Allogeneic Islet Cells Implant on Poly-L-Lactide Matrix to Reduce Hyperglycaemia in Streptozotocin-Induced Diabetic Rat

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Objective

To demonstrate the effects of allogeneic islet cell matrix implants for glycaemic control in rats with induced diabetes.

Method

Sprague-Dawley rats were used as allogeneic donors of islet cells. Cells were seeded on three-dimensional proprietary poly-(L-lactide) matrices. The matrices are three-dimensional circular shaped sponges with the porosity of the sponge is more than 90% with a pore size of approx. 400 µm (Fig. 1a, 1b). Animals were rendered diabetic and a week later a matrix seeded with islet cells (IMI group) or a control matrix (placebo group) was implanted in the small bowel mesentery (Fig. 1c). Blood glucose levels were measured weekly for 12 weeks. After sacrifice, implant sections were Gomori stained for beta-cells and immuno-stained for insulin 3, 4, 5, and 8 months post implantation.

Results

82% of seeded islet cells attached to the matrices. In the IMI group blood glucose levels were significantly reduced after implantation compared with before implantation across several time points (Fig. 2). In the IMI group beta-cells and insulin-positive cells were identified at the implant site (Fig. 3).

Conclusion

The islet cell matrix implant reduced the blood glucose levels although complete normoglycaemia was not established. The islet cell matrix implant may serve as an additional option for islet cell transplantation using 3D scaffold platforms for better survival and function of the islet cells.

References