Compositions for Enhancing Beta Cell Maturation, Health, and Function

BRIEF DESCRIPTION

Beta cell failure is the central cause of type-2 diabetes. Researchers at UCI have developed molecules for treating diabetes that target proteins on the surface of beta cells and induce their clustering. This clustering results in an increase in insulin secretion and content and promotion of beta cell maturation. Furthermore, the clustering effect seen with these compositions may promote both proliferation and the reversal of de-differentiation.

TECHNOLOGY DESCRIPTION

Inventors at UCI have identified specific proteins on the surface of pancreatic beta cells that, when bound with proteins on the surface of adjacent cells in a clustered fashion, can promote beta cell maturation, increase beta cell function, increase insulin secretion, and provide resistance to stressors. Targeting these proteins, the inventors have developed molecules, including peptide mimetics and full-length proteins, which mimic these proteins, allowing for binding in a clustered fashion. These molecules can be applied to pancreatic beta cells to restore insulin secretion and protect the cells from further stress.

In the figure below, insulin secretion is measured comparing one of the molecules, HAS-28P to other control treatments in mouse islets.

Investigators are currently testing the effect of these molecules on precursor cells and stem cells to promote proper maturation and differentiation. Nanoparticle formulations have been tested to enhance delivery of the molecules.

Future Development Plans

Researchers plan in vivo and further in vitro testing in the near future. In vivo testing will include rodent models for treatment of type 2 diabetes. In vitro testing will focus on efficacy in driving the functional maturation of stem-cell derived beta cell precursors and enhancing glucose-stimulated insulin secretion.

FEATURES/BENEFITS

- Targets a novel mechanism that enhances beta cell maturation and increases resistance to stress.
- Treatment for type 2 diabetes to support function of beta cells.
- Addresses both hyperglycemia and the pathophysiology of diabetes.
- Avoids the risk of inducing hypoglycemia in patients with diabetes.
- Can be used to mature precursor beta cells into normally-functioning beta cells.
Targets a novel pathway that enhances glucose-responsiveness of beta cell or beta cell precursors.

**PATENT STATUS**
Patent Pending

**RELATED MATERIALS**

- Mimicking Neuroligin-2 Functions in β-Cells by Functionalized Nanoparticles as a Novel Approach for Antidiabetic Therapy. ACS Appl Mater Interfaces.
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