Innovative Lab Methods and Techniques Lead to Ocular Herpes Vaccine
Wet and Dry Macular Degeneration
Eye Telescope Brings World Back Into View
Building New Connections for Growth and Success

Implantable Miniature Telescope Brings Patients Closer to Restored Vision

Gavin Herbert Eye Institute doctors are the first in Orange County to implant this miniature eye telescope to restore vision affected by macular degeneration, the leading cause of vision loss for Americans aged 60 and older.

This past summer, a 94-year-old Anaheim baseball fan was able to watch a game and see the scores for the first time in many years, thanks to a tiny telescope that Sumit (Sam) Garg, MD, implanted in his eye in May. The 4-millimeter implantable miniature telescope (IMT) was approved by the FDA for irreversible end-stage macular degeneration in 2011.

"Macular degeneration damages the retina and causes a blind spot in the center of a person’s field of vision," says Dr. Garg, Medical Director of the Gavin Herbert Eye Institute. "The telescope projects an image onto an undamaged portion of the retina, making it possible for patients to once again recognize faces, read and perform daily activities."

Clinical trials for the IMT were performed at the institute by Vice Chair of Clinical Research Baruch Kuppermann, MD, PhD. The telescope is surgically placed in one eye to regain some use of central vision, while the other eye handles peripheral vision.

Part of a treatment plan called CentraSight, the IMT involves a team of doctors and therapists that work together to make sure the device is a good fit for their patients. First, a retinal specialist must diagnose them with vision loss from macular degeneration in both eyes. Second, a corneal specialist at the institute ensures that they have healthy corneas and that their eyes can hold the telescope, which is approximately five times thicker than a standard intraocular lens. Third, an occupational low vision therapist tests whether they will benefit from an IMT by checking how well their eyes adjust to a simulation of vision with the implant.

An outpatient surgery is then scheduled with the corneal specialist to remove a cataract and implant the IMT. The surgeon checks the implant after surgery and, when the eye has stabilized, sends the patients over to the low vision therapist to begin rehabilitation, so they can adjust to their new vision with the IMT.

Marjan Farid, MD, the institute’s Director of Cornea, Cataract and Refractive Surgery, implanted one of the first IMTs in the U.S. in December 2011, helping an active 85-year-old Irvine woman see her son’s face for the first time in more than a decade. Several other patients have been scheduled to receive the telescope—with more likely to follow.

"Until now, there was no mechanism, surgical or medical, to restore that central sight," says Dr. Farid. "The Gavin Herbert Eye Institute is doing things no one else does. We strive to take care of patients with eye conditions that are too complicated for others to handle."
All of our faculty—researchers, clinicians and surgeons—are deeply grateful for the support that has brought us so close to achieving the landmark event of opening a world-class eye center right here in Orange County. We have raised over $35.5 million for the new building solely through the philanthropy of our grateful patients and the community. Our final goal has been updated to $39 million, and with your help, we will open this center dedicated to eliminating blindness and vision impairment in 2013.

Sincerely,

Roger Steinert, MD
Chair, Department of Ophthalmology

Please contact Janice Briggs, Senior Development Director, Health Advancement, at (949) 824-0091 for more information on how you can help.

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INNOVATIVE LAB METHODS AND TECHNIQUES

LEAD TO OCULAR HERPES VACCINE

It is estimated that up 90% of the world’s population is infected with the herpes simplex virus. Most commonly associated with genital lesions and cold sores, herpes affects over 400,000 Americans in an ocular form that can cause vision impairment and blindness.

Herpes simplex virus (also known as HSV) infects the eye when people rub or touch their eyes after their hands come into contact with other parts of the body, such as the genital areas, containing the virus. The cells of the cornea, the black center of the eye, become infected. The virus then travels up the nerves to the brain and infects brain cells called neurons. The virus lies dormant in the neurons, hidden from detection by the immune system. While it may remain latent for years, the herpes virus can be reactivated by UV exposure or stress. Once active, the virus returns to the eye and re-infects the cornea. This triggers the immune system to produce white cells that begin to attack and destroy the cornea, leading to complete vision loss over time.

Currently, there are just two methods available for treating ocular herpes. First, the oral drug acyclovir, used only to improve symptoms, requires high daily doses that can become expensive. Since the herpes virus remains present in the body, the symptoms can and do return. Second, a corneal transplant may be performed to restore vision lost to ocular herpes.

Lbachir BenMohamed, PhD, Associate Professor of Immunology at UC Irvine and Director of Cellular and Molecular Immunology and Ophthalmology at the Gavin Herbert Eye Institute, has worked for over 10 years to create a therapeutic vaccine to treat and cure the ocular herpes virus. Says Dr. BenMohamed, “I focused on developing a vaccine because every year, 20,000 people in the U.S. are infected with ocular herpes and in danger of losing their vision to the disease.”

While the general mechanism of ocular herpes is known, the specifics are still a mystery. For the vaccine, Dr. BenMohamed examined the progression of the disease as a starting point: “The majority who carry the virus are asymptomatic, which means they

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INNOVATIVE LAB METHODS AND TECHNIQUES

LEAD TO OCULAR HERPES VACCINE

Dr. BenMohamed is developing a vaccine to treat and cure ocular herpes.

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have no symptoms. A tiny minority of symptomatic individuals who carry the virus often develop recurrent disease, some multiple times per year. Why do these people develop ocular herpes symptoms and not others? What is it about their immune system that accounts for this? If we found out exactly what makes asymptomatic individuals able to resist ocular herpes, it could help us to develop a vaccine."

Dr. BenMohamed was the first to compare the immune systems of symptomatic and asymptomatic individuals with the goal of developing a herpes vaccine. There was another major obstacle to overcome in producing a vaccine for ocular herpes. Typically, vaccines contain either a weakened or killed form of a virus, or proteins that the virus produces. The immune system can then recognize the virus and either develop immunity or decrease the severity of an infection.

Traditional vaccines cannot be used in the eye because they contain immuno-adjuvants—substances which enhance the immune response but may contain toxins that can produce severe side effects.

Because he specializes in molecular vaccines, Dr. BenMohamed was able to study the proteins of ocular herpes and perform a sort of microsurgery to isolate the small pieces of those proteins that could produce immunity without harming the eye. He was the first in the world to use this technique, which was developed in his lab.

Ultimately, Dr. BenMohamed and his team of researchers at the Laboratory of Cellular and Molecular Immunology successfully developed the first and only ocular herpes vaccine, which can be safely administered via eye or oral drops, nasal sprays or inhalers. Since it does not need to be injected, the vaccine could be conveniently administered to patients topically and potentially has a lower cost. Armed with a decade of productive pre-clinical research in mouse and rabbit models of ocular herpes and millions of dollars in funding, including several National Institute of Health grants, the lab’s human testing of the ocular herpes vaccine is scheduled to begin in a few years.

To ensure its safety and efficacy, the ocular herpes vaccine will be thoroughly tested in three phases. In Phase 1, ten people who do not have the herpes virus will be given versions of the vaccine that were successful in animal testing. They will be monitored for one or two years to verify that the vaccine is safe in human eyes. In Phase 2, the vaccine will be given to 20 to 30 people who do carry the herpes simplex virus. There will be two years of follow-up to check if they are indeed protected from ocular herpes. Phase 3 will be the clinical trial of the vaccine, in which hundreds to thousands will be vaccinated and monitored over three to four years to confirm the vaccine’s effectiveness.

Although the vaccine treats ocular herpes, the science behind it can be applied to other forms of the herpes simplex virus, such as genital herpes and ora-facial herpes (cold sores), because their mechanisms and the proteins they produce are similar. “The difference between those who do not develop symptoms and those who simply carry it is not completely known, and I believe that finding this difference is the key to the next generation of herpes vaccines,” says Dr. BenMohamed. “I collect samples of tears and blood every day from donors and volunteers for analysis. I hope to find the immune molecule, virus protein, or genetics that allow herpes symptoms to surface, so we can create a vaccine that takes care of herpes once and for all.”

**FACULTY MEMBERS**

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Anand Bhatt, MD
Swaraj Bose, MD
Donald J. Brown, PhD
Robert Wade Crow, MD
Marjan Farid, MD
Vice Chair of Ophthalmic Faculty
Sumit (Sam) Garg, MD
Vice Chair of Clinical Ophthalmology
Ronald N. Gaster, MD
James V. Jester, PhD
Jack H. Skirball Endowed Chair

Tibor Juhasz, PhD
Maria Cristina Kenney, MD, PhD
Henry Klassen, MD, PhD
Baruch Kuppermann, MD, PhD
Vice Chair of Clinical Research
Ron Kurtz, MD
Robert W. Lingua, MD
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Jennifer Simpson, MD
Roger F. Steinert, MD
Irving H. Leopold Professor and Chair of Ophthalmology
Professor of Biomedical Engineering
Director, Gavin Herbert Eye Institute
Jeremiah Tao, MD
Matthew Wade, MD
Steven L. Wechsler, PhD

TO CONTACT FACULTY MEMBERS OR TO MAKE AN APPOINTMENT, CALL (949) 824-2020 (IRVINE) OR (714) 456-7183 (ORANGE)
While it may not sound as familiar as glaucoma or cataracts, macular degeneration is one of the leading causes of visual impairment and blindness for adults over 50 years of age.

Functioning much like a camera, the eye’s cornea and natural lens focus an image, and the retina is the film that captures it. The macula is an oval-shaped yellow spot found near the center of the retina. Damage to the macula means the center of every image can be gray, distorted and nearly impossible to discern.

Risk factors for macular degeneration, often called age-related macular degeneration, include advanced age, smoking, heart disease, UV exposure and a family history with the condition. Since macular degeneration affects central vision, it can prevent people from being able to drive, read or recognize faces. Since peripheral (or side) vision remains intact, it is possible to continue performing daily tasks.

There are two main types of macular degeneration: wet and dry. Because they have different causes, the symptoms and treatments for wet and dry macular degeneration also differ.

Wet macular degeneration occurs when abnormal blood vessels form under the retina in the back of the eye, causing swelling and bleeding. It is marked by a sudden change in vision, such as straight lines appearing curvy. Only about 10% of macular degeneration diagnoses are for wet macular degeneration. If left untreated, wet macular degeneration can lead to irreversible macular scarring.

Dry macular degeneration is a slow, gradual decrease in central vision from the aging process. The natural pigments in the retina atrophy over time, and hard, yellow or white deposits called drusen begin to form. The accumulation of drusen can damage the retina, causing vision loss and distortion. Dry macular degeneration can convert to wet macular degeneration in a small percentage of cases.

Macular degeneration affects central vision, which makes seeing and recognizing faces difficult.

Wet macular degeneration occurs when abnormal blood vessels form under the retina in the back of the eye.
Wet macular degeneration occurs when abnormal blood vessels form under the retina in the back of the eye, causing swelling and bleeding.

Wet macular degeneration progresses over time, so earlier damage from blood vessels (Images A, B) can lead to scarring (Image C).

Dry macular degeneration is caused by aging deposits that form underneath the retina.

The mainstay of treatment for wet macular degeneration involves injection of medication into the eye to help stop bleeding and treat the abnormal blood vessels. Some patients may receive photodynamic therapy, a targeted laser treatment.

There are no currently available medical or surgical treatments to reverse the effects of dry macular degeneration. If you are diagnosed with the condition, your doctor may suggest that you stop smoking, take steps to control your cholesterol and blood pressure levels, and eat more fruit and vegetables or other antioxidant-rich foods to try to slow the progression of the disease. In advanced cases, you may be referred to a low vision specialist who will help you maximize your remaining vision through magnifying devices such as telescopic glasses or closed-circuit television, which uses a video camera to project a larger image onto a TV screen. The implantable miniature telescope, available at the Gavin Herbert Eye Institute, is a new, cutting-edge option that helps restore a portion of the vision lost from advanced macular degeneration.

To schedule an appointment with a retinal specialist, contact the Gavin Herbert Eye Institute at (949) 824-2020. For dates and times of upcoming patient education seminars or to learn more details about treatments for macular degeneration and other state-of-the-art ophthalmic services, visit our website at www.eye.uci.edu/fall.
As Lbachir BenMohamed, PhD, began medical school, he realized that seeing individual patients meant that he could only solve health issues one at a time. So, although he had wanted to be a medical doctor since he was nine years old, Dr. BenMohamed decided instead to become a medical researcher working toward solving health problems on a much broader scale—by developing vaccines that could benefit millions of people.

Born in Morocco, Dr. BenMohamed studied Immunology and Vaccine Development in Paris, France, where his efforts were focused on multiple infectious diseases. After receiving his PhD from the Pasteur Institute (founded by the father of vaccines, Louis Pasteur), Dr. BenMohamed decided to apply his knowledge of viral vaccines to the herpes simplex virus, which is present in some form in up to 90% of the U.S. and world population.

Shortly after he obtained his PhD in 1997, Dr. BenMohamed moved to the United States as a post-doctoral researcher. In 2002, he was asked to join the Gavin Herbert Eye Institute (GHEI) to fill a gap in immunology research expertise, and to help develop new eye treatments—including an ocular herpes vaccine.

Today, Dr. BenMohamed continues his work on the ocular herpes vaccine in the Laboratory of Cellular and Molecular Immunology (located on the UC Irvine Campus in Hewitt Hall), which he founded soon after joining GHEI. His cutting-edge ocular herpes vaccine research program, which has consistently been awarded prestigious grants from the National Institute of Health, explores why some people can develop resistance to herpes and never experience symptoms, while others often suffer from ocular, oro-facial (mouth and face) or genital herpes symptoms.

An internationally respected immunologist, Dr. BenMohamed also collaborates with many GHEI doctors on other research projects. He collects samples of tears and blood from their patients to test for the presence of the herpes virus and investigates their immune response to herpes symptoms. As an Associate Professor of Immunology at UC Irvine and Director of Cellular and Molecular Immunology at the institute, Dr. BenMohamed regularly collaborates with the immunology, molecular biology and biochemistry departments, as well as with many other national and international labs.

He has a strong commitment to the progress of immunology and vaccine research programs at UCI and teaches immunology courses to students to impart his knowledge of the immune mechanisms of controlling diseases, including ocular herpes.

Says Dr. BenMohamed, “With the institute’s new building opening in 2013, I am looking forward to increased collaboration with Gavin Herbert Eye Institute clinicians. We are truly making a difference for eye care in Orange County, the nation and the world by delivering breakthrough treatments and vaccines.”

Dr. BenMohamed decided to become a medical researcher and work toward solving health problems by developing vaccines that could benefit millions of people.
CHARITABLE GIVING THAT KEEPS ON GIVING

The gift of sight is one that the Gavin Herbert Eye Institute (GHEI) strives to give to each of its patients through world-class care and innovative research. But you don’t have to be one of GHEI’s specially trained ophthalmologists to be a part of this precious gift. GHEI thrives on the contributions made by many generous donors within the community via popular planned giving opportunities including the Charitable Gift Annuity.

There are significant benefits for both you and the institute with a Charitable Gift Annuity. In exchange for your generous gift of cash, underperforming CDs or stocks, the University of California commits to providing you with a fixed-income stream for life, which can range from 4.7% for a 60-year-old to 9.0% for those 90 years old and older. What’s more, because this lifetime income stream is backed by the strength of the University’s assets, your income is guaranteed and will never change with market fluctuations. Once the University’s commitment to you is fulfilled, the remainder of your initial gift is used to further GHEI’s efforts to provide the gift of quality eye care for generations to come.

Perhaps best of all, the Charitable Gift Annuity is a unique and practical way to benefit yourself, a worthy cause and the entire community.

To learn more about charitable gift annuities and other types of contributions, please contact Roland Ho at roland.ho@uci.edu or at (949) 824-6454.

There are many opportunities to give at the Gavin Herbert Eye Institute. The table below is a quick overview of the many available legacy planning options.

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For detailed information, please contact Roland Ho in the UC Irvine Planned Giving department at (949) 824-6454 or email roland.ho@uci.edu.

EYE TELESCOPE BRINGS WORLD BACK INTO VIEW

Ask most people to describe a telescope and they might imagine a large cylinder on a hilltop, training its penetrating gaze into outer space. Don Mason carries one implanted in his right eye. He is among the first patients in the country to receive a pea-sized telescope designed to partially restore vision in those with age-related macular degeneration. In May, Dr. Sumit (Sam) Garg, Medical Director at the Gavin Herbert Eye Institute, implanted the 4-millimeter device in the 94-year-old Anaheim resident’s right eye.

“Mr. Mason came to me with years of very poor vision due to macular degeneration,” says Dr. Garg. “He was very interested in exploring options to improve his vision and quality of life, and when presented with this option, he was very excited by the possibility of regaining useful vision.”

Mason worked in the building industry, traveling around the world as an operations manager in places like Hong Kong and Australia before he and his family settled in Southern California.

A life-long baseball fan, Mason recalls the Angels’ first games in 1961. Now, for the first time in years, he can read the sports page and watch games on TV. “Before the operation, I was vaguely aware the TV was on,” Mason says. “I feel that this has been a vast improvement.”
In addition to its mission of providing world-class eye care to patients in Orange County, the Gavin Herbert Eye Institute (GHEI) plays a key role in connecting the Southern California ophthalmic community. Dan McWard, a GHEI Steering Committee member since July 2011, believes that collaboration between local ophthalmic companies and the institute fosters mutual growth and success.

“The best way to build these connections is through one-on-one interaction,” says McWard, who along with his wife, Kathleen, has been an ardent supporter of the institute since 2007. McWard has worked in ophthalmic sales and marketing for over 25 years with companies like Johnson & Johnson, Allergan and Bausch+Lomb. “My experience in the ophthalmic industry has helped me develop relationships with key physicians and business leaders that can assist with the institute’s growth.”

Serving as both a clinical and research facility, the Gavin Herbert Eye Institute can be a unique resource to smaller, emerging companies in the area. McWard and the Steering Committee hope to raise awareness of services the institute has to offer. Companies without educational facilities or clinical and regulatory staff can leverage the clinical services of the institute for their business initiatives. More established eye care technology companies can assist the institute by providing hands-on training with the latest ophthalmic devices. The institute could also receive early access to new treatments. As construction of the center nears fruition, McWard hopes to give industry leaders and companies a closer and more personal look at GHEI by offering tours of the facility and arranging one-on-one meetings with medical staff members.

“Our focus is on getting this center finalized, so we can expand our ability to help patients as well as companies, large and small,” says McWard. “It’s very exciting to see an eye institute of this magnitude in Southern California. The support from local ophthalmic companies is a great example of how key players in the industry are funding the growth of the eye institute to bring services and benefits to patients.”