
The role of neural stem cells in cerebellar development, regeneration and tumorigenesis

Grant Award Details

The role of neural stem cells in cerebellar development, regeneration and tumorigenesis

Grant Type: Research Leadership

Grant Number: LA1-01747

Project Objective: To understand the role of neural stem cells in cerebellar development, regeneration and tumorigenesis. The proposed studies approach the above goal through multiple strategies which trace the fate of cerebellar stem cells and determine their role in regeneration of normal tissue and in the development of brain tumors.

Investigator:

Name:	Robert Wechsler-Reya
Institution:	Sanford Burnham Prebys Medical Discovery Institute
Type:	PI

Disease Focus: Brain Cancer, Cancer, Solid Tumors

Cell Line Generation: Cancer Stem Cell

Award Value: \$5,226,049

Status: Closed

Progress Reports

Reporting Period: Year 1

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Reporting Period: Year 4

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Reporting Period: Year 7 NCE

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Grant Application Details

Application Title: The role of neural stem cells in cerebellar development, regeneration and tumorigenesis

Public Abstract: Stem cells have the remarkable ability to renew themselves and to generate multiple different cell types. This allows them to generate normal tissues during development and to repair tissues following injury, but at the same time, renders them highly susceptible to mutations that can result in cancer. Only by understanding the signals that control growth and differentiation of stem cells can we learn to harness their regenerative capacity and restrain their malignant potential. The research described in this proposal is aimed at elucidating the role of neural stem cells in development, regeneration and tumor formation in the cerebellum.

Our previous studies identified a population of neural stem cells in the developing cerebellum. We now propose to use genetic approaches to mark these cells and identify the cell types that they generate during normal development. In addition, we plan to examine the capacity of these cells to regenerate the cerebellum following radiation. Finally, we propose to study the ability of these cells to give rise to brain tumors, and use the models that result from these studies to develop and test novel approaches to therapy. These studies will pave the way towards use of stem cells for repair of neurological damage and help develop more effective treatments for patients with brain tumors.

Statement of Benefit to California: We have previously identified a novel population of neural stem cells in the cerebellum. This proposal is focused on understanding the role of these cells in normal development, regeneration and tumor formation. It has the potential to benefit California in a number of important ways.

1. Treatment of Brain Damage: Radiation is the most commonly used treatment for brain tumors, and children who receive this treatment often suffer severe side effects, including a progressive loss of intellectual function. By studying the ability of cerebellar stem cells to repair brain tissue, we will advance the treatment of patients suffering from brain damage due to radiation therapy. The knowledge we gain may also be more broadly applicable, advancing the use of stem cells to repair damage due to congenital brain disorders, trauma and stroke.

2. Treatment of Brain Tumors: Medulloblastoma and astrocytoma are the most common brain tumors in children. By examining the role of stem cells in development of these tumors, we will deepen our understanding of how brain tumors form, and develop novel approaches to treating them. Moreover, we will create new model systems that can be used to test these therapies, with the hope of moving the most effective ones forward towards trials in patients.

3. Technology: Our research will culminate in the invention and generation of new drugs and approaches to therapy that will be made available for licensing by the academic institutions in California, such as {REDACTED} and its collaborators, and developed by pharmaceutical companies based in the State.

4. Collaboration: Our work is multidisciplinary and translational in nature. As such, it will require collaboration with other investigators, including stem cell biologists, neurobiologists, cancer biologists and chemists involved in experimental therapeutics. Once discoveries are made that may be of benefit to patients, we will also work with clinicians to move these discoveries towards the clinic. Californians will be the likely first beneficiaries of these therapies because the clinical trials will be conducted here and we will make an effort to make sure that Californians have immediate access to these therapies when they become standard. By bringing together investigators from various fields and focusing their attention on clinically relevant problems, our studies will advance the translational potential of stem cell research in California.

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