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Retina Research Foundation Board of Directors

Dede Weil, Bettie Lee and Nancy Japhet

John Dawson, Jr., and John Cater

L. Henry Gissel, Jr.

Bruce Mack and Richard Walton
Chairman Emeritus Message

In introducing past Annual Reports, Dr. McPherson and others have emphasized the importance of our loyal friends and the importance of their support in achieving the many advances made by the Foundation, and properly so. But this is only part of the story, and it is the financial and business management of the Foundation that I would like to comment on for this Annual Report. The Foundation has taken exceptional care of your donations over the years and is happy to report that your trust has been well placed.

Those early days of RRF were truly a hand-to-mouth existence. Through careful budgeting and research project selection, we were able to start research projects locally and then gradually expand them beyond Houston, Texas, and even the U.S. Our investments consisted only of three month CDs laddered to mature at intervals to pay bills as they came due. As funds grew the Board decided to establish an endowment and structured it so that only the interest and dividend income from its investment could be spent. The core funds could not be spent but continued to grow. It was called the Permanent Endowment Fund. Professional management was selected to manage these funds, and the PEF market value has now grown in value to over double the amount of the original contributions. This increase in value has been achieved while your continuing donations have made possible generous funding for research projects sponsored by the Foundation $24 million spent to date. We also take pride in our ability to keep administrative and overhead expenses low, averaging only about 15 percent of budget expenditures.

While our research support started locally, it has steadily expanded to national and international coverage. As Dr. McPherson has reported, RRF now supports research in 11 institutions in Texas, 42 in the United States, and 45 internationally.

All affairs of the RRF are directed by a Board of Managing Directors, which is composed of a group of very capable and dedicated community leaders with career experiences in business, law, medicine, basic sciences, etc. None is affiliated with any research institution, and no member of the Foundation receives compensation from RRF for their services.

So, in conclusion I would like to express all of our appreciation to those Board members and officers who serve so diligently and so well in stewarding the confidence and trust put in them. You, our supportive community of donors, also help our programs grow and thrive. We continue to meet the highest standards of research thanks to a winning team of leaders, donors, and scientists. 2010 was a year of outstanding research, and RRF is fortunate to have the leadership in place which makes the science possible and gives hope to so many.

Sincerely,

Emmett A. Humble
Chairman Emeritus
Overview of Research - 2010

Retina Research Foundation supports an exemplary variety of programs in retina research around the world. Past and present RRF research sites now total 53 national and 45 international. The following is a brief recap of sites for RRF research funds in 2010, which illustrates the wide reach of RRF activities.

RRF Pilot Study Grants Ì nvestigation of New Research Topics

Baylor College of Medicine, Houston, TX
  Samuel Wu, PhD - Gueymard Research Project
  Ramon Font, MD - Kayser 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

Texas A&M Health Science Center, Temple, TX
  Lih Kuo, PhD - Basic Research Grant

University of Wisconsin, Madison, WI
  Curtis Brandt, PhD - Murfee Macular Degeneration Project

UT MD Anderson Cancer Center, Houston, TX
  Louise Strong, MD - Humble Research Project

UT MD Anderson Cancer Center

UT MD Anderson Cancer Center, Houston, TX
  Louise Strong, MD - Humble Research Project

RRF Macula Research Grant Ì llot Study Award

RRF Cox Research Project Ì dministered by The Macula Society
  Rajendra Apte, MD, PhD - Washington University School of Medicine, St. Louis, MO

Established Awards □ Awards Recognizing Lifetime Achievement

RRF Award of Merit Ìresented by The Retina Society - San Francisco, CA - Sept. 25
  Eliot Berson, MD – Harvard Medical School, Massachusetts Eye and Ear Infirmary, Boston, MA

RRF Kayser International Award □presented by International Society for Eye Research (ISER) - Montreal, Canada □July 18-23
  Frank Werblin, PhD, University of California, Berkeley, CA

RRF Pyron Award Ìresented by American Society of Retina Specialists (ASRS) - Vancouver, Canada □Aug. 29
  Julia Haller, MD - Wills Eye Institute, Thomas Jefferson University, Philadelphia, PA

CL Schepens MD/AAO Award Ìo-Sponsored by RRF and Schepens International Society (SIS) Ìicago, IL - Oct. 15
  William Tasman, MD - Wills Eye Institute, Thomas Jefferson University, Philadelphia, PA

RRF Gonin Lecturer Ìresented by Club Jules Gonin Ì yoto, Japan Ìov. 5
  Napoleone Ferrara, MD, and Anthony Adamis, MD - Genentech, San Francisco, CA

RRF Gonin Medalist Ìresented by ICO with Club Jules Gonin Ì erlin, Germany Ìune 5-9
  Alan Bird, MD - Moorfields Eye Hospital, London, England
Research Chairs Ongoing Proven Research Projects

University of Wisconsin, Madison, WI
   Curtis Brandt, PhD - Helmerich Chair
   Nansi Colley, PhD - Helmerich Chair
   Nader Sheibani, PhD - RRF Chair
   Daniel Albert, MD, MS - Humble Distinguished Directorship
   David Gamm, MD, PhD - Murfee Chair

Baylor College of Medicine, Houston, TX
   RRF Chair - Yet to be named

Research Professorships Ongoing Proven Research Projects

University of Wisconsin, Madison, WI
   Arnold E. Ruoho, PhD - Gamewell Professor
   Arthur S. Polans, PhD - Matthews Professor
   Bikash Pattnaik, PhD - Brown Professor

International Fellowships Advanced Subspecialty Training

ICO/Helmerich International Fellowships - administered by International Council of Ophthalmology Foundation (ICOF)
   Lala Ceklic, MD, PhD - from Sarajevo to Bern University Hospital, Switzerland
   Afsun Sahin, MD - from Turkey to Schepens Eye Research Inst., Harvard Univ., Boston, MA

Gillingham Fellowships - administered by Pan-American Association of Ophthalmology (PAAO)
   Sandra Montezuma, MD - from Colombia to Massachusetts Eye and Ear Infirmary, Boston, MA
   Alfredo Castillejos, MD - from Mexico to New York Eye and Ear Infirmary, New York, NY

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-three vitreoretinal scientists representing schools in fifteen states traveled to the ARVO Annual Meeting to present their scientific research

Pan-American Research Initiatives - administered by Pan-American Association of Ophthalmology (PAAO)
   Kayser Travel Scholarships
      Eight ophthalmologists from California, Massachusetts, Florida, New York, and Oregon traveled to Brazil, Venezuela, Dominican Republic, Mexico, Chile, Argentina, and Colombia

   Tyson Research Initiatives
      Eight ophthalmologists from Mexico, Argentina, and Colombia traveled to the ARVO Annual Meeting

Special Recognition Awards Outstanding Grantees

Baylor College of Medicine, Houston, TX
   Ramon Font, MD - Brochstein Award
   Richard Hurwitz, MD - Barr Award
# Retina Research Sites

## Past and Present

### National: 42

<table>
<thead>
<tr>
<th>Location</th>
<th>Institution</th>
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<tbody>
<tr>
<td>Miami, FL</td>
<td>Bascom Palmer Eye Institute</td>
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<td>Pasadena, CA</td>
<td>California Institute of Technology</td>
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<tr>
<td>Portland, OR</td>
<td>Casey Eye Institute</td>
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<td>Cleveland, OH</td>
<td>Cleveland Eye Clinic/Foundation</td>
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<td>New York, NY</td>
<td>Columbia University</td>
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<td>Ithaca, NY</td>
<td>Cornell University Medical College</td>
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<td>Durham, NC</td>
<td>Duke University Medical School</td>
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<td>Atlanta, GA</td>
<td>Emory University Eye Center</td>
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<td>Eye Research Institute</td>
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<td>Worcester, MA</td>
<td>Eye Tech Pharmaceuticals</td>
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<td>Baltimore, MD</td>
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<td>Boston, MA</td>
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<td>Baltimore, MD</td>
<td>Johns Hopkins University Medical School</td>
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<td>Baltimore, MD</td>
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<td>Boston, MA</td>
<td>Massachusetts Eye &amp; Ear Infirmary</td>
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<td>Massachusetts Institute of Technology</td>
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<td>National Eye Institute</td>
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<td>Evanston, IL</td>
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<td>Boston, MA</td>
<td>Schepens Eye Research Institute</td>
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<td>Philadelphia, PA</td>
<td>Sheie Eye Institute</td>
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<td>Baltimore, MD</td>
<td>St. Joseph's Hospital</td>
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<td>New Orleans, LA</td>
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<td>Royal Oaks, MI</td>
<td>William Beaumont Hospital</td>
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### International: 21

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<td>Asahikawa, Japan</td>
<td>Asahikawa Medical College</td>
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<td>Buenos Aires, Argentina</td>
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<tr>
<td>La Paz, Bolivia</td>
<td>Hospital Ophthalmique</td>
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<tr>
<td>Tokyo, Japan</td>
<td>Keio University</td>
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<td>Sydney, Australia</td>
<td>Lariboisiere Hospital</td>
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<td>Montreal, Quebec, Canada</td>
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<td>London, England</td>
<td>McGill University</td>
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<td>Osaka, Japan</td>
<td>Montreal General Hospital</td>
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<td>Edinburgh, Scotland</td>
<td>Moorfields Eye Hospital</td>
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<td>Reykjavik, Iceland</td>
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<td>Paris, France</td>
<td>University of Osaka</td>
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<td>Erlangen, Germany</td>
<td>University of Oxford</td>
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<td>Leipzig, Germany</td>
<td>University of Paris</td>
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<td>Regensburg, Germany</td>
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<td>Edinburgh, Scotland</td>
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<td>Caracas, Venezuela</td>
<td>University of Tubingen</td>
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<td>Lima, Peru</td>
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### Pan American Countries: 24

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<td>Curilba, Argentina</td>
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<td>San Salvador, El Salvador</td>
<td>La Paz, Bolivia</td>
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<td>Asuncion, Paraguay</td>
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<td>San Juan, Puerto Rico</td>
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<td>Montevideo, Uruguay</td>
<td>Cali, Colombia</td>
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<tr>
<td>Caracas, Venezuela</td>
<td>San Juan, Costa Rica</td>
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Research

RRF provided funding for 11 pilot study research projects conducted at leading research institutions. Eight of the projects were named in recognition of generous support of gifts. 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

Adolphe G. and Josephine Roberts Gueymard Research Project
Samuel Wu, PhD
Cullen Eye Institute
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 and synaptic mechanisms underlying retinal cell death in age-related macular degeneration (AMD) and glaucoma, designing early detection/diagnostic devices and identifying new drug treatments and gene therapies for AMD and glaucoma patients.

A gene therapy strategy for preventing photoreceptor death in a mouse model of Bardet Biedl Syndrome (BBS) has been developed in Dr. Wu’s lab. This is the first successful gene therapy for this blinding disease, and it constitutes a major step towards a cure for BBS in human patients.

His group has studied major synaptic connections in the retinal neuronal network, which allows them to construct a comprehensive model for retinal function. This model will serve as a blueprint for future research efforts in fighting various types of retinal diseases such as AMD, which are associated with retinal synaptic dysfunctions.

Emmett A. Humble Research Project
Louise C. Strong, MD
Molecular Genetics
University of Texas M.D. Anderson Cancer Center, Houston, TX

Genetic Etiology of Retinoblastoma

Dr. Strong has found that many of the children who were successfully treated for retinoblastoma in infancy and early childhood went on in older age to develop new cancers. Her lab discovered that there was an underlying genetic risk of certain tumor types in hereditary retinoblastoma patients, and that perhaps the radiation further increased that risk, and shortened the time to tumor.

One of the ongoing aims of her research has been to understand the factors that contribute to the second cancers, with the hope that the information could be useful in identifying those at highest risk, and in identifying the molecular pathways involved that might suggest potential intervention or treatment targets.
The IgG4-positive related inflammatory condition is a novel clinico-pathological entity that is characterized by increased serum levels of IgG4 associated with the increased presence of IgG4-positive plasma cells in the involved tissues including the lacrimal gland, orbit and ocular adnexa associated with the infiltration of T-lymphocytes in various organs. The immune mechanism is mediated by T-cells (mainly CD4-positive T-cells), and the increased expression of IgG4-positive plasma cells within the involved tissues could play an important role in the pathogenesis that modulates the inflammatory conditions of the affected ocular tissues.

This condition must be considered in the differential diagnosis in order to offer new modalities of treatment for these patients, as has been suggested by some researchers. Dr. Font's preliminary results strongly suggest that the main immunologic mechanisms involved are more dependent on the role of T4 helper/inducer lymphocytes rather than T8 suppressor/cytotoxic lymphocytes.

Vertebrate retinal formation is a complex process that requires the formation of the anterior neural plate as well as the specification and differentiation of retinal cells. This requires the interplay of several genes essential for eye formation.

Dr. Jamrich has shown previously that Rx, a paired like homeobox gene, has a critical role in vertebrate eye formation, as mice missing Rx function do not develop eyes. Furthermore, his preliminary evidence suggests that Rx also has a role in the survival of differentiated retinal cells.

Since Rx genes appear to be the key gene in vertebrate eye formation, Dr. Jamrich is examining the molecular network that mediates Rx function in the specification, differentiation and survival of vertebrate retinal cells.

Leber congenital amaurosis (LCA) is one of the most common hereditary causes of visual impairment in infants and children, which accounts for more than five percent of all retinal dystrophies. The clinical phenotype of LCA can be
Research

extremely severe and it is characterized by several visual perturbations identifiable at birth or within the first year of life.

Dr. Chen’s project aims to identify the underlying mutations for LCA, which is the essential first step for understanding the molecular mechanisms and designing proper treatment for this disease. Based on homozygosity mapping of all the consanguineous LCA families with no known mutations (Li et al., 2009), his lab has identified numerous LCA disease candidate loci. In total, they have completed homozygosity mapping for 23 LCA families, each containing homozygous regions that range in size from 2 Mb to more than 200 Mb.

The Kathryn and Latimer Murfee Macular Degeneration Project
Curtis R. Brandt, PhD
Ophthalmology and Visual Sciences
Medical Microbiology and Immunology
University of Wisconsin School of Medicine and Public Health, Madison, WI

Gene Therapy for Retinal Degenerative Diseases

Dr. Brandt’s laboratory is focusing on using viral-based vectors for ocular gene delivery. They and others have shown that vectors based on several different viruses can deliver genes to various cells in the retina. Other work in his laboratory and in collaboration with others has shown that introduction of many of these viral vectors into the primate eye triggers a transient inflammatory response. Interestingly, inflammatory responses are not triggered in rodent eyes.

For ocular gene therapy to move forward in people, it is necessary to identify the cause of the inflammatory response so strategies to block the effect can be developed. Dr. Brandt’s lab is focusing on several pre-inflammatory signaling molecules that could be the signal that initiates the process.

Bertha and I.L. Miller Research Project
Graeme Mardon, PhD
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 Dr. Mardon's research is improve our ability to prevent, diagnose, and treat human retinal disease. His laboratory employs a three-pronged approach.

First, they are actively mapping and identifying new human retinal disease genes using cutting-edge genomic technologies. Specifically, they are mapping new genes that cause Leber Congenital Amaurosis (LCA), the most common form of congenital blindness in humans. Second, they use the mouse as a model system to study the function of conserved genes required for normal retinal development, including genes identified in our screen of LCA patients.

Finally, they use their mouse models to test new treatments to cure blindness, including gene therapy. This combination of approaches comprises an efficient and comprehensive plan to advance our understanding of the molecular and genetic mechanisms of human retinal disease.
Research

Mary Ellen Wilson Research Project
Richard L. Hurwitz, MD
Associate Professor of Pediatrics,
Ophthalmology and Molecular and Cellular Biology
Director, Retinoblastoma Center
Texas Children’s Cancer Center
Center for Cell and Gene Therapy
Baylor College of Medicine, Houston, TX

Immune Consequences of Gene Therapy for Ocular Disorders

Disorders such as retinoblastoma, retinitis pigmentosa, and Stargardt disease are good candidates for gene therapy in the eye. Dr. Hurwitz has created an embryonic mouse model of retinoblastoma, a cancer of the eye that occurs in children. This model conclusively shows that proliferating, undifferentiated retinal cells can form tumors.

A small percentage of cells that express the neural stem cell related protein CD133 can be isolated from a cell line that was created from this murine tumor. These CD133 positive cells can preferentially recreate the retinal tumor in mice, and this tumor appears identical to primary retinoblastoma tumors in both mice and children. Therefore, a proliferating tumor cell that expresses the neural stem cell marker CD133 is responsible for retinoblastoma tumor initiation in a mouse model of the disease.

Basic Research Grants

Barbara Klein, MD, MPH
Ophthalmology and Visual Sciences
University of Wisconsin School of Medicine and Public Health,
Madison, WI

Prevalence and Incident Changes in Retinal Vascular Caliber Associated with Medication and Supplement Use

Retinal vessel diameters (RVD) are associated with cardiovascular diseases such as hypertension, myocardial infarction and cardiovascular mortality. RVDs are affected by many factors. A class of exposures that is often ignored in examining associations between cardiovascular endpoints and RVD is medications and supplements. Dr. Klein is completing the analyses of recently collected data during a period of time when use of new vasodilator drugs as well as ACE inhibitors and ARBs became more common to determine the effects of these powerful medications on retinal vessel diameters.
**Research**

**Lih Kuo, PhD**  
Departments of Systems Biology and Translational Medicine  
and Ophthalmology  
Scott & White Memorial Hospital  
Texas A&M Health Science Center, Temple, TX

*Activation of Endothelin-dependent RhoA/ROCK by C-Reactive Protein Elicits Retinal Arteriolar Dysfunction*

Retinal vascular disease such as diabetic retinopathy is one of the leading causes of blindness in the USA, but the etiology and development of vascular and visual pathology in this disease is not fully understood. Elevated plasma level of inflammatory marker C-reactive protein (CRP) is associated with patients with diabetes and various cardiovascular diseases.

Interestingly, Dr. Kuo’s lab found that CRP elicits retinal vascular disorder by losing endothelium-dependent vasodilatory function. However, the mechanistic action of CRP on retinal vasomotor function remains elusive.

His lab also examines the therapeutic potential of statins in the protection and treatment of vascular dysfunction elicited by CRP. They use an isolated vessel approach to directly assess retinal microvascular function and use molecular tools to address the signaling pathways leading to vascular dysfunction by CRP.

**Leonard Levin, MD, PhD**  
Dept. of Ophthalmology and Visual Science  
University of Wisconsin, Madison, WI

*Pharmacological Protection of Endothelial Cells For Retinal Vascular Disease*

Dr. Levin’s laboratory continues to develop novel pharmacological approaches to treating endothelial cell death in retinal disease. These focus on molecules (phosphine-borane complexes) that reduce disulfide bonds and thereby block the signaling of cell death.

In 2010 his group was able to show that the phosphine-borane complexes not only could protect retinal endothelial cells against radiation injury, but that they did so without affecting the levels of a reactive oxygen species, superoxide, which resulted from the radiation. This means that these drugs might work through a different mechanism than other drugs, and might represent a new approach to retinal disease for the future.
Grant Recipient from The Macula Society

The Margaret and Mills Cox Macula Research Project

Rajendra Apte, MD, PhD
Washington University School of Medicine
St. Louis, MO

*Wnt Signaling in Choroidal Neovascularization*

Dr. Apte was chosen to be the Macula Society Grant Recipient based on the following criteria in his application: originality, description of his methods, clinical relevance, clarity and organization of the presentation.

Dr. Apte’s research has advanced our understanding of how the innate immune system regulates angiogenesis in the eye. His laboratory has discovered age-related changes in macrophages that provide an explanation for the increase in pathologic angiogenesis seen with aging. Dr. Apte’s findings have profound implications for understanding age-related macular degeneration, as well as other age-related diseases such as coronary artery disease and cancer.

Rajendra Apte, MD, PhD

Established Research Awards

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

The Award of Merit in Retina Research

Eliot L. Berson, MD
Harvard Medical School
Massachusetts Eye and Ear Infirmary
Boston, MA

*Retinitis Pigmentosa: Advances in Diagnosis and Treatment*

In being chosen for the Award of Merit, Dr. Berson gave the Charles L. Schepens Lecture at the 43rd Annual Scientific Meeting of The Retina Society in San Francisco, CA, which was held in September.

Dr. Berson completed his medical degree at Harvard Medical School. He is the author of over 250 papers on hereditary retinal degenerations with a particular emphasis on retinitis pigmentosa and allied night-blinding disorders.

He and his colleagues are responsible for developing the first treatment regimen for adults with typical retinitis pigmentosa. Vitamin A palmitate 15,000 IU/day, lutein 12 mg/day, and one or two, three-ounce servings of omega-3 rich fish per week of which DHA is a major constituent are part of the recommended regimen.

His continuing research is aimed at further slowing the rate of progression of retinitis pigmentosa, detecting causative genes, and defining the course of disease among patients with known mutations.

Eliot L. Berson, MD
Established Research Awards

**Gertrude Pyron Award for Outstanding Achievement in Retina Research**

*Julia A. Haller, MD*

Wills Eye Institute
Thomas Jefferson University
Philadelphia, PA

*Ties That Bind: The Vitreo-Retinal Relationship*

As the Pyron Award recipient, Dr. Haller presented her lecture on August 29 at the Annual Meeting of the American Society of Retina Specialists (ASRS), which was held in Vancouver, Canada.

Dr. Haller completed her medical degree at Harvard Medical School. She has published more than 220 articles and 20 book chapters on the treatment of age-related macular degeneration and other eye disorders.

A prominent scholar and lecturer, Dr. Haller’s research interests have focused on age-related macular degeneration, complicated retinal detachments, diabetic retinopathy, macular edema, retinal venous occlusive disease, and retinal infectious diseases.

**Charles L. Schepens, MD/AAO Award**

*William Tasman, MD*

Wills Eye Institute
Thomas Jefferson University
Philadelphia, PA

*Retinopathy of Prematurity: Do We Still have a Problem? A Global Perspective*

In being selected for the Charles L. Schepens, MD/AAO Award, Dr. Tasman 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 15.

Dr. Tasman completed his medical degree at Temple University Medical School. He was first exposed to the diagnosis and management of retinal diseases while serving in the US Air Force in Wiesbaden, Germany.

When Dr. Tasman returned home in 1959, he was one of only a handful of people in the United States who had seen or used the xenon photocoagulator. He learned to appreciate its use, specifically in the treatment of diabetic retinopathy.

He participated in developing the protocol for effective use of cryotherapy in retinopathy of prematurity and later coauthored a study confirming that laser therapy was as good as, or better than, cryotherapy. Aside from retinopathy of prematurity, Dr. Tasman also has a strong interest in other pediatric vitreoretinal conditions, such as Stickler’s syndrome.
Paul Kayser International Award in Retina Research
Frank Werblin, PhD
University of California
Berkeley, CA

The Retina, Simplified: A 40 Year Review of Retinal Neuroscience

The XIX Biennial Meeting of the International Society for Eye Research (ISER), held in Montreal, Canada, from July 18 to 23 was the setting for Dr. Werblin’s Lecture as recipient of the Kayser International Award.

Besides teaching a variety of courses at both the graduate and undergraduate levels in the area of neuroscience at the University of California at Berkeley, Dr. Werblin has been leading research studies on retinal function at many different levels. He was the first person in the world to make intracellular recordings from all major types of retinal neurons with dye labeling and characterize their receptive fields. He discovered the presence of two types of center-surround antagonistic receptive fields in retinal bipolar cells. His studies cover details of synaptic transmission, retinal pharmacology, transporter function, retinal circuitry, neuronal behavior, the functional significance of retinal processing, and finally retinal prosthetics.

Club Jules Gonin Lecturer
Anthony Adamis, MD
Napoleone Ferrara, MD
South San Francisco, CA

Vascular Endothelial Growth Factor: A Key Regulator of Intraocular Neovascularization

Two scientists, Dr. Adamis and Dr. Ferrara, gave the Gonin Lecture and shared the award presented by Club Jules Gonin at the XXVII Meeting in Kyoto, Japan, on November 5. This award is given every two years.

Dr. Adamis’ research focused on mechanisms of AMD and diabetic retinopathy, as well as ocular drug delivery. He is best known for his co-discovery of the role of VEGF in ocular disease, and for the causal role of inflammation in the pathogenesis of diabetic retinopathy. Dr. Ferrara’s research studies on the role of VEGF in intraocular neovascularization led to a potential therapy for wet age-related macular degeneration.

Club Jules Gonin Medalist
Alan C. Bird, MD
Moorfields Eye Hospital
London, England

Retinitis Pigmentosa and Inherited Retinal Degeneration

Every four years the Gonin Medalist is selected by the Board of the International Council of Ophthalmology (ICO) in conjunction with the University of Lausanne and the Swiss Ophthalmological Society.

This year Dr. Bird was chosen for this honor and gave a special lecture in Lausanne on March 12 at the Jules-Gonin Eye Hospital. The Gold Medal was awarded to Dr. Bird during the XXXII World Ophthalmology Congress held on June 5-9 in Berlin, Germany.

Dr. Bird is internationally recognized for his leadership research into inherited retinal degeneration, particularly retinitis pigmentosa. His highly collaborative research effort has developed novel technology to define the clinical characteristics of retinal disease. His body of work has significantly contributed to a better understanding of degenerative diseases of the retina and impacts upon clinical management in terms of more effective genetic counseling of patients and the exploration of new treatment approaches, including gene therapy.
Research Chairs and Professorships

A fifth chair at University of Wisconsin was established this year thanks to a gift from Kathryn and Latimer Murfee. This chair is created to support basic science research regarding the diagnosis, treatment and cure of all types of macular degeneration.

Now a total of five chairs in retina research provide funds to vision scientists engaged in original excellent research that has the potential to increase understanding of the retina or retinal diseases. Four chairs have been established at University of Wisconsin and one at Baylor College of Medicine.

Funding is provided by gifts from Margaret and Mills Cox, Gertrude D. Pyron, W. H. Helmerich, III, RRF Advisory Trustee, and gifts given in honor of Emmett A. Humble, RRF Board Chairman for many years.

Walter H. Helmerich Chair
Curtis R. Brandt, PhD
Ophthalmology and Visual Science
University of Wisconsin School of Medicine and Public Health, Madison, WI

Gene Therapy for Retinal Degenerative Diseases

Viral-based gene delivery vectors are being extensively investigated for therapeutic use in a wide variety of ocular diseases. In fact considerable success has been achieved for some diseases. Because many viruses are human pathogens, our host defense systems can be activated even when replication defective viruses are used for gene delivery.

Our bodies have innate recognition systems that can see these viral vectors, and when they recognize the presence of a vector, they trigger a defensive response. This response has a number of negative consequences that can affect therapeutic use of the vector. These include the activation of an immediate inflammatory response that can cause pathology or negatively affect the efficiency of the gene delivery.

Dr. Brandt’s lab has recently found that the activation of some of these defense systems is actually required for efficient replication of viruses in the retina, raising the possibility that these defense systems might affect the efficacy of viral gene delivery. He is currently studying how these systems are activated by viral gene delivery vectors and whether this has an effect on gene delivery. In particular, one particular receptor system seems to be required for expression of the very early herpes simplex virus proteins that are essential for replication.

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

Molecular Genetic Studies of Retinal Degeneration in Drosophila

Dr. Colley utilizes Drosophila as a model for studying hereditary retinal diseases in humans, such as retinitis pigmentosa (RP) and age-related macular degeneration (AMD). Her lab has focused on those events in the secretory pathway that ensure the proper folding, modification, oligomeric assembly, quality control, transport and targeting of newly synthesized proteins.

An ongoing challenge in diagnosing and treating AMD and RP is that they are highly complex diseases with multiple subtypes, each with a distinct genetic and biochemical basis. Drosophila is a powerful animal model for studying inherited retinal degeneration disorders. Flies have a strong genetic similarity to humans, are amenable to genetic manipulation and experimentation, and have a short life span, making it possible to study the onset and progression of retinal degenerations over relatively short time periods.
**Research Chairs and Professorships**

**RRF Chair**  
Nader Sheibani, PhD  
Ophthalmology and Visual Science  
University of Wisconsin School of Medicine and Public Health, Madison, WI

Understanding the Molecular and Cellular Mechanisms that keep Retinal Vascularization in Check

The growth of new blood vessels from pre-existing capillaries (angiogenesis) contributes to the pathogenesis of many diseases, including retinopathy of prematurity, diabetic retinopathy, and age-related macular degeneration.

Understanding the molecular and cellular mechanisms that regulate angiogenesis and how their alterations contribute to growth of new blood vessels, has significant clinical impact. Dr. Sheibani is working to develop new modalities to treat a variety of eye diseases with a neovascular component.

**Emmett A. Humble Distinguished Directorship**  
Daniel Albert, MD, MS  
Director, Eye Research Institute  
University of Wisconsin, Madison, WI

The UW Eye Research Institute, of which Dr. Albert is Director, fosters a multidisciplinary community of scholars working in collaboration to advance knowledge about the science and art of vision and apply it to the prevention of blindness.

Dr. Albert’s research focuses on ocular tumors, specifically melanoma and retinoblastoma. His work with retinoblastoma utilizes transgenic mouse models of the tumor to investigate the molecular biology of the disease and to learn whether vitamin D analogs produce tumor regression in these animal models. He also studies melanoma in a transgenic mouse model.

His other interests include medical ethics and the history of medicine and ophthalmology.

**Kathryn and Latimer Murfee Chair**  
David M. Gamm, MD, PhD  
UW Eye Research Institute  
University of Wisconsin, Madison, WI

Deriving Photoreceptors from Human Embryonic Stem Cells

Dr. Gamm’s success in producing multiple retinal cell types from induced pluripotent stem (iPS) cells has led to development of human retinal disease-specific models advancing stem cell-based therapies. These iPS lines will aid the study of the pathogenesis of inherited and acquired retinal dystrophies and provide a means to test pharmacologic agents and develop customized stem cell treatment strategies.

In a mouse model of Type 2A Usher Syndrome, he has demonstrated that human neural stem cells could rescue dying photoreceptors. It is clear that this cell type has great promise as a treatment for retinal and neurodegenerative diseases.

The RRF Chair at Baylor College of Medicine has yet to be named.
Research Chairs and Professorships

**Edwin and Dorothy Gamewell Professor**
Arnold E. Ruoho, PhD
UW Eye Research Institute
University of Wisconsin, Madison, WI

*Retinal Neuroprotection by the Sigma-1 Receptor Chaperone*

Dr. Ruoho’s research is directed at understanding the molecular mechanisms underlying neurotransmitter release and receptor activation. He has discovered a new class of compounds that are high-affinity inhibitors of the Sigma-1 receptor, a transmembrane chaperone protein expressed in many different tissue types and particularly concentrated in multiple layers of the retina.

Sigma-1 may be utilized to diminish neurodegeneration of retinal photoreceptors and ganglion cells. His goal is to prevent blindness by applying pharmacological and genetic approaches that will enhance the biological activity of the Sigma-1 receptor in the retina.

**M.D. Matthews Research Professor**
Arthur S. Polans, PhD
UW Eye Research Institute
University of Wisconsin, Madison, WI

*Studies of the Resveratrol-Stimulated Calcium Response in Endothelial Cells*

There are significant problems associated with current treatment regimens involving the use of radiation and chemotherapy agents. Dr. Polans’ lab has demonstrated that resveratrol, a natural plant product, can inhibit tumor growth in different mouse models of uveal melanoma, retinoblastoma and other types of cancer and can cause tumor regression when the bioavailability of the compound is increased.

The same compounds that are useful in reducing tumor growth may now be used to treat other neovascular diseases of the eye, including forms of AMD, diabetic retinopathy and retinopathy of prematurity.

**Rebecca Meyer Brown Professor**
Bikash Pattnaik, PhD
UW Eye Research Institute
University of Wisconsin, Madison, WI

*Mechanisms Underlying Kir 7.1 Mutation Causing Snowflake Vitreoretinal Degeneration (SVD)*

Macular degenerative diseases are hard to study because the aging process and consequences are hard to replicate in a laboratory setup. Studying disease mechanism of genetic eye diseases with parallel retinal degenerative phenotype is the best possible alternative.

Snowflake vitreoretinal degeneration (SVD) is a genetic disorder due to a mutation in the RPE potassium channel causing pigment appearance on the retina. Dr. Pattnaik has made significant advances in understanding of the disease cause in SVD.
International Fellowships

RRF funds two programs of international fellowships, one a 12-month fellowship and the other a six-month fellowship.

ICO/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.

These two, 12-month fellowships of $25,000 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 who are committed to returning to a position at a teaching institution or public service hospital in their home country following the fellowship.

2010 Recipients:

Lala Ceklic, MD, PhD, Bosnia and Herzegovina, for training in retina and vitreoretinal surgery at Bern University Hospital in Switzerland. After fellowship Dr. Ceklic will return to the position of Chief of the Eye Department Kasindo Clinical Center of Eastern Sarajevo.

Afsun Sahin, MD, Turkey, for training in corneal disease and surgery at the Schepens Eye Research Institute at Harvard University. After fellowship Dr. Sahin will return to teaching and research at the University Medical School in Eskisehir, Turkey.

Gillingham Fellowships/PAAO

Established by W. J. Gillingham, 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.

Sandra Rocio Montezuma, MD
Colombia
Massachusetts Eye and Ear Infirmary
Harvard Medical School, Boston, MA

Alfredo Rodriguez Castillejos, MD
Mexico
New York Eye and Ear Infirmary
New York, NY
Research Initiatives and Special Recognition Awards

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
Educational programs administered for RRF by the American Academy of Ophthalmology are funded by the endowed gifts from Laura I. Cannon, Burt L. Risley, and the Schlichting Family. This program will upgrade clinical research skills in the field of retina. The 2010 funding for this program was $47,963.

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 the Joe M. and Eula C. Lawrence. A total of $20,000 was funded to provide travel expenses for the students to attend the ARVO Annual Meeting in May in Ft. Lauderdale, FL, to present their papers or posters.

In 2010, 23 ophthalmology students were selected from these schools:

- Columbia University New York, NY
- Ohio State University Columbus, OH
- Duke University Durham, NC
- Medical College of Wisconsin Milwaukee, WI
- Cleveland Clinic Cleveland, OH
- NYU School of Medicine New York, NY
- University of Oklahoma Health Sciences Center Oklahoma City, OK
- The Scripps Research Institute La Jolla, CA
- University of Utah Moran Eye Center Salt Lake City, UT
- Georgia Institute of Technology Atlanta, GA
- University of Houston Houston, TX
- University of Nebraska Medical Center Omaha, NE
- Bascom Palmer Eye Institute Miami, FL
- Yale University School of Medicine New Haven, CT
- Schepens Eye Research Institute, Harvard Medical School Boston, MA
- Washington University School of Medicine St. Louis, MO
- Wills Eye Institute Philadelphia, PA
- New England Eye Center Boston, MA
- Massachusetts Eye and Ear Infirmary, Harvard Medical School – Boston, MA
- Burke-Cornell Medical Research Institute New York, NY
Pan-American Research Initiatives

Paul Kayser Travel Scholarships
RRF established this program in memory of Paul Kayser to create opportunities for U.S. ophthalmologists to observe clinical research in Latin America. Funding provided was $25,000.

Habeeb Ahmad, MD to Sao Paulo, Brazil
From Los Angeles, CA

Netan Choudhry, MD to Caracas, Venezuela
From Cambridge, MA

Davinder S. Grover, MD, MPH to Santo Domingo, Dominican Republic
From Miami Beach, FL

Aziz A. Khanifar, MD to Mexico City, Mexico
From New York, NY

Nancy Kunjukunju, MD to Mexico City, Mexico
From Ashland, OR

Yannek I. Leiderman, MD, PhD to Santiago, Chile
From Boston, MA

Lauren E. Patty, MD to Rio de Janeiro, Brazil
From Los Angeles, CA

Anita R. Shirodkar, MD to Buenos Aires, Argentina
From Miami, FL

Tyson Research Initiative

The earnings from the gift of Nell Sue Tyson funded travel scholarships for Latin American ophthalmologists to attend the 2010 ARVO Annual Meeting. This year $12,500 was provided.

Efrain Romo Garcia, MD from Mexico City, Mexico
Juan Pablo Velquez Martin, MD from Mexico City, Mexico
Ral Velez Montoya, MD from Mexico City, Mexico
Valeria E. Lorenc, PhD from Cordoba, Argentina
Natalia Restrepo Galeano, MD from Medellin, Colombia
Damian Dorfman, MD from Buenos Aires, Argentina
Aldo Arturo Oregan Miranda, MD from Zapopan, Mexico
Lukas Saldarriaga Franco, MD from Medellin, Colombia

Special Recognition Awards
In 2010, RRF gave honoraria to two of its most outstanding grantees for their milestone accomplishments. These awards are named in honor of the families who funded them: Samuel and Bertha Brochstein, and a fund established in memory of James M. Barr.

Brochstein Award Ramon Font, MD
James Barr Award Richard Hurwitz, MD
## Combined Statement of Financial Position

**Retina Research Foundation**

Combined Statement of Financial Position  
December 31, 2010  
(With Summarized Information as of December 31, 2009)

The accompanying notes are an integral part of these combined financial statements.

### ASSETS

<table>
<thead>
<tr>
<th></th>
<th>General Funds</th>
<th>Endowment Funds</th>
<th>2009 Total All Funds (Memorandum Only)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Temporarily Unrestricted</td>
<td>Temporarily Restricted</td>
<td>Permanently Restricted</td>
</tr>
<tr>
<td>Cash and Cash Equivalents</td>
<td>$ 323,449</td>
<td>150,000</td>
<td>473,449</td>
</tr>
<tr>
<td>Contributions Receivable</td>
<td>-</td>
<td>5,000</td>
<td>5,000</td>
</tr>
<tr>
<td>Investments</td>
<td>1,115,336</td>
<td>-</td>
<td>1,115,336</td>
</tr>
<tr>
<td>Furniture and Equipment, Net of Accumulated Depreciation of $5,202</td>
<td>13,150</td>
<td>-</td>
<td>13,150</td>
</tr>
<tr>
<td>Charitable Remainder Trust</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Intangible Assets</td>
<td>12</td>
<td>-</td>
<td>12</td>
</tr>
<tr>
<td><strong>TOTAL ASSETS</strong></td>
<td>$ 1,451,947</td>
<td>155,000</td>
<td>1,606,947</td>
</tr>
</tbody>
</table>

### LIABILITIES AND NET ASSETS

<table>
<thead>
<tr>
<th></th>
<th>General Funds</th>
<th>Endowment Funds</th>
<th>2009 Total All Funds (Memorandum Only)</th>
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</thead>
<tbody>
<tr>
<td>Accounts Payable</td>
<td>$ 7,095</td>
<td>-</td>
<td>7,095</td>
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### COMMITMENTS AND CONTINGENCIES

<table>
<thead>
<tr>
<th></th>
<th>General Funds</th>
<th>Endowment Funds</th>
<th>2009 Total All Funds (Memorandum Only)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1,444,852</td>
<td>155,000</td>
<td>1,599,852</td>
</tr>
</tbody>
</table>

### TOTAL LIABILITIES AND NET ASSETS

<table>
<thead>
<tr>
<th></th>
<th>General Funds</th>
<th>Endowment Funds</th>
<th>2009 Total All Funds (Memorandum Only)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$ 1,451,947</td>
<td>155,000</td>
<td>1,606,947</td>
</tr>
</tbody>
</table>
# Combined Statement of Activities and Changes in Net Assets

**Retina Research Foundation**

Combined Statement of Activities and Changes on Net Assets for the year ended December 31, 2010

(With Summarized Financial Information for the Year Ended December 31, 2009)

<table>
<thead>
<tr>
<th>General Funds</th>
<th>2010 Total</th>
<th>Total All Funds (Memorandum Only)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revenues</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Contributions</td>
<td>$ 143,544</td>
<td>42,398</td>
</tr>
<tr>
<td>Interest, Dividend and Distribution Income</td>
<td>19,200</td>
<td>-</td>
</tr>
<tr>
<td>Realized and Unrealized Gains on Investments, Net</td>
<td>103,900</td>
<td>-</td>
</tr>
<tr>
<td>Mineral Interest Income and Other Income</td>
<td>91,100</td>
<td>-</td>
</tr>
<tr>
<td>Change in Value of Split-Interest Agreement</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Income Transferred from Endowment Fund Investments</td>
<td>897,424</td>
<td>77,500</td>
</tr>
<tr>
<td>Net Assets Released from Restrictions-Satisfaction of Program Restrictions</td>
<td>67,398</td>
<td>(67,398)</td>
</tr>
<tr>
<td>Total Revenues</td>
<td>1,322,566</td>
<td>52,500</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Expenses</th>
<th>2010 Total</th>
<th>Total All Funds (Memorandum Only)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Program Services:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Research Projects and Grants</td>
<td>1,067,342</td>
<td>-</td>
</tr>
<tr>
<td>Public Education</td>
<td>31,945</td>
<td>-</td>
</tr>
<tr>
<td>Career Development and Awards</td>
<td>174,164</td>
<td>-</td>
</tr>
<tr>
<td>Total Program Services</td>
<td>1,273,451</td>
<td>-</td>
</tr>
</tbody>
</table>

| Supporting Services: |            |                                  |
| Management and General | 108,193 | | 108,193 | 19,718 | 246,492 | - | 266,210 | 374,403 | 398,842 |
| Fund Raising | 27,455 | - | 27,455 | - | - | - | - | 27,455 | 11,542 |
| Total Supporting Services | 135,648 | - | 135,648 | 19,718 | 246,492 | - | 266,210 | 401,858 | 410,384 |

| Total Expenses | 1,409,099 | - | 1,409,099 | 19,718 | 246,492 | - | 266,210 | 1,675,309 | 1,572,503 |

| Changes in Net Assets | (86,533) | 52,500 | (34,033) | 239,657 | 3,200,557 | 150,928 | 3,591,142 | 3,557,109 | 6,943,352 |
| Transfer (Note 5) | - | - | - | - | 478,011 | (478,011) | - | - | - |
| Net Assets, Beginning of Year | 1,531,385 | 102,500 | 1,633,885 | 2,540,618 | 16,543,255 | 17,496,063 | 36,579,936 | 38,213,821 |

| Net Assets, End of Year | $ 1,444,852 | 155,000 | 1,599,852 | 2,780,275 | 20,221,823 | 17,168,980 | 40,171,078 | 41,770,930 | 38,213,821 |
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Jean Evans, Kathleen Moore, Susan Prickett, Yvonne Robertson and Alice Dailey

David Leebron, Dr. Alice McPherson and Dr. Frank Eggleston

Keith Humble, Emmett Humble and Deral Humble

Jean Evans, Kathleen Moore, Susan Prickett, Yvonne Robertson and Alice Dailey
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### In Memoriam

- Knox Tyson
- Valient Baird
- Harry I. Battelstein
- Herbert R. Gibson, Sr
- Opie B. Leonard
- Aubrey C. Martindale
- Latimer Murfee
- R. Bryon Robinson
- Knox Tyson
- Joseph W. Robertson
- John H. Miracle