ANGIOGENIC POTENTIAL OF MESENCHYMAL STEM CELLS FROM HUMAN PLACENTA TO OPTIMIZE PANCREATIC ISLETS TRANSPLANTATION

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Introduction: Type I diabetes affects approximately 387 million people worldwide. Islet transplantation emerged as an alternative treatment for this serious disease. However, \(\beta\) cell death and loss vascularization remains a significant obstacle in successful islet transplantation. Co-transplantation of pancreatic islets with mesenchymal stem cells from placental tissue (MSC-PL) appears as an interesting option to improve graft viability and revascularization.

Objective: In vitro study the angiogenic potential of MSC-PL to improve revascularization and viability of human pancreatic islets graft.

Materials and Methods. MSC-PL were isolated from human placental samples. Expanded MSC-PL were cultured and characterized by flow cytometry, real time PCR and in vitro multilineage differentiation assay. Endothelial cells from umbilical vein were isolated and cultured in EBM-2. MSC-PL conditioned medium was obtained and frozen. The ability of MSC-PL to support angiogenesis was assessed in a sprouting in vitro assay and compared to positive control group (MSC-BM).

Results and Discussion. Cells isolated from fetal membranes and placental tissue showed typical MSC phenotype (positive for CD90, CD105, CD29, CD146; negative for CD14, CD34) and were able to differentiate into mesodermal cells (chondroblasts, osteoblasts, adipoblasts). Immunophenotyping and angiogenic potential results were confirmed by real time PCR (positive for CD90, CD105 and VEGF). In vitro angiogenesis assay showed that MSC-PL have a higher ability to support in vitro vessel formation compared to control MSC-BM.

Conclusion. Our data demonstrated that cultures of MSC-PL contain individual cells that fulfill two essential stem cell criteria: (i) self-renewal capacity and (ii) multi-lineage potential. Proteomic analysis of the MSC-PL conditioned medium to identify secreted components that could regulate angiogenesis is still under development. After further experiments, MSC-PL may represent a potential alternative to enhance revascularization and graft viability in pancreatic islets transplantation.

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