UC San Diego
UC San Diego News Center

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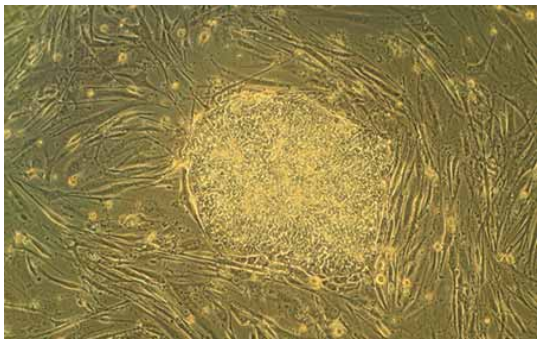
CIRM Grants May Fund the Next Great Stem Cell Achievement

Three UC San Diego researchers receive funding to pursue "great ideas"

All scientific achievement begins with an idea. Yesterday, three researchers at University of California San Diego School of Medicine were awarded funding by the Independent Citizens Oversight Committee of the California Institute for Regenerative Medicine (CIRM) to pursue budding ideas that might eventually impact the field of human stem cell research.



Micrograph of human stem cell. Photo courtesy of Wikimedia Commons

The CIRM Discovery Inception Program provides seed money for "great ideas" that need testing and early data before they can compete for later, larger funding opportunities. The Oversight Committee approved more than $4 million for 19 such projects at its May 19 meeting, covering projects ranging from stroke and heart disease to prostate cancer and blindness.

"This is a program supporting early stage ideas that have the potential to be ground-breaking," said C. Randal Mills, PhD, president and CEO of CIRM. "We asked scientists to pitch us their best new ideas, things they want to test but that are hard to get funding for. We know not all of these will pan out, but those that do succeed have the potential to advance our understanding of stem cells and hopefully lead to treatments in the future."

Three ideas by UC San Diego researchers involving inflamed brain cells, growing blood cells and building mini-retinas earned awards of $232,200 each:

Using existing anti-retroviral drugs to treat neuro-inflammation

Alysson R. Muotri, PhD, associate professor in the UC San Diego School of Medicine departments of Pediatrics and Cellular and Molecular Medicine

Inflammation of nervous tissue is an important component of several neurological disorders, including autism, amyotrophic lateral sclerosis, Alzheimer's disease and lupus. It's also an element of aging, but little is known about what initiates the neuro-inflammatory process. Usual suspects include infection, trauma and toxic metabolites from the environment, but none of these explain the persistent, chronic nature of the condition. Muotri and colleagues have shown that neuro-inflammation involves retrotransposons or "jumping genes," stretches of highly active DNA that accumulate in the cytoplasm of certain brain cells, triggering an inflammatory response. Some anti-retroviral drugs already on the market for other conditions may help reduce neuro-inflammation. Muotri wants to investigate how these drugs work and whether they can be used effectively to treat neuro-inflammation across a broad range of disorders.

Expanding the supply of hematopoietic stem and progenitor cells

Dionicio Siegel, PhD, associate professor of chemistry and molecular pharmacology, Skaggs School of Pharmacy and Pharmaceutical Sciences

Hematopoietic stem and progenitor cells (HSPCs) give rise to all other types of blood cells. The ability to grow them outside of the body — a process called *ex vivo* expansion — offers the potential to provide limitless supplies for treating multiple blood diseases. A plant-derived natural product called euralinilide E has been found to promote the expansion of HSPCs, but access to the compound is extremely limited. Siegel and colleagues will investigate how eupalinilide E, developed through a synthetic process, promotes HSPC expansion and its therapeutic potential.

Learning how to build a better retina for blinding diseases

Karl Wahlin, PhD, assistant professor of ophthalmology at Shiley Eye Institute, and director of the Richard C. Atkinson Laboratory for Regenerative Ophthalmology

In recent years, researchers have managed to harness the power of HSPCs to generate retinal cells and tissues, often with an advanced 3-dimensional architecture similar to human eyes. This ability to self-assemble into 3D "mini-retinas" raises hope that such cells could be used for transplantation into individuals going blind from retinal degenerative disease. At present, the process of generating mini-retinas has not been standardized and there is considerable

variation in quality, which raises concerns over efficacy and safety. Wahlin and colleagues will use the gene-editing tool CRISPR-Cas9 to create retinal reporter stem cells, which his lab will then employ to develop systematic and quantifiable methods to improve retinal differentiation, particularly in 3D culture. The goal is to identify and optimize micro-environment conditions that mimic the native embryonic environment of developing eyes. He hopes to develop stem cell models of inherited retinal dystrophy applicable to age-related macular degeneration, retinitis pigmentosa and glaucoma.

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