Reversal of Diabetes by Pancreatic Islet Transplantation into a Subcutaneous, Neovascularized Device.

Original Articles


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Abstract:

Background. Transplantation of pancreatic islets for the treatment of type 1 diabetes allows for physiologic glycemic control and insulin-independence when sufficient islets are implanted via the portal vein into the liver. Intrahepatic islet implantation requires specific infrastructure and expertise, and risks inherent to the procedure include bleeding, thrombosis, and elevation of portal pressure. Additionally, the relatively higher drug metabolite concentrations in the liver may contribute to the delayed loss of graft function of recent clinical trials. Identification of alternative implantation sites using biocompatible devices may be of assistance in improving graft outcome. A desirable bioartificial pancreas should be easy to implant, biopsy, and retrieve, while allowing for sustained graft function. The subcutaneous (SC) site may require a minimally invasive procedure performed under local anesthesia, but its use has been hampered so far by lack of early vascularization, induction of local inflammation, and mechanical stress on the graft.

Methods. Chemically diabetic rats received syngeneic islets into the liver or SC into a novel biocompatible device consisting of a cylindrical stainless-steel mesh. The device was implanted 40 days prior to islet transplantation to allow embedding by connective tissue and neovascularization. Reversal of diabetes and glycemic control was monitored after islet transplantation.


Conclusions. Ease of implantation, biocompatibility, and ability to maintain long-
term graft function support the potential of our implantable device for cellular-based reparative therapies.

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