WashU

Office of Technology Management

DEVICE FOR DIABETES CELL REPLACEMENT THERAPY

Millman, Jeffrey, Song, Jiwon

Poranki, Deepika

T-016681

Technology Description

Researchers at Washington University in St. Louis have developed a 3D-printed device for the subcutaneous transplantation of stem cell-derived beta (SC-beta) cells for diabetes cell replacement therapy. Diabetes mellitus, a disease characterized by loss of blood glucose control, affects millions of people. Treatments for diabetes are costly and complications can arise due to imprecise glucose control. Thus, new treatment approaches are needed. Cell replacement therapy in which SC-beta cells are transplanted into patients is a new approach for controlling diabetes. Currently, there are no FDA-approved treatments using stem cells. To help advance diabetes cell replacement therapy the inventors have developed a macroporous device for the subcutaneous transplantation of SC-beta cells. The device is fabricated with biocompatible PLA using 3D printing. SC-beta cells are distributed throughout the pores and secured in place with fibrin gel. The device retains structural integrity after transplantation and can be removed. This technology provides a novel platform for development of cell replacement therapy for diabetes.

Stage of Research

The inventors have shown that upon transplantation into mice, the SC-beta cell filled devices- are functional, as they secrete insulin in response to glucose; maintain structural integrity; and are retrievable.

Publications

Song, J., & Millman, J. R. (2016). Economic 3D-printing approach for transplantation of human stem cell-derived β-like cells. *Biofabrication*, *9*(1), 015002.

Applications

- Diabetes cell replacement therapy

Key Advantages

- Designed to reduce hypoxia and promote vascularization which:
  - Improves survival and function
  - Reduces delays in glucose sensing
- Maintains structural integrity after transplantation
- Retrievable after transplantation

- Fabricated with low-cost, consumer-grade 3D printing
- Biocompatible

Patents

- US Patent 10,597,639- 3D-Printed Scaffold Device for Cell Transplantation

Related Web Links

- Dr. Millman profile