

Schepens
Eye Research
Institute

Annual Report 2006 **Collaborating to advance our vision**



An affiliate of
Harvard Medical School

Schepens Eye Research Institute fights blindness by developing new technologies, therapies and knowledge to retain and restore vision. Through a continuum of discovery, the Institute works toward a future in which blindness is prevented, alleviated, and, ultimately, cured.

Founded in 1950 by famed retinal surgeon Charles L. Schepens, M.D., Schepens Eye Research Institute is the largest independent eye research institute in the nation and an affiliate of Harvard Medical School. Since our inception, we have trained more than 600 postdoctoral fellows in various disciplines of eye research; trained more than 500 eye surgeons who now practice around the world; and published more than 4,600 scientific papers and books about health and eye disease.

Dedicated to the memory of our founder
Charles L. Schepens, M.D. 1912-2006

Never underestimate the power of youth

“Two of my cousins, Emma and Nathan, were diagnosed with Stargardt’s Disease a little more than a year ago. Currently, there are no treatments for Stargardt’s, which results in macular degeneration in about one in every 10,000 children. My cousins mean a lot to me, and I was determined to do something to help.

“Some people I know had made donations for cancer research and wore yellow rubber bracelets, so I thought I could do something similar to benefit vision research.

My dad offered to cover the cost of designing and producing our ‘Vision for the Future’ blue bracelets so that all the money raised would support research at Schepens Eye Research Institute in Boston.

“I started with my friends and other people at school and in our neighborhood. So far, I’ve sold hundreds of bracelets and raised more than \$14,000 for the Institute. What really makes me happy is that now other people in Boston, Italy, Germany and

elsewhere have become interested in my project and are raising money with these blue bracelets as well.

“I know research can take a long time, but I felt it was important to do something to help my cousins and other children. The work at the Schepens Institute is the best in the country, so I wanted to make sure the bracelets supported the researchers there.”

Kelsey, 13 years old
Chicago, Illinois



Collaborations turn ideas into cures

We are in the golden age of biomedical research, a time when the idea of what is possible is continually expanding into areas that even six years ago would have seemed more like science fiction than science. At Schepens Eye Research Institute, the pace of innovation is aggressive. As you will see in this Annual Report, the future of treatment for vision-robbing diseases and injury is already beginning to arrive. We are developing new technologies and treatments for use in preserving and restoring vision today, tomorrow and in the future.

As recently as 1999, treatments under development in research laboratories for one of the most common blinding diseases, macular degeneration, sounded like fantasies. They included 1) photodynamic therapy, where a laser turns on a light-activated drug to seal vessels; 2) injection of a sticky molecule that seeks out and ties up the factor causing leaky blood vessels to grow; and 3) injection of a “magic bullet” antibody to eliminate the key blood vessel growth factor, stopping disease progression and allowing the hemorrhage to dry up, restoring some vision. In fact, laser-based photodynamic therapy was approved for treatment of the “wet” form of macular degeneration by the FDA in 2000. Macugen, a molecule that binds VEGF - the factor that promotes leaky blood vessel growth - was approved in 2004. And Lucentis, a fragment of an antibody that binds VEGF, was approved earlier this year. Creative thinking in the lab has brought revolutionary new techniques for treatment to the clinic—and many more ideas are in the pipeline on their way to helping those in need.

But how does an idea, even a great idea, become a technology or treatment with real impact in the lives of patients and their families? Our world is increasingly interconnected, and the world of

biomedical science is no different. To move momentous ideas forward, research institutions must embrace a model that prioritizes responsiveness, collaboration, and connection. We must lead in our areas of strength and find the right partners to help move important ideas to the next step. Through collaborations—with other research organizations, corporations, the military, volunteer organizations, and philanthropists—we are accelerating the pace of discovery, and forging a new model of scientific leadership, one that positions us to lead and to anticipate—and realize—future directions.

The Institute has research at every stage of development—filling the pipeline—from the critical new ideas that are changing the way researchers around the world are looking at the future of treatment, to products that are in late-stage clinical trials, set to make an impact now on the lives of people struggling with vision-robbing diseases and injuries. I am delighted to report that the Institute has made tremendous progress toward development of new cures for macular degeneration, diabetic retinopathy, glaucoma, other types of retinal and optic nerve degenerations and damage, dry eye, and eye tissue transplants. We have also made great strides in the development of new technologies—new lenses and devices—to help those with low vision make the absolute most out of the vision they have, until we can reverse vision loss. These

advances not only make a tremendous impact on blindness, but also yield wider benefits beyond the eye, opening new avenues for treatment for cancer, diabetes and other major diseases.

In this Annual Report we profile some of the important collaborations that enable and advance our progress. Through our new Corporate Alliances program, the Institute works to aggressively partner with industry, combining our scientific expertise with the unique ability of the private sector to bring an idea to the marketplace.

To move momentous ideas forward, research institutions must embrace a model that prioritizes responsiveness, collaboration, and connection.

Through interactions with volunteer organizations like the Lions Clubs, the Institute is able to translate the contributions of millions of individuals volunteering in their communities into major innovations in vision science. Through partnerships with individual donors, the Institute advances shared goals for innovation, whether national funding agencies have caught up with them or not. Through a robust partnership with the Department of Defense, the Institute is building on the military’s dedication to innovation and long-term thinking to address vision challenges on the battlefield and to translate these findings to benefit the nation as a whole.

The past year has also given us an opportunity to build. After engaging in a rigorous self-study process in 2005 involving all of the organization’s stakeholders, the Institute was able to move forward in important ways. In 2006 we recruited five new faculty members (pages 8 and 14) at the level of Assistant Professor and initiated an Associate level search to be completed by the end of the calendar year. We have recruited a new Director of Development and a Director of Grants and

Contracts. And we welcome new trustees and corporators—individuals who share our zeal to develop new ways to preserve and restore vision. All are important new collaborators in the journey ahead.

So what lies ahead? We can imagine the ophthalmologist in 10, 20 or 50 years evaluating treatment options for a patient who is beginning to lose sight as a result of retinal degeneration. In his doctor’s toolbox he has 1) a drug that activates a patient’s own cells to regenerate a functioning retina; 2) an injection of stem cells that find the site of injury and repair the damage; 3) a transplantable retina, either engineered in the lab or taken from a human donor; or 4) a transplantable eye. Surveying all the tools at hand, the ophthalmologist decides that, because the degeneration was diagnosed early, the routine drug therapy is best. Only in rare cases is more needed.

This is the future, but it’s not a matter of if. It’s a matter of when. And through our strategic collaborations, we are ushering in that future around the corner and around the world—with all due haste.

Join us on this exciting journey.



Michael S. Gilmore, PhD
President, CEO and Dewalt and Marie Ankeny Director of Research



Advancing the pace of progress

Ready, set, grow

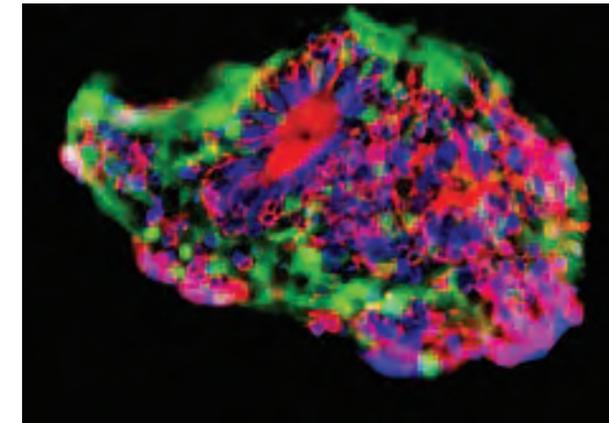
Stem cells enter clinical trials for the treatment of retinal degenerations

This year stem cell therapies moved closer to reality. Dr. Michael Young, the de Gunzburg Director of the Retinal Transplantation Research Center at Schepens Eye Research Institute, entered a partnership with ReNeuron Group, a stem cell technologies company based in the United Kingdom, in a clinical trial of a stem cell therapy for diseases of the retina.

The objective is to develop stem cell lines to treat major blinding diseases such as age-related macular degeneration, retinitis pigmentosa, and diabetic retinopathy, which together represent a major

unmet medical need. Dr. John Sinden, Chief Scientific Officer of ReNeuron, said, “I am delighted that ReNeuron is working so closely with Schepens Eye Research Institute, one of the world’s major research centers in the field of retinal diseases. Our new collaboration with the Institute will combine their important know-how with ReNeuron’s versatile stem cell platform, with the aim of generating novel stem cell therapies for these major retinal diseases. Future collaborations will offer the potential to take these therapies through to the clinic in the most efficient way possible.”

In addition to this clinical partnership, Dr. Young’s laboratory is pursuing several concurrent research projects. First, they are examining the integration of transplanted retinal progenitor cells into the retina to investigate the ability of grafted stem cells to repopulate the retina. Other research involves the differentiation of retinal progenitor cells into



Fluorescent green retinal stem cells express markers of photoreceptors in red (rhodopsin) and blue (recoverin). This suggests that these transplanted retinal stem cells have developed into photoreceptors with all the structures needed to capture light and translate it into chemical signals, which are then transmitted to the brain.

specific cell types to enhance survival and functional integration of transplanted cells. Another ongoing project is the investigation of a treatment for glaucoma using biopolymers either secreting growth factors, or seeded with stem cells derived from the brain and retina to investigate the repair of the optic nerve.

Let’s be clear about this

The secret of corneal clarity is revealed

The eye is an organ with unique properties. Among them is a clear window, the cornea, which is free of blood vessels, allowing light to enter unobstructed. This is one of the crucial conditions necessary for the miracle of vision. Now, for the first time, we have learned what keeps this unique tissue free of blood vessels, and that knowledge holds promise not only for treatments of eye disease, but also for cancer.

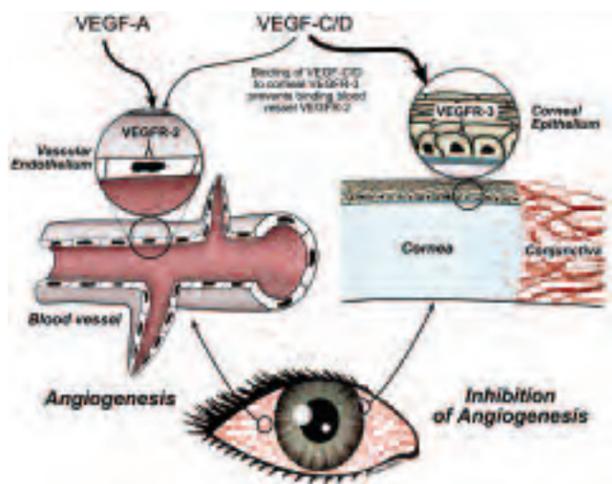
The key to corneal clarity is the presence of unexpectedly large amounts of the protein VEGFR-3 (vascular endothelial growth factor receptor-3) on the top cell layer of normal healthy corneas. Dr. Reza Dana and his team have found that VEGFR-3 halts angiogenesis (blood vessel growth) by acting as a “sink” to bind or neutralize the messages sent by the body to stimulate the growth of blood vessels.

These results, published in the July 25, 2006 issue of the *Proceedings of the National Academy of Sciences*, not only solve a profound scientific mystery, but also hold great promise for preventing and curing blinding eye disease and illnesses such as cancer—diseases where blood vessels grow abnormally and uncontrollably.

“A clear cornea is essential for vision. Without the ability to maintain a blood-vessel-free cornea, our vision would be significantly impaired,” says Dr. Dana, who is a Senior Scientist at the Schepens Eye Research Institute, head of the Cornea Service at the Massachusetts Eye and Ear Infirmary, an Associate Professor at Harvard Medical School, and the senior author and principal investigator of the study.

“Drugs designed to manipulate the levels of this protein could heal corneas that have undergone severe trauma or help shrink tumors fed by rapidly growing abnormal blood vessels,” he says. “In fact, the next step in our work is exactly this.”

Dr. Dana's laboratory concentrates its studies on molecular and cellular mechanisms of inflammation and immunity in the eye. Of particular interest are projects studying the immunopathogenesis of **transplant rejection**, molecular regulation of antigen-presenting cell (APC) recruitment in the eye, chemokine and integrin regulation of APC activity, immunopathogenesis of chronic ocular surface inflammation in **dry eye syndromes**, development of protein- and lipid-based **anti-inflammatory agents** for ocular use, and regulation of ocular **angiogenesis** and lymphangiogenesis, and their interface with immunity.



The surface of the cornea normally expresses high levels of a receptor, called VEGFR-3. This receptor binds the factors (VEGF-C & -D) that normally trigger abnormal blood vessel growth (angiogenesis) by serving as a “trap” for these factors, thereby keeping the cornea clear of blood vessels. Corneal clarity is one of the essential conditions that makes vision possible.

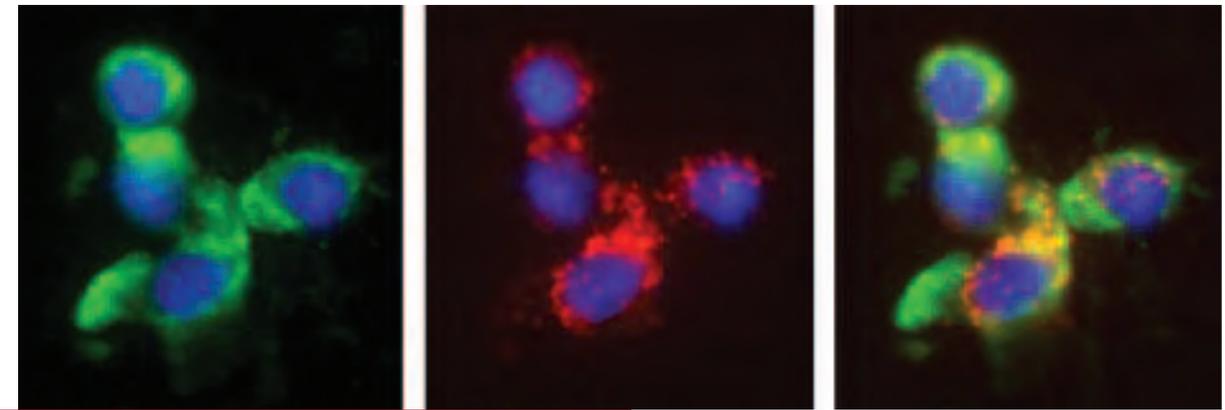
All in the family

Genetic factors of juvenile diabetes are identified in Sardinia

Trained in endocrinology and diabetes research in the US, Dr. Mara Lorenzi has developed a new project that will take her back to her native Italy to study diabetic retinopathy in Sardinians. What makes a small island off the southern coast of Italy the best possible location for such a study? The population of Sardinia has a disproportionately high rate of juvenile diabetes, probably the highest in the world. But that’s not all. They have genetic characteristics that may impact the frequency and severity of diabetic retinopathy, a blinding eye disease often caused by diabetes.

The population of Sardinia, probably on account of its limited crossing with other populations, maintains a large pool of genetic alterations. Dr. Lorenzi, a Senior Scientist at Schepens Eye Research Institute and a Professor at Harvard Medical School, became interested, in particular, in the genetic abnormality called G6PD deficiency—or favism—common in Sardinians. The high blood glucose of diabetes feeds excess glucose to the cells of blood vessels. Those cells, in turn, put some of this excess glucose through the polyol pathway that churns out toxic molecules, which are suspected to have a role in retinopathy, although no direct relationship has been proven. Individuals with the G6PD deficiency have very little activity in the polyol pathway and may be protected from developing retinopathy.

If Dr. Lorenzi’s studies in Sardinia prove that those with G6PD are protected from developing diabetic retinopathy, she and others will then push hard to identify drugs that inhibit the polyol pathway, thereby saving the sight of many people. Thanks to support from the Massachusetts Lions Eye Research Fund and the Juvenile Diabetes Research Foundation, Dr. Lorenzi was able to begin her work in Boston, screening individuals at the Institute’s Vision Assessment Center, and continue her investigation in Sardinia among a specialized population at great risk for developing blinding retinopathy.



Aldose reductase (shown in green) does not function as well in individuals with diabetes and G6PD deficiency. This may protect them from developing toxic molecules that lead to diabetic retinopathy in the lining of their retinal vessels.

Dr. Lorenzi’s laboratory is interested in reconstructing the pathogenesis of diabetic retinopathy. They target very early events induced by diabetes in the retina in order to be able to prevent diabetic retinopathy. Prevention is a realistic proposition; whereas, arresting the course once changes have begun to set in the retinal vessels is more challenging.

The Lions' share

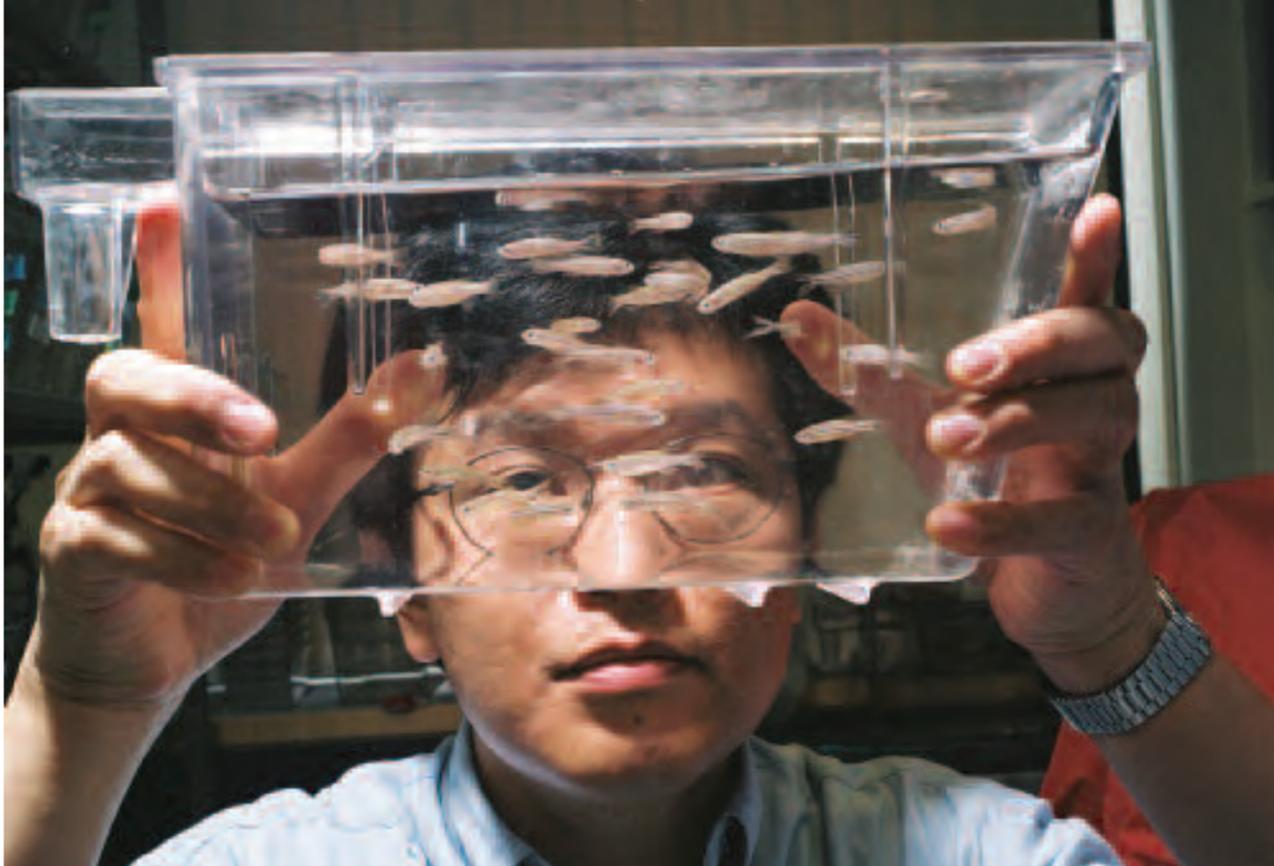
Since 1917, Lions Clubs have offered people the opportunity to give something back to their communities. From involving members in projects as local as cleaning up an area park—or as far-reaching as bringing sight to the world’s blind—Lions Clubs have always embraced those committed to building a brighter future for their community.

Over the past 50 years, the Lions have supported eye research at the Institute with grants totaling more than \$4 million, making the Massachusetts Lions Eye Research Fund the Institute’s largest single non-governmental donor. Support from the Lions purchased the equipment that

launched the Institute’s research endeavors, and the Lions have continued as engaged partners in our shared fight against blindness ever since.

Peg Dunn was sworn in as the Massachusetts Lions’ 27th president, on August 12, 2006. She notes, “In every speech I give, I tell the audience that for every dollar we send to the Schepens Institute as seed money, the return in federal funding for eye research is fifteen to one. Not only is this a strong collaboration in terms of our fulfilling our mission to provide support for research and education in eye diseases, but our investment is tremendously leveraged.”

Peg, along with nearly 50 of her fellow Lions from across the state, including her husband, Dick, a former president, joined researchers and President Mike Gilmore for a dinner held at the Institute in September to acknowledge the Club’s tremendous depth and range of funding in support of eye disease research. “The Institute is one of the top five recipients of Lions funding over the last six decades. We are proud of our connection to the Institute and proud of the work we have enabled to address a multitude of eye disorders. We believe the Mass Lions’ partnership with the Schepens Eye Research Institute to be among our strongest collaborations.”



Dr. Kishi holds a small tank of zebrafish, which he uses in his study of the role of aging and degeneration in eye disease.

Making a splash

New Assistant Scientist Shuji Kishi introduces a zebrafish model to study aging and degeneration

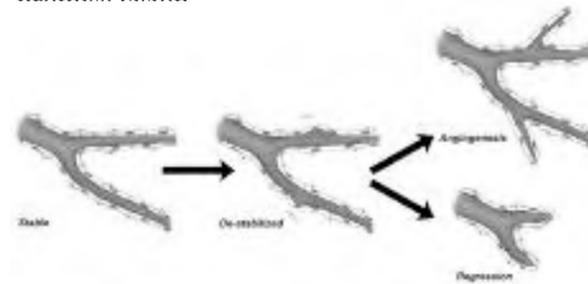
Dr. Shuji Kishi made the move from Dana-Farber Cancer Institute to Schepens Eye Research Institute in the summer of 2006 precisely because he wanted to focus on the eye as a model for understanding the processes of aging and degeneration. To do this, he brought a model system that has been used with great success in studying cancer, the zebrafish. As one of the first researchers to use this model to study the mechanisms of aging, Dr. Kishi wants to understand the kinds of degeneration that take place over a person's lifespan, including macular degeneration, glaucoma, and cataracts.

Dr. Kishi has already identified several potential aging indicators that will help to elucidate common pathways of aging in vertebrates—from fish to humans. This, in turn, will provide avenues of research dedicated to the discovery of potential drugs applicable to age-associated diseases. Because the eye of the zebrafish possesses much the same structure as the human eye, this small vertebrate, whose genome has been painstakingly mapped, proves to be a highly valuable model in which to observe the mechanisms of degeneration and to try potential therapeutics. The introduction of this new research model has gotten the attention of other researchers at the Institute, who are excited by its potential as a means to explore unanswered questions about eye disease.

Making the switch

The discovery of new ways to control blood vessel growth may lead to alternative avenues for treatment

Angiogenesis, or abnormal blood vessel growth, is a major part of the damage caused by diseases that attack the retina. Unscheduled angiogenesis brought on by prolonged diabetes results in immature and leaky retinal vessels, which compromise vision.



How does angiogenesis get started? The loss of cells called "pericytes" that surround the walls of blood vessels is an early sign that the vessel has become destabilized and that more damage is on the way. The presence of growth factors and other angiomodulators contribute to the fate of the destabilized vessel.

A TUNEL assay reveals apoptosis, or "programmed cell death", among endothelial cells (in green). Kazlauskas and Im are identifying the mechanisms that switch on this self-destruct mechanism, leading to blood vessel regression.



Dr. Andrius Kazlauskas, a Senior Scientist at Schepens Eye Research Institute and an Associate Professor at Harvard Medical School, and Dr. Eunok Im, a Senior Scientist Associate in his laboratory, have made a discovery that takes a whole new approach to this problem, and could lead to more targeted drugs for diabetic retinopathy, macular degeneration and cancer. They are the first to discover a switch inside blood vessel cells that controls new blood vessel growth. The switch is turned on and off by the balance between two enzymes (known as PI3K and PLC γ) that compete for the use of the same lipid membrane to fulfill opposite missions, growth and regression, respectively.

Dr. Kazlauskas, says that scientists have long suspected an "intracellular" switching process, but until now have known very little about it. "Current drugs focus on suppressing blood vessel growth by inhibiting a mechanism outside the vessel cells, which involves the action of growth factors such as VEGF or vascular endothelial growth factor. While effective in preventing vessel growth, these drugs have little impact on existing, stable vessels," he says. "Our discovery may help design drugs that could dismantle existing vessels by targeting this switch inside the vessel cells."

Dr. Kazlauskas' laboratory conducts research related to diabetic retinopathy including the molecular basis of endothelial dysfunction, signal transduction pathways that regulate cell proliferation, and molecular regulation of angiogenesis. He also conducts research related to corneal transplantation, including gene therapy to improve graft survival in high-risk eyes, and corneal angiogenesis.

Set to stun

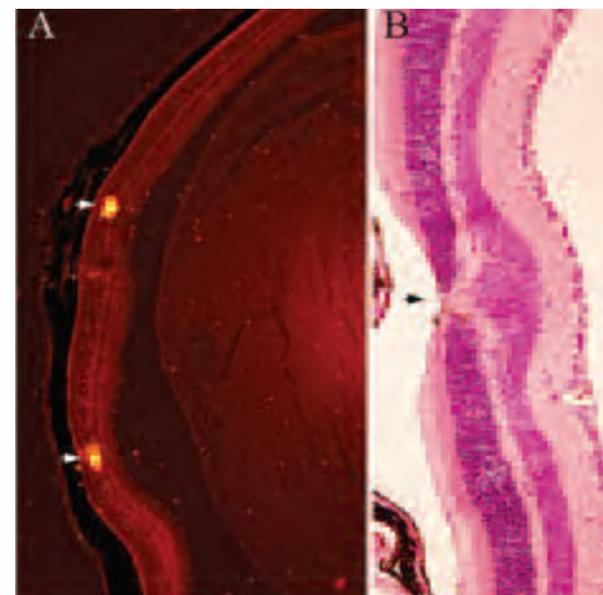
Collaborative research group finds means to counteract laser damage to the retina

Use of lasers in the military is growing. Lasers are now used in range-finding and target identification for a variety of weapons. Because the retina is designed to use light for vision, it is especially sensitive to highly focused laser light.

The Institute's Military Vision Research Program has responded to military ophthalmologists' concerns about laser damage by creating a research team to examine the various effects of laser light on the eye, and to find ways to counteract damage. The team, headed by Dr. Dong Feng Chen, includes Drs. Kameran Lashkari, Andrew Taylor, Bruce Ksander, and Joan Stein-Streilein.

Program researchers have found that laser light itself damages the nerves of the retina, and that the damage slowly spreads. Why? Because a special group of retinal cells overreact to laser damage, leading to scarring and inflammation. Also, researchers have demonstrated that laser damage to one eye changes the immune response not only of the injured eye, but also to the uninjured eye. Thus both eyes are at risk for loss of vision.

Insights from this work have identified new strategies for repairing damage whether in the military or civilian context. For example, program researchers have recently identified signals that control retinal scarring following laser burns and new experiments are focusing on finding ways to manage it. Aside from the obvious military applications, this advance will be of importance to eye surgeons, especially those treating diabetic eye disease. Lasers are frequently used in eye surgery, and controlling scarring and healing will constitute a major advance.



Clusters of dying cells glow brightly in a fluorescence-labeled section of the retina 24 hours after receiving laser burns. Without new ways to halt the damage, and then reverse it, the damage will spread to surrounding cells, further compromising the retina and its ability to function.

Group leader Dr. Dong Feng Chen, an Associate Scientist at Schepens Eye Research Institute and an Associate Professor at Harvard Medical School works to address several fundamental questions in her laboratory's research. Why can't neurons or nerve fibers in the mature retina or central nervous system (CNS) of mammals be regenerated after injury? Is the regenerative failure driven by intrinsic mechanisms of neurons or neural stem cells, or is it a result of changes in the environment? These are not only important issues in neurobiology; answering these questions may provide leads for drug development and therapeutic strategies to treat retina and CNS degenerative diseases and nerve damage.

From battlefield to bedside

Lasers. The Internet. Night Vision. Global Positioning. Artificial Limbs. Flu Shots. The fruits of Department of Defense (DoD) research are well known, but the Department's aggressive culture of collaboration is less so. DoD supports a major research program that focuses on protecting national security, contributes significantly to the economic infrastructure, and improves the quality of life of the nation. Working primarily on long-term goals leading to new or improved technologies, the DoD research program

seeks out partners who can stimulate innovation and help open up fresh research areas. Through these partnerships it has developed an impressive track record for delivering revolutionary innovations.

In the 1990s, the Institute began collaborating with the Department of Defense to develop new ways to save the vision of soldiers injured on today's battlefield and to push the frontier of vision technologies by creating the Military Vision Research Program. To keep abreast of the needs of the military, the Institute holds two-

day symposia biannually in which practicing military eye specialists discuss the challenges that they encounter in caring for men and women in uniform with Schepens scientists. Our scientists then design research programs to respond to these needs. The resulting research, on everything from optic nerve regeneration to enhanced displays, results in clinically targeted projects with enormous potential for both military and civilian applications.

The wizard of vid

Refined Television enhancement technology helps low vision patients

"Most of us take seeing the television for granted," says Dr. Eli Peli, Senior Scientist at Schepens Eye Research Institute and a Professor at Harvard Medical School. "But for the visually impaired, it is very difficult. This is a source of great frustration and discouragement since so much news and entertainment comes from tuning in to the 'tube'."



Eli Peli, O.D.

Through a study of 46 patients with central vision loss, Dr. Peli has found that increasing the contrast of details was of special importance in making television more enjoyable for the visually impaired. The study provides information that will aid in the development of an electronic device to help millions suffering from diseases like macular degeneration, diabetic retinopathy and other causes of low vision.

The study suggests that enhancement levels could be selected that will be acceptable to most people, simplifying the type of device needed. Peli envi-

sions a small box that could be attached to any television and would offer only a few enhancement settings, making it less expensive and less complicated to use than currently available technologies.

Belkin, an international technology company, has recently released a video enhancement cable product, RazorVision, which enhances video for normally sighted TV viewers. DigiVision, the company that developed the Belkin device and holds a patent pending on the technology, is interested in creating another version of the product for visually impaired viewers based on results from this and other image studies by Peli and his colleagues.

As a low vision rehabilitation expert, Dr. Eli Peli sees hundreds of patients suffering from vision impairments caused by diseases such as age-related



Contrast on the right side of the image has been enhanced to make viewing television easier for the visually impaired. Dr. Peli's partnership with DigiVision promises to help millions struggling with low vision enjoy television along with their families.

macular degeneration (AMD), diabetic retinopathy and other diseases. An electrical engineer and an optometrist by training, he has devoted his career to creating and evaluating new technologies to help low vision patients regain their ability to do everyday tasks such as reading, walking and driving.

A blue ribbon advocate

Activist, mother, champion equestrian, survivor. Any of these words adequately describe the blue ribbon nature of Tory Watters LeBlond. And the key message is—Tory meets life head on and fights for what she believes in. One thing she believes in is spreading the word about vision loss and the work the Institute is doing to cure it.

Tory has been legally blind since a brain tumor stole most of her vision in her teens. She became aware of the Institute several years ago when searching for visual aids to maximize the vision she did still have. She eventually found Dr. Eli Peli, who gave her a pair of glasses equipped with a tiny adjustable magnifier that allows her to

view her equestrian competitors, watch sporting events on television, and many other activities she had missed since age 14.

Today she has immersed herself in an ambitious outreach effort to create awareness, education, understanding, and compassion for the millions of people living with vision impairment. Tory acts on her commitment to the important research objectives of Schepens Eye Research Institute—through community awareness and individual financial support as a potential catalyst to inspire others to do the same.

Her ultimate goal is to create a universal symbol for legally blind people to use as a subtle indicator of their impairment. She doesn't want special treatment for the visually impaired,

simply recognition and understanding that she and others like her aren't being difficult when they can't see numbers in an elevator or read a sign in a restaurant, or other public venues. Ideally, this symbol would be in the form of a pin or other small object that can easily be worn on clothing.

Since the summer of 2003, Watters LeBlond's story—including her commitment to the Institute—has been featured in equestrian magazines, local newspapers, and nationally on the Early Show. She feels her logical next step is to promote the symbol on a larger scale, ideally on The Oprah Winfrey Show.

International recognition

Faculty presentations and Awards

Dr. Dong Feng Chen served as a visiting professor and participated in a lecture series at New York Eye and Ear Infirmary in New York, NY.

Dr. Patricia D'Amore presented the First Shepro Lecture, "The Microvasculature: Not Just Nucleated Cellophane Tubes," at Boston University, Boston, MA, in April 2006.

Dr. Reza Dana served as a visiting professor at Case Western Reserve University in Cleveland, OH, where he presented the Immunology Seminar entitled, "Regulatory mechanisms in corneal dendritic cell recruitment and function."

Dr. Darlene Dartt was elected Vice President for North America of the International Society for Eye Research.

Dr. Michael Gilmore delivered this year's Division B lecture, entitled "Regulation of toxin expression by *Enterococcus faecalis*," at the meeting of the American Society for Microbiology.

Dr. Ilene Gipson is the 2007 recipient of the Friedenwald Award, which honors the outstanding research of senior scientists in basic or clinical sciences as applied to ophthalmology.

Dr. Meredith Gregory-Ksander was awarded the Alice J. Adler Fellowship of the Harvard Scholars in Medicine Fellowship Program. She was also awarded the "Thomas R. Lee Award for National Glaucoma Research" from the American Health Assistance Foundation.

Dr. Tatsuo Hirose received the first special award of Pfizer Ophthalmics Japan at the meeting of Japanese Ophthalmology Society.

Dr. Eli Peli was awarded an Honorary Doctor of Science degree by the State University of New York, New York, NY. He delivered the Dr. William Feinbloom Distinguished Lecture in Low Vision at *Envision New York*, SUNY-College of Optometry, entitled "Biopic Telescopes: The Past, Future, and Using Them Right Now" in New York, NY. He also delivered the H. Talmage Dobbs Lectureship in Ophthalmology at Emory Eye Center, Emory School of Medicine, Atlanta, GA, entitled, "Near-Peripheral Vision Reorganization in Macular Degeneration."

Fellows' presentations and Awards

Dr. Eric F. Finkelstein of the D'Amore laboratory received the American Society for Investigative Pathology Trainee Travel Award.

Dr. Susan Heimer of the Gilmore laboratory received a National Eye Institute travel grant to make a presentation at the 2006 Association for Research in Vision and Ophthalmology Annual Meeting.

Dr. Arindel Maharaj of the D'Amore laboratory was the recipient of the Harvard Medical School Hauser Scholar Award for distinguished graduate work and demonstrated interest in communicating science to a wider population.

Dr. Daniel Saban of the Dana laboratory was awarded a 2006 Fight for Sight Postdoctoral Fellowship.

Dr. Christine Watte of the Stein-Streilein laboratory won the Cora Verhagen prize, which is awarded for the best ocular immunology poster or paper presentation at the 2006 ARVO Annual Meeting.

Meet our new investigators

In addition to Dr. Shuji Kishi (profiled on page 8), we are delighted to welcome four new investigators to our research faculty. Each brings fresh insights, enthusiasm, and a willingness to collaborate to advance our shared goals.



Sharmila Masli, Ph.D.
Assistant Scientist

1986 *B.Sc. University of Bombay, Bombay India*
1987 *D.C.A. Sophia College, Bombay, India*
1994 *M.S. Northeastern University, Boston Medical Lab.*
1997 *Ph.D. Northeastern University, Boston Biomedical Sciences*

The eye has the unique ability to protect itself from foreign invaders such as bacteria or transplanted tissue without causing inflammatory immune responses typical of those that occur in most other parts of the body. Immunity can permanently damage tissues, and in organs such as the eye where damaged cells are not able to replenish themselves, immune injury causes permanent damage, even loss of vision. Dr. Masli's research addresses molecular mechanisms utilized by antigen presenting cells in the eye that are involved in inducing an immune response to ocular antigens. Understanding these mechanisms can provide a basis to develop therapeutic strategies not only to

treat inflammatory ocular diseases but may also help regulate inflammatory responses in other parts of the body.

"Having had the privilege of completing post-doctoral training under the mentorship of a world-renowned ocular immunologist, the late J. Wayne Streilein (past President of Schepens Eye Research Institute), my work reflects many ideas that originated from numerous discussions I had with him. I feel privileged to have the opportunity to carry forward some of his ideas through my research and contribute to his legacy in the form of scientific advances in the vision research that were part of his journey at Schepens Eye Research Institute."



Chiara Gerhardinger, M.D., Ph.D.
Assistant Scientist

1979 *B.S. Scientific Lyceum, Treviso, Italy*
1987 *M.D. University of Padua Medical School, Italy*
1995 *Ph.D. University of Milan, Italy*

Diabetic retinopathy, a complication of diabetes, is one of the leading causes of blindness in the adult population of the United States and other developed countries. Future projections indicate that diabetic retinopathy will only worsen as a public health problem, as the prevalence of diabetes increases due to the current obesity epidemics and the aging of the US population.

Dr. Gerhardinger's research is focused on determining whether inflammatory changes have a causal role in the development of diabetic retinopathy. Identifying a mediator of diabetes-induced retinal damage would have a profound impact on the field of diabetic retinopathy, opening new avenues for the prevention and treatment of this complication of diabetes.

"I truly believe that the rich and diverse vision research environment provided by Schepens Eye Research Institute has and will continue to give me the opportunity to contribute excellent work to my own field of research."



Meredith Gregory-Ksander, Ph.D.
Assistant Scientist

1994 *B.A. Colby College, Waterville, Maine*
1999 *Ph.D. Loyola University, Chicago, Illinois*

The eye is a complex organ where inflammation is tightly regulated to provide it with protection against pathogens, while at the same time protecting the visual axis from sight-destroying inflammation. There are a variety of mechanisms involved in regulating inflammation in the eye and together they are known as immune privilege. Dr. Gregory-Ksander is focused on determining how ocular immune privilege regulates the immune response and how changes in immune privilege contribute to ocular disease. Her three main areas of concentration are the following: the mechanism by which Fas ligand regulates ocular innate immune privilege, the host

response to ocular bacterial infections, and the immune abnormalities involved in pigmentary glaucoma.

"Schepens Eye Research Institute provided an excellent training environment to develop an independent research career in ocular immunology. I believe my focus on the immunology of infectious eye disease will advance a critical area of vision research. I look forward to contributing both scientifically and intellectually to the field of ocular immunology and participating in paving the way towards new and improved treatments for infectious eye diseases."



Pablo Argüeso, Ph.D.
Assistant Scientist

1993 *M.S. University of Valladolid, Spain*
1997 *Ph.D. University of Valladolid, Spain*

Dry eye (also called dry eye syndrome) is a common condition which occurs when people don't have either enough tears, or the correct composition of tears, on the

surface of their eyes to lubricate and keep them comfortable. Patients with the most severe disease are at increased risk of developing corneal infection, scarring or ulceration.

Dr. Argüeso's research is focused on characterizing the carbohydrate portion of the different mucins expressed by the ocular surface epithelia as well as the enzymes involved with their synthesis, and to determine whether the alteration of mucin glycosylation is associated with ocular surface disease. Revealing the mechanisms by which carbohydrate modifications of mucins participate in the organization and function of mucosal surfaces may help to develop new approaches to prevent and cure diseases of the ocular surface.

"As the largest independent vision research program in the nation and a member of the Harvard research community, Schepens Eye Research Institute offers a unique environment to perform my research—a collaborative, encouraging environment where I can have an impact well beyond the eye."

Stepping up the pace

The sequencing of several genomes—including the human, mouse and zebrafish genomes—has created a multiplier effect, expanding the opportunities for research and accelerating a biomedical revolution that promises to transform our lives. The pace of research continues to quicken, and the quantity of information available now to the Institute’s scientific staff is staggering.

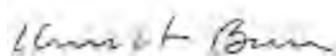
But information by itself isn’t enough to help those in need. To harness the potential of this information, Schepens Eye Research Institute scientists are building strong collaborative relationships—across the scientific community and with federal funding agencies, foundations, and other organizations critical to the success of our research endeavors. Based in the heart of Boston, the center of biomedical research, the Institute’s scientific staff has the opportunity to interact closely with exceptional scientists at area institutions and, in this new technological era, also to develop partnerships across the globe. We’re combining what we discover with what others unearth to advance the pace of progress.

Individuals are also critical collaborators. We’re grateful to the many outstanding individuals who send contributions, large and small, year upon year. Among these individuals, we especially recognize those who join our William Wolff Society and help us far into the future by including the Institute in their estate plans. The Institute also has long-standing ties with local organizations, like the Massachusetts Lions Club, a supporter of our work for 55 years. Money raised by Lions’ volunteers makes a difference to many who are in need. Foundations and corporations, too, partner with us to continue the forward trajectory of research; they support inno-

vation by supplying much-needed seed money and also help to move projects from the lab to patients through corporate-sponsored research.

Each of these collaborations brings new ideas and new resources, both scientific and personal, to advance our shared vision. I am delighted to take this opportunity to recognize and honor all those who join with us in the profound endeavor of unlocking the mysteries of eye disease. Only through increased collaboration, cooperation, and support will we be able to understand eye diseases, improve treatments, reduce the impact of low vision and blindness, and improve the quality of life for many.

We look forward to continued collaboration and progress.



Kennett F. Burnes

Chairman of the Board, Schepens Eye Research Institute
President and Chief Executive Officer, Cabot Corporation



With your help, Schepens Eye Research Institute continues its tradition of leadership—developing treatments for eye diseases and injury, a health care challenge more urgent than ever.

A legacy of foresight

In the mid 1980s, William Wolff learned first hand what eye research could do when Dr. Charles Schepens repaired his detached retina with an innovative surgical technique. While grateful for the restoration of his vision, he also knew that cures were not yet available for millions of others with blinding eye disease. He believed that their best hope and that of future generations would be the work of scientists at Schepens Eye Research Institute.

In 1987, William, the former President and CEO of King Clothing Company in New York City and an Institute Board member, along with his wife, Babbette, dedicated themselves

to a special collaboration with the Institute, one that would ensure financial support for sight-saving research over time. First, the Wolffs included bequests in their wills to support the future research activities of Schepens Eye Research Institute. Then William systematically went about convincing his fellow Board members at the Institute that a planned giving program could build a strong endowment for future research.

Before William Wolff passed away in 1991, he had already seen the fruits of his efforts. Many others, influenced by his passion, had included the important research of the Institute in their estate planning. Today, The William Wolff Society, which was named in his honor, includes nearly 80 friends who have informed the Institute of their planned gifts.

According to Babbette Wolff, who continues to carry the torch of altruism on the trail that she and her husband jointly blazed, “The William Wolff Society is an important reminder to all of us of the important role of planned giving to the viability of any non-profit with a public mission.

“William would be delighted that so many others have followed his lead and made eye research a part of their own personal legacies,” adds Babbette, who now serves as an Honorary Trustee. Tomorrow’s research depends on the foresight of those who share the Wolffs’ vision.

Meet our new Trustees and Corporators

We're pleased to introduce you to the Institute's new Trustees and Corporators. They join our other volunteers—engaged, committed people from all walks of life who together are focused on governing the Institute and helping it to realize its vital mission.

Trustees

David M. Knipe, Ph.D. is Higgins Professor of Microbiology and Molecular Genetics at Harvard Medical School, Chair of the Harvard Program in Virology, and an authority on herpes viruses and herpes virus vaccines. His viral genetic work has led to a safe new form of live virus vaccine for genital herpes, a replication-defective mutant virus, which is in development for clinical trials. His laboratory has also developed herpes vectors for AIDS and biodefense vaccines, and the first vectors have yielded promising results in non-human primate trials. Dr. Knipe is co-chief editor of *Fields Virology*, the major virology reference book.

Martin H. Loeffler is Chairman, President and Chief Executive Officer of Amphenol Corporation (NYSE-APH), one of the world's leading producers of electronic and fiber optic connectors, cable and interconnect systems. Mr. Loeffler is a native of Tyrol, Austria. He has undergraduate and graduate degrees in philosophy, psychology, physics and mathematics, and he earned his Ph.D. in experimental physics at the University of Innsbruck, Austria.

Gerald Ostrov recently retired as Company Group Chairman of the Johnson & Johnson Global Vision Care Franchises. He spent over 20 years at J&J in leadership roles in the vision and consumer areas. Mr. Ostrov is a graduate of Cornell University and the Harvard Business School. He is currently Chairman of the Board of Trustees of Middlesex County (NJ) College and serves on many philanthropic boards including the Jewish Federation of Greater Middlesex County, the Central New Jersey Jewish Home for the Aged, the Garden States Arts Center Foundation and the East Brunswick Jewish Center.

Nancy Raquet is the former President of Interact, Inc., a strategic public relations consulting business specializing in executive speech writing and annual reports in support of a range of Fortune 100 company clients including, AT&T, BellSouth, Ameritech, Unisys, IBM, Nortel, and General Instrument. She has also held leadership positions with AT&T and General Instrument. Mrs. Raquet retired from her business in 2000 to devote her professional skills to charitable organizations. The Raquets have established the Raquet Family

Charitable Trust Foundation focused on the resolution of children's health and education issues. Mrs. Raquet is a graduate of Northwestern University's Medill School of Journalism.

Tim Sear is Chairman Emeritus of Alcon, Inc., the global leader in ophthalmic pharmaceuticals, surgical instruments and accessories, and consumer vision care products. Mr. Sear joined Alcon in Sydney, Australia in 1971 and has held positions of increasing responsibility, including serving for 14 years as Chairman of Alcon International. He became Chairman, President and CEO in October of 1997, and led the executive team that took Alcon public in March 2002. Under his leadership Alcon achieved more than \$3.9 billion in sales in 2004. Mr. Sear retired as President and CEO on October 1, 2004, and as Chairman on April 30, 2005. Mr. Sear began his career in the pharmaceutical industry in international management assignments with Mead Johnson International, moving with his family to the United States, the United Kingdom, Singapore, Australia and Hong Kong, and traveling extensively throughout Africa and the Far East.

Corporators

Roger Sametz

Roger Sametz is the President and founder of Sametz Blackstone Associates, a brand-focused strategic communications and design consultancy located in Boston, Massachusetts. He received both his BA and MFA from Yale University. Since founding Sametz Blackstone in 1979, Mr. Sametz has collaborated with a wide range of corporate, academic, research, cultural, and professional service clients to help them better communicate their value-and values-to a range of target audiences.

He serves on the Executive Committee of the Board of Associates of the Whitehead

Institute for Biomedical Research, the Executive Committee of the Board of Directors of the American Jewish Committee, the Board of the Corporate Design Foundation, the Board of Directors of the Boston Center for Arts, and is an Overseer of Boston Ballet. He is on the Board of Visitors of Longy School of Music, the Board of Friends of the McGovern Institute for Brain Research, and serves on the Corporate Executive Council of WGBH.

Marian Woolston-Catlin, M.D. is a retired child and adolescent psychiatrist who has worked both in hospital settings and in private practice. A graduate of Harvard Medical School, Dr. Woolston-Catlin is a member of the American Psychiatric Association, the Massachusetts Psychiatric Society, the American Academy of

Child and Adolescent Psychiatry, the New England Council of Child and Adolescent Psychiatry, the American Medical Association and the Massachusetts Medical Society. The numerous organizations with which she is active as a volunteer include the Boston Vassar Club, the New England Conservatory of Music (Wellesley), Medfield State Hospital Reuse Committee (Charter Member), the Women's Eye Health Task force, and many other hospitals and schools. Dr. Woolston-Catlin is a resident of Medfield, Massachusetts.

Lost in translation...discovery, development, new drugs

By its very nature, translational research crosses the boundaries between academic research labs, corporate drug development and clinical application. Historically, communication and cultural disconnections between academic and industry scientists have made this difficult. As a result, exciting discoveries and technologies have been lost in translation. But when these collaborations are seamless—when a talented translator makes sure that we are all speaking the same language—great ideas take the fast track to

becoming therapies that help patients. By collaborating with corporations, the Institute is able to move forward innovation at every stage of the pipeline—from earliest ideas to products ready for clinical trials—with the companies who have a track record of delivering results to patients around the world.

The Office of Corporate Alliances, formed in the fall of 2004 to encourage these collaborations, has experienced significant growth in the past year in terms

of both participation and research funding. With partner companies, the Institute has embarked on multiple new research projects across a wide spectrum of scientific disciplines. Through these projects, Institute scientists have the opportunity to engage in translational research with colleagues in industry, combining our intellectual, technical, and financial assets toward our common goal of conquering the diseases that cause blindness.

The Schepens Eye Research Institute, Inc. Year ended June 30, 2006

	Unrestricted	Temporarily Restricted	Permanently Restricted	Total
Operating:				
Federal grants and contracts	\$ 17,175,893			\$ 17,175,893
Contributions	1,039,233	108,150		1,147,383
Bequests	781,958			781,958
Nonfederal grants and contracts	3,254,203			3,254,203
Income on long-term investments	1,405,134	466,274		1,871,408
License and royalty fees	561,190			561,190
Corporate sponsorships	600,000			600,000
Other sources	384,857			384,857
Total operating revenues	25,202,468	574,424		25,776,892
Net assets released from restrictions	1,188,573	(1,188,573)		
Total revenues and other support	26,391,041	(614,149)		25,776,892
Expenses:				
Research	20,719,811			20,719,811
Management and general	7,199,347			7,199,347
Fundraising and public relations	704,027			704,027
Total operating expenses	28,623,185			28,623,185
Change in net assets from operations	(2,232,144)	(614,149)		(2,846,293)
Nonoperating:				
Net unrealized gains on investments	598,071	(415,601)		182,470
Realized gains on investments	154,839	1,522,115		1,676,954
Contributions		50,638	89,971	140,609
Change in split interest agreements	17,788			17,788
Net assets released from restrictions for endowment		(50,000)	50,000	
Transfers	(148,865)	148,865		
Change in net assets from nonoperating activity	621,833	1,256,017	139,971	2,017,821
Change in net assets	(1,610,311)	641,868	139,971	(828,472)
Net assets, beginning of year	16,576,390	15,132,940	13,491,794	45,201,124
Net assets, end of year	\$ 14,966,079	\$ 15,774,808	\$ 13,631,765	\$ 44,372,652

	2006	2005
Assets		
Cash in interest-bearing accounts	\$ 463,038	185,551
Funds held in trust by others	716,172	716,172
Trustee held bond funds	3,393,979	3,271,309
Pledges receivable, net	896,126	1,247,055
Grants and contracts receivable	1,074,658	1,056,984
Prepaid expenses and other assets	715,117	438,754
Land, buildings, and equipment, net of accumulated depreciation	29,259,079	32,440,977
Long-term investments at fair market value	35,527,253	34,553,342
Total assets	\$ 72,045,422	73,910,144
Liabilities and net assets		
Liabilities:		
Accounts payable and other accrued expenses	\$ 1,580,142	2,565,972
Accrued payroll	589,865	600,989
Deferred support	3,134,179	2,560,545
Annuity obligations	302,224	320,012
Deferred credit	8,966,360	9,316,502
Long-term debt	13,100,000	13,345,000
Total liabilities	27,672,770	28,709,020
Commitments and contingencies		
Net assets:		
Unrestricted	14,966,079	16,576,390
Temporarily restricted	15,774,808	15,132,940
Permanently restricted	13,631,765	13,491,794
Total net assets	44,372,652	45,201,124
Total liabilities and net assets	\$ 72,045,422	73,910,144

Trustees

Mark B. Abelson, M.D.
 Mr. William F. Aikman
 Mr. DeWalt H. Ankeny, Jr.
 Dean Bok Ph.D.
 Mr. Kennett F. Burnes
 Mr. Charles de Gunzburg
 Thaddeus P. Dryja, M.D.
 Mr. Kenneth M. Fischer
 Mr. Robert L. Gable
 Gerard D. Goldstein, Esq.
 Paul J. Gormisky, Esq.
 Mr. Richard J. Harte, Jr.
 Ms. Susan Hudson-Wilson CFA
 David M. Knipe, Ph.D.
 Donald R. Korb, O.D.
 Mr. David T. Lawrence
 Martin H. Loeffler, Ph.D.
 Ms. Renée Manger
 Ms. Victoria D. McCullough
 Mr. Gerald Ostrov
 Ms. Patricia M. Patricelli
 Ms. Nancy Raquet
 Mr. T. R.G. Sear
 Eleanor G. Shore, M.D.
 Mr. Sherman H. Starr
 Mr. Glenn P. Strehle
 Dennis R. Tourse Esq.
 Mrs. Kathryn C. Vecellio
 Mr. Theodore N. Voss

Corporators

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 Mr. William P. Benton
 Mrs. Judith A. Brodtkin
 Mrs. Ann Shannon Cassidy
 Mrs. Rosalie F. Cohen
 Mr. David M. Coit
 Mr. Anthony DiGiovanni
 Dean S. Edmonds Jr., Ph.D.
 Mr. Harold L. Emerson
 Mrs. Edith Exton
 Mr. Roger C. Faxon
 Mr. Arthur B. Fisher
 Mr. William G. Garrison
 Michael S. Gilmore, Ph.D.
 Mrs. Judith Murat Grubman
 Mrs. Suzanne Harte Sears
 Mr. John G. Higgins
 Tatsuo Hirose, M.D.
 Mark S. Hughes, M.D.
 Mr. Walter S. Kiebach
 Ms. Sharon King Hoge
 Frances B. Kinne, Ph.D.
 Mr. Glenn S. Kurth
 Louis J. Marett Esq.
 Mr. Leland B. McDonough
 J. Wallace McMeel, M.D.
 Alice R. McPherson, M.D.
 Mr. John Palmer
 Mr. Roger Sametz
 Mr. Augustin P. Schepens
 Mr. George H. Shattuck, Jr.
 Richard J. Simmons, M.D.

David A. Snyder, M.D.
 Clement L. Trempe, M.D.
 Mr. A. Raymond Tye
 Mr. Leo A. Vecellio, Jr.
 Stephen M. Weiner, Esq.
 Glenn L. Wing, M.D.
 Marian Woolston-Catlin, M.D.

Officers

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Chairman
 Michael S. Gilmore, PhD
President
 David L. Conlon
Treasurer
 Nina R. Collins
Secretary-Clerk
 Megan C. Stuart
Assistant Secretary-Clerk

Administrative directors

Michael S. Gilmore, Ph.D.
President and Chief Executive Officer
Dewalt and Marie Ankeny Director of Research
 Mary M. Chatterton, MBA, JD
Director of Corporate Alliances
 Sharon Comvalius Goddard, MPH
Director of Grants and Contracts
 David L. Conlon
Chief Administrative Officer
Chief Financial Officer
 Patricia A. D'Amore, Ph.D., MBA
Associate Director of Research
 Darlene A. Dartt, Ph.D.
Director of Scientific Affairs
 Elizabeth M. Erickson
Director of Development and Public Relations
 Frances Ng, MBA
Director of Human Resources
 Joseph Finnigan
Director of Plant Operations

Faculty of Schepens Eye Research Institute

Emeritus senior scientists

Adler, Alice J., Ph.D.
 Cintron, Charles, Ph.D.
 Doane, Marshall G., Ph.D.
 Refojo, Miguel F., Sc.D.

Senior scientists

D'Amore, Patricia, Ph.D.
 Dana, Reza, M.D., M.P.H.
 Dartt, Darlene A., Ph.D.
 Delori, Francois, Ph.D.
 Gilmore, Michael S., Ph.D.
 Gipson, Ilene K., Ph.D.
 Joyce, Nancy, Ph.D.
 Kazlauskas, Andrius, Ph.D.
 Lorenzi, Mara, M.D.
 Peli, Eliezer, O.D.
 Stein-Streilein, Joan, Ph.D.
 Sullivan, David A., Ph.D.
 Webb, Robert H., Ph.D.
 Zieske, James, Ph.D.

Associate scientists

Chen, Dong-Feng, M.D., Ph.D.
 Ksander, Bruce, Ph.D.
 Taylor, Andrew, Ph.D.
 Young, Michael, Ph.D.

Assistant scientists

Argueso, Pablo, Ph.D.
 Gerhardinger, Chiara, M.D., Ph.D.
 Gregory-Ksander, Meredith, Ph.D.
 Kishi, Shuji, M.D., Ph.D.
 Lashkari, Kameran, M.D.
 Masli, Sharmila, Ph.D.

Investigators

Chen, Lu, M.D., Ph.D.
 Ng, Tat Fong, Ph.D.
 Rawe, Ian, Ph.D.
 Rios-Garcia, Jose, Ph.D.
 Romeo, Giulio R., M.D.
 Woods, Russell, Ph.D.

Adjunct associate scientists

Bex, Peter J., Ph.D.
 Klassen, Henry, M.D., Ph.D.

Adjunct assistant scientists

Maruyama, Kazuichi, M.D., Ph.D.
 Ruberti, Jeffrey, Ph.D.

Emeritus clinical senior scientists

Freeman, H. MacKenzie, M.D.
 Tolentino, Felipe I., M.D.

Clinical senior scientists

Abelson, Mark B., M.D.
 Dohlman, Claes H., M.D.
 Hirose, Tatsuo, M.D.
 McMeel, J. Wallace, M.D.
 Miller, Joan, M.D.
 Trempe, Clement L., M.D.
 Weiter, John, M.D.

Clinical associate scientists

Greiner, Jack V., D.O., Ph.D.
 Rubin, Peter, M.D.
 Schaumberg, Debra Sc.D.

Clinical assistant scientists

Colby, Kathryn, M.D., Ph.D.
 Grosskreutz, Cynthia, M.D., Ph.D.
 Pasquale, Louis, M.D.

Adjunct clinical senior scientists

Bonini, Stefano, M.D.
 Kenyon, Kenneth R., M.D.
 Kinoshita, Shigeru, M.D., Ph.D.

Adjunct clinical associate scientists

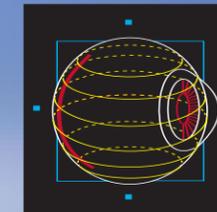
Arai, Mikki, M.D.
 Fletcher, Donald, M.D.
 Wing, Glenn L., M.D.

Adjunct clinical assistant scientists

Collins, James F., M.D.
 Ghuman, Thomas, M.D.
 Hughes, Mark S., M.D.
 Raskauskas, Paul, M.D.
 Sang, Delia, M.D.
 Usomoto, Nari, M.D.
 Walker, Joseph, M.D.

Visiting scientists

Marcos, Susana, Ph.D.
 Garcia Perez, Miguel Angel, Ph.D.
 Van de Velde, Frans J., M.D.
 Young, Conan, Ph.D.

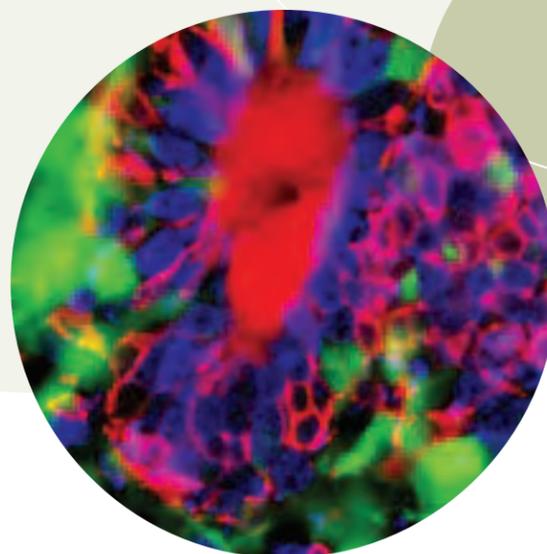


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Institute

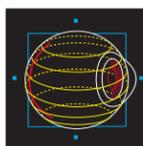
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Annual Report 2006 **Collaborating to advance our vision**



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