Dr. Charles Kelman’s forward-thinking style enabled him to make the ophthalmic discovery of the 20th century. As a dental probe pulsates through the hard tooth enamel, he reasoned, ultrasound vibrations could be used to break up a clouded lens. The method called phacoemulsification, changed cataract surgery forever.

IRRF Founder, Alston Callahan, MD became one of Kelman’s early patients using the new technique and they remained friends for over three decades. Their friendship was an important factor in the formation of the International Retinal Research Foundation in 1997. Kelman served as a Director of the Foundation until his death in 2004, and was posthumously awarded the prestigious Lasker Award in Clinical Science for his contribution to ophthalmology.

Through My Eyes: The Charlie Kelman Story celebrates the double life of Dr. Charles D. Kelman and debuted at the annual meeting of the American Academy of Ophthalmology held in San Francisco in October. The one-hour documentary is a fascinating study of scientific discovery; a rumination on the dynamic of fathers and sons; and a one-of-a-kind success story launched at the intersection of failure, fame and fate that gives hope to anyone who has ever harbored a secret dream. Produced by New York metro area public television station WLIW21 and funded in part by the IRRF, the program premieres nationwide on public television in January 2010.

The documentary will air on Alabama Public Television on Tuesday, January 19th at 8:00 PM. Other airing times include: KERA Dallas, January 5th at 10:00 PM; WXEL West Palm Beach, January 9th at 9:00 PM; Nashville Public Television, January 5th at 11:00 PM; WCEU/Ch 15 Daytona Beach, January 7th at 8:00 PM.

Dr. Kelman’s autobiography, THROUGH MY EYES is available for purchase through The Dr. Charles and Ann Kelman Family Foundation’s website: drcharlesandannkelmanfamilyfoundation.org.

(above) Dr. Michael Callahan at the premiere of Through My Eyes: The Charlie Kelman Story.
(below) Charles Kelman and Alston Callahan
IRRF-FUNDED RESEARCHERS HAVE BEEN RECOGNIZED FOR THEIR EFFORTS AND CONTRIBUTIONS TO VISION SCIENCE BY THE ASSOCIATION FOR RESEARCH IN VISION AND OPHTHALMOLOGY (ARVO), AN ORGANIZATION FOUNDED IN 1928 IN WASHINGTON, D.C., ESTABLISHED TO “ENCOURAGE AND ASSIST RESEARCH, TRAINING, PUBLICATION AND DISSEMINATION OF KNOWLEDGE IN VISION AND OPHTHALMOLOGY.” ARVO MEMBERSHIP IS MORE THAN 12,500 INDIVIDUALS REPRESENTING OVER 70 COUNTRIES AND HAS BECOME KNOWN WORLDWIDE FOR VISION RESEARCH INNOVATION.

The Friedenwald Award honors outstanding research in the basic or clinical sciences as applied to ophthalmology. The winner presents the Friedenwald Award Lecture at the ARVO Annual Meeting. Samuel Miao-Sin Wu, PhD, Baylor College of Medicine, Houston, TX, was presented the Friedenwald Award in 2009 for characterizing synaptic interactions at the inner and outer retina, and for setting the highest standards for retinal systems analyses. Dr. Wu is also the recipient of the Ludwig von Sallmann Prize from the International Society for Eye Research.

(right) Joshua L. Dunaief, MD, PhD, University of Pennsylvania Cancer Center, Philadelphia, PA, was presented the Cogan Award in 2006.

(left) Michael A. Dyer, PhD, St. Jude Children’s Research Hospital in Memphis, TN., was presented the Cogan Award in 2008.
“Immune cells called macrophages and the cytokine interleukin-10 spur the development of the damaging blood vessels,” reports Rajendra S. Apte, MD, PhD (top right), a Washington University retinal specialist. (Cytokines, such as interleukin-10 (IL-10) are small proteins that regulate immunity and inflammation.) “The offending immune system cell and cytokine are identical.” Apte, an assistant professor of ophthalmology and visual sciences and of developmental biology, previously found in mice that IL-10 contributes to abnormal blood vessel growth by interacting with macrophages in the eye, leading to growth beneath the mouse retina. This correlates to what happens in patients who have the “wet” form of macular degeneration.

In diabetic retinopathy, new vessels also form and contribute to vision loss. One difference is that those vessels do not develop beneath the retina, but grow into the retina. A similar condition, retinopathy of prematurity, occurs when premature babies with immature retinas experience an obstruction in blood flow into the retina called ischemia. In response, these children often develop abnormal blood vessels in the retina that can cause retinal detachment and interfere with vision.

“The mechanisms inducing angiogenesis may not be exactly the same in a premature baby and a 70-year-old person,” says Apte, “but it’s important to note that the two key players – macrophages and interleukin-10 – appear to be the prime movers in this process of damaging blood vessel formation in all of these potentially blinding diseases.” It is his belief that therapies that interfere with the IL-10/macrophage pathway might help prevent vision loss.

Members of the scientific team for this study included first author Dru S. Dace, PhD, (left) recipient of the 2008 Alston Callahan, MD Postdoctoral Scholar Award; Aslam A. Kahn, PhD, recipient of the 2009 Alston Callahan, MD Postdoctoral Scholar Award; and Rajendra S. Apte, MD, PhD, IRRF-funded principal investigator.
Research Funding…

The International Retinal Research Foundation finished its inaugural year of 1997 with nearly $1 million in donations, and made its first grant 17 months after Dr. Alston Callahan announced he would form a new foundation dedicated to research into retinal diseases. Since that time, the Foundation’s endowment has grown to $30 million, with over $8 million awarded to nearly three-dozen vision scientists. Because eye diseases affect individuals worldwide, funding internationally has always been a priority and grant recipients are a diverse group of scientists from across the United States and overseas. The chart below lists the top 10 institutions that have received research support since 1997.

Other institutions include the University of Rio de Janeiro; University of Schleswig-Holstein, Germany; Columbia University, New York; University of Wisconsin and the University of Rochester, New York.
2009 Funding Summary...

More than $1.1 million has been awarded in 2009 for the following research activities:

**Rajendra S. Apte, MD, PhD,**  
Washington University, Immunosenesence and the ability of macrophages to regulate angiogenesis in age-related macular degeneration. $100,000.

**Peter Barabas, PhD,**  
University of Utah, Charles D. Kelman, MD Postdoctoral Scholar. $35,000.

**Gwendolyn Boyd, MD,**  
University of Alabama at Birmingham, Equipment Purchase for the Callahan Eye Foundation Hospital – Dinamap Pro 1100®. $5,000.

**Jiyang Cai, PhD,**  
Vanderbilt University, Genetic Variations of NrF2 Gene and Age-related Macular Degeneration. $100,000.

**Mina M. Chung, MD,**  
University of Rochester, Adaptive optics imaging in the diagnosis and evaluation of age-related macular degeneration. $49,917.

**Joshua L. Dunaief, MD, PhD,**  
University of Pennsylvania, Evaluation of the iron regulatory hormone hepcidin as a potential factor in age-related macular degeneration. $67,000.

**Janis T. Eells, PhD,**  

**Aslam A. Khan, PhD,**  
Washington University, Alston Callahan, MD Postdoctoral Scholar. $35,000.

**The Albert and Mary Lasker Foundation,**  

**Xiumei Li, MD, PhD,**  
University of Alabama at Birmingham, International Retinal Research Foundation Postdoctoral Scholar. $35,000.

**Rodrigo Matins, BSc, MSc, PhD,**  
University of Rio de Janeiro, Regulation of Ocular Organogenesis by MYC transcription factors. $40,034.

**Russell W. Read, MD, PhD,**  

**Martin Rudolf, MD,**  
University of Schleswig-Holstein, In vivo remodeling of Bruch’s membrane by targeting age-related lipid deposition via apolipoprotein mimetics. $100,000.

**Botir T. Sagdullaev, PhD,**  
Burke Medical Research Institute, Functional Remodeling of the Retinal Output after Photoreceptor Death. $99,500.

This study was conducted with IRRF support.


This study was conducted with IRRF support.
PUBLISHED SCIENCE FINDINGS BROADEN THE FIELD OF KNOWLEDGE AND ARE ESSENTIAL AS A FOUNDATION FOR BREAKTHROUGH DISCOVERIES. IRRF-SUPPORTED SCIENTISTS ARE CONTRIBUTING TO THE RESEARCH FIELD WITH SCHOLARLY ARTICLES THAT ARE CONSTANTLY MOVING FORWARD OUR UNDERSTANDING OF BLINDING EYE DISEASES.

To access this article: www.iovs.org/cgi/content/full/50/4/1929.

This study was conducted with IRRF support.

To access this article: www.iovs.org/cgi/content/full/50/4/1814. Dr. Washington receives IRRF funding through 2009.

Investigative Ophthalmology & Visual Science (IOVS), “Adaptive Optics Scanning Laser Ophthalmoscopy Images in a Family with the Mitochondrial DNA T8993C Mutation.” Yuhua Zhang, PhD is a corresponding author for this paper. (April 2009, vol. 50, no. 4)
To access this article: www.iovs.org/cgi/content/full/50/4/1838. Dr. Zhang receives IRRF funding through 2011.

Proceedings of the National Academy of Sciences (PNAS), “Small interfering RNA-induced TLR3 activation inhibits blood and lymphatic vessel growth,” Mark Kleinman, contributing author, Department of Ophthalmology & Visual Science, University of Kentucky, Lexington. (April 2009, vol. 106, no. 17, p 7137-7142) This study was conducted with IRRF support; Dr. Kleinman received the IRRF Charles D. Kelman, MD Postdoctoral Scholar Award in 2008.
To access this article: www.pnas.org/content/106/17/7137.full.pdf.

Nature, “CCR3 is a target for age-related macular degeneration diagnosis and therapy,” Mark E. Kleinman, contributing author, Department of Ophthalmology & Visual Science, University of Kentucky, Lexington. (July 2009, vol. 460, p 225-230) This study was conducted with IRRF support; Dr. Kleinman received the IRRF Charles D. Kelman, MD Postdoctoral Scholar Award in 2008.
To access this article: www.nature.com/nature/journal/v460/n7252/pdf/nature08151.pdf.
The annual meeting of the Association for Research in Vision and Ophthalmology (ARVO) serves as a forum for vision scientists from around the globe and provides a fertile setting for information dissemination. The IRRF cultivated an opportunity for idea exchange by supporting Christine Curcio, PhD, Professor of Ophthalmology at the University of Alabama at Birmingham (UAB), in her proposal of hosting a Special Interest Group (SIG) session at the 2009 meeting. Curcio specializes in age-related macular degeneration and has recently been named a member of the National Eye Institute’s Board of Scientific Counselors. The SIG, Cholesterol and lipoproteins in retinal health and age-related maculopathy, was presented to an audience of approximately 200 by a panel of experts, including James Handa, MD, Johns Hopkins Wilmer Eye Institute, served as moderator; Lionel Bretillon, PhD, Eye & Nutrition Research Group, Dijon, France; Christine Curcio, PhD, UAB Department of Ophthalmology; Mark Johnson, PhD, Northwestern University, IL; back row: Steven Fliesler, PhD, SUNY – Buffalo; and Ira Tabas, PhD, Columbia University, NY.

(above) IRRF Director Sandra Blackwood met with Drs. Justine Smith and Yuzhen Pan during the poster session. Dr. Smith is an IRRF-supported scientist at Oregon Health & Science University.

(right): Members of the panel — James Handa, MD, Johns Hopkins Wilmer Eye Institute, served as moderator; Lionel Bretillon, PhD, Eye & Nutrition Research Group, Dijon, France; Christine Curcio, PhD, UAB Department of Ophthalmology; Mark Johnson, PhD, Northwestern University, IL; back row: Steven Fliesler, PhD, SUNY – Buffalo; and Ira Tabas, PhD, Columbia University, NY.
Dr. Ira Tabas, Department of Medicine at Columbia University, NY, as the keynote speaker. A noted macrophage biologist and influential writer on atherosclerosis pathobiology, Tabas summarized the role that lipoproteins play in atherosclerosis initiation. The largest risk factor for age-related maculopathy (ARM) is aging, and one of the largest age effects in human retina is the accumulation of neutral lipid in normal Bruch’s membrane across the lifespan. Recent work establishing that this accumulation is accounted for by cholesterol-rich lipoproteins lays the foundation for further work on the retinal pigment epithelium (RPE) as a constitutive lipoprotein secretor and ARM as an atherosclerosis-like progression in a vessel wall (Bruch’s membrane).
Yuhua Zhang, PhD, has been recruited to the University of Alabama at Birmingham (UAB) to develop an advanced adaptive optics scanning laser ophthalmoscope (AOSLO) to study retinal structure and function at the cellular level in the living human eye. The ophthalmoscope records real-time video of living retina on a microscopic scale and can visualize features including cone photoreceptors, RPE cells, and the flow of single leukocytes through the smallest retinal capillaries. This technology has provided significant new insights into variations in retinal cells from one person to another. Without adaptive optical techniques, this kind of research is not possible since the eye disrupts light passing through it causing blurring in conventional attempts to image the retina. The use of adaptive optics in ophthalmology emerged within the last fifteen years and because it is such a new field, there are only a handful of individuals with the research experience needed to develop this exciting new technology.

When Judith Kapp, PhD, Professor and Vice Chair for Research at UAB, identified Yuhua Zhang as one of these experts and proposed his recruitment to the Department of Ophthalmology, the Foundation was positive about the idea. The EyeSight Foundation of Alabama also expressed interest, along with the UAB School of Medicine, and a partnership was formed to bring Dr. Zhang to Birmingham.

Dr. Zhang has authored scores of peer-reviewed articles pertaining to the adaptive optics technology and is considered one of the most promising, talented young investigators in this field. The IRRF has committed support for Dr. Zhang at $300,000 over three years.

Investigative Ophthalmology & Visual Science (IOVS), “Adaptive Optics Scanning Laser Ophthalmoscopy Images in a Family with the Mitochondrial DNA T8993C Mutation.” Yuhua Zhang, PhD is a corresponding author for this paper. (April 2009, vol. 50, no. 4) To access this article: www.iovs.org/cgi/content/full/50/4/1838.
When the Foundation was asked about interest for a collaboration to raise awareness and funds for the University of Alabama at Birmingham (UAB) Center for Low Vision Rehabilitation and to support research efforts at the Optic Nerve Imaging Center, it was an easy decision. Songs for Sight was organized by 16-year-old Mountain Brook, Alabama native, Alie B. Gorrie, who was diagnosed as an infant with optic nerve hypoplasia, a genetic form of vision impairment caused by underdeveloped optic nerves. Wanting to help support low-vision services and research, Miss Gorrie organized the evening of music.

The event featured celebrities as country singer Sara Evans, rocker Grace Potter and alternative-rock songwriter, guitarist Eliot Morris, as well as Birmingham ophthalmologist and concert pianist, Drew Mays. Songs for Sight raised over $400,000.

The partnership between Birmingham community leaders and other local foundations has enabled the IRRF to support eye research and low vision services, while assisting in a fund-raising effort that will have an enormous impact.

In 2008, the IRRF announced a partnership with The Albert and Mary Lasker Foundation in a collaboration to identify and pursue innovative strategies to address diseases that impair or destroy vision. One component of the association is support for the Lasker Awards, a program established in 1945, which have become the most respected science prizes in the world. Seventy-six Lasker laureates have received the Nobel Prize, including 28 in the last two decades. In 2004, 3 months after his death, IRRF co-founder Charles D. Kelman, MD was awarded the Albert Lasker Award for Clinical Medical Research.

(More about the Lasker/IRRF Initiative on the following pages.)
The International Retinal Research Foundation is very pleased to be a supporter of the Lasker Awards given each year to honor individuals who have contributed to medical innovation that benefit society as a whole. Albert and Mary Lasker created the Lasker Foundation in 1942 with a novel vision - to encourage government support for biomedical research in the United States. The conception of Medical Research Awards was Mary’s and were first given in 1945, increasing visibility and public support for research progress and celebrating scientists, physicians, and public servants whose daring achievements had extraordinary impact on research, medicine, and public health. Since that time the Lasker Foundation has become one of the most influential advocates for public health in America.

The 2009 Albert Lasker Basic Medical Research Award went to John Gurdon and Shinya Yamanaka for their discoveries concerning nuclear reprogramming. Nuclear reprogramming is a process that instructs fully specialized adult cells how to turn into stem cells that can guide the formation of any tissue type.

The 2009 Lasker-DeBakey Clinical Medical Research Award honored Brian J. Druker, Nicholas B. Lydon and Charles L. Sawyers for their development of novel treatments for chronic myeloid leukemia (CML) that converted this fatal cancer into a manageable chronic condition.

New ground in cancer therapy was broken by the targeting of the molecular underpinnings of the disease thereby radically altering the prognosis of CML patients.

The 2009 Mary Woodard Lasker Public Service Award was given to New York City Mayor Michael R. Bloomberg who has led the way in reducing the scourge of tobacco use and promoting good eating habits. Early in his mayoral term, Bloomberg banned smoking in restaurants and bars and forced restaurant chains to post calorie counts as prominently as they display names of menu items and prices.
The concept of the Initiative defined by the two foundations was simple – to invite the top scientists in the world from many disciplines related to retinal disease to meet and form collaborations that will make significant advances toward finding a cure or solution for the problem. Finding a leader to coordinate the unique knowledge of the disciplines involved and identify a group of eminent scientists who complement each other presented a more challenging task. John Dowling, PhD was the obvious choice and all involved were delighted when he accepted the role as Chair of the Initiative.

Dowling is the Llura and Gordon Gund Professor of Neurosciences and professor of Ophthalmology at Harvard Medical School and has received numerous awards, including the Friedenwald Award, the highest award from the Association for Research in Vision and Ophthalmology ARVO. He is a member of the National Academy of Sciences as well as the writer of many textbooks on ophthalmology, including “The Retina: An Approachable Part of the Brain.”

About Woods Hole…

The town of Woods Hole is located in the far southwest corner of Cape Cod, a peninsula in Massachusetts, and has a long history related to the sea. Famous for its marine science institutes such as the Woods Hole Oceanographic Institute and the Fisheries Science Center, it has long been recognized as the location of the National Academy of Sciences (NAS), which was established by Abraham Lincoln in 1863. Almost all serious scientists are aware of its publication, the Proceedings of the National Academy of Sciences (PNAS). The NAS owns and operates the J. Erik Jonsson Center (below right), the location for the July and August sessions of the Initiative for Innovation in Vision Science. The complex consists of meeting centers, a marine dock, and the main Hackerman house (below left), a historic mansion dating back to 1884. The setting is ideal for scientific discussion in an atmosphere where the free exchange of ideas can take place.
**Keynote Speakers**
(both sessions)
**Moderator: John Dowling**
Len Levin, MD, PhD
*Neuro-Ophthalmic Introduction in Glaucoma*
Ben Barres, MD, PhD
*Astrocytes in Neurodegeneration*

**Session I – Moderator B. Barres**
Mark Ellisman, PhD
*New Views of Astrocytes: What we missed about Size and Territories in Healthy and Diseased Brains*
Martin Raff, MD
*Retinal Astrocytes are Immigrants from the Optic Nerve Head*
Simon John, PhD
*Optic Nerve and Retinal Injury in Glaucoma. Potential Damaging/Protective Roles of Glia*
Tailoi Chan-Ling MOptom, PhD
*Spatial Differences in Retinal Astrocytes and Vasculature in Aging*

**Session II – Moderator L. Levin**
Q. Richard Lu, PhD
*Ion Channels in Astrocyte function and Retinal Degeneration*
Kinichi Nakashima, PhD
*Epigenetic Regulation for Neural Cell Differentiation and Plasticity*
Amir Rattner, PhD
*The Genomic Response of the Retina and RPE in Injury and Disease*

**Session III – Moderator L. Donoso**
Samuel M. Wu, PhD
*Sensitivity Loss of Ganglion Cells in a Mouse Model*
Geoffrey Lewis, PhD
*The Response of Astrocytes and Müller Cells to Retinal Injury*
Monica Vetter, PhD
*Another Player in the Room – The Role of Microglia in Glaucoma*
Richard Masland, PhD
*The Organization of Astrocytes in the Optic Nerve Head of the Mous*

**Session IV – Moderator A. Sommer**
Larry I. Benowitz, PhD
*The Yin and Yang of the Immune Response in Animal Models of Glaucoma and Optic Nerve Degeneration*
Richard Daneman, PhD
*Mechanisms Regulating Blood CNS Barriers During Health and Disease*

**Session V – Moderator P. Sternberg**
King-Wai Yau, PhD
*Intrinsically Photosensitive Retinal Ganglion Cells*
Marcus Fruttiger, PhD
*The Role of Astrocytes in Retinal Vascular Development*
Claire Mitchell, PhD
*Scleral Rigidity in Glaucoma*

(below) The Marine Biology Laboratories in Woods Hole
SESSION I – MODERATOR B. BARRÉS

Richard Stone, MD
Experimental Glaucoma and the challenge of Clinical Relevance

Claude F. Burgoyne, MD
Early Optic Nerve Head: a Histomorphometric and Proteomic Change in a Monkey Model

J. Crawford Downs, PhD
Does the Biomechanical Environment of the Optic Nerve Head Drive Remodeling in Glaucoma

Cynthia L. Grosskreutz, MD, PhD
Do Retinal Astrocytes and Müller Glia Play a Protective Role in Glaumatous Neurodegenerations?

SESSION II – MODERATOR L. LEVIN

Brian Link, PhD
Exploring the Genetics and Cell Biology of Glaumatous-associated Phenotypes in Zebrafish

Jeffrey Goldberg, MD, PhD
Retinal Ganglion Cell Survival and Regeneration

Donald Zack, MD, PhD
Role of ER Stress in EGC Damage

M. Francesca Cordeiro, MD, PhD
Glaumatous RGC Apoptosis

SESSION III – MODERATOR L. DONOSO

Steven Fisher, PhD
A Comparison of Astrocytes and Müller cells of the Retina and their Response in Retinal Injury

Michael V. Sofroniew, MD, PhD
Molecular Dissection of Reactive Astrogliosis and Glial Scar Formations

Milos Pekny, MD, Dr. Med Sc
Reactive Gliosis-A Two Sided Sword: Targeting the Intermediate Filament System of Astrocytes

Ananth Viswanathan, FRCPhtih, MD
Psychophysics in Glaucoma

SESSION IV – MODERATOR – A LATIES

Beth Stevens, PhD
Role of the Complement Cascade in Mediating Synapse Elimination During Development and Disease

Robert Marc, PhD
The Retinal Connectome, Glia and Disease

Gail Mandel, PhD
Gliaal Contributions to Rett Syndrome

SESSION V – MODERATOR J. DOWLING

David Williams, PhD
Imaging Retinal Mosaics in the Living Eye

Yuhua Zhang, PhD
Adaptive Optics Scanning Laser Ophthalmoscopy for in vivo Cellular Imaging of Retinal Structure

Tatjana C. Jakobs, MD
Imaging Individual Astrocytes in the Optic Nerve

Kazuhiro Ikenaka, PhD
Imaging of Glutamate and ATP Released from Astrocytes

(left) The participants of the August meeting paused long enough for a photo.
BECOME A BENEFACtor:
How you can help...

Today’s scientists play a crucial role in the universal struggle against debilitating eye diseases, but they need financial funding to facilitate and sustain their efforts. Since 1998, the IRRF has granted more than $8 million in support of scientific investigations targeting all structures of the human eye, with emphasis on finding the causes, prevention and cure of degenerative diseases. If you would like to help with this challenge, please send your tax deductible contribution to:

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