



Simple diagnostic test improves patient care

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Investigators from the Department of Ophthalmology and Visual Sciences have developed a simple, objective, and rapid clinical test for detecting photoreceptor degeneration in children and adults.

Randy H. Kardon, MD, PhD, Professor and Director of Neuro-ophthalmology and Pomerantz Family Chair in Ophthalmology, has devised a test using the pupil response to red and blue lights for assessing cone and rod function. The test can be performed in two minutes without the need for dark adaptation. Patients sit in front of a Ganzfeld bowl, normally used for electroretinography and wear a pair of eyeglass frames containing miniature video cameras and infrared lights to record the pupils' reaction to red and blue light stimuli during the test. A computer receives the video of the pupils and stores the dynamics of the pupil movement where it is automatically analyzed for each light stimulus. **Edwin Stone, MD, PhD**, Professor and Seamans-Hauser Chair in Molecular Ophthalmology, is collaborating with Dr. Kardon to test patients with various forms of inherited photoreceptor degeneration and their families. Dr. Kardon is also using this test to detect optic

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From The Department Head

Welcome to the inaugural issue of *Iowa Vision*! On behalf of the faculty and staff of the University of Iowa Department of Ophthalmology and Visual Sciences, I am pleased to introduce you to this new publication highlighting the activity and discoveries of our department.

We are excited to let you know about our efforts to be a leader in vision research, medical education, and exceptional patient care. In this edition you will read about new clinical and educational resources being developed at Iowa, as well as cutting-edge research initiatives that extend from the lab to the clinic. We will also share with you how Iowa has been a pioneer in some facet of ophthalmology and vision sciences and has made an impact on eye health across the world.

The mission of the University of Iowa Department of Ophthalmology and Visual Sciences is to provide the highest quality, accessible, and cost-effective patient care while contributing to the global effort to alleviate all diseases of the eye through teaching and research. Through this mission, we remain "dedicated to progress in ophthalmology."

I hope you enjoy reading *Iowa Vision*, and we look forward to hearing from you.

Keith D. Carter, MD

Professor and Department Head

Lillian C. O'Brien and Dr. C.S. O'Brien Chair in Ophthalmology

U.S. News & WORLD REPORT

"America's Best Hospitals 2007" ranks the University of Iowa's Ophthalmology program #6 in the country.



Keith D. Carter, MD

Diagnostic test, continued from page 1

nerve damage, as well as photoreceptor disease.

Patients who are blind from photoreceptor disease still show pupil responses to bright blue light, due to intrinsic activation of melanopsin containing retinal ganglion cells, which project to the pupil centers of the brain. The melanopsin retinal ganglion cells can be activated indirectly by connections with photoreceptors and bipolar cells or can be activated directly by light in the absence of photoreceptors.

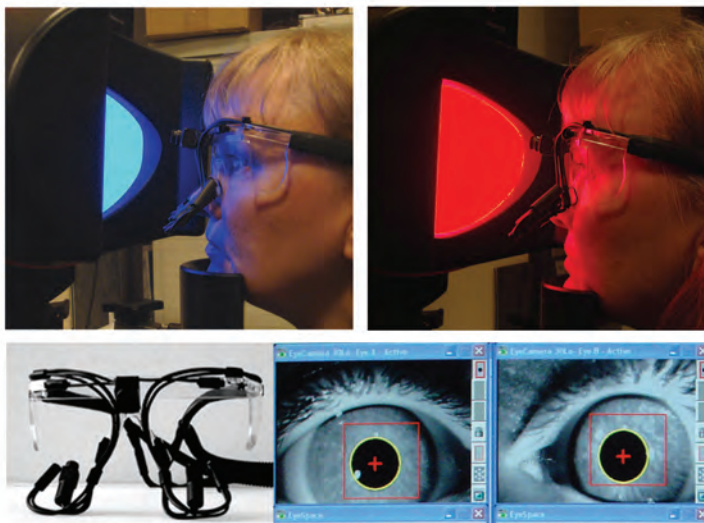
The test shows great promise for easy and rapid diagnosis of retinal and optic nerve disease and also as a means of following patients for signs of progression or response to treatment, especially when an electroretinogram is difficult to obtain.

Drs. Stone and Kardon are seeking to use the pupil test to understand the phenotypic expression of genetic diseases affecting the retina. **Susan Anderson**, program assistant working with Dr. Kardon, has been testing patients for the last year and analyzing the data with Dr. Kardon while **Elizabeth Grace**, a senior honors medi-

cal student at the UI, has studied the pupil response using this test in normal eyes.

Tina Damarjian, a Doris Duke Clinical Research Fellow from the University of Illinois, is also working with Dr. Kardon this year to test specific retinal diseases affecting rods or cones.

Ganzfeld Red and Blue Stimulus with Pupilometric Recording



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Iowa Vision is published for friends and alumni of the Department of Ophthalmology and Visual Sciences.

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Bringing products that diagnose and treat AMD to the marketplace

Two genes, complement factor H and complement factor B, are believed to account for nearly three out of four cases of age-related macular degeneration (AMD). Variations in these two genes alter the function of a key pathway in the immune system called the alternative complement system and researchers believe this pathway leads to AMD.

Scientific discoveries involving these two genes and their role in controlling inflammation serve as the basis for a new company. **Gregory Hageman, PhD**, Professor of Ophthalmology and Visual Sciences, and Josephine Hoh, PhD, from Yale University, founded Ophtherion, Inc., a company developing products to diagnose and treat AMD and other chronic diseases.

Dr. Hageman and his laboratory have collaborated with research groups worldwide to identify genes associated with AMD and other inflammation-based diseases, with the eventual goal of developing diagnostic tools and treatments. He was appointed to an Iowa Entrepreneurial Endowed Professorship, which allows release time for faculty to develop entrepreneurial plans based on their research. Ophtherion is a University of Iowa Research Foundation licensee with offices and laboratories in New Haven, Connecticut and at the University of Iowa Oakdale Research Park in Coralville, Iowa.



New research institute will lead to advances in ophthalmic imaging

Biomedical imaging and image analysis play critical roles in modern medicine, both in the diagnosis and treatment of disease. Recognizing this trend, the UI's Carver College of Medicine and the College of Engineering established the Iowa Institute for Biomedical Imaging (IIBI) in October 2007.

The IIBI aims to foster multi-disciplinary and cross-college research and discovery in biomedical imaging, and improve training and education. A primary objective of the Institute is to translate the advances in imaging research to the clinic improving health care for patients. The collaborative nature of the Institute ensures that insight from the "bedside" informs and helps direct fundamental imaging research at the "bench."

Image-based diagnosis has always been a very important part of clinical ophthalmology. Quantitative medical image analysis and computer-aided detection/diagnosis have equally long contributed to ophthalmologic research. However, most of the clinical image analysis is traditionally performed visually and qualitatively. With the arrival of a number of digital imag-

ing approaches, especially the widespread availability of retinal optical coherence tomography (OCT), there is a need for quantitative ophthalmologic imaging in daily clinical routine. With OCT devices offering three-dimensional coverage of the retina, the visual analysis quickly becomes tedious if not impossible due to the large number of image slices to be analyzed and quantified.



The need for new methods and approaches to ophthalmologic research and in order to translate them to routine clinical practice has fostered an interdisciplinary research team focusing on ophthalmologic applications. The collaboration of ophthalmologists **Michael Abramoff, MD, PhD**, **Randy Kardon, MD, PhD**, **Young Kwon, MD, PhD**, and **Stephen Russell, MD**, with medical imaging engineering experts **Joseph Reinhardt, PhD**, **Milan Sonka, PhD**, and **Xiaodong Wu, PhD**, has estab-

lished a very active OCT image analysis research program with several research proposals and projects. On the clinical side, the medical imaging research targets the major blindness-causing diseases including glaucoma, age-related macular degeneration, and diabetic retinopathy with the aim of bringing research results to the clinic as quickly as possible.

The Institute will reside in the Iowa Institute of Biomedical Discovery Building, to be completed in 2011. Nearly 20,000 sq. ft. will be devoted to biomedical imaging and image analysis activities. Ophthalmology research projects will find dedicated space for research-related image acquisition and quantitative image analysis.

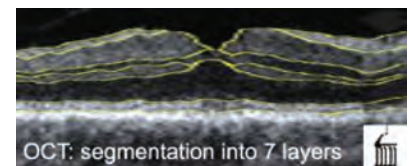


Figure: Three-dimensional segmentation of the retina imaged with 3D OCT into 7 layers: eight boundaries were identified automatically.

Global reach

Efforts by alumni of the UI Department of Ophthalmology and Visual Sciences are making an impact on vision research and eye health around the world.

David Zumbro, MD, LTC(P), MC, completed a Retina-Vitreous Fellowship at The University of Iowa in 2005. He left Iowa to serve at the Brooke Army Medical Center in Fort Sam Houston, Texas. In March 2007, Dr. Zumbro was deployed to Iraq. He was stationed in an area called Balad, a big airbase that is also known as LSA (life support area) Anaconda. It is

about 70 km north of Baghdad and near the Tigris River.

During Dr. Zumbro's deployment, UI Clinical Technician Phyllis May coordinated the Department's efforts to support Dr. Zumbro and his colleagues in Iraq and began "Operation Iowa to Iraq." From March 2007 until Zumbro's return in September, UI faculty and staff sent dozens of care package boxes containing notes of encouragement for Dr. Zumbro, as well as toys, clothing, prosthetic eyes, eye drops and other medical supplies for the people of Iraq.



Dr. Zumbro and Major Kris Duggar, Iowa National Guard.

A new resource for teaching gonioscopy examination techniques

Gonioscopy is one of the more challenging eye examination techniques for ophthalmology residents to learn. It is a critical part of the eye examination and, unfortunately, in clinical practice is not performed as often as it should be. Now, a valuable new resource has been created to share gonioscopy techniques and images.

Wallace L. M. Alward, MD, the Frederick C. Blodi Chair in Ophthalmology and

Director of the Glaucoma Service, collaborated with Iowa faculty members **Young H. Kwon, MD, PhD**, **Emily C. Greenlee, MD**, and **John H. Fingert, MD, PhD**, as well as videography and IT staff members, **Randall Verdick** and **Jessica Bryant**, to design and launch the web site (www.gonioscopy.org). This site teaches how to perform a gonioscopy examination and shows the iridocorneal angle in health and

in disease. The web site will show the dramatic polycoria seen in the iridocorneal endothelial syndrome and also the early form of the disease in which one may only see a single synechia. While drawings, paintings, and photographs of the iridocorneal angle are helpful for the student of gonioscopy, Dr. Alward has found that videography demonstrates the techniques and findings much more readily than any other medium. Slit lamp videos are also used to provide illustrations of the findings in glaucoma-related diseases.

Ultimately, the web site seeks to become a living atlas that can be constantly updated, showing the entire spectrum of anterior segment diseases.

Gonioscopy is an examination technique that utilizes a specialized lens (goniolen) in conjunction with a slit lamp or biomicroscope to view the angle formed between the eye's cornea and iris, usually to monitor conditions associated with glaucoma.

Remembrance

Ron Keech, MD, passed away peacefully on October 16, 2007 in Iowa City. Ron was the W.E. Scott Chair of Education in Pediatric Ophthalmology at the University of Iowa. He is survived by his wife, daughter, son, son-in-law, and granddaughter. He is missed by the entire Department.

The Department of Ophthalmology & Visual Sciences Team participated in the Leukemia and Lymphoma Society's "Light the Night" Walk on October 20, 2007 in honor of Dr. Keech. The team's effort in this event raised over \$22,000 for leukemia and lymphoma research.

Online condolences and memories may be shared at www.lensingfuneral.com



Ronald V. Keech, MD (1948-2007)

Highlights

- Ranked 6th (tie) for best overall program, *Ophthalmology Times*
- The 2007 "Best Doctors in America"® list includes 16 UI ophthalmologists (see page 7)
- In top 10 percent of the number of National Eye Institute-funded institutions in FY 2006 based on award amounts
- Two Howard Hughes Medical Institute investigators among faculty

Seeking a cure for inherited eye diseases

Imagine being a parent who has been told that your child has a rare eye disease, will lose his or her vision, and there is nothing you can do. That is what happened to Chicago Cubs, first baseman **Derrek Lee**, whose child was diagnosed with Leber congenital amaurosis (LCA), an inherited form of blindness or severe vision loss that is typically discovered in infancy or early childhood. The diagnosis prompted the Lee family to contact **Edwin Stone, MD, PhD**, Professor of Ophthalmology and Seamans-Hauser Chair in Molecular Ophthalmology. A series of conversations about what could be done for those impacted by the disease led to the formation of an exciting initiative known as Project 3000, which seeks to find the causes of and cures for inherited blinding eye diseases such as LCA.

Project 3000 (www.project3000.org) seeks to identify and provide genetic testing for the estimated 3,000 individuals in the nation with LCA. It was launched when Derrek Lee and Boston Celtics CEO and Co-owner **Wyc Grousbeck**, who also has a child affected by LCA, sought a partnership with The University of Iowa to advance scientific understanding of the disease and work toward a cure.

Genetic testing is being offered nationwide through Project 3000 to every person affected with LCA through the Carver Nonprofit Genetic Testing Laboratory (www.carverlab.org) at The University of Iowa. The Carver Laboratory has developed an extensive data bank of genetic information and provides the most clinically relevant information to patients and their families. The lab has been involved in locating dozens of genes responsible for inherited eye diseases and identified hundreds of specific disease-causing mutations.

LCA is estimated to affect one in 100,000 children in the nation. More than one-sixth of the LCA patients in the U.S. have already been tested for mutations in the known genes, and the results of this testing have been summarized and accepted for publication by the *American Journal of Ophthalmology*. Additionally, the molecular methods that underlie the genetic test for LCA have been

extensively refined and improved so that the chance of finding the specific molecular cause for an individual patient with LCA is now near 70 percent (up from 50 percent one year ago).

As a result of Project 3000 efforts, there has been a tremendous increase in awareness of LCA. Press conferences, news reports, articles and events have reached millions of people with a message of hope: "There is something you can do." In addition, more than \$1 million in philanthropic support for Project 3000 has been raised in the past year. Dr. Edwin Stone spoke about LCA and Project 3000 when he delivered the Jackson Memorial Lecture at the recent American Academy of Ophthalmology meeting in New Orleans.

Project 3000 has five major goals:

- Provide hope to the individuals affected with LCA that there is something that can be done
- Provide accurate information about LCA and other genetic eye diseases
- Find the remaining genes responsible for the estimated 30 percent of LCA cases remaining to be discovered
- Find cures from trials of new treatments for LCA
- Make genetic testing the standard of care for LCA

Project 3000 also seeks to have a broad and lasting impact by serving as a model for approaching other genetic diseases. If you are aware of patients with LCA or interested in genetic studies associated with hereditary eye diseases such as LCA, consider the resources available through Carver Nonprofit Genetic Testing Laboratory and Project 3000.

Visit the Project3000 website at www.project3000.org



PROJECT 3000

Philanthropy in action

The Fuerste family is filled with traditions. Three generations of family members have pursued their medical education and ophthalmic training at the University of Iowa, including Frederick Fuerste, Sr. ('18 BA, '20 MD), Frederick Fuerste, Jr. ('45 MD), C. Rommel Fuerste ('83 MD), F. Hunter Fuerste ('82 MD), and Gretchen Fuerste ('78 MD; '82 Residency). A long-term interest and tradition of support led the family to make a generous gift to the Department of Ophthalmology and Visual Sciences.

Frederick Fuerste, Sr., practiced in Dubuque, Iowa until 1953 when his son,

Frederick Jr., took over the family business. Frederick Jr. continued practicing ophthalmology until shortly before his death in 2003. Now the trust of his wife, Marion Fuerste, who died in 2005, has provided a very generous bequest to establish a professorship that will be used to provide support, and promote research and education in ophthalmology. The bequest will also help create an ophthalmic lecture series that will be used to invite distinguished ophthalmologists and scientists to participate in the teaching program of the Department of Ophthalmology and Visual Sciences. Additional proceeds from the bequest gift will provide sustaining support

for the UI Carver College of Medicine. "Our family is grateful for the education we received at the University of Iowa and the ongoing medical education that is available there. This gift will help support the educational mission for many years to come", says Gretchen Fuerste, MD, of Fuerste Eye Clinic in Dubuque, Iowa. Keith D. Carter, MD, Professor and Department Head adds, "The Fuerste family has been a part of the Department's family dating back to Dr. Frederick Fuerste's completion of medical school at Iowa in 1920. We are grateful for the family's ongoing support and the additional education opportunities this very generous gift will allow".

Pioneers in ophthalmology: Lee Allen

The University of Iowa enjoys a rich history of innovations and inventors in ophthalmology and the vision sciences. One of the individuals who made a great impact was Lee Allen.

Lee's interests ranged from the fine arts to medical device invention. From the time he received an oil painting set when he was eleven years old, he became passionately interested in painting and fine arts. While Lee studied art at the University of Iowa (1929-37), he was a student and close friend of Grant Wood of "American Gothic" fame. Lee was one of

a small number of associates Wood invited to work on painting the library murals at Iowa State University. The Treasury Department awarded contracts to paint two of the now famous Works Progress Administration post office murals: "Soil Conservation" in Onawa, Iowa and "Conservation of Wildlife" in Emmetsburg, Iowa to Allen. Both survive to this day. The painting for the Onawa post office mural has been kept in the Smithsonian's National Archives and was one of only 100 paintings selected for the Whitney Museum of American Art's 1999 "American Century" exhibit.

In 1939, Dr. C.S. O'Brien recruited Lee as a medical illustrator for The University of Iowa Department of Ophthalmology. His career soon grew beyond medical illustration and he gained an international reputation as a pioneer in the fields of ocular prosthetics and medical photography. Allen was prolific while at UI; illustrating scores of medical textbooks, authoring numerous scientific articles, and designing many medical devices. Among his inventions was the quasi-integrated buried motility implants used during eye removal surgery to replace volume and to transmit

motility to the eye prosthesis.

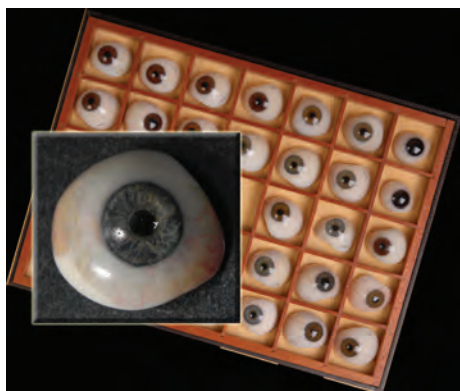
Lee retired from the UI in 1976 with the rank of Emeritus. During his career, he

served as President of the Association of Medical Illustrators, founding member and first President of the Ophthalmic Photographer's society, Charter member and President of the American Society of Ocularists, and Charter Board member of the National Examining Board of Ocularists. He received both the Senior Honor Award in 1984 and the Outstanding Lifetime Achievement Award from the American Academy of Ophthalmology in 2001.

Lee's book, *The Hole in My Vision*, chronicled his own loss of vision to macular degeneration and was published in 2000. Copies are available through the Department and profits from the book benefit the UI Carver Family Center for Macular Degeneration.



E. Lee Allen (1910-2006)



Enhancements in competency-based ophthalmic education lead to better prepared residents

Programming and curriculum are continually enhanced to better serve the residents in training at The University of Iowa. Many of the enhancements are the result of our expertise in competency-based ophthalmic education and desire to provide the finest in resident education. With inspiration from **Andrew G. Lee, MD**, Professor of Ophthalmology, Neurology and Neurosurgery, a team of cataract surgery faculty, including **Thomas Oetting, MD**, **A. Tim Johnson, MD, PhD**, **Hilary Beaver, MD**, and **Emily Greenlee, MD**, developed a competency based curriculum for training residents cataract surgery.

The Ophthalmic Web Lab (OWL) Program curriculum developed by Drs. Greenlee and Lee reflects a desire to better prepare first-year residents for the surgical requirements of their second year. It involves giving increasing surgical responsibility as residents progress from beginner to proficient in cataract surgery.

Started in 1997, the wet lab has become an integral part of competency-based surgical training and is available at any time for residents to use. The wet lab includes both peristaltic and venturi-based



phacoemulsification units and has a steady source of porcine tissue. The lab uses resources from the Iowa Lions Eye Bank and also reflects a strong partnership with the local Veterans Affairs Health Care System.

A more formal system of utilizing the wet lab started in 2005 with the objectives of exposing first-year residents to surgery before their second year. First-year residents are introduced to suturing techniques and then allowed to proceed on their own as their comfort level and proficiency improves in the lab. This type of training experience is thought to ease the novice ophthalmology resident's transition into working in the OR and with real patients. The wet lab curriculum has been discussed in a paper published in *Ophthalmology*. It has been featured as part of an American Academy of Ophthalmology course offered for the past three years that has received high marks from attendees.

Another important curriculum enhancement includes the local VA hospital's recent integration of an EYESI Simulator. The EYESI Simulator allows virtual simulation of cataract and retinal procedures and has become a vital part of the curriculum. Residency Program Director Dr. Thomas Oetting has programmed a cataract surgery curriculum which first-year residents must complete before the end of

their 10-week rotation. This simulator allows residents to experience intraocular surgery and learn the difficult steps of cataract surgery-capsulorhexis and phacoemulsification. Offering exercises of increasing difficulty allows residents the opportunity to advance their surgical skills earlier in their training.

The use of a structured wet lab program and simulator training are critical parts of the initial development of surgical skills progression. Incorporating these elements into the curriculum and training program allows Iowa to maintain its position as a leader in competency-based education.

Best doctors

The "Best Doctors" database included the following UI ophthalmologists in its latest release:

Wallace Alward
Hilary Beaver
H. Culver Boldt
Keith Carter
James Folk
Karen Gehrs
Kenneth Goins
A. Tim Johnson
Randy Kardon
Ronald Keech (deceased)
Young Kwon
Andrew Lee
Jeffrey Nerad
Stephen Russell
Edwin Stone
Thomas A. Weingest

Best Doctors, Inc. uses its database to support services that link individuals with serious illness to expert medical specialists for second opinions or treatment. The company's Web site is <http://www.bestdoctors.com>.





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Let us know what you think of our new publication. Send an email to: iowaeyecare@uiowa.edu

Upcoming events

Join us in Iowa City for our Clinical Conference Series where we explore and discuss relevant and interesting clinical topics in Ophthalmology. Check our website for the latest dates, topics, and registration information.

The 2008-2009 Clinical Conference series is now in the planning stages. Save the date for these conferences:

September 19, 2008	Oculoplastic Surgery
October 24, 2008	Retina and Vitreous
December 5, 2008	Neuro-ophthalmology
February 6, 2009	Pediatric Ophthalmology
March 6, 2009	Cornea
April 3, 2009	Glaucoma

May 9, 2008

Annual Optometric Meeting

June 12-13, 2008

Iowa Eye Association Annual Meeting

Accompanying Nurse/Technician Conference

October 2-4, 2008

Ophthalmic Genetics Meeting, Iowa City

November 11, 2008

Iowa Alumni Reception, AAO Annual Meeting, Atlanta