RETINA RESEARCH FOUNDATION

2014 annual report

Retina Research Foundation Board of Directors

UNIVERSITÉ DE LAUSANNE
SOCIÉTÉ SUISSE D'OPHTALMOLOGIE

MÉDAILLE GONIN

EN L'AN MCMXXXVII

L'UNIVERSITÉ DE LAUSANNE

TENANT À HONORER LA MÉMOIRE D'UN DE SES MAÎTRES
QUI L'A ILLUSTRÉE PAR UNE DÉCOUVERTE INSIGNE
FRUIT D'UN TRAVAIL OPINIÂTRE

ET

LA SOCIÉTÉ SUISSE D'OPHTALMOLOGIE

DÉSIREUSE D'AFFIRMER SA RECONNAISSANCE
POUR L'ACTIVITÉ FÉCONDE DE L'UN DE SES FONDATEURS
PATRIOTE ARDENT ET BIENFAITEUR DE L'HUMANITÉ

ONT INSTITUÉ CONJOINTEMENT

LA MÉDAILLE GONIN

AFIN DE STIMULER LE PROGRÈS DE L'OPHTALMOLOGIE
AUQUEL POUR UNE GRANDE PART A CONTRIBUÉ
CELUI QUI A CRÉÉ LE TRAITEMENT
DU DÉCOLLEMENT RÉTINIEN

LA MÉDAILLE GONIN

EST DÉCERNÉE PÉRIODIQUEMENT PAR LES SOINS
DU CONSEIL INTERNATIONAL D'OPHTALMOLOGIE
À UN OPHTALMOLOGISTE DE MÉRITE RECONNU

EN L'AN MMXIV ELLE A ÉTÉ ATTRIBUÉE AU DOCTEUR

ALICE R. McPHERSON

LAUSANNE

UNIVERSITÉ DE LAUSANNE
LE RECTEUR

SOCIÉTÉ SUISSE D'OPHTALMOLOGIE
LE PRÉSIDENT

The Gonin Medal Diploma

Cover: **The Gonin Medal**

Retina Research Foundation

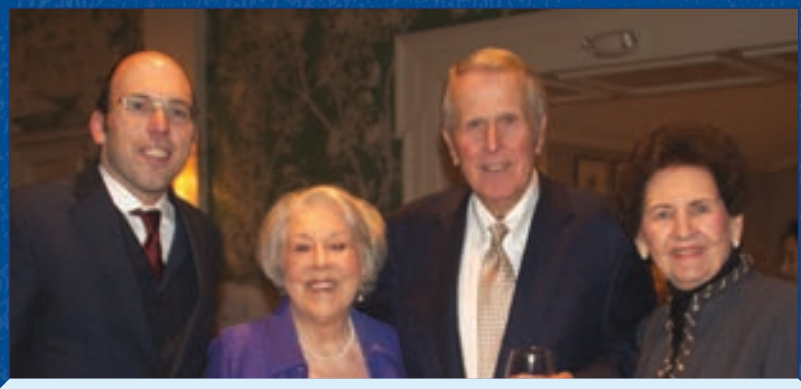
Annual Report
2014

Table of Contents

Dr. Alice McPherson and Dr. Frank Eggleston

Ames Smith and Margaret Farese

Mike Patrick and Malcolm Wooley



Dr. Petros Carvounis, Jacque Royce, Joe and Kathryn Coleman

Rich Walton, Dean Malouta, Rose Haché, Bettie Lee, Suzanne Miller and Shara Fryer

Chairman's Message

Dear Friends,

The year 2014 marks a milestone for Retina Research Foundation. This year the accomplishments of the past 45 years were recognized worldwide with the awarding of the Gonin Medal to Dr. Alice McPherson, Founder and President. This Medal is only awarded every four years, and the selection is made by the International Council of Ophthalmology (ICO) Board of Trustees. The mission of the ICO is "to enhance ophthalmic education and improve access to the highest quality eye care in order to preserve and restore vision for the people of the world."

Prior Gonin Medalists have included the most outstanding and influential historical figures in ophthalmology. In selecting Dr. McPherson as Gonin Medalist, ICO honored her lifetime achievements, and RRF was one of her two key contributions that have improved vision care worldwide:

> "In 1960, Dr. McPherson began practice as the first full-time woman vitreoretinal specialist in the world, and she is now a recognized leader in her field. She established the Retina Service at Baylor College of Medicine, Houston, Texas, in 1960, where she pioneered scleral buckling procedures, cryopexy, and laser therapy in the treatment of retinal diseases.
>
> In 1969, Dr. McPherson founded the Retina Research Foundation (RRF) and is the organization's President and Scientific Advisor. The RRF has become one of the nation's leading eye research organizations dedicated solely to the eradication of retinal diseases."
>
> *Excerpt from WOC2014 Tokyo program (World Ophthalmology Congress)*

Instituted in 1937, the Gonin Medal is the oldest and most prestigious medal in ophthalmology. In the congratulatory words of J. J. De Laey, MD, Vice-president of ICO, the "Gonin medal is the highest honor to be bestowed on an ophthalmologist." We are proud to share this honor with you. Each of our programs in research and education is only possible thanks to your interest in our mission.

As you view this year's report, remember that although many questions remain unanswered, it is an exciting and promising time in vision research. The outlook is bright, with current research discoveries at the basic science level paving the way for improved patient outcomes of the future.

With gratitude,

Frank K Eggleston, DDS

Frank K. Eggleston, DDS
Chairman

Overview of Research - 2014

Retina Research Foundation supports an exemplary variety of programs in retina research around the world. The following is a brief recap of RRF research supported in 2014, which illustrates the wide scope of RRF activities.

RRF Pilot Study Grants – Investigation of New Research Topics

Baylor College of Medicine, Houston, TX

- Samuel Wu, PhD – Kayser Research Project
- Benjamin Frankfort, MD, PhD – Mueller Research Project
- Milan Jamrich, PhD – Lawrence Research Project
- Rui Chen, PhD – Manning Research Project
- Graeme Mardon, PhD – Miller Research Project
- Richard Hurwitz, MD – Wilson Research Project

University of Texas Medical Branch-Galveston, Galveston, TX

- Wenbo Zhang, PhD – Basic Research Project

Texas A&M Health Science Center, Temple, TX

- Lih Kuo, PhD – Gueymard Research Grant

University of Wisconsin, Madison, WI

- Curtis Brandt, PhD – Murfee Macular Degeneration Project
- Ruchira Singh, PhD – Basic Research Project

Indiana University, Indianapolis, IN

- Timothy Corson, PhD – Basic Research Grant

Georgia Regents University, Augusta, GA

- Ming Zhang, MD, PhD – Basic Research Grant

The City College of New York, New York, NY

- Mark Emerson, PhD – Basic Research Grant

University of Utah, John Moran Eye Center, Salt Lake City, UT

- Wolfgang Baehr, PhD – Basic Research Project

RRF Cox Macula Society Research Grant – administered by The Macula Society

- Demetrios G. Vavvas, MD – Massachusetts Eye and Ear Infirmary, Boston, MA

Research Chairs – Ongoing Proven Research Projects

Baylor College of Medicine, Houston, TX

- Ching-Kang Jason Chen, PhD – RRF Research Chair

University of Wisconsin, Madison, WI

- Akihiro Ikeda, PhD – Helmerich Chair, Assoc. Director, McPherson Eye Research Institute
- Nader Sheibani, PhD – RRF Research Chair
- David Gamm, MD, PhD – Humble Distinguished Director, McPherson Eye Research Institute
- Arthur S. Polans, PhD – Murfee Chair, McPherson Eye Research Institute
- Christine Sorenson, PhD – Albert Chair, McPherson Eye Research Institute

Overview of Research - 2014

Research Professorships – Ongoing Proven Research Projects

University of Wisconsin, Madison, WI

Jeremy Rogers, PhD – Gamewell Professor, McPherson Eye Research Institute
Nansi Jo Colley, PhD – Matthews Professor, McPherson Eye Research Institute
Aparna Lakkaraju, PhD – Brown Professor, McPherson Eye Research Institute

Established Awards – Awards Recognizing Lifetime Achievement

RRF Award of Merit – presented by The Retina Society – Philadelphia, PA – September 13
Peter A. Campochiaro, MD – Johns Hopkins Wilmer Eye Institute, Baltimore, MD

RRF Kayser International Award – presented by International Society for Eye Research (ISER) – San Francisco, CA – July 23
Robert E. Marc, PhD – John Moran Eye Center, Salt Lake City, UT

RRF Pyron Award – presented by American Society of Retina Specialists (ASRS) – San Diego, CA – August 10
Andrew Schachat, MD – Cleveland Clinic, Cleveland, OH

CL Schepens MD/AAO Award – presented by American Academy of Ophthalmology (AAO) and Schepens International Society (SIS) – Chicago, IL – October 17
Jerry A. Shields, MD – Wills Eye Hospital, Philadelphia, PA

RRF Gonin Lecturer – presented by Club Jules Gonin – Zurich, Switzerland - September 5
Frank G. Holz, MD – University of Bonn, Bonn, Germany

Gonin Medal – presented by International Council of Ophthalmology in affiliation with University of Lausanne and Swiss Ophthalmological Society – Tokyo, Japan – April 2
Alice R. McPherson, MD – Baylor College of Medicine, Houston, TX

Paul Kayser/RRF Global Award – presented by Pan-American Association of Ophthalmology (PAAO) – will be presented again in 2015

International Fellowships – Advanced Subspecialty Training

ICO – RRF Helmerich International Fellowships – administered by International Council of Ophthalmology Foundation (ICOF)
Guillermo Salcedo-Villanueva, MD – from Mexico to University of Colorado, Denver, CO
Mehran Zarei-Ghanavati, MD – from Iran to Sussex Eye Hospital, Brighton, UK

Gillingham Pan-American Fellowships – administered by Pan-American Association of Ophthalmology (PAAO)
Cristhian Urzua Salinas, MD – from Chile to Shiley Eye Center, La Jolla, CA
Natalia Camacho Espinosa, MD – from Colombia to National Eye Institute, Bethesda, MD

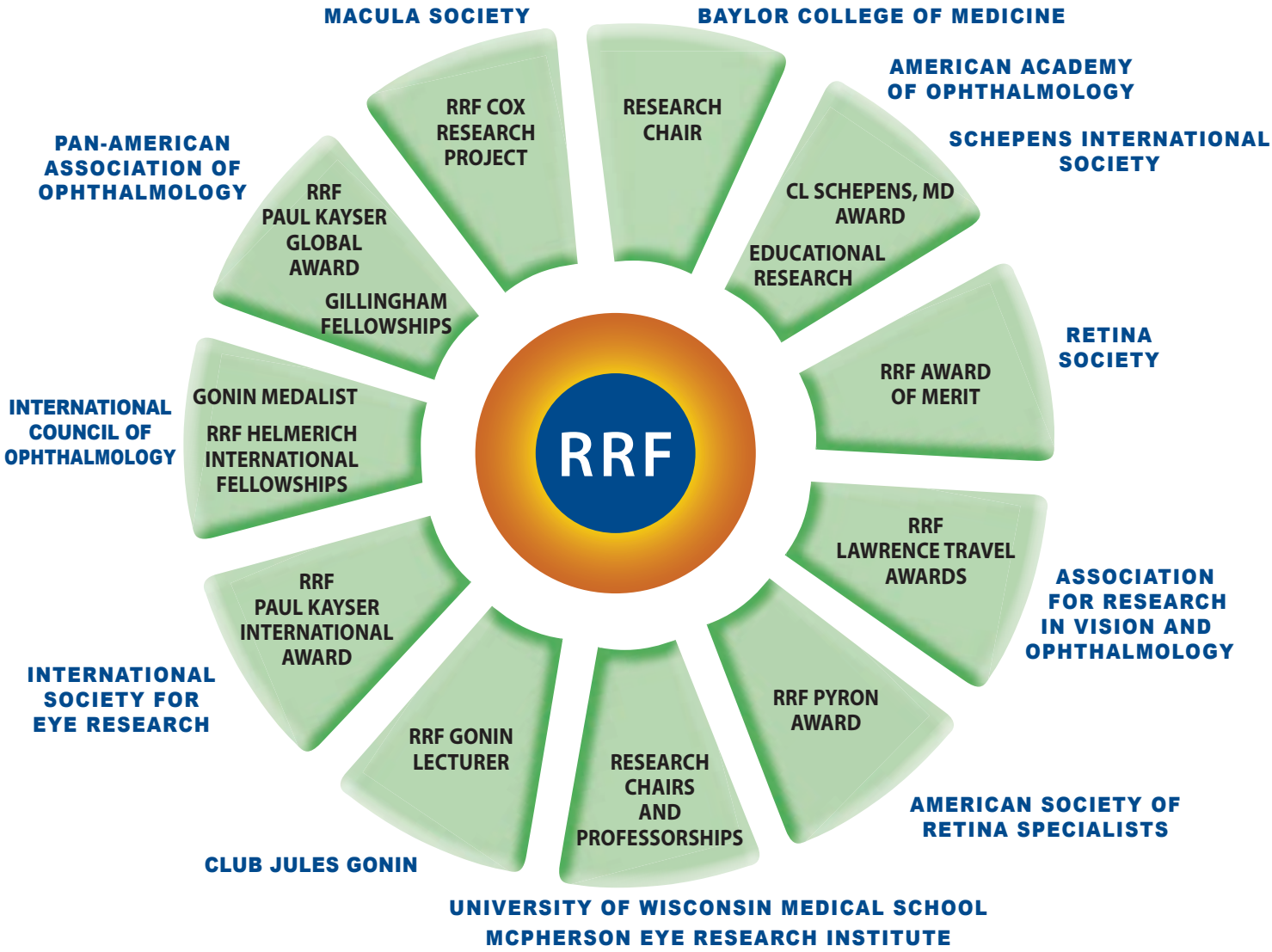
Research Initiatives – Educational and Travel Scholarships

AAO Educational Trust Fund – administered by The Foundation of the American Academy of Ophthalmology (FAAO)
Retina-related educational research programs for clinical and basic science

RRF Lawrence Travel Scholarships – administered by The Association for Research in Vision and Ophthalmology (ARVO)

Twenty-two vitreoretinal scientists representing schools in 13 states traveled to the ARVO Annual Meeting to present their scientific research.

COLLABORATING ORGANIZATIONS



COLLABORATING ORGANIZATIONS	AWARD	DATE OF FIRST COLLABORATION WITH RRF
RETINA SOCIETY	RRF Award of Merit in Retina Research	1978
ARVO Assoc. for Research in Vision and Ophthalmology	RRF Lawrence Travel Awards	1984
ISER International Society for Eye Research	RRF Paul Kayser International Award	1986
ASRS American Society of Retina Specialists	RRF Pyron Award	1988
PAAO Pan-American Association of Ophthalmology	Gillingham Pan-American Fellowships Paul Kayser/RRF Global Award	1992 2012
AAO American Academy of Ophthalmology	Educational Trust Fund	1993
MACULA SOCIETY	RRF Cox Research Project	1993
CLUB JULES GONIN	RRF Gonin Lecturer	1996
ICO International Council of Ophthalmology with University of Lausanne and Swiss Ophthalmological Society	Gonin Medalist	1998
BAYLOR Baylor College of Medicine	Research Chair	1998
UW University of Wisconsin School of Medicine and Public Health	Research Chairs and Professorships	1998
MERI McPherson Eye Research Institute	Research Chairs and Professorships	2007
AAO American Academy of Ophthalmology with SIS Schepens International Society	Charles L. Schepens, MD/AAO Award	2008
ICO/ICOF International Council of Ophthalmology	ICO RRF Helmerich International Fellowships	2009

RETINA RESEARCH SITES

PAST AND PRESENT

TEXAS : 11

Baylor College of Medicine
Center for Technology
Houston Advanced Research Center
UT MD Anderson Cancer Center
Southwest Research Institute
Texas A & M Health Science Center
Texas Children's Hospital
The Methodist Hospital
University of Houston
University of Texas at Galveston
University of Texas at Houston

PAN AMERICAN : 21

Buenos Aires, Argentina
Curitiba, Argentina
La Paz, Bolivia
Belo Horizonte, Brazil
São Paulo, Brazil
Porto Alegre, Brazil
Santiago, Chile
Bogotá, Colombia
Cali, Colombia
San Juan, Costa Rica
Santo Domingo, Dominican Republic
San Salvador, El Salvador
Port-au-Prince, Haiti
San Lorenzo, Honduras
Mexico City, Mexico
Nuevo León, Mexico
Asunción, Paraguay
Lima, Peru
San Juan, Puerto Rico
Montevideo, Uruguay
Caracas, Venezuela

INTERNATIONAL : 32

Asahikawa Medical College	Asahikawa, Japan
Bern University Hospital	Bern, Switzerland
Eskisehir Osmangazi University	Eskisehir, Turkey
Eye Foundation Hospital	Laos, Nigeria
Hospital Ophthalmique	Lausanne, Switzerland
Institut de la Vision	Paris, France
Kasindo Eye Clinic	E. Sarajevo, Bosnia and Herzegovina
Keio University	Tokyo, Japan
L V Prasad Eye Institute	Hyderabad, India
Lariboisiere Hospital	Paris, France
Lidcombe Hospital	Sydney, Australia
Lund University	Lund, Sweden
Magrabi ICO Cameroon Eye Institute	Yaounde, Cameroon
Mashhad University Medical Services	Mashhad, Iran
McGill University	Montreal, Canada
Melles Cornea Clinic	Rotterdam, Netherlands
Montreal General Hospital	Montreal, Canada
Moorfields Eye Hospital	London, England
Osaka Medical School	Osaka, Japan
Research Institute of Ophthalmology	Cairo, Egypt
Royal College of Ophthalmologists	Edinburgh, Scotland
Sankara Nethralaya Eye Hospital	Chennai, India
University of Cambridge	Cambridge, England
University of Iceland	Reykjavik, Iceland
University of Osaka	Osaka, Japan
University of Oxford	Oxford, England
University of Paris	Paris, France
University of Erlangen-Nuremberg	Erlangen, Germany
University of Leipzig	Leipzig, Germany
University of Regensburg	Regensburg, Germany
University of Tübingen	Tübingen, Germany
Western General Hospital	Edinburgh, Scotland

NATIONAL : 50

Bascom Palmer Eye Institute	Miami, FL
Beaumont Hospital	Royal Oak, MI
California Institute of Technology	Pasadena, CA
Casey Eye Institute	Portland, OR
Cleveland Eye Clinic/Foundation	Cleveland, OH
Cole Eye Institute	Cleveland, OH
Columbia University	New York, NY
Cornell University Medical College	Ithaca, NY
Dean McGee Eye Institute	Oklahoma City, OK
Duke University Medical School	Durham, NC
Emory University Eye Center	Atlanta, GA
Eye Research Institute	Boston, MA
Eye Tech Pharmaceuticals	Worchester, MA
Georgia Regents University	Augusta, GA
Greater Baltimore Medical Center	Baltimore, MD
Harvard Medical School	Boston, MA
Indiana University	Indianapolis, IN
Johns Hopkins University Medical School	Baltimore, MD
Joslin Diabetes Center	Baltimore, MD
Jules Stein Eye Institute	Los Angeles, CA
Kresge Eye Institute	Detroit, MI
Massachusetts Eye & Ear Infirmary	Boston, MA
Massachusetts Institute of Technology	Boston, MA
McPherson Eye Research Institute	Madison, WI
Medical University of South Carolina	Charleston, SC
National Eye Institute	Bethesda, MD
Northwestern University	Evanston, IL
Rockefeller University	New York, NY
Schepens Eye Research Institute	Boston, MA
Sheie Eye Institute	Philadelphia, PA
Shiley Eye Center, UC San Diego	La Jolla, CA
St. Joseph's Hospital	Baltimore, MD
Stanford University Medical School	Palo Alto, CA
Tulane University Medical School	New Orleans, LA
Thomas Jefferson University	Philadelphia, PA
University of California	Berkeley, CA
University of California	Los Angeles, CA
University of California	San Francisco, CA
University of Florida	Gainesville, FL
University of Kansas Medical College	Kansas City, KS
University of Miami Medical School	Miami, FL
University of Nebraska HSC	Omaha, NE
University of Pennsylvania	Pittsburg, PA
University of Southern California	Los Angeles, CA
University of Washington	Seattle, WA
University of Wisconsin Medical School	Madison, WI
Vanderbilt University	Nashville, TN
Washington University	St. Louis, MO
Wills Eye Hospital	Philadelphia, PA
Wilmer Eye Institute	Baltimore, MD

Research

RRF provided funding for 14 pilot study research projects conducted at leading research institutions. Eight of the projects were named in recognition of generous support through gifts and years of exceptional service to the Foundation. Pilot studies are experimental studies designed "to test the waters" or break new ground. Findings may lead to larger ongoing studies in the future.

Named Basic Research Projects

The Kathryn and Latimer Murfee Macular Degeneration Project

Curtis R. Brandt, PhD
Dept. of Ophthalmology and Visual Sciences
McPherson Eye Research Institute
University of Wisconsin, Madison, WI

Gene therapy for retinal degenerative diseases

Recently several groups have brought us closer to the use of gene delivery to prevent retinal degenerative diseases such as retinitis pigmentosa (RP) and macular degeneration (MD), and the technology of gene delivery vectors continues to advance. The goal of Dr. Brandt's project is to determine the cause of the transient inflammatory response induced by vector injection into the primate eye. This year Dr. Brandt determined, by Western blotting, the expression levels of innate immune response molecules in monkey retina tissue; examined the expression and distribution of inflammasome components in macaque retina tissue; and analyzed RNA isolated from macaque retina tissue before and after viral vector challenge by quantitative PCR microarray to examine the expression of innate immune molecules and inflammatory cytokines.

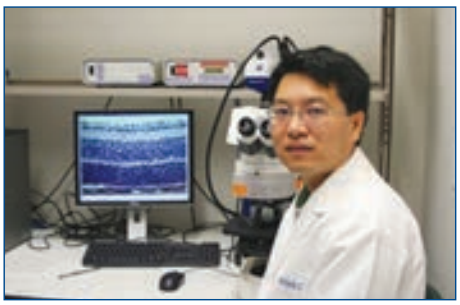
Joe M. and Eula C. Lawrence Research Project

Milan Jamrich, PhD
Dept. of Molecular and Cellular Biology
Baylor College of Medicine, Houston, TX

Function of Rx in the specification, differentiation and survival of vertebrate retinal cells

The goal of this project is to identify genes and developmental processes that are responsible for development and survival of vertebrate retinal cells. Identification of these genes and molecular processes will lead to the better understanding of eye diseases. Dr. Jamrich's laboratory made genetically modified mice that allow determining whether there is a direct binding between Rx and other proteins. He has generated the N-tagged Rx by inserting the 3XFLAG and SBP sequences immediately downstream of the Rx ATG initiation codon using gene targeting. He made heterozygous ES cells that were injected into mouse blastocysts and has obtained several chimeric mice that contained the mutant, pigmented cells that contain the tagged Rx locus. As the FLAG antibodies recognize the flagged-Rx protein, Dr. Jamrich's laboratory is now in process of identifying Rx interacting proteins.

The W.O. Manning Research Project



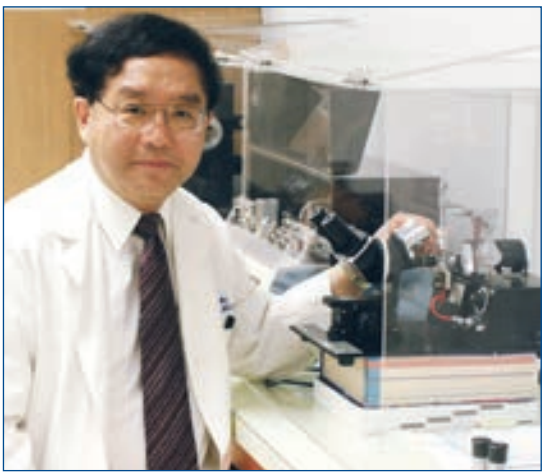
Rui Chen, PhD

Dept. of Molecular and Human Genetics
Baylor College of Medicine, Houston, TX

Identification and functional analysis of gene involved in retina diseases and development

The goal of Dr. Chen's project is to identify novel genes involved in human retinal disorders, conduct functional analysis, and develop therapy of these disease genes using model organism such as Mus musculus. He has completed the sequencing for a Saudi patient cohort as well as more than 400 Leber congenital amaurosis (LCA) and retinitis pigmentosa (RP) patients with various ethnic backgrounds. Through exome sequencing and functional studies, Dr. Chen has identified several novel LCA and RP disease genes, such as HK1 and ATF6. These works have been accepted for publication in IOVS. Further analysis of this dataset is ongoing.

The Paul Kayser Research Project

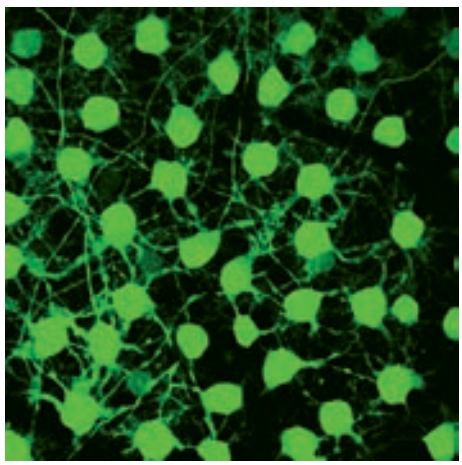


Samuel Wu, PhD

Cullen Eye Institute, Neurosensory Center
Baylor College of Medicine, Houston, TX

Pharmacological and genetic mechanisms underlying retinal cell death in glaucoma and age-related macular degeneration (AMD)

Dr. Wu's research project is focused on molecular, cellular and genetic mechanisms underlying retinal cell death in glaucoma and age-related macular degeneration (AMD). This year his lab published three papers and submitted four manuscripts in top international journals. These publications report their new discoveries on how various isoforms of glutamate transporters affect signal transmission from photoreceptors to second-order retinal neurons, and how dysfunction of the photoreceptor output synapses may mediate retinal degeneration in glaucoma, AMD and retinitis pigmentosa (RP). Dr. Wu and his lab members gave four presentations at the Association for Research in Vision and Ophthalmology (ARVO) annual meeting in May, 2014, in Orlando, Florida and one presentation at the International Society for Eye Research meeting in July, 2014, in San Francisco, California.



Neurobiotin staining of coupled horizontal cells in the primate retina

Bertha and I.L. Miller Research Project

Graeme Mardon, PhD
Depts. of Pathology, Molecular and Human Genetics
Baylor College of Medicine, Houston, TX

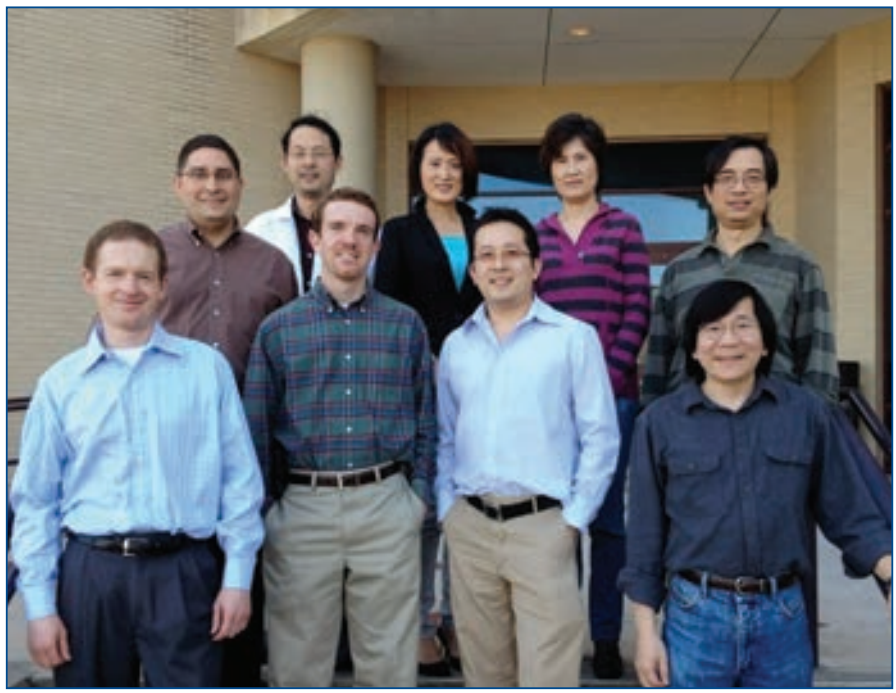
Genetic and molecular analysis of retinal development and disease

The long-term goal of this project is to improve both the diagnoses and treatments of Leber congenital amaurosis (LCA), which accounts for more than 5% of all retinal diseases. The clinical phenotypes of LCA classically follow autosomal recessive modes of inheritance, are often severe and identifiable at birth or within the first year of life. Dr. Mardon made a significant breakthrough in his research concerning the Kcnj13 retinal disease gene. Specifically, his laboratory found that loss of Kcnj13 function in their mouse models causes strong loss of photoreceptors. Dr. Mardon generated and characterized null and conditional mutations in this critical human disease gene in mice and has shown that homozygous mutant mice recapitulate the human disease phenotype.

Adolphe G. and Josephine Roberts Gueymard Research Project

Lih Kuo, PhD
Depts. of Medical Physiology, Surgery, and Ophthalmology
Texas A&M Health Science Center, Temple, TX

Activation of endothelin-dependent RhoA/ROCK by C-reactive protein elicits retinal arteriolar dysfunction

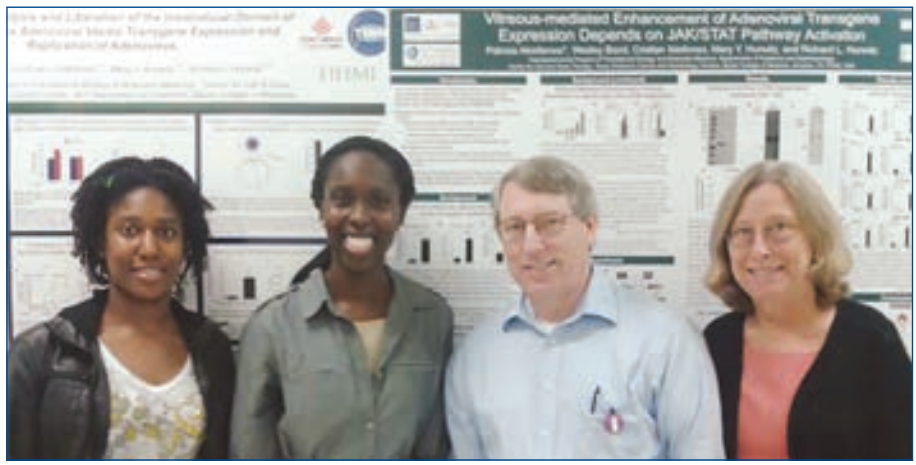


Dr. Kuo (front row, right) and his research team (Ophthalmic Vascular Research Program) at the Texas A&M Health Science Center and Baylor Scott & White Health

The purpose of this project is to understand the pathophysiology of inflammation and diabetes-associated retinal vascular dysfunction at molecular, cellular and intact-tissue levels and to develop a therapeutic approach for disease treatment. Dr. Kuo focused on the possible counter-interaction between endothelium-released vasodilator NO and the vasoconstrictor ET-1. The results of this study were published in the Invest Ophthalmol Vis Sci. He further examined the cellular signaling mechanism of activation of NO synthesis by the enzyme NO synthase (NOS) during elevated flow (shear stress). The results of this study not only help our understanding on how NOS is activated by flow elevation but also provide useful information on how to protect NOS from the insult of the disease related to retinal ischemia.

Mary Ellen Wilson Research Project

Richard L. Hurwitz, MD
Dept. of Pediatrics, Ophthalmology,
Molecular and Cellular Biology
Co-Director, Retinoblastoma Center
Texas Children's Cancer Center
Center for Cell and Gene Therapy
Baylor College of Medicine, Houston, TX



Dr. Richard Hurwitz and Dr. Mary Hurwitz Lab Group

Immune consequences of gene therapy for ocular disorders

Dr. Hurwitz has completed the first clinical trial that used suicide gene therapy (a method of forcing the tumor cells to produce a protein that converts a drug to a locally toxic agent) to treat children with advanced Retinoblastoma (Rb). The successful reduction of vitreous seeds has encouraged him to continue his laboratory initiatives to improve this innovative therapy. Additionally, he would like to better understand the differences between invasive and non-invasive tumors and to identify and characterize the Rb tumor stem cell. Dr. Hurwitz is also interested in developing gene therapy options for retinal degenerative disorders such as Stargardt Disease. His strategy for either application of gene therapy uses a special nonpathogenic virus to deliver the correct genetic material to selected cells in the eye.

Carl G. Mueller, Jr., Research Project

Benjamin J. Frankfort, MD, PhD
Cullen Eye Institute, Neurosensory Center
Baylor College of Medicine, Houston, TX

Impact of elevated intraocular pressure on retinal function in mice

Dr. Frankfort's goal is to understand the visual function change in glaucoma that is caused by damage to retinal ganglion cells (RGC). This project is designed to understand the earliest changes in retinal function that occur in glaucoma, and integrating these changes into our understanding of diabetes and intracranial pressure (ICP), both of which are risk factors for glaucoma. Dr. Frankfort has performed basic characterizations of retinal ganglion cell death and changes in retinal activity as measured with the electroretinogram (ERG) following IOP elevation. These studies indicate that electrical activity of several parts of the retina is disturbed prior to retinal ganglion cell death, and suggest that retinal dysfunction precedes cell loss.

Timothy W. Corson, PhD
Eugene & Marilyn Glick Eye Institute
Indiana University School of Medicine
Indianapolis, IN

Cellular target of a candidate AMD therapy

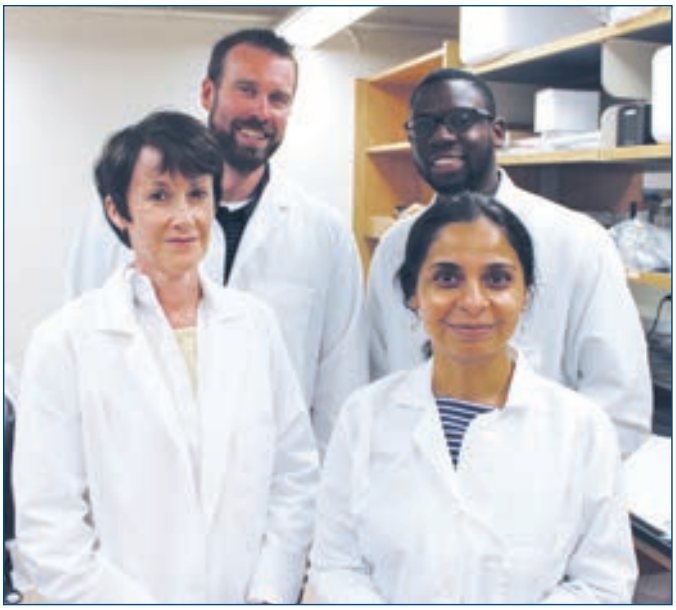
Dr. Corson (second from right) and his lab group

Previously with RRF funding, Dr. Corson investigated a class of natural products, homoisoflavonoids, as antiangiogenic molecules. He synthesized a naturally occurring, antiangiogenic homoisoflavanone called Cremastranone derived from a medicinal orchid species and a novel isomer, both of which showed antiangiogenic activity in vitro. He has tested a novel, more potent derivative of Cremastranone called SH-11037 in the oxygen-induced retinopathy (OIR) model of ROP. It showed efficacy comparable to the standard anti-VEGF treatment. Importantly, he saw no short- or long-term toxicity in the eyes of adult mice intravitreally injected with SH-11037, and the compound was also effective in the laser-induced choroidal neovascularization (L-CNV) mouse model. Dr. Corson has begun to tease apart how SH-11037 works to block blood vessel growth.

Ming Zhang, MD, PhD
Georgia Regents University
Augusta, GA

Autophagy and NLRP3 inflammasome in acute retinal necrosis (ARN)

Herpes simplex virus (HSV) is believed to be the leading cause of infectious blindness in the developed world. Many aspects about ocular herpesvirus infections, in general, and about acute retinal necrosis (ARN), in particular, in human patients remain enigmatic. HSV-1 inhibits autophagy through Beclin-binding domain (BBD) of ICP34.5. Dr. Zhang's team has published three papers in top international journals in 2014. By using mice deficient for autophagy specifically in neural cells, his group demonstrated that HSV-1 inhibits autophagy and subsequent activation of the NLRP3 inflammasome via Beclin-binding domain (BBD). Inhibition of autophagy by HSV-1 BBD increases death of infected neurons by apoptosis. Their results also suggest that early administration of autophagy inducing peptide Tat-beclin 1 inhibits viral replication and protects retinal cell death by apoptosis.

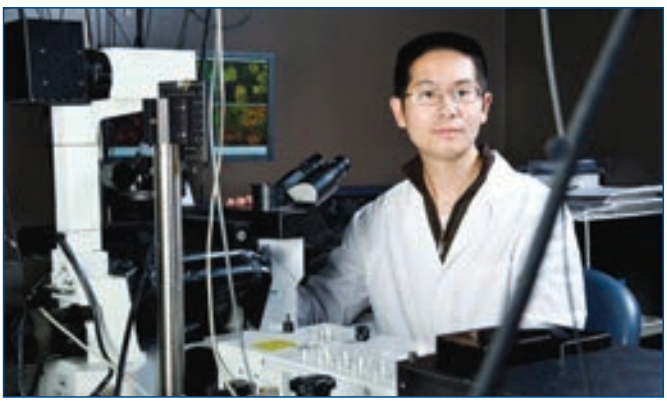


Dr. Singh (front right) with her lab group

Ruchira Singh, PhD
Stem Cell Research Program
University of Wisconsin, Madison, WI,
and University of Rochester, Rochester, NY

Elucidating the role of environment in the pathophysiology of macular degenerative diseases using an hiPSC model system

Numerous studies have shown that both endogenous cellular defects and exposure to toxic environmental agents (eg: smoke or uv light) play a role in the disease mechanism of macular degeneration. Dr. Singh aims to evaluate the effect of environmental variables on the cellular phenotype and disease mechanisms of maculopathies. In 2014, she collected data indicating that extrinsic environmental agents can significantly affect RPE cell function. Specifically, she has seen that iron overload and drug-induced alteration of lysosome function can alter specific RPE functions, including processing of POS outer segment. This is an important finding because other clinical and animal model studies have suggested that iron overload (an environmental risk) and disrupted lysosome function contribute to the development of macular degeneration.



Wenbo Zhang, PhD
Department of Ophthalmology & Visual Sciences
University of Texas Medical Branch at Galveston
Galveston, TX

Novel therapy for retinal neovascularization

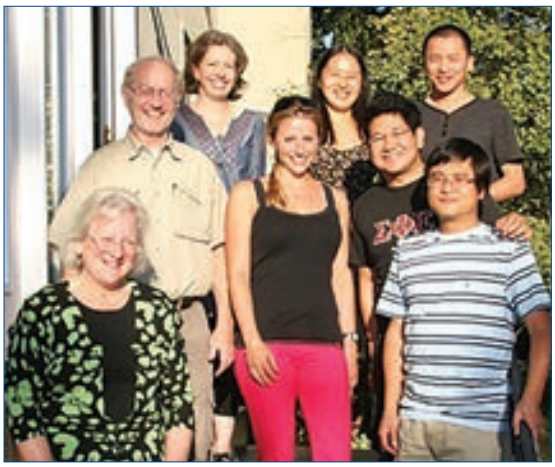
The goal of this project is to develop a novel approach for topical delivery of anti-angiogenic drugs to selectively kill abnormal blood vessels in the retina without affecting normal blood vessels. Dr. Zhang found in 2014 that two proteins known as Fn14 and Epac1, which are highly expressed in endothelial cells of abnormal new blood vessels in retina, are involved in the process of retinal neovascularization. He determined whether blocking Fn14 can specifically eliminate retinal neovascularization and developed nanoparticles targeting Fn14 for the delivery of anti-neovascularization drug. He is testing the hypothesis that nanoparticles-mediated delivery of drugs to block Fn14 and Epac1 may allow for safe and effective treatment of retinal neovascularization without impairing normal vascular repair.

Research

Mark Emerson, PhD
Department of Biology
The City College of New York
New York, NY

A mouse model to improve the generation of stem cell therapies for the treatment of human blindness

This project leverages new insights into how cone cells are normally generated during development to create a mouse stem cell model for cone genesis. Dr. Emerson's goal is to engineer a modified line of embryonic stem cells that will glow green when they are on their way to making cone photoreceptors. Dr. Emerson's goal in 2014 was to finish the molecular construction of reporters that will drive expression in progenitor cells that will generate cone photoreceptors, and at this time the construction is almost complete. His intent is to have these constructs submitted to the Memorial Sloan Kettering Cancer Center transgenic facility, and these constructs will be used to make transgenic animals.



Dr. Baehr (middle row, left) with his lab group

Wolfgang B. Baehr, PhD
Department of Ophthalmology and Visual Sciences
University of Utah Health Science Center
Salt Lake City, UT

Therapy for a mouse model of Senior-Løken Syndrome

Senior-Løken Syndrome (SLS) is a disease inherited in an autosomal recessive fashion that affects multiple organ systems. It is characterized by concurrent development of retinitis pigmentosa (RP)-like retinal dystrophy and medullary cystic kidney disease, nephronophthisis (NPHP). Mutations in several genes (called nephrocystins) are known to cause SLS. The proteins encoded by these genes are localized in the photoreceptor connecting cilium and kidney cell primary cilium. This application focuses on nephrocystin-5 (NPHP5), as inactivation of NPHP5 is associated with Leber Congenital Amaurosis (LCA) in all patients. Deleting the mouse NPHP5 gene, Dr. Baehr created a mutant mouse that precisely mimics human SLS. In this application, he strives to cure this LCA type by gene replacement therapy using adeno-associated virus (AAV).

Grant Recipient from The Macula Society

The RRF Margaret and Mills Cox Macula Society Research Project

Demetrios G. Vavvas, MD, PhD
Massachusetts Eye and Ear Infirmary
Boston, MA

Role of RIP3 Kinase in Inflammation and Photoreceptor Cell Loss

Dr. Vavvas' clinical and research interests are on understanding cell death mechanisms and ways to intervene in order to create new therapies for retinal eye conditions such as AMD, retinitis pigmentosa and glaucoma. He is also investigating novel non-chemotherapy agents for ocular cancers and metabolic pathway modulators for retina vascular and inflammatory conditions.

Research Chairs and Professorships

RRF now supports a total of six chairs and three professorships in retina research, which provide funds to vision scientists engaged in original excellent research that has the potential to increase understanding of the retina or retinal diseases.

RRF Research Chair

Ching-Kang Jason Chen, PhD

Depts. of Ophthalmology, Biochemistry and Molecular Biology, Neuroscience
Baylor College of Medicine
Houston, TX

Dr. Chen (far left) with his research group

Mechanisms and Consequences of Photoreceptor Degeneration

Dr. Chen works on heterotrimeric G-protein signal transduction in retinal neurons, including rod and cone photoreceptors, bipolar cells, amacrine cells and retinal ganglion cells. By making and characterizing mouse models of human congenital stationary night blindness and photoreceptor degeneration, he also studies the mechanisms and functions of rhythmic membrane potential oscillation of inner retinal neurons in the development and maintenance of the entire visual system. Dr. Chen has authored 69 publications in peer-reviewed scientific journals as well as seven book chapters. He is a widely recognized molecular geneticist and provides rod-specific and ON-bipolar cell-specific inducible Cre driver lines to the worldwide vision community.

Walter H. Helmerich Chair

Akihiro Ikeda, DVM, PhD

Associate Director, McPherson Eye Research Institute
Department of Medical Genetics
University of Wisconsin, Madison, WI

Identification of Genetic Factors Affecting Aging of the Retina

Dr. Ikeda uses mouse models to study the genetic and molecular mechanisms of aging. His laboratory studies a mouse mutant showing similar symptoms as observed in age-related macular degeneration (AMD) patients. He identified a mutation in the gene (Tmem135) involved in the regulation of mitochondrial dynamics to be responsible for these symptoms. Another major project is to identify genes that determine the severity of aging symptoms in the retina, using two mouse strains, one of which shows retinal aging symptoms earlier than the other. He has mapped the loci that affect aging of retina and identified candidate genes. One promising candidate with sequence differences between the two mouse strains is the Bloom syndrome gene, which is involved in DNA repair.

Research Chairs and Professorships

RRF Research Chair

Dr. Sheibani (standing, second from right) with his research team

Nader Sheibani, PhD

Department of Ophthalmology
& Visual Sciences
University of Wisconsin, Madison, WI

Regulation of Ocular Vascular Development and Neovascularization

Dr. Sheibani's work focus on the mechanisms that regulate retinal and choroidal vascular function. He is also developing novel treatment for ocular diseases with a neovascular component. In collaboration with Drs. Arthur Polans and Daniel Albert, he published studies on potential therapeutic benefit of resveratrol for exudative AMD. In collaboration with Dr. Zhang at Northwestern University he published a combined method for evaluation of retinal metabolic rate for use to detect metabolic abnormalities associated with diabetes. He also published the impact of high glucose conditions on astroglial cell function, and its impact on the novel post-translational (O-GlcNAc) modification of retinal pericyte proteins and their death (reported in: Molecule (2014 Oct), Sci Rep (2014 Oct), Plos One (2014 July), and Plos One (2014, May)).

Emmett A. Humble Distinguished Directorship

David M. Gamm, MD, PhD

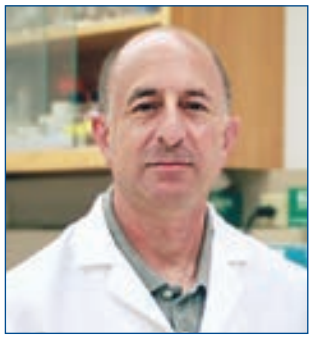
Director, McPherson Eye Research Institute
Department of Ophthalmology & Visual Sciences
University of Wisconsin, Madison, WI

Modeling and Treating Retinal Disease with Human Induced Pluripotent Stem Cells (hiPSCs)

Dr. Gamm has pioneered the use of human induced pluripotent stem cell (hiPSC) technology to model human retinal diseases (including macular degenerations) in a laboratory dish - a powerful system to test drug and gene therapies. In addition, he is developing stem cell-based photoreceptor replacement approaches to treat retinal degenerative disease. His ultimate goal is to utilize the stem cell differentiation methods invented in his lab to produce clinical-grade cells for the treatment of blind and low vision patients. He is also studying the key biological steps through which photoreceptors are created from stem cells so as to improve the efficiency of the process. Together with collaborators at the UW-Madison, Dr. Gamm's team is paving the way for hiPSC therapies for retinal disease.

Research Chairs and Professorships

Kathryn and Latimer Murfee Chair



Arthur S. Polans, PhD
McPherson Eye Research Institute
Department of Ophthalmology & Visual Sciences
University of Wisconsin, Madison, WI

Studies of the Resveratrol-stimulated Calcium Response in Endothelial Cells

Dr. Polans' long term research goal is to develop safe and effective anti-angiogenic agents based on his studies of non-toxic natural products and to apply these agents initially to the prevention and/or treatment of exudative age-related macular degeneration. Dr. Polans has delineated the mechanisms by which certain non-toxic natural products inhibit activated endothelial cells from forming abnormal blood vessels in an animal model of choroidal neovascularization. Both in vitro and pre-clinical studies have now been completed. He also has finished synthesizing improved analogs that are safe and is currently testing them for efficacy in animal models of ocular neovascularization.

Daniel M. Albert Chair

Photo by Andy Manis

Christine M. Sorenson, PhD
University of Wisconsin Dept. of Pediatrics
McPherson Eye Research Institute
Madison, WI

Apoptosis in Retinal Vascular Development and Disease

Dr. Sorenson's research focus is delineating the role Bim and Bcl-2 proteins play in modulating apoptosis during normal and aberrant retinal neovascularization. Her studies have established key roles for Bcl-2 family of proteins in retinal vascular development and neovascularization. She is also in the process of evaluating the impact of these proteins in retinal neovascularization through their vascular, cell-specific deletions in vivo. The knowledge gained from these studies will aid in development of new therapies that lack global systemic effects as now seen in anti-VEGF therapies. Dr. Sorenson also works closely with Drs. Sheibani, Polans, and Albert on development of novel treatments for exudative AMD.

Edwin and Dorothy Gamewell Professor

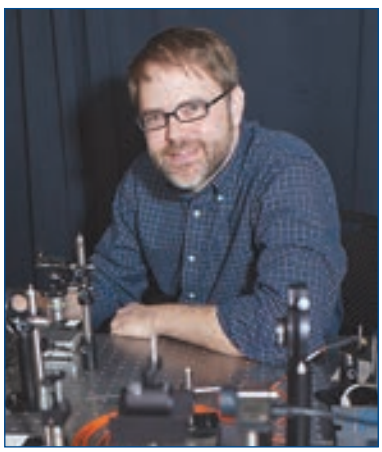


Photo by Todd Brown/Media Solutions

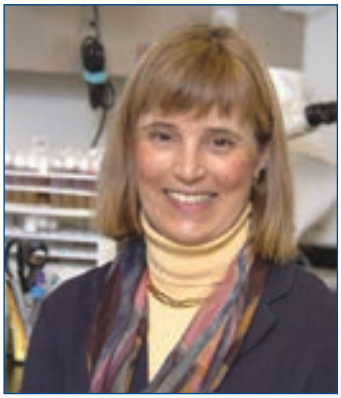
Jeremy Rogers, PhD
McPherson Eye Research Institute
Department of Biomedical Engineering
University of Wisconsin, Madison, WI

Optical Instrumentation and Technology Platforms for the Study and Screening of Retinal Disease

A critical component of the treatment, prevention, and basic research of retinal disease is the ability to image and quantify changes in structure and function of cells and tissue. Optical methods are particularly useful because of their potential to be adapted to clinical settings and their ability to image at cellular-scale resolution. Dr. Rogers' research targets the development of new imaging modalities that build on advances in Adaptive Optics (AO) and Optical Coherence Tomography (OCT) and leverage the physics of light scattering from tissue structures to quantify changes associated with different disease states. These quantitative imaging methods are valuable tools for basic research and could potentially be used in the clinic to enable early disease screening and detection, to study disease progression, and to monitor treatment.

Research Chairs and Professorships

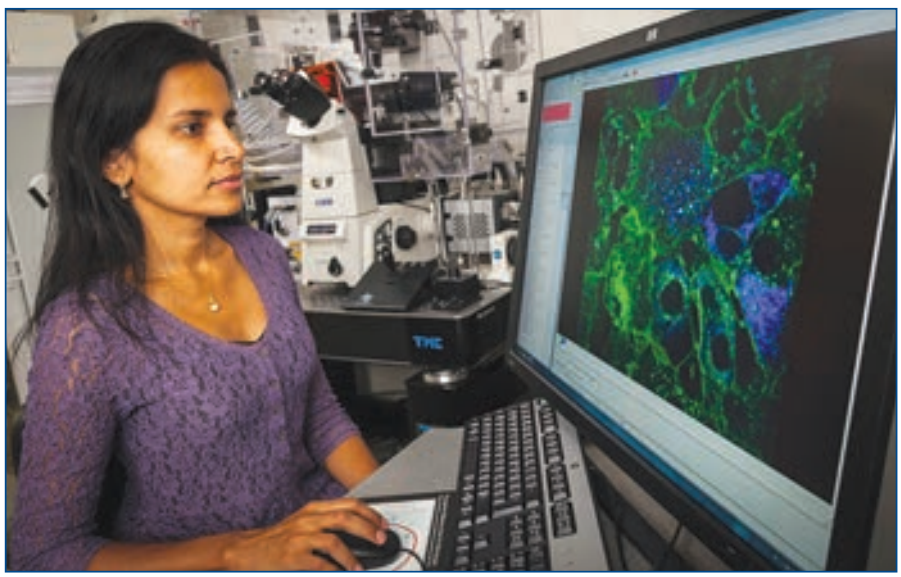
M.D. Matthews Research Professor



Nansi Jo Colley, PhD
McPherson Eye Research Institute
Department of Ophthalmology & Visual Sciences
University of Wisconsin, Madison, WI

Molecular Genetic Studies of Retinal Degeneration in Drosophila

Dr. Colley is focused on using Drosophila as a model for studying hereditary human retinal diseases, such as retinitis pigmentosa (RP) and age-related macular degeneration (AMD). Genetic defects that lead to photoreceptor cell death in AMD and RP are highly heterogeneous, and they now include a list of more than 132 genes. Drosophila is a powerful animal model for studying inherited retinal degeneration disorders. One area of investigation is on rhodopsin biosynthesis and signal transduction in the photoreceptors of Drosophila. Dr. Colley continues to demonstrate that mutations in constituents of protein transport, rhodopsin function and phototransduction lead to severe retinal defects and retinal degeneration in Drosophila.



Rebecca Meyer Brown Professor

Aparna Lakkaraju, PhD
McPherson Eye Research Institute
Department of Ophthalmology &
Visual Sciences
University of Wisconsin, Madison, WI

Insight into the Cellular Basis of Retinal Degenerative Diseases

Dr. Lakkaraju investigates cellular mechanisms underlying age-related macular degeneration (AMD). In particular, she is interested in how cells of the retinal pigment epithelium (RPE), the initial site of damage in AMD, cope with aging and cellular stress. Using a state-of-the-art live imaging system, she follows processes such as cellular clearance, membrane repair and immune-mediated inflammation within the RPE and the retina. Her goal is to identify early deficits in the RPE that promote vision loss and use this information to identify novel therapeutics or novel uses for existing drugs to target AMD.

Established Research Awards

These awards were presented to renowned scientists in recognition of their lifetime achievement.

The Award of Merit in Retina Research

Peter A. Campochiaro, MD
The Wilmer Eye Institute
The Johns Hopkins School of Medicine
Baltimore, MD

Development of Treatments for Retinal/Choroidal Vascular Diseases

In being chosen for the Award of Merit, Dr. Campochiaro gave the Charles L. Schepens Lecture at the 47th Annual Scientific Meeting of The Retina Society in Philadelphia, PA, which was held in September.

Dr. Campochiaro is a clinician-scientist who has a large laboratory and a large clinical research team. His laboratory research is directed toward three major areas: the molecular mechanisms of ocular neovascularization and macular edema with a goal of developing new treatments, the mechanism of photoreceptor cell death in retinal degenerations and developing new treatments for retinitis pigmentosa and non-neovascular AMD, and ocular gene transfer.

RRF Pyron Award for Outstanding Achievement in Retina Research

Andrew P. Schachat, MD
Cleveland Clinic Cole Eye Institute
Cleveland, OH

Fourteen-Thousand Decisions and Counting – Tales From an Editor

Dr. Schachat presented the RRF Pyron Award lecture at the 32nd Annual Meeting of the American Society of Retina Specialists (ASRS), which was held in San Diego, CA in August.

Dr. Schachat has authored or co-authored approximately 325 manuscripts in peer reviewed journals relating to topics in medical and surgical retina and eye tumors. The most important manuscripts flow from collaborative clinical trial work relating to age-related macular degeneration, diabetic retinopathy and choroidal melanoma.

Charles L. Schepens, MD/AAO Award

Jerry A. Shields, MD
Wills Eye Hospital
Philadelphia, PA

Management of Posterior Uveal Melanoma: Past, Present and Future

In being selected for the Charles L. Schepens, MD/AAO Award, Dr. Shields gave the Charles L. Schepens, MD/AAO Lecture at the Retina Subspecialty Day of the American Academy of Ophthalmologists (AAO) Annual Meeting in Chicago, IL on October 17.

For more than 30 years, Dr. Shields has been active in the care of patients with ocular tumors and in clinical research related to tumors of the eyelids, conjunctiva, intraocular structures, and orbit. He has authored or co-authored more than 1,254 articles in scientific journals and more than 548 textbook chapters for a total of 1,802 scientific publications. He has authored or co-authored 13 major textbooks and has given 1,531 national and international lectures, including 77 named lectures.

Established Research Awards

Paul Kayser International Award in Retina Research

Robert E. Marc, PhD
John A. Moran Eye Center, University of Utah
Salt Lake City, UT

Mapping Retinal Cells and Networks

The XXI Biennial Meeting in July of the International Society for Eye Research (ISER), held in San Francisco, CA, was the setting for Dr. Marc's Plenary Lecture as recipient of the Kayser International Award.

Dr. Marc's research focus is retinal connectomics, neural rewiring and gene therapy for neurodegenerative disease. The Marc laboratory has developed high-speed transmission electron microscope imaging with molecular tagging for brain and retinal mapping.

Club Jules Gonin Lecturer

Frank G. Holz, MD
University of Bonn
Bonn, Germany

Fundus Autofluorescence Imaging in Dry AMD

Dr. Holz gave the Jules Gonin Lecture at the XXIXth Meeting of the Club Jules Gonin in Zurich, Switzerland, in September.

Dr. Holz's research interests include innovative retinal imaging technologies and image analysis strategies, pathogenesis, biomarkers and new therapies for age-related macular degeneration and other retinal diseases.

The Gonin Medal

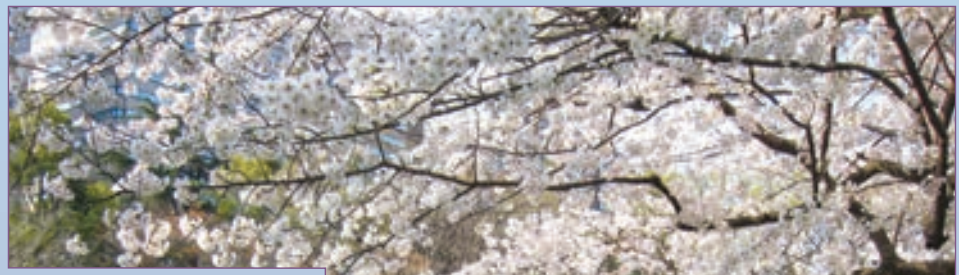
Alice R. McPherson, MD
Baylor College of Medicine
Houston, TX

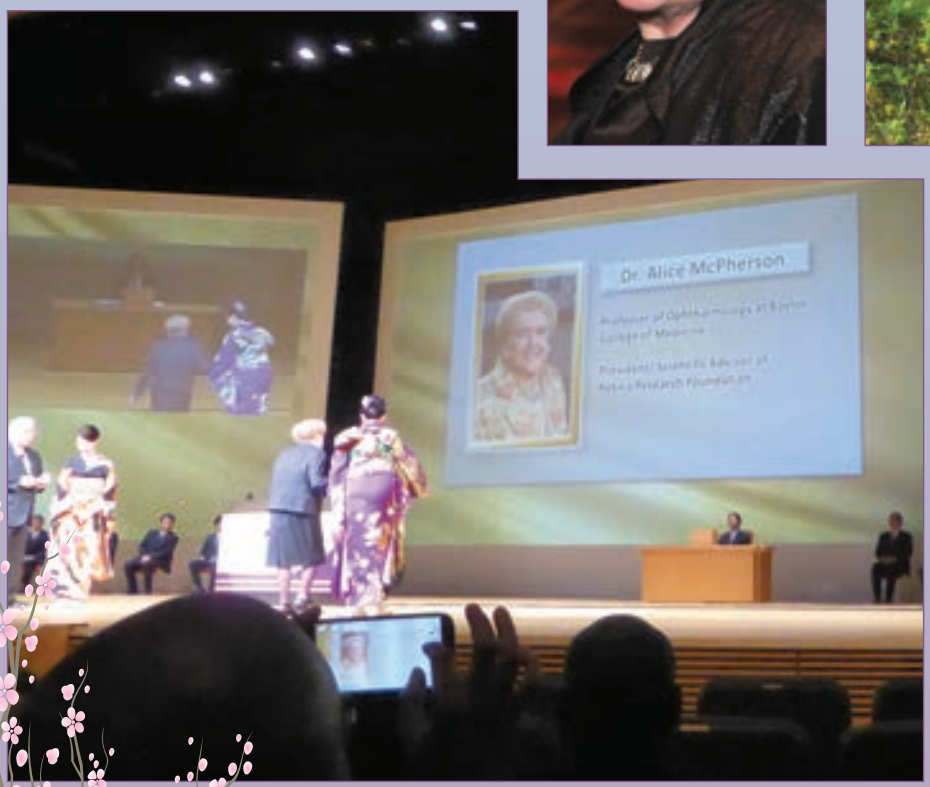
The Retina Specialty After Gonin: Personal Recollections and Contributions

Every four years The Gonin Medalist is selected by the International Council of Ophthalmology (ICO) Board of Trustees in collaboration with the University of Lausanne and the Swiss Ophthalmological Society. The Diploma of the Gonin Medal was presented to Dr. McPherson at the Jules Gonin Eye Hospital in Lausanne, Switzerland, following her Gonin Medal Lecture on February 13, 2014. The Gonin Medal was awarded at the Opening Ceremony of the World Ophthalmology Congress in Tokyo, Japan, on April 2, 2014.

The Gonin Medal

Retina Research Foundation is proud to share this great honor with Dr. McPherson. The following is a review of the 2014 Gonin Medal with some background and history of the award. In being selected one of only 19 Gonin Medalists in history, Dr. McPherson's founding of RRF was recognized as being one of her significant achievements contributing to global vision preservation. ***This section was originally printed in the May 2014 RRF Newsletter.***





The Gonin Medal - WOC 2014

The World Ophthalmology Congress of the International Council of Ophthalmology, Japanese Ophthalmology Society, Asia-Pacific Academy of Ophthalmology in Tokyo

Tokyo, Japan: Site of the World Ophthalmology Congress (WOC2014).

Dr. McPherson with young Jules Gonin Eye Hospital ophthalmologists.

Dr. McPherson arriving in the lecture hall at Jules Gonin Eye Hospital, Lausanne, Switzerland, February 13, 2014.

Prof. Dominique Arlettaz, Dean of the University of Lausanne, and Dr. J.J. De Laey, Vice President ICO, presenting Diploma of Gonin Medal to Dr. McPherson.

Alice R. McPherson, MD, Chosen to be the 2014 Gonin Medalist

Instituted in 1937 in honor of Swiss-born Dr. Jules Gonin, the **Gonin Medal** is awarded every four years to an ophthalmologist notable for his or her outstanding work or research. It is the oldest and most prestigious medal in ophthalmology.

In collaboration with the **University of Lausanne** and the **Swiss Ophthalmological Society**, the I**nternational Council of Ophthalmology (ICO)** Board of Trustees selects the Gonin Medalist. In accepting this high honor, the recipient first delivers a lecture in Lausanne, Switzerland, at the Jules Gonin Eye Hospital. The diploma of the medal is awarded during a special ceremony at that time. The gold medal is later presented at the World Ophthalmology Congress.

Alice R. McPherson, MD

This year **Dr. Alice McPherson** of Houston was named Gonin Medalist by the International Council of Ophthalmology Board of Trustees.

She is the first woman to be selected for this high honor, and now joins a list of only 18 other names in history who are Gonin Medalists. Among those chosen previously are Dr. Alfred Sommer, who demonstrated the impact of vitamin A deficiency on childhood blindness and mortality in developing countries, and Dr. Robert Machemer, who pioneered the most commonly performed and useful procedure in vitreoretinal surgery.

To be singled out among so many now who are outstanding in the retina subspecialty, and chosen for the named medal of Jules Gonin, is truly a life highlight for Dr. McPherson.

Dr. McPherson is an accomplished teacher, scholar, leader and pioneer dedicated to the study and treatment of retinal diseases.

Her scientific contributions to ophthalmology began with pioneering scleral buckling procedures, cryotherapy and xenon arc and laser photocoagulation in the treatment of retinal diseases. She was an early and vigorous advocate of photocoagulation in the treatment of diabetic retinopathy. This was initially a controversial position, later proven correct by the large, randomized prospective National Eye Institute Diabetic Retinopathy Study.

In 1969 she founded the Retina Research Foundation (RRF), one of the nation's leading eye research organizations, dedicated to promote understanding, prevention and treatment of retinal diseases.

Gonin Medal

Dr. Bruce Spivey, ICO President, awarded the Gonin Medal to Dr. McPherson at the Opening Ceremony of the World Ophthalmology Congress in Tokyo, Japan on April 2. With the Crown Prince of Japan in attendance, and in front of thousands of ophthalmologists from around the world, Dr. McPherson graciously accepted this gold medal.

Dr. Spivey congratulating Dr. McPherson

Gonin Medal Lecture and Diploma

As Gonin Medalist, Dr. McPherson traveled to Lausanne, Switzerland, in February to present a lecture entitled, *"The Retina Specialty After Gonin: Personal Recollections and Contributions."* The following is a brief sampling of the lecture delivered to the Swiss academicians and ophthalmologists in attendance.

World Ophthalmology Congress (WOC2014) International Council of Ophthalmology (ICO) Gonin Medal Award presentation at the Opening Ceremony, April 2, 2014.

Dr. McPherson's lecture began with the story of the first two women to practice ophthalmology in the United States. Dr. Isabel Barrows of New York traveled to Zurich in 1869 for her eye training, and then established a practice in Washington, DC. The second female ophthalmologist to practice in the US was Dr. Elizabeth Sargent, who had her ophthalmic training in Zurich in 1882. Dr. Sargent returned to San Francisco to practice ophthalmology. Both women had to travel to Switzerland for training because the few women doctors at that time had little opportunity for post-graduate education in the United States. The connection between US and Swiss ophthalmology was established early.

Jules Gonin, MD
"The Father of Retina Surgery"

At the turn of the century, one young ophthalmologist from Lausanne had an interest in retinal detachment: Dr. Jules Gonin. For many decades he single-handedly lit and carried the torch of enthusiasm, doing more than any other individual to enkindle and nourish the flame of ever-increasing interest in the retina. Such was his case in becoming the "Father of Retina Surgery." Initially his work was met with skepticism, but perseverance and extensive documentation of his cases validated his extraordinary success treating retinal detachments by localizing retinal breaks and closing them by thermocauterization. Dr. Gonin published his landmark text with color plates in 1934, and his findings stirred up new interest in the retina as a subspecialty of ophthalmology.

Dr. McPherson completed her ophthalmologic residency in the 1950s at University of Wisconsin-Madison and joined Dr. Frederick Allison Davis and Dr. Peter Duehr in their private practice. Dr. Duehr was assigned to treat the patients referred for retinal detachment.

"I was struck by the contrast that existed between Duehr's cataract surgery, done with elegance and speed, and the more awkward and difficult struggle required to locate and close the breaks in retinal detachments using monocular direct ophthalmoscopy," Dr. McPherson noted.

Dr. Matthew Davis, son of Dr. Frederick Davis, returned to Wisconsin from a three-month fellowship with Dr. Charles Schepens in Boston, introducing Dr. McPherson to the binocular indirect ophthalmoscope and scleral depression taught by Schepens. She resolved to gain further retina training under Dr. Schepens herself, and was the first woman fellow to train with him and the first to complete a full year fellowship.

"He was my mentor, and soon I came to strongly share his belief that progress in clinical practice is the dividend of investing in basic research, and hoped eventually to act on this belief," Dr. McPherson continued.

Following her retina fellowship, Dr. McPherson made

several decisions that changed her life. She married Tony Mierzwa and moved to Texas. *"The three best decisions I ever made: ophthalmology, Tony and Texas,"* she said.

In 1960, Dr. McPherson accepted a position at Baylor College of Medicine. There she established a large retina practice, taught residents, developed a fellowship program, and was active in postgraduate teaching in several important clinical areas, including retinal detachment, diabetic retinopathy and retinopathy of prematurity.

Dr. McPherson delivering the Gonin Medal Lecture: "The Retina Specialty After Gonin: Personal Recollections and Contributions."

"During this time, the desire grew in me to find a way to facilitate research directed specifically to understanding the causes, cures and prevention of retinal disorders. As I gained experience in academic ophthalmology and clinical research, I became increasingly convinced that the most important contribution I could make would be to establish an organization that could help develop and sustain innovative retinal research.

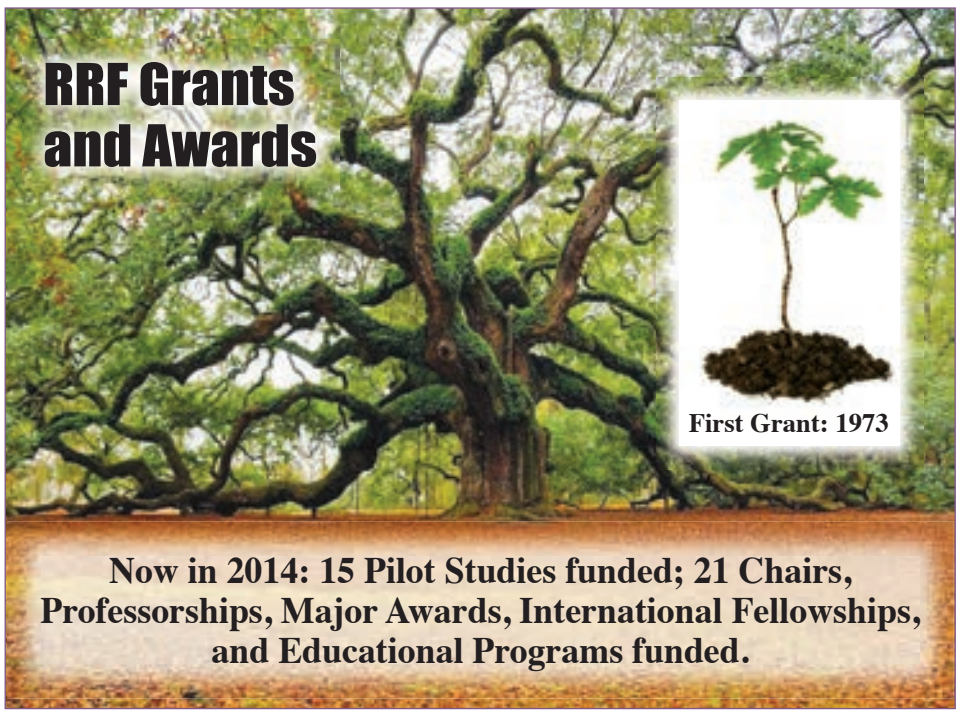
The Retina Research Foundation (RRF) moved from a dream, to a concept, to a reality," Dr. McPherson concluded.

Dr. Alice McPherson with a few of her 80 McPherson Associates Vitreoretinal Fellows, Baylor College of Medicine.

Established in 1969, RRF is committed to its mission of preserving vision worldwide through research and education. In 1973, RRF awarded its first grant, and now a total of 892 awards have been made. We support a carefully selected variety of programs around the world, in collaboration with the finest organizations in ophthalmology: pilot studies, research chairs, research fellowships, established awards recognizing lifetime achievement, international fellowships of advanced subspecialty training, educational programs, and travel scholarships for young investigators.

"Like the mighty live oak tree, RRF's growth represents decades of steady progress --- beginning with the seed of an idea and now firmly established with programs in research and education extending around the globe."

Dr. McPherson with her mentor, Dr. Charles L. Schepens.



"The Gonin Medal to me represents the power of regular people, united through common goals, to accomplish something big. Each of you has played a part in the path that has led to this global and historic recognition of RRF's accomplishments. Individually, you want science to progress; collectively, this honor shows what each small link in the chain can do when joined together in pursuit of our shared mission to eradicate blindness. Not only caring about your own wellbeing, but also dedicated to ensuring the most hopeful future for generations to come – thanks to each of you for your ongoing dedication."

The Board of Directors and Advisory Trustees of Retina Research Foundation join her many patients, friends, fellows, and peers in congratulating Dr. McPherson on this well-deserved honor.

Dr. Alice McPherson

Dr. McPherson with Dr. David Gamm, Humble Director, McPherson Eye Research Institute, University of Wisconsin-Madison, and Dr. Petros Carvounis, Baylor College of Medicine, Houston, Texas.

Retina Research Foundation Headquarters, 4th Floor, Houston, Texas.

Retina Research Foundation 2014 Board of Directors.

International Fellowships

RRF funds two programs of international fellowships, one a twelve-month fellowship and the other a six-month fellowship.

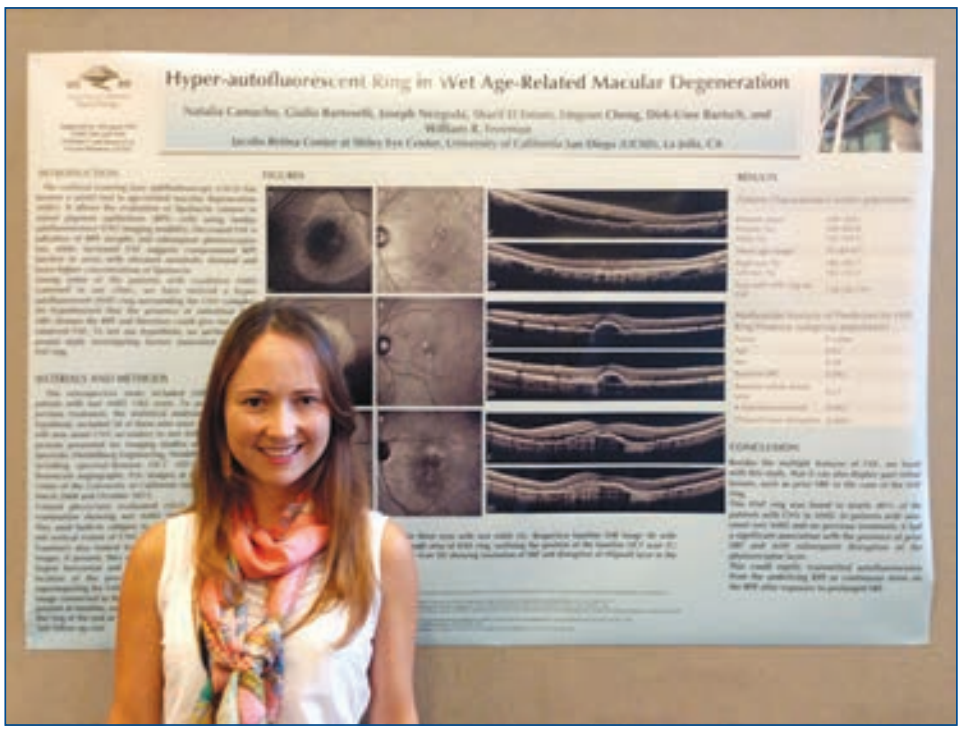
ICO - RRF Helmerich International Fellowships

The International Council of Ophthalmology (ICO), in cooperation with the International Council of Ophthalmology Foundation (ICOF), and Retina Research Foundation, has established two international fellowships with income from an endowment created by Walter H. Helmerich, III. These two, twelve-month fellowships of $33,000 each provide advanced subspecialty training for young ophthalmologists from developing countries who are recommended by the head of a teaching or public service institution and are committed to returning to a position at a teaching institution or public service hospital in their home country following the fellowship.

Guillermo Salcedo-Villanueva, MD, from Mexico, for training in medical retina at University of Colorado, Denver, CO, with Dr. Hugo Quiroz-Mercado. Following fellowship Dr. Salcedo-Villanueva will return to teach medical students, ophthalmology residents and fellows, and to treat patients at Altino Ventura Foundation in Recife, Brazil.

Mehran Zarei-Ghanavati, MD, from Iran, for training in cornea and external diseases with Dr. Christopher Liu at Sussex Eye Hospital, Brighton and Sussex University Hospitals NHS, in Brighton, UK. After fellowship Dr. Zarei-Ghanavati will return to Tehran University of Medical Sciences in Tehran, Iran, to teach medical students, ophthalmology residents and fellows, and to treat patients.

Gillingham Pan-American Fellowships/PAAO



Natalia Camacho Espinosa, MD, from Bogotá, Colombia, for training in retina at University of California San Diego, Shiley Eye Center in La Jolla, CA, with William R. Freeman, MD.

This program is administered for RRF by the Pan-American Association of Ophthalmology (PAAO). Two six-month fellowships, providing stipends of $10,000 each, were awarded this year to Latin American ophthalmologists for training at leading institutions in the United States.

Cristhian Urzua Salinas, MD from Santiago, Chile, for training in clinical immunology at National Institutes of Health, National Eye Institute, in Bethesda, MD, with Robert B. Nussenblatt, MD.

Research Initiatives

RRF has endowed gifts with earnings applied to translational research and education to bring laboratory knowledge to the clinical level.

American Academy of Ophthalmology Educational Trust Fund

This educational program is administered for RRF by the American Academy of Ophthalmology, and upgrades clinical research skills in the field of retina. The 2014 funding for this program was over $46,000.

RRF Lawrence Travel Scholarships

This program is administered by the Association for Research in Vision and Ophthalmology (ARVO) and is made possible by a gift to RRF from Joe M. and Eula C. Lawrence. A total of $20,000 was funded to provide travel expenses for young vitreoretinal scientists to attend the ARVO Annual Meeting to present their papers or posters. This year the meeting was held in May in Orlando, FL.

In 2014, twenty-two ophthalmology students were selected from these schools:

New York University, New York, NY
Duke University, Durham, NC
University of North Texas Health Science Center, Fort Worth, TX
University of California San Francisco, San Francisco, CA
Joslin Diabetes Center, Boston, MA
Duke University School of Medicine, Durham, NC
Perelman School of Medicine, Univ. of Pennsylvania, Philadelphia, PA
University of Texas Medical Branch (UTMB), Galveston, TX
NYU Medical Center, New York, NY
University of Michigan, Ann Arbor, MI
Case Western Reserve University, Cleveland, OH
IUPUI, Indianapolis, IN
Weill Cornell Medical College, New York, NY
Moran Eye Center, University of Utah, Salt Lake City, UT
Emory University, Atlanta, GA
Georgia Regents University, Augusta, GA
Oregon Health & Science University, Portland, OR
University of California Berkeley, Berkeley, CA
SUNY Upstate Medical University, Syracuse, NY
Washington University, St Louis, MO
University of Southern California, Los Angeles, CA

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RETINA RESEARCH FOUNDATION
COMBINED STATEMENT
FINANCIAL POSITION

December 31, 2014
(with summarized financial information as of December 31, 2013)

	General Funds			Endowment Funds					2013 Total All Funds
	Unrestricted	Temporarily Restricted	Total	Unrestricted	Temporarily Restricted	Permanently Restricted	Total	**2014 Total All Funds**	(Memorandum Only)
Assets									
Cash and cash equivalents	$ 520,017	$ 14,000	$ 534,017	$ -	$ 3,187,349	$ -	$ 3,187,349	**$ 3,721,366**	$ 2,974,201
Contributions receivable	4,945	-	4,945	-	-	29,889	29,889	**34,834**	487,400
Investments	1,499,326	-	1,499,326	3,382,797	25,360,771	18,676,841	47,420,409	**48,919,735**	47,754,993
Furniture and equipment, net of accumulated depreciation of $5,282	14,342	-	14,342	-	-	-	-	**14,342**	14,342
Charitable remainder trust	-	-	-	-	-	322,154	322,154	**322,154**	329,953
Intangible assets	12	-	12	-	-	-	-	**12**	12
Total assets	$ 2,038,642	$ 14,000	$ 2,052,642	$ 3,382,797	$ 28,548,120	$ 19,028,884	$ 50,959,801	**$ 53,012,443**	$ 51,560,901
Liabilities and net assets									
Accounts payable	$ 2	$ -	$ 2	$ -	$ 87,414	$ -	$ 87,414	**$ 87,416**	$ 86,354
Commitments and contengencies									
Net assets	2,038,640	14,000	2,052,640	3,382,797	28,460,706	19,028,884	50,872,387	**52,925,027**	51,474,547
Total liabilities and net assets	$ 2,038,642	$ 14,000	$ 2,052,642	$ 3,382,797	$ 28,548,120	$ 19,028,884	$ 50,959,801	**$ 53,012,443**	$ 51,560,901

RETINA RESEARCH FOUNDATION
COMBINED STATEMENT
NET ASSETS

For the year ended December 31, 2014
(with summarized financial information for the year ended December 31, 2013)

	General Funds			Endowment Funds				2014	2013 Total All Funds
	Unrestricted	Temporarily Restricted	Total	Unrestricted	Temporarily Restricted	Permanently Restricted	Total	**Total All Funds**	(Memorandum Only)
Revenues									
Contributions	$ 180,485	$ 42,000	$ 222,485	$ -	$ -	$ 128,190	$ 128,190	**$ 350,675**	$ 348,527
Interest, dividend and distribution income	47,485	-	47,485	68,986	956,556	-	1,025,542	**1,073,027**	1,050,238
Realized and unrealized gains on investments, net	52,776	-	52,776	121,937	1,675,882	-	1,797,819	**1,850,595**	6,462,550
Mineral interest income and other income	90,635	-	90,635	-	-	-	-	**90,635**	106,180
Change in value of split-interest agreement	-	-	-	-	-	(7,799)	(7,799)	**(7,799)**	17,579
Income transferred from Endowment Fund investments	887,796	110,838	998,634	(67,189)	(931,445)	-	(998,634)	**-**	-
Net assets released from restrictions-satisfaction of program restrictions	276,338	(276,338)	-	-	-	-	-	**-**	-
Total revenues	1,535,515	(123,500)	1,412,015	123,734	1,700,993	120,391	1,945,118	**3,357,133**	7,985,074
Expenses									
Program services									
Research projects and grants	1,332,986	-	1,332,986	-	-	-	-	**1,332,986**	991,921
Public education	32,158	-	32,158	-	-	-	-	**32,158**	30,399
Career development and awards	79,612	-	79,612	-	-	-	-	**79,612**	80,850
Total program services	1,444,756	-	1,444,756	-	-	-	-	**1,444,756**	1,103,170
Supporting services									
Management and general	111,091	-	111,091	22,820	317,671	-	340,491	**451,582**	405,296
Fund raising	10,315	-	10,315	-	-	-	-	**10,315**	27,910
Total supporting services	121,406	-	121,406	22,820	317,671	-	340,491	**461,897**	433,206
Total expenses	1,566,162	-	1,566,162	22,820	317,671	-	340,491	**1,906,653**	1,536,376
Changes in net assets	(30,647)	(123,500)	(154,147)	100,914	1,383,322	120,391	1,604,627	**1,450,480**	6,448,698
Net assets, beginning of year	2,069,287	137,500	2,206,787	3,281,883	27,077,384	18,908,493	49,267,760	**51,474,547**	45,025,849
Net assets, end of year	$ 2,038,640	$ 14,000	$ 2,052,640	$ 3,382,797	$ 28,460,706	$ 19,028,884	$ 50,872,387	**$ 52,925,027**	$ 51,474,547

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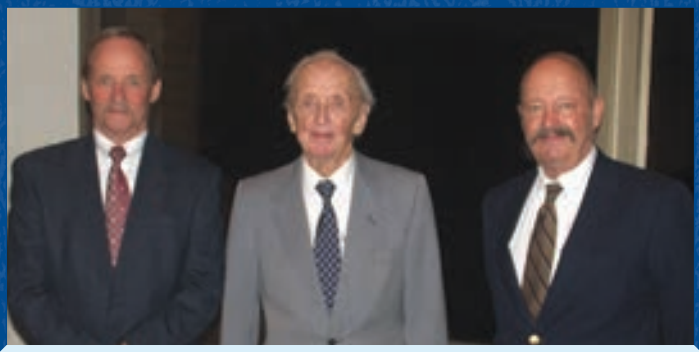

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