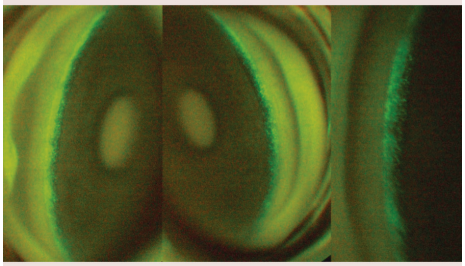
THE Eye & Ear Foundation OF PITTSBURGH

News for Supporters and Friends

2014 SIGHT+SOUND

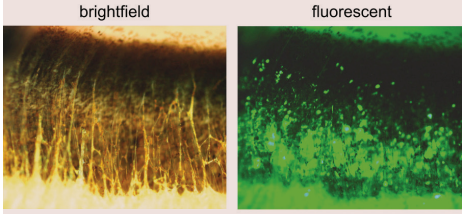
FALL EDITION

Macaque Model



Gonioscopy of a monkey eye with genetically altered trabecular meshwork, the tissue that is affected by glaucoma.

Ex Vivo View



High power view of genetically modified outflow tract that expresses a fluorescent marker gene.

In This Issue

Curing Glaucoma Within Our Sights

By Zack Butovich

In previous issues of *Sight + Sound*, we mentioned the enormous strides in utilizing stem cells from the trabecular meshwork (TM) of the eye to alleviate the effects of, and potentially cure, glaucoma. Initially supported through a large grant from an anonymous donor, most of this work was spearheaded by Dr. Yiqin Du, who soon became the first ever researcher to publish on techniques related to isolating and growing TM stem cells — an enormous accomplishment. Later, Dr. Du followed up on this success by creating an animal model where TM stem cells actually restored lost function of the TM — in other words, she cured glaucoma in mice.

Also previously mentioned was the arrival of Dr. Nils Loewen to our research and clinical faculty. Dr. Loewen is a highly trained glaucoma surgeon and Chief of the Department's Glaucoma and Cataract Service. He is one of only a small number of surgeons in the world who can perform a special kind of glaucoma procedure that removes part of the trabecular meshwork in order to relieve pressure. Dr. Loewen's research follows suit, by investigating novel ways to completely remove and then rebuild a healthy TM, using gene therapeutic vectors and techniques from bioengineering and tissue regeneration.

Together, these two world-class researchers, in conjunction with the Chairman of the Department of Ophthalmology, Dr. Joel S. Schuman, a leader in glaucoma research and treatment, will partner with the Eye & Ear Foundation as we begin a campaign to develop the Initiative to Cure Glaucoma.

The Initiative will be built around three bold strategies to address the problem of glaucoma:

- The first goal will involve Dr. Loewen teaming up with Dr. Joseph Glorioso, a professor of Microbiology and Molecular Genetics at the University of Pittsburgh, to develop a gene therapy vector that would specifically remove the diseased tissue from the TM that is responsible for increased eye pressure and can thus address the cause of glaucoma. Already, this team has produced unique models that have demonstrated success in small experiments that are now ready to be scaled up to larger, more complex scenarios.
- This will lead to the second strategy, using Dr. Du's TM stem cells to rebuild the damaged or removed TM tissue, by relying on the inherent self-regenerative ability of stem cell treatments and therapies. This effort would reduce the pressure caused by glaucoma and a malfunctioning outflow tract, thereby preventing damage to the optic nerve, or otherwise halting vision loss as a result of the disease.
- Finally, Dr. Loewen will then partner with Dr. Schuman, and Dr. Lawrence Kagemann, Assistant Professor of Ophthalmology and Bioengineering, to determine what is responsible for continued outflow resistance following surgical removal of TM segments. Determining the cause of this peculiar residual resistance, despite the absence of the TM that is responsible for outflow resistance, will allow to quickly develop entirely new drug categories and therapies.

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CREATing Technologies to Improve Surgeries

In early September of 2014, Dr. Umamaheswar Duvvuri traveled to Marburg, Germany, to perform a head and neck cancer operation in front of a live audience at the University Hospital. Joined by a team of highly trained surgeons from Germany and Belgium, Dr. Duvvuri led the group through a very complex technical procedure called TransOral Robotic Surgery (TORS). As the Director of the Center for Robotic Surgery at the University of Pittsburgh, Department of Otolaryngology, Dr. Duvvuri is one of the foremost experienced surgeons using robotic techniques in the country.

The TORS surgical team: Prof. Georges Lawson (Belgium), Dr. Umamaheswar Duvvuri (University of Pittsburgh), and Dr. Magis Mandapathi (Germany).

The TORS procedure is nothing new to Dr. Duvvuri. The robotic device used was the new Medrobotics system, which was in its first surgical procedure. This milestone event was due to the fact that, in the United States, only one machine has been approved by the FDA for use on humans.

The use of robotic surgical equipment in head and neck surgery is relatively novel. It was only a decade or so ago when the only access to some difficult to reach tumors in the throat or base of the skull was to break open the jaw and cut through significant amounts of tissue, thereby leaving the patient's body with lasting trauma. Yet, new approaches, such as the endoscopic endonasal approach (EEA), which uses the nasal cavity as a corridor to approach specific types of tumors, or with robotic approaches, which uses incredibly minute and sensitive instruments that enter the body with barely noticeable incisions in unobvious locations, have reduced patient trauma to minimal amounts, while maintaining the highest level of positive outcomes. Robotic instruments also take surgeons to the next level, by removing unavoidable hand tremor, increasing dexterity and maneuverability, and reaching locations that previously would have been extremely difficult or impossible to reach.

The TORS procedure Dr. Duvvuri performed is a relatively new approach, yet Dr. Duvvuri has become a leading expert, receiving well-deserved accolades. TORS utilizes robotic instruments that Dr. Duvvuri is familiar with, but the physical approach through the body is very different, highly technical, yet very effective, especially in reducing visible scars on the patient.

The timing of this highly regarded surgical procedure in Marburg could not be better. Currently, Dr. Duvvuri is working alongside his University of Pittsburgh colleagues, Drs. Carl Snyderman and Paul Gardner, as well as the Eye & Ear Foundation to begin a massive project integrating surgical robotics, innovative procedures (such as the endoscopic endonasal approach), surgeon education and training, and medical equipment innovation and development. This highly ambitious collaborative center will be the focal point of the efforts of engineers, scientists, surgeons, and clinicians from Carnegie Mellon University, the University of Pittsburgh, and the University of Pittsburgh Medical Center.

The goal of the proposed Center for Research, Education, and Technological Enhancement in Surgery (called Pittsburgh CREATES), is to bring surgeons, engineers, developers, and clinicians together, to design and innovate for the best technical solutions to surgical problems, as well as provide the highest quality education and teaching tools so that young surgeons, from all over the world, can have access and knowledge of best practices and procedures for their patients.

In time, the hope is that additional collaborators, perhaps IBM, GE, or Google, will become interested in the developed technologies, offering their own ideas and concepts, creating a multi-disciplinary approach to surgical innovation.

This concept is not unprecedented. Medrobotics, mentioned above as the developer of the new surgical robot Dr. Duvvuri used in Marburg, is a company spun out of a concept developed by a CMU engineer, in an innovation institute much like Pittsburgh CREATES.

By combining the brilliant minds of CMU, with the clinical expertise of the University of Pittsburgh, Pittsburgh CREATES is poised to become an incredible driver of innovation, business, and healthcare development in the city. The success of Marburg could be the success of nearly every patient in Pittsburgh, as time will surely show. S+S

Umamaheswar Duvvuri, MD, PhD is an Assistant Professor of Otolaryngology and the Director for the Center of Robotic Head and Neck Surgery at the University of Pittsburgh. Dr. Duvvuri specializes in head and neck oncology. To support Dr. Duvvuri and the Pittsburgh CREATES project, please contact the Eye & Ear Foundation of Pittsburgh, 412-864-1300, or complete the enclosed envelope.

Friendship and Fellowship – Very Important to Vision Research

by Zack Butovich

One of the interesting, and often unrecognized, aspects of scientific research is who actually does the work. Of course, the scientists do — Dr. Igor Nasonkin, or Dr. Nils Loewen, Dr. Steketee, or Dr. Yiqin Du, among so many others that we have mentioned in our *Sight + Sound* editions over the years. All spend countless hours in their labs, digging out the incredibly minute pieces of information that may hold the key to ophthalmic tissue regeneration or disease prevention. Be that as it may, they do not, and most of the time, cannot possibly do all the work alone. Principal Investigators, as the ones mentioned above, in addition to analyzing data, also need to write grants and research papers, manage budgets and personnel, in addition to spending time with their families. So, who fills in the gaps when time is of the essence?

The answer is a unique type of scientist called a postdoctoral researcher, who is sometimes categorized as a fellow, or in fellowship training.

Postdoctoral fellows (postdocs) are highly trained and skilled scientists, with PhD degrees and backgrounds in a variety of areas. For our purposes, fellows can have experience in engineering, molecular biology, genetics, stem cell biology, immunology, and et al. Often, the more diverse the training, the better. These young researchers provide a fresh prospective, and as such, can approach problems in inventive ways. Sometimes, postdocs can see truly unique and ingenious solutions that scientists involved in a field for thirty years may have overlooked.

When postdocs are brought into a lab, they begin highly specialized training in a very specific field, such as retinal regeneration or trabecular meshwork tissue engineering, and the hope is, that after a period of a few years, they will have the developed the skills to establish their own lab, beginning their own independent research. This process is how the brightest and most innovative minds establish themselves in any field, including ophthalmology.

Understanding the necessity of postdoctoral fellows to advance research, Dr. E. Ronald Salvitti, who funded the Dr. E. Ronald Salvitti Chair in Ophthalmology through the Eye & Ear Foundation, has now contributed funds for a two-year fellowship in his name, within the lab of Dr. Igor Nasonkin, at the Charles and Louella Snyder Lab for Retinal Regeneration. This fellowship position is a crucial component of success, and Dr. Nasonkin gratefully acknowledges that it could not come at a better time. "Dr. Salvitti's gift is very special and comes at the right time when my laboratory is developing new stem cell approaches to alleviate vision loss…the hands of an experienced and very dedicated person are very important, even crucial, to drive and implement these new ideas of repairing damaged retina," Dr. Nasonkin says. "Dr. Salvitti's crucial support of the lab's effort demonstrates the commitment of this renowned physician to helping people see better in multiple ways. His generosity and deep understanding of how translational science generates data allowed him to fund this first ever Dr. E. Ronald Salvitti Postdoctoral Fellowship in Retinal Repair and Regeneration."

Dr. Igor Nasonkin and Dr. E. Ronald Salvitti

In similar fashion, Ms. Bernita Buncher hosted an Eye & Ear Foundation fundraiser in her lovely Squirrel Hill home, to support a special type of postdoctoral fellowship position that exists only at the University of Pittsburgh — an OTERO Fellow. OTERO stands for Ocular Tissue Engineering and Regenerative Ophthalmology, and represents an effort to create a postdoc position that would operate within the Louis J. Fox Center for Vision Restoration, a collaborative program of the Department of Ophthalmology and the McGowan Institute for Regenerative Medicine at the University of Pittsburgh, combining the renowned expertise of all three world-class institutions into a highly innovative and cross-disciplinary research scientist. This "Art of Vision" event was designed to showcase ophthalmic images of our research scientists, inspiring supporters to recognize the aesthetic beauty of science behind the work.

Lawton Snyder, Dr. Joel S. Schuman, and Bernita Buncher.

Images from the "Art of Vision" event can be found on our website, www.eyeandear.org, and are available in print form for a donation of $1,000 or more towards our OTERO Fellowship program. By the end of the year, we aim to achieve full funding for an OTERO position for one year — we hope you can be a part of that campaign. S+S

Dr. Yigin Du detailing the art of her research to EEF Board Member Bruce Wiegand during the Art of Vision fundraiser.

Medical Mission to Nepal

by Jonas T. Johnson, MD, FACS

Nepal is a small country in central Asia which is landlocked between China (Tibet) to the north and India to the south. Much of Nepal is on the rugged slopes of the Himalayan Mountains, extending to over 29,000 feet in altitude at Mt. Everest.

I had an opportunity to participate in a medical mission to Nepal in April of this year. The expedition was led by professionals from Himalayan Health Care, a not-for-profit philanthropic organization that has served the people in rural Nepal for over 20 years. Our team included seven physicians, a support staff of about 20 people who participated in diagnosis and treatment, and over 70 individuals who served as porters to carry our equipment.

Rural Nepal is remarkably poor. There are no roads and no motorized vehicles. There is no public water supply and no public sewers. Our trek began in Katmandu when we boarded a group of Land Rovers, and drove up to an altitude of 9,000 feet, where we disembarked and began a two-day hike to the first village. We slept on the ground in tents. A small schoolhouse was converted to a medical clinic. We converted one room to a dispensing pharmacy and used another room for small surgical procedures. After spending two days in the first village, we packed up and proceeded on another two-day trek to a second village. Over the course of two weeks, we saw 940 patients. Those individuals who required more extensive diagnostic work or surgery were referred to the regional hospital, which was a two-day hike and a one-day car ride from the nearest village.

An experience like this certainly causes me to reflect on the remarkable healthcare we have available to all of us here in Western Pennsylvania. For those of you interested in knowing more about Himalayan healthcare, I refer you to their website, www.himalayanhealthcare.org. S+S

Dr. Jonas T. Johnson, a renowned head/neck cancer surgeon, is the Dr. Eugene N. Myers Professor and Chairman of the Department of Otolaryngology for UPMC and a faculty member at the University of Pittsburgh. Additionally, Dr. Johnson serves on the Eye & Ear Foundation's Board of Directors. The Eye & Ear Foundation of Pittsburgh supports the research being conducted in Dr. Johnson's Department of Otolaryngology. Should you wish to learn more about the research advances within the Department of Otolaryngology or lend your support, please complete the attached envelope or call the foundation office, 412-864-1300.

Dr. Jonas T. Johnson performing exams during his mission to Nepal.

A Lasting Legacy

by Zack Butovich

In mid-August of this year, the Eye & Ear Foundation hosted the Stout family at the Eye and Ear Institute, including former State Senator J. Barry Stout, and Diann Stout, widow of prominent businessman Thomas Philip Stout, who passed away in 2011. The Foundation was honoring several donations from Stout family and friends, which would combine to form the Philip Stout Fund, to support research in both swallowing disorders and head and neck cancer oncology in our Department of Otolaryngology.

Philip Stout was a successful businessman and entrepreneur, who found success in turning his small family construction business into a nationwide railroad contracting firm, real estate development group, and services corporation. Mr. Stout was a highly recognized and lauded figure in the Pittsburgh community, having received accolades from many organizations, including the University of Pittsburgh's Katz School of Business with a Family Business of the Year Award in 1998 and an honorary Doctorate of Humanities from Washington and Jefferson College in 2003.

Despite a diagnosis of cancer in the head and neck, and resulting dysphagia (a condition causing the inability to swallow food or liquid), Philip Stout remained a positive and strong willed individual. While seeking care with Dr. Jonas Johnson and Tamara Wasserman-Winko for both his cancer and swallowing difficulties, Philip formed a strong friendship with everyone at the Eye and Ear Institute, and sought to give back as a way of thanking them for their expert care. The Philip Stout fund is culmination of those efforts. The Eye & Ear Foundation is truly grateful for the kindness, generosity, and goodwill of the entire Stout family and recognizes the permanent link between the Stout Family and the Eye and Ear Foundation of Pittsburgh. S+S

Dr. Jonas T. Johnson, The Honorable J. Barry Stout, and Diann Stout attending the Swallowing Clinic's Thomas Philip Stout's plaque dedication.

Thomas Philip Stout

Regenerating Hope

by Carrie Fogel

For most people, losing one's vision would be devastating. The entire way that we perceive the world and live our lives would be forever altered. Blindness, be it attained though a degenerative disease, like glaucoma or diabetic retinopathy, or through injury or trauma to the eye, is likely permanent. Some might argue that the permanence or lack of a cure would be the most frustrating and demoralizing element of losing one's sight.

The Louis J. Fox Center for Vision Restoration looks to comprehensively combat this permanence by focusing on the restoration of sight through tissue regeneration, transplantation, and technology. The field of regenerative medicine might seem, to some, to be science fiction. Re-growing functional tissue, parts of one's body, is becoming more and more plausible as science advances. In partnering with the UPMC Eye Center and the McGowan Institute for Regenerative Medicine, the Fox Center is able to bring together the talents of clinicians, basic scientists, and engineers together to work toward novel solutions for preserving or even restoring lost vision.

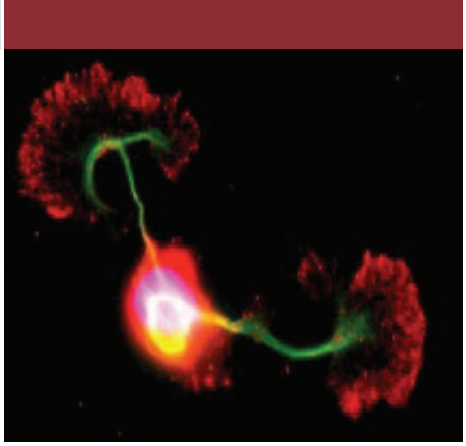
Important advances in regenerative medicine for many parts of the body have been made over the last several years, many of them right here in Pittsburgh. The eye, however, has remained an elusive subject, until now. Dr. Michael Steketee and his team, working at the Louis J. Fox Center for Vision Restoration with Drs. William Wagner and Stephen Badylak, are researching how the optic nerve responds to these regenerative treatments. The optic nerve is essential to one's sight. It transmits visual information from neurons located in the retina at the back of the eye, called retinal ganglion cells (RGCs), to the visual centers in the brain. RGCs transmit visual information through the optic nerve via long thin processes termed axons, analogous to wires in a cable. Once retinal ganglion cell axons are damaged, vision is permanently affected.

Regenerative medicine strategies target repair at the cellular level, tissue, and organ level. When retinal ganglion cell axons are injured within the optic nerve, the axons generally degenerate leading to RGC cell death and permanent vision loss. To combat failed regeneration, Dr. Steketee is developing Extracellular Matrix (ECM) technology to alter the default healing response in the optic nerve in a manner that promotes functional regeneration over scarring. ECM is derived by decellularizing healthy tissues and, when used correctly, can counteract the default healing response of scarring by promoting functional tissue remodeling.

ECM is not a new technology. ECM bioscaffolds are used clinically in over 60 FDA-approved products for various medical treatments. Part of Dr. Steketee's research has been determining what type of decellularized material provides the highest chance for cell survival and axonal regeneration in the central nervous system, which has received much less attention than other tissues and organs throughout the body. He has found that matching ECM for the same tissue from fetal pig ECM is far more effective at fostering a positive healing response than ECM derived from either dissimilar tissues or from similar adult tissues. Dr. Steketee is working on two forms of tissue-specific ECM bioscaffolds derived from fetal decellularized material, a sheet that can wrap around the optic nerve and a hydrogel that can be injected directly into either the retina or the optic nerve.

In the case of one's optic nerve being damaged progressively by a degenerative disease, ECM technology can be implemented in order to save one's vision. In the case of severing or damaging the optic nerve, the need for ECM treatment is much more urgent in order to prevent inflammation from worsening the injury. It is this potential treatment that caught the attention of the Department of Defense. Dr. Steketee explains, "we're developing technical devices that can be used right in the field, to treat soldiers rapidly. The goal is to minimize damage once a soldier sustains trauma and preserve as much visual function as we can." The $1 million award from the Department of Defense goes toward advancing the translational research of this technology so that soon, soldiers who sustain a visual injury may receive immediate care with the potential to preserve their vision instead of dealing with the reality of permanent blindness.

The hope that this work in optic nerve regeneration is providing to so many people suffering from blindness or potential vision loss is palpable. About a year ago, a participant in another vision restoration study, who suffered from a rare, adult-onset ocular disease, caught wind of the work being done in Dr. Steketee's lab. Melody Goodspeed, already involved in the work being done at the Fox Center, was organizing her second fundraising event for the Eye & Ear Foundation — a dance-a-thon called "Dance for Sight" in her hometown of Herndon, Virginia. She felt compelled to reach out to Dr. Steketee to learn more about his work and show her support. The call, as she describes it, "was more than a call to me, it was pure comfort. I said to my husband, "For the first time, I am so sure I will see our four year old son, Jonah." Dr. Steketee, moved not only by her story and her positive outlook on her own life, but her interest in the bright future of optic nerve regeneration made a promise, that he would travel to Virginia for the next "Dance for Sight" event.



Retinal ganglion cell image

Melody Goodspeed (center) receiving the Louis J. Fox Center for Vision Restoration's Ambassador award. Pictured with her are Dr. Michael Steketee (left) and Lawton Snyder.

The second "Dance for Sight" was held on September 13th of this year and gained four more dancers. Dr. Steketee, his wife and two children attended the event to, in turn, show their support for Melody and the message they will spread together; the message of hope. S+S

Michael Steketee, PhD is an Assistant Professor of Ophthalmology at the University of Pittsburgh. To learn more about our optic nerve regenerative research or to help advance Dr. Steketee's work through a donation, please use the enclosed envelope or contact the Eye & Ear Foundation of Pittsburgh at 412-864-1300 or info@eyeandear.

The Voice Center Takes Center Stage

By Carrie Fogel

A Celebration of VOICE

On Saturday, September 27th, the Eye & Ear Foundation, in partnership with Steinway Piano Gallery Pittsburgh, the Opera Theater of Pittsburgh, and the University of Pittsburgh Voice Center came together for the inaugural Celebration of Voice concert. Guests were treated to an evening of varied musical entertainment at the Twentieth Century Club, starring opera star Marianne Cornetti, R&B singer Billy Price and his band, and the famed dueling-piano duo Karl Bailey and Drew Tepe from Sing-Sing in Homestead. Located in the heart of Oakland, The Twentieth Century Club is one of the oldest women's-only clubs in Pittsburgh and has retained its beautiful art deco interior design since it opened in 1894. Guests mingled throughout the salons during the cocktail hour's pre-concert entertainment generously donated by the Opera Theater of Pittsburgh. The guests marveled at the historical art and architecture that the club offers.

Their admiration may have had something to do with the fifty Steinway pianos scattered throughout the building. The Celebration of Voice was the grand finale of a four-day Steinway piano sale that was widely publicized. Steinway's President and CEO, Dr. Gregory Roscoe, sponsors events such as this one, recognizing the opportunity to support organizations by holding a sale and donating a portion of the proceeds to their mission.

For Dr. Gregory Roscoe, an alumnus of the Department of Otolaryngology Residency program, a practicing physician, and Pittsburgh entrepreneur, it started with a piece of mail. A 1983 graduate, Roscoe went on to open Roscoe Hearing & Balance Center in DuBois, PA. He reconnected with his mentor, Dr. Eugene Myers, former Chair of the Department of Otolaryngology at the University of Pittsburgh, and began receiving mail from the Eye & Ear Foundation. Upon receiving the Annual Report, Dr. Roscoe scanned the listings of donations and was shocked. "I noticed how meager the contributions from physicians and alumni were", he said, "it seemed as though we didn't support the work that was being done at Pitt, and the need for support is so great."

Thus set into course a fortuitous series of discussions that would create the Celebration of Voice, which began with a call Dr. Roscoe made to Eye & Ear Foundation's Executive Director, Lawton Snyder. The prestigious reputation of Steinway Piano Gallery Pittsburgh demanded an event of similar caliber, which led Mr. Snyder to seek the assistance of Eye & Ear Foundation board member, Dr. Eugene Myers. Being involved in so many organizations throughout the years, Dr. Myers, connected the Opera Theater of Pittsburgh to the cause, and the Twentieth Century Club for the location. The Eye & Ear Foundation supports every research project within Chairman, Dr. Jonas Johnson's, Otolaryngology Department, but the natural fit for this event was clearly the work being done at the University of Pittsburgh Voice Center, under the direction of Dr. Clark Rosen.

"The Voice Center is so unique because of the collaborative and multi-disciplinary approach that we've created within our team. We have ENT clinicians working with speech pathologists who focus on the narrow field of using one's voice as the primary communicative tool and issues pertaining only to the voice, and that is what makes us so successful" explains Dr. Rosen. The Voice Center is a treatment clinic as well as a research center. Right now, scientists at the center are developing a new, never been used drug for those with paralyzed vocal cords, resulting in a recovery at almost triple the speed of current drugs. Dr. Rosen and his team are also developing a new, more effective cross-discipline system of voice therapy which is easier on patients and takes less time to show results.

Dr. Gregory Roscoe and Dr. Eugene N. Myers onstage at The Celebration of Voice Concert.

Their specialized work in voice therapy and training naturally implies their close working relationship with Pittsburgh vocal performers looking to strengthen, heal, and preserve their voices. "Our center is deeply rooted, and has been for over 20 years, in taking care of vocal performers so that they can retain their livelihood", he explains. Donating their time and talent that evening, Ms. Cornetti, Mr. Price, and Mr. Bailey expressed their sincere gratitude to the Voice Center staff for helping them continue to do what they love most; sing and perform. S+S

To learn more about the Voice Center's advances in paralyzed vocal cords or other voice disorders, please contact the Eye & Ear Foundation of Pittsburgh 412-864-1300. Donations to the Voice Center fund can be through our website, eyeandear.org, or by returning the attached envelope.

Dr. Clark A. Rosen, Director of the Voice Center, and Dr. Jackie Gartner-Schmidt, Associate Director, along with the Voice Center staff attending the Celebration of Voice fundraiser.

Understanding How the Cornea Stays Clear

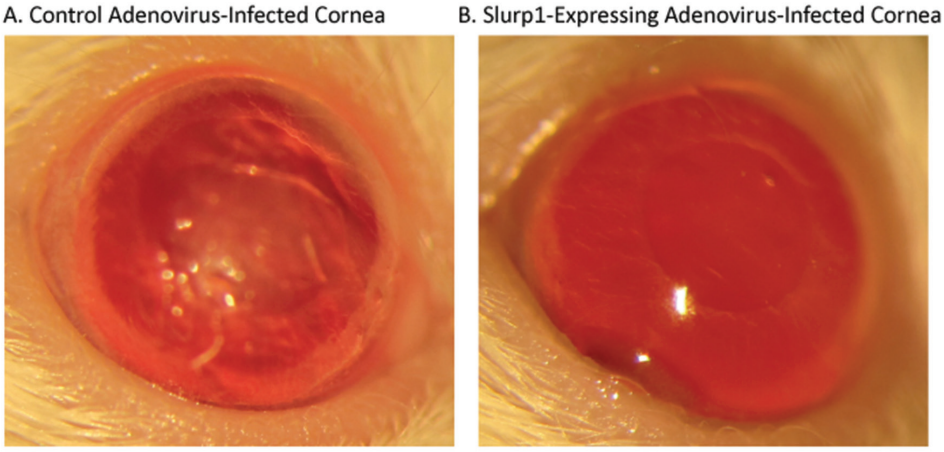
by Shiva Swamynathan, PhD

Dry eye, a complex disorder resulting from dysfunctional tear film, is responsible for severe discomfort in about 6 million women and 3 million men in the United States. Dry eye results in in a significantly decreased quality of life, as well as work place productivity. The ocular surface, which consists of the clear cornea, surrounding conjunctiva, and the inner eyelids, is essential for our vision. The tear film that covers the ocular surface serves an important role in maintaining a healthy ocular surface. Just as the windshield washer and the wipers keep our automobile windshield clean, the tear film and the eyelids help keep our cornea healthy and transparent. In spite of the importance of a healthy ocular surface for normal vision, our understanding of the development, maturation and maintenance of the ocular surface is incomplete. Efforts to bridge this gap are underway in the 'Laboratory of Ocular Surface Development and Gene Expression' led by Dr. Shiva Swamynathan. The primary goal of this laboratory is to determine how the timely production of different proteins that make up our ocular surface is regulated during development and what goes wrong in certain ocular surface disorders.

Each of our cells contains special proteins called 'transcription factors' that regulate the production of other proteins responsible for each cell's unique properties. Among the transcription factors that serve the ocular surface epithelial cells, Krüppel-Like Factors KLF4 and KLF5 stand out as two of the most influential. Research from the Swamynathan laboratory revealed the many critical contributions of KLF4 and KLF5 to maturation and maintenance of a healthy ocular surface. Using complicated state-of-the-art genetics, the Swamynathan lab discovered that the absence of KLF4 or KLF5 results in multiple defects in the ocular surface. The cumulative outcome of such defects is an edematous, opaque cornea, which obstructs vision. This work was supported by the prestigious National Eye Institute K22 Career Development Award.

Aside from Dry Eye, ocular surface inflammation is the single most common reason for outpatient visits to an ophthalmologist. It is still not clear as to how the cornea remains free of chronic inflammation in spite of mild, but frequent physical, chemical, and biological insults, and responds to acute infections and other severe insults with a full-blown inflammation. In a second line of research, the Swamynathan lab is investigating the functions of a protein called secreted Ly6/uPAR-related protein-1 (SLURP1), which is one of the most abundantly expressed proteins in the cornea that is secreted into the tear film. Ongoing studies in the Swamynathan laboratory are anticipated to reveal the value of SLURP1 as a diagnostic and/or therapeutic target for managing ocular surface inflammatory disorders, leading to development of novel therapies for managing ocular surface inflammation. Current research is supported by an RO1 grant from the National Eye Institute, Research to Prevent Blindness, Eye and Ear Foundation of Pittsburgh, and a grant from the PA Lions Sight Conservation and Eye Research Foundation. S+S

Dr. Shiva Swamynathan directs the 'Laboratory of Ocular Surface Development and Gene Expression' in the Department of Ophthalmology, University of Pittsburgh School of Medicine. To learn more about Dr. Swamynathan's research or to lend your support, please contact the Eye & Ear Foundation of Pittsburgh, (412-864-1300 or info@eyeandear.org).



SLURP1 Modulates Corneal Inflammation. Cornea infected with control adenovirus are inflamed, unlike those infected with Slurp1-expressing adenovirus

Curing Glaucoma Within Our Sights

continued from front page

"Our department and vision research community has an excellent track record of successfully implementing efforts like the Initiative to Cure Glaucoma, such as the Charles and Louella Snyder Laboratory for Retinal Regeneration," states Dr. Loewen, "we believe this strategic plan really brings us within striking distance of something no one has yet accomplished — a cure for the high pressure seen in most forms of glaucoma."

The Initiative to Cure Glaucoma is a very bold and dynamic effort in the fight against glaucoma and vision loss. We look forward with great anticipation to the benefit it can bring our patients. S+S

To receive updates on the research advances being made at the Initiative to Cure Glaucoma, please contact the Eye & Ear Foundation of Pittsburgh at 412-864-1300 or info@eyeandear.org. Donations to the Initiative to Cure Glaucoma can be through our website, eyeandear.org, or by returning the attached envelope.

THE Eye & Ear Foundation OF PITTSBURGH

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To contribute a story or obtain more information on the Eye & Ear Foundation and our research, please contact our S+S editor, Katherine Troy, at 412-864-1300 or katherine@eyeandear.org

Giving from the Heart Without Missing a Beat

By Lawton Snyder

For her entire career, Gayle Tissue has been invested both personally and professionally in philanthropy. She has experienced first-hand how a gift can be truly transformational and make a positive impact on the lives of current and future generations of people within this community and beyond. For instance, for many of the major gifts to the University of Pittsburgh Cancer Institute or Brain Institute, Children's Hospital of Pittsburgh, and the Louis J. Fox Center for Vision Restoration, Gayle had a front row seat, but always as the Chief Development Officer. Now, Gayle has turned the tables and is making an impact as a donor.

This year Gayle and her husband, Yiannis Kaloyeropoulos, made two gifts to the University of Pittsburgh School of Medicine at a major gift level. They made significant estate commitments to the University of Pittsburgh Cancer Institute and the Louis J. Fox Center for Vision Restoration, both designated for research. Gayle would be the first to tell you that she never dreamt she would be capable of making a donation at this level, but she found a way to make this happen and let her genuine passion do the rest. According to Gail, "Yiannis and I have been very fortunate in our lives — we have a lovely family, we have the best possible colleagues and friends, and we want to share this good fortune during a time when NIH funds are not as available as previously, yet when research momentum at the University and UPMC is full speed ahead." Gayle and Yiannis are making these gifts through a life insurance policy. Life insurance is an excellent tool for making a charitable gift because it can amplify the benefit of a gift and bring it to a level that is considerably more than the cost to the donor. "With these gifts we want to share the good fortune in our lives. By providing research funding, we want to bolster our community, create new jobs, and support the highest levels of health care that our community has come to expect, the kind of care that can only be achieved through strong philanthropic support", explains Gail. S+S

Gail Tissue and her husband, Yiannis Kaloyeropoulos

Planned Gifts to the Eye & Ear Foundation could include gifts of insurance, bequests through your will, an IRA rollover, or a charitable remainder trust. To discuss further, please call the Eye & Ear Foundation office at 412-864-1300. As always, consulting with your attorney or financial planner is recommended to ensure your individual plan makes the most sense for your situation.