Sightings

Retinitis Pigmentosa—Expanding the View
“Make new friends but keep the old. One is silver and the other gold.” This familiar saying has been used by the Girl Scouts of America for decades. Similarly, this adage speaks to those of us who wish to sustain the vital work of Schepens Eye Research Institute. Combining our long-time, tried-and-true friends with our new enthusiastic acquaintances propels the work we are doing to cure blinding eye disease, some of which is eloquently described on our website and the pages of this publication.

The past year has been a particularly intense period of forming new relationships and revitalizing old friendships.

In Florida, old friends came together to celebrate the Institute in their homes and in elegant venues as they do every year, attracting more than 250 supporters. The Florida symposia opened new opportunities for unanticipated and very special alliances, attracting nearly 1400 attendees.

One such alliance was formed with John Sutton, a Florida lawyer who lost his sight in a shooting. His compelling story, to be aired by Dateline NBC, included the Institute’s research as part of his story of hope (see page 11 for more details).

This past spring, more than one hundred people attended the first Boston Symposium on Macular Degeneration, held at the Institute with participation from Schepens scientists and clinicians representing Ophthalmic Consultants of Boston and the Massachusetts Eye and Ear Infirmary. This audience heard firsthand from our scientists about the discoveries they are making and their commitment to curing a disease that affects nearly 10 million Americans.

The Institute also bolstered its long and trusted relationship with members of Congress and the Department of Defense in the quest to cope with the needs of thousands of returning veterans. Soldiers afflicted with eye and brain injuries have come to us asking how they can contribute to our work in hopes of regaining normal lives.

We continue to collaborate with companies that have the ability to bring discoveries to market, and we have created new partnerships with individuals, in addition to forging new alliances with foundations.

Each of these individuals and organizations is indispensible to the success of this mission-driven organization and we are profoundly grateful to everyone.

Whether you are a new or longtime friend to Schepens Eye Research Institute, we sincerely value your tireless involvement in this very special and critical organization. As you read the following pages, it is our hope that you and your family become inspired and reinvigorate your commitment to cure blindness.

Sincerely,

Kennett F. Burnes
Chairman of the Board
Schepens Eye Research Institute
On June 12, 2008, I traveled with Dr. Dong Feng Chen, Associate Scientist, to a special award ceremony in Beverly Hills, CA. Dr. Chen had been chosen from all scientists in the world to receive the Vision Award for Outstanding Scientific Achievement from Retinitis Pigmentosa International (RPI). Through its Vision Awards, RPI honors daring and extraordinary accomplishments in film, television, technology, medical research, leadership, and music. It also brings luminaries from all these fields together to support research to cure degenerative eye disease. Chief Operating Officer Ken Fischer and Institute supporters John Sutton and Kathy Henry joined Dr. Chen and me in representing the Institute.

Dr. Chen was selected by the RPI judges because of her groundbreaking work to regenerate the optic nerve, and her success in awakening stem-like cells in the retina to regrow retinal tissue. The latter is described in the cover article in this issue of Sightings, along with other efforts to treat and cure retinitis pigmentosa.

As Dr. Chen and I shared the stage with Martin Landau, Danny Glover, Barbara Eden, Kris Kristofferson, and even Jack LaLanne, and as Dr. Chen modestly accepted the recognition of the audience, I was once again struck by how exceptional the Institute’s scientists are. They dedicate their lives to the patient pursuit of discoveries that will enhance the lives of people who suffer daily with vision loss, people they likely will never meet. Moreover, they are the best in the world.

While this award and its ceremonies were particularly spectacular (and will be broadcast later this year on the PAX channel [now ION Television]), it is not the only such event recognizing the achievements of our faculty. In the last month, Francois Delori was awarded the Roger H. Johnson Macular Degeneration Prize, and it was announced that Ilene Gipson will be awarded the Endre A. Balazs Prize from the International Society for Eye Research at its meeting in Beijing this September. Because of the achievements of our outstanding faculty, the Schepens Eye Research Institute is one of the leading candidates for the highly competitive €1 Million Champalimaud Vision Award, which recognizes the world’s top vision research institution. The winner of this award will be announced this summer and I hope to have more good news to share soon.

Awards are not the goal of our mission or our scientists. They are, however, an important external validation of the truly exceptional and critical work being done by our scientists in advancing the scientific basis for new treatments for blinding diseases. To have our scientists recognized nationally and internationally for having made the most important contributions of the year to macular degeneration research, retinitis pigmentosa, and ocular surface disease is a great honor. I hope you will join me in supporting their achievement at the highest level.

Sincerely,

Michael S. Gilmore, PhD
President, CEO and
DeWalt and Marie Ankeny Director of Research
A t age 40, Henry, whose sister also has RP, was diagnosed with a late onset form of RP, a name given to a group of hereditary degenerative eye diseases that can often strike in childhood or early adulthood. Today, Henry walks with a long cane to detect obstacles, rarely goes out at night alone, and no longer drives, relying heavily on his wife and public transportation. He also works in Dr. Eli Peli’s Vision Rehabilitation Laboratory at Schepens Eye Research Institute, both as a researcher and helping to evaluate the latest visual aids, having retired from his high-tech career in the computer industry.

Like most people with retinitis pigmentosa, Henry experienced night blindness as one of the first symptoms, along with the deterioration of his peripheral (side) vision, which left him with a narrowing view of the world known as tunnel vision. People with tunnel vision find just walking around without bumping into people or tripping over objects challenging if not impossible.

“Night vision and peripheral vision go first because RP attacks the cells in the retina known as rods,” says Dr. Michael Young, associate scientist at Schepens.

Rods are one of the two types of photoreceptor cells that make up the retina—the tissue that captures light and transmits images from the outside to the brain. (The other photoreceptors are the cones.) Rods are the more abundant, numbering about 120 million in each retina, are more light sensitive than cones, and make low light and peripheral vision possible. By secreting a special molecule, they also seem to keep the cones—concentrated in the tiny center of the eye and responsible for color and fine detail vision—alive and well.

In the worst cases, RP can start to destroy the central vision, because as the rods die, they eventually take the cones with them. With the destruction of the center can come total blindness.

No cure exists for RP, but recently, scientists have had some success with gene therapy for one particular form of RP. Scientists are also tapping the potential of regenerative medicine to treat this inherited disease. Schepens researchers are at the forefront of this movement.
Dr. Young is currently exploring ways to transplant stem cells and coax them into becoming rods, which would, in turn, support the surviving cones.

Associate Scientist Dong Feng Chen is taking a slightly different approach. “We are trying to reawaken the retina’s ability to begin regenerating both rods and cones,” she says.

In the meantime, helping people with lives diminished by RP is of major concern for Drs. Alex Bowers, Gang Luo, and others based in Dr. Eli Peli’s Vision Rehabilitation Laboratory. They are focusing on creating and evaluating devices to improve night vision and peripheral vision for RP patients.

Here are some of the details of these scientists’ groundbreaking efforts:

**With RP, a person’s view of the world becomes narrower and narrower as the disease destroys peripheral or side vision first. This is known as tunnel vision.**

**Dr. Young is currently exploring ways to transplant stem cells and coax them into becoming rods, which would, in turn, support the surviving cones.**

**Replenishing the rods**

For the past decade, Young and his research team have been transplanting retinal and brain stem cells into the eyes of mice and pigs to regenerate retinas damaged by macular degeneration-like diseases and injuries. The target of that promising research has been the center of the retina, known as the macula.
Now he is taking the knowledge and expertise from those experiments and applying them to the regeneration of rods depleted by the relentless progression of RP.

“Retinitis Pigmentosa is actually an easier disease for us to target because we have many more models in nature to work with,” he says. “RP, unlike macular degeneration, occurs in many animals.”

Young and his team have already transplanted stem cells they developed into the eyes of RP mice and seen them transformed into rod-like cells. Now their goal is to watch rods regrow in a new model, a “mini” pig, bred to remain small and easily housed in laboratory settings.

“Pig eyes are very similar to human eyes, and these “mini” pigs will give us a good indication of how successful this can ultimately be in humans,” says Dr. Young.

He adds that he and his team are also considering combining gene and stem cell therapy to treat a particular type of RP. More information will be available about this study in future issues of Sightings.

They have already made significant headway. Dr. Chen and her team recently discovered that a chemical called glutamate, which exists naturally in the retina, can, when increased to a certain level, turn on stem-like cells known as Müller cells (also located in the retina) and transform them into new photoreceptor cells. They also found that an altered form of glutamate, called aminoadipate, did the same thing.

These initial experiments were done in healthy mice. Dr. Chen’s next step will be to test this “awakening” process in animal models that have RP or other retinal diseases such as macular degeneration.

Associate Scientist Dong Feng Chen is taking a slightly different approach. “We are trying to reawaken the retina’s ability to begin regenerating both rods and cones,” she says.

From the inside out
“A drug that awakens stem-like cells lying dormant in the retina, transforms them into retina cells, and encourages them to replace missing rods and cones—that’s our aim,” says Dr. Chen of her team’s RP research.
If the next step proves successful, Dr. Chen believes that her hoped-for drug could be manufactured from aminoadipate and made available for humans in the not too distant future.

**Improving night vision and day mobility**

Making it possible for RP patients to see better at night and maneuver better by day is the focus of the research being conducted by Drs. Bowers and Luo.

“Canes to detect unseen objects and reverse binoculars to bring missing areas of the field of vision into view have been the only aids available to this population,” according to Dr. Luo, who hopes the work he and Dr. Bowers are doing will offer other, better options for people with RP.

For instance, they have helped to design and continue to evaluate a small high-tech device shown to significantly increase effectiveness and speed with which people with tunnel vision can find and identify objects that are located outside of their restricted field of vision.

The device comprises a tiny camera, a pocket-sized computer, and a transparent computer display on a pair of glasses. Developed with the help of Micro Optical Corporation of Westwood, Massachusetts, these glasses allow patients with tunnel vision to see detailed visual information through the transparent display, while also viewing a superimposed minified outline version of a wider visual field.

The tiny computer-video system provides updated outline information 30 times per second. When a patient becomes aware of a possible obstacle or important object in the superimposed outline image of the wide field of view, he or she can move his / her head and eyes to look directly at the object through the display.

Drs. Bowers and Luo are also evaluating a similar device for night vision, which uses infrared light and cameras that are highly sensitive at low light levels. People with RP who evaluated a prototype of this device over several weeks found it useful for improving night vision and assisting with obstacle detection when walking.

“We are also investigating the use of prisms to grab the missing information from outside the field of vision,” says Dr. Luo. Prisms, by their nature, can bring images from outside the visual field into view. The team has already created and successfully tested prism glasses for an eye disorder known as hemianopia (see Ask the Expert on page 12).

**The future**

Apfelbaum has great hopes for the future. “Although I don’t expect to be a quick beneficiary of the advances being made to understand the causes and find the cures for RP, I know they will have a profound impact on the next generation. I also know that the visual aids we are creating will have a major life impact on me and others like me. Both kinds of research are important,” he says.
Question: I have read that many soldiers have LASIK surgery (laser-assisted in situ keratomileusis) on their eyes before going to combat zones in the middle east, and that some develop severe dry eye syndrome after they are deployed. Is there something that can prevent the complications for these servicemen and women?

Answer: Thousands of soldiers have LASIK surgery to correct far- and near-sightedness before they go overseas. While many civilians choose this surgery for cosmetic reasons, those in the armed forces opt for the surgery because it can help them see better and identify objects and people in the field more quickly, and because it eliminates the worry and hassle of glasses or contacts. These advantages can be lifesaving on the battlefield.

As you know, LASIK surgery uses small laser cuts to reshape the surface of the cornea (the clear tissue window on the surface of the eye). Usually, LASIK causes some dry eye syndrome directly after surgery, but the condition resolves within a few months. Dry eye syndrome occurs when the mechanism that produces tears, called the tear film, does not function well enough to lubricate the eye. In a small number of cases, the dry eye condition following LASIK can become chronic and impact functioning of both civilian and military individuals for as long as nine months after surgery.

While painful in civilian life, dry eye syndrome could become life threatening under combat conditions.

As part of our commitment to our military research program, we decided to investigate what makes a person more likely to develop this chronic eye syndrome.

We discovered that people who had less than normal tear production before LASIK surgery were more likely to develop the chronic dry eye condition after surgery. At the same time, we developed a reliable prescreening test and criteria for patients and ophthalmologists to consider before surgery.
To do this, we evaluated 24 patients who were about to undergo LASIK at the Massachusetts Eye and Ear Infirmary. The patients were given a series of evaluations, including the Schirmer test with and without anesthesia, before and after surgery. Using a piece of filter paper on the corneal surface, the Schirmer test measures the amount of tears an eye is producing. Study subjects also filled out a dry eye questionnaire, indicating their experience with dry eyes pre- and post-operatively.

The team discovered that if a patient had a presurgical tear production value greater than 20 mm of wetting of the Schirmer strip in 5 minutes, they were not likely to develop chronic dry eye syndrome. Patients who produced fewer tears were more likely to develop long-term dry eye syndrome.

We believe that these findings should help ophthalmologists determine if pretreatment, which can include a regimen of artificial tears over a given period of time, is necessary before surgery—or if surgery is appropriate at all for an individual.

Darlene Dartt is a senior scientist, the Director of Scientific Affairs, the Harold F. Johnson Research Scholar at Schepens Eye Research Institute, and an Associate Professor of Ophthalmology, Harvard Medical School. Dr. Dartt received her PhD in Physiology from the University of Pennsylvania in 1978 and completed a post-doctoral fellowship in Medical Physiology at the University of Copenhagen in Denmark and later in Physiology at Tufts University School of Medicine. Today, she heads the Institute’s congressional appropriation program. Her research focuses on tear production and the causes of dry eye syndrome.
Like many of his contemporaries, Tom Mahan endured the hardships of the Great Depression and proudly served his country as a Corporal in the Army. After completing his military service, he returned to his hometown of Framingham, Massachusetts, where he and his wife, Mary, made their home for the rest of their lives, and Tom’s honest, hard work and dexterity made him a highly sought-after carpenter.

Although Tom had a full and rewarding life, his later years were hampered by visual impairment. For a man who had always worked with his hands, the loss of sight was a cruel blow.

However, Tom never complained but carried this burden with a quiet dignity. Instead he displayed the selfless spirit of service to others that characterized his generation.

In his Last Will and Testament, Tom directed a significant portion of his estate to Schepens Eye Research Institute, so that future generations may be spared the devastation of blindness.

During Tom’s life, numerous medical advances brought substantial increases in both life expectancy and quality of life. In the field of ophthalmology, for example, surgical techniques developed at Schepens Eye Research Institute saved the sight of countless people who would have been rendered blind just a few years earlier.

Unfortunately, there remain a number of visual afflictions, such as macular degeneration and retinitis pigmentosa, for which there is no cure.

Fortunately, there are caring and altruistic individuals, like Tom, who make the ultimate gift, a bequest in their will, to support Schepens’ dynamic research efforts to combat blindness.

Over the years, members of the William Wolff Society, such as Tom Mahan, have provided the Institute with critical funding through their estates. This support has allowed us to zealously pursue the next generation of treatments for macular degeneration, diabetic retinopathy, and other blinding diseases. We are honored that Tom Mahan chose to support Schepens in this way, and are delighted to serve as stewards of his legacy—one that may offer the gift of sight to future generations.

To learn more about how you can provide for Schepens Eye Research Institute in your will or trust, please contact us at (877) 724-3736 or development@schepens.harvard.edu. The William Wolff Society recognizes and honors those who include the Institute in their estate plans.
Champions of Vision Research

Your life can change in an instant. What was urgent yesterday can suddenly become insignificant. What was once a passing thought could transform into your life’s passion. Such was the case for John Sutton, a prominent Miami attorney. The survivor of a gunshot to the head sustained in a traumatic home invasion in 2004, Sutton is now an active spokesperson for vision research.

Shortly after the incident, Sutton was diagnosed with optic nerve damage. His doctor told him that damage to this precious nerve, which transmits images from the eye to the brain, could have many causes, including diseases such as glaucoma, birth defects, or head or brain trauma. In all cases, his doctor said, the damage is considered irreversible.

Sutton’s injury left him legally blind, with only the ability to see light and limited shadows. Desperately searching for new hope, he turned to the internet. When he searched on the internet for optic nerve research, Schepens Eye Research Institute emerged at the forefront.

He was impressed and moved by the breadth of the research, particularly the groundbreaking work of Drs. Michael Young, Kameran Lashkari, and Dong Feng Chen in regenerative medicine. He was astounded to learn that the Schepens scientists were the first to regenerate nearly an entire optic nerve.

With renewed hope, Sutton decided to attend the Institute’s symposium in Naples, Florida last winter. After the presentation, Sutton spoke with Richard Godfrey—the Institute’s patient liaison—about his story and his desire to partner with Schepens to help accelerate the Institute’s critical research.

He informed Rich that Dateline NBC had approached him for the right to his story. However, in return for the right to be the first to tell his story, he asked NBC to use part of the piece to feature the strides being made in optic nerve regeneration. Sutton and Godfrey saw the enormous visibility potential of the piece, which would reach a vast audience of people who could benefit from the research. This past March, Schepens Eye Research Institute opened its doors to the film crew from continued on page 13
**Question:** I have heard that many returning veterans are suffering from traumatic brain injury, which can often affect their ability to see. Is Schepens doing anything to help these wounded service people?

**Answer:** My laboratory has been working for eight years on a rehabilitation device that can help people who suffer from hemianopia, one of the more severe visual consequences of traumatic brain injury (TBI).

TBI is brain damage caused by violent trauma to the head. Warfare in the 21st century is making TBI epidemic among our armed forces. IEDs (improved explosive devices), combined with improved armor that keeps the body safe and the soldiers alive but does not adequately protect the head, are increasing the number of soldiers who return home with TBI.

TBI, which can cause paralysis, vision loss, cognitive problems, and memory loss, can also cause perceptual problems that can leave a person able to see the letter chart but with functional problems in many visual tasks.

In my laboratory we are focusing on a common TBI-related visual problem in which patients experience blindness in one half of their visual field in both eyes, known as hemianopia. Common to stroke patients and TBI patients, this condition is often the result of damage to the back of the brain at or near the visual cortex.

People who have hemianopia may not know what they cannot see on one side, and frequently trip over or bump into things and people on that side. Some of these patients, who also suffer from spatial neglect, often eat food from only one half of their plate, unaware that the food on the other side exists.

Our goal is to show them what they are missing by artificially expanding their visual field. We do this by attaching small, specially designed prisms on the top and bottom of one lens of a pair of glasses, leaving the center of the lens untouched. The prisms pull in images missing from the visual field above and below the line of sight on the side of the vision loss, and alert the patient to the presence of a potential obstacle or hazard. The patient can then move his/her head and eyes to examine the prism-captured image directly.

Prisms by their nature can shift images from one side of the visual field to the other (e.g., from the right side of the field to the left side). Others have placed such prisms in the center of the glasses, which has resulted in annoying double vision. Our solution has been to keep the central part prism-free and place prisms above and below.

*Archives of Ophthalmology* recently published a report on our first multicenter study of the glasses’ success in improving a patient’s walking mobility, which
Dateline NBC. During their visit, they got a firsthand look at laboratories and spoke with Drs. Young, Lashkari, and Chen. The crew was also present for Sutton’s clinical visit with Schepens’ trustee Dr. Joseph Rizzo. The segment will air nationally early next year.

Sutton has been instrumental in exploring new partnerships, which we hope to turn into valued allies in the fight against vision loss.

Meanwhile, John Sutton has become a vocal supporter of Schepens Eye Research Institute. At every opportunity, he shares his passion for vision research, helping spread the excitement to an entirely new audience for the Institute. Sutton has been instrumental in exploring new partnerships, which we hope to turn into valued allies in the fight against vision loss.

The Institute will update you on the air date.

For more information on various research projects or to make a donation to Schepens Eye Research Institute, please contact Melanie Saunders at 617-912-2564 or visit http://www.schepens.harvard.edu.

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Dr. Eli Peli is a senior scientist and the Institute’s low vision expert. He is also the Moakley Scholar in Aging Eye Research and a professor of Ophthalmology at Harvard Medical School. He has devoted his life’s work to developing rehabilitative techniques and devices to help those afflicted by low vision.
Boston Macular Degeneration Symposium

On Wednesday, May 21st, Schepens Eye Research Institute hosted more than 150 people from as far away as North Carolina for the 1st Annual Eye and Vision Symposium in Boston. The event offered hope for individuals and their caregivers as the Institute’s faculty and clinical partners discussed the causes, current treatments, and latest discoveries for potential cures for macular degeneration.

Schepens Eye Research Institute President and CEO, Dr. Michael S. Gilmore, provided the audience with an overview of the current research on macular degeneration, which included regenerative medicine that, through stem cell transplantation and drug therapies, showed the potential to regrow damaged human retinas.

Dr. Gilmore introduced Dr. Patricia D’Amore, Associate Director of Research at Schepens, whose research on blood vessel growth (angiogenesis) helped provide the foundation for the first anti-angiogenic drugs (Lucentis and Macugen). She described her current research to refine these treatments, eliminate side effects, and explore the causes of dry macular degeneration. By doing so, it is Dr. D’Amore’s hope that therapies can go beyond nutritional supplements and antioxidant cocktails, which slow but ultimately fail to reverse damage.

The Institute’s scientists were joined by board members Dr. Mark S. Hughes of Ophthalmic Consultants of Boston and Dr. Joseph Rizzo, III of the Massachusetts Eye and Ear Infirmary. Dr. Hughes, a retina specialist, discussed his expe-
The Schepens Eye Research Institute Office of Corporate Alliances hosted the 2008 Scientific Update symposium for our sponsor companies on June 3. Scientists and senior management of numerous pharmaceutical companies attended, including Vistakon, Novartis, Bausch & Lomb, Alcon, Celgene, and others. Faculty members presented concise descriptions of their latest research interests and progress toward developing treatments for eye disease. Sessions highlighted research progress in the past year toward understanding and treating retinal diseases, glaucoma, inflammatory eye diseases, eye infections, and dry eye. The final session focused on the Institute’s development of stem cell therapies to reverse or even cure blinding diseases of the retina such as retinitis pigmentosa and AMD.

This meeting, held annually, provides an opportunity for our academic researchers to interact with their colleagues in industry and identify opportunities for translational research projects. Such collaborations allow unique technologies and models developed at Schepens to be applied by our sponsor companies toward development of new drugs or biologic treatments for vision patients. Informal conversations between scientists throughout the day resulted in several new ideas for collaborative projects, and the new projects supported by industry began this summer.

We were also pleased to welcome several Schepens trustees and corporators who attended the meeting, including Ken Burnes, Susan Hudson-Wilson, and David Coit. In addition to demonstrating their interest in our current research, they took advantage of the opportunity to visit with corporate guests and express their appreciation for the ongoing financial and scientific support provided by our industry partners.

Please let us know if you are interested in learning more about a specific area of interest, such as diabetic retinopathy, dry eye syndromes, or other topics about which you would like more information. Contact patient liaison, Rich Godfrey, at 617-912-2569 or richard.godfrey@schepens.harvard.edu.
Vision of Beauty Luncheon and Auction

December 3, 2008

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Season Kick-off Event for Schepens

Grand Honorary Chairman
Hermé deWyman Miro

Honorary Chairmen
Judith Murat Grubman
Kathryn Vecellio

Top: Marsha Snyder, Kay Lyons, Cathy Henry, Joanne Stringer, Marilyn Connor, Anne Moran, Angela Godfrey, Monika Preston, Bjaye Pilotte, Dusty Aronsohn, Susan Lovejoy, Pieter-en Knollenberg, Linda Saldandra Dweck, Colleen Bain

Bottom: Laurie Silvers, Cheryl Gowdy, Beth Pine, Kathryn Vecellio, Hermé deWyman Miro, Judith Murat Grubman, Roberta Drey

Chairmen: Colleen Bain, Linda Saldandra Dweck, Kay Lyons, Sandra Krakoff, Michele Millard, Anne Moran, Monika Preston, Nancy Raquet, Laurie Silvers and Andrea Stark

Missing from photo: Sandra Krakoff, Michele Millard, Nancy Raquet, and Andrea Stark