An artificial transplantation site for pancreatic islets
De Vos, P; Hillebrands, JL; De Haan, BJ; Strubbe, JH; Van Schilfgaarde, R

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MICROENCAPSULATED islets still have their functional limitations. Transplantation near blood vessels may improve the function. An intraperitoneally located and prevascularized expanded polytetrafluoroethylene (ePTFE) solid support is potentially a suitable transplantation site for encapsulated pancreatic islets because it allows both for the implantation of a large volume islet graft in the immediate vicinity of blood vessels and for its complete removal. ePTFE seems a suitable material for the construction of solid supports as it is biocompatible and can be coated to induce vascularization. The present study investigates the efficacy of an ePTFE solid support for the implantation of nonencapsulated islet isografts in streptozotocin-induced diabetic rat recipients.

MATERIALS AND METHOD
Solid supports were prepared from expanded fibers of ePTFE (courtesy of W.L. Gore & Associates). Islet isografts were transplanted in streptozotocin-induced diabetic rat recipients 4 weeks after intraperitoneal implantation of the supports. Diabetic rats transplanted with islets in the unmodified peritoneal cavity served as controls. Recipients of successful grafts were provided with permanent cardiac catheters for blood sampling and infusion in undisturbed, freely moving rats.

RESULTS AND DISCUSSION
Solid supports were always coated with a-FGF because we found that this growth factor enhances the neovascularization. The success rates of 5-μL (group A) and 10-μL (group B) islet isografts in solid supports were compared to the success rates of 5-μL (group C) and 10-μL (group D) islet isografts implanted in the unmodified peritoneal cavity. Four of seven rats in group A and all seven rats in group B became normoglycemic for at least 6 months. Only two of eight rats in group C and 4 of 11 rats in group D showed normoglycemia, which lasted for at least 6 months in none of two in group C and three of four in group D. Because of the low success rates in groups C and D, intravenous and oral glucose testing were restricted to the successful recipients in groups A and B. Glucose tolerance was found to be proportional to the grafted islet volume but, expectedly, in both groups the glucose tolerance and the insulin responses were somewhat lower than in controls. Thus, the present results show that the prevascularized ePTFE solid support rather than the unmodified peritoneal cavity is an efficacious transplantation site.

REFERENCES

From the Surgical Research Laboratory, Groningen, The Netherlands.
Address reprint requests to P. de Vos, PhD, Surgical Research Laboratory, Bloemsingel 1, 9713 BZ, Groningen, The Netherlands.