

Images



Some See

3-D

Some Don't

3-D glasses inside

Vision research
for the future

Bascom Palmer Eye Institute's mission is to enhance the quality of life by improving sight, preventing blindness, and advancing ophthalmic knowledge through compassionate patient care and innovative vision research.



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Editor's note: This edition of *Images* contains three dimensional (3-D) photographs, which may appear blurry without the use of the enclosed special glasses.

Bascom Palmer's advances on 3-D imaging to better diagnose and treat eye disease, coupled with the recent popularity of 3-D movies, television and magazines, were the exciting impetus for this issue. Special thanks to Dr. Douglas Anderson, who for fifty-plus years has been a world-renowned expert in the fields of glaucoma and stereo/3-D vision, and Derek Nankivil of Bascom Palmer's Ophthalmic Biophysics Center, who fabricated a stereo-vision tripod adapter that was utilized to make the 3-D photographs in this issue possible.

Your glasses are inside — put them on and enjoy. — Marla Bercuson

On the cover:

Wendy Lee, M.D., M.S., oculoplastic specialist and assistant professor of clinical ophthalmology

Dear Friends and Colleagues:

2010 has been a year of growth and achievement for Bascom Palmer Eye Institute. In this issue of *Images*, we are pleased to introduce you to Dr. Vittorio Porciatti, our new director and vice chair of research along with some members of his scientific team who are working to better understand the underlying causes of eye disease, prevent blindness, and maintain vision in older patients. Bascom Palmer has a long history of leadership in ophthalmology to advance patient care, medical education and vision research. For example:



I am joined by Dr. Akef El-Maghraby (center), chairman of the Magrabi Hospitals and Clinics, and Bascom Palmer's Dr. David Tse (right). We are excited to conduct teleconferences for ophthalmic education and training with international institutions such as the Magrabi group in the Middle East.

- Our uveitis service, under the superb leadership of Dr. Janet Davis, was recently recognized as generating two of the ten most important papers on uveitis (an inflammatory disease of the eye) available for United States resident training in 2009.
- Dr. Stephen Schwartz was elected president of the Florida Society of Ophthalmology (FSO); Dr. David Samimi, one of our talented third-year residents, won first place for his research presentation at the annual FSO meeting; and Dr. David Goldman was recently elected to the presidency of the Palm Beach County Ophthalmology Society.
- Two of our investigators received prestigious Research to Prevent Blindness Awards: Dr. Abigail Hackam — the Ernest & Elizabeth Althouse Scholar Award; and Dr. Jeffrey Goldberg — the Walt and Lilly Disney Award for Amblyopia Research. Dr. Goldberg has had his work published in *Science* and was named the Scientist of the Year by Hope for Vision.

- Dr. Victor Perez continued to receive accolades for his pioneering surgery in the United States of a modified osteo-odonto keratoprosthesis (artificial cornea).

Bascom Palmer is dedicated to providing each of our patients with the best possible care. This includes our conversion to UChart – a new streamlined electronic medical records system. The first phase of UChart, including patient scheduling, registration and billing has been implemented and we expect the system to be fully installed by October 2011.

I am especially proud of this current issue of *Images*, which is another example of the imagination, creativity and innovative thinking that is the hallmark of Bascom Palmer. Marla Bercuson, *Images* editor and Bascom Palmer's director of marketing and communications, has published this superlative magazine that combines science and medicine with contemporary culture. The article "3-D: Some See It, Some Don't" and its accompanying spectacular 3-D photographs explain how 3-D imaging is used by our physicians to diagnose and treat our patient's eye disease. I hope that you will enjoy, and share, this unique issue.

During this holiday season, I want to thank our many patients, friends and donors who make all of Bascom Palmer's good work possible. I wish you and your loved ones a happy, healthy and prosperous 2011.

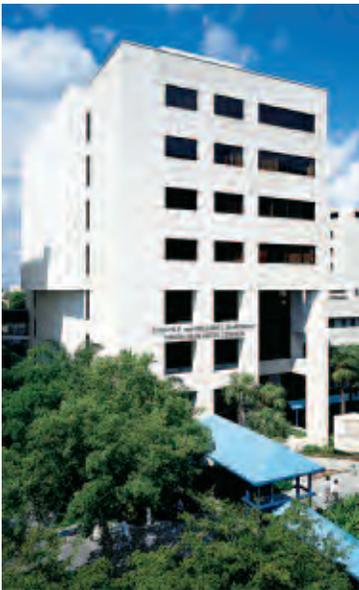
Sincerely,

Eduardo C. Alfonso, M.D.
Kathleen and Stanley J. Glaser Chair in Ophthalmology
Chairman, Bascom Palmer Eye Institute

Collaboration is key to success

Meet Vittorio Porciatti, D.Sc., Bascom Palmer's Director and Vice Chair of Research

Vittorio Porciatti, D.Sc., tenured research professor of ophthalmology, was recently named director and vice chair of research for Bascom Palmer Eye Institute. A neuroscientist, electrophysiologist and biophysicist, his current research focuses on prevention of glaucoma.



Porciatti, who joined Bascom Palmer's faculty in 2001, received his education and training at the University of Pisa, Italy. He served for many years as senior scientist and a member of the scientific committee at the Institute of Neurophysiology at the Italian Research Council. He has published and lectured extensively.

What is your long-term vision for research at Bascom Palmer?

Bascom Palmer has been the number one eye institute on the clinical side for many years. In research, we are moving up the ladder, in terms of both studies and grants, but we are not yet number one. In the past few years, we have increased in size from half a dozen scientific researchers to more than 25 in our program based at Bascom Palmer's Evelyn F. and William L. McKnight Vision Research Center. That's a major advance, just in terms of growth. Now, we are considered one of the top 10 ophthalmology research laboratories in the country. My vision is for us to continue moving up in the national rankings as we contribute to better understanding of ophthalmic diseases and disorders and the ways to treat or cure them.

What challenges do you face?

With our recent growth, we have virtually exhausted the existing laboratory space in the McKnight Research Center. This limits our investigators to expand their programs and hinders our ability to hire new investigators. Under the direction of Eduardo C. Alfonso, M.D., chair of Bascom Palmer, we are in the process of converting administrative offices into much-needed laboratory space which we will need to equip and staff.



How and from where do Bascom Palmer's researchers receive funding?

Getting funds during an economic downturn is challenging, but we are successfully increasing our research grants and donor funding. The National Institutes of Health (NIH) is a major source of funding for our research projects. We are also supported by various private foundations and individual donors. In addition to external funding, we, as the department of ophthalmology, invest in our own research, such as covering a portion of a young investigator's salary. Or, we may contribute to the purchase and maintenance of expensive equipment that is beyond the reach of individual investigators. This internal support is critical to our success.

What are your research priorities?

Our physicians are very skilled in their clinical fields. They have accomplished remarkable feats in repairing the eye and restoring vision, even in patients with very difficult visual conditions. Our laboratory researchers work to better understand the underlying causes of eye diseases to prevent blindness and maintain useful vision in older patients. For example, using the tools of 21st century medicine – including genetics, cellular

biology, molecular diagnostics and advanced imaging—we are trying to understand why the eye may become susceptible to diseases like glaucoma or macular degeneration, and how biotechnologies may help in preventing such conditions.

Could you expand on that goal?

Pascal Goldschmidt, M.D., dean of the University of Miami Miller School of Medicine, noted recently in his blog that for most chronic illnesses, humans are born with genetic susceptibilities. At some point in life – perhaps influenced by environmental factors, such as nutrition, smoking or stress – the disease may reach a “tipping point,” when the body can no longer repair that cell and tissue damage; the disease becomes symptomatic and progresses at a fast rate. By that time, various therapies can ease the patient's symptoms and stabilize the condition, but cannot turn back the clock. In many of our studies at Bascom Palmer, we are seeking to identify the biomarkers that may indicate whether or not an individual has reached that tipping point. In that way, we may be able to intervene clinically at an earlier stage and prevent damage to vision.



“I look forward to building upon Bascom Palmer’s tradition of collaboration and continuing to strive toward unparalleled ophthalmic discoveries.”

— Vittorio Porciatti, D.Sc.

Looking ahead, what progress in research do you see in the next five to ten years?

We are making substantial progress, although it takes considerable time to move from basic science at the laboratory “bench,” through clinical models, to actual trials on patients. First of all, gene therapy is now a reality in humans. As we learn more and more about genomics – our genetic blueprint – we will be able to recognize potential medical problems and develop new tools for treatment. Second, we are

currently conducting clinical trials involving growth factors. By injecting these compounds into the eye, our investigators have been able to regrow damaged photoreceptors – a very important advance, according to the NIH, which is funding the research. Third, a better understanding of genetics will influence the diagnosis and treatment of macular degeneration. We will be able to better understand an individual’s prognosis and prescribe effective treatments. Fourth, we are studying the use of stem cells to regrow tissue in clinical models, and finally, we are looking at nanotechnology for tagging cells and steering them to specific locations affected by the disease process. We expect that this may become a powerful tool in treating some diseases at the cellular level.

What is the difference between basic science and clinical science?

In medicine, basic science focuses on understanding biological processes at the root level, such as cellular, genetic and chemical interactions. Clinical science is concerned with translating the breakthroughs at the laboratory level into new diagnostic and treatment therapies. Traditional clinicians typically do not conduct basic science. However, we are fortunate to have a number of medical doctors at Bascom Palmer who have also been trained in basic research. They find it natural to think in terms of both basic and clinical research, and spend some days seeing patients and the other days working in the laboratory.

What about translational research and how it may affect patient care?

Translational research aims to bring laboratory findings into the physician’s practice. At Bascom Palmer, this is a two-way process, often sparked by our physicians’ clinical questions. They may ask: Why does a disease progress in a certain way? Is there a genetic predisposition to certain disorders? How do the biochemical interactions within the eye’s structure influence loss of vision? That often leads our scientists in the laboratory to begin generating new information, ideas and ways of thinking about a condition. Translational research is not just developing new biotechnology or identifying a problematic molecule – it’s changing the way clinicians think about a disease.

What is unique about Bascom Palmer’s research program?

We have the strongest clinical program in the nation, exceptional residency, fellowship and foreign observer training programs that attract physicians from around the world, and a large volume of patients. This ideal combination provides a steady flow of research ideas and helps generate a great number of translational research opportunities in areas like glaucoma, macular degeneration, corneal disease, retinal disorders, neuro-ophthalmology and other fields. Another exceptional area that sets us apart is our Ophthalmic Biophysics Center, which has a stellar history of creating devices, instruments and technologies that help advance patient care.

Are there examples of that synergy?

Yes. When Dr. John R. Guy joined our faculty two years ago as professor of ophthalmology and basic researcher on mitochondrial DNA, he was able to access a large pool of patients with Leber hereditary optic neuropathy who may be candidates for gene therapy. There are many other examples of that crossover between clinical care and basic research. Dr. Jinhua (Jay) Wang, associate professor of ophthalmology and one of the world’s foremost dry eye researchers, is developing hardware for better imaging and quantifying optical coherence tomography images of eye structures. This will provide novel diagnostic tools to help doctors detect and monitor eye diseases and the effect of treatments.

Why is Bascom Palmer's commitment to collaboration in research, bioengineering and clinical care so important?

Having clinical specialists in many disciplines of ophthalmology together in one place leads to a continual sharing of ideas and insights. In addition to spurring basic scientific research, it leads to advances in medical technology. A prime example is the creation of a visual prosthesis made with a patient's canine tooth or "eyetooth." You may recall that last year, Dr. Victor Perez performed the first surgery of its kind in the United States when he restored a woman's sight using her eyetooth. That remarkable procedure required his expertise as an ophthalmic surgeon, complemented by an oral surgeon, our bioengineering team led by Dr. Jean-Marie Parel, who designed the prosthetic lens, and our research expertise in cellular biology and optics. Without that combination, this clinical advance would not have been possible.

How are you building awareness of Bascom Palmer's research?

Our researchers participate in a number of medical education programs, including our weekly grand rounds at the hospital, our continuing medical education programs and research seminars. Our scientists also travel around the world to present their findings and take an active role in the Association for Research in Vision and Ophthalmology, which is the world's largest organization devoted to sight-saving research. In addition, Bascom Palmer's website is continually updated to display our investigators' projects. We have found that researchers around the world can visit bascompalmer.org to see what we are working on, and tap into that expertise if appropriate. And, of course, we are certainly open to collaboration with other institutes.

Tell us about your own research interests and activities.

My focus is on the early detection of glaucoma – determining an individual's susceptibility to this disease before the "tipping point" is reached. We have tools for evaluating the cells of the retina and



measuring if the electrical activity they generate is normal or not. This is similar to using a treadmill for a stress test in cardiology patients. My primary goal is to prevent the onset of glaucoma, improve the patient's quality of life and reduce costs to the overall healthcare system. My mother, Anna, is virtually blind from glaucoma, and this is a personal quest for me.

Can you provide more details on your research?

I received a \$1.9 million grant from the NIH/ National Eye Institute for the project, "Reversible Dysfunction of Retinal Ganglion Cells in Glaucoma." Glaucoma causes progressive damage and death of retinal ganglion cells (RGCs) resulting in blindness. My objective is to see if we can prevent RGC death in the early stages of glaucoma. Our research team includes Dr. Lori Ventura, who serves as my co-principal investigator, and experts in glaucoma, electrophysiology, biomedical engineering, biophysics and biostatistics.

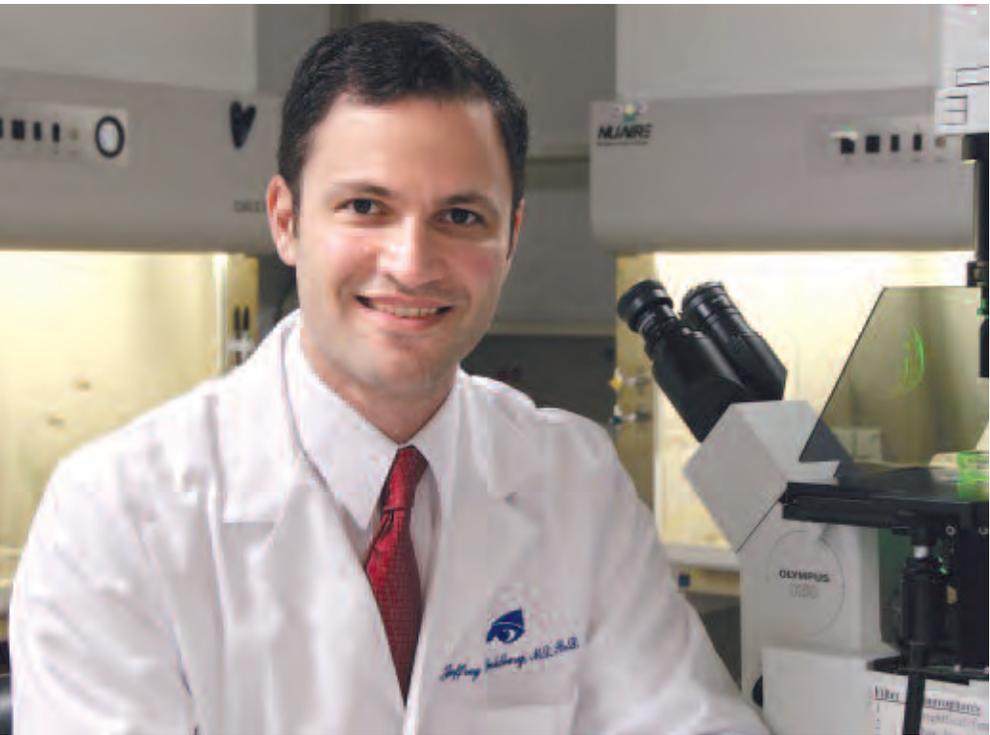
How did you first become interested in biomedical research?

After my undergraduate education in chemistry, I worked as a technician in a nuclear chemistry laboratory in Pisa, Italy. I became interested in biology and graduated from the University of Pisa, majoring in neurophysiology under the mentorship of one of the great pioneers of the field, Giuseppe Moruzzi. When the local eye clinic needed a visual physiologist, I started working hands-on with hospital patients each morning and spent afternoons in the experimental laboratory. This represented a very formative and productive period. As my research became acknowledged, I began collaborating with national and international institutions and began teaching visual neuroscience in Pisa and Rome. Research has always been at the heart of my career. I am honored to have the privilege to work with such esteemed colleagues here at Bascom Palmer. I look forward to building upon Bascom Palmer's tradition of collaboration and continuing to strive toward unparalleled ophthalmic discoveries. Together we will help pave the way for Bascom Palmer's contribution in revolutionary areas of study and scientific research. ■

Bascom Palmer's scientific research Frontiers of Vision

William L. McKnight, the legendary leader of Minnesota Mining and Manufacturing Company (3M), valued research as "a key to tomorrow." As a result of McKnight's generosity, Bascom Palmer's Evelyn F. and William L. McKnight Vision Research Center embodies his enthusiastic support of research on the nervous system and the eye as a "window to the brain and body."

Primarily based in the McKnight Center, Bascom Palmer's scientists advance the frontiers of ophthalmology. Meet some of them now as they describe their work – in their own words.



Jeffrey L. Goldberg, M.D., Ph.D.
Associate Professor of Ophthalmology

In my laboratory research, I am studying why neurons in the retina, particularly photoreceptors and retinal ganglion cells that transmit information from the retina to the brain, fail to regenerate themselves in degenerative diseases like macular degeneration and glaucoma. I am looking at two potentially promising strategies for cellular regeneration. The first involves harvesting a patient's adult retinal stem cells from their peripheral retina, growing them in the laboratory and reimplanting them back into the patient as retinal neurons. The second approach is applying nanotechnology to ocular repair - using magnetic nanoparticles to deliver stem cells to the back of the eye or to encourage retinal ganglion cells to grow through the optic nerve.

M. Livia Bajenaru, Ph.D.
Research Assistant Professor of Ophthalmology

My research interests are cellular biology and anatomy. I am focused on finding therapeutic treatments for optic neuropathies, such as glaucoma, and for ocular tumors, such as optic pathways gliomas and retinoblastomas, which may occur in children. I am using biochemical and pharmacological tools and experimental models to identify cell-signaling pathways and molecular targets in retinal ganglion cells, and in the supporting star-shaped glial cells (astrocytes). Using a sophisticated contact lens model, I am also studying the molecular development of infectious keratitis associated with the use of contact lenses.



Abigail S. Hackam, Ph.D.

Associate Professor of Ophthalmology

My laboratory investigates genes and cellular pathways that lead to photoreceptor degeneration, including age-related macular degeneration and retinitis pigmentosa. Our main research focus is to identify novel treatments that increase photo-receptor survival. A major component of this research is determining the role of a cell type called glia during retinal disease. We recently identified a class of molecules called “Wnts” that protect photoreceptors from dying and are active in glial cells. We are currently investigating how Wnts work and determining whether they can be utilized as a novel therapeutic strategy for retinal degeneration.



Giovanni Gregori, Ph.D.

Research Assistant Professor of Ophthalmology

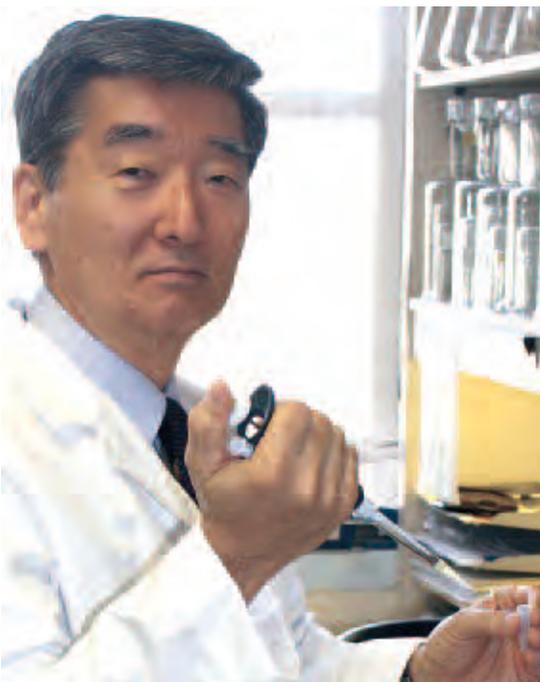
We are making great progress in the development of new retinal imaging tools, focusing in particular on spectral domain optical coherence tomography, a relatively new technology that can produce three-dimensional images of the retina with very high resolution. Our group has developed algorithms that for the first time allow the physician to visualize accurately the spatial geometry and anatomy of the retina. This makes it possible to measure small retinal features and accurately monitor their changes over time, a crucial step in evaluating the need for treatment or the effectiveness of different treatment programs. Using this approach, we have developed important insights into the disease processes associated with age-related macular degeneration.



George Inana, M.D., Ph.D.

Professor of Ophthalmology

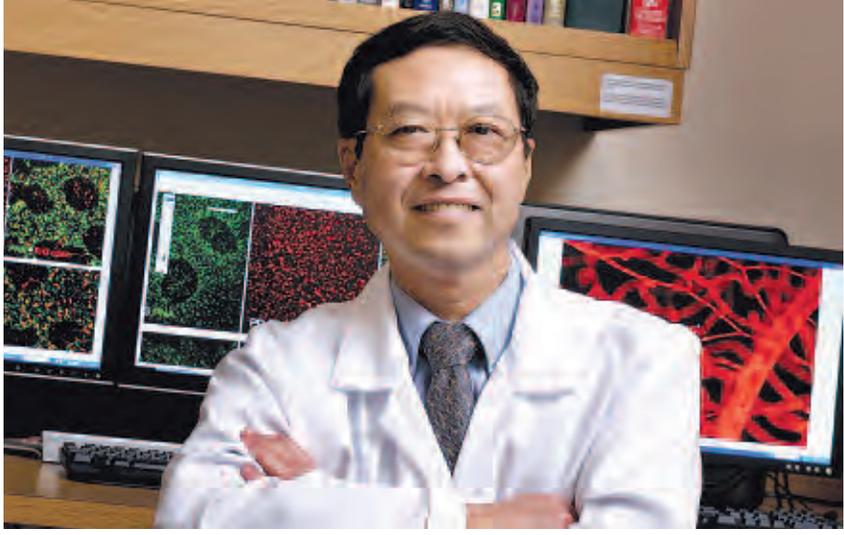
My research has focused on understanding and curing age-related macular degeneration (AMD) and other retinal degenerative diseases (RD) through molecular genetic approaches. Notable achievements of our team over the years have included cloning of the first inherited retinal degeneration gene (for gyrate atrophy), identification of three novel gene targets for RD and, most recently, identifying many new candidate genes for AMD by a novel gene-screening approach. An experimental model based on one of these genes, MMP14, is being used for therapeutic testing. We have achieved very promising preliminary results, demonstrating that therapy for wet AMD based on this gene may be superior or complementary to the anti-VEGF therapy available today.



Yiwen Li, M.D.

Research Assistant Professor of Ophthalmology

My research is focused on the degeneration of cone cells in the retina of the eye. Cone cells are photoreceptors that are responsible for color and central vision and are very important for our daily activities. Cone cell death causes blindness in the late stages of retinal degeneration. I have characterized cone degeneration in experimental models and have discovered recently that it can be reversed by CNTF, a neurotrophic factor. I am currently testing other factors for their abilities to reverse cone degeneration. My research in photoreceptor cell biology, retinal vascular disorders and retinal degeneration could one day lead to new therapies to save sight.



Rong Wen, M.D., Ph.D.
Associate Professor of Ophthalmology

The long-term objectives of my research are to understand the mechanism of retinal degeneration and to develop new therapies to stop this blinding disease. As a retinal cell biologist, I want to understand why photoreceptors – the light-sensing neurons – die prematurely in retinal degeneration. Photoreceptors renew their light-sensing devices every 10 days, an energy-consuming process. I have developed a novel technology to measure this renewal rate in order to understand how it is affected by different pathological conditions. I believe this is a key to understanding this process and could lead to the development of novel treatments for retinal degeneration.



Sanjoy K. Bhattacharya, Ph.D.
Associate Professor of Ophthalmology

My research concentrates on the cell biology of the trabecular meshwork, an area of tissue in the eye located between the iris and the cornea responsible for draining the aqueous fluid from the eye. Aqueous is the clear liquid that bathes and supports the inside of the eye. An imbalance in aqueous outflow through the tabecular meshwork results in elevation of intraocular pressure, which damages the optic nerve and is frequently associated with glaucoma. We have discovered how the protein “cochlin” affects the outflow of fluid and is critical in controlling intraocular pressure. We are studying how cochlin may contribute to glaucoma and how to reverse its damaging effects.

Mitra Sehi, O.D., M.S., Ph.D., F.A.A.O.
Research Assistant Professor of Ophthalmology

My research is focused on detection of the earliest signs of damage to retinal nerve cells and their axons in glaucoma in order to intervene before the retinal nerve cells die. Advanced technologies for eye research are used to detect the earliest signs of glaucoma-related damage to the optic nerve head and nerve cell axons. We use advanced ocular imaging, electrophysiological techniques, and mathematical models to evaluate the impact of damage due to glaucoma on the structure and function of the visual system over time.



Maria E. Marin-Castaño, M.D., Ph.D.
Research Associate Professor of Ophthalmology

Little is known about the prevention of age-related macular degeneration, the leading cause of severe visual impairment among elderly persons worldwide. My research focuses on understanding and explaining the origin and development of AMD, and then applies that knowledge to identify more effective preventive strategies and therapeutic approaches. AMD arises from a complex interaction of genetic, systemic and environmental risk factors. I am focusing upon the roles played by cigarette smoking and hypertension, which are major risk factors for developing AMD. My research explores molecules that could be used as biological indicators in blood, urine and eye fluid to help predict which patients who smoke and have high blood pressure, will get AMD.





Wei Li, Ph.D.

Assistant Professor of Ophthalmology

Retinal aging is caused by accumulation of harmful metabolic products that may lead to age-related macular degeneration. Several of these products have been identified and associated with retinal damage. Currently, there is no therapeutic intervention to prevent or minimize the accumulation of these substances. With my interest in molecular therapeutics for eye diseases involving the immune system, I am investigating molecules that control the clearance of these metabolic products by retinal pigment epithelium cells. Our studies look at the therapeutic potential of these molecules to facilitate the clearance of these products and to prevent retinal aging.



Valery I. Shestopalov, Ph.D.

Associate Professor of Ophthalmology

Molecular mechanisms of the eye that trigger aberrant communication between various cells is the focus of my research. By using molecular genomics and bioinformatics, we analyze pathological alterations in the signaling between most vital cell types. Our research revealed the roles that individual cells and molecules play in the resistance to ocular pathologies. One of my newest projects utilizes cutting-edge DNA sequencing to survey microbial pathogens at the surface of the eye. We identified hundreds of bacterial species, some of which were never detected or were completely unknown to doctors. This scientific knowledge will ultimately be translated into clinical application for the treatment of glaucoma, optic neuritis and retinal ischemia, eye infections, dry eye and allergies. ■

Delia Cabrera DeBuc, Ph.D.

Research Associate Professor of Ophthalmology



My research focuses on physical and mathematical modeling of retinal and corneal morphology as visualized by optical coherence tomography (OCT). I have introduced quantitative tools and measures into the analysis of OCT images using basic principles from physics in order to quantify treatment-induced changes in patients with ocular

diseases. I am exploring the relationship between vitreoretinal disease and the internal architecture of the retinal structure in patients with diabetic retinopathy. My goal is to develop indicators for the early detection of diabetic retinopathy using OCT.

WHAT IS A CLINICAL STUDY?

A clinical study, also known as a clinical trial, applies the scientific method to human health. Essentially, clinical studies combine medical research with patients. Most medical research begins in the laboratory and when that research generates positive results that may benefit patients, it is translated to patient applications in the form of clinical trials or studies. An observational study, a type of clinical study, is one in which patients are observed and their outcomes are measured by doctors. Another type of clinical study is an interventional study in which patients are assigned by the doctor to a treatment or other intervention, and their outcomes are measured.

Bascom Palmer Eye Institute has a long history of leading, participating in and sponsoring clinical trials to improve patient care.

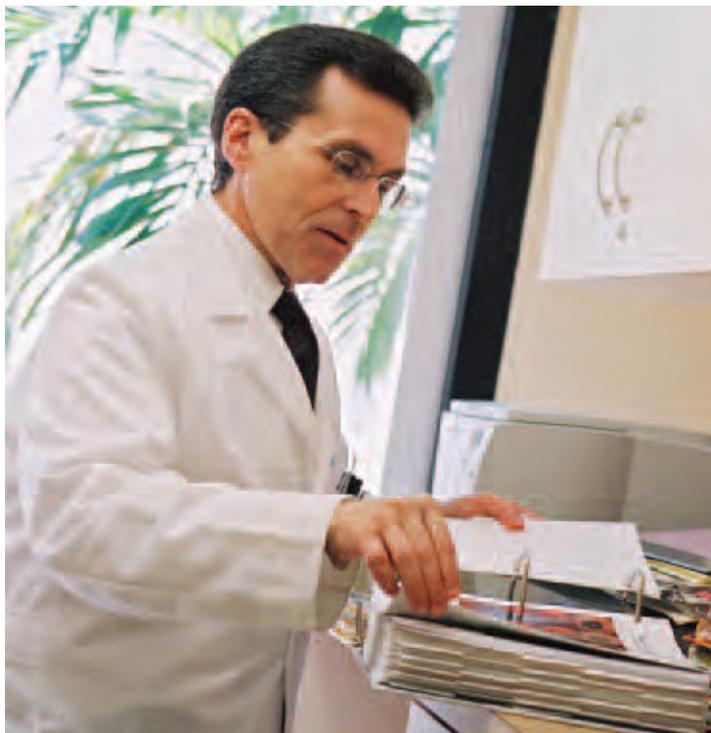
WHAT ARE THE SYMPTOMS OF MACULAR DEGENERATION?

- Words appear blurry while reading
- Inability to recognize faces at a distance
- Blurred or blind spot in the center of vision
- Straight lines appear wavy or crooked
- Rapid loss of central vision

Do you have Dry Age-Related Macular Degeneration (AMD)?

You may qualify for a clinical study at Bascom Palmer Eye Institute in Palm Beach Gardens or Miami.

Bascom Palmer macular degeneration specialists, Drs. Philip J. Rosenfeld and Sander Dubovy (in Miami) and Andrew Moshfeghi (in Palm Beach Gardens), are seeking volunteers for a study using an FDA-approved drug (off-label) named Eculizumab (SOLIRIS). Through this study, our doctors hope to provide a better treatment for dry AMD.



To be included:

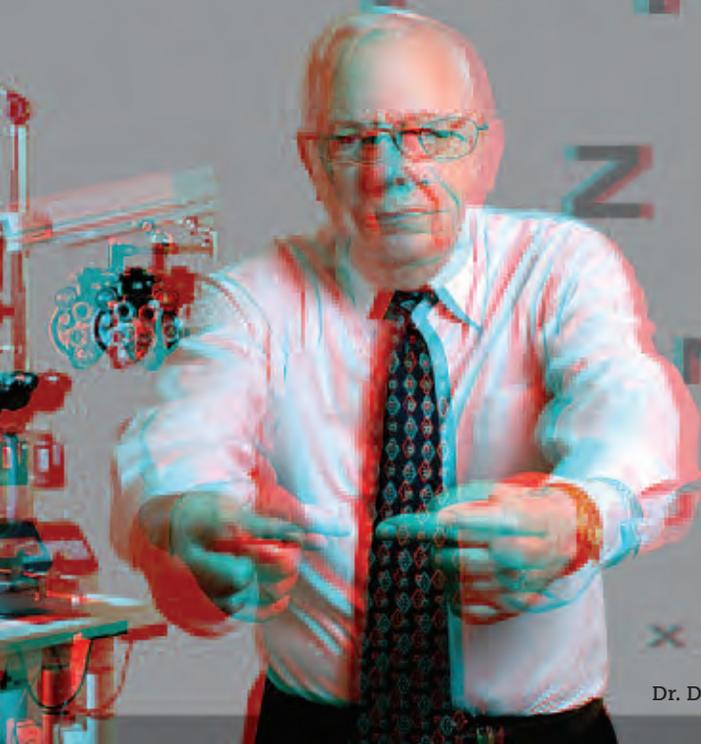
- Your vision needs to be better than 20/100 in one eye.
- You must be able to visit Bascom Palmer every week for four weeks, then every two weeks for six months. Half the visits are one to two hours in duration, the other half are three to four hours long.
- Your other eye can have wet or dry AMD.

Presently, the only recommended treatments for dry AMD include vitamin/micronutrient supplementation and an appropriate diet which only slows the progression of disease and vision loss. Eculizumab is administered as an intravenous infusion in a vein in the arm. Two out of three study patients get the drug. One out of three patients gets a placebo. Neither the doctors, nurses, nor patients will know who is receiving the drug or the placebo. After six months of therapy, the infusions are stopped and patients are examined every three months.

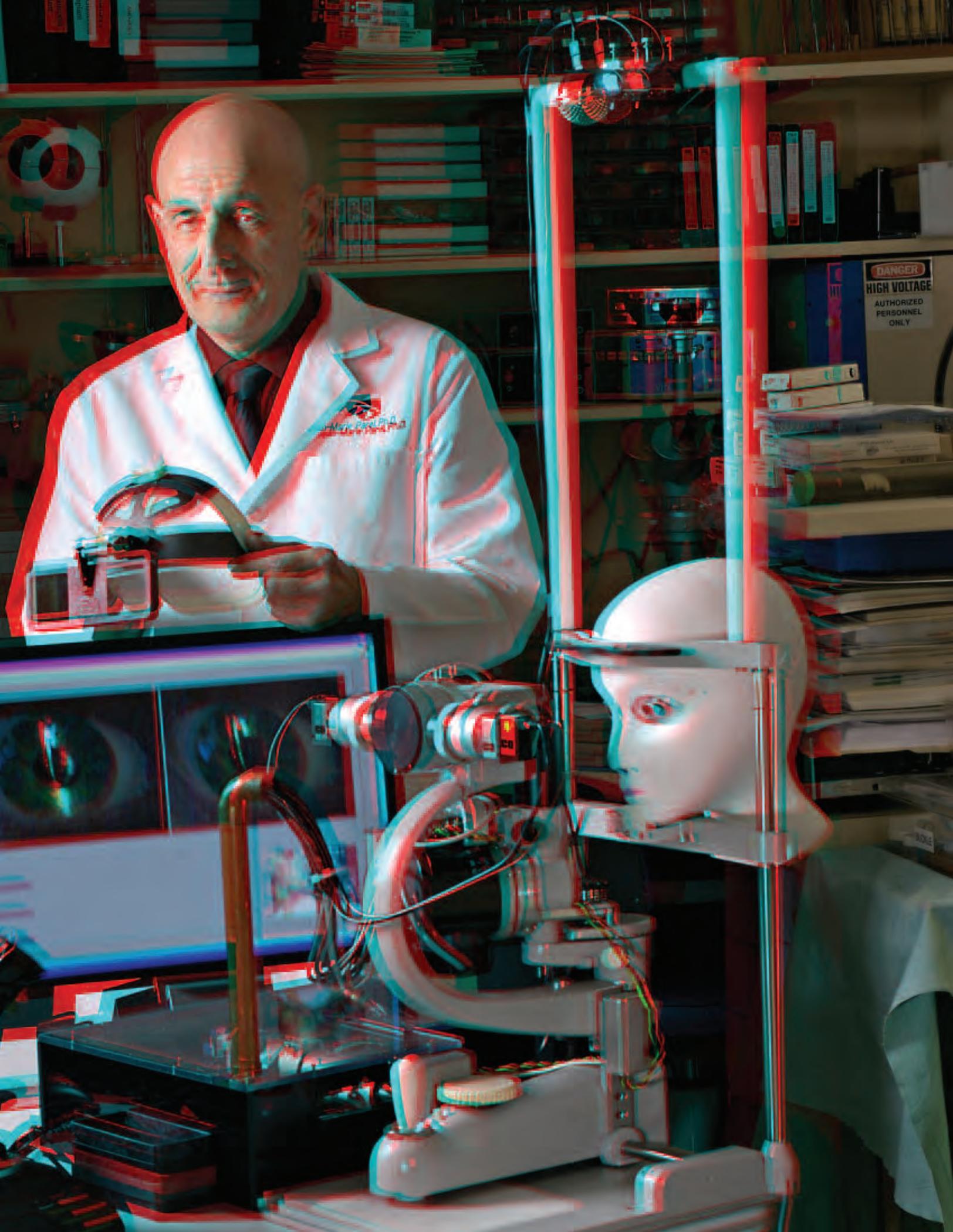
For more information: contact Maria Esquiabro, clinical study coordinator, at mesquiabro@med.miami.edu or 305.326.6508. Visit bascompalmer.org and click on Clinical Studies for a description of the study. ■

3-D

Some See It
Some Don't



Dr. Douglas Anderson



DANGER
HIGH VOLTAGE
AUTHORIZED
PERSONNEL
ONLY

Some See 3-D Some Don't

**When swinging a golf club,
driving a car, or cooking dinner
we need to judge the distance
of objects near and far.**

In our everyday activities, we take depth perception for granted, not realizing that this is a complex brain process involving two functional eyes as well as many visual clues. For example, if someone in the distance obscures part of a hedge, your brain can determine that the hedge is further away than the person.

Through familiarity, the brain knows the typical size of people and common objects. When driving on the highway, we know that a tiny image of a car in the rear-view mirror means that vehicle is far away. When we look at a flat painting, our brain uses size and position information to interpret “distances” created by the artist’s use of perspective.

“When a friend starts walking toward you, you don’t perceive that person as getting bigger, but your brain interprets the enlarging image to mean the person is coming toward you,” explains Douglas R. Anderson, M.D., FARVO, professor of ophthalmology and holder of the Douglas R. Anderson Chair in Ophthalmology. “We see in three dimensions (3-D): height, width, and depth, which can be either distance or thickness.”

Because our two eyes see objects from slightly different angles, the images they send to the brain are slightly different. Through a process called “stereopsis,” the brain interprets those differences to help determine the distances to objects in our fields of vision. When objects are very far away, there is very little distinction between the eye’s two images. Therefore, we can’t perceive the varying distances of the stars and planets. At moderate distances, such as walking through a room or

parking a car, stereopsis supplements other visual cues. In general, stereopsis provides the greatest help when viewing nearby items, such as when sewing or cooking. Such tasks are more difficult without normal binocular (two-eye) vision because monocular (one-eye) vision does not provide those two slightly contrasting images to our brains.

“Depth perception is thus a rather complex process,” adds Anderson. To see the importance of stereopsis, try to perform this simple task: first, cover or close one eye. Then try to bring together the index fingers of your two hands with your elbows moderately bent. It’s very difficult to get those fingers to meet without binocular vision.

Many animals, like fish, horses, cattle or deer, have depth perception only from non-stereoscopic clues. Their eyes are located toward the side of the face, giving them a broader field of vision to detect predators. However, the two eyes do not see the same objects at differing angles to provide stereopsis. That difference underscores the importance of stereopsis in humans.

At Bascom Palmer Eye Institute, our clinicians strive to preserve binocular vision whenever possible, allowing stereoscopic depth perception of near objects. Our physicians also use a variety of instruments to measure depth and distance. For example, highly sophisticated diagnostic tools can measure how long it takes for an ultrasound pulse or focused beam of light to be reflected back to the instrument. This information-gathering process – which is made possible by powerful computing technology – allows our clinicians to create 3-D images of the eye and identify changes caused by diseases. In addition, our biomedical researchers have been leaders in the development of innovative 3-D

“Seeing in three dimensions – or depth perception – is a rather complex process. Most people take their binocular vision for granted – until they try to perform a simple task that involves depth perception, like trying to touch the index fingers on each hand with one eye closed.”

— Douglas R. Anderson, M.D.

(Photo at left) The development of a mechanized remotely-operated slit lamp biomicroscope (fondly called “Don’s Drone”) may greatly improve access to specialists for remote patients providing them with better and more affordable eyecare. The system, conceived by Dr. Donald Budenz, and fabricated by Dr. Jean-Marie Parel (shown), permits remote 3-D stereo-viewing of the patient’s eye with the full functionality of a standard slip lamp. Made possible through the support of the Department of Defense, this project is part of a growing paradigm of teleophthalmology and Defense-sponsored projects for Bascom Palmer.

imaging technologies and techniques designed to improve patient care around the world.

This issue of *Images* takes an in-depth look at 3-D vision of the eyes. It also illustrates how Bascom Palmer's clinical and research teams continue to advance the frontiers of medicine by improving 3-D methods to observe the eye's structure and examine diseased regions.

An In-Depth Look at 3-D Vision

Stereopsis is the special effect used to create the 3-D movie "Avatar" and other blockbuster films. It also accounts for the arrival of 3-D television, the creation of 3-D commercials for special events like the World Cup, and 3-D photographs that literally jump off the magazine page. Today, "3-D" is a big part of the multimedia entertainment industry. By wearing an inexpensive set of red and blue filters, such as those included in this issue of *Images*, your eyes can convert a fuzzy-looking multicolor photograph or video into a sharp image with depth. The filters allow each eye to see only one of the two images, as the stereopsis enhances and emphasizes the other depth-related visual clues.

Creating Stereoscopic 3-D Images

In 1838, British scientist Sir Charles Wheatstone explained stereopsis in detail and constructed the first stereoscope. Lenses and mirrors combined two different photographs into one "solid" image. A few decades later, another British inventor, David Brewster, developed the prism stereoscope and touched off a craze for "stereogram" photos. In the 20th century, American children enjoyed 3-D images of scenes around the world using their ViewMaster™ stereoscopes.



Stereoscope courtesy of Dr. Louis Goldszer, optometrist, retired, Pittsburgh, PA and Dr. Robert Goldszer, chief medical officer, Mount Sinai Medical Center, Miami Beach

Meanwhile, Hollywood made 3-D movies using glasses with red and blue filters to create a sense of depth. Although the first three-dimension motion picture feature, "The Power of Love," was made in 1922, only in the 1950s did 3-D movies catch on with the public, as fire-breathing monsters, rocket ships and speeding bullets appeared to fly right at the audience, pulling patrons right into the action.

In a major advance, filmmakers in the '50s began using polarization, rather than red-blue filters, to produce movies with more vivid, natural color. Today's 3-D movies are filmed with two synchronized cameras taking slightly different views of the same scene, each seen with a polarized filter at a separate orientation. Moviegoers wear glasses with polarized filters at orientations that permit each eye to see only one image. The result is a more comfortable "big-screen" experience, as shown by attendance of large audiences at 3-D IMAX theaters. A further advance is emerging with 3-D television. The screen shows alternating images very rapidly, and the filters are synchronized so that one eye sees every other image. These special effects may be particularly striking with large images that move forward on the screen toward the viewer.



Helping Children Develop 3-D Vision

Newborn babies see the world as a confusing place, filled with blurry, indistinct shapes and washed-out colors. It takes time for an infant's eyes to learn how to focus on objects near and far, and for the brain to interpret the visual information it receives through the optic nerves.

However, in 2 to 4 percent of infants, the two eyes are misaligned – a disorder known as strabismus (called "squint" in the United Kingdom). Without early treatment, a child with strabismus may never develop stereopsis. They depend on other clues to judge distance. "Many individuals are not aware they lack stereopsis, and assume that their vision is the same as in other people," says Craig A. McKeown, M.D., professor of clinical ophthalmology and a specialist in pediatric disorders of the eye.

"Newborn babies move from poor vision to nearly adult levels of vision by age 3," he adds. "To develop good vision, children have to use their eyes. For the brain to have the ability of seeing with stereopsis, the eyes need to be well aligned and used together during the first few years of life when humans develop their binocular vision."

Misaligned eyes have different images. If the brain of an infant is unable to merge them to create stereoscopic appreciation of depth, the brain's attention is turned away from one image to avoid double vision. If the brain occasionally switches attention from one eye to the other, each eye will

(Photo at right)

Dr. Craig McKeown and the team of Bascom Palmer pediatric ophthalmologists treat more than 7,000 children each year.



The Four Dimensions of Life

In mathematics and science, the dimensions of life have very specific meanings:

1-D

Length:
Picture a dot or a long line stretching out to infinity.

2-D

Height and width:
Like a photo or painting, a two-dimensional image covers a flat area. However, visual cues within the image – such as smaller figures in the background – can create the illusion of depth.

3-D

Height, width and depth:
Using various stereopsis techniques, two slightly different images can be brought into alignment so the eyes perceive a 3-D image.

4-D

Height, width, depth and time:
A series of 3-D images taken at different times can provide a physician with important information about the progress of an eye disease or other condition.

have good vision, but both eyes will not be used simultaneously. If the brain habitually ignores one eye in favor of the other, it never develops full visual potential, a condition called “amblyopia.”

“On any given day, Bascom Palmer’s William and Norma Horvitz Children’s Center is filled with children who have either limited or no stereoscopic capabilities,” says McKeown. “We see many children with strabismus, amblyopia, and other problems so that only one eye can see well. We also see adults with similar conditions.”

While there can be many causes for strabismus, this disorder is often related to the brain’s signaling to the tiny sets of muscles that control the positioning of the eyeballs. As a result, one eye may be turned in or out, up or down, or be rotated in one direction or another. For decades, Bascom Palmer’s ophthalmologists have been performing corrective surgery to equalize those tiny muscle groups.

From one cause or another, it is estimated that between 3 million to 9 million people in the United States have vision problems that keep them from enjoying 3-D television or movies. Not all come from childhood conditions. “Many of our patients will be unable to see the three-dimensional photographs appearing in this issue of *Images*,” says Eduardo C. Alfonso, M.D., Bascom Palmer’s chairman. “The lack of depth perception in some adults results from glaucoma, age-related macular degeneration, cataracts, or various other eye disorders. To someone unable to see in 3-D, the photographs will look blurry, discolored, and out of focus without the red and blue filters. But even wearing the filters, that person will see only one of the two images flat on the page like any other picture.”

Diagnosis and Treatment

In some cases, parents may be able to see a misalignment, unsteady gaze in a child’s eyes, or an unusual way a child looks around. However, not all children with a slight misalignment have obvious symptoms or signs. That’s why physicians recommend vision assessments of ocular alignment and visual development early in an infant’s life.

The first eye evaluation should be performed by the pediatrician during the initial newborn screening examination, and ideally again as part of well-baby examinations and regular pediatric visits. This is particularly important during visual development, which continues through the first decade of life. “The earlier a problem is detected and treatment

initiated,” McKeown adds, “the more likely we are to have a favorable outcome.”

The Bascom Palmer team also works with many teenagers and adults who have double vision, which can result from a recurrence of childhood strabismus or from a new problem. In all these cases, strabismus results in a loss of stereoscopic vision.

An indication that a child may not see in 3-D might be a lack of reaction during a 3-D movie or TV show when others are reacting with “ohs” and “ahs” and reaching for objects that appear to come out of the screen. “If we are certain that a child doesn’t have stereopsis, I often tell the parents to avoid 3-D movies, since they may be frustrating to the child,” McKeown says. “Recently, I have begun to tell them that it may not be wise to spend the extra money to buy one of the new 3-D television sets unless others in the family will enjoy it.”

Through the years, McKeown has seen many patients who have learned to compensate for the loss of one eye – and, as a consequence, the loss of stereopsis – by using other visual cues. Such patients include a football quarterback blinded in one eye as a result of a childhood accident, but who needed surgery when his remaining eye drifted off center. “3-D vision is necessary in football, but this young man was able to succeed using clues other than stereopsis,” McKeown says. “However, having stereoscopic ability is essential to some types of careers, such as performing certain types of surgery or passing a commercial or military pilot’s examination,” he adds.

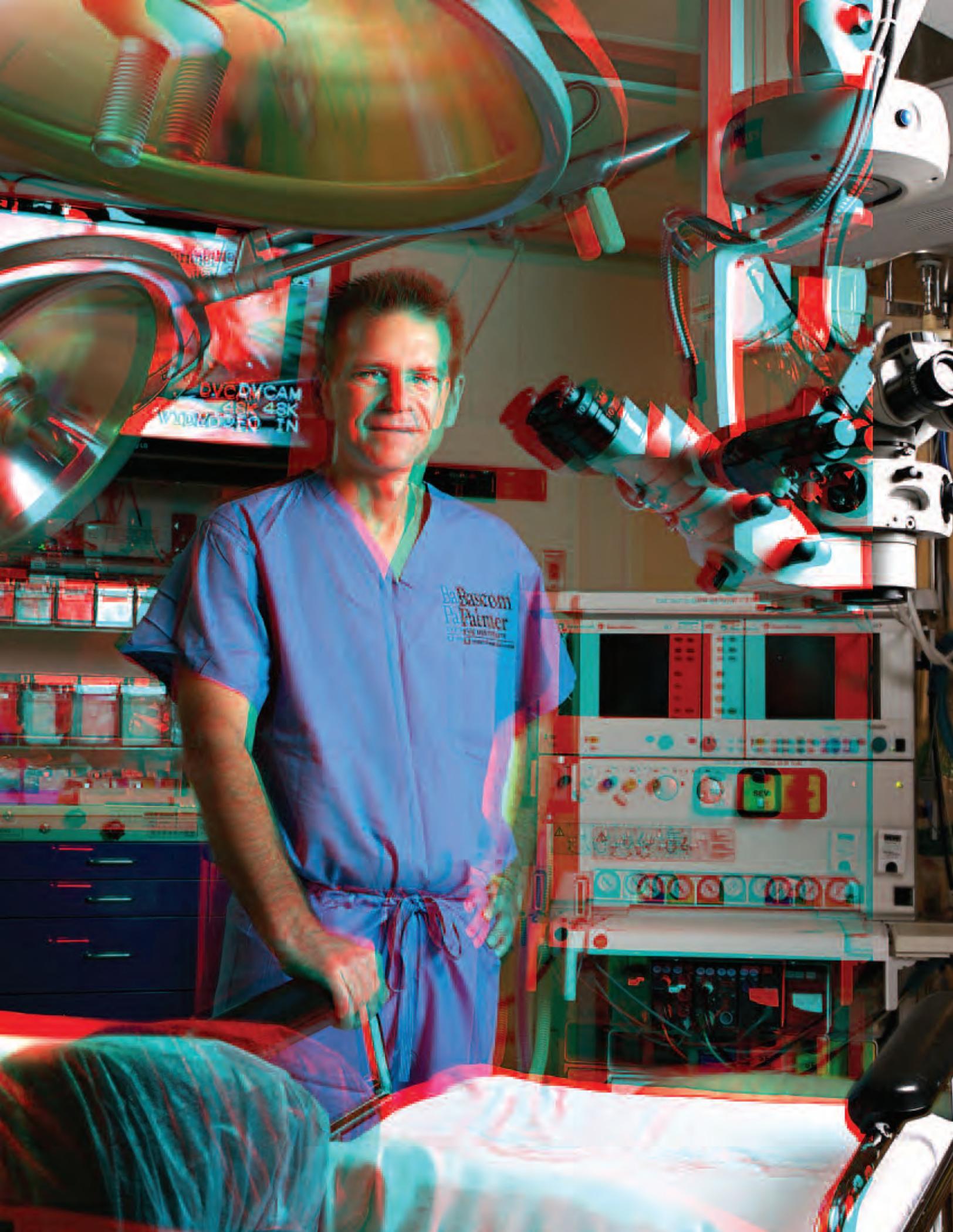
Although Bascom Palmer’s Pediatric Service sees several hundred patients a week with strabismus, most are treated successfully without surgery. “Because a child’s body is developing and changing in many ways, the character and treatment of strabismus may fluctuate through the years,” says McKeown. “We tell parents that the right type of treatment today may be different in the future. Our goals are for the child to grow up with good vision in each eye, to maintain 3-D binocular vision and to have eyes with a normal ‘straight’ appearance.”

Studying the Eye in 3-D

Bascom Palmer has a long history of studying the eye in three dimensions. Beginning in the 1970s, all photography at Bascom Palmer was done with film

(Photo at right)

Glaucoma specialist, Dr. Donald Budenz, has helped develop the parameters for advanced, three-dimensional imaging for glaucoma at Bascom Palmer.



DVCDV CAM
48K 48K
VIDEO IN

Basscom
Palmer
Boston Children's Hospital



in three-dimension. Dr. Edward W. D. Norton, founding chairman of Bascom Palmer, and fellow-founder, Dr. J. Donald M. Gass, believed that details of a disease or disorder were better seen when looking at it in three-dimensions. Gass's *Stereoscopic Atlas of Macular Diseases – Diagnosis and Treatment*, first published in 1970, and now in its fourth edition, continues to set the standard for stereoscopic imaging of medical conditions. Three-dimensional imaging enabled Gass and Norton to discover and describe hundreds of ophthalmic clinical conditions.

Today, sophisticated 3-D scanning technology – such as magnetic resonance imaging, computed tomography, ultrasound and optical coherence tomography (OCT) – provides Bascom Palmer physicians with a better understanding of the eye, from the thin tear film in front, to the retina and optic nerve in back. For instance, Bascom Palmer's physicians use 3-D technology in the treatment of glaucoma, a leading cause of blindness that affects more than two million Americans. Glaucoma is a family of ocular diseases characterized by progressive damage to the optic nerve, which is the part of the eye that carries the images we see to the brain. "Bascom Palmer's 3-D technology allows us to diagnose glaucoma sooner and chart its progression with better certainty than older techniques, such as visual fields and optic nerve photographs," says Donald L. Budenz, M.D., M.P.H., professor of ophthalmology and glaucoma specialist.

Unlike stereopsis, these powerful 3-D technologies create in-depth "models" of the eye. First, they generate two-dimensional images, effectively "slicing" the eye into many very thin sections, sometimes from different directions. During the scanning process, some types of tissue, such as bone or nerves, absorb or reflect more of the light, sound or x-rays than other tissues, creating 2-D images of the eye's structure. Powerful computer software applications then combine the two (or more) sets of images into a detailed 3-D representation of the eye. These representations can show a tiny embedded object, a retinal tear, an enlarged blood vessel or many other conditions affecting a patient's sight and

allow measurements not previously possible. As a result, 3-D imaging in ophthalmology is critical to capturing the unique relationships among anatomic structures of the eye that traditional 2-D imaging with clinical photographs, ultrasound and OCT does not document reliably.

"Currently, the greatest utility of 3-D imaging is the ability to document the structural alterations in the eye to allow physicians to better understand tissue relationships," says Timothy G. Murray, M.D., M.B.A., professor of ophthalmology, vitreoretinal specialist and expert on retinoblastoma, the most common form of eye cancer in children. "This 3-D imaging has played a particularly large role in evaluation of the pediatric patient with complex retinal disease, evaluation of intraocular tumors, and in complex vitreoretinal disease in the adult, such as diabetic retinopathy, vitreomacular traction, epiretinal membrane and macular hole," he adds.

In addition, 3-D imaging allows the physician-in-training to experience the unique complexities of ocular disease, Murray says. "It is a major advance in teaching and has great potential for telemedicine evaluation. As technology advances, 3-D imaging will become the standard approach to imaging of the eye for clinical and surgical management."

Advancing the Frontiers

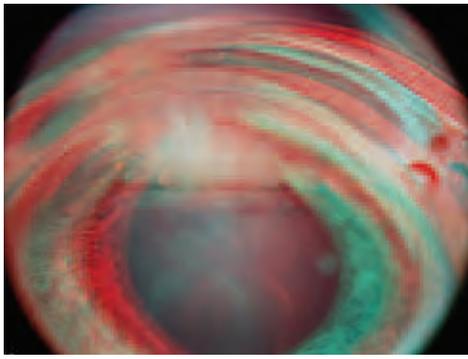
In the past decade, Bascom Palmer's clinicians and researchers have made further advances in 3-D imaging. Today, spectral domain optical coherence tomography (SDOCT) has become the best clinical method for high-speed imaging of many eye conditions. In fact, Bascom Palmer's SDOCT equipment can conduct 256 scans in half a second – less than the blink of an eye – using infrared light, which causes no discomfort for patients.

Just as a computer screen presents 2-D images using pixels – the more pixels, the sharper the resolution – SDOCT technology can create tiny 3-D cubes called "voxels" (for volume). Sophisticated modeling software then allows the physician to change the viewing angle, providing different perspectives on the optic nerve, cornea, lens or other parts of the eye.

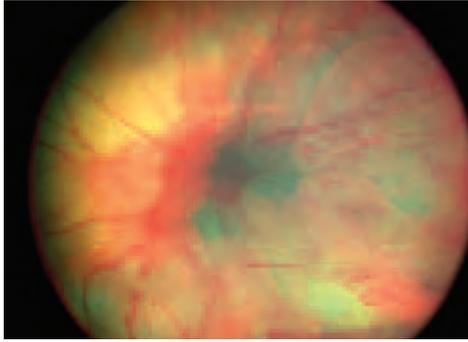
Today's SDOCT imaging technology allows Bascom Palmer ophthalmologists to visualize the eye in 3-D, helping them detect disease, diagnose other problems and follow changes in the eye. Some SDOCT instruments can automatically track the movements of the eye, making it an effective tool

(Photo at left) Biomedical engineer, Derek Nankivel (left) and research assistant, Marco Ruggeri, are part of Bascom Palmer's strong Ophthalmic Biophysics Center. Working with the clinical faculty, our engineers and scientists use state-of-the-art technology to invent, fabricate and develop instruments used for the diagnosis and treatment of eye disease. .

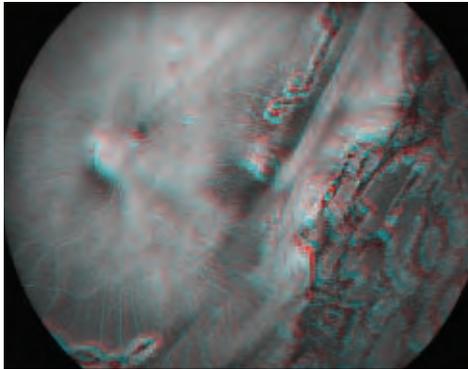
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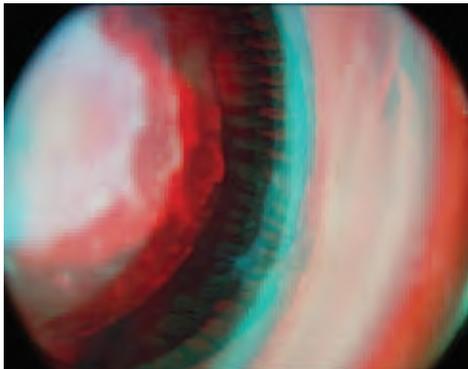
Lens material in the anterior chamber secondary to trauma



Coats' disease with a total retinal detachment



Familial exudative vitreoretinopathy with retinal traction and laser treatment



Retinoblastoma, the most common form of eye cancer in children. This photograph was awarded "Best of Show" Stereo Division, Ophthalmic Photographers' Society/ American Academy of Ophthalmology 2010

All photos on this page by Ditte J. Hess, CRA, Director of Photographic Educational and Research Training Programs, Bascom Palmer Eye Institute.

for patients with low levels of vision and those who cannot keep their eyes focused in a steady position.

Under the guidance of Jean-Marie Parel, Ph.D., Ing., ETS-G, director of the Ophthalmic Biophysics Center (OBC) and the Henri and Flore Lesieur Professor of Ophthalmology, Bascom Palmer biomedical engineers are pressing ahead with key enhancements to SDOCT imaging. Currently, SDOCT scans typically have limited depth – enough to provide a 3-D picture of either the retina or the cornea but not other structures, such as the entire anterior segment or the crystalline lens. This system is also used by scientists to understand glaucoma and other eye diseases, ultimately leading to better diagnosis and treatment.

Bascom Palmer's research team uses ultrasound biomicroscopy (UBM) to produce 3-D images of the crystalline lens. With UBM, high-frequency sound waves are bounced off the inside of the eye and the "echo" patterns are captured in an image called a sonogram or echogram. "We can correlate changes in the sound with changes in the crystalline lens," says biomedical engineer Derek Nankivil. "The optical and mechanical lens properties correlate with the speed of sound." The novel UBM scanning system designed, and built by Parel's team, provides a 3-D set of data for a computer display. The doctor can rotate the image and "fly" through the tissue for a close-up at different angles.

Benefits for the Patient

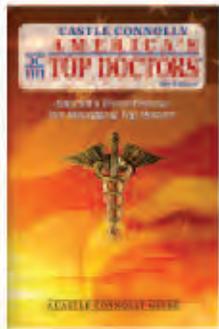
Taking a series of 3-D images allows clinicians to make precise measurements of changes in the eye over time – an important factor in treating glaucoma, age-related macular degeneration, cataracts and other chronic conditions. In glaucoma, for instance, a patient gradually loses nerve fibers. SDOCT scans help the clinician diagnose glaucoma since they reveal thinning of the layer of a patient's nerve fibers and can determine treatment effectiveness by measuring any further loss of such fibers.

"If there is a further loss, we can adjust the treatment right away," says Anderson. "We can also plot the rate at which the nerve fibers are declining to help decide how aggressive treatment should be."

In the future, Bascom Palmer's research on 3-D imaging may lead to further breakthroughs in the treatment of many eye conditions. "Being able to see real-time images of the cornea, lens and iris all at once in 3-D would be a fantastic benefit during corneal transplants or other eye surgeries," says Parel.

Finally, Parel believes that readily available 3-D imaging could provide an accurate and objective life-long record of any changes to an individual's eye. "If we took 3-D images at a young age or at the time of a first eye examination, we would have a reliable benchmark for the future," he says. "If that person comes back later and is not seeing well, we could take a new 3-D image and compare the differences. That would be a huge benefit to the patient and a major advancement in ophthalmic medicine." ■

Faculty named nation's best



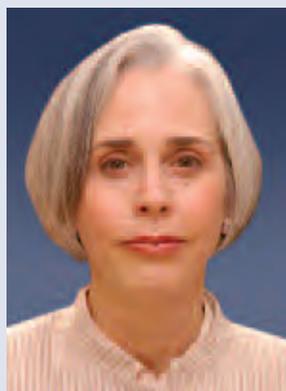
Twenty-seven Bascom Palmer Eye Institute physicians are included in *America's Top Doctors*. Published each year by Castle Connolly, physicians are selected by their peers throughout the country for their medical experience and skill. The inclusion of our faculty members on this notable list is another indicator of the extraordinary quality of medical care at Bascom Palmer. The physicians are named below with their practice locations.



Eduardo C. Alfonso, M.D.



Hilda Capo, M.D.



Janet L. Davis, M.D., M.A.



Thomas E. Johnson, M.D.

America's Top Doctors® 2010/11

Vitreoretinal Diseases

Janet L. Davis, M.D., M.A. (M, P)
 Yale L. Fisher, M.D. (PBG)
 Harry W. Flynn, Jr., M.D. (M)
 Timothy Murray, M.D., M.B.A. (M)
 Carmen A. Puliafito, M.D., M.B.A. (PBG)
 Philip J. Rosenfeld, M.D., Ph.D. (M, PBG)
 Stephen G. Schwartz, M.D., M.B.A. (N, PBG)

Corneal and External Diseases

Eduardo C. Alfonso, M.D. (M)
 George F. Corrent, M.D., Ph.D. (N, PBG)
 William W. Culbertson, M.D. (M)
 Richard K. Forster, M.D. (M)
 Carol L. Karp, M.D. (M)
 Terrence P. O'Brien, M.D. (PBG)
 Victor L. Perez, M.D. (M, PBG)

Glaucoma

Donald L. Budenz, M.D., M.P. H. (M)
 David S. Greenfield, M.D. (PBG)
 Paul F. Palmberg, M.D., Ph.D. (M)
 Richard K. Parrish II, M.D. (M, P)

Neuro-Ophthalmology

Joel S. Glaser, M.D. (M)
 John R. Guy, M.D. (M, PBG)
 Norman J. Schatz, M.D. (M)

Ophthalmic Plastic and Reconstructive Surgery

Thomas E. Johnson, M.D. (M)
 David T. Tse, M.D. (M, PBG, N)

Pediatric Glaucoma

Elizabeth Hodapp, M.D. (M)

Pediatric Ophthalmology

Hilda Capo, M.D. (M)
 Craig A. McKeown, M.D. (M, PBG, N)

Comprehensive Ophthalmology

Lori M. Ventura, M.D. (M)

Key: M Miami
 PBG Palm Beach Gardens
 P Plantation
 N Naples

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Faculty continues expansion



CHRIS R. ALABIAD, M.D., an ophthalmic plastic and orbital surgery specialist, joins the faculty as an assistant professor of clinical ophthalmology. Alabiad received a bachelor of science degree and a doctor of medicine degree from the University of Miami. He completed an

internal medicine residency at Massachusetts General Hospital at Harvard University followed by an ophthalmology residency and an American Society of Ophthalmic Plastic and Reconstructive Surgery-approved fellowship in oculofacial plastic and reconstructive surgery at Bascom Palmer. He is certified by the American Board of Internal Medicine and the American Board of Ophthalmology. Alabiad is available for consultation on oculofacial plastic, reconstructive and orbital surgeries, as well as ophthalmic and orbital oncology at Bascom Palmer's locations in Miami and Naples. He will also see patients at the Miami Veterans Hospital. His research interests include orbital inflammatory disease, orbital infectious disease, and orbital and adnexal oncology.



JORGE A. FORTUN, M.D., joins Bascom Palmer as an assistant professor of clinical ophthalmology. A vitreoretinal specialist, Fortun received a bachelor of science degree from Vanderbilt University and a doctor of medicine degree from the University of Michigan Medical School. He then

completed an ophthalmology residency, serving as chief resident at Baylor College of Medicine Affiliated Hospitals, and a fellowship in vitreoretinal diseases and surgery at Emory Eye Center of the Emory University School of Medicine. He is certified by the American Board of Ophthalmology. Fortun is available for consultation at Bascom Palmer Eye Institute at Palm Beach Gardens on vitreoretinal diseases and surgery, including macular degeneration, retinal vascular disease, diabetic retinopathy, macular surgery and retinal detachment repair. His research interests include macular degeneration, retinal vascular disease, and innovation of surgical instrumentation and techniques.



AMY C. SCHEFLER, M.D., joins the faculty as assistant professor of clinical ophthalmology. Schefler, a vitreoretinal specialist, received a bachelor of arts degree from Yale University and a doctor of medicine degree from Weill Medical College of Cornell University. She completed an

ophthalmology residency, serving as chief resident, and fellowships in vitreoretinal surgery and ocular oncology at Bascom Palmer. Additionally, she underwent training in ocular oncology at Wills Eye Institute and Memorial Sloan-Kettering Cancer Center. Certified by the American Board of Ophthalmology, Schefler is available for consultation on pediatric and adult ocular tumors, and vitreoretinal surgery at Bascom Palmer Eye Institute at Miami and Palm Beach Gardens. Her research interests include pediatric and adult ocular tumors.



SARA TULLIS WESTER, M.D., joins Bascom Palmer as assistant professor of clinical ophthalmology. Wester received a bachelor of arts degree from Dartmouth College prior to receiving a doctor of medicine degree from Harvard Medical School. She then completed both an

ophthalmology residency and an American Society of Ophthalmic Plastic and Reconstructive Surgery-approved fellowship in oculofacial plastic and reconstructive surgery at Bascom Palmer. She is certified by the American Board of Ophthalmology. Wester is available for consultation on oculofacial plastic, reconstructive and orbital surgery, and cosmetic facial rejuvenation at Bascom Palmer's locations in Miami, Plantation and Palm Beach Gardens. Her research interests include orbital and adnexal oncology and orbital inflammatory disease.

To schedule an appointment with a Bascom Palmer specialist, please call 1-888-845-0002, or visit bascompalmer.org

Bascom Palmer ranked #1 in ophthalmology for seventh consecutive year

For the seventh consecutive year, Bascom Palmer Eye Institute was ranked the nation's best in ophthalmology in *U.S. News & World Report*. Bascom Palmer has received the #1 ranking nine times since the rankings began 20 years ago.

The magazine's **Best Hospitals** guide ranks America's top hospitals in 16 medical specialties. The annual issue is a resource for consumers who seek optimal care in the diagnosis, treatment and management of difficult medical problems.

"We are honored to receive this prestigious recognition, especially since our patients share in this special accolade," says Eduardo C. Alfonso, M.D., professor and chairman of Bascom Palmer Eye Institute. "At Bascom Palmer, we provide the best clinical care possible. We do so through the expertise and compassion of our stellar team of 1,200 ophthalmologists, vision researchers, nurses, ophthalmic technicians and outstanding support staff. Ensuring personalized, exceptional care for each of our patients is always our priority and we deeply appreciate being highlighted for that ongoing effort."

For close to five decades, Bascom Palmer has been at the forefront of innovation in ophthalmology. This past year, a Bascom Palmer physician and his surgical team performed an extraordinary surgery in which a blind patient's sight was restored by removing her eyetooth, fitting it with an optical lens and implanting it into her eye. Bascom Palmer physicians also pioneered the off-label use of the colorectal cancer drug Avastin, to treat the wet form of age-related macular degeneration and other eye diseases.



OPHTHALMOLOGY		
Rank	Hospital	Reputation (%)
1	Bascom Palmer Eye Institute at the University of Miami	71.8
2	Wilmer Eye Institute, Johns Hopkins Hospital, Baltimore	67.6
3	Wills Hospital, Philadelphia	58.4
4	Mass. Eye and Ear Infirmary, Massachusetts Gen. Hosp., Boston	30.2
5	Jules Stein Eye Institute, UCLA Medical Center, Los Angeles	30.1
6	University of Iowa Hospitals and Clinics, Iowa City	17.7
7	Duke University Medical Center, Durham, N.C.	14.3
8	Doheny Eye Institute, USC University Hospital, Los Angeles	10.2
9	University of California, San Francisco Medical Center	8.8
10	Cleveland Clinic	7.6
11	Mayo Clinic, Rochester, Minn.	7.5
12	Methodist Hospital, Houston	6.9
13	New York Eye and Ear Infirmary	6.8
14	Emory University Hospital, Atlanta	6.7
15	Barnes-Jewish Hospital / Washington University, St. Louis	6.6
16	Hospital of the University of Pennsylvania, Philadelphia	6.6
17	W.K. Kellogg Eye Center, University of Michigan, Ann Arbor	4.1

"Bascom Palmer will continue to provide unparalleled care for our patients. Our mission to enhance the quality of life by improving sight, preventing blindness and advancing ophthalmic knowledge through compassionate patient care and innovative vision research is the engine that drives us every day."

Ophthalmology Times names Bascom Palmer best program in country



For the third year in a row, Bascom Palmer Eye Institute was named the **Best Overall Ophthalmology Department** in the United States by *Ophthalmology Times*. At a presentation during the American Academy of Ophthalmology's annual meeting in Chicago, Illinois, Mark Dlugoss and Sheryl Stevenson of *Ophthalmology Times* presented Drs. Eduardo Alfonso and Steven Gedde with the award. Bascom Palmer also ranked first for having the **Best Residency Program** and **Best Clinical (Patient Care) Program**.

Patient care has always been the prime focus for Bascom Palmer, which has retained its number one ranking in this area for all 15 years of the survey.

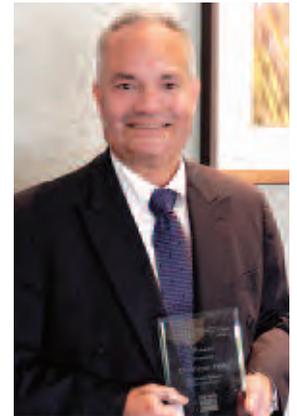


DR. STEPHEN G. SCHWARTZ (right) has assumed the presidency of the 500-member Florida Society of Ophthalmology. Schwartz is the first Bascom Palmer full-time faculty member to be elected president of the Society, although Dr. Bascom H. Palmer, for whom the Institute is named, served as president in 1948. Dr. Bradley Fouraker, outgoing president, is shown on the left.

VICTOR L. PEREZ, M.D. was selected as the recipient of the **INNOVATOR AWARD** at the 2010 South Florida Business Journal's annual Excellence in Health Care Awards.

Dr. Perez received the award for performing the first modified osteo-odonto keratoprosthesis, or "eye-tooth" surgery in the United States — a revolutionary procedure done last year that restored patient Kay Thornton's vision after nearly a decade of blindness. A cornea specialist, Dr. Perez led the multidisciplinary surgical team that brilliantly combined medicine, dentistry and ophthalmology to remove Thornton's tooth, fit it with an optical lens and implant it into her eye.

"Bascom Palmer Eye Institute congratulates Dr. Perez and his entire team on having received this prestigious recognition," said Eduardo C. Alfonso, M.D., chairman of Bascom Palmer. "The innovation used to create this revolutionary procedure is remarkable. We are all so pleased it was such a success and that our patient has been given back the precious gift of sight."



RICHARD K. LEE, M.D., PH.D., was selected as one of 10 inaugural winners of the University of Miami Miller School of Medicine **FACULTY CITIZENSHIP AWARD**. This award recognizes faculty members who exemplify the highest standard of service to the School and display good citizenship, integrity and an inspirational positive

attitude. "I want to take the opportunity to recognize remarkable individuals who exemplify the highest principles of service to our patients, our community and our Miller School of Medicine," said Pascal J. Goldschmidt, M.D., senior vice president for medical affairs and dean of the University of Miami Miller School of Medicine. "These people have given selflessly of their time, talent and energy to help fulfill our goals in clinical care, research, education and community service."

Lee is a notable advocate for the prevention of blindness in the United States. He assumed an immediate leadership role in the Haiti earthquake relief efforts, providing emergent surgical care and setting up a makeshift eye clinic. Lee's continued dedication to the Haitian people is demonstrated by his ongoing efforts to organize donations of supplies, equipment, eye glasses and ophthalmic medical books. Lee continues to

oversee teams from Bascom Palmer Eye Institute, who are sent to Haiti to work with, train and support local ophthalmologists and deliver medications and other eye-care supplies. He also has a long-term commitment to combat glaucoma as one of the leading causes of irreversible but preventable blindness in the United States and works in local communities to provide vision screenings through Bascom Palmer's Vision Van.



A Bascom Palmer team prepares for travel to Haiti: Dr. Thomas Shane; Ashlee Vainisi, RN; Dr. Thomas Johnson; Emmanuel Paz, CRNA; and Dr. Richard Lee.

Scientist of the Year

“Scientists are our angels,” said Betti Lidsky, co-founder of Hope for Vision, when **Jeffrey L. Goldberg, M.D., Ph.D.** was named **Scientist of the Year** at Hope for Vision’s annual Party with a Purpose. “We want to recognize Dr. Goldberg for his research in retinal disease, stem cells and nanotechnology. This is a celebration of scientists and all the work they do. They are our unsung heroes.”

Hope for Vision, a nonprofit organization dedicated to raising awareness of retinal degenerative and other blinding disease, has been instrumental in funding critical ophthalmic research initiatives, including Bascom Palmer’s Adrienne Arsht Hope for Vision Retinal Degeneration Research Laboratory.

In his laboratory research, Goldberg, an ophthalmologist and neuroscientist, is studying why neurons in the retina, especially retinal ganglion cells, fail to regenerate themselves in degenerative diseases like glaucoma or after injury. Retinal ganglion cells transmit visual information from the retina’s photoreceptors through the optic nerve to the brain.

Goldberg was recently inducted into the American Society of Clinical Investigation (ASCI). One of the most prestigious organizations in the country, the ASCI is an honor society of physician-scientists, those who translate findings in the laboratory to the advancement of clinical practice. The Society’s members are in the upper ranks of academic medicine and industrial healthcare. “Membership in the ASCI is a testament to the exceptional research that Dr. Goldberg is conducting at Bascom Palmer,” says Eduardo Alfonso, M.D., Bascom Palmer’s chairman. “Dr. Goldberg’s work on retinal and optic nerve regeneration and his innovation in cell therapies will propel stem cell research into clinical use.”

Goldberg’s lab recently joined with the University of Miami’s Interdisciplinary Stem Cell Institute, which will allow Goldberg to more rapidly translate cell therapies into clinical trials. “We’re excited about Dr. Goldberg’s research leading to new treatments and cures for blindness,” Alfonso adds.



Drs. Eduardo Alfonso and Jeffrey Goldberg



DAVID S. GREENFIELD, M.D., professor of ophthalmology, was presented with the **AMERICAN GLAUCOMA SOCIETY’S CLINICIAN–SCIENTIST OF THE YEAR AWARD**, one of the Society’s highest

honors. Greenfield, a clinician who takes care of patients with glaucoma, sees an essential role for research to advance not only the science, but patient care as well. Greenfield received this prestigious honor for his work in glaucoma imaging and diagnosis.

Congratulations to corneal specialists **EDUARDO C. ALFONSO, M.D.**, **RICHARD AWDEH, M.D.**, **WILLIAM CULBERTSON, M.D.**, **DAVID GOLDMAN, M.D.**, **TERRENCE O’BRIEN, M.D.**, and **SONIA YOO, M.D.**, for being selected by *Premier Surgeon* for being among the 250 top innovators in premium intraocular lens (IOL) implant surgery.

When the eye’s natural lens is removed during cataract surgery, it is replaced with an artificial IOL. A traditional IOL is monofocal, which means that it offers vision at one distance only, and the patient may still require eyeglasses to see at near or far distances. Premium IOLs are multifocal lenses that allow the patient to see well at more than one distance without the use of eyeglasses.

The editors of *Premier Surgeon* selected surgeons who are educating their colleagues about premium IOLs, conducting research to optimize patient clinical outcomes, and looking into the diagnostic technology to assist in selecting the best lens for the patient.

Seeing a different



Bascom Palmer 2010-2011 chief residents Lisa C. Olmos, M.D., M.B.A. and Charles C. Wykoff, M.D., D. Phil.

RESIDENCY TRAINING AT BASCOM PALMER

1st Year: Residents learn the basic techniques of diagnosis and medical management of a variety of eye diseases.

2nd Year: Dedicated to in-depth exposure to ophthalmic subspecialties: retina, cornea and external diseases, glaucoma, neuro-ophthalmology, pediatric ophthalmology, and oculo-plastics, as well as an introduction to intraocular surgery.

3rd Year: Residents assume full responsibility for the medical and surgical care of patients, learning about all types of eye diseases as they receive further subspecialty training.

To say the competition is steep is an understatement. Each year, following medical school training and internship, nearly 450 young physicians apply to Bascom Palmer's ophthalmology residency program. Only seven are accepted. A three-year program, limited to 21 residents, it is ranked by *Ophthalmology Times* as the nation's best. After their first year, residents can participate in a medical service elective—an optional two-week trip, often to a developing country, conducted under the supervision of a senior physician. The residents travel abroad to learn about novel approaches and techniques used to treat serious eye conditions. Over the past two years, eight Bascom Palmer residents have taken such an elective and collectively visited locations scattered across four continents. Following are the travel experiences of three of those residents, the impact it had on them, and why they are certain it will make them better doctors.

Where Blindness is an Everyday Challenge

"Cataracts are the leading cause of blindness in the world, affecting tens of millions of people," states Charles Wykoff, M.D., D.Phil., chief resident at Bascom Palmer. "Yet this condition is often curable. There is a new approach to dealing with this global health issue," he explains, "and it is faster, cheaper and less dependent on technology than the techniques we typically use in developed parts of the world." The approach Wykoff refers to is *small incision cataract surgery* (SICS). Over the past several years it has proven dramatically effective in developing countries—primarily India, which has one of the planet's largest blind populations. Wykoff traveled to Aravind Eye Hospital in India last year to see SICS in action. Upon returning to Miami, he taught the procedure to several Bascom Palmer colleagues. Bascom Palmer has performed SICS on only about 12 patients, as the number of candidates in the United States is very low. "That's because the majority of our patients have access to quality eye care and receive treatment long before their cataracts become exceedingly dense," states Wykoff. "Ideally," he says, "the physicians who learn this procedure will volunteer in developing countries to help make a dent in the tremendous need for this vital service."

perspective

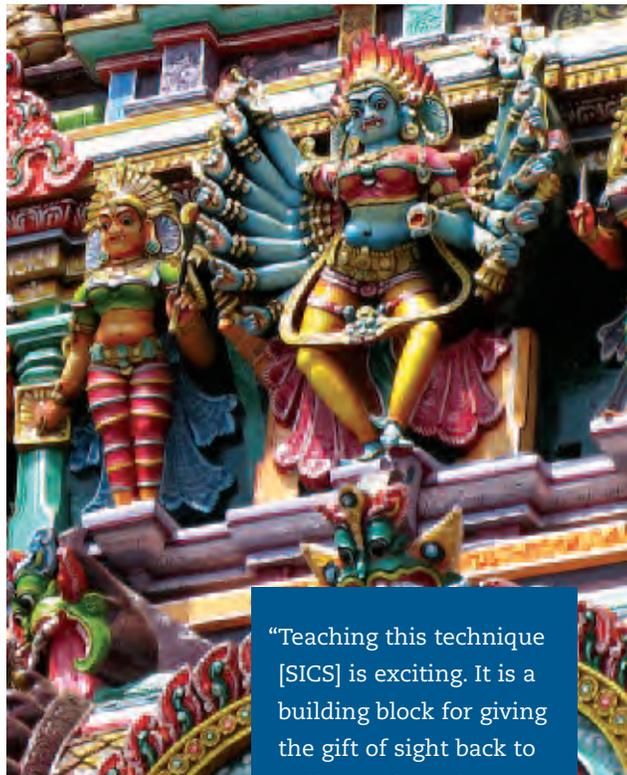
The main advantage of SICS is that an efficient surgical team—using a single operating table—can perform up to 10 cases per hour. They do so by consistently completing five-minute procedures on the densest of cataracts with minimal turnover time and no sutures. In comparison, a cataract procedure in the United States takes an average of 30 to 60 minutes. “Being able to help ten times the number of people in the same time span is impressive,” he says, “but the vast backlog of cases in India, Africa, Asia and South America remains staggering.”

Compared to cataract removal by phacoemulsification (phaco), the technique commonly used for cataract surgery in the United States, SICS creates a bigger wound, requires longer healing time, and may yield less than ideal vision outcomes of about 20/30 versus 20/20. However, considering the alarmingly high rate of blinding cataracts in some regions, it is an effective, low-cost way to address the epidemic, cure blindness and help people return to productive lives. With a severe shortage of ophthalmologists in developing countries, this procedure has huge potential. “Teaching this technique is exciting,” summarizes Wykoff. “It is a building block for giving the gift of sight back to millions of people. My experiences in India and Nepal serve as daily reminders of the vast need for quality eye care worldwide. Next year, I would like to go back as a volunteer for the Himalayan Cataract Project and plan to do so annually.”

Although Bascom Palmer has always had a residency training program, the medical service elective was added to the curriculum in 2005 under the supervision of Steven J. Gedde, M.D., Bascom Palmer’s residency program director for the past 11 years. “Dr. Gedde’s contribution to ophthalmic education is outstanding,” says Eduardo C. Alfonso, M.D., Bascom Palmer’s chairman. “He is recognized as a superb educator and through his leadership, our residency program is second to none.”

“There is no better teacher than firsthand experience,” states Gedde. “These trips allow residents to provide ophthalmic care in underserved areas of the world. As a result, they return with an even stronger understanding of the complexities involved, including the overwhelming challenges other populations face every day in trying to alleviate vision loss and prevent blindness. It’s a learning experience they will draw upon throughout their careers.”

In 2006, Dr. Wykoff teamed up with ophthalmologists Geoffrey Tabin, M.D. of Utah and Sanduk Ruit, M.D. of Nepal to co-author “Fighting Global Blindness – Improving World Vision Through Cataract Elimination.” This step-by-step guide illustrates how low-cost and efficiently run programs can restore sight to patients blind from cataracts.



“Teaching this technique [SICS] is exciting. It is a building block for giving the gift of sight back to millions of people. My experiences in India and Nepal serve as daily reminders of the vast need for quality eye care worldwide.”

— Charles Wykoff, M.D., D. Phil.



“There is no better teacher than firsthand experience.”

—Steven J. Gedde, M.D.; director, Bascom Palmer Residency Program

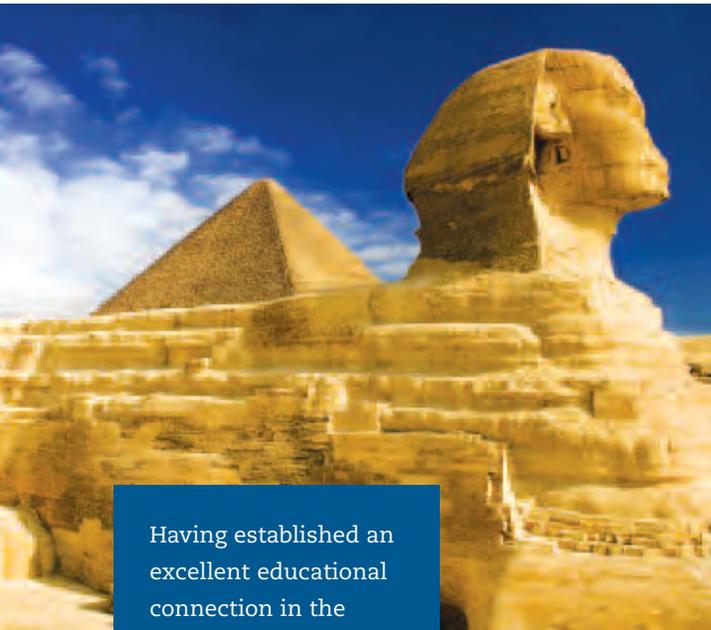
A Unique Cure for a Rare Condition

“It was day and night,” states Andrea Lora Kossler, M.D., a Bascom Palmer oculoplastics fellow. “She is a darling little girl and this procedure will make a dramatic difference in her life as she grows up. I plan to perform this operation in the future and hope to have a similar impact upon many more children’s lives.”

“Day and night” was the “before and after” appearance of a 22-month-old girl, who Kossler met at the Magrabi Eye Hospital at Cairo, Egypt while on a medical service elective as a third-year resident. The largest sub-specialized medical-care network in the region, Magrabi Hospitals and Centers consists of 32 hospitals and centers in nine countries throughout the Middle East and Africa. The child was at the Cairo facility for a follow-up exam after implantation of an orbital tissue expander (OTE), designed and patented by David T. Tse, M.D., of Bascom Palmer Eye Institute. Tse, in conjunction with Bascom Palmer’s Jean-Marie Parel, Ph.D., created the device to treat children born without one eye, a congenital defect that typically results in lifelong facial disfigurement. The OTE is an expandable balloon anchored to the socket bone that is gradually inflated with varying volumes of saline. The fluid exerts pressure against the eye socket to stimulate bone growth. A successful OTE implant reduces the need for additional surgeries, significantly lessening trauma for the child.

“Fortunately, Dr. Tse was visiting Magrabi while I was there,” shares Kossler, “As a result, I participated in the follow-up care of eight babies who have had OTE implants. It was an incredible opportunity.” This experience came full circle when Kossler assisted Tse this past August with the second OTE implant done at Bascom Palmer.

Kossler also studied under oculoplastic surgeon Dr. Mohammed Hafez while in Cairo. The scope of congenital abnormalities Kossler saw was extensive, including babies born without eyelids. “Bascom Palmer’s relationship with Magrabi expands the boundaries of medicine and surgery,” states Kossler. “It’s a merging of exceptional ideas and talent that helps residents like me to learn. Experiencing a different culture and its approach to patient care enhanced my patient-communication skills and ability to better understand what patients are going through. Such lessons are often just as important as learning a specific surgical skill.”



Having established an excellent educational connection in the Middle East, Bascom Palmer Eye Institute has trained more than 40 fellows in the region.

Enhanced Outcomes via Innovation

Specializing in cataract surgery, Daniel B. Driscoll, M.D., a cornea fellow at Bascom Palmer, spent his medical elective earlier this year at The Lions Eye Institute in Australia—the largest eye research institute in the southern hemisphere. While there, he gained experience on a newly enhanced cataract-removal device. He also left with a deeper appreciation for the importance of doctor/patient interaction.

The standard procedure to remove a cataract, which is a clouding of the eye’s naturally clear lens, is to make a circular hole in the lens capsule. A phaco machine, equipped with a metal probe running back and forth at a high frequency, breaks the lens into tiny pieces and gently aspirates those elements out of the eye using ultrasound waves. In most cases, the focusing power of the lens is restored by replacing it with a permanent intraocular lens implant. In Australia, the instrument Driscoll was trained on is called the *Barrett Axe*, used in conjunction with a phaco machine. The Barrett Axe cuts cataracts in half vertically and then removes the pieces.

“Its main advantage,” states Driscoll, “is that it produces a quick vertical break of the nucleus, allowing the cataract to be removed with less ultrasound. That feature aids post-operative recovery because certain nerves in the cornea can be damaged by high levels of ultrasound energy.” Driscoll was trained in Australia by Dr. Graham Barrett who created the device. Upon returning to South Florida, Driscoll requested that a Barrett Axe be sent to Bascom Palmer for trial use and possible future purchase.

“It’s important to me to be knowledgeable of the latest developments in ophthalmic equipment,” he states. “The more tools we have at our disposal, the more tailored and effective the treatment options are for our patients.”

Driscoll also shared what he learned on a more personal level. “Watching doctors in a different setting interact with patients reinforced for me that even though eye problems are universal, people are individuals,” he says. “They appreciate you taking a little more time to answer questions and listen to their concerns. Doing so also provides the doctor with more detailed information about symptoms and outcomes. I hope to always incorporate that approach when treating patients.”

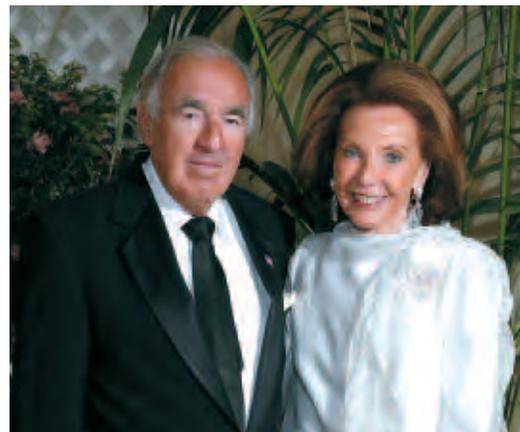
Describing the importance of medical education at Bascom Palmer, Gedde states, “Our residency program standards are the highest. What residents learn here is invaluable; however, education has a ripple effect,” he continues. “That’s why the impact of a medical service elective cannot be measured on any one level. Such trips can pique residents’ interests in a clinical subspecialty, excite them about a new area of vision research, or deepen their compassion for patients. The ‘bigger picture’ of how ophthalmology changes lives stays with the doctors who take these trips. It provides a different perspective about patient care that benefits them well into the future.” ■



Over the past two years, Bascom Palmer residents have participated in medical service electives in Australia, Asia, Africa and South America.



Herme' de Wyman Miro, Lois Pope and Ari Rifkin



Richard and Bernis Rosenbloom

We only have eyes for you

This spring, Bascom Palmer's supporters celebrated the 29th annual Evening of Vision Gala at The Beach Club in Palm Beach. All eyes were on Herme' de Wyman Miro and Ari Rifkin, the event's co-chairs, as well as Lois Pope, the evening's honorary chair.

The highlight of the "eye-deal" evening was a mesmerizing musical interlude provided by internationally acclaimed violinist virtuoso, Ferenc Illenyi, and his guitarist, Barry Roberts. Originally from Budapest, Illenyi currently holds a position in the first violin section of the Houston Philharmonic. Graciously underwritten by Co-Chairman Ari Rifkin, Illenyi's performance brought the audience to its feet with a rousing standing ovation.

"While we greatly value the national and international recognition that Bascom Palmer receives," Eduardo C. Alfonso, M.D., Bascom Palmer's chairman, told the guests, "we are even more grateful to all of you here tonight who make our good work possible." Proceeds from the gala are used to support patient care and vision research at Bascom Palmer.

"We are grateful to all of you here tonight who make our good work possible."

— Eduardo C. Alfonso, M.D.



David and Rhoda Chase



Lois Pope, Dr. and Mrs. Terrence O'Brien



Mercedes Cassidy, Gordon and Trudy Brekus



Dr. Alfonso with gala chairs Ari Rifkin and Herme' de Wyman Miro



Doris Hastings and Nick Kindred



Dr. and Mrs. Philip Rosenfeld

Benefactor Sandra Dreikorn Creates Meaningful Legacy

Bascom Palmer Eye Institute gratefully acknowledges the friendship, benevolence and caring spirit of Sandra Dreikorn who first experienced Bascom Palmer's dedication to vision care, research, and education in 2002, and has been an avid volunteer and supporter since that time. Her exemplary generosity will touch the lives of many for years to come.

Sandra invites you to join her as a member of Bascom Palmer's Society of Encouraging Endowment (SEE). This Society includes compassionate individuals who ensure Bascom Palmer's future by making the Institute a beneficiary of their estate or financial plans.

Sandra shares with you why she became a member of SEE and what Bascom Palmer means to her:



In 1968, my mother experienced a serious eye condition. We were told that nothing could be done—until we learned of Bascom Palmer. They gave us the hope-filled words: "I think we can help." And they did.

In 2002, I moved to Florida and attended the Institute's annual Palm Beach Friends Luncheon. Dr. Carmen Puliafito, the chairman of Bascom Palmer at that time, spoke at the event. Impressed by his expertise, I scheduled an appointment. The outstanding treatment I received greatly enhanced my strong regard for the Institute. In fact, I was so impressed I began volunteering weekly at the Palm Beach Gardens location. It was rewarding to meet patients whose vision had not only improved, but in various cases, been saved by the dedicated physicians. We are so fortunate to have this amazing facility in our community.

An annual donor and member of the Institute's "Evening of Vision" Gala Committee, I also support Bascom Palmer by being a planned giving donor. By investing in Bascom Palmer's worthwhile mission, I have created a meaningful legacy. Planned gifts can be directed to a specific disease, research, or a chosen physician's work. My gift is directed to age-related macular degeneration research, as a result of the excellent care my late mother received more than 40 years ago.

Please join me and become a member of Bascom Palmer's "Society for Encouraging Endowment." For additional information, contact the Institute's Development Office at 305-326-6190. Your gift will be an important part of Bascom Palmer's future. Thank you.



Dates to Remember:

PALM BEACH FRIENDS LUNCHEON & MEDICAL FORUM

JANUARY 21, 2011

The Mar-a-Lago Club, Palm Beach, Florida

Herme' de Wyman Miro, Honorary Luncheon Chairman

Presentation:

New Horizons for Macular Degeneration Treatment

Philip J. Rosenfeld, M.D., Ph.D.

Ask the Doctors:

Eduardo Alfonso, M.D., Yale Fisher, M.D., Jorge Fortun, M.D.

30TH ANNUAL EVENING OF VISION GALA, VISIONS OF PALM BEACH

MARCH 12, 2011

The Breakers, Palm Beach, Florida

Mr. and Mrs. Dale McNulty, Gala Chairmen



**GETTING TO THE TOP
TAKES FOCUS.**

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YEAR AFTER YEAR
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Bascom Palmer ranked #1 in ophthalmology in the U.S. for the seventh year in a row.

For almost 50 years, the most important innovations which have transformed global ophthalmology have come from one place - the Bascom Palmer Eye Institute of the University of Miami Miller School of Medicine. In fact, Bascom Palmer, once again, has been ranked #1 by board-certified ophthalmologists from around the U.S. in the annual *U.S. News & World Report* ranking of "America's Best Hospitals." So while we are honored to be #1, it's our patients who really come out on top.



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Some See 3-D, Some Don't

See story on page 11