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Polymer porous scaffolds for transplantation of Langerhans islets

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The pancreatic islets transplantation (ITx) is a therapeutic alternative for patients with type-1 diabetes mellitus suffering from the hypoglycemia unawareness. The current protocol of ITx is limited, among other factors, by a suboptimal engraftment of islets after infusion into the hepatic portal vein. This results immediately in significant reduction of the graft and in unsatisfactory long-term graft viability predominantly due to an insufficient vasculature and supraphysiological nutrients, drugs and toxins concentration within portal vein blood. Therefore, a considerable effort has been spent to bioengineer an extra-hepatic transplant site rich in vasculature network similar to situation in native pancreas. We aimed to create a highly-vascularized bioartificial cavity using a macroporous polylactide-based scaffold with anisotropic channeled pores as a template, and a host body as the bioreactor. The capsular-shaped scaffolds were prepared using the Dip-TIPS method. We evaluated the effect of the scaffold pore architecture, implantation site and introduction of the vascular endothelial growth factor on the scaffold vascularization. *In vivo* studies (a rat model) showed the ability of the scaffold pore architecture to guide cell infiltration fully in omentum and partially when implanted subcutaneously. The *in vivo* magnetic resonance imaging data and immuno-histochemical analysis revealed the enhanced vascularization of the VEGF/scaffolds when compared to unmodified ones. The current study is a significant step forward in the field of biomaterial based extra-hepatic site for islets transplantation.

Biography

Dana Kubies has completed her PhD from the Institute of Macromolecular Chemistry AS CR (IMC), Prague, Czech Republic and Post-doctoral studies from University of Liege, Belgium. She is the Head of the Department of Bioactive Polymers at IMC, a leader polymer institute in the central Europe. She is interested in the application of polymer scaffolds in biomedical applications. She has published more than 28 papers in reputed journals.

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