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VISION

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A YEAR OF ADVANCES IN RESEARCH, EDUCATION, AND PATIENT CARE

Duke Eye Center

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ON THE COVER

Human eye: Showing the iris and embryonic pupillary membranes

Q&A with David L. Epstein

WHAT EXCITING DEVELOPMENTS HAVE YOU SEEN THIS PAST YEAR?
Our scientists and clinician scientists have been involved in discoveries that uncover the mechanisms behind eye diseases and bring us closer to new therapies. These advances include a finding that targeting inflammation may be an option for treating glaucoma, and the discovery of genes that play a role in myopia. We have also begun making progress toward a greatly needed new clinical facility, and we have received a very generous $12-million gift from LC Industries to expedite this undertaking. LC Industries, which finds meaningful employment for people who are visually disabled, has been a supporter of the Duke Eye Center and Albert Eye Research Institute for many years. LC Industries president, Bill Hudson, was inspired by the enthusiasm of our doctors here to help us in our need for new clinical space, which will allow us to more efficiently treat our current patients and serve new ones.

HOW WILL THE NEW CLINICAL FACILITY ADVANCE THE MISSIONS OF THE EYE CENTER?
It's, of course, obvious that our mission to care for patients will benefit. The doctors here see nearly 80,000 patients per year. We have no unoccupied exam rooms, and our patients have inadequate waiting areas. Patient flow due to the space constraints is very fragmented and unfriendly. As an additional example, our Vision Rehabilitation Service, which maximizes function and sight for people with low vision, currently is limited to two rooms. The technology specialist there fits patients with vision aids, such as telescopic lenses that are enabling people to read or see faces again. Occupational therapists help patients learn techniques that enable them to go about their normal activities despite limited sight. Both these activities require additional space so our specialists can help more patients.

One of our other most important missions is to bring new treatments to patients with potentially blinding eye diseases. We also wish to train the next generation of ophthalmology leaders. In both these endeavors, collaboration is crucial. With our scientists interacting with clinicians, and experienced ophthalmologists interacting with our inquisitive trainees, the Eye Center is truly a "bubbling cauldron of ideas." But we have a desperate shortage of clinical space for translating such ideas to treatment. We can put new clinical faculty in satellite spaces, but then they miss out on the interaction with other clinicians and scientists at our main Duke Eye Center "home." This interaction is what leads to new discoveries and is a core advantage of Duke.

WHAT FUTURE DEVELOPMENTS ARE ON THE HORIZON FOR THE EYE CENTER?
We're continuing to recruit new scientists and clinician scientists to the Albert Eye Research Institute, as well as new clinical faculty (as space permits). Two noted strengths of the Duke Eye Center are the inquisitive environment we foster here and our recruitment of so many smart, talented young people who bring a spirit of optimism, and a quest to innovate and cure. We are the number-seven Eye Center in the country according to the 2010 *U.S.News & World Report* rankings (and number six according to *Ophthalmology Times*, and number five in research). When our new clinical building is complete, I am confident we will become the number-one eye program in the country.

David L Epstein, M.D.

David L. Epstein, MD, MMM
Chair, Department of Ophthalmology

SCIENTISTS INTERACTING WITH CLINICIANS AND EXPERIENCED OPHTHALMOLOGISTS INTERACTING WITH OUR INQUISITIVE TRAINEES...THAT IS WHAT CAN LEAD TO NEW DISCOVERIES.

THE PLANS UNFOLD

$12-million gift advances goal of improved space for patient care and clinical research

A $12-million gift from the United States' largest employer of people who are visually impaired has propelled the Eye Center much closer to its goal of a new clinical building to expand patient capacity and foster translation of basic research to clinical application.

In March 2010, LC Industries of Durham announced the donation, one of the largest Duke Medicine has ever received. "The Duke Eye Center and LC Industries are both focused on helping many visually impaired people for years to come," says Bill Hudson, President of LC Industries. "We are happy to have broadened our horizons by getting involved in other areas besides employment. We hope that with the help of a new building, the doctors and scientists of the Eye Center will be able to cure some of the blinding eye diseases."

The Eye Center's current clinical building, the Wadsworth Building, was built nearly 40 years ago, when the center was composed of seven doctors who handled about 15,000 patient visits a year. Now Eye Center physicians provide 80,000 patient visits annually in the same space. That means that clinics are booked solid, and it's challenging to get patients in and out in a timely way, according to Mary Walter, the Eye Center's director of development.

The gift will also enable expansion of the Eye Center's clinical research program, says David Epstein, MD, MMM, chair of ophthalmology. "We really want to practice bench-to-bedside care; we want to translate the best in science to understanding the mechanism of diseases with the goal of new, curative therapies," Epstein says. "One of our goals in designing the new building will be to foster collaboration between basic scientists and clinical researchers."

"So many of the diseases that cause blindness in children have a genetic component," Walter says. "To solve those diseases, basic researchers have to go back and identify genes and their function, and then clinical scientists have to apply that work."

Once the remaining funds needed to reach the estimated $55 million cost of the new building are raised, construction of the building must be approved through the state of North Carolina's Certificate of Need process. It is possible that the building could be built as early as 2013.

Expanded clinic space will accommodate the Eye Center's more than **80,000** patient visits per year

Duke University Hospital opened: **1980**

New facility will have an additional **32** post-anesthesia care units.

Duke Eye Center, Wadsworth Building opened: **1973**

New facility will have more than **76** examination rooms and **4** additional operating theaters.

Ruth and Herman Albert Eye Research Institute (AERI) opened: **2005**

The **116,000**-square-foot building will be designed to be a patient-friendly facility that offers the best in clinical care and innovation.

The Sands Parking Garage opened: **2010** (see page 28)

All design and construction pending approval of the Duke University Board of Trustees, Duke University Health System Board of Directors, and State of North Carolina.

SARA KATHERINE GOES TO WASHINGTON

Sara Katherine Sills; her mother, Annette; and father, Michael; met with U.S. Representatives Bob Etheridge (above) and Mike McIntyre about eye disease screening programs.

IN 2006, SARA KATHERINE SILLS was healthy and happy and about to turn four. Then she had a vision screening at her day care—a photorefractive screening, in which pictures of each child are taken with a specialized camera that detects light reflecting back from the pupil. The screening warned of a possible problem with Sara Katherine's iris. Her mother, Annette Sills, did an internet search for the best pediatric ophthalmologists and found Laura Enyedi, MD, at the Eye Center.

Sara Katherine had her first appointment with Enyedi just three weeks after her day-care screening, which turned out to be just in time. "She looked perfectly healthy, but after her diagnosis, the doctors told us she was about two more weeks from losing her sight," Sills says. Enyedi diagnosed Sara Katherine with a chronic inflammation of the eye called uveitis, which if allowed to continue untreated can cause scarring, cataracts, and even blindness. A screening just one year earlier had turned up no problems.

The screening that uncovered Sara Katherine's uveitis wouldn't have happened without Prevent Blindness NC, a nonprofit organization that funds eye-disease research as well as screening programs. The screening, which was provided at the day care free of charge, cost the organization about $1.55 per child. But its value for Sara Katherine's family has been immeasurable. In March 2010 Sara Katherine and her parents traveled to Washington, DC to speak to legislators such as Mike McIntyre and Bob Etheridge about the big difference that one screening made, and about the importance of continued funding for such screenings.

Photoscreenings can be vital for young children, who may not notice or speak up about vision problems, especially those in only one eye, until it's too late. "Young children aren't trying to drive or see a chalkboard in a classroom, so they often do not complain about a loss of vision," Enyedi says.

Sara Katherine is almost eight now; she recently began second grade, where she's in the gifted and talented program. Her uveitis is under control with varying regimens of eye drops and systemic anti-inflammatory medications. "She had good months and bad months," Sills says. Enyedi coordinates her care with a pediatric rheumatologist at Duke, because Sara Katherine's condition is caused by an autoimmune problem, though its exact causes are unknown. Sara Katherine has developed a cataract because of the uveitis, but for now it isn't severe enough to be removed. "Duke is one of the very few places in the country that can treat pediatric uveitis, so we're fortunate that we live close enough that we can go there," says Sills, who lives in North Carolina's Sampson County. "Dr. Enyedi has been wonderful; she's been right with us the whole time."

ALBERT EYE RESEARCH INSTITUTE

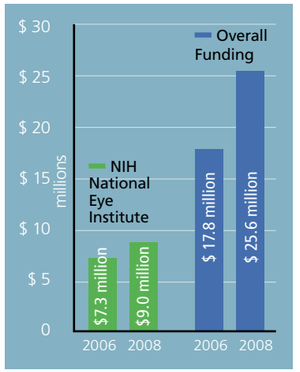
The Albert Eye Research Institute has facilitated expansion in both research faculty and research funding.

CELEBRATING FIVE YEARS OF RESEARCH GROWTH AT THE EYE CENTER

DURING ITS PEAK FROM THE 1930s to the 60s, the Bell Labs were the premier research facility in telecommunications, where technologies such as the laser and the transistor were invented. According to ophthalmology chair David Epstein, MD, MMM, and Vadim Arshavsky, PhD, scientific director of research ophthalmology at the Eye Center, Duke has created its very own "Bell Labs" for eye-disease research. "We have in-house expertise in generating new ideas for future therapies and diagnostics," says Arshavsky, "but we also have a large group of experts who monitor any new development in ophthalmic research and visual sciences and therefore are in a good position to alert clinicians and clinician scientists of new developments and their implications."

The degree of collaboration needed to sustain such an environment wouldn't be possible without a place where researchers and clinician scientists can interact daily to share ideas, and the Ruth and Herman Albert Eye Research Institute (AERI), which marks its fifth anniversary this year, provides that and more in an open setting with space for modern research labs and an auditorium that makes the training of fellows and residents easier.

When the AERI opened in 2005, the center was able to recruit eight new faculty and expand its research programs in glaucoma, macular degeneration, and retinal disorders and function. Over the last few years, researchers at the institute have made discoveries about the basic mechanisms behind the processes that lead to glaucoma, macular degeneration, and retinal disorders. Among them:



The Eye Center's funding for research from the National Institutes of Health's National Eye Institute has steadily grown since 2006.

Epstein and Eye Center researcher P. Vasantha Rao, PhD, have discovered that a class of molecules known as "Rho-kinase inhibitors" currently tested for treating cancer, could also ameliorate the elevated ocular pressure in glaucoma. Preclinical testing (in animal models) is now ongoing.

Stuart McKinnon, MD, PhD, whose hiring in 2005 was part of the expansion made possible by AERI, has developed a novel concept that pathological processes in age-related macular degeneration (AMD) and glaucoma may resemble certain aspects of Alzheimer's disease, particularly the formation of amyloid deposits. This opens the door to consider therapies currently developed in the context of Alzheimer's. Furthermore, Eye Center researcher Catherine Bowes Rickman, PhD, demonstrated that similar amyloid deposits may be a part of pathological change in AMD. She is now pursuing experiments aiming to demonstrate that the progression of visual loss accompanying AMD may be delayed by anti-Alzheimer's drugs.

Arshavsky, who was also hired in 2005 because of the AERI opening, studies the role of signaling mechanisms that protect the eye's rods and cones from the adverse effect of bright light. Learning more about how this process is regulated could at some point result in new therapies for disorders such as retinitis pigmentosa or AMD.

THE EYE CENTER RANKED
5TH
IN THE NATION IN NIH VISION RESEARCH FUNDING.

THE EYE CENTER SEES
80,000
PATIENTS A YEAR.

Along the same lines, another 2005 AERI recruit, Paulo Ferreira, PhD, is investigating how mutations of several genes implicated in severe forms of inherited retinal degenerations manifest in cellular pathology on the molecular level.

A building won't cure glaucoma or macular degeneration, but the science that can requires equipment, space, and ideas. "We need a critical mass of basic and clinical scientists to translate the very best in science to understanding and developing new treatments for these potentially blinding eye diseases. We were below critical mass before we had the Albert Institute," says Epstein.

Vadim Arshavsky | Stuart McKinnon | David Epstein | P. Vasantha Rao | Catherine Bowes Rickman

DUKE OP-TECHS:
ON THE FAST TRACK

SUMMER STEVENS WAS WORKING FOR AN OPTOMETRIST when she became interested in how the eye works. That's when she found out about Duke's Ophthalmic Technician Training Program and moved from Connecticut to attend. "I wanted to become more involved one-on-one with patients, and I found out that Duke has this excellent, accelerated program," she says.

After graduation in July 2009, she passed the exam to become a Certified Ophthalmic Technician (COT) and decided to interview for a job as a technician at the Duke Eye Center, where she has worked since. "The eye is so small but so vast and amazing. I love my work," she says.

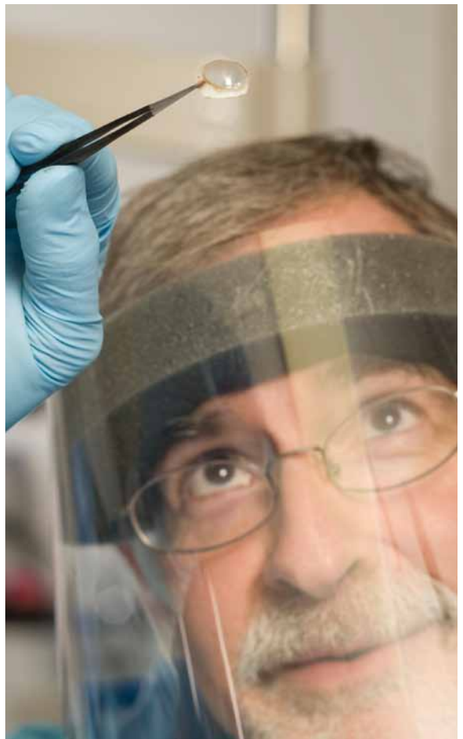
All of the program's graduates usually have at least one job offer by graduation day, and many of them have multiple offers, says Jo Anne Legacki, COMT, director of the Duke program. "There is a big demand for ophthalmic technicians; there's a shortage of them right now."

The Duke Op-Tech training program graduates its trainees in only one year, with a COT exam pass rate that is twice the national average.

Three students out of the program's 2009 graduating class and three out of 2010's class now work at the Eye Center. "That's one of the advantages of Duke running this program—we often have the choice to hire the top graduates in each class," Legacki says.

All of the graduates have completed one of the most rigorous technician training programs in the nation, in which they earn COT certification in just one year. "It's a very accelerated program that requires a big commitment from the student," Legacki says. Graduates of the Duke program pass the Certified Ophthalmic Technician national examination administered by the Joint Commission on Allied Health Personnel in Ophthalmology (JCAHPO) at a rate that's two times the national average.

The program accepts 15 students per year. For more information, visit: dukeeyecenter.duke.edu.



INDIVIDUAL EXPERIENCES
Third-year residents explore ophthalmology on their own terms

CHAR DECROOS, MD, HAD NEVER BEEN to India before, but he says when he worked there last year for his third-year residency elective, the foreign environment was no obstacle. "I was unfamiliar with the culture and the language, but my skills in ophthalmology allowed me to immediately offer something to the people I was working with. That's one of the wonderful things about a health care career that I didn't appreciate before—it gives you the opportunity to be helpful anywhere in the world," he says.

DeCroos worked at LV Prasad Eye Institute in the South Indian city of Hyderabad, treating patients and conducting research. He conducted a study of ocular infections caused by a bacterium called *Nocardia*, which is common in India, though rare in the United States. "We looked at all the cases over the last 11 years to try to find laboratory tests and hallmark signs that doctors can use to diagnose this unusual infection early. The more quickly doctors can identify it, the more appropriately they can treat it," DeCroos says.

The elective rotation enables third-year residents to spend 10 weeks on any ophthalmology work that interests them. For DeCroos, the rotation helped build his experience in international health, a longtime interest of his, and will be valuable in the career he plans in developing and conducting clinical trials, as more and more trials are using international collaborations. "It was interesting to see a very different culture. And, patients came there from all over the world—Africa, the Middle East, and even one patient from Raleigh, North Carolina," DeCroos says.

The other third-year residents stayed closer to home while pursuing research. Preeya Gupta, MD, for instance, performed data collection and analysis for two studies at the Eye Center that address disorders of the cornea, her chosen specialty. In one study, led by Terry Kim, MD, associate director of the Cornea and Refractive Surgery Service, Gupta examined wound integrity after cataract surgery using contrast enhanced SDOCT imaging. This study, submitted for publication, marks the first time that a medication commonly used to treat inflammation after cataract surgery was used as a contrast agent to image the eye. "It's dynamic imaging of the eye in real patients. So we could see how the corneal wound changed over the first 24 hours and how it was healing," Gupta says. "Ophthalmologists construct their wounds in different ways, and this technique may help to assess, in future studies, which types of wounds are safer. Had I not been on an elective rotation I would never have been able to do this study."

Gupta also worked with Alan Carlson, MD, chief of the Cornea and Refractive Surgery Service, to study the prevalence of obstructive sleep apnea in patients with keratoconus, a condition in which the cornea gradually bulges to form a cone shape, blurring vision. Carlson had observed in his practice that many of his keratoconus patients have sleep apnea. "Ours is the first study to formally assess that relationship. We found a higher prevalence of sleep apnea among patients with keratoconus than among the general population," Gupta says. "We don't really know what causes keratoconus, so there is a lot of speculation as to whether or not there is some underlying biological mechanism that is shaping both of those diseases."

"It was a great experience to have that time to actually complete two projects and do some meaningful research," says Gupta.

FIT THEM, THEN FORGET THEM

Scleral lenses provide freedom to a growing number of patients

BECAUSE OF HER DRY-EYE PROBLEM, a side effect of a bone marrow transplant, Jamie Harwood had practically become a hermit. "I wouldn't make plans with anyone because I would think, 'Well, I don't know how my eyes will be tomorrow,'" she says. She was using prescription eye drops every 15 minutes, but her eyes were still so dry that she mostly stayed at home in front of a humidifier. "I would take so many showers a day and keep a wet cloth on my eyes, anything to get some moisture in them. It just totally controlled my life," she says. Harwood tried punctal plugs, which block tear drainage. They helped somewhat, but not enough to make her feel normal, she says. Her bone-marrow specialist suggested she travel to Boston to get scleral lenses. But then she visited Jill Bryant, OD, director of the Contact Lens Service at the Duke Eye Center, who told her she could get them at Duke.

About the size of a nickel and gas-permeable, scleral lenses land on the sclera of the eye and vault up over the cornea. "When the patient puts the lens on, they're filling it with a sterile, non-preserved saline," Bryant says. "So there's a fluid reservoir between the lens and the eye, which acts as a liquid bandage to cushion the cornea."

> "With the advent of new contact lens materials and technology, there's been renewed interest in sclerals, and they're increasing in popularity."
>
> JILL BRYANT

Harwood says the lenses have turned her life around. Some days she may put extra drops in once or twice, but not every day. "I can go to the mountains and hang out with my kids, anything I want," she says. "They've given me the freedom to be me again."

Scleral lenses have been around since the 1800s, but back then they were made of blown glass, so they were uncomfortable and signs of corneal hypoxia could be seen in as little as 30 minutes. Not surprisingly they fell out of use. "But with the advent of new contact lens materials and technology, there's been renewed interest in sclerals, and they're increasing in popularity," Bryant says. Their use at Duke, which began in early 2009, has grown so much that Bryant and John T. Petrowski III, OD, each spend a half a day a week on specialty contact lens fittings, which are mostly sclerals fittings.

Another type of patient also can benefit from scleral lenses—those who have corneal irregularities caused by ocular disease or trauma. Because the lens vaults up over the cornea, it will mask the corneal irregularity beneath and subsequently improve vision, Bryant says. Ananth Thyagarajan, MD, a former fellow in Duke's Division of Allergy and Immunology, received scleral lenses to treat keratoconus, in which the cornea gradually bulges to form a cone shape, blurring vision. Thyagarajan's sight had been fine with glasses for about 10 years, but as he got into his thirties, his glasses weren't able to correct his vision enough and he had to stop driving at night.

"When Dr. Bryant offered the scleral lenses, it changed my life," he says. "I can drive at night and read from a good distance. It's been an absolute game changer for me and my family. Now my wife doesn't have to do all the night driving."

The lenses do require a bit of a time commitment from the patient because they are custom made and require multiple appointments. Taking the time for fittings is important, Bryant says. Wearing scleral lenses that aren't properly fitted, such as painted lenses sold illegally on the internet to create "zombie eyes" and other special effects, carries risk of infection, corneal ulcer, impaired vision, and even blindness. Some patients try several different pairs before getting the fit just right. "Over the last year or so, I've had three pairs of lenses," Thyagarajan says. "Now they fit perfectly. Dr. Bryant has been with me every step of the way and has gone way beyond the call of duty."

MORE THAN A HEADACHE

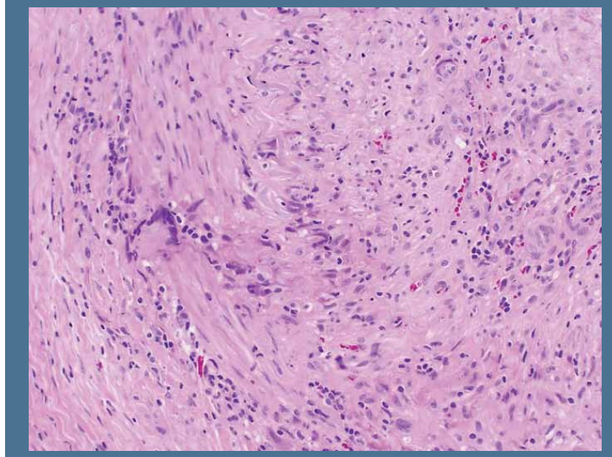
Early diagnosis of giant cell arteritis can save sight—and life

In April 2009, Relia Inscoe began having headaches and jaw pain. "Chewing was awfully painful," she says. Her primary doctor referred her to an ear-nose-and-throat specialist, suspecting sinus problems. "He took x-rays, but nothing showed up there," she says.

About a month later, Inscoe lost sight in her left eye. "It was a Wednesday night. I was taking my shoes off, and when I raised up, I realized there was something wrong," she says. The next morning her regular ophthalmologist referred her to Duke Urgent Care for a blood test, which showed that her erythrocyte sedimentation rate was abnormally high, indicating inflammation. That result made M. Tariq Bhatti, MD, chief of Duke's Neuro-Ophthalmology Service, suspect an autoimmune condition called giant cell arteritis. He immediately prescribed steroids to prevent loss of the vision in Inscoe's right eye, then made a definitive diagnosis with a procedure called a temporal artery biopsy.

Giant cell arteritis, in which the immune system goes into overdrive and causes the arteries to inflame and shut off blood supply to the eyes and other organs, is one of the true emergencies in ophthalmology, Bhatti says. "Physicians who see elderly patients with new-onset headaches should consider the condition as a possibility," he says. It's most common in Caucasian women older than 70. Pain and weakness in the jaws is often a symptom, caused by ischemia (lack of blood flow to the arteries) in those muscles. Steroid treatment is vital to prevent loss of sight or worse. "If we can recognize and treat this disease early, we can save the patient's eye sight and even save the patient's life," Bhatti says. Because blood vessels in all areas of the body can be involved in the condition, it can cause a heart attack or stroke.

Inscoe stayed in the hospital four days, receiving a high dose of intravenous steroids. Now she's down to 2.5 milligrams per day. She's glad to have the sight in her right eye and is back to driving and golfing. "I've been under Dr. Bhatti's care for about a year now," she says. "He and his staff have given me tremendous help getting through this."



Giant cell arteritis causes inflammation in the arteries, shutting off blood supply to the eyes and other organs.

RESEARCH GETS REAL

Clinical trials and research results that are changing the practice of pediatric ophthalmology

AMBLYOPIA: TO PATCH OR TO FILTER?

CHILDREN WITH AMBLYOPIA (lazy eye), in which one eye doesn't focus or see as well, are often treated with a patch over the good eye, to train the brain to use the weaker one. But some kids find the patch uncomfortable and won't wear it. Now, because of a randomized clinical trial conducted at Duke and other centers, ophthalmologists can feel confident in an alternative—Bangerter filters, which fit over the child's glasses to blur vision in the stronger eye. The trial, conducted by the Pediatric Eye Disease Investigator Group (PEDIG), found that improvement with either of the treatments was roughly similar after several months. "Until this study, some ophthalmologists used Bangerter filters but many of us were not comfortable that we were doing as well as we could compared to using an eye patch," says David Wallace, MD, MPH, associate professor of ophthalmology, and vice-chair of PEDIG.

May 2010, *Ophthalmology*

EXOTROPIA: PEDIG TAKES ON STRABISMUS SURGERY

A TRIAL CURRENTLY RECRUITING patients at Duke will determine the best surgical approach for treating exotropia—a condition in which one or both eyes turn outward, which can interfere with development of binocular vision. "Many doctors believe that if you move two muscles on one eye (unilateral rectus recession), you get the best results, and at least one small study supports that," Wallace says. But sometimes this approach results in an overcorrection, causing the eye to turn inward. "That's why many of us take the approach of weakening one muscle on the outside of both eyes (bilateral rectus recession)." But that repair has drawbacks too; sometimes the eye reverts to turning outward. "Most of us do it that way, but we could be wrong; maybe the other treatment is better. That makes this condition ideal for a randomized trial," Wallace says. The study is the first randomized trial of surgery for strabismus (misaligned eyes) conducted by PEDIG and will be only the second large-scale, randomized trial of strabismus surgery in the United States. Even a specialty center such as Duke that sees hundreds of strabismus patients a year may only see 20 or so who meet specific criteria for such a randomized trial, so it takes an effort such as PEDIG that brings many centers together to collect evidence from hundreds of patients to determine the best treatments. "When I was in training, I had a lot of excellent teachers, but they had only their own experience to draw from," Wallace says. "We have found that in many cases, personal observation, even from experienced experts, is much different from what you find when you do a well-designed, adequately powered, randomized trial."

PEDIG WAS FUNDED by the National Eye Institute in 1997 to research such unanswered questions in pediatric ophthalmology. "Before PEDIG, there were a handful of randomized clinical trials in the field, but so many questions were never addressed in this rigorous way. PEDIG enables us to compare a treatment to a control or comparison group and to generate high-level evidence, so that when we talk to our patients, we know that we're advising them to the best of our abilities," Wallace says. As vice-chair of the PEDIG network, Wallace plans some of the new studies and helps oversee about 40 of the clinical trial sites. Duke pediatric ophthalmologist Laura Enyedi, MD, serves as principal investigator for the Duke site, overseeing patient recruitment and follow up. For more information about PEDIG or these trials, visit pedig.jaeb.org/.

INFANT APHAKIA: ARE CONTACT LENSES A BETTER TREATMENT?

CLINICAL INVESTIGATORS at Duke Eye Center are helping solve a controversy in pediatric ophthalmology—whether a lens implant or contact lenses are best for babies after they have a cataract removed from just one eye (resulting in unilateral aphakia, or loss of the lens in one eye).

When babies are born with congenital cataracts in both eyes, the treatment decision is straightforward. The cataracts are removed, and rather than inserting a lens implant, as is done after adult cataract removal, ophthalmologists fit the baby with contact lenses or glasses, which can easily be changed to adjust to developing eyes. But when a baby has a cataract in just one eye, ophthalmologists disagree on the best treatment. "Some doctors have said babies aren't ready for a lens implant, and it's much better to wait and put in a lens implant closer to the adult power when the eye has done most of its growing (usually around age five). But others say an implant is the best thing, because parents have trouble keeping a contact lens in the baby's eye," says Sharon Freedman, MD, chief of pediatric ophthalmology.

A baby with a cataract removed from one eye is at high risk for amblyopia (lazy eye), which is more likely to develop when just one eye has an impaired focus. Implanting an intraocular lens right away removes the need for parents to worry with contact lenses and glasses can be used instead. But an early implant has a drawback: the lens implant has a fixed focus power that does not change as the baby's eye grows. So if the proper implant power for the baby's eye is chosen, that eye will soon be very nearsighted. By contrast, if the implant power is estimated for what the adult eye will need, the baby's eye will be left quite far-sighted to begin with, and will need glasses to make up the difference until the eye grows, hopefully as it has been predicted to grow. "If you have one perfectly normal eye that can change focus anytime, and the other eye has a fixed focus, that eye is at a tremendous disadvantage. It will be an uphill fight to develop vision in that eye, with or without a lens implant," Freedman says.

The Infant Aphakia Treatment Study is determining which treatment leads to better outcomes. Conducted at multiple centers, Duke's site has faculty surgeons Edward Buckley, MD, and Freedman participating. Careful records are kept of the progress for all children in this study, recording vision as well as any problems that develop.

The study is ongoing, so the results are not conclusive, but preliminary results of one-year outcomes suggest that using a lens implant in babies isn't any better than using a contact lens and may cause more complications. "Vision wasn't any better in either group, and in fact, for the group that had a lens implanted, more surgeries were necessary, mostly to remove membranes or tissue that tried to grow on top of or under the lens implant," Freedman says. "The jury is still out, but as a result of the findings so far, we are not recommending that lens implants be used in the first six months of life. We can't say it's bad, but it's not proven that they are better. It should be taken on a case-by-case basis. At Duke, we choose for most cases not to use lens implants in the first six months of a baby's life."

May 2010, *Archives of Ophthalmology*

STOPPING A STEALTHY CAUSE OF BLINDNESS

STUDIES REVEAL THE GENETICS OF MYOPIA

YOU MAY THINK OF MYOPIA (nearsightedness) as just an inconvenience that requires glasses or contact lenses, but it's actually a significant cause of blindness. The risk is highest for those with so-called pathologic or high-grade myopia, in which the back of the eye continues to grow, causing vision to deteriorate into adulthood, increasing the risk of retinal detachment, cataracts, glaucoma, and a form of macular degeneration.

Right now there aren't practical treatments to prevent myopia progression. But Eye Center researchers have made a discovery that may help change that. Terri Young, MD, and colleagues have co-authored two studies, one in which they found that a particular gene—RASGRF1—was associated with myopia.

"If we can understand the genetics of myopia then we can try to develop custom biological tools to manipulate eye growth," Young says. "My goal is to find practical ways of curbing the excessive eye growth that happens in myopia." Myopia is the most common human eye disorder; in some Asian countries, for instance, myopia affects 80 percent of the population. In the United States, it affects 33 percent of adults and costs an estimated $5.5 billion annually.

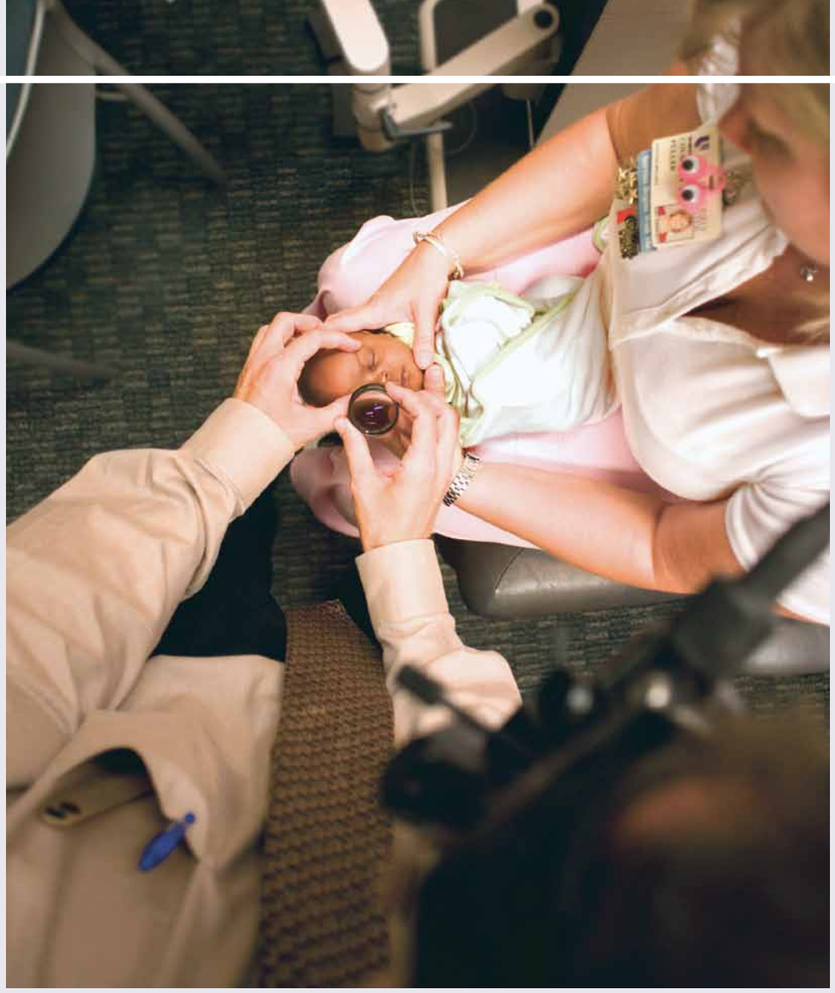
Two studies from Duke may have found the genetic roots of myopia.

Young led one of the two studies, in which she and colleagues examined genetic patterns in a population of 4,270 people to find which small genetic variations, called single-nucleotide polymorphisms (SNPS), are associated with myopia. "Using a genome-wide association study, we examined small genetic differences distributed throughout the entire human genome at a known location of known size to find out where these markers may align with the actual disease," she says. "We found that the RASGRF1 gene was most closely associated with myopic refractive error in that large group."

Young's group validated the findings in a second population of about 8,000 people, collaborating with researchers at Erasmus Medical Center in Rotterdam, the Netherlands. "We need to look at thousands and thousands of patients to be able to say that this effect that we see based on physical analysis is valid and reproducible," she says.

Next, Young will learn more about the role of RASGRF1 by conducting eye growth studies in mice that have the gene knocked out (silenced). These mice show changes in the eye's lens and have impaired vision.

August 2010, *Nature Genetics*



A new Duke study has shown that some babies with type 1 retinopathy of prematurity can benefit from earlier-than-standard care.

RETINOPATHY OF PREMATURITY: WHEN TO TREAT IT EARLY

IN THE UNITED STATES an estimated 15,000 premature infants each year are born with retinopathy of prematurity (ROP), which is one of the most common causes of vision loss in young children. "We've always known that severe retinopathy of prematurity needs treatment," says Sharon Freedman, MD, chief of pediatric ophthalmology. "But what hadn't been proven is that there was this subset of babies with severe ROP who would benefit from earlier-than-standard treatment. This study proved that, and it also showed the characteristics of those babies who would benefit." Freedman was the co-principal investigator of the Duke arm of the 12-site study.

In eyes with ROP, abnormal blood vessels grow on the surface of the retina, and the resulting scar tissue can pull on the retina, causing it to detach, which results in vision loss or complete blindness. Laser therapy is the most effective treatment to slow or stop the growth of abnormal blood vessels. "The basis of the study was to determine the optimal timing for laser or cryotherapy treatment," says Duke ophthalmologist David Wallace, MD, MPH, the other co-principal investigator of the Duke study site. "The study found those who benefit from early treatment are children who have what's called Type 1 disease, when the blood vessels become very dilated and tortuous—fat and wiggly—or abnormal vessels grow on the surface of the retina," he says. The assessment of the infant's disease severity can be made by an exam of the eyes at bedside.

Freedman and Wallace say that this study changes the standard of care for this subset of infants with Type 1 ROP. Infants with a more moderate amount of new blood vessel growth (Type 2 disease) did not benefit from early treatment; those babies had similar results with either early treatment or treatment at the standard time.

April 2010, *Archives of Ophthalmology*

Specific techniques can help drivers with one eye learn to compensate for challenges such as changes in perception of distance or range of vision.

LEARNING TO LIVE WITH ONE EYE

IN 2008, ANNE RICE LOST THE SIGHT in her right eye because of a fungal infection that occurred as a complication of cataract surgery. Because Rice has 20-20 vision in her left eye, her retinal specialist predicted that in just a little while, she wouldn't notice the difference.

But she did notice, especially when she backed into another car in a grocery store parking lot. "I had looked over my right shoulder when I backed up, but I failed to remember that I didn't have the full range of vision that I had before," she says. "You are continually reminded of your loss in vision efficiency." That's when Rice accepted a referral to a driving evaluator from Diane Whitaker, OD, chief of the Duke Eye Center's Vision Rehabilitation Service.

The referral was part of a formal protocol that Whitaker has developed to help retrain adults who have lost vision in just one eye (monocular vision loss), whether that loss is caused by trauma, infection, or tumor. It takes more work than most might think to adjust to this type of sudden loss. "Some people assume that if you have one eye with good vision, you will function the same way you would if you have two eyes. In fact, many eye doctors have underestimated the time required to adjust to losing one eye," Whitaker says.

But studies have shown that adults who lose the sight in one eye have declines in their abilities to accurately track moving objects, to judge distances, and to perceive depth. That means that they will have to learn how to consciously use one eye and their other senses to gather the information that their two eyes once collected effortlessly. "The automatic pilot no longer works automatically," Rice says. "It was so refreshing to discover Dr. Whitaker and the help she can give because she truly understands, as much as a person with two eyes can."

Whitaker's intervention prescribes training in three specific activities. The first—reaching for and grasping objects—is covered by one or more hour-long sessions with an occupational therapist. "Both the speed and accuracy of the grasp is negatively affected by loss of binocular vision. For example, they will grab for something and not get it on the first try, or they will be pouring coffee or tea and miss the cup," Whitaker says. Rice learned to remedy this by wrapping one hand around the cup while she pours with the other hand. Adding the non-visual signal (from the sense of touch) helps the brain judge the distance and location more accurately, Whitaker says.

Adults who lose vision in one eye also have more collisions when walking, especially on the side where they lost the vision. That's where sessions with an orientation and mobility specialist can help. "The emphasis is on helping people to judge distances by using monocular clues, such as something called motion parallax. If you've ever seen a cat moving its head or eyes side to side before it jumps, that's motion parallax," Whitaker says. "You can train a person to do this by using more side-to-side head movements." Rice says that to avoid bumping into people in crowded stores, for example, she's learning to stop and check her right side before she moves.

The final part of the intervention is learning new techniques for driving safely with vision in only one eye. "The loss of depth perception means that people have a hard time judging their vehicle's distance from another car, or whether their car can fit into a parking space," Whitaker says. "We can train people to turn their head more toward the non-seeing eye, and some driving instructors may recommend special interior or exterior mirrors that can help improve field of vision as well."

Rice says the driving evaluator helped her tremendously. They went out in her own car, and he assessed her strengths and weaknesses while driving and parking at places that she frequents, such as her church and her bank. Now she turns her head more and makes a conscious effort to scan her full visual field. "You're scanning all the time when you have two eyes that work, and you also can do that with one eye, but you don't realize how much your two eyes were working together, especially in judging distance," Rice says. "When you don't have that second eye working for you, you have to take some overt steps to remedy that deficiency. The training improved my ability to drive, and it also gave me a new level of confidence."

"The protocol can help them avoid losing work time or wasting time with anxiety about the functional changes they are experiencing."
DIANE WHITAKER

"Traditionally, we assume a six- to nine-month adjustment period is normal to help someone adjust to having vision in only one eye," Whitaker says. "The intervention expedites this recovery and can help patients avoid losing work time. It also lessens their anxiety about the functional challenges they are experiencing." Whitaker is now studying the results of the intervention to quantify how much it helps and determine the reduction and adjustment time.

Rice and Whitaker hope to start a support group for adults who have lost vision in one eye. "It can be easy to get discouraged," Rice says. "Dealing with this requires learning some new skills, and those are things you can share with other people."

Anne Rice says working with vision rehabilitation specialists such as Fay Tripp, OTR/L, has given her new skills and new confidence.

LOVE AT FIRST SIGHT

An artificial cornea helps a mother see her baby for the first time

Donna Casteen and her son, Nathaniel, both have aniridia, a rare genetic condition in which all or part of the iris is missing.

AS WITH MOST MOTHERS, the first time Donna Casteen saw her son Nathaniel, it was love at first sight. The difference for Casteen—it happened a month after he was born.

Vision is precious to Casteen, because at many times during her life she has lived without it. She has a rare genetic condition called aniridia, in which all or part of the iris is missing. Aniridia is usually accompanied by other developmental eye problems; Casteen also has glaucoma associated with aniridia. She has an inherited mutation in a gene called PAX6, which plays a crucial role in eye development. "I've been visually impaired all my life," Casteen says.

When Casteen first came to see Natalie Afshari, MD, in 2009, she had seen only light and shadows for several years, and she needed guidance to walk. A donor cornea transplant had enabled her to see for a time but had eventually failed.

Afshari told Casteen she could implant a keratoprosthesis—an artificial cornea that is made of two plates of thick polymer, with a donor cornea in between anchoring the two plates. "It creates a clear window into the eye, a window that doesn't cloud over," Afshari says. When Afshari began offering the procedure at Duke in 2001, it was quite rare. Now it has become more common, but she is still the only doctor in North Carolina and South Carolina to offer it.

> "It was amazing, it's hard to even put it into words. It's like hearing the baby's first cry after he's born."

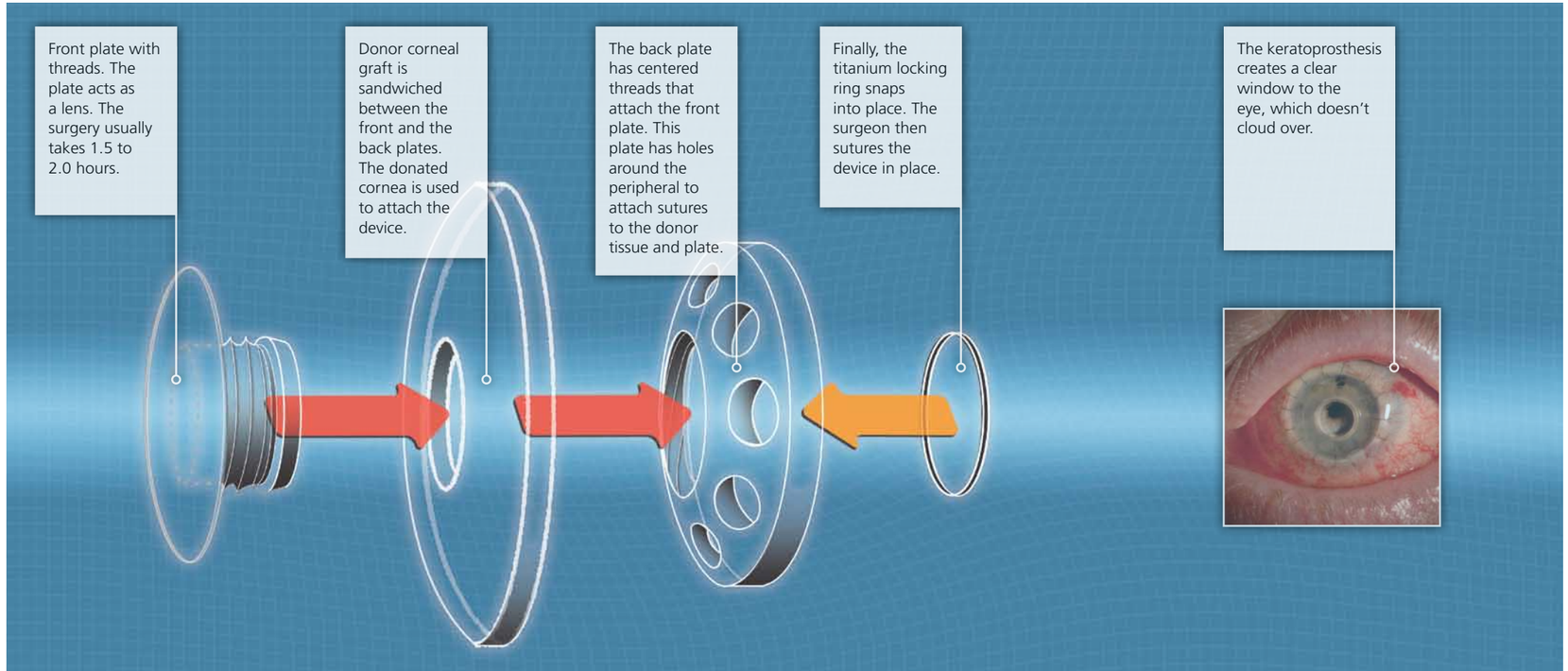
The day after the 2009 surgery, Afshari removed a patch from Casteen's eye. That first day, she could see again. For a year, she was able read to her four-year-old daughter and play computer games with her 14-year-old. She could do the many tasks needed to take care of her son Timmy, who was born with multiple medical conditions, including diabetes and bilateral anophthalmia, which means he was born without eyes.

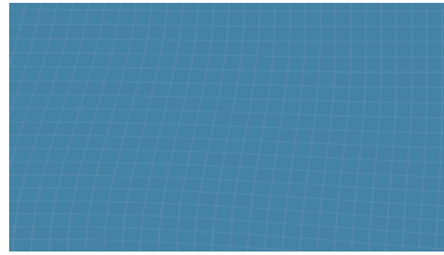
But after one year, a tear in the keratoprosthesis implant reduced Casteen's vision once again to only light and shadow perception. She was expecting a new baby, which would make undergoing anesthesia to get a new cornea unsafe. So she couldn't see the ultrasound of the baby she was expecting, or pick out baby clothes. Thirty-one days after Casteen's new baby was born, Afshari implanted a new keratoprosthesis in Casteen's eyes. The first time Casteen saw her month-old baby, Nathaniel, was in Afshari's office. "It was amazing, it's hard to even put it into words," Casteen says. "It's like hearing the baby's first cry after he's born."

That moment was the result of a joint effort between Afshari and several other Eye Center doctors who help manage Casteen's vision. Casteen has had tubes inserted into her eyes to relieve the pressure of glaucoma, which she manages with the help of Stuart McKinnon, MD, PhD. She also sees retina specialist Brooks McCuen, MD. Now she can take care of her children and update the blog she keeps about Timmy's progress.

After Casteen's first procedure with Afshari in 2009, she came for a follow-up visit with her parents and other family members in tow. "After I had my first procedure with Dr. Afshari, I was so pleased. Everybody in my family decided, okay, let's run to Duke," Casteen says. Her son Timmy sees Michael Richard, MD, in oculoplastics, who is preparing him to receive prosthetic eyes. Her five-year-old daughter, Emily, has eye conditions which are managed at the Eye Center with the help of Richard and Terri Young, MD. Casteen's mother, her domestic partner, Floyd, and his mother are also patients of Afshari and Pratap Challa, MD. "This is a family affair for us at Duke," Casteen says.

Casteen's new baby, Nathaniel, seemed to have normal eyes and vision all the way through gestation, and he responds to lights and reaches for toys at home. But unfortunately, when he was about two months old, Young diagnosed him with aniridia. "We received Nate's diagnosis early," Casteen says. "Now we are able to start the process of getting him vision therapy, which will aid Nate in learning to use any useful vision that he may have."





The assembled keratoprosthesis before implantation.

THE NEW TARGETS

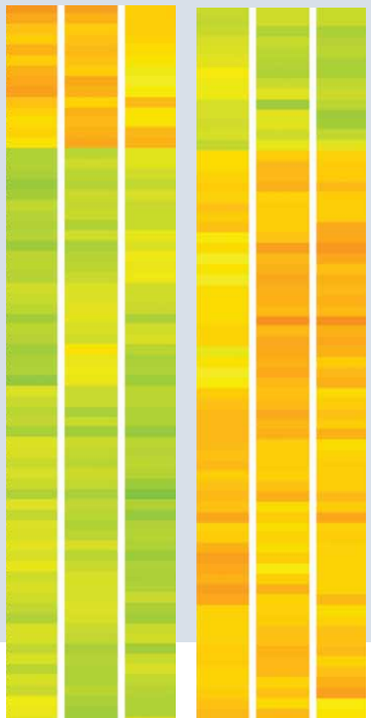
Inflammation and other cell processes may open up new treatment strategies for glaucoma

"If we observe changes in human eyes similar to those we've seen in the mouse, that opens up possibilities."

MOLLY WALSH

EYE DROPS, LASERS, SURGERY—all the current treatments for glaucoma aim to lower the eye's intraocular pressure. But for some patients, that doesn't help much. "There is definitely a sub-population of glaucoma patients who continue to get worse even though we are lowering their pressures significantly," says Molly Walsh, MD, MPH, assistant professor of ophthalmology. And, some people with glaucoma never have high pressures (so called normal tension glaucoma), but they suffer the same optic nerve damage that other glaucoma patients do. "As you can imagine, if someone's pressure is low initially, it is even more challenging to lower it," Walsh says.

Walsh and colleagues recently published findings that point to a possible alternative: treating glaucoma by targeting cellular processes that are active when ocular pressure increases. Publications in the last few years have suggested that inflammation plays a role in the disease process, and Walsh's research suggests specific inflammatory factors that could be targeted with new therapies and have measurable clinical impact.



Overall changes of gene expression by elevated IOP. The sample at left is the injected case; control on the right.

Walsh and colleagues made their discovery using a mouse model of glaucoma that was created by Duke neurobiologist and ophthalmologist Stuart McKinnon, MD, PhD, who modified a rat model created by John Morrison, MD, at the Casey Eye Institute in Portland. The researchers injected the right eyes of mice with hypertonic saline (to simulate glaucoma and its associated increased pressure). The left eye in each mouse served as a control eye. The retinas of the right eyes showed increases in several inflammatory factors, including serum amyloid A1 (SAA1), an inflammatory protein which had never been implicated in glaucoma until now. "In every mouse we evaluated, we saw a six- to nine-fold increase in serum amyloid in the retina of the right eye," Walsh says. "This tells us that there is an inflammatory basis for the changes occurring in glaucoma." The study was published August 2009 in *Experimental Biology and Medicine*.

Several months before Walsh and colleagues published their paper, Abe Clark, PhD, and colleagues reported serum amyloid A1 in the trabecular meshwork in the eyes of mice with experimental glaucoma. "It's interesting that serum amyloid A1 was found in other eye tissues. It lends support to the concept of an inflammatory basis for glaucoma," Walsh says.

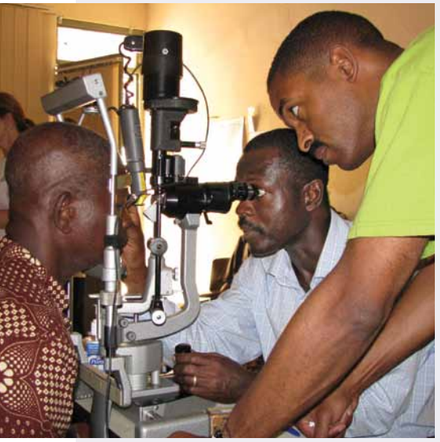
Walsh's team also found other inflammatory markers, including XIAP and catalase, in the "glaucoma" eyes of the mice in their study. Now they are looking for all these markers in the vitreous (the clear, jelly-like substance that fills the back cavity of the eye) of human glaucoma patients and those without glaucoma. (Patients at Duke who have a vitrectomy, either before having tubes placed in their eyes to treat glaucoma, or as part of treatment for a different condition, called macular hole [epiretinal membrane], can consent to have their vitreous examined for this study after removal.)

If Walsh finds that serum amyloid A1 or other inflammatory proteins have leaked into the vitreous of human glaucoma patients, it would suggest that some may benefit from intravitreal injections of new compounds targeting these pathways. Medications to treat macular degeneration are now commonly injected into the vitreous, so it may be possible to treat glaucoma in this way too. "If we observe changes in human eyes similar to those we've seen in the mouse, that opens up possibilities," Walsh says. "Ten years ago no one would have believed we would be injecting so many medications into the vitreous. That technology has become widely accepted now and I believe we can extend this to the treatment of some glaucoma patients."

GLAUCOMA IN GHANA

Duke Eye Center physicians continue the quest

IN MAY 2010, Duke ophthalmologist Leon Herndon, MD, had his feet in Durham but his mind in Ghana, Africa, as he helped out a patient named Willie by e-communicating with his doctor during a procedure



In West African countries, glaucoma strikes at a younger age and its consequences are more devastating, in large part because the treatment options and medical staff are limited. Eye Center ophthalmologist Leon Herndon (right, in the green shirt) spends much of his visits to Ghana educating both patients and physicians about glaucoma treatment.

called needling—using a needle to lessen scar tissue that has developed after glaucoma surgery.

Herndon has kept in touch with Willie after meeting him on one of his trips to Ghana. He goes in part to conduct research with R. Rand Allingham, MD, chief of Duke's Glaucoma Service, on the genetic causes of glaucoma, which for reasons that are unclear is more prevalent and more severe in people of West African descent. But Herndon also makes

the trips because it's the right thing to do. "It has been clear to me there is a great need to improve glaucoma care in West Africa. Published papers show that glaucoma affects a younger age there, and it's more devastating, and the treatment options we have here just aren't readily available there," Herndon says.

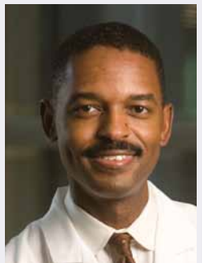
In the United States, glaucoma is treated first with medications (eye drops), then laser treatments, then surgery. Though the medical infrastructure in Ghana is well advanced compared to most African countries, lasers aren't readily available, and medications are scarce and too expensive for most people. "When I travel to Ghana, I may bring a lot of medication samples. But samples run out," Herndon says. "In Ghana and other developing countries, I feel that glaucoma is a surgical disease." So he spends much of his time there teaching the few ophthalmologists in the country (only 40 ophthalmologists serve 20 million people) to perform the surgery and necessary aftercare.

But even that approach is more challenging than it seems, because in Ghana glaucoma treatment has a perception problem. "Most of the ophthalmologists concentrate on cataract surgery because the rewards are greater. If a patient has glaucoma surgery, often their vision will be a little worse for a while. Then word travels quickly that this is not a good eye doctor," Herndon says. "So when I go there, I try to educate patients and doctors about why we do what we do to treat glaucoma and why in many cases it may be necessary to operate."

The Eye Center's efforts in Ghana started in the late 1990s, when a student in Duke's Ophthalmic Technician Program, Phillip Ridenhour, traveled to the country to do mission work and saw a need. He contacted Allingham, who in 1998 traveled to sub-Saharan Africa and began evaluating patients and conducting studies of the genetic components of the disease, with the ultimate goal of finding new ways to diagnose and treat it. In August Herndon and other ophthalmologists from around the world who have been working to solve the glaucoma problem in Ghana met during the first African Glaucoma Summit, which Herndon helped organize. "It was the first opportunity for people who are passionate about some of these issues to be in the same room," Herndon says.

For more information about the summit, sponsored by the World Glaucoma Association, visit: worldglaucoma.org/AfricaSummit/.

Leon Herndon



R. Rand Allingham

ARSHAVSKY IS NAMED TO ENDOWED PROFESSORSHIP

Vadim Arshavsky, PhD, was named the Helena Rubinstein Foundation Professor of Ophthalmology. According to David Epstein, MD, MMM, chair of the Department of Ophthalmology, since joining Duke in 2005, Arshavsky "has been an extraordinary mentor to other scientific faculty." Arshavsky has served as the scientific director for the Duke Eye Center's Albert Eye Research Institute (AERI) since 2007 and contributed immensely to making the Duke Eye Center a pioneer in translational research.

DELMONTE WINS RESIDENT WRITER'S AWARD

Derek DelMonte, MD, third year resident at Duke Eye Center, brought home first place in the seventh annual *Ophthalmology Times* Resident Writer's Award Program. His article on the treatment of a patient using a femtosecond laser, titled "The LASIK 'do over,'" appeared in *Ophthalmology Times*' January 2010 edition. Second place went to University of Utah. Third place was awarded to a former Duke medical student and current Bascom Palmer Eye Institute resident, Anil Vedula, MD. This is the third consecutive year that a Duke Ophthalmology resident has been presented with the Writer's Award.

EPSTEIN ELECTED AUPO PRESIDENT

David Epstein, MD, MMM, chair of the Department of Ophthalmology, was elected president-elect of the Association of University Professors of Ophthalmology (AUPO), the national organization for Chairs of Ophthalmology programs as well as Program and Medical Student Directors.

FREEDMAN EARNS HUMANISM AWARD

Sharon Freedman, MD, was honored with the 2010 Leonard B. Tow Humanism in Medicine Award. The award was presented in May at the Doris Duke Center of the Duke Gardens. Selection was determined by a distinguished faculty committee and awarded to one faculty member who demonstrates "compassion in the delivery of care, respect for patients, their families, and health care colleagues, as well as clinical excellence," as described by Ann J. Brown, MD, MHS, associate vice dean for faculty development. The award is sponsored by the Arnold P. Gold Foundation and for seven years, has been supported by Leonard Tow.

HUANG RECEIVES MACHEMER RESEARCH AWARD

Wei Huang, MD, PhD, was selected for the prestigious Robert A. Machemer Research Award for her proposal, "The roles of Forkhead (Fox) transcription factors in lens aging." Her work was presented in June at the 2010 Residents and Fellows Day. The Robert A. Machemer Research Award, established in 2000, recognizes a resident, clinical fellow, or research fellow whose clinical or basic science research proposal demonstrates high intellectual curiosity, outstanding scientific originality, and has a significant impact on the clinical management of persons with ophthalmic disease. The award honors the late Robert A. Machemer, MD, a past chair of the Duke Department of Ophthalmology. (see page 25)

NEW LEADERSHIP ROLES FOR LEE

Paul Lee, MD, JD, vice-chair of the Department of Ophthalmology,s has accepted two new positions within Duke University Health System (DUHS). He was recently appointed director of applied health systems research as well as senior advisor to DUHS chancellor and CEO Victor Dzau, MD. As director of applied research, Lee will take a strategic look at measuring performance inside DUHS and improving patient outcomes by utilizing clinical care data and other metrics. As senior advisor, he will be working closely with Dzau on a variety of new initiatives, all of which are intended to create innovative approaches to health care delivery and training.

LEE TO DIRECT THE AMERICAN BOARD OF OPHTHALMOLOGY

Paul Lee, MD, JD, is one of three new directors of the American Board of Ophthalmology. In this position, Lee will be tasked with setting strategic goals and executing the overall mission of the ABO during his 4-year term. He will also lead the development and maintenance of certification examinations and processes.

Vadim Arshavsky

Derek DelMonte

Sharon Freedman

Wei Huang

Paul Lee

WALSH AWARDED GRANTS

Molly Walsh, MD, MPH, received an American Glaucoma Society (AGS) Clinician Scientist Grant for 2010 for work on aging and its effect on protein expression in glaucomatous retinas. She also was awarded the Society for Experimental Biology and Medicine (SEBM) Best Paper Award for 2009 in the Experimental Biology category for her paper, "Gene and Protein Expression Pilot Profiling and Biomarkers in an Experimental Mouse Model of Hypertensive Glaucoma."

WALSH SPEAKS AT MEDICAL RESEARCH DAY

Molly Walsh, MD, MPH, was selected to give an oral presentation on her research, global gene expression and protein profiling of retinas exposed to elevated intraocular pressure, at Duke's second annual Research Career Day in May. The event was sponsored by Duke's School of Medicine, School of Nursing, and the Duke Translational Medicine Institute. Keynote speaker, John R. Feussner, MD, MPH, chair and distinguished professor at USC's Department of Medicine, joined other prominent figures, including Chancellor Victor Dzau, MD, Dean Nancy Andrews, MD, PhD, and Vice Chancellor Rob Califf, MD, in celebrating the work of pioneering scientists such as Walsh.

WOODWARD CONTINUES TEACHING

Julie Woodward, MD, chief of the oculoplastics service at Duke Eye Center, continued her cosmetic procedures lectures across the United States speaking about blepharoplasty and how to avoid and handle complications. She also presented about fractional CO^2 laser resurfacing at the American Society for Aesthetic Plastic Surgery in April in Washington, DC. Woodward is scheduled as a keynote speaker at the 2011 American Academy of Cosmetic Surgery meeting held in January 2011 in Phoenix.

YOUNG NOMINATED TO DUKE ACADEMIC COUNCIL

Terri Young, MD, was elected to the Duke Academic Council for a two-year term in April. The Duke Academic Council and the Executive Committee which it elects are the main instruments of faculty governance at Duke University. Young will represent the School of Medicine in clinical sciences.

FARSIU AND MALEK EARN AHAF GRANTS

The American Health Assistance Foundation (AHAF) awarded two $100,000 grants for Duke Eye Center researchers Sina Farsiu, PhD, and Goldis Malek, PhD. Both grants will help fund Duke Eye Center's goal of finding a cure for age-related macular degeneration. Farsiu was awarded a $100,000 grant for his work entitled "Automatic Measurement of Wet AMD's Imaging Biomarkers." Malek's $100,000 grant was awarded for her research into investigating the role of oxidant activated nuclear receptors in retinal pigmented epithelium (RPE) cell injury, mitochondrial dysfunction, and sub-RPE deposit formation, key features of early age-related macular degeneration.

GUPTA AND DECROOS WIN ASCRS RESIDENT EXCELLENCE AWARDS

The American Society of Cataract and Refractive Surgery (ASCRS) Foundation's annual Resident Excellence Award recognizes 10 residents from around the country who have shown excellent performance in areas of research, patient care, leadership and education. Preeya K. Gupta, MD, and Francis Char DeCroos, MD, were two of this year's 10 recipients. The winners are offered travel grants and complimentary housing to attend the Annual ASCRS Symposium and Congress in Boston. This experience offers unique educational and networking opportunities with other promising ophthalmologists.

SCOTT COUSINS NAMED IN TOP 34 OPHTHALMOLOGISTS

Duke Eye Center retina specialist and vice-chairman for research, Scott Cousins, MD, was recently named a "Top 34 Ophthalmologist" in the United States by Becker's ASC Review, a leading source of business and legal news for ambulatory surgery centers. They cited his leadership of the Duke Center for Macular Diseases and his ongoing research in developing blood tests and new imaging technologies for the identification of patients who are at high risk for developing complications of macular degeneration as reasons for the honor.

Molly Walsh

Julie Woodward

Terri Young

Sina Farsiu

Goldis Malek

Scott Cousins

Paulo Ferreira

RESEARCH TO PREVENT BLINDNESS

An extended professorship aids research into retinopathies

Paulo Ferreira, PhD, has received a two-year extension of the Jules & Doris Stein RPB Professorship awarded to him by Research to Prevent Blindness (RPB) in 2004. The professorship supports his research into the causes, treatment, and prevention of blinding diseases.

Ferreira will use the RPB extension to continue his research program investigating the molecular, cellular, and genetic basis of retinal function—including the mechanisms of inherited retinopathies and related diseases. The RPB extension will be critical to ensuring the achievement of such goals.

Since it was founded in 1960, RPB has channeled hundreds of millions of dollars to medical institutions throughout the United States for research into all blinding eye diseases.

"RPB has truly catalyzed research to prevent blindness both at Duke and worldwide," says Duke ophthalmology chair David L. Epstein, MD, MMM. "It is a remarkably important and effective organization dedicated to all of our quests to cure potentially blinding eye diseases."

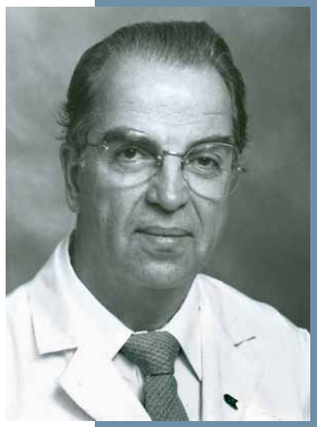
For information on RPB, RPB-funded research, eye disorders, and the RPB Grants Program, go to rpbusa.org.

IN MEMORIAM: ROBERT MACHEMER

Robert Machemer, MD, the pioneering chairman of the ophthalmology department at Duke from 1978 to 1991, passed away on December 23, 2009.

Machemer is widely recognized for having revolutionized ophthalmic surgery with his invention of vitrectomy—in his remembrance of Machemer, Duke ophthalmology chair David Epstein called this invention a truly "'disruptive technology' that made the previously impossible now possible." The sight of many people around the world has been saved as a result of his innovative research and invention.

During his 13 years as chair, Machemer worked hard to establish a first-class ophthalmological research program at Duke and helped train a new generation of retina specialists. He gave generously of his time and knowledge to fellows and residents, who moved on to establish their own successful careers. In his retirement, Machemer continued to demonstrate his dedication and loyalty to the Department of Ophthalmology, and he was honored with the establishment of two Machemer Professorships of Ophthalmology.



Machemer was born in Germany and came to the United States in 1966 for a research fellowship at the Bascom Palmer Eye Institute in Miami under Dr. Ed Norton. There, he developed vitrectomy through a process that began with Machemer experimenting at home with a drill bit and a chicken egg. In 1978, Machemer came to Duke University to accept the chairmanship of the Department of Ophthalmology. He retired in 1998.

He is survived by his wife, Christel, a former member of the Duke psychiatry faculty, and his daughter, Ruth, a former Duke Eye Center research coordinator.

Opportunities for honoring Machemer with a named space in the new clinical building are being planned.

DUKE EYE CENTER FACULTY AND ADMINISTRATION

FACULTY LEADERSHIP

David Epstein, MD, MMM	Chairman, Department of Ophthalmology
Paul Lee, MD, JD	Vice Chairman, Department of Ophthalmology
Scott Cousins, MD	Vice Chairman of Research, Department of Ophthalmology Director, Translational Research Program Director, Center for Macular Diseases
Leon Herndon, MD	Medical Director, Department of Ophthalmology
Eric Postel, MD	Director, Eye Center Perioperative Services
Vadim Arshavsky, PhD	Scientific Director, Research Ophthalmology
Robin Vann, MD	Service Chief, Comprehensive Ophthalmology
Alan Carlson, MD	Chief, Cornea and Refractive Surgery
R. Rand Allingham, MD	Service Chief, Glaucoma
M. Tariq Bhatti, MD	Service Chief, Neuro-Ophthalmology
Julie Woodward, MD	Service Chief, Oculoplastic and Reconstructive Surgery
Sharon Freedman, MD	Service Chief, Pediatric Ophthalmology and Strabismus
Diane Whitaker, OD	Service Chief, Low-Vision Rehabilitation Service
Glenn Jaffe, MD	Service Chief, Vitreoretinal Diseases and Surgery
S. Jill Bryant, OD	Director, Contact Lens
Edward Buckley, MD	Director, Appointments, Promotion, and Tenure Vice Dean of Medical Education, Duke University School of Medicine
Paulo Ferreira, PhD	Assistant Director, Translational Research Program
Sharon Freedman, MD	Director, Pediatric Low Vision Program
Glenn Jaffe, MD	Director, Duke Reading Center
Prithvi Mruthyunjaya, MD	Director, Continuing Medical Education
William Rafferty, OD	Director, Optometry Education
Sharon Fekrat, MD	Chief, Division of Ophthalmology at the Durham VA Medical Center
Cynthia Toth, MD	Liaison, Duke BioEngineering
David Wallace, MD, MPH	Director, Site-Based Research (SBR) Program
Julie Woodward, MD	Director, Public Education Program
Terri Young, MD	Director, Pediatric Genetics Program Faculty Liaison, Singapore
Catherine Bowes Rickman, PhD	Director, Third-Year Medical Student Program
Pratap Challa, MD	Director, Duke Ophthalmology Residency Program
Terry Kim, MD	Director, Duke Ophthalmology Fellowship Program
Jo Anne Legacki, COMT	Director, Ophthalmic Technician Program
Tina Singh, MD	Director, Second- and Fourth-year Medical Student Program

ADMINISTRATION

Michael Howard, MBA, FAHEC	Director of Operations
Christopher Frederick, CPA	Finance Director
Evelyn Kelly, OCA	Health Center Administrator
Justin Hammond, BA, BS	Marketing Manager
Nick Hernandez, BS	Senior IT Manager
Mary Walter, BA	Director, Development
Renee Dawson	Coordinator, Continuing Medical Education Director, Education Program Staff

COMPREHENSIVE OPHTHALMOLOGY

S. Jill Bryant, OD	Assistant Professor of Ophthalmology
Anupama Horne, MD	Assistant Professor of Ophthalmology
Thomas Hunter, MD	Assistant Professor of Ophthalmology
Philip McKinley, MD, MPH	Assistant Professor of Ophthalmology
John Petrowski III, OD	Assistant Professor of Ophthalmology
Laurie Pollock, MD	Assistant Professor of Ophthalmology
Frankie-Lynn Silver, MD,MHS	Assistant Professor of Ophthalmology
Tina Singh, MD	Assistant Professor of Ophthalmology
Robin Vann, MD	Assistant Professor of Ophthalmology Service Chief

CORNEA AND REFRACTIVE SURGERY

Natalie Afshari, MD	Associate Professor of Ophthalmology
Christopher Boehlke, MD	Assistant Professor of Ophthalmology
Alan N. Carlson, MD	Professor of Ophthalmology Service Chief
Terry Kim, MD	Professor of Ophthalmology
Anthony Kuo, MD	Assistant Professor of Ophthalmology
William Rafferty, OD	Assistant Professor of Ophthalmology
Terry Semchyshyn, MD	Assistant Professor of Ophthalmology

GLAUCOMA

R. Rand Allingham, MD	Richard and Kit Barkhouser Professor of Ophthalmology Service Chief
Sanjay Asrani, MD	Associate Professor of Ophthalmology
Pratap Challa, MD	Associate Professor of Ophthalmology
David Epstein, MD, MMM	Joseph A.C. Wadsworth Clinical Professor of Ophthalmology Chairman
Leon Herndon, MD	Associate Professor of Ophthalmology Medical Director
Jill Koury, MD	Assistant Professor of Ophthalmology
Paul Lee, MD, JD	James Pitzer Gills III, MD & Joy Gills Professor of Ophthalmology Vice Chairman
Stuart McKinnon, MD, PhD	Associate Professor of Ophthalmology Associate Professor in Neurobiology ++
Frank Moya, MD	Assistant Professor of Ophthalmology
Kelly Muir, MD	Assistant Professor of Ophthalmology
Henry Tseng, MD, PhD	Assistant Professor of Ophthalmology
Molly Walsh, MD, MPH	Assistant Professor of Ophthalmology
Carol Ziel, MD	Assistant Professor of Ophthalmology

LOW-VISION REHABILITATION SERVICE

Diane Whitaker, OD	Assistant Professor of Ophthalmology Service Chief

NEURO-OPHTHALMOLOGY

M. Tariq Bhatti, MD	Associate Professor of Ophthalmology Associate Professor of Medicine ++ Service Chief
Edward Buckley, MD	Banks Anderson, Sr. Professor of Ophthalmology Professor in Pediatrics ++
Mays El-Dairi, MD	Assistant Professor of Ophthalmology

OCULOPLASTIC AND RECONSTRUCTIVE SURGERY

Parag Gandhi, MD	Assistant Professor of Ophthalmology
Jason Liss, MD	Assistant Professor of Ophthalmology
Michael Richard, MD	Assistant Professor of Ophthalmology Assistant Professor of Surgery ++
Julie Woodward, MD	Assistant Professor of Ophthalmology Assistant Professor in Dermatology ++ Service Chief

PEDIATRIC OPHTHALMOLOGY AND STRABISMUS

Edward Buckley, MD	Banks Anderson, Sr. Professor of Ophthalmology Professor in Pediatrics ++
Mays El-Dairi, MD	Assistant Professor of Ophthalmology
Laura Enyedi, MD	Assistant Professor of Ophthalmology Assistant Professor in Pediatrics ++
Sharon Freedman, MD	Professor of Ophthalmology Professor in Pediatrics ++ Service Chief
David Wallace, MD, MPH	Associate Professor of Ophthalmology Associate Professor in Pediatrics ++
Tammy Yanovitch, MD	Assistant Professor of Ophthalmology
Terri Young, MD	Professor of Ophthalmology Professor in Pediatrics ++ Professor in Medicine +++

VITREORETINAL DISEASES AND SURGERY

Scott Cousins, MD	Robert Machemer, MD, Professor of Ophthalmology Vice Chairman of Research Professor in Immunology ++
Sharon Fekrat, MD	Associate Professor of Ophthalmology
Glenn Jaffe, MD	Professor of Ophthalmology Service Chief
Brooks McCuen II, MD	Robert Machemer Professor of Ophthalmology
Prithvi Mruthyunjaya, MD	Assistant Professor of Ophthalmology
Eric Postel, MD	Associate Professor of Ophthalmology
Stefanie Schuman, MD	Assistant Professor of Ophthalmology
Cynthia Toth, MD	Professor of Ophthalmology Professor in Biomedical Engineering ++

RESEARCH OPHTHALMOLOGY

Vadim Arshavsky, PhD	Professor in Ophthalmology Professor of Pharmacology & Cancer Biology++ Scientific Director
Catherine Bowes Rickman, PhD	Associate Professor of Ophthalmology Associate Professor in Cell Biology ++
Sina Farsiu, PhD	Assistant Professor of Ophthalmology Assistant Professor in Biomedical Engineering ++
Paulo Ferreira, PhD	Associate Professor in Ophthalmology Associate Professor of Pathology ++
Pedro Gonzalez, PhD	Associate Professor in Ophthalmology Associate Professor of Molecular Genetics and Microbiology ++
Gordon Klintworth, MD, PhD	Professor of Pathology Joseph A.C. Wadsworth Research Professor of Ophthalmology ++
Paloma Liton, PhD	Assistant Professor in Ophthalmology Assistant Professor in Pathology ++
Goldis Malek, PhD	Assistant Professor in Ophthalmology Assistant Professor in Pathology ++
P. Vasantha Rao, PhD	Associate Professor in Ophthalmology Associate Professor in Pharmacology & Cancer Biology ++
Tatiana Rebrik, PhD	Assistant Professor of Ophthalmology
Nikolai Skiba, PhD	Assistant Professor in Ophthalmology
Sandra Stinnett, DrPH	Assistant Professor of Biostatistics & Bioinformatics Assistant Professor in Ophthalmology ++
Fulton Wong, PhD	Professor of Ophthalmology Professor in Neurobiology ++ Assistant Professor in Pathology +++

Secondary appointment ++

Tertiary appointment +++

DUKE'S FIRST GREEN GARAGE OPENS

The Eye Center's new parking deck, which opened in January 2010, earned LEED certification and is the health system's first eco-friendly parking garage. The garage's sustainable design features include LED lights, a "green wall" of vertically planted live plants, bioretention ponds to catch and reuse rainwater, and green canopies on the roof that will grow over the next two years to provide shade to top-level parking spaces.

The garage also provides 1,650 new parking spaces for Eye Center patients and staff.

DUKE EYE CENTER RESIDENTS

Jessica H. Chow, MD
Chief Resident, Department of Ophthalmology

Third Year
Lan Chang, MD
Sulene Chi, MD, PhD
Mark Fernandez, MD
Nieraj Jain, MD
Nicholas Ramey, MD

Second Year
Brian Alder, MD
Wei Huang, MD, PhD
Janice Liao, MD
Andrew Munro, MD
Kathryn Pepple, MD, PhD

First Year
Michael Allingham, MD
Jacqueline Dzau, MD
Mark Hansen, MD
Sujit Itty, MD
Peter Nicholas, MD
Zachary Zavodni, MD

DUKE EYE CENTER FELLOWS

Corneal/External Disease
Jennifer Kim, MD
Christopher Majka, MD
Victor Chang, MD
Amina Husain, MD

Glaucoma Disease
Jason Hall, MD
Jullia Rosdahl, MD, PhD
Keith Mathers, MD

Oculoplastics and Reconstructive Surgery
Michael Ehrlich, MD
Usha Reddy, MD

Pediatric Ophthalmology and Strabismus
Michelle Cabrera, MD
Nandini Gandhi, MD
S. Grace Prakalapakorn, MD

Medical Retina
Lili Grunwald, MD
Larry Koreen, MD, PhD, MPH
Prithu Mettu, MD
Jeremy Shaw, MD

Vitreoretinal Disease and Surgery
Shelly Day, MD
Paul Hahn, MD, PhD
Annie Lee, MD
Phoebe Lin, MD, PhD

TOTAL PATIENT VISITS IN FY 2010: **156,156**

Duke Eye Center
Ranks in the Top Ten
U.S.News & World Report

Ophthalmology Times
Ranks Duke Eye Center

6TH BEST OVERALL PROGRAM

6TH BEST RESIDENCY PROGRAM

6TH BEST CLINICAL/ PATIENT CARE PROGRAM

5TH RESEARCH PROGRAM

THE EYE CENTER HAS **10** LOCATIONS IN NORTH CAROLINA AND VIRGINIA.

DUKE EYE CENTER LOCATIONS:

Duke Eye Center of Cary
Duke Eye Center at Duke University Medical Center
Duke Eye Center of North Durham
Duke Eye Center of Raleigh
Duke Eye Center of Southpoint
Duke Eye Center for Vision Correction
Duke Eye Center of Winston-Salem

RETINA CLINICS:

Danville, Virginia
Fayetteville
Wilmington

HOW TO CONTACT THE EYE CENTER:

// online at dukeeye.org
// patients call: 1-888-ASK-DUKE (275-3853)
// physicians call: 1-800-MED-DUKE (633-3853)
// info@dukeeye.org

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THIS IMAGE SHOWS Cystinosis crystals in the cornea. Cystinosis is a rare, incurable metabolic disease that afflicts 500 children and young adults in the United States and only 2,000 worldwide. The amino acid cystine accumulates and crystallizes in cells due to abnormal transport of the cystine. This build-up eventually destroys all the body's organs including the kidneys, liver, muscles, white blood cells, eyes, and central nervous system.
DUKE EYE CENTER PHOTOGRAPHY