Microenvironment for hiPSC-derived pacemaking cardiomyocytes

Grant Award Details

Microenvironment for hiPSC-derived pacemaking cardiomyocytes

Grant Type: Quest - Discovery Stage Research Projects

Grant Number: DISC2-10120

Project Objective: Develop a proof-of-concept biopacemaker consisting of hiPSC-derived cardiomyocytes in a porcine matrix scaffold from the sinoatrial node.

Investigator:

Name:	Deborah Lieu
Institution:	University of California, Davis
Type:	PI

Disease Focus: Heart Disease

Human Stem Cell Use: iPS Cell

Award Value: $2,042,728

Status: Active

Progress Reports

Reporting Period: NCE #1

View Report

Grant Application Details

Application Title: Microenvironment for hiPSC-derived pacemaking cardiomyocytes

Public Abstract:

Research Objective

This proposal investigates the effects of the microenvironment on the development and maintenance of pacemaking function in human induced pluripotent stem cell (hiPSC)-derived cardiomyocytes.

Impact

Pacemaking function of hiPSC-derived cardiomyocytes is lost over time. Sustainability of pacemaking function of these cells is critical for engineering an biopacemaker from the patient's own cells.

Major Proposed Activities

- Determine the effects of matrix scaffolds on the differentiation and maintenance of pacemaking function in hiPSC-derived cardiomyocytes.
- Determine the appropriate hiPSC-derived cardiac cells to be subjected to the microenvironment for efficient yield of pacemaking hiPSC-derived cardiomyocytes.
- Induce vascularization in tissue constructs in small animals to sustain pacemaking tissue construct.
- Test sustainability of a functional pacemaking tissue construct in a small animal model.

Statement of Benefit to California:

Over 350,000 patients a year in the U.S. require an electronic pacemaker to restore their heart rhythm. The annual healthcare burden amounts to $20 billion. Repeated surgeries to replace battery and electrical parts generate additional costs and suffering for the patients. A biopacemaker engineered from human stem cell-derived pacemaking cells can overcome problems associated with electronics and improve the quality of life for the pacemaker recipient while reducing cumulative health care costs.
