The Glaucoma Foundation

2018 Annual Report
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Message from the President

Dear Friends:

2018 was a challenging year for everyone, and The Glaucoma Foundation was certainly not immune to the meaningful economic uncertainties we were all presented. However, as the year ended, we were able to cite meaningful and measurable accomplishments in all key areas.

Our mission continues to embrace the funding of cutting-edge research that is being performed around the world by the best and the most talented investigators. They each offer a vision coupled with an idea, that if validated and achieved, may stand to make a meaningful difference in the diseases that we call glaucoma.

The second component of our core purpose is to provide educational outreach to all, relative to proper eye care and awareness about glaucoma. As we all understand, proper and timely diagnosis is essential to arresting the progress of this disease. We are continually reminded that our efforts have made a huge impact on behalf of the populations of the world.

During the year 2018, we hosted an award-worthy 25th Annual International Think Tank in New York City. Forty eight participants from around the world gathered to address: “EXFOLIATION SYNDROME: GENETIC AND BIOLOGICAL ASPECTS.”

Enormous positive progress was demonstrated throughout the session, with the hope being that the same exciting report will be forthcoming from the 26th Annual Think Tank that will be held in June, 2019 once more in New York City.

We are very proud of our Foundation and its accomplishments. We are also extremely excited about the future service that will be provided to all of our constituencies. We thank you for your support of and interest in The Glaucoma Foundation. You and we, as partners, can make a significant difference to the world in which we operate.

Scott R. Christensen
President
Chief Executive Officer
Board of Directors

Gregory K. Harmon, MD
Chairman
New York, NY

Robert Ritch, MD
Medical Director, Vice President,
Secretary & Founder
The New York Eye & Ear Infirmary
New York, NY

William C. Baker
New York, NY

Salvatore P. Ciampo
Albert Einstein School of Medicine
Bronx, NY

Joseph M. Cohen
J.M. Cohen & Company
New York, NY

James P. Digan
Columbus, Ohio

David Fellows
NightstaRx
London, UK

Murray Fingeret, OD
SUNY College of Optometry
Hewlett, NY

Barry S. Friedberg
FriedbergMilstein, LLC
New York, NY

Ilene Giaquinta
New York, NY

Gerald Kaiser, Esq
Huntington, NY

Paul L. Kaufman, MD
University of Wisconsin-Madison
Madison, WI

Jeffrey M. Liebmann, MD
Columbia University Medical Center
New York, NY

Kumar Mahadeva
Greenwich, CT

Kenneth Mortenson
New York, NY

Louis Pasquale, MD, FARVO
Mount Sinai Healthcare System
New York, NY

Sheldon M. Siegel
Boca Raton, FL

Mary Jane Voelker
Pueblo, CO

Irving Wolbrom
New York, NY

Allergan plc
Karen Ling
Madison, NJ
Robert Ritch, MD
Co-Chairman
Medical Director, T.G.F.
Shelley and Steven Einhorn
Distinguished Chair, Professor of Ophthalmology
Chief, Glaucoma Services
Surgeon Director
New York Eye & Ear Infirmary

Abbot Clark, PhD
Executive Director
North Texas Eye Research Institute
University of North Texas Health Science Center

Miguel Coca-Prados, PhD
Professor (Adjunct) of Ophthalmology
Department of Ophthalmology and Visual Sciences
Yale University School of Medicine

Jonathan G. Crowston, BSc, MBBS, PhD, FRCOphth,
Ringland Anderson Professor
Head of Ophthalmology
University of Melbourne
Director
Centre for Eye Research Australia

John Danias, MD, PhD
Professor and Interim Chair
Department of Ophthalmology
State University of New York - Downstate

John H. Fingert, MD, PhD, FARVO
Hadley-Carver Chair in Glaucoma
Professor
Department of Ophthalmology and Visual Sciences
Carver College of Medicine, University of Iowa

Jeffrey L. Goldberg, MD, PhD
Professor and Chair, Department of Ophthalmology
Byers Eye Institute at Stanford University

Neeru Gupta, MD, PhD
Professor and Dorothy Pitts Chair
Chief of Glaucoma
University of Toronto, Canada
Director, Roy Foss and Family Glaucoma Laboratory
Keenan Research Centre for Biomedical Science
Li Ka Shing Knowledge Institute
St. Michael’s Hospital, Canada

Michael Hauser, PhD
Professor of Medicine and Ophthalmology
Duke University Medical Center

Simon John, PhD
Principal Investigator
Howard Hughes Medical Institute
The Jackson Laboratory

Paul L. Kaufman, MD
Ernst H. Bárány Professor of Ocular Pharmacology
Department Chair Emeritus
Department of Ophthalmology & Visual Sciences
School of Medicine & Public Health
University of Wisconsin-Madison

Uday B. Kompella, PhD
Professor
Department of Pharmaceutical Sciences
University of Colorado Denver

Richard K. Lee, MD, PhD
Walter G. Ross Distinguished Chair in Ophthalmic Research
University of Miami Miller School of Medicine

Jeffrey M. Liebmann, MD
Shirlee and Bernard Brown Professor of Ophthalmology
Vice Chair, Department of Ophthalmology
Director, Glaucoma Service
Harkness Eye Institute
Columbia University Medical Center

Yutao Liu, MD, PhD
Associate Professor
Cellular Biology & Anatomy Graduate Studies
Augusta University

Carlo D. Montemagno, PhD
Chancellor
Southern Illinois University

Robert Nickells, PhD
Professor
Department of Ophthalmology & Visual Science
University of Wisconsin Medical School

Colm O’Brien, FRCS, MD
Professor of Ophthalmology
Mater Misericordiae University Hospital
Ireland
Dieter Reinhardt, PhD
Professor and Canada Research Chair in Cell-Matrix Biology
Faculty of Medicine
Department of Anatomy and Cell Biology
McGill University
Canada

Julia E. Richards, PhD
Harold F. Falls Professor of Ophthalmology & Visual Sciences
Professor of Epidemiology
University of Michigan
W.K. Kellogg Eye Center

Ursula Schlötzer-Schrehardt, PhD
Professor
Department of Ophthalmology
University of Erlangen-Nürnberg
Germany

Joel S. Schuman, MD, FACS
Professor and Chairman of Ophthalmology
NYU Langone Health
NYU School of Medicine
Professor of Neuroscience and Physiology
NYU Neuroscience Institute
Professor of Neural Science Center for Neural Science
Bellevue Hospital Center

Ernst Tamm, MD, FARVO
Professor and Chairman
Institute of Human Anatomy & Embryology
University of Regensburg
Germany

Gülgün Tezel, MD
Professor
Harkness Eye Institute
Columbia University Medical Center

Robert N. Weinreb, MD
Distinguished Professor of Ophthalmology
Chairman, Department of Ophthalmology
Director, Shiley Eye Center
Director, Hamilton Glaucoma Center
Morris Gleich Chair
University of California San Diego

M. Roy Wilson, MD, MS
President
Wayne State University

Barbara Wirostko, MD
Clinical Adjunct Associate Professor
Moran Eye Center
University of Utah

Ting Xie, PhD
Investigator and Professor
The Stowers Institute for Medical Research
Department of Anatomy and Cell Biology
University of Kansas Medical Center

INDUSTRY LIAISONS:

Baldo Scassellati Sforzolini, MD, PhD, MBA
Senior Vice President, Clinical Development
Allergan, Inc.
2018 RESEARCH GRANTS

Michael Anderson, PhD
University of Iowa, Iowa City, IA

Robust Mouse Models of Exfoliation Glaucoma

While some mouse models of exfoliation glaucoma exist, they lack some key features of the human disease. This project proposes generating new mouse models of exfoliation syndrome (XFS) by screening animals with targeted manipulations to genes that are known genetic risk factors for human disease. These mice could be used by the research community in a wide range of studies that will expedite development of new treatments and bring us closer to finding a cure.

Rajendra Apte, MD, PhD
Washington University, St. Louis, MO

Growth Differentiation Factor - 15 Levels in Pseudoexfoliation Glaucoma

Loss of vision can make it more difficult for people to work, get around, and enjoy daily life. The number one cause of irreversible vision loss in the world is glaucoma. There are several kinds of glaucoma, all of which can lead to the death of cells in the eye that send visual information to the brain. Preventing these cells from dying is an important part of the treatment for glaucoma. However, it can be difficult for physicians to identify which patients are at highest risk of developing glaucoma, or having their glaucoma get worse over time. Finding a marker, such as a protein in the eye, whose presence might predict whether glaucoma will get worse would make it possible for physicians to better determine whether a patient should have surgery or another treatment. This project will study a protein called growth differentiation factor 15 (GDF-15), which is associated with retinal stress in rodents and humans. By measuring the levels of this protein in human patients with glaucoma before and after surgery, we hope to understand whether there is a relationship between GDF-15 levels in the eye, the severity of glaucoma, and success of glaucoma surgery. If high GDF-15 levels are linked with more severe glaucoma, it could be used as a marker to help determine treatment for patients at the highest risk of developing severe glaucoma.

Rashima Asokan, PhD
Medical & Vision Research Foundation, Sankara Nethralaya, India

Evaluating the Effect of Ocular UV Exposure as a Major Causative Factor in a Risk Model for Pseudoexfoliation Syndrome in Indian Population

Pseudoexfoliation syndrome (XFS) is a disease that manifests in ocular tissues, is the major cause of secondary glaucoma and associated vision loss. Certain changes in the genetic makeup of an individual make them more susceptible in developing XFS. Similarly, environmental factors such as lifetime ocular UV exposure through solar radiation, inflammation and hypoxic condition (low oxygen supply to eye tissues) also are known to play a role in XFS disease progression. However the extent of influence that the factors have individually or in combination remains uncertain and
needs to be investigated. This study, using a single group of patients aims to address this issue and hopes to generate a profile accounting for the effect of both genetic and non-genetic factors in XFS disease pathology.

Sanjoy K. Bhattacharya, M. Tech, PhD  
Bascom Palmer Eye Institute, University of Miami Miller School of Medicine, Miami, FL

**Metabolomic Analyses of Aqueous Humor of Pseudoexfoliation Glaucoma**

We will identify the small molecules in the clear fluid of the front part of the eye termed aqueous humor. These small molecules are involved in all day-to-day functions of biological tissues in the eye. This analysis will show a difference in small molecules between pseudoexfoliation glaucoma and normal eyes. Their addition (for example the molecules that provide energy) or removal (for example known toxic molecules) may be early intervention strategies for treating pseudoexfoliation glaucoma.

Rachel Kuchtey, MD, PhD  
Vanderbilt Eye Institute, Nashville, TN

**Elastic Fibers and Exfoliation Glaucoma**

In order to effectively treat exfoliation glaucoma (XFG), precise understanding of its molecular mechanisms is needed. The breakthrough genetic discoveries within the last decade have paved the pathways leading toward this goal. Lysyl oxidase-like 1 (LOXL1) is the most significant gene associated with XFG and the interaction between LOXL1 and fibrillin-1 has been increasingly recognized as they are two essential elements for proper elastic fiber formation and function. This study will use mouse models to study these two key molecules, affording the unique opportunity to test the hypothesis that mice with dual defects of those two proteins have more severe XFG. If successful, new treatments could be quickly tested.

Joshua Morgan, PhD  
University of California, Riverside, CA

**Identifying Changes in Protein Synthesis and Secretion Induced by PXFG-Associated LOXL1 Mutants**

Pseudoexfoliative glaucoma (PXFG) occurs due to the production of extracellular deposits within the eye. By inhibiting the flow of aqueous humor, these deposits lead to a dangerous increase in IOP, the hallmark of glaucoma. In this project, investigators use a sequencing technique, ribosome profiling, to understand how mutations in the gene LOXL1 and PXFG-associated molecules alter the production and secretion of proteins. This knowledge will provide increased understanding as to how changes in protein production within the cell can contribute to the formation of these deposits.

Ernst R. Tamm, MD  
University of Regensburg, Universitätsstr, Regensburg, Germany
Towards an Understanding of the Roles of LOXL1 and BMP-1 in PEX Syndrome

Pseudoexfoliation (PEX) syndrome is characterized by the deposition of whitish, fluffy material throughout the anterior eye segment. Variants in the gene that codes for the protein LOXL1 are associated with PEX syndrome, and genetic and/or environmental factors may cause elevated levels of LOXL1 in the eye. We believe that cleavage of LOXL1 (when present in high amounts) by the protein BMP-1 causes molecular changes that induce the formation of PEX material. To test our idea, we will increase BMP-1 levels in mouse eyes via virus-delivered gene transfer and examine the eyes for signs of PEX material. To this end, we have generated genetically engineered mice that already have high levels of LOXL1 in the eye. In parallel cell culture experiments we will elucidate the molecular mechanisms of the LOXL1/BMP1 interaction.
THE GLAUCOMA FOUNDATION, INC.  
STATEMENT OF FINANCIAL POSITION  
AT DECEMBER 31, 2018  
(With comparative totals at December 31, 2017)

<table>
<thead>
<tr>
<th></th>
<th>12/31/18</th>
<th>12/31/17</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Assets</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cash and cash equivalents</td>
<td>$1,201,559</td>
<td>$1,308,832</td>
</tr>
<tr>
<td>Pledges receivable</td>
<td>113,253</td>
<td>334,038</td>
</tr>
<tr>
<td>Prepaid expenses and other assets</td>
<td>3,915</td>
<td>5,199</td>
</tr>
<tr>
<td>Security deposit</td>
<td>27,796</td>
<td>27,796</td>
</tr>
<tr>
<td>Property and equipment, net (Note 3)</td>
<td>4,125</td>
<td>4,401</td>
</tr>
<tr>
<td>Investments held for endowments (Note 5)</td>
<td>5,299,615</td>
<td>6,121,951</td>
</tr>
<tr>
<td><strong>Total assets</strong></td>
<td>$6,650,263</td>
<td>$7,802,217</td>
</tr>
</tbody>
</table>

|                             |          |          |
| **Liabilities and Net Assets** |      |          |
| Liabilities:                |          |          |
| Accounts payable and accrued expenses | $67,176  | $50,534  |
| Grants payable              | 90,000   | 240,000  |
| Deferred rent               | 5,175    | 9,476    |
| **Total liabilities**       | 162,351  | 300,010  |
| Net assets:                 |          |          |
| Without donor restrictions: |          |          |
| Operations                  | 617,666  | 721,440  |
| Board designated for medical research grants | 570,631 | 408,816 |
| Board designated for endowment | 1,511,123 | 1,700,719 |
| **Total net assets without donor restrictions** | 2,699,420 | 2,830,975 |
| With donor restrictions:    |          |          |
| For future periods (Note 4) | 0        | 250,000  |
| Donor restricted endowment (Note 5) | 3,788,492 | 4,421,232 |
| **Total net assets with donor restrictions** | 3,788,492 | 4,671,232 |
| **Total net assets**        | 6,487,912 | 7,502,207 |
| **Total liabilities and net assets** | $6,650,263 | $7,802,217 |
## THE GLAUCOMA FOUNDATION, INC.
### STATEMENT OF ACTIVITIES
#### FOR THE YEAR ENDED DECEMBER 31, 2018
(With comparative totals for the year ended December 31, 2017)

<table>
<thead>
<tr>
<th>Without Donor Restrictions</th>
<th>Donor Restricted Support</th>
<th>Donor Restricted Endowment</th>
<th>Total</th>
<th>12/31/18</th>
<th>12/31/17</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Support and revenue:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Contributions</td>
<td>$1,026,627</td>
<td>$10,050</td>
<td>$10,050</td>
<td>$1,036,677</td>
<td>$960,402</td>
</tr>
<tr>
<td>Special event income (net expenses with a direct benefit to donor (Note 6))</td>
<td>0</td>
<td>0</td>
<td>57,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interest income</td>
<td>14,697</td>
<td>0</td>
<td>14,697</td>
<td>6,566</td>
<td></td>
</tr>
<tr>
<td>Net assets released from restrictions</td>
<td>402,500</td>
<td>($250,000)</td>
<td>(152,500)</td>
<td>(402,500)</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total support and revenue</strong></td>
<td>1,443,824</td>
<td>(250,000)</td>
<td>(142,450)</td>
<td>(392,450)</td>
<td>1,051,374</td>
</tr>
<tr>
<td><strong>Expenses:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Program services</td>
<td>1,053,692</td>
<td></td>
<td>0</td>
<td>1,053,692</td>
<td>1,210,934</td>
</tr>
<tr>
<td>Supporting services:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Management and general</td>
<td>177,640</td>
<td>0</td>
<td>177,640</td>
<td>114,505</td>
<td></td>
</tr>
<tr>
<td>Fundraising</td>
<td>154,451</td>
<td>0</td>
<td>154,451</td>
<td>185,772</td>
<td></td>
</tr>
<tr>
<td><strong>Total supporting services</strong></td>
<td>332,091</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>332,091</td>
</tr>
<tr>
<td><strong>Total expenses</strong></td>
<td>1,385,783</td>
<td>0</td>
<td>0</td>
<td>1,385,783</td>
<td>1,511,211</td>
</tr>
<tr>
<td><strong>Change in net assets from operating activities</strong></td>
<td>58,041</td>
<td>(250,000)</td>
<td>(142,450)</td>
<td>(392,450)</td>
<td>(334,409)</td>
</tr>
<tr>
<td><strong>Non-operating activities:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Investment income/(loss) (Note 5)</td>
<td>(189,596)</td>
<td>(490,290)</td>
<td>(490,290)</td>
<td>(679,886)</td>
<td>1,092,589</td>
</tr>
<tr>
<td><strong>Total non-operating activities</strong></td>
<td>(189,596)</td>
<td>0</td>
<td>(490,290)</td>
<td>(490,290)</td>
<td>(679,886)</td>
</tr>
<tr>
<td><strong>Change in net assets</strong></td>
<td>(131,555)</td>
<td>(250,000)</td>
<td>(632,740)</td>
<td>(882,740)</td>
<td>(1,014,295)</td>
</tr>
<tr>
<td><strong>Net assets - beginning of year</strong></td>
<td>2,830,975</td>
<td>250,000</td>
<td>4,421,232</td>
<td>4,671,232</td>
<td>7,502,207</td>
</tr>
<tr>
<td><strong>Net assets - end of year</strong></td>
<td>$2,699,420</td>
<td>$0</td>
<td>$3,788,492</td>
<td>$3,788,492</td>
<td>$6,487,912</td>
</tr>
</tbody>
</table>