

## The Benefits of Co-Transplantation of Adipose Tissue-Derived Mesenchymal Stem Cells on the Survival and Function of Islet Grafts in Diabetic Rats.

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### Abstract

#### Introduction:

Allogeneic islet transplantation serves as an ideal source for insulin-secreting beta cells, maintenance of normal glucose levels and treatment of diabetes. However, limited availability of islets, high rates of the islet graft failure and the need for life-long nonspecific immunosuppressive therapy have been a major obstacles in the widespread adoption of this therapeutic option. In this study, we attempted to determine whether the inclusion of mesenchymal stem cells (MSCs) with islet transplantation could improve the survival and function of the islet graft.

#### Methods and Results:

Islets were transplanted, either alone or with in vitro-expanded adipose tissue-derived MSCs, into omental pouch in a rat model of streptozotocin (STZ)-induced diabetes. After transplantation, non-fasting blood glucose level was monitored every 5 days using samples obtained from the tail vein. Normoglycemia was defined as two consecutive blood glucose determinations of less than 250 mg/dl. In addition, the grafted animals were monitored every 5 days for the changes in their body weight.

The transplantation of islets into the omentum of STZ-induced diabetic rats decreased blood glucose levels in a time-dependent manner, established normoglycemia after 20 days and sustained euglycemia until the last day of the 75-day study period. Interestingly, co-transplantation of islets with MSCs, with half of the required number of islets for successful islet transplantation alone, resulted in an improvement of islet allograft outcome similar to that of sole islet transplantation.

#### Conclusions:

Our results indicated that co-transplantation of adipose tissue-derived MSCs with islet graft promoted survival and function of the graft and reduced the islet mass required for reversal of diabetes. This innovative protocol may allow “one donor to one recipient” islet transplantation.

**Key words:** Co-transplantation, Mesenchymal stem cells, Pancreatic islets, Type 1 diabetes

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