

Beta-cell patch with controlled release function to enhance cell survival and functionality during transplantation

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Nanofiber Technology and Cellular Engineering (NTCE), Aarhus University focuses on developing novel functional nanofibrous materials as artificial extracellular matrix for biomedicine applications.

Novo Nordisk A/S

Novo Nordisk is a global healthcare company with almost 100 years of experience in diabetes research. It is a Danish founded company, but its 42,000 employees are spread to almost 80 different countries.

Problem

Diabetes globally affects more than 400 million patients. A cure to this chronic disease might be found in beta cell therapy and several studies have already shown promising results. One of the major obstacles in cell therapy, however, is the low retention rate and graft survival observed after transplantation. [1] [2]

Solution

To overcome this problem, we aim to develop electrospun core-shell nano-fibers to support 3D cell culture. Factors stimulating cell survival and/or function will be incorporated in the scaffold to be released in a controlled manner to enhance the therapeutic potential of the transplanted cells .

Illustration of project idea

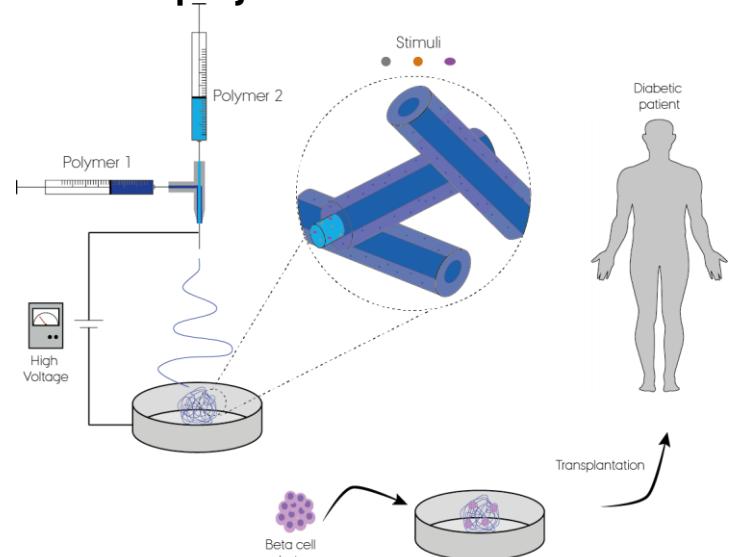


Figure 1. Principle of Project. Polymers are electrospun into core-shell nanofibers containing survival and functionality enhancing factors. Beta cell clusters are seeded on the patches before transplantation.

Potential

- Improve the potency of transplanted cells.
- Retain cells at the transplantation site and thereby lower variation in animal models.
- Generate knowledge that will be of use to all Stem Cell projects at Novo Nordisk as delivering the differentiated Stem Cells in functionalized biomaterials will constitute superior products.
- Functionalized biomaterials will be key to secure future IPR.

Challenges

- The two institutes are experts within their fields but have a limited knowledge about each others science areas. Thus, this project builds a bridge between two different worlds.
- Biomaterials have a huge potential for Stem Cell projects performed at Novo Nordisk. However, due to IPR restrictions, the usage of these cells will not be applicable in this project.

References:

- [1] - Komatsu, H., Kandeel, F. & Yoko Mullen, M.P., 2018. Impact of Oxygen on Pancreatic Islet Survival. *Pancreas*, May. pp.533-43
[2] - World Health Organization. Global Report on Diabetes. 2016. ISSN 1311-8080