

CIRM Tools & Technology Grants Awarded to UC San Diego Stem Cell Researcher

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A researcher from the University of California, San Diego School of Medicine is among 23 awardees statewide to receive “Tools and Technology” grants from the California Institute for Regenerative Medicine (CIRM). The grant to Steven Dowdy, Ph.D., Professor of Cellular and Molecular Medicine and Howard Hughes Medical Institute Investigator, for \$925,200 brings the total of CIRM funding to the university to almost \$34 million since grants were first awarded in late 2005.

CIRM’s governing board, the 29-member Independent Citizens Oversight Committee (ICOC), announced 23 “Tools and Technology” grants, intended to support work that either creates new reagents and methods for stem cell research, or that scales up existing technologies – all designed to accelerate the development of critical therapies for patients with chronic disease or injury. A total of \$19 million in funding for 23 grants at 18 institutions was approved by the ICOC, 17 not-for-profit and six for-profit organizations.

One of the major obstacles in translating basic discoveries in stem cell research into safe therapies for patients has been the risk of a patient acquiring malignant mutations through use of viral and DNA vectors, molecules used to introduce foreign DNA into host cells. For the past ten years, Dowdy’s lab has pioneered an alternative, non-DNA (“epigenetic”) approach to stem cell research, allowing for the introduction of proteins into embryonic and adult stem cells without the use of DNA-based vectors.

In this project, Dowdy and colleague Ben Yu, M.D., Ph.D., assistant professor in the Division of Dermatology, will develop a non-genetic approach to manipulate stem cells using short interfering dsRNAs or siRNA, small strands of RNA that interfere with the translation of messenger RNA. The siRNA are used to differentiate pluripotent cells – cells with the potential to differentiate into specific cell types – and adult stem cells into specific cell lineages such as heart muscle and neurons.

“Our past experiments have demonstrated the potential of using a novel approach to efficiently deliver siRNAs into stem cells, using a type of cell permeable protein called Peptide Transduction

Domains, or PTDs,” said Dowdy. “The ability to introduce siRNAs into embryonic stem cells without the use of DNA is essential in moving this field forward. If successful, this proposal will remove one of the major roadblocks to developing therapies for humans using embryonic stem cells and induced pluripotent stem, or IPS cells.”

Dowdy and Yu – who received a \$3 million New Faculty grant from CIRM in March 2008 – will use hair follicles from the skin to create IPS cells, then introduce peptide transduction domains to turn on the transcription factors that will stimulate the IPS cells to differentiate into nerve, heart muscle and blood cells.

“This latest round of CIRM funding will help enable our scientists to develop technology required to bring the hope of stem cell therapies for treating devastating human diseases to reality,” said Larry Goldstein, Ph.D., professor of Cellular and Molecular Medicine and director of UC San Diego’s Stem Cell Research Program. “These advanced tools are the nuts and bolts required to control stem cells in specific ways and move past current roadblocks to stem cell-based therapies.”

This grant brings the total awarded by CIRM to UC San Diego to \$33.8 million. In addition, the Sanford Consortium for Regenerative Medicine – comprised of UC San Diego, the Salk Institute for Biological Studies, The Scripps Research Institute and The Burnham Institute – received a \$43 million facilities grant from CIRM earlier this year to help build a joint stem cell research facility, scheduled to break ground in early 2009.

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