Transcriptional regulation of pluripotency in human embryonic stem cells

Grant Award Details

Transcriptional regulation of pluripotency in human embryonic stem cells

Grant Type: Basic Biology IV

Grant Number: RB4-06016

Project Objective: The goal is to isolate, characterize and reconstitute components of transcriptional machinery required for maintenance of pluripotency in hPSCs.

Investigator:

Name:	Robert Tjian
Institution:	University of California, Berkeley
Type:	PI

Human Stem Cell Use: Embryonic Stem Cell, iPS Cell

Award Value: $1,220,968

Status: Closed

Progress Reports

Reporting Period: Year 1

View Report

Reporting Period: Year 2

View Report

Reporting Period: Year 3

View Report

Grant Application Details

Application Title: Transcriptional regulation of pluripotency in human embryonic stem cells

Public Abstract:

All of the diverse cells in the human body contain the same genetic information, and originally arose from a single cell, a fertilized egg. Embryogenesis is a result of cell division followed by differential gene expression, to selectively activate only the genes needed for development of each specialized cell type. By understanding the multiple gene activities required to either maintain stem cell pluripotency or effect cell specific differentiation, it should be possible to define conditions under which undifferentiated stem cells may be grown in large volume in culture, or induced to become mature cell types of therapeutic interest.

The experiments described in this proposal are directed at understanding the regulation of gene expression in stem cells as they self-renew, and in the conversion of adult cells back to a stem cell-like state. Our laboratory has identified three protein complexes, SCC, SCC-A and SCC-B, required for the activity of genes needed for stem cell self-renewal. Here we propose to characterize the component proteins of these complexes. SCCs are potential targets for drugs aimed at increasing or decreasing the ability of stem cells to divide. SCCs could also facilitate the production of high quality induced pluripotent stem cells for regenerative medicine and tissue replacement therapy.

Statement of Benefit to California:

The ultimate goal of these studies is the development of therapies for diseases that are the result of inappropriate levels of gene expression, cell division and differentiation. The proposed experiments will demonstrate how gene activity is controlled to maintain a renewing population of stem cells. An understanding of the gene regulatory networks will be crucial for drug development and testing.

The work described in this proposal will likely reveal gene activities that are essential for the establishment, survival and maintenance of stem cells and generation of high quality induced pluripotent stem cells that can be faithfully re-differentiated into fully functional adult cell types for tissue replacement therapy. This knowledge may potentially identify previously unknown drug targets that will allow the screening of novel classes of pharmaceuticals.
