
Engineering microscale tissue constructs from human pluripotent stem cells

Grant Award Details

Engineering microscale tissue constructs from human pluripotent stem cells

Grant Type: Research Leadership

Grant Number: LA1-08015

Project Objective: Development of 3D microscale tissue constructs from human pluripotent cells to generate in vitro models of physiologically mature cardiomyocytes and neuronal tissue.

Investigator:

Name:	Todd McDevitt
Institution:	Gladstone Institutes, J. David
Type:	PI

Disease Focus: Heart Disease, Neurological Disorders

Human Stem Cell Use: Embryonic Stem Cell, iPS Cell

Award Value: \$5,884,058

Status: Active

Progress Reports

Reporting Period: Year 1

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Reporting Period: Year 2

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Reporting Period: Year 5

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Grant Application Details

Application Title: Engineering microscale tissue constructs from human pluripotent stem cells

Public Abstract: Tissues derived from stem cells can serve multiple purposes to enhance biomedical therapies. Human tissues engineered from stem cells hold tremendous potential to serve as better substrates for the discovery and development of new drugs, accurately model development or disease progression, and one day ultimately be used directly to repair, restore and replace traumatically injured and chronically degenerative organs. However, realizing the full potential of stem cells for regenerative medicine applications will require the ability to produce constructs that not only resemble the structure of real tissues, but also recapitulate appropriate physiological functions. In addition, engineered tissues should behave similarly regardless of the varying source of cells, thus requiring robust, reproducible and scalable methods of biofabrication that can be achieved using a holistic systems engineering approach. The primary objective of this research proposal is to create models of cardiac and neural human tissues from stem cells that can be used for various purposes to improve the quality of human health.

Statement of Benefit to California: California has become internationally renowned as home to the world's most cutting-edge stem cell biology and a global leader of clinical translation and commercialization activities for stem cell technologies and therapies. California has become the focus of worldwide attention due in large part to the significant investment made by the citizens of the state to prioritize innovative stem cell research as a critical step in advancing future biomedical therapies that can significantly improve the quality of life for countless numbers of people suffering from traumatic injuries, congenital disorders and chronic degenerative diseases. At this stage, additional investment in integration of novel tissue engineering principles with fundamental stem cell research will enable the development of novel human tissue constructs that can be used to further the translational use of stem cell-derived tissues for regenerative medicine applications. This proposal would enable the recruitment of a leading biomedical engineer with significant tissue engineering experience to collaborate with leading cardiovascular and neural investigators. The expected result will be development of new approaches to engineer transplantable tissues from pluripotent stem cell sources leading to new regenerative therapies as well as an enhanced understanding of mechanisms regulating human tissue development.

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