A Chemical Approach to Stem Cell Biology

Grant Award Details

A Chemical Approach to Stem Cell Biology

Grant Type: SEED Grant

Grant Number: RS1-00302

Investigator:

Name:	Peter Schultz
Institution:	Scripps Research Institute
Type:	PI

Human Stem Cell Use: Embryonic Stem Cell

Award Value: $748,944

Status: Closed

Progress Reports

Reporting Period: Year 2

View Report

Grant Application Details

Application Title: A Chemical Approach to Stem Cell Biology

Public Abstract: The aim of this project is to screen large collections of small molecules to identify molecules that allow one to propagate human embryonic stem cells (hESCs) in cell culture under defined conditions in an undifferentiated, pluripotent state. The chemical structures of any biologically active small molecules will be optimized with respect to potency, selectivity and biological stability. The ability of hESCs proliferated in the presence of such small molecules to be differentiated into specific cell lineages both in cell culture and in vivo will also be assessed. And finally, we will determine the mechanism of action of active small molecules by a variety of biochemical and genomic methods. The demonstration that one can identify synthetic drug-like molecules that allow one to control the self-renewal and/or differentiation of hESCs will represent an important step in the ultimate therapeutic application of hESCs to human disease. In addition, biological studies of such molecules should provide new insights into the processes that control stem cell biology.

Statement of Benefit to California:	Historically, small molecules have been more useful than genetic approaches in the treatment of human disease. However, much of our ability to control embryonic stem cell self-renewal and directed differentiation currently involves genetic manipulation of these cells or complex mixtures of protein factors. The demonstration that one can systematically identify, optimize and characterize the mechanism of action of small drug-like molecules that selectively control stem cell biology both in vitro and in vivo will: (1) provide important tools to manipulate stem cells in the lab; (2) provide new insights into the complex biology that regulates stem cell differentiation; and (3) provide an important first step which may ultimately lead to drugs that facilitate the clinical application of stem cells.
