

CENTER FOR STEM CELL BIOLOGY AND ENGINEERING

UNIVERSITY OF CALIFORNIA SANTA BARBARA

MISSION STATEMENT

The mission of the UC Santa Barbara Center in Stem Cell Biology and Engineering is to foster an interdisciplinary program of stem cell research and teaching to develop new technologies in the emerging field of regenerative medicine, with research focused on:

-  **MOLECULAR MECHANISMS**
of stem cell pluripotency, proliferation and differentiation. (12 Laboratories)
-  **BIOTECHNOLOGY AND BIOENGINEERING**
of stem cell growth, differentiation, sorting and delivery. (11 Laboratories)
-  **REGENERATIVE MEDICINE**
with research targeted at specific diseases. (5 Laboratories)

UC Santa Barbara is well positioned to make unique, significant contributions in stem cell research, with extraordinary enabling technologies in biomaterials, systems biology, nanotechnology, micro-processing, bioengineering, and fundamental biomedical research.

Our approaches are distinct from those at California medical schools, with our emphasis on basic biological questions and engineering challenges related to stem cell research.

UCSB's renowned faculty includes five winners of the Nobel Prize and scores of elected members of national and international academies and societies. UCSB was ranked 4th in the nation in Natural Sciences among public universities in the 2009 rankings by US News and World Report. Searches are underway to hire additional faculty members engaged in innovative stem cell research.

The Center for Stem Cell Biology and Engineering has grown rapidly thanks to crucial grant support from The California Institute for Regenerative Medicine, including a Major Facilities Grant, a Shared Laboratory Grant, 2 Training Grants, and a Tools and Technology Grant. Additional funding comes from the National Institutes of Health, The National Science Foundation, The Army Research Office, The Tri-Counties Blood Bank, Santa Barbara Cottage Hospital, Allergan Inc., Millipore, Inc., Advanced Cell Technology, Primegen Biotechnology, UCSB, and generous private individuals, including Amos Ben Mir, Virgil Ellings, and William K. Bowes.



Co-Directors Dennis D. Clegg, James A. Thomson, H. Tom Soh



<http://www.stemcell.ucsb.edu/>

stemcell-info@lifesci.ucsb.edu

A SAMPLE OF ONGOING RESEARCH PROJECTS

MOLECULAR MECHANISMS

Induced Pluripotent Stem Cells

Molecular basis of pluripotency.

James A. Thomson
Co-Director, UCSB Center for Stem Cell Biology & Engineering; MacArthur Chair, UWisc; Scientific Director, Wicell; Director of Regenerative Biology, Morgridge Institute



MOLECULAR MECHANISMS

Stem Cells in Model Systems

Molecular and genetic control of development in the nematode *C. elegans*; the genetic basis of stem cell competence states; micro RNA control of proliferation and differentiation in the stem cell niche.

Joel Rothman
Professor, Molecular, Cellular and Developmental Biology; Director, Woods Hole Embryology Course



BIOTECHNOLOGY & BIOENGINEERING

Nanotechnology and Cancer

Cell adhesion and tumor metastasis; tissue-specific vascular "zip codes" for delivery of nanoparticles to specific tissue targets; novel synthetic matrices to support hESC survival, proliferation, and delivery to specific niches.

Erkki Ruoslahti
Professor, Molecular, Cellular and Developmental Biology; Burnham Institute for Medical Research at UCSB



BIOTECHNOLOGY & BIOENGINEERING

Cell Sorting Biotechnology

High throughput cell screening, including novel methods for sorting hESC derivatives; molecular screening and directed evolution; integrated biosensors.

H. Tom Soh
Co-Director, Center for Stem Cell Biology and Engineering; Professor, Departments of Materials and Mechanical Engineering



REGENERATIVE MEDICINE

Macular Degeneration

Cellular and molecular processes that cause age-related macular degeneration; ocular differentiation of human embryonic stem cells.

Lincoln V. Johnson
Director, Center for the Study of Macular Degeneration, Neuroscience Research Institute



REGENERATIVE MEDICINE

Alzheimer's Disease

Micro RNA regulation of neural differentiation of Human embryonic stem cells; Autism and Alzheimer's Disease.

Kenneth S. Kosik, M.D.
Harriman Professor of Neuroscience Research, MCDB; Co-Director, Neuroscience Research Institute

