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Immunosuppressive and Anti-apoptotic Properties of Pancreatic Islet Derived Stem Cells

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Several studies have been reported on the *in vitro* expansion of stem cells from pancreatic islet (PI-SCs) cultures and on the differentiation of these SCs into multi-lineage cells. These mesenchymal-type cells which exhibit no hormone expression could then be induced to differentiate into hormone-expressing islet-like cell aggregates. It has been shown that human islet-derived precursor cells (hIPCs) were a type of mesenchymal stem cell (MSC). Newly we and some other research groups showed that nestin-positive progenitor/stem cells isolated from islets of human and murine pancreas have phenotypic markers identical to MSCs from bone marrow and that are able to proliferate and differentiate into insulin-producing cells *in vitro*. We also searched for the transcripts of Oct-4, Rex-1 and Sox-2, because these genes are generally known to be the master regulators of stem cell renewal and differentiation and were expressed by rat pancreatic islet-derived progenitor/stem cells. Therefore, based on our positive outcomes we called them as pancreatic islet-derived stem cells (PI-SCs). We showed by RT-PCR that the nestin-positive cells in the pancreatic islets express neither the hormones insulin, glucagon, somatostatin, or pancreatic polypeptide, nor the markers of embryonic development of endocrine pancreas. Recent studies also recommend that MSCs possess the dual ability to suppress and/or activate the immune responses depending on stimulus to which they are exposed. In addition, MSCs was shown to induce the production of T_{reg} and it was suggested that they could play a potential role in treatment of autoimmune diseases. We studied the protective role of islet derived stem cells in the apoptosis of beta cells. After co-culture of damaged pancreatic islets with pancreatic islet derived stem cells, the expression of regulatory proteins in apoptosis, like Bcl3, TNIP1 (TNFAIP3 interacting protein 1) and MAPKAPK2, were increased under stress in pancreatic islets (unpublished data). The number of viable cells and insulin secretion capacity were preserved in the co culture with stem cells, whereas necrotic bodies were formed in the absence of the stem cells. Under the light of all these findings, SCs of islets like BM-MSCs might have the immunosuppressive and immunomodulatory roles, anti-apoptotic effects and a key function in the evolvement of type 1 diabetes. Therefore, strategies targeting the islet derived MSCs for the correction of the β-cell loss in type 1 diabetes should be established to prevent the destruction of β-cells.