CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY

Name(s)

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Project Number

S1731

Project Title

Investigating the Role of Extracellular Cinacalcet on the Proliferation of MIN6 Pancreatic Beta Cells in vitro

Abstract

Objectives/Goals

Last year, the American Diabetes Association recognized 2.6 million people in the United States to be diagnosed with Insulin Dependent Diabetes Mellitus (IDDM), or more commonly, Type 1 Diabetes, a chronic disease characterized by the autoimmune destruction of pancreatic beta cells. Previous research has been conducted to understand the physiologies of surface receptors of beta cells as well as their respective agonists, and to connect them to a treatment for IDDM. Specifically, the prevalence of the Calcium Sensing Receptor, a Class C G-protein-coupled receptor, on the beta cell surface has been well-documented, and this receptor is linked to cellular proliferation in embryonic fibroblasts and osteoblasts in murine models, as shown in various past studies. The present study investigates the role of Cinacalcet, a calcimimetic drug, as an agonist to the Calcium-Sensing Receptor in order to stimulate proliferation in the MIN6 pancreatic beta cell.

Methods/Materials

The MIN6 beta cell culture was incubated in cell culture plates using media prepared primarily with Dulbecco's Modified Eagle Medium (DMEM). In preparation for treatment, the culture was divided into six sets, and each set was seeded into an eight-well plate. Aliquots of 1.0 uM dimethylsulfoxide (DMSO) control, Cinacalcet, and NPS 2143 negative control, were prepared and added to the seeded cells. Treatment was administered for 24 hours and 48 hours at 37 degrees Celsius. The cell proliferation assay was conducted using immunohistochemistry techniques and fluorescent microscopy.

Results

It was discovered that the Cinacalcet treatment yielded 24% more cell proliferation after 48 hours of treatment compared with the DMSO control. Using a one-tailed T-test, this data was shown to be statistically significant ($p < 0.05$).

Conclusions/Discussion

It can be concluded that Cinacalcet stimulates significant cellular proliferation in MIN6 pancreatic beta cells. These results can prove to be a valuable asset to beta cell regeneration as a potential treatment option for Type 1 Diabetes.

Summary Statement

This research shows that Cinacalcet, a calcimimetic drug, stimulates cellular proliferation in MIN6 pancreatic beta cells, thereby providing an opportunity to investigate a novel approach to treating Type 1 Diabetes.

Help Received

The German Lab at UCSF provided the lab facility and equipment for experiments. Dr. German and Dr. Macias supervised and provided instructions on proper use of equipment and handling of the cell line.