Systems-level discovery of the regulatory mechanisms directing differentiation of hESC

Grant Award Details

Systems-level discovery of the regulatory mechanisms directing differentiation of hESC

Grant Type: Basic Biology V

Grant Number: RB5-07012

Project Objective: To elucidate mechanisms that regulate self-renewal and differentiation of hESCs into mesendoderm, neural progenitor cells, mesenchymal stem cells, and trophoblast-like cells. Specific goals are to identify lineage-specific regulators and use computational methods to predict and validate the results of their experimental manipulation.

Investigator:

Name:	Wei Wang
Institution:	University of California, San Diego
Type:	PI

Human Stem Cell Use: Embryonic Stem Cell

Award Value: $1,161,000

Status: Closed

Progress Reports

Reporting Period: Year 1

View Report

Reporting Period: Year 2

View Report

Reporting Period: Year 3/NCE

View Report

Grant Application Details

Application Title:	Systems-level discovery of the regulatory mechanisms directing differentiation of hESC
Public Abstract:	Human embryonic stem cells (hESCs) are capable of unlimited reproduction and retain the ability to differentiate into all cell types in the human body. Therefore, hESCs hold great promise for human cell and tissue replacement therapy. However, our knowledge on how to differentiate them into desired cell types for therapy remains limited. The overall goal of this proposal is to address this lack of knowledge to improve the feasibility of large production of hESCs and routine derivation of therapeutically valuable cells from hESCs. We propose to establish a systems biology approach, which will be continuously optimized with our experimental data, to provide intelligent guidance on how to differentiate hESCs into various cell lineages for therapy. The combination of the proposed bioinformatics and experimental approaches will provide a unique opportunity to address the needs for hESC-based replacement therapy.
Statement of Benefit to California:	Human embryonic stem cells (hESCs) are capable of unlimited self-renewal and retain the ability to differentiate into all cell types in the human body. Therefore, hESCs hold great promise for human cell and tissue replacement therapy. However, due to our limited knowledge of the mechanism underlying the self-renewal and lineage-specific differentiation, it becomes increasingly urgent that more effort must be made to address these knowledge bottlenecks. Our overall goal is to establish a systems biology approach to provide intelligent guidance for our experimental effort to elucidate the mechanisms underlying the lineage-specific differentiation. Achieving this goal will significantly improve our capacity for reliable differentiation of these cells into therapeutically useful cell types. Therefore, the proposed research will benefit California citizens by contributing to the eventual realization of the therapeutic potential of hESCs.