

California's first master's program in stem cells

USC is pleased to offer the first master's program in stem cell biology and regenerative medicine in California.

"The program gives students a unique entrée into the rapidly expanding field of stem cell biology in the globally-recognized capital of stem cell science, California," said Henry Sucov, PhD, director of the master's program.

Offered by the Department of Stem Cell Biology and Regenerative Medicine at the Keck School of Medicine of USC, the one-year program with an invitational second research year will welcome its inaugural class in Fall 2014.

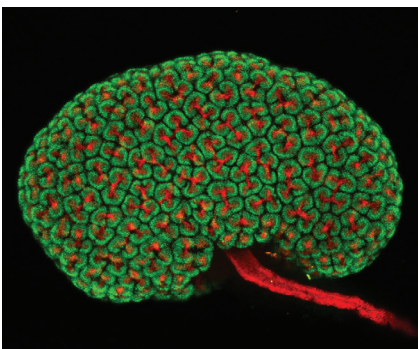
Students will enjoy courses in cutting-edge biomedical science, including developmental and stem cell biology, human embryology, regenerative medicine, and the

translational and therapeutic aspects of stem cell technology. They will also have the unusual opportunity for extensive hands-on laboratory experience with stem cells.

At the conclusion of year one, selected students will be invited

to conduct independent research and course work during an optional second year. Selection will be based on academic performance and research interests.

After completing this program, graduates will have a competitive advantage in applying to medical or PhD programs, entering the growing stem



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 across USC, including 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 creating new educational opportunities with the USC Marshall School of Business and the USC Roski School of Art and Design.

cell pharmaceutical domain, or engaging in other academic, clinical or business efforts.

"There are only two other master's programs in stem cell biology that I am aware of in the U.S., and neither of these take as rounded of an approach to the problem of translating research from the laboratory into the clinic," said Department Director Andy McMahon, PhD, FRS. "I'm particularly excited to bring in the field's leading practitioners as visiting faculty to share their experience with business, regulatory oversight, clinical trials and the pharmaceutical industry. Our goal is to train our students to become the select group of leaders who will chart the course of the medicine of the future — regenerative medicine."

USC invites prospective students to submit their applications — including transcripts, GRE test scores, a personal statement and two recommendation letters — at usc.edu/admission/graduate/apply. For more information, visit scrm.usc.edu.

USC Stem Cell and USC Roski announce collaboration

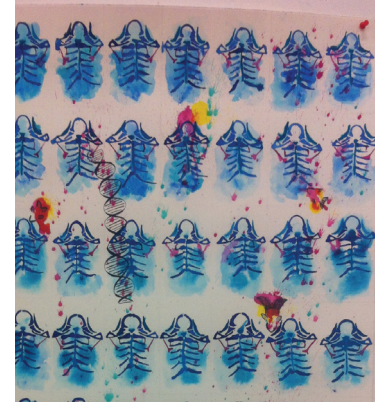
What happens when USC students — some studying art and design, others stem cell biology — examine zebrafish skulls under a microscope? It depends on who's looking.

During spring 2014, scientists at the Eli and Edythe Broad Center for Regenerative Medicine and Stem Cell Research at USC invited students from the USC Roski School of Art and Design to find artistic inspiration under microscopes, in petri dishes and in test tubes. The collaboration is part of USC Stem Cell, a university-wide, multidisciplinary initiative.

Students hailed from four courses: Advanced Drawing; Advanced Ceramics; Special Project and Design; and Art and Technology. The results ranged from Kristen Chen's watercolor of zebrafish skulls (pictured) to an outsized environmental design project

to decorate USC's stem cell building.

"This project demonstrates only one of the many possible forms that collaboration might take between the arts and pioneering scientific research, and the importance of such collaborations," said USC Roski Dean Erica Muhl.



Andy McMahon, head of USC Stem Cell, added: "Beyond the works of art that have been forged through this collaboration, scientists have improved their ability to communicate with non-scientists, and art students have learned the beauty of science."

Businessman invests in Stem Cell Kidney Disease Team

Can patients with kidney disease be effectively treated with injections of stem cells or other cells that aren't fully differentiated? Chinese businessman Yong Chen has pledged \$400,000 to begin answering this question.

Chen's gift establishes a Yong Chen Zhongmei Group USC Kidney Research Fund to support research led by Andy McMahon, PhD, FRS, at USC and Laura Perin, PhD, at The Saban Research Institute of Children's Hospital Los Angeles and USC. Cross-institutional research efforts such as these are central to USC Stem Cell, a collaborative, multidisciplinary initiative working to translate the potential of stem cell research to the clinical imperative of regenerative medicine. Perin and McMahon are key members of the USC Stem Cell Kidney Disease Team.

McMahon, who heads USC Stem Cell, points out that one in 10 adults in the U.S. — more than 20 million people — are suffering from some degree of chronic kidney disease.

"There's a real need for us to develop novel stem cell-

based therapies, and Mr. Chen's gift will help make this possible," McMahon added.

McMahon will lend his expertise in kidney development, repair and regeneration to Perin's mouse studies, which demonstrate that injections of stem cells derived from amniotic fluid can improve the course of kidney fibrosis and prolong survival. The new collaborative research team will provide preliminary data for future clinical research and therapeutic applications benefiting the many patients in need.

Chen is owner of the international Zhongmei Group, which owns hospitals, specialty centers and a medical school in China, and promotes medical education, training, investment, research and development. The group is currently partnering with several U.S.-based institutions to further advance medical care, research and education.

"My goal is to accelerate the process of turning basic scientific discoveries into clinical therapies," said Chen. "This is the best way to help the millions of patients awaiting a cure."

USC Stem Cell welcomes four new researchers



Rong Lu, PhD studies stem cell coordination, regulation and malfunction from a single cell perspective, using blood stem cells. She seeks to provide insights into the origins of disease and identify new therapeutic targets.



Neil Segil, PhD is working to regenerate the sensory hair cells of the inner ear. The loss of these cells is the major contributor to hearing loss and balance disorders, which affect more than half of adults in the US by retirement age.



Megan McCain leverages techniques in tissue engineering to understand the mechanisms of development and disease on the cell and tissue level. She is a faculty member at the USC Viterbi School of Engineering.



Min Yu, MD, PhD researches the mechanism of cancer metastasis, the major cause of cancer-related death. She is gaining a better understanding of the cancer stem cell properties in circulating tumor cells and how to target them.

USC Stem Cell clinical trial to study loss of vision

A clinical trial of a new stem-cell based therapy for aged-related macular degeneration (AMD) patients has been funded as part of the California Institute for Regenerative Medicine's (CIRM) Disease Team awards.

The nearly \$19 million study is led by Mark Humayun, MD, PhD (right), professor of ophthalmology and biomedical engineering and cell and neurobiology, and David Hinton, MD (left), professor of pathology, neurological surgery and ophthalmology at the Keck School of Medicine of USC. Both Humayun and



Hinton are principal investigators with USC Stem Cell.

The team also includes scientists from the University of California at

Santa Barbara, the California Institute of Technology and City of Hope.

“We believe this research will help us restore native photoreceptors so we can slow vision loss and even restore eyesight in people who suffer from advanced dry age-related macular degeneration,” Humayun said.

The team is using stem cells to grow the cells that support the health of the retina — retina pigment epithelium, or RPE cells. The death of RPE cells is one of the primary contributors to AMD, the leading cause of blindness in the Western World in the elderly.

They will deliver these RPE cells into the eyes of patients with the most common form of the disease — the dry type of AMD — in a phase 1 clinical trial, scheduled to begin in early 2015.

“This research could be a game-changer in AMD,” said Keck School Dean Carmen A. Puliafito. “Estimates indicate that by 2020, more than 450,000 people in California alone will suffer vision loss or blindness because of this disease, and the innovative approach shows distinct promise.”

Research Highlights

C. Thomas Vangsness and colleagues demonstrated that a single stem cell injection following meniscal knee surgery may provide pain relief and aid in meniscus regrowth in a phase I clinical trial. (*Journal of Bone and Joint Surgery*)

Hu Zhao, Yang Chai and colleagues revealed how nerve bundles and arteries interact with stem cells in the incisors of mice. (*Cell Stem Cell*)

Lick Lai, Andy McMahon and colleagues shed light on how a protein called liver kinase b1 (Lkb1) promotes orderly skeletal growth and prevents skeletal tumors. (*Proceedings of the National Academy of Sciences*)

Valentina Villani, Laura Perin and colleagues showed that injecting amniotic fluid stem cells into the hearts of diabetic mice can promote the regeneration of insulin-producing pancreatic cells. (*Cytherapy*)

Haiyan Qin, Songtao Shi and colleagues identified a group of molecules that works together to turn a normal stem cell into a tumor-initiating stem cell in the human jaw bone. (*Cell Stem Cell*)

Seyung S. Chung and Chester J. Koh discovered that a protein called FGF10 is important for the generation of bladder lining from human stem cells, an important first step in regeneration this organ. (*In Vitro Cellular & Developmental Biology - Animal*)

Yasuhiro Torashima, Tracy Griksheit and colleagues found that the protein FGF10 enhances the growth of tissue-engineered small intestines in mice. (*Journal of Tissue Engineering and Regenerative Medicine*)

Ping Wu, Chen-Ming Chuong and colleagues identified the stem cell population and groups of molecules that enable alligator teeth to regenerate throughout their lives. This may blaze the trail for regenerating adult teeth in humans. (*Proceedings of the National Academy of Sciences*)

Jing Liu, Andy McMahon and colleagues discovered early molecular markers for acute kidney injury in mice, providing important tools to study kidney injury, fibrosis, repair and regeneration, as well as to improve kidney diagnosis in patients. (*Journal of Clinical Investigation*)

Featured Image



This image might resemble a blossom, but it's actually a look inside the ear of a mouse, with the middle ear ossicles off-center. (*Image by Camilla Teng, a graduate student in the labs of Rob Maxson and Gage Crump*)

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