Award ID:
RP150637

Project Title:
Efficient Production of iPSC-Derived Mesenchymal Stem Cells to Kill Cancers by Bystander Effects from Suicide Genes

Award Mechanism:
High Impact/High Risk

Principal Investigator:
Bartosh, Thomas

Entity:
Texas A&M University System Health Science Center

Lay Summary:

Treatment of cancer is one of the most challenging areas in medicine today. New therapeutic strategies are desperately needed as the incidence of cancer and cancer-related deaths continues to rise. One attractive and promising avenue to effectively eliminate cancer is centered on the ability to introduce suicide or ‘cancer-killing’ genes directly into tumors so that when a cancer patient is given a harmless prodrug, products of the suicide gene will convert the prodrug into a toxic compound that kills the neighboring cancer cells. The success of this approach, often referred to as targeted suicide gene therapy, rests in the ability to deliver the suicide genes exclusively within the tumor mass and therefore avoid the severe side effects that currently limit the use of conventional chemotherapy. We have made some recent discoveries that appear to make this strategy for destroying cancer possible. By employing a specific type of tumor-seeking stem cell that was recently developed by colleagues at our Institute in combination with our innovative methods to grow the stem cells, we propose to have found a novel procedure to efficiently deliver suicide genes into tumors. Ultimately we will load the stem cells with suicide genes, manipulate the cells to enhance their anti-tumor properties, and thoroughly test the ability for these cells to reduce tumor size in models of melanoma and breast cancer. It is important to note that the significance of this approach is far-reaching and could potentially be a viable option for treatment of a variety of other cancers. Just as important, if the proposed experiments are successful, our colleagues plan to produce large banks of stem cells expressing suicide genes to be used not only in our future endeavors but to be distributed to other investigators. By providing these tools to other scientists, this work will significantly advance cancer research and treatment.