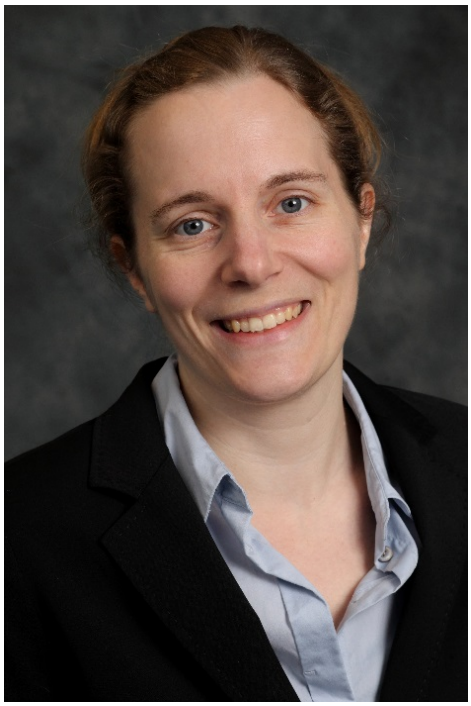
Title:

Manufacturing a 3D printed bioartificial pancreas for type 1 diabetes cellular therapy

Abstract:

Cellular therapy is revolutionizing the way we treat cancer and degenerative diseases such as type 1 diabetes. Islet transplantation is a cell-based therapy that allows most graft recipients to live without daily insulin administration for at least one year. This therapy also significantly improves blood glucose control in islet transplant recipients, reducing the incidence of hypoglycemic events. However, access to this therapy is limited by access to donor islets as well as the requirement for lifelong immunosuppression which is associated with increased risks of infection and cancer. With the emergence of protocols to manufacture islet-like cell clusters from pluripotent stem cells, a key limitation to diabetes cellular therapy becomes the safe delivery of these cells without the need for immune suppression. Islet encapsulation devices ranging from microbeads to macroscopic pouches are being investigated in clinical trials. One limitation of most encapsulation devices is the lack of efficient oxygen and insulin mass transport. To overcome this limitation, the Hoesli laboratory is developing a vascularized bioartificial pancreas using different 3D printing approaches. These approaches could be applied to not only islet transplantation, but also to study human pancreas biology and development using human-scale pancreatic tissue mimics, or to generate other vascularized tissue models.

Biography:



Prof. Corinne Hoesli is the head of the Stem Cell Bioprocessing Laboratory at McGill University. She joined the Department of Chemical Engineering as an Assistant Professor in August 2014. She is a biochemical engineer with expertise in bioprocess development, high-throughput screening and stem cell culture optimization. Her research aims to develop bioprocesses to produce and transplant therapeutic cells to treat diabetes and cardiovascular disease. She notably developed new methods to encapsulate pancreatic islets, as well as vascular biomaterials surface modification strategies which are now applied by other researchers around the world. Her emerging leadership in bioengineering was recognized through the 2014 Martin Sinacore Outstanding Young Investigator Award from Engineering Conferences International & Biogen Idec, as well as the “Étoiles effervescence” award from Montreal InVivo.

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