

USC Stem Cell NEWS

Broad Foundation advances stem cell research at USC

Albert Einstein once said, “A person who has not made his great contribution to science before the age of 30 will never do so.” To ensure that emerging scientific talents have the opportunity to make their marks, The Eli and Edythe Broad Foundation has given a \$2 million gift to the Eli and Edythe Broad Center for Regenerative Medicine and Stem Cell Research at USC.

The gift establishes a series of Broad Fellows — exceptional senior postdoctoral researchers at the transition point to starting their own laboratories. It will also support core research facilities and innovative projects at USC, home to one of only two dedicated university stem cell research centers in Los Angeles.

“This gift ensures that USC’s stem cell research center will continue to attract the best and brightest emerging talent, and encourages their pioneering work as they transition into the next stage of their careers,” said Andy McMahon, PhD, FRS, director of USC’s stem cell research center.

To advance the next generation of scientists, the gift provides ongoing support for the stem cell center’s state-of-the-art core facilities in imaging, therapeutic

screening, flow cytometry, and stem cell isolation and culture. It also enables strategic investments in the innovative research projects that will become tomorrow’s clinical advances in regenerative medicine.



USC’s stem cell research center
(Photo by Chris Shinn)

About USC Stem Cell

USC Stem Cell is a collaborative and multidisciplinary effort working to translate the potential of stem cell research to the clinical imperative of regenerative medicine.

The initiative brings together more than 100 research and clinical faculty members from the Keck School of Medicine of USC, Children’s Hospital Los Angeles, the USC Viterbi School of Engineering, the USC Davis School of Gerontology, the Ostrow School of Dentistry of USC, the USC School of Pharmacy, and the USC Dornsife College of Letters, Arts and Sciences. USC Stem Cell is also creating new educational opportunities with the USC Marshall School of Business and the USC Roski School of Art and Design.

The gift will ensure USC remains a destination for the next generation of pioneers in the field. Patients will also reap the rewards of this research in the form of future stem cell-based cures.

Philanthropic leaders in biomedical research as well as many other fields, Eli and Edythe Broad created USC’s stem cell research center with a \$30 million gift to the Keck School of Medicine of USC in 2006.

A renowned business leader who built two Fortune 500 companies over a 50-year career, Eli Broad is the founder-chairman of both SunAmerica Inc. and KB Home (formerly Kaufman and Broad Home Corporation). He is also a member of the Board of Overseers of the Keck School of Medicine of USC.

“We believe that the promise of stem cells — and the research underway at USC — is limitless,” said Eli Broad. “For us, this is an opportunity to advance essential research in hopes of finding new treatments for the many diseases that are still untreatable.”

Meet the new president of Calif.'s stem cell agency

Please join in a conversation with Randy Mills, PhD, the new president and CEO of the California Institute for Regenerative Medicine (CIRM), on June 10, 2014 from 6 to 7 p.m. at the Eli and Edythe Broad CIRM Center for Regenerative Medicine and Stem Cell Research at USC.

Mills has a track record of success in stem cell research. For the last 10 years, he has been president and CEO of Osiris Therapeutics. He helped the company develop Prochymal, which is used to treat

children for acute graft-versus-host disease, a devastating complication of bone marrow transplantation.

Light refreshments will be served, and parking will be available.

For more information, contact Kevin McCormack at kmccormack@cirm.ca.gov.



Randy Mills, PhD (Photo courtesy of CIRM)

Baxter Foundation supports young researchers at USC

In 1959, the Donald E. and Delia B. Baxter Foundation made its first grant of \$6,000 to USC. Fifty-five years later, the foundation continues to support innovative medical research with \$100,000 awards to two talented assistant professors: Justin Ichida, PhD, in the Department of Stem Cell Biology and Regenerative Medicine, and Kai Chen, PhD, in the Department of Radiology. The foundation also awarded \$100,000 for the Baxter Medical Student Summer Research Fellowship Program.

Ichida will use his award to find new ways to treat patients with two fatal neurodegenerative disorders: frontotemporal dementia (FTD) and amyotrophic lateral sclerosis (ALS or Lou Gehrig's disease).

The most common forms of both ALS and FTD are caused by the same genetic mutation in which six letters of the genetic code repeat as many as 1,000 times. In FTD, this causes the death of neurons in the front and sides of the brain, leading to a loss of personality, emotions, empathy, memory and, eventually, basic bodily functions. In ALS, the mutation causes the death of motor neurons — the cells that convey messages between the brain and the muscles — leading to paralysis and death.

Ichida's lab is determining precisely how this genetic mutation causes these diseases, which will enable the discovery of more targeted drug therapies.

"The Baxter Foundation funds projects that will

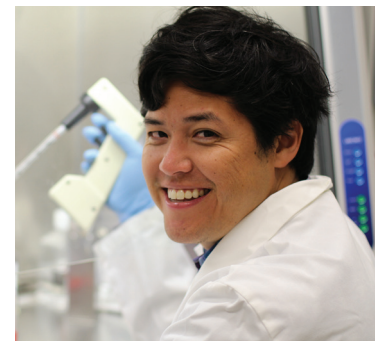
improve the lives of patients sooner rather than later," said Ichida. "We don't know the answer to the questions that we proposed, but we're close to finding out."

Chen's award will improve the lives of a different group of patients by advancing a tumor imaging technology called "positron emission tomography," or PET.

"This project leverages the interdisciplinary expertise of our group covering supramolecular chemistry, nanoparticles, radiochemistry, molecular imaging and cancer biology," said Chen. "We envision that the success of our proposed research could change the current paradigm in PET cancer imaging, and open up new opportunities for pretargeted drug delivery."

Through these generous grants, the foundation is supporting medical students and young investigators as they embark on their careers, start laboratories and perform research that will eventually benefit patients.

"The early stage of career development is critical for new researchers and medical students," said foundation president Donald Haake. "By supporting them during this formative period, we are investing in a healthier future for all of us."



Justin Ichida, PhD (Photo by Cristy Lytal)

Choi Family Therapeutic Screening Facility opens

How can scientists make more accurate predictions about which potential drugs will effectively treat disease — before launching expensive and laborious human clinical trials? USC's new Choi Family Therapeutic Screening Facility offers one answer: through the so-called “disease in a dish” approach.

“At the grand opening on May 2, researchers thanked Kin-Chung Choi and his family for the generous gift that made this “disease in a dish” approach possible.

The approach involves reprogramming patients' stem cells into their disease-affected cell types. This allows scientists to populate petri dishes with neural cells from patients with neurodegenerative diseases, inner ear cells from patients with hearing loss or balance disorders, and other cell types relevant to a wide variety of medical conditions. These “diseases in a dish” can then be used to test the effects of potential drugs on a patient's actual cells.

Part of the Eli and Edythe Broad Center for Regenerative Medicine and Stem Cell Research at USC, the facility comprises extensive chemical libraries, screening equipment and trained technicians — which will support researchers across the university.



From right, philanthropist Kin-Chung (KC) Choi; USC's stem cell research center director Andy McMahon and program director Qing Liu-Michael; and KC's wife Amy Choi, daughter Lucia Choi-Dalton, daughter-in-law Quence Choi, and son and USC alumnus Henry Choi (Photo by Cristy Lytal)

“Stem cell research is such an exciting field for scientists now,” said Kin-Chung Choi. “Our family is honored to have the opportunity to learn alongside USC's scientists and help them reach their potential in turning discoveries into cures.”

Justin Ichida, PhD, director of the screening facility and assistant professor of Stem Cell Biology and Regenerative Medicine, highlighted his own promising work: conducting some of the first screens on Lou Gehrig's disease using patient-specific cells.

“This facility is that critical link in what we want to do here, which is translating stem cell science into treatments for people,” said Ichida.

Two of Ichida's colleagues from the Department of Stem Cell Biology and Regenerative Medicine shared additional examples of how the facility is accelerating the development of new patient therapies.

Professor of Research Neil Segil, PhD, talked about the quest for potential drugs that can regenerate inner ear cells as a treatment for hearing loss and balance disorders, which affect millions of people.

Assistant Professor Min Yu, MD, PhD, described how the facility will advance her breast cancer research, which involves filtering out circulating tumor stem cells from the blood to understand how the disease spreads and stop it in its tracks.

According to Qing Liu-Michael, PhD, program director at the Eli and Edythe Broad Center for Regenerative Medicine and Stem Cell Research at USC, the facility will provide the opportunity for these researchers to do great work and develop new therapies for diseases.

“Facilities such as this enable the depth, breadth and quality of stem cell research,” said Andy McMahon, PhD, FRS, director of the Eli and Edythe Broad Center for Regenerative Medicine and Stem Cell Research at USC. “Therapeutic screening adds a transformative new element to the center's research infrastructure.”

Research Highlights

Rong Lu and colleagues at Stanford University used a cell labeling technique to demonstrate that different types of white blood cells may come from different blood stem cells. This knowledge may help improve bone marrow transplant techniques. (*Cell Stem Cell*)

Yi Liu, Songtao Shi and colleagues revealed that bone marrow stem cells require hydrogen sulfide gas to control calcium ion flow — necessary for properly multiplying and forming bone tissues. (*Cell Stem Cell*)

Chih-Chiang Chen, Cheng-Ming Chuong and colleagues showed that molecules from skin cells of young mice prevent hair loss and promote hair growth in old mice. (*Journal of Investigative Dermatology*)

Pinchas Cohen and colleagues studied people between ages 90 and 99 and found that females with below average levels of insulin-like growth factor-1 (IGF-1) live longer than those with above average levels. Lower IGF-1 levels predicted longer survival in males and females with history of cancer. (*Aging Cell*)

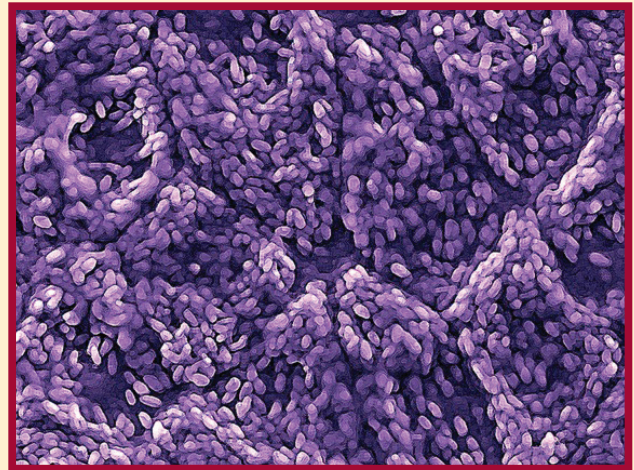
Morgan Levine, Valter Longo and colleagues looked at the relationship between protein intake and mortality in humans between ages 50 and 65 during an 18-year study. High protein intake correlates with a 75 percent increase in mortality and four-fold increase in the risk of cancer-related death in people 65 and younger, but not older than 65. (*Cell Metabolism*)

Helty Adisetiyo, Baruch Frenkel and colleagues found that a cell type called “cancer-associated fibroblasts” promote survival of prostate cancer stem cells responsible for relapse after hormone therapy ceases to be effective. (*Journal of Cellular Physiology*)

Justin Ichida and colleagues at Harvard University created a safer way of making pluripotent stem cells from skin cells without using two proteins (KLF4 and c-Myc) that could cause cancer. They did so by adding a small chemical that inhibits a cell signaling system called the Notch pathway. (*Nature Chemical Biology*)

Megan McCain and colleagues at Harvard University developed an improved substrate for growing heart muscle cells in a petri dish. This enabled them to grow contracting rat heart tissue and stem cell-derived contracting human heart muscle for nearly a month, providing a much-needed system for testing drug toxicity. (*Biomaterials*)

Featured Image



USC scientists Mark Humayun, MD, PhD, and David Hinton, MD, are delivering these retinal-support cells into the eyes of patients with the dry form of age-related macular degeneration in a clinical trial. (*Image by David Hinton, MD*)

Your Support

To learn how you can transform medicine by supporting USC Stem Cell, contact:

Keck School of Medicine of USC
(323) 442-1013
stemcelldev@usc.edu
stemcell.usc.edu/donate

USC
Stem Cell