Washington University in St. Louis
Office of Technology Management

METHOD TO GENERATE FUNCTIONALLY MATURE, STEM-CELL DERIVED, BETA CELLS

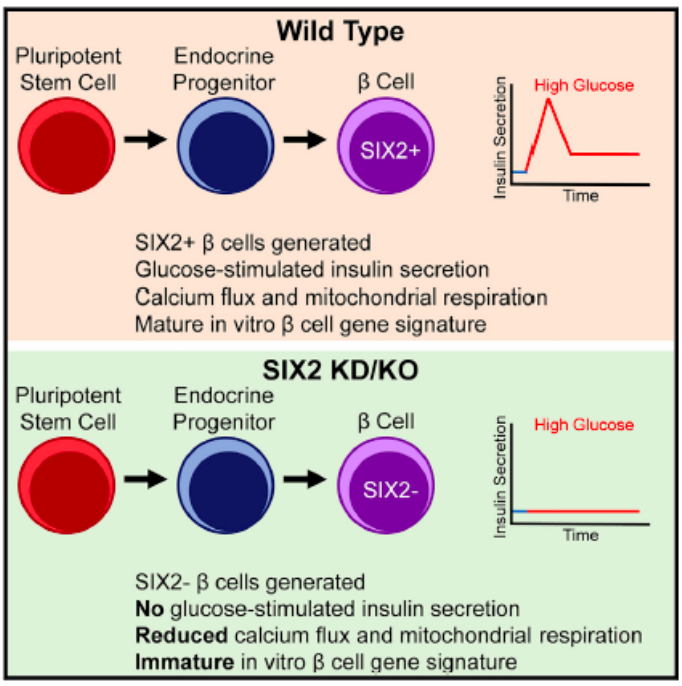
Millman, Jeffrey, Velazco-Cruz, Leonardo

Poranki, Deepika

T-019270

Technology Description

Researchers at Washington University in St. Louis have developed an improved method to differentiate stem-cells into functionally mature, insulin-secreting beta cells (SC-beta cells). Pancreatic beta cells play an important role in controlling blood glucose levels as they secrete insulin in response to changes in extracellular glucose. Damage to or death of these cells leads to diabetes. Replacing beta cells is a promising approach to treating diabetes. However, donor cells are limited and highly variable. To overcome this limitation and advance diabetes cell therapy the inventors have developed an improved method to generate functional, mature, insulin-secreting SC-beta cells. For this, the inventors took advantage of recent work from their lab. They identified the transcription factor SIX2 as key for generating functional SC-beta cells *in vitro*. Modulating SIX2 can result in differentiated cell populations with increased function and utility for cell therapy. This technology provides a method to potentially improve diabetes cell therapy.



Stage of Research

The inventors have shown that maturation of SC-beta cells is regulated by the transcription factor SIX2. Knockdown or knockout of SIX2 in SC-beta cells dramatically limits glucose-stimulated insulin secretion.

Publications

Velazco-Cruz L, Goedegebuure MM, Maxwell KG, Augsornworawat P, Hogrebe NJ, Millman JR. SIX2 Regulates Human β Cell Differentiation from Stem Cells and Functional Maturation In Vitro. *Cell Rep*. 2020;31(8):107687.

Applications

- Therapeutic- diabetes cell therapy
- Research tool- drug screening and beta-cell research
- Diabetes drug screening targeting

Key Advantages

- Improves existing SC-beta cell differentiation protocols
- Potential to increase function and therapeutic applications of differentiated cell populations
- Single cells, rather than cell clusters, are capable of glucose-simulated insulin secretion

Patents

- Patent application has been filed.

Related Web Links

- Dr. Jeffrey Millman profile