UC Davis physicians awarded state stem cell grants

Research to explore innovative treatment for non-healing wounds and an alternative to liver transplantation

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California's stem cell agency voted today to fund two new grants to UC Davis School of Medicine physicians for their work in regenerative medicine research. Roslyn Rivkah Isseroff, professor of dermatology, and Mark Zern, professor of internal medicine, were among the scientists from around the state whose Early Translational study proposals were approved by the California Institute for Regenerative Medicine's governing board in Los Angeles. The funding enables Isseroff to further explore her innovative work to create a bandage-like material composed of stem cells and a collagen framework that can be applied to chronic wounds to prompt rapid healing. Zern's research is designed to establish clinically useful methods of generating human liver cells that could be used to repair an injured liver. Known as hepatocytes, these cells provide a safer and less expensive treatment than whole-liver transplantation.

Their combined grants will total approximately $9.7 million over a three-year period.

"Drs. Isseroff and Zern are doing amazing work," said Jan Nolta, professor of internal medicine, director of the UC Davis Institute for Regenerative Cures and co-principal investigator on the Isseroff wound-repair grant. "Their research is rapidly advancing the field of regenerative medicine and helping to develop innovative new medical treatments. These grants will help tremendously in our mission to bring stem cell-based treatments to our patients who currently lack other options."

Stem cells offer the unique potential to restore tissues damaged by injury or disease. CIRM’s Early Translational awards are designed to support scientific investigations that show promise for developing clinical applications from laboratory research.

Isseroff, who also serves as chief of dermatology and director of the wound clinic at the Veterans Affairs Northern California Health Care System, has long been frustrated by the challenges of treating the chronic, non-healing wounds of diabetics. Foot ulcers, in particular, affect between 15 to 25 percent of the approximately 21 million Americans who have diabetes. Eighty-five percent of lower-limb amputations are preceded by active foot ulcers.

Isseroff's research, conducted in collaboration with scientists from Germany's Technical University of Munich, will combine mesenchymal stem cells (stem cells extracted from a donor's fat or bone marrow) with a collagen scaffolding upon which to build and regenerate new tissue. The stem cells secrete potent stimulatory molecules that can have reparative properties to restore blood flow and heal damaged tissue. Isseroff envisions a therapeutic biological product that will one day allow physicians to simply rinse a living bandage-like material and apply it to wounds for rapid tissue repair.

Scientists are keenly interested in stem cells because they have the potential to develop into many different cell types in the body, such as liver, kidney, brain or heart cells. When unspecialized stem cells divide into specialized cells, the process is called “differentiation.” Understanding what triggers stem cell differentiation and how to direct it to areas of the body are among the key areas of regenerative medicine research.

Zern, who also directs the Transplant Research Program at UC Davis, is working to develop an alternative to liver transplants. Whole-organ transplantation continues to have very high costs and complex challenges, including a lack of viable donor organs. More than a 1,000 people die each year while on a waiting list for a new liver. Tens of thousands of other people never get on the lists because of the lack of available donor organs.

Zern's research involves comparing approved lines of human embryonic stem cells with other types of stem cells to determine which will be the most effective cell type to transplant into people with liver disease. He and his research team will differentiate the stem cells to act like liver cells while also ensuring that the cells are safe. Zern's goal is to create a safe and unlimited supply of liver cells for treating people with liver injury, liver failure or inherited liver disease. Developing methods to generate unlimited amounts of liver-like cells would provide regenerative treatments that could offer a better, less invasive alternative to whole-organ transplantation.

UC Davis is playing a leading role in regenerative medicine, with nearly 150 scientists working on stem cell-related research projects on the Davis and Sacramento campuses. It now has received 19 grants from the California Institute for Regenerative Medicine (CIRM), the state stem cell agency, totaling more than $61 million. In 2010, the UC Davis Institute for Regenerative Cures, a facility supported by CIRM, opened its doors on the university's Sacramento campus. This $62 million facility is the university's hub for stem cell science. It includes Northern California's largest academic Good Manufacturing Practice laboratory, with state-of-the-art equipment and manufacturing rooms for cellular and gene therapies. UC Davis also has a Translational Human Embryonic Stem Cell Shared Research Facility in Davis and a collaborative partnership with the Institute for Pediatric Regenerative Medicine at Shriners Hospital for Children Northern California. The stem cell research work is facilitated by the
resources of the Clinical and Translational Science Center at UC Davis, which was formed in 2005 to enhance collaborations that bring new treatments to people more quickly. For more information, visit healthsystem.ucdavis.edu/stemcellresearch/.