

# Vision *for the* Future

UNIVERSITY OF ROCHESTER

FLAUM EYE INSTITUTE

AUTUMN 2011 NEWSLETTER

## GETTING BACK HIS GROOVE

"If I were to close my right eye while driving, I could see the road but not any details. I couldn't see the yellow lines, or make out oncoming cars, or even read the letters on a stop sign. But thanks to Dr. Aquavella, my right eye is 20/25 and life is great," said Karl Sterling. An avid runner, cyclist and accomplished jazz drummer, Sterling counts on his vision to lead an active and fulfilling life. But it wasn't always this way.

Sterling was diagnosed with a rare condition known as corneal lattice dystrophy when he was 8 years old. He is one of 12 in his family who has this disease which — like many corneal dystrophies — is usually inherited. "It didn't get bad until the mid-1990s," he said. "My corneas would literally split open and then close back up, leaving behind scar tissue that became increasingly difficult to see through. Sometimes the pain was unbearable."

For Sterling, this meant giving up some of his best paying gigs as his vision progressively worsened. "I couldn't take about a third of the jobs I was offered," he said. "I do a large number of gigs and recording sessions which require reading sheet music, which I could no longer see," he said.

It was during this time that he first began seeing **James Aquavella, M.D.**, an internationally respected cornea specialist and professor of Ophthalmology at Flaum Eye Institute (FEI.) "When Karl

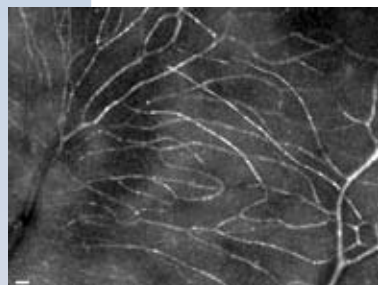
first came to me, he complained that his vision gave him difficulty driving," said Aquavella. "It was no wonder, he had some significant problems. Lattice dystrophy is characterized by the buildup of protein fibers in the thickest layer of the cornea, called the stroma. These fibers appear as lines in the cornea and disrupt vision. In the worst cases, such as Karl's, the cornea erodes causing a great deal of pain and light

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## Evolution of a Revolution

In its last issue, *Vision for the Future* visited the translational research laboratories of **Geunyoung Yoon, Ph.D.** He and his team have used adaptive optics (AO) technology (the process where arrays of tiny mirrors are used to correct optical flaws) to investigate and enhance vision. The unprecedented performance of custom LASIK is a prime example of how AO can improve the quality of how light enters the eye. Much of this work was directed by the University of Rochester Center for Visual Science's **David Williams, Ph.D.** Williams originally had other

intentions for AO. He and his team believed that this technology could be used to non-invasively image the retina. Their initial work, in 1977, led to individual photo-receptors (cones) being imaged in living humans with unprecedented detail. A flood of watershed publications followed.

Since the initial breakthrough, there has been a rapid evolution of the technology, and AO retinal imaging labs have mushroomed across the country. FEI still remains at the vanguard as scientists and clinicians work to improve the fidelity of AO and develop new modalities to

study the most vision threatening diseases. *Vision for the Future* recently got an update about what's going on in the AO labs from long-time research fellow and newly appointed FEI faculty member **Jennifer Hunter, Ph.D.**, clinician scientist **Mina Chung, M.D.**, and post-doctoral fellow **Ethan Rossi, Ph.D.**

(CONTINUED ON PAGE 8)



STEVEN E. FELDON,  
M.D., M.B.A.

## Reaching for the Top

I came to the University of Rochester nearly 10 years ago to take on the challenge of building a nationally acclaimed eye institute. Since that time, I have been privileged to work with dedicated faculty, staff, and community leaders. Their dedication and effort have led the Flaum Eye Institute along a steep growth trajectory addressing its missions of research, education, patient care, and technology transfer. Of course, the ultimate goal of preventing blindness and restoring and enhancing vision guides all of these missions. Our sustaining donors, **Bausch + Lomb, Glover-Crask Foundation, Research to Prevent Blindness Foundation, David and Ilene Flaum, and the estate of Lynn and Jack Lutz** have been pivotal by contributing more than \$20 million in support of our programmatic and infrastructure needs. Hundreds of additional major and annual gifts add to this outpouring of generosity. In addition to supporting our philanthropy, our Advisory Board continues to provide outstanding guidance in our strategic and operational planning, as exemplified by **Clayton Osborne**, who is profiled in this issue. Also recognized in this Vision for the Future is the important clinical and

scientific impact of the Flaum Eye Institute, built upon a decade of incredible individual and collective efforts.

In this issue you'll learn about the quest of **Richard Libby, Ph.D.**, assistant professor of Ophthalmology, Human Genetics, and Visual Science, to understand the molecular triggers of retinal neuron death in glaucoma (page 4). You'll also discover how our team of scientists and clinicians, including one of our newest faculty members, **Jennifer Hunter, Ph.D.**, is using adaptive optics imaging of the retina to find better ways to treat blinding diseases like macular degeneration. We also welcome **Ryan Vida, O.D.** who is working in conjunction with **Scott MacRae, M.D.** at the FEI Refractive Surgery Center.

We continue to reach out into the community with more screenings and patient support and education programs. We welcome your feedback on these efforts. If you can think of new ways we could provide additional outreach, please talk to us. The entire faculty and staff look forward to your thoughts on how we can serve outside the walls of FEI.

Aggressive pursuit of our academic missions requires that the organizational structure and culture evolve. In the last edition of this newsletter, I mentioned our interest in developing as a learning organization as envisioned by Peter Senge in his classic book *The Fifth Discipline*. One of our first steps involves a revision of our mission statement to include input from the board, faculty, and staff. I look forward to sharing our efforts in the near future. Another step has been an expansion of our quality improvement teams with increased participation from all levels of the organization. To improve internal communications, we have rolled

out a new on-line publication "Insight" to make sure everyone within our organization of almost 200 individuals is updated on what's happening at FEI. Another initiative involves providing more managerial and technical support for our faculty and staff within a refined organizational structure that has the capacity to be efficient, responsive, and supportive of even more rapid growth over the next five years.

As you can tell, my enthusiasm for the potential of the Flaum Eye Institute to have regional, national, and international impact on vision health is greater than ever. There are already plans to add more clinical and research faculty and to expand our space to meet the increased demand. Our readership encompasses professional and academic colleagues, staff, community leaders, donors, and patients. You are very much a part of what the Flaum Eye Institute is today and what it aspires to become. With your support, our goals as an eye institute can be met and surpassed. And I conclude with my thanks to all of you that are part of this journey.

Sincerely,

Steven E. Feldon, M.D., M.B.A.

Director, David and Ilene Flaum Eye Institute  
Chair, Department of Ophthalmology  
University of Rochester School of  
Medicine & Dentistry



# ADVISORY BOARD PROFILE

*The Flaum Eye Institute Advisory Board is integral to our mission to serve the community through patient care and education while advancing the treatment of eye disease through translational research. Consisting of prominent leaders and philanthropists, their wise counsel is helping to develop FEI as a national leader in ophthalmology and as a sustainable engine of economic growth at the University of Rochester and throughout the region. This is the second in a series of profiles to introduce you to these dedicated men and women who are helping FEI to chart its course.*



CLAYTON OSBORNE

## Staying on Board

**CLAYTON "CLAY" OSBORNE** has a passion for coaching leaders and building learning organizations. After 25 years in the corporate, education and government sectors, he is now president of True Insights Consulting. Osborne is recognized for his acumen in talent management, human resource development, organizational effectiveness and diversity, and is an adjunct professor at the St. John Fisher College Executive Leadership Program. He is also Minnett Professor Emeritus at Rochester Institute of Technology, where he consults for the RIT Leadership Institute, and has been invited to serve on several boards including ESL Federal Credit Union and Rochester's Center for Governmental Research. He holds a bachelor's degree and master's degrees in social work from SUNY Albany.

Osborne originally came to sit on the Flaum Eye Institute's Advisory Board as a liaison from Bausch + Lomb. The former Advisory Board liaison Barbara Kelley had just retired from the company. B+L continued to need someone to maintain its commitment to help the University of Rochester establish a world class center for vision research and patient care and Osborne was the perfect fit. As Vice President of Human Resources, Talent Management, Learning and Diversity at B+L, he was connected to virtually all of the company's far-flung enterprises.

Within a year and a half of joining the FEI Advisory Board, B+L was taken private and some of its operations moved out of Rochester. After an eighteen-year tenure, Osborne decided to retire from B+L and establish True Insights Consulting LLC. With his responsibilities to B+L fulfilled, he decided to remain a member of the FEI Advisory Board where he is still a key figure.

"When Steve Feldon asked me to stay on, it was a pretty easy decision," he said. "It didn't take long to become captivated by what

was going on at the Eye Institute. By then I had really developed a passion for the type of work that occurs here. The technology and the innovative models for treating and researching eye disease were compelling; I just had to stay."

As an active member of the Board, Osborne has served on several sub-committees including community awareness. Currently he is helping FEI to evolve as a learning organization. No one appreciates his expertise here more than Feldon.

"We are so fortunate to have Clay Osborne on our advisory board," said Feldon. "His vast experience in building relationships between the public and private sectors as well as his expertise in developing organizations has been of tremendous value to me in directing the Flaum Eye Institute through its rapid growth. As FEI strives to evolve as a learning organization, Clay's guidance has been inspirational."

As a strong advocate for improving health care strategies, Osborne sees the learning organization concept as one of the catalysts for future growth at FEI.

"FEI's strongest asset is the faculty, staff and leadership who Dr. Feldon has been able to attract and retain," he said. "I believe that with further cultivation of the talent and diversity that exists at FEI — as well access to private and public funding — the opportunity for more growth and innovation is incredible," he said. "If even a small percentage of what is planned comes to fruition, I see tremendous potential for FEI to provide eye care not only throughout the region, but beyond. Ten years from now, FEI could be the model for how to build an eye institute in the U.S. and perhaps internationally. Under Dr. Feldon's Leadership, FEI has captured my imagination. I am glad that I made the choice to stay on board."

## FEI in the Community

*The new academic year always brings a busy schedule of FEI extending its reach into the region to bring healthcare and education through community-based lectures and screenings. FEI extends its appreciation to all the staff students and volunteers who helped out at during the following events:*

**SEPTEMBER 10TH** : FEI residents and medical student volunteers provided free glaucoma screenings at the **Rochester Public Market** as part of the University of Rochester Medical Center's women's health screening. The screenings are made possible through a grant from the **Friends of the Congressional Glaucoma Caucus Foundation**.

**SEPTEMBER 22ND** : The **Foundation for Fighting Blindness (FFB)** invited **Mina Chung, M.D.**, to deliver a presentation to its local members titled "Adaptive Optics Imaging for Inherited Retinal Degenerations". FFB is dedicated to eradicating the entire spectrum of retinal degenerative diseases through the research it supports.

**SEPTEMBER 23RD** : **Scott MacRae, M.D.**, gave a lecture about options for people facing cataract surgery at Men's Health Day. The program sponsored by the URMC was held at the downtown Hyatt Regency Hotel.

**OCTOBER 6TH** : marked the second meeting of a patient run support group for Graves' disease. The meeting was chaired by patient **Patricia Marino, Ph.D.**, and **James Aquavella, M.D.**, discussed dry eye coping strategies for those suffering from thyroid eye disease.

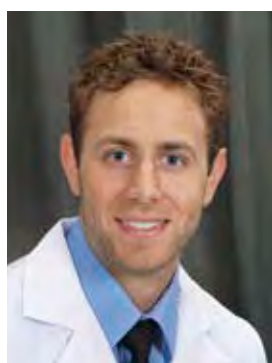
## New Faculty



JENNIFER HUNTER, Ph.D.

FEI has promoted **Jennifer Hunter, Ph.D.**, to assistant professor of Ophthalmology on the research faculty. Hunter oversees many of the operations of FEI's adaptive optics scanning laser ophthalmoscope laboratories in addition to pursuing her research into imaging the living retina. Hunter completed her Ph.D. in Physics and Vision Science at the University of Waterloo in Ontario, Canada. She first came to the University of Rochester as a postdoctoral research associate working in the laboratories of **David Williams, Ph.D.**, and became a

research assistant professor at FEI in 2010. She has an extensive record of publications and presentations and is the associate chair of the Vision and Color Division of the Optical Society of America.



RYAN VIDA, O.D.

**Ryan Vida, O.D.**, joins FEI as a senior instructor. Vida works with the FEI refractive surgery team at its Brighton, NY location. Originally from Pittsburgh, Penn., he graduated from the Indiana University School of Optometry where he completed his clinical training at the cornea/contact lens clinic in Bloomington, Ind. and at several Department of Veterans Affairs Medical Centers along the east coast. In July 2011, he completed an Indiana University

residency in refractive and ocular surgery at Wang Vision Institute in Nashville, Tenn. Vida recently authored chapters in two upcoming internationally released ophthalmology textbooks and is a member of a national corneal topography consult team. He is a member of the American Academy of Optometry and the Optometric Council on Refractive Technology.

## FEI Researchers Make Headway Understanding the Root Cause of Glaucoma

**Richard Libby, Ph.D.**, and **Jeffrey Harder** recently published in the journal *Molecular Neurodegeneration*, findings that may ultimately point toward better treatments for glaucoma. Retinal ganglion cells (RGCs) are the retinal neurons that connect the eye to the brain. RGCs are the neurons thought to die in glaucoma.

Retinal development is a complex process involving both the generation and circuit formation of many different types of RGCs. Before we are born about twice as many RGCs are made as are necessary. To get a normal functioning retina, the extra neurons must be pruned. The pruning process occurs by a mechanism called apoptosis — a molecular process of cell death that involves killing a cell in a controlled way. To date, numerous factors have been suggested to play a role in determining the ultimate number of neurons that we are born with, but at a molecular level it is unclear what triggers the 'extra' cells to die.

In glaucoma, a blinding disease that affects more than 4 million Americans, the ultimate cause of vision loss is the death of RGCs. Interestingly, RGC death in glaucoma and development are thought

to occur by a similar molecular pathway. As with development, the molecular process regulating RGC death in glaucoma is unknown. Understanding the molecular process of RGC death is an important step to developing a neuroprotective treatment for glaucoma and will provide fundamental insight into how the nervous system develops.

Several years ago, Libby and colleagues showed that the molecule BAX was required for RGC death both in development and glaucoma. BAX is a molecule that is known to be critical for neuronal apoptosis; in fact, BAX activation is the point of no return in this process. Unfortunately, inhibiting BAX activation is not a good therapeutic option. The reason for this is that BAX is too far down the degeneration pathway. Even after BAX is turned off, the damage has already been done and RGCs are still too sick to function properly. However, BAX activation provides us with a known entry point into the degeneration pathway of RGCs. Using this knowledge, the team has begun to unlock the cascade of upstream biochemical events step-by-step, hoping ultimately to understand the entire cell death signaling pathway in RGCs. There are only a small number of molecules that can activate BAX.

Through experimentation it was determined which of these molecules is required for BAX activation in developing RGCs and in RGCs after a glaucomatous-like injury. Surprisingly, it was found that a molecule BBC3 is required for BAX-dependent cell death in the developing retina, but not for BAX-dependent cell death in developed adults. This result is surprising because BBC3 had not been previously implicated in retinal development, and it clearly shows that RGC developmental cell death is molecularly different from glaucoma. Overall, the work illustrates the selectivity of physiological (normal) and pathological (disease) RGC death and defines a branching point in the cell death pathways. This work has also helped define the potential signaling pathways that could kill RGCs in glaucoma, putting us one step closer to developing a neuroprotective treatment for the disease.

## FEI Researcher Receives \$1.4 Million NEI Grant to Study Training-Induced Visual Recovery After Brain Damage



Brain damage, most commonly resulting from stroke, can have devastating effects on vision. Many times, these insults to neural tissue in the primary visual cortex (V1) result in what is referred to as "cortical blindness". In this condition, an individual's eyes may be perfectly healthy, but the brain can no longer process the visual signals it receives because of the damaged pathways. Recently, FEI researcher **Krystel Huxlin, Ph.D.**, has proven that vision can be partially restored in cortically blind regions of the visual field through a rigorous program that "retrains" the brain to see. She hypothesizes that training works by stimulating an alternative brain pathway through visual area MT which can process visual motion; this pathway is upstream of V1. Initial results from a series of experiments — where cortically blind test subjects were retrained and regained some of their lost sight — have been encouraging. This early success has resulted in a slew of journal articles and patentable technologies. The National Eye Institute wants to better understand how this process works and has awarded Huxlin and her team of experts, including the University of Rochester's **Duje Tadin, Ph.D.**, and New York University professors **David Heeger, Ph.D.**, and **Marisa Carrasco, Ph.D.**, a four-year R01 grant to character-



## ABOUT *Lattice Dystrophy*

ize what happens in the brain during visual retraining.

Experiments will determine why visual retraining, using moving stimuli, recovers not only motion vision but also static vision (useful in tasks such as reading and recognizing objects and faces). Several hypotheses will be tested to determine what changes may be occurring to the rest of the visual pathways during retraining. Results of this testing may provide critical information about brain pathways and signal processing mechanisms stimulated by training to evoke visual relearning in cortically blind fields. This knowledge is essential to better understand the type and degree of recovery possible in damaged visual systems and may improve treatment strategies for those suffering from cortical blindness.

*Lattice dystrophy gets its name from an accumulation of amyloid deposits, or abnormal protein fibers, throughout the middle and back of the thickest of the cornea's five layers, called the stroma. During an eye examination, doctors see these deposits in the stroma as clear, comma-shaped overlapping dots and branching filaments, creating a lattice effect. Over time, the lattice lines will grow opaque and involve more of the stroma. They also gradually become confluent, giving the cornea a cloudiness that may also reduce vision.*

*In some people, these abnormal protein fibers can accumulate under the cornea's outer layer — the epithelium. This can cause erosion of the epithelium resulting in temporary vision problems and severe pain. Even the involuntary act of blinking can be painful. To ease this pain, a doctor may prescribe eye drops and ointments to reduce the friction on the eroded cornea. In some cases, an eye patch may be used to immobilize the eyelids. With effective care, these erosions usually heal within three days, although occasional sensations of pain may occur for the next six to eight weeks.*

*By about age 40, some people with lattice dystrophy will have scarring under the epithelium, resulting in a haze on the cornea that can greatly obscure vision. In this case, a corneal transplant may be needed. Although people with lattice dystrophy have an excellent chance for a successful transplant, the disease may also arise in the donor cornea in as little as three years. Although lattice dystrophy can occur at any time in life, the condition usually arises in children between the ages of two and seven years old.*

## GETTING BACK HIS GROOVE

sensitivity while leaving scars on the surface of the eye making it more difficult to see. Lattice dystrophy almost always affects both eyes and results in surgical intervention 80 to 90 percent of the time.”

It wasn't long until Sterling received his first Phototherapeutic Keratectomy (PTK). In this procedure, an excimer laser is used to remove the scar tissue and smooth the cornea to provide better optics. “Between both eyes, I had three PTKs,” said Sterling. “For awhile it worked pretty well, but by 2003 the problems returned and my vision eventually got worse than before. That's when Dr. Aquavella and I agreed that I needed a cornea transplant.”

Unfortunately for Sterling, nearly three years after a successful surgery, the natural-tissue transplant failed. This is not uncommon. Sterling's father had 12 natural-tissue transplants since 1970. The good news was that during this time, Aquavella had been working with his Harvard University colleague Klaus Dohlman, M.D., perfecting the latest version of an artificial cornea (Keratoprosthesis) for transplantation.

“Natural-tissue cornea transplantation enjoys a high success rate,” said Aquavella. “I've performed thousands of them. Given Karl's family history, however, we thought this would be the ideal situation to use an artificial cornea.” Aquavella explained that even when a natural-tissue graft is successful, lattice dystrophy can return. “With Keratoprosthesis (K-pro) there is no chance of this happening.”

During the first two months after surgery, there were a few touch and go moments that had to be managed. But all the while, the K-pro provided a clear path for light to enter Sterling's eye; something he hadn't experienced for years. “There was some turmoil with my eye, but I knew that I was in good hands,” said Sterling. “Within six months I was seeing great. With glasses I could get down to 20/25. Before the K-pro, 20/40 (legal driving vision) with correction was the best I could get.”

Now Sterling is seeing better than ever through his K-pro. On any

(CONTINUED FROM COVER)

given day, vision in his right eye ranges between 20/20 and 20/30. “It can vary a bit,” laughed Sterling. “Since it's plastic, I have to keep it clean. When it gets a little dirty, it's like looking through an unwashed windshield.” Sterling maintains a regimented routine to keep his K-Pro clean and also uses an antibiotic eye drop daily.

“It's just like an artificial knee joint or heart valve,” said Aquavella. “He'll continue to use the antibiotic throughout his life to reduce the risk of an infection developing.”

Although Sterling notices that his K-pro is there, cosmetically, and it infrequently causes him some mild discomfort (especially when he is in bright sunlight and not wearing sunglasses) he says the benefits far outweigh any minor inconveniences. “During the last four years I have almost no complaints,” he said. “With the bands (he plays in two regularly) and as a certified personal fitness trainer, I travel a lot and I need good vision to drive. The K-pro gives me this. Even better, I can take any gig because I can see the sheet music again.”

“I'm so pleased with how the K-pro worked out for me,” he continued. “I wouldn't go anywhere else for my eye care. The doctors really know their business and the staff has become like family to me. Since lattice dystrophy runs in my family, I've referred many of my relatives to Dr. Aquavella. My cousin has two K-pros and is doing

really well. I get along fine with the one, but if ever I wanted to do the second, I know where to come. I couldn't live the life I choose to if it weren't for Dr. Aquavella and the Eye Institute. It's great.”

. . . and the beat goes on . . .



# ADVANCING THE VISION

## A MOST GRATEFUL THANK YOU TO OUR DONORS FOR THEIR GENEROUS GIFTS AND ONGOING SUPPORT.

The David and Ilene Flaum Eye Institute is most grateful to its donors for their generous gifts and ongoing support. We are especially appreciative to the friends, patients, alumni and faculty who contributed to our Eye Institute Annual Fund. The Annual Fund is an essential source of funding that will help continue our groundbreaking work in vision care and research.

The following donors have contributed in various ways to FEI between April 1, 2011, and September 1, 2011. Gifts can be designated to the Annual Fund and mailed to: **Rachel Wicks**, Director of Advancement, FEI, 210 Crittenden Blvd., Box 659, Rochester, NY 14642.

Or make a gift online by going to [eyeinstitute.urmc.edu](http://eyeinstitute.urmc.edu) and clicking on **"Support the Eye Institute."**

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Dr. Karl J. Marchenese '74 (MD), '79 (Res)



**Nationally renowned artist Treacy Ziegler presented an original work of art to FEI. Entitled, "Anatomy of the Inside". The oil on panel painting hangs in the check out area. Ziegler is a patient and supporter of the Eye Institute. Her studio is near Ithaca, NY.**

Ellen Marple and Homer L. Marple  
Dr. Stephen Sidney Martin '79 (MS),  
'81 (PhD), '81M (MD), '85 (Res)  
Elizabeth Marvel and Clyde Marvel  
Nona M. Maurer '74 (BS) and  
James William Maurer '68 (BS)  
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### NOT-FOR-PROFITS

Burroughs Wellcome Fund  
Research To Prevent Blindness Inc.

*We offer special thanks to Bausch + Lomb, Research to Prevent Blindness, Glover-Crask Charitable Trust, David & Ilene Flaum, and the late Lynn & Walter Lutz for their sustaining support.*



# Long-Time Supporter Sees Great Return on Her Gift to the Eye Institute

**Ann Mowris Mulligan** is one of the Flaum Eye Institute's most enthusiastic cheerleaders. As a patient under the care of **David DiLoreto, M.D.**, she has come to know many of the doctors and staff here on a personal level and recommends FEI to anyone in her circle of family and friends who need eye care. And that's a large circle, as an active community volunteer and philanthropist, she is known throughout Rochester for her kindness and dedication to a variety of causes. Recently, Ann made a generous gift to FEI that actually provides income to her. It came in the form of a University of Rochester charitable gift annuity. Although it's not a new concept in philanthropy, it is particularly compelling given the volatility in the investment markets and low interest rates offered by many savings plans. The University of Rochester's Office of Trusts and Estates **Christopher Raimy** explained.

*"With the gift, Ann enjoyed an immediate charitable tax deduction.*

*She receives a generous payout rate of 7.5 percent which results in a fixed income for life. Moreover, a portion of this income is tax-free for a period of years,"* he said. *"The gift annuity provides Ann with quarterly payments which actually increased her income because appropriately conservative assets like CDs and other accounts were not returning the payout rate that the UR gift annuity offered. It also fit into her charitable goals and she was able to designate that in the future the annuity funds that are working for her now will eventually go to support retina research."*

*Mrs. Mulligan couldn't be more pleased and is a great advocate for this type of gift. "If more charitably-minded people looked into structuring their gifts using charitable gift annuities, I think they would be very happy indeed,"* she said. *"Unlike a commercial annuity that benefits the life insurance or*

*investment company in the end, my UR charitable gift annuity will eventually be put to work to benefit something that I care passionately about, medical research, particularly eye research."*

*"We are so grateful to Ann and pleased that structuring her gift in this way meets her goals,"* said FEI Director **Steven Feldon, M.D.** *"Ann is an important member of the FEI family and this gift helps to cement her legacy to eradicate blindness through retinal research. This is a wonderful way to kick off the tenth year celebrating our founding as an eye institute."*

*If you are interested in finding out how a charitable gift annuity can meet your immediate financial goals while supporting the goals of the Flaum Eye Institute, please contact Christopher Raimy, or members of the University of Rochester – Office of Trusts and Estates at **585-275-7547** or visit the website [www.giftplans.rochester.edu](http://www.giftplans.rochester.edu)*

## In Memoriam: Adeline P. Lutz

**Adeline P. Lutz**, a Greece piano teacher who donated her life's savings to the Flaum Eye Institute, died Tuesday, Aug. 2, 2011, at the age of 83.

Lutz's donation of \$6 million followed more than 20 years of treatments by ophthalmologist and corneal surgeon **Steven Ching, M.D.**, to correct extensive corneal and retinal problems.

She was moved to support the Flaum Eye Institute (FEI) in advancing its mission of providing cutting-edge care and research for cures for tomorrow. The University recognized her generosity by naming the entrance to the FEI building the **Adeline P. Lutz Pavilion** in 2009.

"Adeline gave all of her fortune, which was accumulated at a sacrifice to her and her husband, because she lived for a larger purpose – to cure eye disease. She's an inspiration for all grateful patients that they can not only receive the benefit of access to advanced eye care but that they can also contribute to benefit those to come," said **Steven E. Feldon, M.D.** "We are saddened by Mrs. Lutz' death and continue to be grateful for her impact on our programs and future of eye care and research," said University of Rochester President **Joel Seligman**.

"When selfless individuals like Adeline Lutz step up to make a difference in the world, we are reminded of the generosity that exists in our community."

Lutz grew up in the Midwest and attended St. Mary's College in Indiana, where she studied music and received a bachelor's degree. She earned a master's degree at the American Conservatory of Music in Chicago.

Lutz and her late husband, Walter "Jack" Lutz, led a quiet life together for more than 50 years. She worked out of their home teaching piano and he was an engineer for Eastman Kodak Co.

"Adeline was determined, independent and frugal. She was willing to donate her funds to help others and she was happy to play a role in our growth and expansion of clinical and research programs," said Ching, who shared her love of tennis, teaching and piano. They had a wonderful, 25-year friendship and he enjoyed her genuine curiosity and her altruistic perspective on life.

"She was very unassuming and never put on airs. She drove the same 1982 Toyota Celica for as long as I knew her. She said it worked perfectly so there was no need to get a new one. That's how she was," Ching said.

Because of her relationship with Ching and the entire FEI staff, the couple decided to assist the FEI become a major national center for eye care, ophthalmic research, education, and technology transfer.

"They are all like family to me and I credit Dr. Ching with saving my sight," Lutz said at the time of her donation. "Jack and I wanted to repay him and everyone at the Eye Institute for their dedication and kindness and ensure that future patients continue to get the very best, the very newest, treatments."



## What is the State of Adaptive Optics Imaging at Flaum Eye Institute?

“We’re able to study so much more these days,” Hunter said. “We have branched out from imaging photoreceptors to many kinds of retinal cell types and structures. The fidelity of the systems we have here at FEI is amazing. Currently our adaptive optics scanning laser ophthalmoscopes (AOSLO) are able to clearly image down to a scale between one and two microns.” A micron is 1/1000th of a millimeter — the average thickness of a red blood cell is 2.4 microns. “At these resolutions we’re seeing living cells. This means that we can see changes to the living cells that make up the structure of healthy retinas and diseased ones,” Hunter continued.

The advances have allowed the team to image numerous retinal structures. For instance, using the FEI AOSLO, one can actually see the blood cells flowing through the tiniest capillaries. These are the same capillaries that become compromised and leak in diseases like diabetic retinopathy or macular telangiectasia (MacTel). Not only may AOSLO ultimately lead to quicker and better diagnoses of diseases like these, it is paying immediate dividends as Flaum Eye Institute uses the technology in clinical research.

## How is AOSLO Being Used in Current Human-based Research?

“We’re imaging many patients’ retinas as part of several ongoing research projects,” said Rossi. “In one investigation, we’ve been looking at geographic atrophy in dry AMD. In the retina, there is a structure called the retinal pigment epithelium (RPE). It is a single layer of cells that supports the retina, including maintaining visual function of the photoreceptors. Many blinding diseases, like dry AMD, involve damage to the RPE. With AOSLO, we are working to detect small changes that happen to the RPE during progression of disease that has already been diagnosed by an ophthalmologist. The changes that we’re looking for can’t be detected by equipment currently used in a doctor’s office. Eventually we might be able to work backwards to distinguish anomalies in the RPE before a doctor can clinically observe symptoms of the disease. This might someday allow us to identify people at risk for retinal disease and begin treatments sooner.”

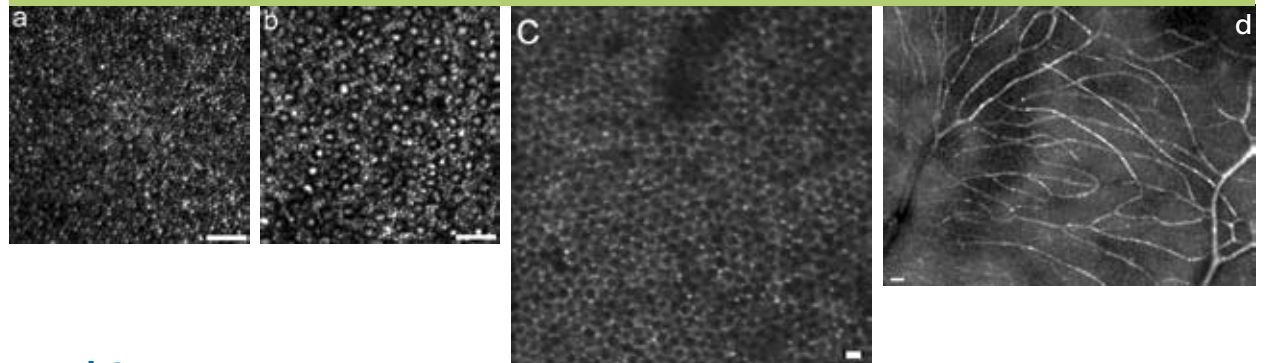
In addition to being an avenue for detecting and better understanding the progression of retinal disease, AOSLO may be useful in testing potential new therapies. If living individual cells, or structures made up of cells, can be imaged at high resolution, the effect of new medicines can be determined very quickly and efficiently.

“We are participating in a phase I clinical trial to determine the effectiveness of an intra-ocular implant that delivers medicine to people

suffering from MacTel,” said Chung. “Because we can see in such great detail, we hope that we will be able to study the effect of this medicine on the cellular level. MacTel, like wet AMD is characterized by leaky blood vessels that ultimately interfere with vision. If we can see the proliferation of these vessels stopping, slowing or reversing, then we know that we may be on the right track to an effective treatment,” she said.

“The advantage of AO imaging in studies like this could be earlier clinical trial endpoints,” continued Chung. “We think that our high-resolution instruments may be able to detect the effects of treatment much earlier than more traditional forms of observation. This may allow companies conducting clinical trials to present their data to governing authorities sooner. If AO can help compress the timeline, especially in the earliest stages of clinical research, we can get useful new treatments to patients more quickly.”

**AOSLO images of (a) foveal cones and (b) rods in a living human eye. In vivo images of (c) RPE cells and (d) retinal vasculature. Scale bars are 20  $\mu$ m.**

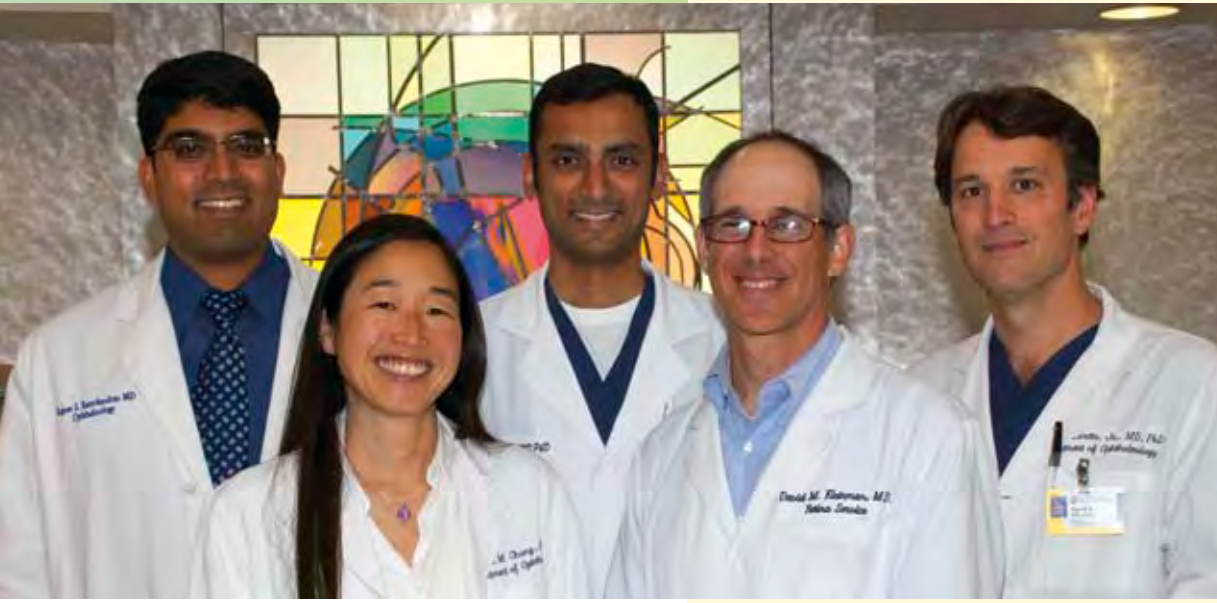


## What is the Potential of AOSLO for Better Detection of Retinal Disease in a Clinical Setting?

The instrumentation we’ve developed at FEI is very sophisticated and sensitive,” said Hunter. “To work well for imaging individual cells, the devices must be constantly calibrated. To do this you need the help of engineers and physicists with years of experience in optics. Fortunately, we have this at the University of Rochester. To harness this imaging power and put into a table-top instrument that could be used in a doctor’s office would be very challenging. This is why we’re currently focused on clinical and pre-clinical research,” she continued. “That’s not to say that someday we might have widely available technology to better diagnose and track retinal disease. Considering where we were as little as ten years ago, we believe that barriers that now seem insurmountable are within reach.”

*The adaptive optics retinal imaging laboratories at the Flaum Eye Institute now encompass five AOSLO stations capable of imaging numerous disease models. If you have retinal disease and are interested in participating in any upcoming studies, please call us at 585-276-8734. We will add you to our confidential database and contact you should an appropriate study open.*





**TEAM RETINA L to R:** Rajeev Ramchandran, M.D., Mina Chung, M.D., recently graduated fellow Vamsi Gullapalli, M.D., Ph.D., David Kleinman, M.D., M.B.A., and David DiLoreto, M.D., Ph.D.

Many of you may recognize FEI's retina doctors. Besides very busy clinical, surgical and teaching schedules, the team is actively engaged in clinical research and they collaborate frequently with our basic scientists through our translational research laboratories. During your next appointment, don't be surprised if you are asked to join a study. Participation in clinical research is a great way to support FEI and the advancement of medicine in general.

## Group Uses Adaptive Optics to Shed New Light on Retinal Disease

Macular Telangiectasia (MacTel) is a blinding disease about which little is known, and there are no effective treatments for it. MacTel gradually destroys a person's fine central vision used for reading or driving and is characterized by tiny blood vessels in the retina becoming dilated and leaky, looking much like varicose veins. As the disease progresses these vessels continue to leak and the retinal photoreceptors are damaged causing vision loss. Flaum Eye Institute's Mina Chung, M.D., and David Williams, Ph.D., joined with collaborators recently to report findings in the

journal *Ophthalmology*. They are part of a group of international researchers trying to better understand how the disease occurs by using FEI's Adaptive Optics Scanning Laser Ophthalmoscope (AOSLO).

Type 2 MacTel is characterized by crystals in the retina that can be viewed with an ophthalmoscope or imaged by standard clinical retina cameras. In their study, Chung, Williams and co-workers used the AOSLO on a group of patients diagnosed with Type 2 MacTel. Observations of the alignment of the crystals present suggest that Müller cells may play a role in the pathogenesis of the disease. Müller cells are thought to be responsible for maintaining the health of the retinal layers. Further understanding of the structure of these crystals and their chemical properties, as well as their relationship to Müller cells, could provide a better understanding the progression of Type 2 MacTel. Knowing the mechanism of the disease is the first step in finding possible treatments to slow, stop or reverse its effects.

The MacTel group, and use of the FEI AOSLO, are supported in part by a grant from the Lowy Medical Research Foundation.

## CLINICAL TRIALS

For more information please contact us at: **585-276-8734**

### CURRENTLY OPEN:

- ⊙ A Phase I Open-Label, Dose Escalation Trial of QPI-1007 Delivered by a Single Intravitreal Injection to Patients with Optic Nerve Atrophy (Stratum 1) and Acute Non-Arteritic Anterior Ischemic Optic Neuropathy (NAION) (Stratum 2) \*stratum 1 enrollment complete\* (Z. Williams, M.D.)
- ⊙ Placebo-Controlled Study Evaluating the Safety, Tolerability, Immunogenicity, Pharmacokinetics and Pharmacodynamics of Multiple Escalating Dosages of RN6G in Subjects with Advanced Dry, Age-Related Macular Degeneration (AMD) Including Geographic Atrophy (M. Chung, M.D.)
- ⊙ Multicenter, double-blind, randomized, Placebo-controlled Study of Weight-Reduction and/or Low Sodium Diet plus Acetazolamide vs. Diet plus Placebo in Subjects with Idiopathic Intracranial Hypertension with mild visual loss comparison of Glatiramer Acetate (Copaxone®) with Placebo in Patients with a First Episode of Optic Neuritis (Z. Williams, M.D.)
- ⊙ Prospective randomized investigation to evaluate incidence of headache reduction in subjects with migraine and PFO Using the AMPLATZER PFO Occluder compared to Medical Management
- ⊙ A Non-Treatment Study of Risk Factors for Nonarteritic Anterior Ischemic Optic Neuropathy (NAION) (S. Feldon, M.D., M.B.A.)
- ⊙ Effect of Diabetes Education During Retinal Ophthalmology Visits on Diabetes (D. DiLoreto, M.D., Ph.D.)
- ⊙ A Randomized Trial of Bilateral Lateral Rectus Recession versus Unilateral Lateral Rectus Recession with Medial Rectus Resection for Intermittent Exotropia (M. Gearinger, M.D.)
- ⊙ A Randomized Clinical Trial of Observation versus Occlusion Therapy for Intermittent Exotropia (M. Gearinger, M.D.)
- ⊙ A Randomized Trial of Levodopa as Treatment for Residual Amblyopia (M. Gearinger, M.D.)





## Eye on the World

Rajeev Ramchandran, M.D., traveled to Mexico where he examined and treated patients suffering from diabetic retinopathy. The patients who came to see Ramchandran were first screened using a tele-ophthalmology program called EyePACS. The EyePACS system consists of a specialized camera that images the retina and can be successfully operated by lay people working in remote areas. A qualified clinician need only an internet connection to view a patient's retina and recommend follow-up care. Ramchandran participated in the screening with Jorge Caudros, O.D., Ph.D., and George Bresnick, M.D., M.P.H., who is a former chair of the University of Rochester Department of Ophthalmology.

## CME CALENDAR

*This academic year will provide excellent learning opportunities for ophthalmologists and allied healthcare professionals to sharpen their skills. The annual visiting professor series has lined up an outstanding list of guest lecturers. In celebration of the 10th anniversary of the founding of the Eye Institute, the 57th Rochester Ophthalmology Conference has an exciting theme. Many of the guest lecturers will be prominent graduates of our residency program, the School of Medicine and Dentistry or the College. Already slated to attend are LV Prasad Eye Institute Director Gullapalli Rao, M.D., University of Cincinnati's Robert Osher, M.D., University of Kentucky's Jayakrishna Ambati, M.D. and Mayo Clinic's Jacqueline Leavitt, M.D.*

## 2011 – 2012 Flaum Eye Institute Visiting Professor Series

### OCTOBER 15

#### OCULOPLASTICS

**Raymond Douglas, M.D., Ph.D.**

Associate Professor of Ophthalmology and Visual Sciences, University of Michigan, Kellogg Eye Center

### NOVEMBER 19

#### CORNEA

**Elmer Tu, M.D.**

Associate Professor of Clinical Ophthalmology; Cornea Service, University of Illinois at Chicago

### DECEMBER 17

#### NEURO-OPHTHALMOLOGY

**Anthony C. Arnold, M.D.**

Professor of Ophthalmology; Chief, Neuro-Ophthalmology Division; Director, Optic Neuropathy Center; Jules Stein Eye Institute, UCLA

### JANUARY 21

TO BE ANNOUNCED

### FEBRUARY 18

#### GLAUCOMA

**Donald L. Budenz, M.D., M.P.H.**

Chair of Ophthalmology, Kittner Eye Center, University of North Carolina at Chapel Hill

## 57th Rochester Ophthalmology Conference

**MARCH 16-17**

### Snell Memorial Lecture

#### INTERNATIONAL OPHTHALMOLOGY

**Gullapalli Rao, M.D.**

Distinguished Chair of Eye Health; Chair, Hyderabad Eye Institute; Founder, L V Prasad Eye Institute

### FEI Distinguished Visiting Professor

#### CATARACT / ANTERIOR SEGMENT

**Robert Osher, M.D.**

Professor of Ophthalmology, University of Cincinnati School of Medicine; Medical Director Emeritus, Cincinnati Eye Institute

### MAY 12

#### RETINA

**Peter Kaiser, M.D.**

Professor of Ophthalmology, Cole Eye Institute, Cleveland Clinic

### JUNE 16

#### CORNEA / ANTERIOR SEGMENT

**Roger Steinert, M.D.**

Chair, Department of Ophthalmology; Director, The Gavin Herbert Eye Institute UC at Irvine School of Medicine

*Ophthalmologists, Physicians from other medical specialties, Optometrists and allied health professionals are invited to attend. There are no fees to attend — except for the annual conference — and each Saturday lecture carries 4.0 hours of ACGME Category I credit. These CME credits may be applicable toward other professional certifications to maintain licensure in New York State or beyond. Please check with your corresponding accreditation council to determine how many credits transfer.*

*Grand Rounds begin at 8 a.m. in the FEI clinic area, located on the third floor.*

*Free event parking in the Eye Institute lot at 210 Crittenden Blvd. is available.*



**The largest contingent ever of FEI faculty, collaborators, residents and fellows presented at the Association for Research in Vision (ARVO) conference held in Ft. Lauderdale.** Thousands of vision researchers from academia and industry from across the world come to this meeting to familiarize themselves with the latest advances in diagnosing and treating vision threatening disorders and diseases. During this year's meeting, 37 posters and papers were presented by the University of Rochester. A reception was held for friends and faculty of FEI, the Center for Visual Science and FEI's sister organization in India, the LV Prasad Eye Institute. During the conference, a record number of residents, fellows and medical students interested in a future in ophthalmology shared results of their research.

**Highlighted presentations from the meeting included:**

**Krystel Huxlin, Ph.D., Holly Hindman, M.D., Scott MacRae, M.D., Richard Phipps, Ph.D., Patricia Sime, Ph.D. and Jens Beuhen, M.D.** presented *Differential Impact of PPAR $\gamma$  Ligands and Anti-TGF $\beta$  Treatment in an In Vivo Model of Corneal Wound Healing*. When the cornea is injured a complex series of cellular/molecular events takes place as the tissue heals. Many times the result of this process can leave scarring, haze or other defects to the cornea that decrease visual acuity and sometimes result in blindness. The team's investigation compared the effectiveness of two families of compounds. The PPAR $\gamma$  ligands Troglitazone and Rosiglitazone were evaluated against an anti-TGF $\beta$  beta blocker in their effectiveness at reducing the development of scarring, haze and higher order aberrations (HOAs) during the healing process. Results showed that the PPAR $\gamma$  ligands were as effective as the beta blocker at the amount of scarring, HOAs and haze. However, the PPAR $\gamma$  ligands also induced a greater remodeling of two of the cornea's layers which may be useful for those with pathologically thinner corneas.

Third-year resident **Syed Mahmood Shah, M.D.**, under mentorship of FEI's **Yousuf Khalifa, M.D.**, presented: *Importance of Proper Diagnosis and Management: Multifocal Choroiditis Mimicking Ocular Histoplasmosis Syndrome*. It detailed a study looking at nine patients who were initially diagnosed with and treated as ocular histoplasmosis syndrome (OHS). This condition is most often found in the eastern and central United States and is caused by a common fungus, histoplasma capsulatum. Further examination and investigations revealed that seven of the nine patients suffered from a more rare condition called multifocal choroiditis (MFC). Differentiating MFC from OHS may be challenging, as it presents with many of the same symptoms of OHS. However, treatment for MFC is markedly different from OHS. The take home lesson is that in addition to a thorough clinical evaluation by fellowship trained uveitis specialist, advanced testing for histoplasma capsulatum should be employed to aid in the diagnosis of such patients.

The benefits of partial thickness corneal transplants such as DALK and DSAEK include decreased risk of rejection and faster recovery time. However, there is evidence to suggest that final vision may not be as good as it is when a traditional full-thickness corneal transplant (PK) is performed. Second-year resident **Seth Pantanelli, M.D.**, has been studying why these differences in visual performance exist in patients who had undergone DALK, DSAEK or PK. He presented results of his work in his poster, *Improvement in Visual Performance with Wave Aberration Correction 3-month and 1-year After Penetrating (PK), Deep Anterior Lamellar (DALK), or Descemet's Stripping with Automated Endothelial Keratoplasty (DAEK)*. Using adaptive optics in FEI's translational research labs, patients had their vision tested and optical higher order aberrations (HOAs) measured. A specialized system was then used to non-invasively correct their HOAs, simulating what their vision would be like if all of the optical imperfections in their eyes were removed. With HOA correction "turned on," their visual acuity (ability to read letters on an eye chart) and contrast sensitivity (ability to distinguish shades of gray) were measured. It was discovered that all patients experience better visual acuity and contrast sensitivity when HOAs are corrected. However, DSAEK eyes, both before and after optical correction, had poorer visual acuity than PK eyes. This suggests that the inferior visual performance after DSAEK is due to other factors, like light scatter at the donor-host interface.

Third-year resident **Sabita Ittoop, M.D.**, presented results of research in visual retraining of the cortically blind that she has been doing with her mentor **Krystel Huxlin, Ph.D.**, in: *Can Ocular Preference Explain the Inter-ocular Asymmetry of Training-induced Visual Gain in Cortically Blind Patients*. Her investigation tested the hypothesis that when rigorous retraining of the cortically blind occurs, the majority of visual gain happens in the patient's preferred (dominant) eye. This might explain the asymmetry of vision that is regained. Testing was done on 15 cortically blind patients (6 had left eye preference and 9 had right eye preference) who were undergoing motion discrimination visual retraining. The experiment revealed that the greatest improvements in vision did not consistently occur in the preferred eye, nor did it explain observed inter-ocular asymmetry in the vision that subjects' recovered due to their retraining. The conclusion is that the asymmetry of visual recovery is most likely due to anatomical asymmetry in the representation of left and right hemi fields from the damaged V1 cortex and the intact visual areas mediating training-induced visual improvements.

**Resident travel to the conference was generously funded by a grant from Rochester Area Foundation's (RAF) Snell Fund which seeks to support the education of ophthalmology residents at the University of Rochester. In addition to the three residents, four University of Rochester medical students interested in ophthalmology presented their research.**



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## FEI Faculty: "What are They Talking About?"

FEI research and clinical faculty are in constant demand for their expertise related to the causes and treatments for eye disease. In between their busy clinical and laboratory schedules they travel across the country and around the world to share the latest advances in the research and treatment of eye disease. During the last year, many were invited to lecture at other prestigious universities and conferences. Following is a sampling of what they were saying:

### SEPTEMBER 2011 : Optic Neuritis:

*Through Thick and Thin*, Steven Feldon, M.D., M.B.A., the Hoover Lecture, Greater Baltimore Medical Center, Baltimore, Md.

**SEPTEMBER 2011** : *Retraining the Blind to See – Challenging the Dogma of Visual Rehabilitation for Cortical Blindness*, Krystel Huxlin, Ph.D., OSA Vision Meeting, Seattle, Wash.

**JUNE 2011** : 1) *New Technology for Evaluating the Ocular Surface*, 2) *Infant Keratoprosthesis*, James Aquavella, M.D., University of Louisville Grand Rounds/Resident's Day, Louisville, Ky.

**JUNE 2011** : *Deploying Technology to Combat Age-Related Ocular Morbidity*, James Aquavella, M.D., Harvard University Massachusetts Eye and Ear Alumni Reunion Meeting, Boston, Mass.

**JUNE 2011** : *Treatment of Presbyopic Pseudophakes with the Acufocus Intracorneal Implant*, Scott MacRae, M.D., International Presbyopic Meeting, Cannes, France

**JUNE 2011** : *Customized Contact Lenses for Keratoconus*, Geunyoung Yoon, Ph.D., The Fifth Berkeley Conference on Translational Research, Berkeley, Calif.

**JUNE 2011** : *High-resolution Adaptive Optics Fluorescence Imaging of Retinal Cell Function*, William Merigan, Ph.D., Engineering the Eye III, Benasque, Spain

**JUNE 2011** : *Multiphoton Imaging of the Living Retina*, Jennifer Hunter, Ph.D., Engineering the Eye III, Benasque, Spain

**JUNE 2011** : *Writing 3D Refractive Index Modifications in Ophthalmic Polymer & Ocular Tissue – A Novel Means of Altering Refraction & Biomechanics with Minimal Cellular Damage*, Wayne Knox, Ph.D., Engineering the Eye III, Benasque, Spain

**JUNE 2011** : *Neural Adaptation Effects to Large Aberrations (keratoconus)*, Geunyoung Yoon, Ph.D., Engineering the Eye III, Benasque, Spain

**MARCH 2011** : *Color and the Cone Mosaic*, David Williams, Ph.D., The Russell DeValois Lecture Series, Berkeley, Calif.

**FEBRUARY 2011** : *Using Models to Identify Critical Signaling Pathways in Glaucomatous Neurodegeneration*, Richard Libby, Ph.D., Association for Ocular Pharmacology and Therapeutics Meeting, Ft. Worth, Texas

**FEBRUARY 2011** : *Past and Future Application of Adaptive Optics in Vision and Eye Care*, Geunyoung Yoon, Ph.D., Wavefront Congress: Wavefront & Presbyopic Refractive Corrections, Vancouver, British Columbia

**FEBRUARY 2011** : *Pseudoaccommodation and Optical Profiles of Single Optic Accommodating IOLs*, Scott MacRae, M.D., Wavefront Congress: Wavefront & Presbyopic Refractive Corrections, Vancouver, British Columbia

**OCTOBER 2010** : *Highs and Lows – Management of Problematic Blebs and Traumatic Ocular Hypotony*, Shakeel Shareef, M.D., Columbia University Department of Ophthalmology Grand Rounds, New York, N.Y.

FLAUM  
EYE INSTITUTE

### FACULTY PRACTICE Comprehensive Eye Care

Shobha Boghani, M.D.  
Rebecca Nally, O.D.  
Jill Schafer, O.D.

### Contact Lens Services

Rebecca Nally, O.D.  
Jill Schafer, O.D.

### Cornea and External Disease

James Aquavella, M.D.  
Steven Ching, M.D.  
Holly Hindman, M.D.  
Yousuf Khalifa, M.D.  
Ronald Plotnik, M.D.

### Glaucoma

Shakeel Shareef, M.D.

### Neuro-Ophthalmology and Orbit

Steven Feldon, M.D., M.B.A.  
Zoë Williams, M.D.

### Pediatric Ophthalmology

Matthew Gearinger, M.D.

### Refractive Surgery

Scott MacRae, M.D.  
Holly Hindman, M.D.  
Ryan Vida, O.D.

### Retina and Vitreous

Mina Chung, M.D.  
David DiLoreto, M.D., Ph.D.  
David Kleinman, M.D., M.B.A.  
Rajeev Ramchandran, M.D.

### Uveitis

Yousuf Khalifa, M.D.

### RESEARCH FACULTY

Charles Duffy, M.D., Ph.D.  
William Fischer, M.S.  
Lin Gan, Ph.D.  
Jennifer Hunter, Ph.D.  
Krystel Huxlin, Ph.D.  
Amy Kiernan, Ph.D.  
Richard Libby, Ph.D.  
William Merigan, Ph.D.  
Gary Paige, M.D., Ph.D.  
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Duje Tadin, Ph.D.  
David Williams, Ph.D.  
Geunyoung Yoon, Ph.D.  
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