regard for our internationally recognized faculty, the depth and breadth of our vision research programs that truly impact people's lives, and the competitive nature of our learning programs.

We are ever-grateful for your steadfast commitment to our mission to save sight globally. We are only able to achieve all of these wonderful accomplishments with your enduring support.

Hope lives here! Please join us in this journey.

Best,



Terri L. Young, MD, MBA

Peter A. Duehr Professor of Ophthalmology, Pediatrics, and Medical Genetics

Chair, Department of Ophthalmology and Visual Sciences,
University of Wisconsin School of Medicine and Public Health





HONORS

DAVIS NAMED 2016 AMERICAN ACADEMY OF OPHTHALMOLOGY LAUREATE

Reprinted from EyeNet Magazine, a publication of the American Academy of Ophthalmology (AAO)



This Year's Laureate: Matthew D. Davis, MD

The Board of Trustees of the Academy is proud to announce Matthew D. Davis, MD, as the recipient of the Laureate Recognition Award for 2016.

Chaired the Diabetic Retinopathy Study

Dr. Davis is known for his groundbreaking work in diabetic retinopathy clinical trials, beginning with his position as the national chair for the Diabetic Retinopathy Study (DRS). DRS began in 1971 and was the first major clinical trial funded by the National Eye Institute (NEI). In 1976, Dr. Davis and his collaborators published a seminal paper based on DRS findings, showing the substantial effect that scatter laser photocoagulation had in treating diabetic retinopathy. Dr. Davis also chaired the follow-up trial, the Diabetic Retinopathy Vitrectomy Study, which demonstrated that vision was significantly better for some patients with very severe diabetic retinopathy if they had early vitrectomy surgery, as opposed to deferring surgery. These trials created standard of care treatments that are still used, and are models of clinical research.

Founded Wisconsin's Fundus Photography Reading Center (FPRC)

Another of Dr. Davis' achievements is the 1970 establishment of the University of Wisconsin FPRC, the first centralized, independent reading center for randomized clinical trials of retinal diseases. The staff at FPRC work with clinical researchers from around the world to analyze photographs of the retina and assess changes over time. Dr. Davis and his collaborators developed photographic standards and systems for analyzing the characteristics of the lens and retina, and designed quality control systems to increase accuracy and assess reproducibility. The FPRC continues to participate in clinical research, and it provides image analyses for trials sponsored by the NEI as well as pharmaceutical companies.

Classified diabetic retinopathy and AMD Dr. Davis and his collaborators developed the modified Airlie House classification of diabetic retinopathy and, later, the Early Treatment Diabetic Retinopathy Study severity scale, as well as the Age-related Eye Disease Study scales for Age-related Macular Degeneration.

These scales have been widely used in the study and management of these disorders.

A Lifetime of Service Dr. Davis has served on the Medical Advisory Board of the Juvenile Diabetes Foundation (1973-1976), the Visual Sciences Study Section of the National Institutes of Health (1975-1978), the Vision Research Review Committee of the National Eye Institute (1979-1981, 1989-1994), and the National Diabetes Advisory Board at the National Institute of Arthritis, Diabetes and Digestive and Kidney Diseases (1981-1984). He has received a number of medals and awards in ophthalmology, including the Mildred Weisenfeld Award from the Association for Research in Vision and Ophthalmology in 1989, the Arnall Patz Medal from the Macula Society in 1992, and the Howe Medal from the American Ophthalmological Society in 2006. He has also authored or coauthored more than 200 peer-reviewed articles.

Honored in Chicago In recognition of Dr. Davis' contributions, the Academy honored him as the 2016 Laureate during the Opening Session of AAO 2016.



KAUFMAN TO RECEIVE FRIEDENWALD AWARD

Paul L. Kaufman, MD, Ernst H. Bérány Professor of Ocular Pharmacology and Chair Emeritus was named the recipient of the 2017 Jonas S. Friedenwald Award honoring outstanding research in the basic or clinical sciences as applied to ophthalmology. This senior award is presented annually by the Association for Research in Vision and Ophthalmology (ARVO), the world's premier scientific society for research in the eye and visual system. As the award recipient, Dr. Kaufman will present the Friedenwald Award Lecture at the May 2017 ARVO Annual Meeting.

Jonas S. Friedenwald, MD, was a practicing ophthalmologist and researcher at the Wilmer Eye Institute at Johns Hopkins University in Baltimore from the 1920s to his death in 1955. In addition to being a stellar clinician, Dr. Friedenwald also performed important research in basic mechanics of vision and the pathophysiology of several major ocular diseases. He also became the role model for the modern ophthalmologist clinician scientist, combining the tools and understanding of ocular diseases into structural and molecular mechanisms to generate major pathophysiological insights and therapeutic targets for blinding diseases. The Friedenwald Award was

established in 1957 as a memorial to this distinguished researcher whose contributions encompassed the entire field of ophthalmic investigations.

Dr. Kaufman served as Chair of the Department of Ophthalmology and Visual Sciences from 2004 to 2014. An Ophthalmology faculty member since 1975, he received the American Academy of Ophthalmology Senior Achievement Award in 2013 and the Research to Prevent Blindness Stein Innovation Award in 2015.

ENDOWED PROFESSORSHIPS



Yasmin Bradfield, MD

Yasmin Bradfield, MD, was promoted from Associate Professor to Professor, CHS, effective July 1, 2016. Dr. Bradfield joined the Department in 2003 as a pediatric ophthalmologist at the assistant level and was promoted to Associate Professor in 2008.

She received a BS in Honors Biology and Chemistry from the University of Illinois, Urbana, and her MD from Northwestern University, Chicago. She completed her residency at Mayo Clinic, Rochester, MN, serving in a chief resident role; and a fellowship in pediatric ophthalmology and strabismus at Indiana University Riley Children's Hospital in Indianapolis.

Recognized internationally for her clinical and surgical expertise in pediatric glaucoma, Dr. Bradfield has made significant contributions to the field of pediatric ophthalmology both as a clinician and a researcher. Her multicenter clinical study through the Pediatric Eye Disease and Investigator Group (PEDIG) led to an understanding of the relationship between corneal thickness and eye pressure in children. In this and other studies, she continues to demonstrate that children are uniquely different from adults, and require special methods to manage their eye disease.

As a teacher, Dr. Bradfield has demonstrated a commitment to developing learners at all levels. She has served as Residency

Director during two different periods, as Associate Residency Director and was named Vice Chair of Education and Faculty Development in April 2016. She has mentored more than 13 international fellows who spend several months each year observing in pediatrics. As co-director of the Department's International Ophthalmology Initiative, Dr. Bradfield is working to establish international exchanges with the University of São Paulo, Brazil, where she was a visiting professor in 2015, and in the Philippines.

Dr. Bradfield's new academic rank will include designation as named professor. In a ceremony that included comments from Robert N. Golden, MD, Dean, School of Medicine and Public Health, Terri Young, MD, MBA, Chair, University of Wisconsin-Madison Department of Ophthalmology and Visual Sciences announced that Dr. Bradfield was to receive the John W. Doolittle Professorship. John W. Doolittle graduated from UW Medical School in 1937 and was a prominent Madison ophthalmologist and consultant to the Wisconsin School for the Visually Handicapped in Janesville. His sister Helen was also a UW graduate and faculty consultant. She made a bequest from her estate to the Department in memory of her brother. This gift helped establish the Dr. John W. Doolittle Professorship of 1996. The Professorship was previously held by Burton Kushner, MD, Professor Emeritus, and former Pediatric Service Chief who was a mentor to Dr. Bradfield. The Doolittle Professorship serves to support the scholarly activities of "a successful and motivated researcher in the field pediatric ophthalmology," according to the bequest.



Curtis Brandt, PhD, FARVO

Curtis R. Brandt, PhD, FARVO, a microbiologist with the Department, has been named the inaugural Professor of Ophthalmology at the University of Wisconsin-Medical Foundation. Serving as the Director of the Vision Research Core and Vice Chair of Research for the Department of Ophthalmology and Visual



TOP DOCTORS

Seven Department doctors were listed in the 2015-16 Best Doctors in America list, Dr. Neal Barney, Dr. Barb Blodi, Dr. Yasmin Bradfield, Dr. Gregg Heatley, Dr. Burton Kushner, Dr. Mark Lucarelli and Dr. Terri Young.

HONORS CONTINUED...

Sciences, he is dedicated to research, mentoring students and assistant professors and teaches courses in virology.

Dr. Brandt received his BS and MS in Microbiology at the Washington State University in Pullman, and completed a postdoctoral fellowship of the National Institutes of Health at the Fred Hutchinson Cancer Research Center in Seattle. He continued his education at Columbia University, College of Physicians and Surgeons, in New York, where he earned a MPhil and PhD in Microbiology and Molecular Genetics.

Dr. Brandt joined the School of Medicine and Public Health at the University of Wisconsin–Madison in 1986 and has held a joint appointment in Ophthalmology and Medical Microbiology and Immunology ever since. He is internationally recognized as a leader in viral pathogenesis, herpes viruses, antiviral drug development, viral gene delivery vectors and ocular diseases. His current research focuses on the genetics of viral virulence in ocular infections, specifically, what genes in a given strain of virus determine the phenotype; innate immune responses of the eye to viral gene delivery vectors, antiviral drug discovery and development and gene therapy for ocular diseases.

In 2016 he will begin collaborations with fellow UW–Madison researchers to use a viral antiapoptotic protein to prevent ganglion cell death and to test microbial proteins affecting tight junctions and actin cytoskeleton as therapeutics for glaucoma. Dr. Brandt also plans to participate in a clinical trial with two clinicians in the Department of Ophthalmology and Visual Sciences.

Dr. Brandt's accomplishments include over 100 published papers and book chapters, nine US or international patents and numerous awards, including the Senior Scientist Award from Research to Prevent Blindness and the Walter Helmerich Chair from the Retina Research Foundation.

Dr. Brandt was named a Fellow of the Association for Research in Vision and Ophthalmology in 2011 and served as the Co-Chair for the 2016 International Herpes Virus Workshop. He also served on the VISA/AED study section for seven years where he reviewed proposals on infectious agents, ocular immunology, ocular cancer, gene therapy and clinical trials. He is the Chair of the NIH Drug Discovery and Antimicrobial Resistance study section and was recently invited to write a chapter on "Gene Therapy for Retinal Degeneration" for the 2nd edition of *The New Visual Sciences*, published by MIT press, which according to one of the reviewers of the book, "will stand as a monumental and fundamental reference source for the visual sciences."



Mark Lucarelli, MD, FACS

Mark Lucarelli, MD, FACS, was selected as the inaugural Richard K. Dortzbach Professor of Ophthalmic Facial Plastic Surgery, by Department Chair Terri Young, MD, MBA, at a ceremony held in conjunction with the annual oculoplastics course for residents and other learners in February. The endowed professorship is the culmination of an 18-year philanthropic effort that raised more than \$550,000 in honor of Dr. Richard Dortzbach, affectionately known as "Dortz."

This new professorship honors Dr. Dortzbach, who performed an internship and ophthalmology residency at UW–Madison, and ultimately served as a faculty member in the Department from 1968 until his retirement in 1998. Dr. Dortzbach was the Department's first fellowship-trained oculoplastic surgeon, and he started the Department's oculoplastics clinical service. "Dortz is an international academic and clinical rock-star," said chair Dr. Terri Young. "The overwhelming response we received to create the endowed professorship is a testament to the indelible impact he made on our Department."

Recognized worldwide as an extraordinary teacher and mentor, Dr. Dortzbach trained 19 American Society of Ophthalmic Plastic and Reconstructive Surgery (ASOPRS) fellows. With fellows and colleagues Drs. Bradley Lemke and Russell Gonnering, he produced numerous landmark publications on orbital anatomy and other subjects in ophthalmic plastic surgery. Dr. Dortzbach served in various ASOPRS leadership positions, becoming the organization's president in 1995. After his retirement, as an Emeritus Professor, he served as Executive Director of the UW Department of Ophthalmology and Visual Science Alumni Association until 2014.

Dr. Lucarelli is the Director of the Oculoplastics Service in the UW Department of Ophthalmology and Visual Sciences. He has authored 111 peer-reviewed journal articles, several textbooks, 39 book chapters and 6 digital publications. He is also a leader nationally in ASOPRS, and has received many awards for academic achievement and teaching. A summa cum laude graduate of the University of Dayton, Ohio, he was also valedictorian of his medical school graduation class at Washington University School of Medicine, St. Louis. Dr. Lucarelli served his residency and chief residency at the Massachusetts Eye and Ear Infirmary, Boston. He performed his fellowship in Ophthalmic Plastic and Reconstructive Surgery with Dr. Dortzbach and joined the Department in 2007 after completing his fellowship, achieving full Professor status in 2009.



YEAR IN REVIEW

LIU INVITED TO PRESENT TELE-OPHTHALMOLOGY PROJECT TO CONGRESS

Glaucoma specialist Yao Liu, MD, recently returned from Washington, DC where she was an invited presenter at the Emerging Vision Scientists Congressional Reception at the Capitol building on September 14-15, 2016. Liu talked about her tele-ophthalmology initiative and the importance of funding vision research.



Yao Liu, MD, (right) meets with Leslie Zelenko (left) in Congressman Mark Pocan's office

Tele-ophthalmology uses specialized eye photos to detect eye disease in primary care clinics among patients with diabetes. These photos are then sent electronically and reviewed by eye specialists. The results are communicated to the patient's primary care provider who refers patients with abnormal findings to local eye care providers. This type of diabetic eye screening provides rapid, high-quality eye care at low cost. It is currently available in the UW Specialty Clinic at Mile Bluff Medical Center in Mauston, WI where primary care patients can obtain eye screening on a walk-in basis.

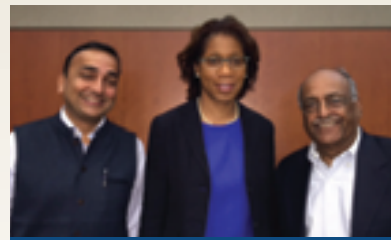
Liu was one of 22 young vision scientists invited from across the country. Her project seeks to identify and address barriers to using tele-ophthalmology in rural health systems. This work is funded by the National Institutes of Health/National Eye Institute and the Wisconsin Partnership Program. Her overall goal is to develop and test an adaptable implementation program to expand this technology statewide and nationally. By developing a successful implementation program, Liu's research will help increase access to eye care in underserved

rural populations, address healthcare disparities and prevent vision loss from diabetic eye disease.

According to the National Eye Institute, diabetic eye disease is the leading cause of blindness among working-age Americans. "In our country, nearly \$2 billion in medical costs will be spent on treating people with avoidable blindness from diabetes—blindness that would have been prevented through earlier eye screening and treatment." Liu said. "Unfortunately, only a half-percent of the annual medical cost of treating vision disorders in the U.S. is spent on vision research. Strong, sustained funding support for vision researchers is critical for helping us to develop better and more cost-effective treatments to prevent blindness in our communities."

Liu was delighted to find strong support for vision research among Wisconsin's legislators. "Kathleen Laird in Senator Tammy Baldwin's office let us know that Senator Baldwin is a tireless supporter of research and, together with Congressman Mark Pocan, will soon be introducing legislation to provide further support for young researchers from the National Institutes of Health," Liu said. "My colleagues from the Medical College of Wisconsin and I talked about our work, the challenges faced by young researchers and the need for strong funding support for vision research. Jenna Mathis in Senator Ron Johnson's office told us we were the most effective and engaging group of researchers in communicating our message that she'd ever met!"

DR. UMANG MATHUR BRINGS INTERNATIONAL OPHTHALMOLOGY COLLABORATION TO DEPARTMENT



Dr. Umang Mathur, Terri Young, MD, MBA and Suresh Chandra, MD

Dr. Umang Mathur, Medical Director of the Dr. Shroff's Charity Eye Hospital in New Delhi, India visited the University of Wisconsin Department of Ophthalmology and Visual Sciences in May 2016. During his Grand

Rounds lecture he spoke of the special challenges in the delivery of eye care in India. 18 million citizens are blind, 27-30 million have low vision, yet 80% of blindness in his country is curable or preventable. "The irony is that international patients are flocking to Indian hospitals for luxury care at a more affordable cost,

YEAR IN REVIEW CONTINUED...

while the rural and urban poor have limited or no access to even basic primary care,” he commented. Dr. Shroff’s Charity Eye Hospital, founded in 1914, addresses this need with a community outreach – hub and spoke approach. The Delhi-based hospital is the tertiary institution and center of excellence, supported by 4 secondary hospitals and 20 vision centers. The Eye Hospital focus is providing quality ophthalmologic care to the almost two thirds of the population that require subsidized or free eye care.

Dr. Mathur attended a dinner hosted by the Madison Ophthalmologic Society, and also met with the staff of Combat Blindness International – an organization that partners with the University of Wisconsin Department of Ophthalmology and Vision Sciences to provide free eye care clinics here in Madison to an underserved clientele.

Dr. Mathur and his colleagues at Shroff’s Eye Hospital welcome our senior ophthalmology residents each year for an educational exchange that began in 2008 and includes a cataract surgery rotation.

DEPARTMENT HOSTS INAUGURAL SPRING VISION SCIENCE RESEARCH SYMPOSIUM

Dale Gregerson, PhD, from the University of Minnesota School of Medicine, was the keynote speaker for a successful Spring Vision Science Research Symposium sponsored by the Department of Ophthalmology and Visual Sciences. The April event featured talks by more than 20 researchers.



Robert Nickells, PhD, Spring Symposium Director

Presenters from the University of Wisconsin School of Medicine and Public Health, The Medical College of Wisconsin, University of Iowa, Northwestern University and the University

of Minnesota shared research in four main areas: Epidemiology, Retinal Disease, Glaucoma and Optic Nerve and Inflammation.

The 2015 Spring Vision Science Research Symposium was supported by the Department of Ophthalmology and Visual Sciences Dr. George K. Kambara Ophthalmology Education Fund.

UW EYE RESEARCH TEAM DISCOVERS NOVEL GENE MUTATIONS THAT CAUSE GLAUCOMA

A research team of the UW Department of Ophthalmology and Visual Sciences has discovered novel mutations in a gene that



Terri Young, MD, MBA

are responsible for an important subset of childhood blindness called primary congenital glaucoma (PCG).

The study, “Angiopoietin receptor TEK mutations underlie primary congenital glaucoma with variable expressivity,”

was published in The Journal of Clinical Investigation on June 6, 2016. Dr. Terri Young,

chair of the Department of Ophthalmology and Visual Sciences, is the senior author of the study performed at the UW School of Medicine and Public Health, and Stuart Tompson, PhD, a lead author of the study, is a UW associate scientist and a member of Dr. Young’s research team.

“In collaboration with an international team of geneticists, our results show that the TEK gene plays an essential role in eye health, and individuals carrying a mutation in this gene are at

“OUR DISCOVERY... COULD AID IN THE DEVELOPMENT OF NEW THERAPEUTIC STRATEGIES FOR GLAUCOMA.”

a much higher risk of developing newborn or later onset forms of glaucoma,” said Dr. Young.

Glaucoma is a condition that can cause vision loss when abnormally high pressure within the eye leads to optic nerve damage. PCG is a devastating inherited form of glaucoma that can present at birth through early childhood. Of note, the World Health Organization has reported that approximately 18 percent of children in institutions for the blind have early-onset glaucoma. Just as in adults, treatment options for

PCG are supportive rather than curative. Many individuals undergo multiple eye surgeries and are destined to a lifetime of applying eye medications in an attempt to decrease the intraocular pressure to normal levels.

The disease is poorly understood. Mutations in only a few genes have been linked to the disease and account for only a minor proportion of cases. Mutations in the CYP1B1 gene are the most common cause of PCG in families with a high degree of marriage between relatives. However, it is a much less common cause in ethnically diverse populations. The researchers knew that a different mechanism must underlie the majority of these other cases and set out to discover how that mechanism structurally alters the way the eye removes excess internal fluid.

The key risk factor for glaucoma is high intraocular pressure, which is thought to result from defects in how the aqueous humor, a renewed fluid within the eye, flows out. The UW-Madison researchers found that a key cell membrane receptor protein (known as TEK) is necessary for proper development of a drainage channel called Schlemm's canal. If the receptor function is greatly reduced or absent due to a genetic mutation, the tubular canal is poorly formed or even missing, resulting in back-up of fluid and elevated eye pressure, which over time causes optic nerve head damage and subsequent visual field loss. Working with human patients, the UW team recruited families with at least one child with PCG, and identified 10 families that had mutations in the TEK gene. One family also had a parent with a diagnosis of childhood glaucoma, and another family contained several individuals with later-onset forms of the disease. All of the mutations identified in these families resulted in disturbance of the cellular signaling pathway necessary for Schlemm's canal development.

"This is an important step in learning more about the biology of general glaucoma as well – a devastating eye disease that impacts more than 60 million people worldwide," said Dr. Young. "Our discovery offers further insight into how eyes normally form a drainage system to avoid fluid build-up, and could aid in the development of new therapeutic strategies for glaucoma." The clue to this connection came from teaming up with a Northwestern University research laboratory that studies mouse genetic models. "The collaboration with the Chicago team was critical," said Dr. Tompson. "They engineered mice that contained mutations similar to those we had identified in our human patients. These mice displayed the hallmark signs of glaucoma and permitted the identification of defects in Schlemm's canal underlying the disease in these cases. We can now perform prenatal genetic testing to determine who might be at risk and in need of earlier treatment before optic nerve damage can occur."

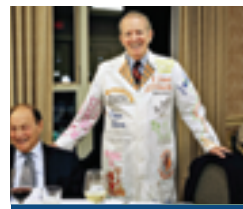
The discovery was presented at an international vision research conference, the Association for Research in Vision and Ophthalmology, May 2016 in Seattle.

50 IN 2017

OCULOPLASTICS SERVICE CELEBRATES HISTORY

Oculoplastics fellowship graduates, physicians and friends gathered this fall to celebrate the 50th anniversary of the Department's Oculoplastics Service and the endowment of the Richard K. Dortzbach Professorship in Ophthalmic Facial Plastic Surgery. Only a handful of such endowed professorships in oculo-facial surgery have been achieved nationwide.

The celebration began with a scientific presentation by visiting professor Dr. James Katowitz, Director, Oculoplastic and Orbital Surgery at the Children's Hospital of Philadelphia, internationally recognized for his expertise in pediatric oculoplastic surgery. The meeting included presentations from former fellows and UW faculty. Dr.



Richard Dortzbach, MD, celebrates 50 years of UW's Oculoplastic Service

Deborah Sherman led a state-of-the-art skills transfer program on facial fillers. Later, Dr. Bradley Lemke, who in 1998 initiated the campaign to endow the Dortzbach

professorship, thanked the donors including former fellowship graduates, patients and families who helped endow the professorship.

Twenty prior UW oculoplastic fellows attended the event. "The remarkable participation demonstrates the very special relationships within the White Coat Society," said Dr. Mark Lucarelli, service director and the inaugural Dortzbach Professor, "Our history in ophthalmic plastic surgery has been truly extraordinary – the resources available with the Dortzbach Professorship ensure a bright future." "It was perfect in every way, and I shall cherish the memories forever," said "Dortz" of the honors.



Aparna Lakkaraju, PhD, studies live cells imagery using a spinning disk confocal microscope

MACULAR DEGENERATION INSIGHT IDENTIFIES PROMISING DRUGS TO PREVENT VISION LOSS

by David Tenenbaum, UW-Madison University Communications

In a study published in the Proceedings of the National Academy of Sciences, a University of Wisconsin-Madison research team pinpoints how immune abnormalities beneath the retina result in macular degeneration, a common condition that often causes blindness.

Aparna Lakkaraju, PhD, an assistant professor of ophthalmology and visual sciences in the UW School of Medicine and Public Health, focused on two protective mechanisms that are compromised during the gradual onset of macular degeneration, which degrades and can destroy the central vision needed to read and recognize faces.

In tests in a mouse model of macular degeneration, drugs that are already on the market prevented damage to the cells that sustain the light-sensitive cells in the eyes.

“These studies raise the possibility of treatments that could slow or prevent macular degeneration,” says Lakkaraju.

Macular degeneration destroys central vision in about 2 million Americans, mainly among the elderly, and is largely untreatable.

Although macular degeneration eventually damages or kills the light-sensitive rods and cones, Lakkaraju explains that it starts with injury to the retinal pigment epithelium (RPE). The RPE, a single layer of cells beneath the rods and cones at the back of the eye, performs many functions essential for healthy vision. The damage starts with a disturbance of immune proteins called complement, which normally kill disease-causing organisms by boring holes in their cell membranes.

“The light-detecting cells in the retina are totally dependent on the RPE for survival,” says Lakkaraju, “but the RPE cells are not replaced through the lifespan. So we asked, ‘What are the innate protective mechanisms that keep the RPE healthy, and how do they go awry in macular degeneration?’”

In a study performed with colleagues Li Xuan Tan and Kimberly Toops, Lakkaraju focused on two protective mechanisms: the

protein CD59, which regulates complement activity when attached to the outside of RPE cells; and lysosomes, spherical structures that plug pores created by the complement attack (a function that Lakkaraju's team first detected in the RPE).

Together, they offer an in-depth defense, Lakkaraju says.

"CD59 prevents the final step of attack that forms the pore," Lakkaraju says. "Once a pore forms, the cell can move a lysosome to close it."



Aparna Lakkaraju, PhD

If the complement attack is not defeated, the opening in the RPE cell membrane allows the entry of calcium ions, which spark a long-term, low-grade inflammation that inhibits both protective mechanisms, creating a vicious cycle of destruction.

The inflammation in the RPE damages mitochondria, structures that process energy inside all cells. This could eventually lead to a decline or death of the photoreceptor cells, once they are deprived of their essential housekeepers. The result is the loss of central, high-resolution vision. Lakkaraju pursued her research in RPE cells isolated from pig eyes, and in mice that lack a protein — a deficiency that causes an inherited form of macular degeneration called Stargardt disease.

"THESE STUDIES RAISE THE POSSIBILITY OF TREATMENTS THAT COULD SLOW OR PREVENT MACULAR DEGENERATION."

Crucially, her study identified an enzyme that is activated by excess cholesterol in the RPE, which neutralizes both protective mechanisms, and found that drugs used to treat depression neutralized that enzyme and restored the protection — and the health of RPE cells — in the mouse model.

Epidemiological studies by Ronald and Barbara Klein, also at the UW-Madison Department of Ophthalmology and Visual Sciences in the UW School of Medicine and Public Health, have linked long-term use of some of the same drugs with a decreased susceptibility to macular degeneration.

The drugs that helped restore protections in the RPE were chosen for their ability to remove excess cholesterol or inhibit aSMase, an enzyme involved in the toxic process, Lakkaraju says.

"There are several FDA-approved drugs that inhibit aSMase. We found that the antidepressant desipramine, administered to mice in their drinking water, restored CD59 on the cell surface, decreased reactive oxygen species, and prevented mitochondrial fragmentation.

"My lab is interested in the earliest stages of macular degeneration, because we cannot reverse the loss of RPE and photoreceptors," Lakkaraju says. A patent application for the idea of preventing macular degeneration by blocking aSMase has been filed by the Wisconsin Alumni Research Foundation.

Given the likely increase in macular degeneration among an aging population, and the current lack of alternatives, "we hope a pharmaceutical company will license this process and start the necessary preclinical and clinical trials," Lakkaraju says. "The epidemiological data are there, and now we have fairly convincing mouse data. The safety profiles of these drugs have been documented for decades. There is certainly no guarantee of success, but we need a way to prevent macular degeneration. I am realistic, but hopeful, that better knowledge of this disease process could be the key."

The research was funded by the National Institutes of Health (grants #R01EY023299 and #P30EY016665), Research to Prevent Blindness, Retina Research Foundation and other sources.



EDUCATION IS KEY TO SAVING SIGHT

Department of Ophthalmology and Visual Sciences engaged with over 500 PEOPLE IN ONE DAY (10/27/16) on the topic of macular degeneration - a disease that currently affects over 2MM people in the US.



CLINICAL & RESEARCH FACULTY



Daniel M. Albert, MD, MS
Frederick Allison Davis & Lorenz E. Zimmerman Professor & Chair Emeritus
Ocular oncology, ophthalmic pathology, comprehensive ophthalmology



Michael M. Altaweel, MD
Professor
Retina, vitreous, macula, ocular melanoma



Richard E. Appen, MD
Professor Emeritus
Neuro-ophthalmology



Neal P. Barney, MD
Professor
Cornea & external disease, cornea & cataract surgery, uveitis, ocular immunology



Barbara A. Blodi, MD
Professor, Medical Director of the Fundus Photograph Reading Center and Clinical Trials Unit
Retinal diseases including macular degeneration & diabetic retinopathy



Yasmin S. Bradfield, MD
Dr. John Doolittle Professor, Ophthalmology & Visual Sciences Vice-Chair/Education and Faculty Development
Pediatric ophthalmology & strabismus, pediatric glaucoma



Curtis R. Brandt, PhD, FARVO
UW Medical Foundation Professor of Ophthalmology and Visual Sciences Vice-Chair/Research
Virology, cell & molecular biology, genetic mapping & recombinant techniques, gene therapy



Cat N. Burkat, MD
Associate Professor
Ophthalmic reconstructive & cosmetic surgery



Suresh R. Chandra, MD
Professor Emeritus
Vitreoretinal disease, macular disease, ocular melanoma, trauma, international ophthalmology



Judy A. Chen, MD, PhD
Assistant Professor
Neuro-ophthalmology



Nansi Jo Colley, PhD
Professor
Molecular/genetic studies of retinal degeneration in Drosophila



Eugene D. Cropp, OD
Clinical Optometrist
Optometry



Karen J. Cruickshanks, PhD
Professor
Epidemiology of age-related ocular disorders, hearing loss, diabetes



Janet Cushing, OD
Clinical Optometrist
Optometry



Ronald P. Danis, MD
Professor
Macular degeneration, diabetic retinopathy, retinal vascular diseases & posterior ocular inflammatory disorders



Matthew D. Davis, MD
Professor Emeritus
Vitreoretinal disease, diabetic retinopathy, clinical trials



Richard K. Dortzbach, MD
Professor Emeritus
Ophthalmic plastic & reconstructive surgery, surgical techniques



Thomas D. France, MD
Professor Emeritus
Pediatric ophthalmology & strabismus, amblyopia, visual function testing



David M. Gamm, MD, PhD
Associate Professor
Pediatric & adult strabismus management & surgery, comprehensive pediatric ophthalmology, genetic retinal disorders, tear duct surgery, disorders leading to double vision, eyelid abnormalities



Justin L. Gottlieb, MD
Professor
Retina, vitreous, macula



Gregg A. Heatley, MD, MMM
Associate Professor
Vice-Chair/Clinical Affairs
Glaucoma, anterior segment & cataract surgery



Michael S. Ip, MD
Associate Professor
Vitreoretinal surgery for diabetic retinopathy & retinal detachment, treatment of age-related macular degeneration, clinical trials research



Celeste K. Jend, OD
Clinical Optometrist
Optometry



Ronald E. Kalil, PhD
Professor
Neural cell death & repair after brain damage



Paul L. Kaufman, MD
Professor
Glaucoma, aqueous humor dynamics, anterior segment physiology & pharmacology, presbyopia



Marilyn C. Kay, MD
Associate Professor
Neuro-ophthalmology



Barbara E.K. Klein, MD, MPH
Professor
Glaucoma, comprehensive ophthalmology, cataracts, diabetic retinopathy, epidemiology, preventive medicine



Ronald Klein, MD, MPH
Professor
Vitreoretinal disease, diabetic retinopathy, age-related eye diseases, epidemiology



Tracy L. Klein, OD
Clinical Optometrist
Optometry



Daniel W. Knoch, MD
Associate Professor
Comprehensive ophthalmology, cataract surgery



Burton J. Kushner, MD
Professor Emeritus
Pediatric ophthalmology & strabismus, amblyopia, surgical techniques



Aparna Lakkaraju, PhD
Assistant Professor
Retinal cell biology, pathogenesis of retinal degenerations, identification of therapeutic targets



Leonard A. Levin, MD, PhD
Professor
 Neuro-ophthalmology,
 ganglion cell death



Yao Liu, MD
Assistant Professor
 Adult & pediatric glaucoma,
 cataract surgery, anterior
 segment surgery



Mark J. Lucarelli, MD
*Richard K. Dortzbach
 Professor of Ophthalmic
 Facial Plastic Surgery*
 Oculoplastic, cosmetic facial
 & orbital surgery



Julie A. Mares, PhD
Professor
 Epidemiology of eye disease,
 nutritional epidemiology



Michele M. Martin, OD
Clinical Optometrist
 Optometry



Gillian J. McLellan, BVMS, PhD
Assistant Professor
 Glaucoma pathogenesis
 & identification of new
 therapeutic targets



Mihai Mititelu, MD, MPH
Assistant Professor
 Retinal vascular diseases,
 age-related macular
 degeneration, retinal
 dystrophies



Anna C. Momont, MD
Assistant Professor
 Glaucoma, anterior segment
 surgery, optic nerve imaging



Sanbrita Mondal, OD
Clinical Optometrist
 Optometry, Director, Low
 Vision Clinic



Frank L. Myers, MD
Professor Emeritus
 Retina



Sarah M. Nehls, MD
Associate Professor
*Vice-Chair/Education &
 Faculty Development*
 Refractive surgery, cornea
 & external disease, cornea
 & cataract surgery, uveitis



Robert W. Nickells, PhD
Professor
Vice-Chair/Research
 Molecular biology of cell death
 in glaucoma & retinoblastoma



T. Michael Nork, MD, MS
Professor
 Diseases & surgery of the
 retina & vitreous



Nayan Patel, OD
Clinical Optometrist
 Optometry



Richard W. Patterson, OD
Clinical Optometrist
 Optometry



Arthur S. Polans, PhD
Professor
 Cancer-related ocular
 pathologies



Heather A.D. Potter, MD
Associate Professor
 Comprehensive ophthalmology,
 ophthalmic pathology, cataract
 surgery, refractive surgery



Shilpa G. Reddy, MD
Assistant Professor
 Comprehensive ophthalmology,
 cataract surgery



Patricia C. Sabb, MD
Assistant Professor
 Comprehensive ophthalmology,
 cataract surgery, refractive
 surgery



Stephen K. Sauer, MD
Associate Professor
 Comprehensive ophthalmology,
 cataract surgery



Melanie A. Schmitt, MD
Assistant Professor
 Pediatric ophthalmology
 & strabismus, ophthalmic
 genetics



Nader Sheibani, PhD
Professor
 Diabetic retinopathy,
 retinopathy of prematurity,
 animal models & retinal
 vascular cell biology &
 signal transduction



Gary W. Sterken, MD
Assistant Professor
 Comprehensive ophthalmology,
 cataract surgery, glaucoma



Thomas S. Stevens, MD
Professor Emeritus
 Vitreoretinal disease, macular
 disease, diabetic retinopathy,
 proliferative vitreoretinopathy



Michael C. Struck, MD
Professor
 Pediatric ophthalmology
 & strabismus, retinopathy
 of prematurity, pediatric
 cataract surgery & intraocular
 lens implantation, pediatric
 glaucoma



John E. Temprano, MD
Associate Professor
 Comprehensive ophthalmology,
 cataract surgery



Andrew T. Thliveris, MD, PhD
Professor
*Vice Chair for
 Resident Education*
Chief of Ophthalmology
 William S. Middleton
 Memorial Veterans Hospital
 Comprehensive ophthalmology,
 cataracts, ocular genetics



James N. Ver Hoeve, PhD
Senior Scientist
 Visual electrophysiology



Amy L. Walker, OD, MBA
Clinical Optometrist
 Optometry



Terri L. Young, MD, MBA
*Peter A. Duehr Professor of
 Ophthalmology, Pediatrics
 and Medical Genetics, Chair,
 Department of Ophthalmology
 and Visual Sciences*
 Pediatric ophthalmology &
 strabismus, ophthalmic genetics



NEW PROVIDERS



Shilpa G. Reddy, MD

Shilpa G. Reddy, MD, began her faculty appointment with the Department of Ophthalmology and Visual Sciences in August, and joins the Comprehensive Ophthalmology service.

Dr. Reddy earned her Bachelor of Arts Honors degree summa cum laude in Mathematics and Spanish at Georgetown University in Washington DC, and her Doctor of Medicine

Shilpa G. Reddy, MD

degree cum laude from the University of Alabama School of Medicine in Birmingham. She completed a transitional internship at Georgetown University Hospital Systems, and residency in Ophthalmology at the Hamilton Eye Institute, University of Tennessee, Memphis.

Dr. Reddy is a seasoned community health advocate, having served abroad in Mexico, Vietnam, as well as in Tennessee, Alabama and Georgia. She has served in the ORBIS Flying Eye Hospital, ophthalmology community screenings, and other volunteer programs to indigenous populations, uninsured patients, and Iraqi refugee families. She will practice at the University Station Eye Clinic, UW Health East Eye Clinic in Madison and the Deming Way Eye Clinic in Middleton.



Jonathan S. Chang, MD

Jonathan S. Chang, MD, will join the Department of Ophthalmology and Visual Sciences in November as a vitreo-retinal surgery faculty member.

Dr. Chang received his Bachelor of Science degree in Biology from the Massachusetts Institute of Technology in Cambridge. His medical doctorate was completed at Columbia University in New York, NY. In addition, he

Jonathan Chang, MD

completed his ophthalmology residency and vitreo-retina surgery fellowship training at the Bascom Palmer Eye Institute in Miami, FL.

His primary practice location will be at the University Station Eye Clinic in Madison.



Kimberly E. Stepien, MD

Kimberly E. Stepien, MD, joins the Department of Ophthalmology and Visual Sciences in December. An alumnae of UW-Madison, she received both her Bachelor of Science and Medical Doctor degrees here. She returns to Madison to join the medical retina faculty team.

Kimberly E. Stepien, MD

She completed two residency programs: one at The Gunderson Lutheran Medical Center in La Crosse, WI and the other at the Albany Medical Center in New York. Her fellowship in Medical Retina was completed at the Bascom Palmer Eye Institute in Miami, FL.

Dr. Stepien is coming from the Medical College of Wisconsin. She will be the Director of our Retinal Degeneration Program, as well as the Co-Director of our Ophthalmic Genetics Clinic. Her primary practice location will be at the University Station Eye Clinic in Madison.



Karina A. Conlin, OD

Karina A. Conlin, OD, begins her optometry practice with UW Health Eye Clinics in November. She is an alumnae of UW-Madison, having received her Bachelor of Science degree at the College of Agricultural and Life Sciences. Dr. Conlin received her Doctorate of Optometry from the Illinois College of Optometry in Chicago and completed her residency

Karina Conlin, OD

training at the Nova Southeastern College of Optometry at the Veterans Affairs Hospital in Miami, FL.

Dr. Conlin joins us from Columbia University in New York, NY, and will practice primarily at UW Health East Eye Clinic in Madison.



RESIDENTS AND FELLOWS

CLASS OF 2019



Randy (Chris) Bowen,
MD, MS

Randy (Chris) Bowen, MD, MS

Dr. Randy Bowen earned his BS in Biochemistry and Biology and MS in Bioengineering at Utah State University in Logan. He also earned his MD at Utah State University and completed his PGY-1 internship year at University of Utah Medical Center, Salt Lake City.



Nathan Matthews, MD

Nathan Matthews, MD

Dr. Nathan Matthews earned his BS in Neuroscience at the University of Michigan in Ann Arbor. He received his MD at the Medical College of Wisconsin in Milwaukee and completed his PGY-1 internship year at Aurora St. Luke's Medical Center, Milwaukee, WI.



Christopher Spearman,
MD

Christopher Spearman, MD

Dr. Christopher Spearman earned his BS in Biochemistry and Molecular Biology at Pennsylvania State University, University Park. He earned his MD at Thomas Jefferson University in Philadelphia. Dr. Spearman completed his PGY-2 internship year at Lankenau Medical Center, also in Philadelphia.

CLASS OF 2018



Roman Krivochenitser,
MD

Roman Krivochenitser, MD

Dr. Roman Krivochenitser earned his BA in Accounting from Michigan State University, East Lansing where he later received his MD. He completed his PGY-1 internship year at Oakwood Hospital and Medical Center in Dearborn, MI.



Jennifer Ciske Larson,
MD

Jennifer Ciske Larson, MD

Dr. Jennifer Ciske Larson received her BS in Biomedical Sciences from Marquette University in Milwaukee, WI. She earned her MD from the University of Wisconsin School of Medicine and Public Health, where she also completed her PGY-1 internship year.



Paul Selid, MD

Paul Selid, MD

Dr. Paul Selid earned his BS in Chemistry from the University of North Dakota, Grand Forks, where he also received his MD and completed his PGY-1 internship year.

RESIDENTS AND FELLOWS CONTINUED...

CLASS OF 2017



Han Kim, MD

Dr. Han Kim earned his BA in Biochemistry from Harvard University in Cambridge, MA. Dr. Kim earned his MD from Washington University in St. Louis, MO and completed his PGY-1 internship at Mercy Hospital, also in St. Louis.

Han Kim, MD



Alexander Ringeisen, MD

Dr. Alexander Ringeisen earned his BS in Biology from the University of Wisconsin and his MD from the University of Minnesota in Minneapolis. Dr. Ringeisen completed his PGY-1 internship at Gundersen Medical Foundation in LaCrosse, WI.

Alexander Ringeisen, MD

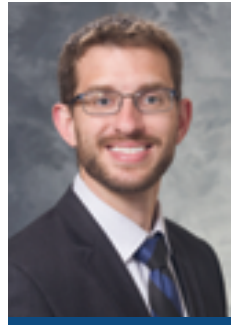


Angeline Wang, MD

Dr. Angeline Wang earned her SB in Neuroscience at Massachusetts Institute of Technology in Cambridge. Dr. Wang earned her MD from the University of Michigan in Ann Arbor and completed her PGY-1 internship at Harbor-UCLA Medical Center in Torrance, CA.

Angeline Wang, MD

CLINICAL FELLOWS



Paul Boeke, MD (Retina 2017)

Dr. Paul Boeke earned his BS with distinction from the University of Iowa in 2005 and MD from UI Carver College of Medicine in Iowa City in 2011. He completed his ophthalmology residency training at the University of Missouri, Columbia, MO. Dr. Boeke is in his second year of fellowship in surgical retina.

Paul Boeke, MD



Courtney Kauh, MD (Oculoplastics 2017)

Dr. Courtney Kauh earned her BS at The University of Akron in Ohio in 2001 and MS at the Ohio State University in Columbus in 2006. She earned her MD degree at the University of Toledo College of Medicine in Toledo, OH in 2011 and completed her ophthalmology residency training at the University of Michigan in Ann Arbor. Dr. Kauh is in the second year of fellowship in ophthalmic facial plastic surgery.

Courtney Kauh, MD



Jacob Martin, MD (Ocular Pathology 2017)

Dr. Jacob Martin earned his BS from Harding University in Searcy, AR in 2012. He completed his MD in May 2016 from the University of Arkansas for Medical Sciences in Little Rock, AR. Dr. Martin began a pre-residency fellowship at the UW in ocular pathology in June.

Jacob Martin, MD



Brandon Metcalf, MD, MPH

**Brandon Metcalf, MD, MPH
(Cornea 2017)**

Dr. Brandon Metcalf earned his BS from Washington College, Chestertown, MD in 2006. He earned his MPH at Johns Hopkins Bloomberg School of Public Health and MD from the School of Medicine at Johns Hopkins University, Baltimore, MD in 2012. Dr. Metcalf completed his ophthalmology residency training at the University of Wisconsin.



Michael Possin, MD

Michael Possin, MD (Retina 2018)

Dr. Michael Possin earned his BS in 2007 and MD in 2012 from the University of Wisconsin. He completed his ophthalmology residency training as chief resident at the University of Missouri, Columbia, MO.



Aleksandra Michalik

**Aleksandra Michalik, DO
(Glaucoma 2017)**

Dr. Aleksandra Michalik earned her BS from Cornell University, Ithaca NY in 2006. She earned her DO in 2011 from New York College of Osteopathic Medicine, Old Westbury. Dr. Michalik completed her ophthalmology residency training program at St. John's Episcopal Hospital, Far Rockaway, NY.



Devasis 'Dave' Reddy, MD

**Devasis 'Dave' Reddy, MD
(Pathology 2017)**

Dr. Dave Reddy earned his BS at University of California — San Diego in 2010. He earned his MD in May 2016 from Oakland University William Beaumont School of Medicine, Rochester, MI and started a pre-residency fellowship in ocular pathology in April 2016.



CHANGING OF THE GUARD

The Ophthalmology Alumni Association continues to build alumni engagement as new association President, Joshua P. Vrabec, MD, (pictured left) and Executive Director Burton Kushner, MD, (pictured right) thank outgoing president, Rob Castrovinci, MD, (pictured middle) for his 10 years of service on the alumni board.



VISION RESEARCH GRADUATE AND POST-DOCTORAL STUDENTS

GRADUATE STUDENTS

Christine McWilliams

Project Assistant/Associate Researcher
Karen Cruickshanks Research Lab
Epidemiology

Li Xuan Tan

Research Assistant
Aparna Lakkaraju Research Lab
Pharmaceutical Sciences

Ryan Donahue

Research Assistant
Robert Nickells Research Lab
Molecular and Cellular Pathology

Margaret Maes

Research Assistant/Trainee
Robert Nickells Research Lab
Molecular and Cellular Pathology

Heather Schmitt

Research Assistant
Robert Nickells Research Lab
Molecular and Cellular Pathology

Juliana Falero-Perez

Research Assistant
Nader Sheibani Research Lab
Environmental Toxicology

Mitra Farnoodian

Research Assistant
Nader Sheibani Research Lab
Clinical Investigation

Nasim Jamali

Research Assistant
Nader Sheibani Research Lab
Cell and Molecular Biology

Sara Adelman

Research Assistant
Gillian McLellan Research Lab
Comparative Biomedical Sciences

Kazuya Oikawa

Research Assistant
Gillian McLellan Research Lab
Comparative Biomedical Sciences

Bethany Kloss

Research Assistant
Terri Young Research Lab
Human Molecular Genetics

POST-DOCTORAL TRAINEES

Bethany A. Kloss

Research Associate
Terri Young Research Lab
Human Molecular Genetics

Gurugirijha Rathnasamy

Research Associate
Aparna Lakkaraju Research Lab
Retinal Cell Biology

Eric Nguyen

Research Associate
Nader Sheibani Research Lab
Biomedical Engineering

Mohammad Ali Saghiri

Research Associate
Nader Sheibani Research Lab
Biomedical Engineering

Divya Sinha

Research Associate
David Gamm Research Lab
Stem Cell Research

Jebjani Phillips

Research Associate
David Gamm Research Lab
Stem Cell Research

Christine Kiire

Honorary Associate/Fellow
Barbara and Ronald Klein Research Lab
Diabetic Retinopathy



James Katowitz, MD, presents at Grand Rounds during the Oculoplastics 50th anniversary celebration



INVITED LECTURERS

Brian Link, PhD

Professor in the Department of Cell Biology, Neurobiology and Anatomy, Medical College of Wisconsin

Grand Rounds – “Studies in Zebrafish to Understand the Mechanisms of Emmetropization” (1/22/2016)

Julian Perry, MD

Oculofacial Plastic Surgery, Cleveland Clinic

Grand Rounds – “Enucleation and Evisceration” (2/26/2016)

Oculoplastics 2016: “Eyelid Reconstruction Techniques,” “Orbital Fractures,” “Forehead Anatomy and Brow Assessment” and “Brow Surgical Techniques”

Dr. Umang Mathur, MS

Schroff’s Chairty Eye Hospital, Delhi

Grand Rounds – “Challenges and Interventions in the Delivery of Eye Care in India” (05/13/2016)

Kathryn Colby, MD, PhD

Chair, Department of Ophthalmology and Visual Science, University of Chicago Medicine

Grand Rounds – “Management of the Pediatric Cornea: It’s Not Just Child’s Play” (5/27/2016)

Joseph Carroll, PhD, FARVO

Professor of Ophthalmology, Biophysics, and Cell Biology,

Neurobiology and Anatomy. Co-Director, Advanced Ocular Imaging Program

Grand Rounds – “Applications of High-Resolution Retinal Imaging” (6/3/2016)

Timothy Kern, PhD

Professor, Director of the Center for Diabetes Research, Case Western Reserve University

Frontiers in Vision Research – “Diabetic Retinopathy: We Were Wrong to Ignore the Outer Retina” (8/22/2016)

James Katowitz, MD

Professor of Ophthalmology and Director, Oculoplastic and Orbital Surgery at the Children’s Hospital of Philadelphia. Director, The Edwing and Fannie Gray Hall Center for Human Appearance at the University of Pennsylvania Medical Center

Grand Rounds – “Balancing Function and Appearance: An Oculofacial Plastic Perspective” (9/30/2016)

Emily Chew, MD

Deputy Director, Division of Epidemiology and Clinical Applications and Deputy Clinical Director, National Eye Institute, National Institutes of Health

Grand Rounds – “Nutrition, Genes and Age-Related Macular Degeneration: What Have We Learned from the Clinical Trials?” (10/21/2016)





NATIONAL & INTERNATIONAL LEADERSHIP POSITIONS

Michael M. Altaweel, MD

Professor - University of Wisconsin-Madison, Department of Ophthalmology and Visual Sciences

- Founder and Co-Director, Ocular Imaging Conference, 2000-present
- President, Madison Ophthalmological Society, 2002-present
- Member, Board of Directors, Combat Blindness International, 2002-present

Neal P. Barney, MD

Professor, University of Wisconsin-Madison, Department of Ophthalmology and Visual Sciences

- Chair, Research Committee for the Eye Bank Association of America, 2012-2016
- Member, Board of Directors, The Foster Ocular Immunology National Society, 2012-present

Barbara A. Blodi, MD

Professor, University of Wisconsin-Madison, Department of Ophthalmology and Visual Sciences; Medical Director, Fundus Photograph Reading Center; Medical Director, Clinical Trials Unit

- Executive Committee Member, Study of Comparative Treatments for Retinal Vein Occlusion 2 National Eye Institute, 2013-2018
- Executive Committee Member, the Diabetic Retinopathy Clinical National Research Network-National Eye Institute, 2014-2019

Yasmin S. Bradfield, MD

Doolittle Professor of Ophthalmology and Vice Chair of Education and Faculty Development, University of Wisconsin-Madison, Department of Ophthalmology and Visual Sciences

- Member, American Association of Pediatric Ophthalmology and Strabismus Nominating Committee, 2016
- Program Director, American Academy of Ophthalmology 2016 Subspecialty Day Program Planning Committee of the American Association of Ophthalmology and Strabismus and the American Academy of Pediatrics, Co-Chair 2016, Chair 2017
- Organizer and Moderator, Pediatric Glaucoma Section, the American Association of Ophthalmology for

Pediatric Ophthalmology and Strabismus, and the Strabismus and Paediatric Ophthalmology Society of India Joint Meeting, Jaipur India, 2016

Curtis Brandt, PhD

Professor, Vice Chair/Research-University of Wisconsin-Madison, Department of Ophthalmology and Visual Sciences and Medical Microbiology and Immunology; University of Wisconsin Medical Foundation Professor of Ophthalmology and Visual Sciences; Director, Vision Research Core

- Chair, NIH-CSR Drug Discovery and Antimicrobial Resistance Mechanisms Study Section, 2015-present
- Section Chair and Assistant Director, Fight for Sight Research Foundation, New York, New York, 2007-present

Thomas D. France, MD

Professor Emeritus, University of Wisconsin-Madison, Department of Ophthalmology and Visual Sciences

- Chair of the Emeritus Committee of the American Ophthalmological Society, 2016
- Chair of the Senior Pediatric Ophthalmology Group of the American Association for Pediatric Ophthalmology and Strabismus, 2016

David M. Gamm, MD, PhD

Associate Professor, University of Wisconsin-Madison, Department of Ophthalmology and Visual Sciences

- Member and Discussion Leader, National Eye Institute Retina Organoid Symposium, 2016
- Member, Challenge Competition Technical Planning Meeting, Bethesda, MD, 2016
- Editorial Board Member, Translational Vision Science and Technology, 2011-present
- Founder and Chief Scientific Officer, Opsis Therapeutics, 2016

Gregg A. Heatley, MD, MMM

Associate Professor, Vice-Chair/Clinical, University of Wisconsin-Madison, Department of Ophthalmology and Visual Sciences

- Associate Examiner, American Board of Ophthalmology, Mentor Examiner, 2009-present

NATIONAL & INTERNATIONAL LEADERSHIP POSITIONS CONTINUED...

Paul Kaufman, MD

Professor, University of Wisconsin–Madison, Department of Ophthalmology and Visual Sciences; Ernst H. Bárány Professor of Ocular Pharmacology, Department Chair Emeritus

- Member, Board of Directors, The Glaucoma Foundation, New York, New York, 2004-present
- Member, Glaucoma Scientific Advisory Board, Bausch & Lomb, Rochester NY and Tampa Florida, Inc., 2006-present
- Member, Scientific Advisory Board, AGTC (formerly Applied Genetics Technologies Corp.), Alachua, Florida, 2012-present

Marilyn C. Kay, MD

Associate Professor, University of Wisconsin–Madison, Department of Ophthalmology and Visual Sciences

- Associate Examiner, American Board of Ophthalmology, Mentor Examiner, 1990-present

Aparna Lakkaraju, PhD

Assistant Professor, University of Wisconsin–Madison, Department of Ophthalmology and Visual Sciences

- Member, International Society for Eye Research Membership/Young Investigator Committee, 2015-2018.

Leonard A. Levin, MD, PhD

Professor, University of Wisconsin–Madison, Department of Ophthalmology and Visual Sciences

- Professor and Chair, McGill University Department of Ophthalmology, 2012-present
- Chair, Executive Scientific Oversight Committee, Audacious Goals Initiative, National Eye Institute, 2015-present
- Member, Neuro-Ophthalmology Subcommittee of the American Academy of Ophthalmology Basic and Clinical Science Course, 2014-present

Yao Liu, MD

Assistant Professor, University of Wisconsin–Madison, Department of Ophthalmology and Visual Sciences

- Member, Patient Care-Coding and Terminology Subcommittee, American Glaucoma Society, 2015-2016

Mark J. Lucarelli, MD

Richard K. Dortzbach Professor of Oculofacial Surgery, University of Wisconsin–Madison, Department of Ophthalmology and Visual Sciences; Fellowship Program Director, Ophthalmic Facial Plastic Surgery, Service Chief-Oculoplastics Service

- American Society of Ophthalmic Plastic and Reconstructive Surgery, Education Committee Member, 1999-present; Program Directors Committee Member, 1999-present; Chair, Oculofacial and Orbital Research Network, 2010-date; Chair, Fellowship Program Directors Committee, 2015-2017
- Member, Practicing Ophthalmologists Curriculum Panel, American Academy of Ophthalmology, 2014-present
- Member, Board of Directors of the International Thyroid Eye Disease Society, 2007-present; Elected Vice-President, 2015-2016

Julie A. Mares, PhD, MSPH

Professor, University of Wisconsin–Madison, Department of Ophthalmology and Visual Sciences

- Member, Scientific Advisory Board of the Center for Science in the Public Interest, 2000-present

Gillian J. McLellan, BVMS, PhD

Assistant Professor, University of Wisconsin–Madison, Department of Ophthalmology and Visual Sciences; Assistant Professor, University of Wisconsin–Madison, Veterinary Medicine

- Member, Executive Committee, European College of Veterinary Ophthalmologists, 2006-2016 (Executive Secretary, 2006-2010; Vice-President, 2010-2012; President, 2012-2014, Past-President, 2014-2016)
- Chair, Code of Conduct Committee, European College of Veterinary Ophthalmologists, appointed 2015-present
- Member, Basic Science Course Committee, American College of Veterinary Ophthalmologists, 2014-present
- Member, Animals in Research Committee, Association for Research in Vision and Ophthalmology, 2016-2019
- Member, Editorial Board, Veterinary Ophthalmology, 2009-present

Sarah M. Nehls, MD

Associate Professor, University of Wisconsin–Madison, Department of Ophthalmology and Visual Sciences

- Director, American Board of Ophthalmology- Anterior Segment and Cornea Division, 2016-2024
- At-Large Board Member, Wisconsin Academy of Ophthalmology, 2016

Robert W. Nickells, PhD

Professor, University of Wisconsin–Madison, Department of Ophthalmology and Visual Sciences

- Organizing Committee Member, Off-Year Meeting of International Society for Eye Research, 2013, 2017
- Member, Bright Focus Foundation Glaucoma Committee, 2016

T. Michael Nork, MD, MS

Professor, University of Wisconsin–Madison, Department of Ophthalmology and Visual Sciences

- Member, Board of Directors- Lions Eye Bank of Wisconsin, 2000-present
- Director, Comparative Ophthalmic Research Laboratories, Inc., 2014-present
- Managing Member, Ocular Services On Demand, Inc., 2009-present

Stephen K. Sauer, MD

Associate Professor, University of Wisconsin–Madison, Department of Ophthalmology and Visual Sciences

- Member, Practicing Ophthalmologists' Curriculum Panel – Cataract and Anterior Segment Panel Subcommittee, American Academy of Ophthalmology, 2012-present.

Melanie A. Schmitt, MD

Assistant Professor, University of Wisconsin–Madison, Department of Ophthalmology and Visual Sciences. Director, Ophthalmic Genetics Clinical Program. Chair, Patient Centered Care Steering Committee

- Member, Professional Education Committee, American Association for Pediatric Ophthalmology and Strabismus, 2015-2018

Michael C. Struck, MD

Professor, University of Wisconsin–Madison, Department of Ophthalmology and Visual Sciences, Fellowship Program Director - Pediatric Ophthalmology and Adult Strabismus, Service Chief - Pediatric Ophthalmology

- Member, Membership Committee, American Association for Pediatric Ophthalmology and Strabismus (year)

Andrew T. Thliveris, MD, PhD

Professor, University of Wisconsin–Madison, Department of Ophthalmology and Visual Sciences, Chief of Ophthalmology and Assistant Chief of Surgery, W.S. Middleton Veterans Administration Medical Center, Madison, WI

- Elected Vice President, Association of Veteran Affairs Ophthalmologists, 2016-present

Terri L. Young, MD, MBA

Chair, University of Wisconsin–Madison Department of Ophthalmology and Visual Sciences

Peter A. Duehr Endowed Professor, University of Wisconsin–Madison, Department of Ophthalmology and Visual Sciences, Pediatrics, and Medical Genetics

- Member, Scientific Advisory Board, International Marfan Syndrome Foundation, 2014-present
- Member, National Board of Scientific Counselors, National Eye Institute, National Institutes of Health, 2014-present
- Member, Disease and Pathophysiology of the Visual System Study Section, National Eye Institute, National Institutes of Health, 2013-present
- Member, Editorial Board of Experimental Eye Research Journal, 2008-present, Ophthalmology and Eye Disorders Journal 2008-present, Journal of Ophthalmology, 2009-present, World Journal of Ophthalmology, 2011-present
- Associate Examiner, American Board of Ophthalmology, Mentor Examiner, 2004-present
- Member, Board of Directors of the Joint Commission on Allied Health Personnel in Ophthalmology as the Association of University Professors of Ophthalmology Representative, 2016-2019



STEPHANIE



SEEING CLEARLY (NOW)

As originally printed in the Beloit Daily News

BELOIT — For most, skipping a routine exam isn't something that would cause panic or result in anything besides a hearty lecture from your doctor. But for others, skipping an exam could change your life.

Stephanie Klett, secretary of Tourism for the State of Wisconsin, found out how vital annual checkups can be. On a busy day, Klett almost convinced herself to cancel an eye appointment with her doctor in Beloit.

"I thought, 'I have no eye problems this year. I should cancel.' And I looked at my schedule and said it would be months out before I would get back in to see the doctor," Klett said. Instead, she decided to forge ahead and go to her appointment. While there, her doctor discovered Klett was on the verge of retinal detachment.

The retina is often referred to as the "film" of the eye. The light sensitive tissues connect to the brain and sends visual signals. A detachment would result in permanent loss of vision.

"She kept going back to one spot on my right eye over and over again," Klett said. Finally her ophthalmologist, Alice Townsend, MD, of the Beloit Clinic said, "We need to get you to a specialist." Klett had several tears in her eye and a partial detachment of her retina.

"THERE WERE FIVE HOLES IN BOTH EYES. HAD I LET THAT GO... I WOULD HAVE LOST MY EYESIGHT."

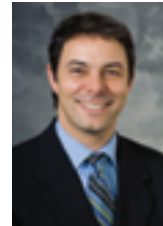
Thinking the appointment was something she could schedule later, Klett said she began looking at her calendar for dates that she might be available.

That was, until Townsend calmly said, "We need to get you in now or you could lose your eyesight." From there, Klett said she was driven to the University of Wisconsin Health Hospital in Madison to save her vision.

Dr. Michael Altaweel, UW Health ophthalmologist, said Klett's case was rare because she had no symptoms prior.

"She didn't really have symptoms, a lot of people do," Altaweel said. "When her doctor saw her, she already had a tear and a pocket of fluid around her eye, it (the retina) was already detaching."

Usually, Altaweel said patients experience "floaters," which occur when the gel substance behind the lens of the eye lapses. The substance begins to shrink and casts shadows on the retina. Other symptoms include an arc of lightning inside the eye, which is caused when a person would look to the right or left quickly, then the gel moves around and pulls on the retina, bleeding. Detachment can occur from a fall, being near-sighted (which occurs when a person has a thinner retina), or due to age-related reasons.



Dr. Michael Altaweel

"There were five holes in both eyes...had I let that go, I would have had a detached retina and I would have lost my eyesight," Klett said.

Altaweel performed emergency surgery on both of Klett's eyes. Each procedure required a laser to be used, and for the 30 minute fix, Klett had to be awake.

During the procedure, Klett had to wear a contact lens, through which the laser beam was directed in order to form scar tissue.

"(I) lasered around it like spot welding, if you can do that right away you can avoid losing vision or having a big surgery," Altaweel said. "We use three rows of lasers around it to seal a detachment. It creates a scar so that it can't get any worse or grow." Klett said being awake during surgery didn't phase her much.

"They talk you through to it," Klett said. "When the laser hits a nerve, you feel it. You can't move. You really have to concentrate on staying steady."

Klett said without the surgery, her entire life would have been changed.

"For 25 years, I've done nothing but promote Wisconsin. My life would have been completely different. There's so much that is going on in our body, and the only way to find that out is to go in (for appointments), I've always been pretty good about doing the annual exams; it (the emergency) really enforced why you should never ever cancel," she said.



TEAM HELPS BABY SEE FOR THE FIRST TIME

Eden Burgmeier, like any other toddler, loves to play with her toys. She will see a favorite toy in a corner and will crawl with glee to retrieve it. Eden did not always react to toys this way. “We knew that there may be a problem with her vision when she was born,” Andy, her father, said. “Her eyes were puffy and red. We thought it might be an infection.” It turned out to be something far more serious. Eden was later diagnosed with Axenfeld-Rieger syndrome, both the corneas in Eden’s eyes were cloudy white and her eye pressures were elevated (glaucoma). Her only visual ability was light perception.



Yasmin Bradfield, MD

“When I first met Eden’s parents, they told me they wanted to give their daughter the best chance of developing vision, but they also wanted to do the ‘right’ surgery,” said Dr. Yasmin Bradfield, UW-Madison Professor of Pediatric Ophthalmology in the Department of Ophthalmology and Visual Sciences. Eden’s father has the same diagnosis and underwent several eye surgeries as a child. Eden’s parents had a strong understanding of her surgical

options because of Andy’s ophthalmic history and their learned complexity of her eye condition. Eden’s parents sought multiple opinions nationwide before deciding to move forward with Dr. Bradfield.

Eden was eight months old when she had her first eye examination in the UW-Madison Pediatric Eye Clinic. With the same FOXC1 gene mutation as her father, Eden had severe abnormal development of the front structures of both eyes, including the corneal clouding, and further complicated by the glaucoma. Eden had never focused on her parent’s faces and seemed only to consistently stare at bright lights. “With my first eye evaluation of Eden, I knew she needed surgery quickly to give her the best possible chance to develop vision. Because of rapid brain development at her young age, the more time that went by, the higher the risk she had of permanent vision loss. She would never appreciate a clearer image if she did not have that experience as a baby.”

Dr. Bradfield consulted with her Department colleague Dr. Sarah Nehls, UW-Madison Associate Professor of Ophthalmology and Cornea Specialist, to develop a surgical plan for Eden. Dr. Nehls recommended cornea transplantation with a Boston type 1 keratoprosthesis to reduce the high risk of rejection and failure that is associated with traditional human corneal transplants

in children. Keratoprosthesis surgery was favored because the corneal substitute “window” is made out of polymethyl methacrylate, an acrylic glass material that is well tolerated by the eye’s immune system. The implant is assembled intra-operatively and combined with human donor cornea tissue. The clear optic of the keratoprosthesis provides a lens that



Sarah Nehls, MD

focuses light onto the neural retinal “film” in the back of the eye. “Keratoprosthesis surgery is a new and exciting technology in the care of pediatric patients with vision-threatening corneal clouding,” said Dr. Nehls. “This device can more rapidly and predictably improve vision in pediatric patients.” Dr. Bradfield also recommended performing a laser treatment called endocyclophotocoagulation (ECP)

instead of conventional tube shunt surgery for eye pressure control. The laser specifically targets internal eye fluid-producing ciliary processes without damaging surrounding eye structures.

Combining their subspecialty experience and expertise, the doctors formed a surgical plan to include a keratoprosthesis, lens removal, and ECP laser treatment. “The keratoprosthesis was specially ordered for Eden to take into consideration the expected future growth of her eye,” Dr. Nehls said. Eden underwent surgery of her right eye in December 2015. Almost immediately, her parents noticed an improvement in how she visually interacted with them and her surroundings. Her improved vision also led to better development of her motor skills. Eden’s father, Andy, recalls his joy at watching his

“BEFORE SURGERY, WE NEVER SAW HER CRAWL TO GET A TOY. THERE WAS NO INCENTIVE - SHE COULDN’T SEE WHERE SHE WAS GOING.”

daughter’s response to visual stimuli. “Before surgery, we never saw her crawl to get a toy,” he said. “There was no incentive - she couldn’t see where she was going.” Now, Eden deliberately crawls for her toys. “Being able to see even helped her crawl better,” Burgmeier said.



After healing well postoperatively, the Burgmeiers wanted to know exactly what their daughter could see, but she was still too young to tell them. The UW-Madison Eye Clinic offers a unique vision testing capability of sweep visual evoked potential (VEP) testing for preverbal infants and children, a technology only available in a handful of centers in the country. It uses brain wave electroencephalogram recordings along the visual pathway to determine vision levels. The pediatric ophthalmology division receives regional patient referrals for this valuable diagnostic tool. Eden underwent sweep VEP testing, which confirmed visual acuity of 20/70. This was a significant improvement from her previous level of light perception only visual acuity before her surgery. Eden underwent the same surgical procedures for her left eye a few months later, also with significant visual improvement postoperatively.

Andy and mother Julie understand Eden will require lifelong care for her ocular condition. Eden requires regular, frequent visits to the UW-Madison Eye Clinic, so that Drs. Nehls and Bradfield can closely follow her keratoprosthesis, glaucoma and vision development. She needs daily eye drops to lower her eye pressure and prevent infection, plus Julie has learned to care for the soft contact lenses that Eden wears. Everyone is thrilled by her visual progress. "We are so thankful to have met Dr. Bradfield and Nehls," Andy said. "They did a really great job of taking care of our daughter and coming up with a successful game plan to overcome her vision challenges. Now we know she can have a normal life."



THOMAS



FEMTOSECOND LASER CATARACT SURGERY OFFERS IMPROVED PRECISION

UW Department of Ophthalmology and Visual Sciences offers a new, state-of-the-art option for cataract surgery, the femtosecond laser. This device is the next step in providing precision care to patients with cataracts. The femtosecond laser technology is now available for UW Health patients who have their cataract surgery at Madison Surgery Center.

Cataracts are a natural part of aging. With their development, the lens inside the eye becomes cloudy, affecting color vision, night driving and sharp focus. The surgery is common and carries few risks and most patients benefit immediately with a noticeable improvement in their quality of life.

The surgery involves making small incisions into the eye, removing the cloudy lens using ultrasound power and water. The intraocular replacement lens is inserted through the same incision.



Daniel Knoch, MD

The femtosecond laser can be used to perform parts of the cataract surgery which sometimes can result in bladeless surgery. "This really is the most precise tool for removing cataracts," said Daniel Knoch, MD, who has performed more than 100 cataract surgeries using the femtosecond laser at the William S. Middleton Memorial Veterans Affairs Hospital in Madison. "For appropriate patients, this is an excellent tool," he said. "The investment in the technology and the tool is another reason we provide remarkable care every day."

Heather Potter, MD, another cataract surgeon on the UW Health team agrees. "The femtosecond laser is the latest technology in our tech-savvy world," Potter said. "It is as far as you can go with cataract surgery right now, and I am excited we are there."



Heather Potter, MD

It is the accuracy and the precision of the femtosecond laser that led Todd, 60, of Madison, to wait for the laser to be in place before he had his cataract surgeries. When Todd's surgeon, Dr. Potter, recommended the femtosecond laser for his procedure, he wanted to do the research before he agreed. An eyeglass wearer since age six, Todd

elected to have astigmatism-correcting toric lenses implanted. "I am a structural engineer, and good vision is very important," Todd said. "I appreciate accuracy and precision, but they mean different things. What I saw with the femtosecond laser was something that is very accurate and very precise."

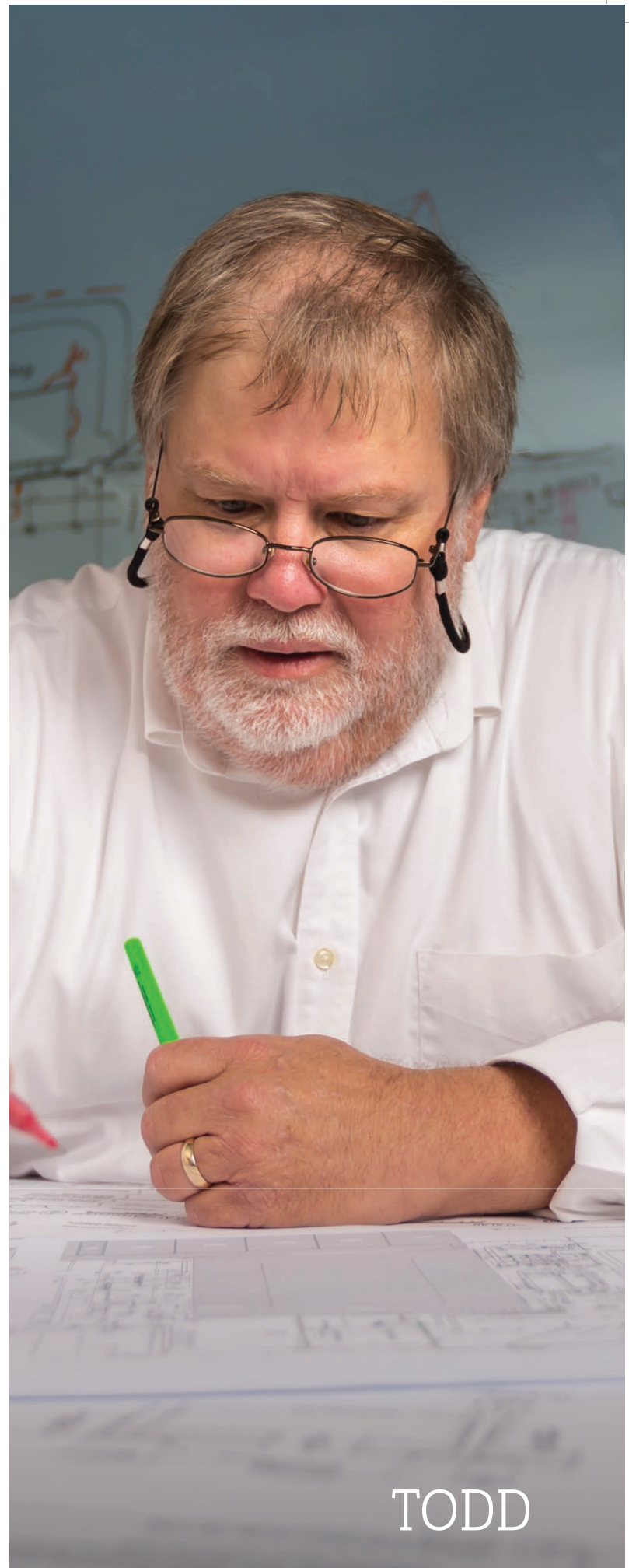
"Using the femtosecond allows for a perfect opening in the capsule," Dr. Potter said. "There are times when we won't use the laser, if a patient is not an appropriate candidate," she said. "But for many people, especially people who have mild astigmatism or who are having specialty lenses implanted, the femtosecond is a terrific option." The laser can help correct astigmatism during the procedure. It also can help make the incisions for a premium intraocular lens that corrects for astigmatism. As a result, patients are often able to get back to enjoying their activities sooner after this bladeless surgery.

The femtosecond laser does have a higher cost. However, in cases where Medicare or other insurance pays for a cataract procedure, the out-of-pocket cost can be minimal for the patient. "This is an important consideration for many of our patients, and we talk carefully about the advantages for each person, and whether this is the best method for them," Dr. Potter said.

Thomas Mackie, 61, of Middleton, a patient of Dr. Knoch, was diagnosed with a fast-forming type of cataracts in both eyes earlier this year. Mackie described how he had been severely nearsighted since he was twelve years old. Having spent his career in the medical device industry, Mackie felt very comfortable with the concept of high-tech medicine. "When Dr. Knoch told me about the precision of the femtosecond laser, I knew I was the right candidate for the surgery. I understood that the extraction of my damaged lenses would be more efficient and reliable," Mackie said.

During his femtosecond laser surgery earlier this year, Dr. Knoch implanted a regular lens in one of Mackie's eyes and an astigmatism-correcting toric lens in the other. A lifelong glasses wearer, Mackie now only needs glasses for reading. "I know how medicine often improves by quantum leaps," Mackie said. "And it is nice to know that UW is leading the charge with new technology."

Knoch sees having the latest technologies on-hand as a double bonus. "As a teacher, having this technology available for our residents means no matter where they practice, they are trained using state-of-the-art technology," Dr. Knoch said. "And as a physician, I know I'm giving my patients the best care available."



TODD



LEADERSHIP IN RESEARCH

CRUICKSHANKS' EPIDEMIOLOGICAL STUDIES ENDURE



Karen Cruickshanks, PhD

2016 marks the 23rd and 12th years, respectively of the Epidemiology of Hearing Loss Study (EHLS) and the Beaver Dam Offspring Study (BOSS), both ongoing longitudinal, cohort studies conducted in the city of Beaver Dam, Wisconsin. The BOSS participants are the adult offspring of the EHLS participants. Findings from these two studies are used to determine possible risk factors and interventions for age-related sensory disorders and to help predict future health care needs in the United States.

The BOSS measures vision and obtains ocular images, and both EHLS and BOSS measure hearing, olfaction, cognition, and cardiovascular health in study participants every 5 years. The BOSS is currently in its ten year follow-up examination phase and the EHLS recently concluded its twenty-one year examination phase. Examining multiple senses and numerous aspects of health in families and multiple generations allows for a more integrated and complete view of sensory health and aging. It also allows us to determine if the risk of sensory decline has changed in more recent generations.

The success of BOSS and EHLS stems from the tremendous commitment and support from study participants and the community of Beaver Dam. Their excitement for continuing participation is evidence of the community's desire to contribute to the health of future generations. The multigenerational aspect of these studies also aids in maintaining participation. The studies are a commonality

amongst family members and exams are viewed as an opportunity for familial bonding. Siblings and parents frequently schedule appointments together and exams often serve as an excuse for out-of-town participants to visit family and friends in Beaver Dam. The community's dedication to EHLS and BOSS is invaluable and serves to strengthen our overall results.

Participants in BOSS and EHLS have helped us learn many things about age-related sensory disorders. One of our most exciting findings is the possible connection between vascular health and sensory health. Ultrasound scans of the carotid arteries are obtained during study exams. Detailed images of the arteries are captured and arterial wall thickness and plaque are graded to determine the presence of subclinical atherosclerosis. We have found that subclinical atherosclerosis is associated with an increased risk of hearing impairment, age-related macular degeneration, decline in olfactory (smell) function, and cognitive decline. These findings suggest that some age-related decline in sensory health and cognitive health may be preventable by taking steps to improve cardiovascular health.

“ONE OF OUR MOST EXCITING FINDINGS IS THE POSSIBLE CONNECTION BETWEEN VASCULAR HEALTH AND SENSORY HEALTH.”

As our country's population continues to age, the desire to age healthily will persist. Community partnerships with epidemiological studies of aging, like that of Beaver Dam with EHLS and BOSS, will continue to provide much needed data to improve the likelihood of healthy aging.

Dr. Karen Cruickshanks' Lab Team



FUNDUS PHOTOGRAPH READING CENTER CONTINUES ORIGINAL MOMENTUM



Barbara Blodi, MD

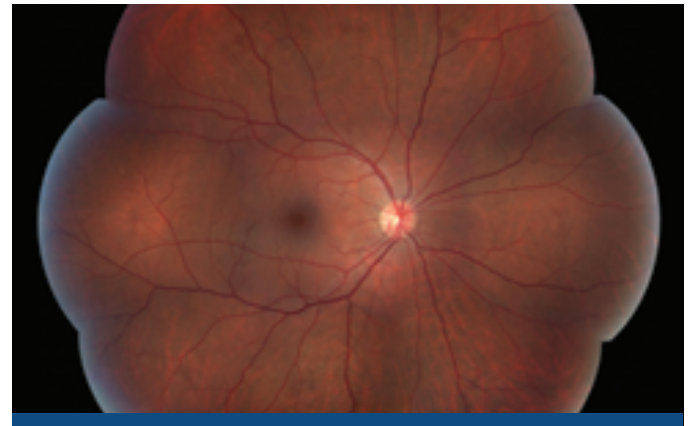
Research in the Department of Ophthalmology and Visual Sciences extends beyond the laboratory to a clinical research lab, the Fundus Photograph Reading Center (FPRC). The FPRC is a retinal imaging lab established by Dr. Matthew Davis in 1970 in order to independently analyze – or “read” – photographs from participants in the first clinical trials of diabetic retinopathy.

The FPRC provides this top quality retinal imaging data to researchers worldwide. “Our aim is to provide an independent source of imaging data – we evaluate retinal images for trials with small numbers of patients as well as trials with thousands of patients. In addition, we collaborate with the study leaders to analyze the results,” said Barbara Blodi, MD, professor, retina specialist and medical director of the FPRC. “Based on our wide range of clients including the National Institutes of Health, pharmaceutical companies, small bio-tech startups and individual researchers, we know our work is making a difference on many different levels.”

From the FPRC’s inception, staff has collaborated with clinical researchers from the National Eye Institute to create disease-specific severity scales. Importantly, these scales are used to determine both the severity of a disease and the individual patient’s prognosis. This work began with Dr. Davis who developed the diabetic retinopathy severity scale in the 1970s. This scale is based solely on retinal photographs and remains the gold standard for the ocular assessment of patients with diabetes.

“OUR SCIENTIFIC INPUT PROVIDES A LOT OF CLARITY TO OUR CLIENTS.”

The FPRC staff consists of a dedicated academic team of both certified readers and photographers, all of whom have longstanding expertise in evaluating retinal images and imaging systems. FPRC Research Director, Amitha Domalpally MD, explains. “As we interpret each retinal image, our goal is to identify any changes from the normal retinal structure. FPRC staff use well-developed grading protocols and disease classifications in evaluating each individual image.” In addition to the reading of images, the FPRC provides sponsors with



An ocular photo montage used in the study of eye disease in AIDS patients

guidance on what imaging tests would be most beneficial and how to interpret the imaging data. “Our scientific input provides a lot of clarity to our clients,” Domalpally said. The FPRC research team is backed up by administrative staff within the Department of Ophthalmology and Visual Sciences.

Through its research, the FPRC supports the academic mission of the Department and the University. Both Blodi and Domalpally, along with retina faculty Michael Altaweel, MD, and Mihai Mititelu, MD, MPH, serve as the principal investigators for the imaging studies performed at the Reading Center. As part of its academic mission, the FPRC routinely involves medical students, residents and fellows in the development of new measurement tools. Innovation at the FPRC is currently focused on accurately identifying and measuring retinal features on new retinal cameras and retinal scans – specifically wide-field retinal imaging and optical coherence tomography angiography. These new retinal imaging techniques require advanced measurement tools in order to provide more information on the structure and function of the retina – this, in turn, helps sponsors determine whether or not a treatment is beneficial.

Over the past 50 years the FPRC has made major contributions to ophthalmic clinical trials and has produced landmark changes in the treatment of all-too-common diseases such as diabetic retinopathy, macular degeneration, retinal vein occlusion and uveitis. However, Blodi notes that “our work is not yet done as many patients worldwide are still suffering vision loss from retinal disease.”

With that in mind, Blodi and the FPRC staff will continue the momentum of the first five decades in fulfilling Dr. Davis’ original vision to foster retinal research and to support clinical investigators around the world.



GRANTS

Altaweel, Michael M

NEI

Macular Edema Treatment Trials Associated with Must (META-MUST)

PENNSYLVANIA STATE UNIVERSITY

Score 2 Comparative Trial

ALCON

Two year randomized, double-masked, multicenter, three-arm study comparing the efficacy and safety of RTH258 versus Aflibercept in subjects with age-related macular degeneration

Blodi, Barbara A

NEI

Score2 Comparative Trial (SCT)

ACUCELA

A Phase 2b/3 randomized, double-masked, dose-ranging multicenter study comparing the efficacy and safety of ACU-4429 with placebo for treatment of geographic atrophy associated with dry age-related macular degeneration

OPHTHOTECH CORPORATION

A Phase 3 randomized, double-masked, controlled trial to establish the safety and efficacy of intravitreal administration of Fovista (anti-PDGF-B perglycated aptamer) administered in combination with Lucentis compared to Lucentis monotherapy in subjects with subfoveal neovascular age-related macular degeneration

LOWY MEDICAL RESEARCH INSTITUTE

A Phase 2 multicenter, randomized clinical trial of ciliary neurotrophic factor (CNTF) for macular telangiectasia Type 2 (MacTel)

GENENTECH, INC

A Phase 3, multicenter, randomized, double-masked, sham-controlled study to assess the efficacy and safety of Lampalizumab administered intravitreally to patients with geographic atrophy secondary to age-related macular degeneration

ICONIC THERAPEUTICS INC

A Phase 2 randomized, double-masked, multicenter, active-controlled study evaluating administration of repeated intravitreal doses of hi-con1 in patients with choroidal neovascularization secondary to age related macular degeneration

Bradfield, Yasmin S

JAEB CENTER FOR HEALTH RESEARCH/NIH

Pediatric eye disease investigator group: ATS5: A randomized trial to evaluate 2 hours of daily patching for amblyopia in children 3 - 7 years old

Brandt, Curtis R

NEI

Core Grant for Vision Research Virulence Genes in Herpes Simplex Virus Ocular Infection

AMEBAGONE, INC./NIH

Biological treatment of bacterial keratitis

RETINA RESEARCH FOUNDATION

Gene therapy for retinal degeneration

Colley, Nansi J

NEI

Molecular Studies of Retinal Degeneration

Cruickshanks, Karen J

NEI

Epidemiology of Age-Related Hearing Loss Familial and Birth Cohort Effects On the Aging Senses

Danis, Ronald P

MOUNT SINAI SCHOOL OF MEDICINE/NIH

Immunologic determinants of age-related macular degeneration

GEORGE WASHINGTON UNIVERSITY/NIH

Epidemiology of Diabetes interventions and complications data coordinating center

Gamm, David M

NEI

Mechanisms of Retinogenesis in Human Stem Cells

RESEARCH TO PREVENT BLINDNESS

Nelson Trust award for retinitis pigmentosa

RESEARCH TO PREVENT BLINDNESS

Catalyst Award for stem cell research approaches for age-related macular degeneration. Another title is - Optimizing cell transplantation strategies for AMD: Roles of mitochondrial integrity and function in hiPSC-RPE survival

CHOROIDEREMIA RESEARCH FOUNDATION

Production and testing of CHM hiPSC derived retinal and vascular cells

Gottlieb, Justin L

JAEB CENTER FOR HEALTH RESEARCH/NIH

Diabetic retinopathy clinical research network protocol V - Treatment of central-involved diabetic macular edema in eyes with very good visual acuity

Kaufman, Paul L

NEI

Extralenticular Aspects of Accommodation and Presbyopia
RESEARCH TO PREVENT BLINDNESS
Stein Innovation Award - Trabecular meshwork, Schlemm's canal drug, gene delivery via minimally invasive glaucoma surgery devices

GLAUCOMA RESEARCH FOUNDATION

Gene therapy for glaucoma

SUBCONTRACT TO UNIVERSITY OF MIAMI

Endogenous Lipid Protectants Against Neurodegeneration

Klein, Ronald

NIDDK

Retinal Vessel Biomarkers for Risk Assessment of Incident Diabetic Complications in The WESDR

NEI

Epidemiology of Age-Related Macular Degeneration and Other Retinal Diseases Epidemiology of Retinopathy and Other Complications in Long Term Type 1 Diabetes

Klein, Ronald/Gangnon, Ronald Edward/Klein, Barbara E K

JUVENILE DIABETES RESEARCH FOUNDATION

Retinal vessel biomarkers for risk assessment of incident diabetic complications in the Wisconsin Epidemiologic Study of Diabetic Retinopathy

Klein, Ronald/Klein, Barbara E K

JOSLIN DIABETES CENTER INC./JUVENILE DIABETES RESEARCH FOUNDATION

Validation of protective factors from diabetic complications

Klein, Ronald/Klein, Barbara E K/Liu, Yao

NATIONAL OPINION RESEARCH CENTER/NIH

Establish a vision and eye health surveillance system for the nation

Lakkaraju, Aparna

NEI

Mechanisms of Cellular Clearance in the Retinal Pigment Epithelium Mechanisms of Cellular Clearance in the Retinal Pigment Epithelium

BRIGHTFOCUS FOUNDATION

Can RPE-derived exosomes contribute to subretinal drusenoid deposits

MACULAR SOCIETY

Modulating mitochondrial dynamics in the retinal pigment epithelium as a therapeutic strategy for macular dystrophies

Levin, Leonard A

NEI

Development of Redox-Active Therapies for spheric Optic Neuropathy

Liu, Yao

NEI

Advancing Integration of Tele-Ophthalmology For Diabetic Retinopathy In Rural, Multi-Payer Settings

ERIE PHARMACEUTICALS INC.

PG324-CS301, a prospective, double-masked, randomized, multicenter, active-controlled, parallel-group 12-month study assessing the safety and ocular hypotensive efficacy of PG324 Ophthalmic Solution compared to AR- 3324 Ophthalmic Solution, 0.02% and Latanoprost Ophthalmic Solution, 0.005% in subjects with elevated intraocular pressure

AMERICAN GLAUCOMA SOCIETY

Mentoring Award for Physician Scientists (MAPS) - Macular pigment levels as a glaucoma risk factor in the Carotenoids in Age-Related Eye Disease Study 2 (CAREDS2)

ALCON

GLT320a-P001 - 24 hour intraocular pressure control with Brinzolamide 1%/Brimonidine 0.2% ophthalmic suspension vs. vehicle

Mares, Julie A

NEI

Macular Pigment in Aging And Disease

McLellan, Gillian

BRIGHTFOCUS FOUNDATION

TGF-beta and glaucoma progression in a spontaneous model

Mititelu, Mihai

PANOPTICA

Phase 1 open-label, multi-center trial with randomization to dose to evaluate the safety and tolerability of topical ocular PAN-90806 in patients with neovascular age-related macular degeneration

REGENERON, INC

A randomized, double-masked, active controlled Phase 2 study of the efficacy, safety, and tolerability of repeated doses of intravitreal REGN910-3 in patients with diabetic macular edema

REGENERON, INC

A randomized, double-masked, active controlled Phase 2 study of the efficacy, safety, and tolerability of repeated doses of intravitreal REGN910-3 in patients with neovascular age related macular degeneration

GRANTS CONTINUED...

OHR PHARMACEUTICALS, INC

A Phase 3 study of the efficacy and safety of Squalamine lactate ophthalmic solution, 0.2% twice daily in subjects with neovascular age-related macular degeneration

Nehls, Sarah M

VISIONCARE OPHTHALMIC TECHNOLOGIES, INC

A prospective, multicenter post-approval study (PAS) of Visioncare's implantable miniature telescope in patients with bilateral severe to profound central vision impairment associated with end-stage age-related macular degeneration

Nickells, Robert W

NEI

Molecular Mechanisms of Retinal Ganglion Cell Death

Sheibani, Nader

NEI

Novel Antiangiogenic Peptides for Treatment of Exudative AMD

Struck, Michael C

OMEROS

A phenylephrine controlled study of the effect of OMS302 added to irrigation solution on intraoperative pupil diameter and postoperative pain in children ages birth through 3 years undergoing unilateral cataract extraction w/without lens replacement

Young, Terri L

NEI

Molecular Genetics of High Myopia

KEY

Federal Funding

NIH - National Institutes of Health

NEI - National Eye Institute

NIDDK - National Institute of Diabetes and Digestive and Kidney Diseases





CLINICAL TRIALS

SUMMARY

The Ophthalmology Clinical Trials Research Unit at the University of Wisconsin has conducted translational research with participating human subjects for over 25 years. The trials are designed to evaluate the safety and efficacy of new laser treatments, oral and intravenous medications, intravitreal injections, surgical procedures and devices in the treatment of ophthalmic diseases. Clinical trials are a valuable means of providing alternative treatment options for our patients. In many cases, participation in an investigational trial may be the last alternative for patients who have exhausted approved treatments. Indisputably, the most important role of the Clinical Trials Research Unit is to guide patients through the treatment process in sometimes difficult circumstances, implementing not only the most current medical techniques and treatments but also compassionate and knowledgeable care committed to protecting their safety.

Clinical Trials Research Unit Staff

- Jennie Perry-Raymond** – Clinical Trials Lead Administrator
- Angela Adler** – Study Coordinator/Regulatory Specialist
- Kristine Dietzman** – Study Coordinator
- Christopher Smith** – Study Coordinator
- Nickie Stangel** – Study Coordinator

Clinical Trials

ACU-4429 Geographic Atrophy Study

This is a two-year, phase 2b/3 multicenter, randomized, double-masked, dose-ranging study for patients with geographic atrophy associated with dry macular degeneration to compare the efficacy and safety of a new oral treatment agent. The objective of this study is to determine if the study drug Emixustat Hydrochloride (ACU-4429) reduces the rate of progression of geographic atrophy compared to placebo in subjects with dry age-related macular degeneration.

Principal Investigator: **Barbara Blodi, MD**
Sponsor: **Acucela Pharmaceuticals**
Condition: **Geographic atrophy due to dry age-related macular degeneration**

OPH-1002 Fovista Study

The objective of this phase 3, randomized, double-masked, controlled trial study is to evaluate the safety and efficacy of the study drug Fovista™ intravitreal administration when administered in combination with Lucentis® compared to Lucentis® alone in subjects

with subfoveal choroidal neovascularization secondary to age-related macular degeneration.

Principal Investigator: **Barbara Blodi, MD**
Sponsor: **Ophthotech Corporation Pharmaceutical**
Condition: **Neovascular age-related macular degeneration**

Study of Comparative Treatments for Retinal Vein Occlusion 2 (SCORE2)

The primary objective of this multicenter, prospective, randomized study of subjects with macular edema secondary to central retinal vein occlusion is to test for non-inferiority based on mean change from baseline visual acuity at 6 months for eyes randomized to intravitreal bevacizumab treatment every 4 weeks compared with eyes randomized to intravitreal aflibercept treatment.

Principal Investigator: **Michael Altaweel, MD**
Sponsor: **National Institutes of Health, National Eye Institute**
Condition: **Macular edema secondary to central retinal vein occlusion**

CHROMA Geographic Atrophy Study

The objective of this phase 3, multicenter, randomized, double-masked, sham-controlled study is to evaluate the efficacy of intravitreal injections of the study drug lampalizumab administered every 30 or every 45 days compared to sham (observation) control. The change measured by fundus autofluorescence is area of geographic atrophy at 12 months compared to baseline.

Principal Investigator: **Barbara Blodi, MD**
Sponsor: **Genentech-Roche**
Condition: **Geographic atrophy secondary to age-related macular degeneration**

EMERGE IT-002 Study

The objective of this phase 2, randomized, double-masked, multicenter study is to evaluate the safety of repeated intravitreal injections of the study drug HL-CON1 administered alone or in combination with ranibizumab compared to ranibizumab alone in patients with choroidal neovascularization secondary to wet age related macular degeneration.

Principal Investigator: **Barbara Blodi, MD**
Sponsor: **Iconic Therapeutics**
Condition: **Wet age-related macular degeneration**

CLINICAL TRIALS CONTINUED...

HAWK Age-related Macular Degeneration Study

The objective of this two-year, randomized, double-masked, multicenter, three-arm trial is to demonstrate that the study drug RTH258 is not inferior to Aflibercept with respect to change in best-corrected visual acuity from baseline at 48 weeks in study subjects with age-related macular degeneration.

Principal Investigator: **Michael Altaweel, MD**

Sponsor: **Alcon Pharmaceuticals**

Condition: **Neovascular age-related macular degeneration**

Diabetic Retinopathy Clinical Research Network Protocol V (DRCR V)

The aim of this trial for study subjects with diabetic retinopathy is to compare the safety and efficacy of prompt focal/grid photocoagulation laser treatment, observation, or prompt intravitreal anti-vascular endothelial growth factor in eyes with central-involved diabetic macular edema and good visual acuity defined as a Snellen equivalent of 20/25 or better.

Principal Investigator: **Justin Gottlieb, MD**

Sponsor: **National Institutes of Health, National Eye Institute**

Condition: **Diabetic macular edema**

Pediatric Eye Disease Investigator Group Intermittent Exotropia Trial 1

The objective of this trial is to evaluate the effectiveness of bilateral rectus muscle recession versus unilateral lateral rectus muscle recession with medial rectus muscle resection procedures for the treatment of basic type and pseudo-divergence excess type intermittent exotropia.

Principal Investigator: **Yasmin Bradfield, MD**

Sponsor: **National Institutes of Health, National Eye Institute**

Condition: **Intermittent exotropia**

Electroretinogram and Multifocal Visual Evoked Potential Testing in Glaucoma Testing

The aim of this pilot trial is to determine if multifocal electroretinogram or multifocal visual evoked potential tests can detect visual field differences between patients with three severity levels of glaucoma based on standard classifications set by the American Glaucoma Society (glaucoma suspect/mild, moderate, and advanced).

Principal Investigator: **Yao Liu, MD**

Sponsor: **Investigator Initiated**

Condition: **Glaucoma**

Implantable Miniature Telescope for Age-related Macular Edema

The objective of this prospective, multicenter, post-approval study is to assess the safety of the implanted intraocular telescope in patients with bilateral severe vision impairment associated with end-stage age-related macular degeneration. This will be measured by the cumulative incidence of vision-impairing corneal edema leading to persistent loss of visual acuity > 2 lines at a 5 year assessment.

Principal Investigator: **Sarah Nehls, MD**

Sponsor: **Visioncare Ophthalmic Technologies**

Condition: **Severe vision loss associated with age-related macular degeneration**

Molecular Genetics of Myopia

The purpose of the study is to identify the genes involved in eye growth, specifically in individuals and families with high-grade myopia (nearsightedness). This effort may lead to effective therapies for the severe forms of this potentially blinding eye disease.

Principal Investigator: **Terri Young, MD, MBA**

Sponsor: **National Institutes of Health, National Eye Institute**

Condition: **Myopia**

OMS302 Pediatric Cataract Trial

The primary objective of this randomized, double-masked parallel group study is to evaluate the effect of study drug OMS302 compared to phenylephrine administered in the irrigation solution during cataract extraction with or without lens replacement on intraoperative pupil diameter, acute postoperative pain, and safety.

Principal Investigator: **Michael Struck, MD**

Sponsor: **Omeros Corporation**

Condition: **Children aged birth to three years with a unilateral cataract**

Mercury 1 Study

The aim of this prospective, double-masked, randomized, multi-center, active-controlled, parallel-group 12-month trial is to hourly evaluate the ocular hypotensive efficacy of the topical study drug PG324 relative to each of its active components, AR 13324 and Latanoprost, in subjects with elevated intraocular pressure.

Principal Investigator: **Yao Liu, MD**
Sponsor: **Aerie Pharmaceuticals**
Condition: **Glaucoma**

Bevacizumab Against Recurrent Retinal Detachment Study

The aim of this prospective, interventional trial is to investigate if intravitreal bevacizumab injection during primary vitrectomy surgery reduces recurrent retinal detachment and proliferative vitreoretinopathy.

Principal Investigator: **Michael Altaweel, MD**
Sponsor: **Investigator Initiated**
Condition: **Retinal detachment**

Albinism Trial-Vision Response to Dopamine Study

The objective of this prospective, interventional trial is to determine vision change in response to oral dopamine administration.

Principal Investigator: **Michael Struck, MD**
Sponsor: **Vision of Children Foundation**
Condition: **Albinism**

The Macular Telangiectasia Study

This is an observational and registry study of subjects with macular telangiectasia type 2. The aim of this natural history study is to better characterize the clinical features of this condition over 5-10 years.

Principal Investigator: **Barbara Blodi, MD**
Sponsor: **Lowy Medical Research Institute**
Condition: **Macular telangiectasia type 2**

Relative Afferent Pupillary Defect Study

This observational study objective is to compare pupillary reactivity to light stimulus in subjects with optic nerve dysfunction relative to normal control subjects using computerized binocular infrared pupillography testing.

Principal Investigator: **Judy Chen, MD, PhD**
Sponsor: **Investigator Initiated**
Condition: **Optic neuritis**

Neurotrophic Factor for Macular Telangiectasia Type 2 Study

The aim of this phase 2, multicenter, randomized clinical trial is to investigate the effect of intravitreal injections of Ciliary Neurotrophic Factor on visual acuity and fundus retinal vasculature in subjects with macular telangiectasia type 2. New drug-delivery technology enables controlled, continuous, long-term therapeutic effect in the 24-month project interval.

Principal Investigator: **Barbara Blodi, MD**
Sponsor: **Lowy Medical Research Institute**
Condition: **Macular telangiectasia type 2**

Carotenoids in Age-Related Eye Disease Study 2 (CAREDS2) Macular Pigment in Aging and Disease

There are three aims for this observational study:

Aim 1: Determine whether macular pigment optical density at baseline is directly related to lower risk for the incidence/progression of age-related macular degeneration

Aim 2: Determine relationships between macular pigment optical density at baseline to structural and functional aging of the neurosensory retina at follow-up

Aim 3: Determine whether macular pigment optical density declines with age, and evaluate modifiable factors that lower age-related declines.

Principal Investigator: **Julie Mares, PhD, Barbara Blodi, MD**
Sponsor: **National Institutes of Health, National Eye Institute**
Condition: **Healthy volunteers of the Women's Health Initiative**

EyeGate Uveitis Study

A prospective, multi-center, randomized, double-masked, positive-controlled phase 3 clinical trial designed to evaluate the safety and efficacy of ocular iontophoresis with dexamethasone phosphate ophthalmic solution EGP-437 using the EyeGate® II Drug Delivery System compared to prednisolone acetate ophthalmic suspension (1%) in patients with non-infectious anterior segment uveitis.

Principal Investigator: **Neal Barney, MD**
Sponsor: **EyeGate Pharmaceuticals**
Condition: **Non-infectious anterior segment uveitis**

CLINICAL TRIALS CONTINUED...

OHR-1601 Study

The objective of this phase 3 study is to evaluate the efficacy and safety of the study drug squalamine lactate ophthalmic solution (OHR-1601) instilled twice daily in combination with intravitreal injections of ranibizumab in treatment-naïve subjects with neovascular age-related macular degeneration.

Principal Investigator: **Mihai Mititelu, MD, MS**

Sponsor: **OHR Pharmaceuticals**

Condition: **Newly diagnosed neovascular age-related macular degeneration**

Alcon GLT320a-P001 Study

The aim of this study is to delineate superior 24-hr intraocular pressure control with topical study drugs Brinzolamide 1%, Brimonidine 0.2% versus sham (observation) vehicle control in subjects with open angle glaucoma or ocular hypertension.

Principal Investigator: **Yao Liu, MD**

Sponsor: **Alcon Pharmaceuticals**

Condition: **Open-angle glaucoma or ocular hypertension**

Regeneron R910-3-DME-1518 Study

The primary objective of this randomized, double-masked, active-controlled, phase 2 study is to compare the efficacy, safety, and tolerability of repeated doses of intravitreal-administered study drug REGN910-3 compared to intravitreal aflibercept with visual acuity assessment in patients with diabetic macular edema.

Principal Investigator: **Mihai Mititelu, MD, MS**

Sponsor: **Regeneron Pharmaceuticals**

Condition: **Diabetic macular edema**

Regeneron R910-3-AMD-1517 Study

The primary objective of this randomized, double-masked, active-controlled, phase 2 study is to compare the efficacy, safety, and tolerability of repeated doses of intravitreal-administered study drug REGN910-3 compared to intravitreal aflibercept with visual acuity assessment in patients with age-related macular degeneration.

Principal Investigator: **Mihai Mititelu, MD, MS**

Sponsor: **Regeneron Pharmaceuticals**

Condition: **Age-related macular degeneration**

Diabetic Retinopathy Clinical Research Network Protocol W (DRCR W)

The objective of this trial for study subjects with proliferative diabetic retinopathy or diabetic macular edema is to determine the efficacy and safety of intravitreal aflibercept injections versus sham injections (observation) for to temper further progression of these complications.

Principal Investigator: **Justin Gottlieb, MD**

Sponsor: **National Institutes of Health, National Eye Institute**

Condition: **Proliferative diabetic retinopathy or diabetic macular edema**

Among all ophthalmology departments in the USA, the UW-Madison Department of Ophthalmology and Visual Sciences is ranked



IN PUBLICATION
PRODUCTIVITY
IN ACADEMIC
OPHTHALMOLOGY
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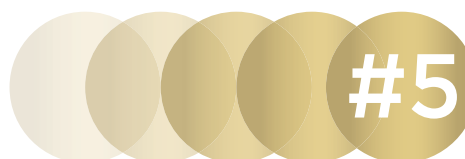
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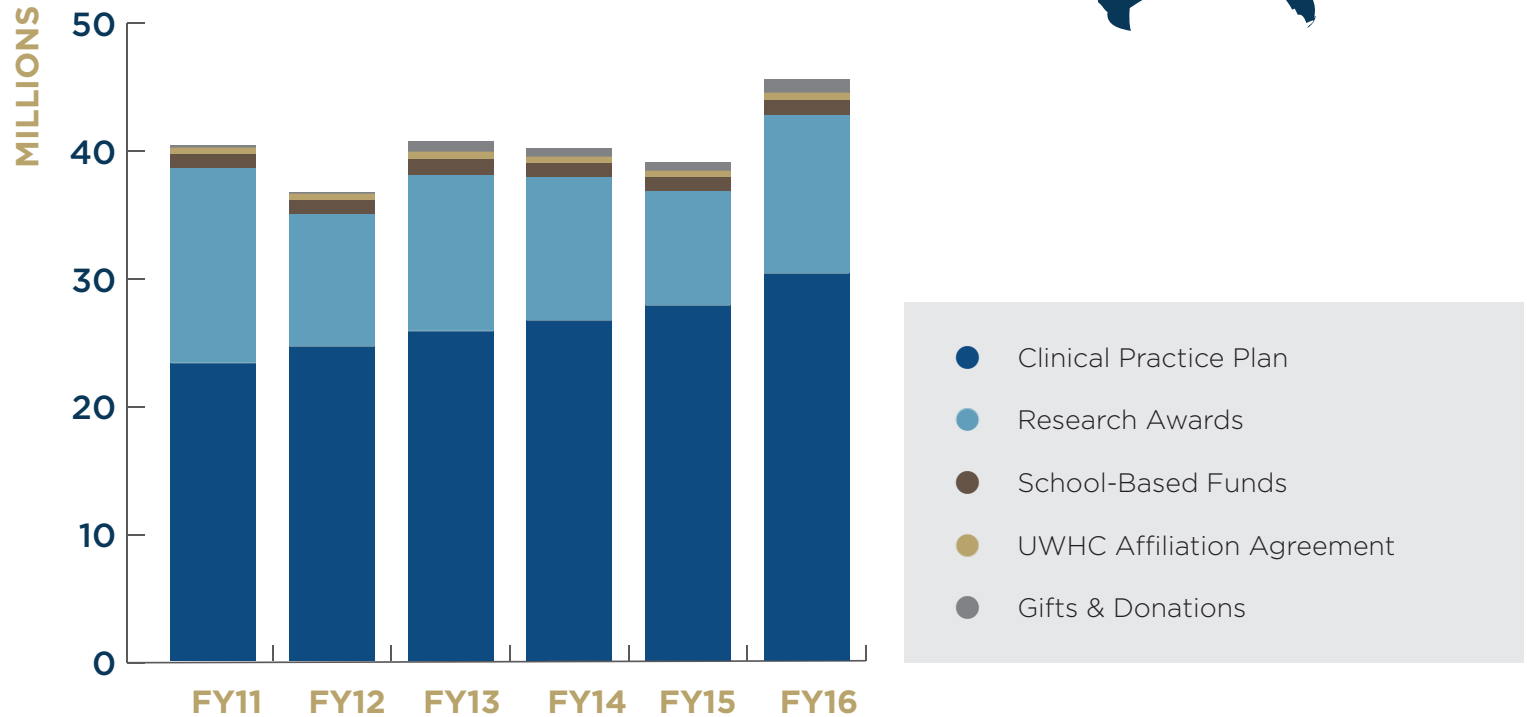
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