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CO-CULTURE OF HUMAN MESENCHYMAL STEM CELLS AND HUMAN ISLETS

Telford Yeung, Karen Seeberger, James Lyon, Gregory S. Korbutt

Department of Surgery, Faculty of Medicine and Dentistry, University of Alberta

Background: Islet transplantation remains an attractive therapy for type 1 di[illegible]. B[illegible] progressive loss of insulin independence in transplant recipients associated w[illegible] destruction is a concern. A strategy to mitigate this decrease in [illegible] mass is to activate endogenous cellular repair. Bone marrow (BM) derived mesenchymal stem cells (MSCs), for instance, can regenerate pancreatic islets in [illegible] w[illegible] chemically induced diabetes. The expansion of a similar MSC population from the [illegible] pancreas leads us to believe the natural fluctuations in β cell mass [illegible]ed to [illegible] d[illegible] can be regulated by these MSCs. As pancreatic m[illegible] d[illegible] or[illegible] s signals [illegible] regulate pancreatic development, we hypothesize [illegible] MSCs may [illegible] factors for beta cell survival.

Methods: Hu[illegible] M[illegible]Cs we[illegible] i[illegible]ated [illegible] the exocrine pa[illegible] and characterized by flow c[illegible]y. Human islets were obtained from [illegible] Clini[illegible] Isl[illegible] Isolation Core and cultured for [illegible] da[illegible]s in se[illegible]m[illegible] media [illegible] encapsulating in calcium-alginate. MSCs a[illegible] en[illegible]p[illegible]ed islets w[illegible] at [illegible] by cell number (1 IEQ ≈ 1000 cells) in D[illegible]EM lo[illegible] glucose [illegible]6[illegible] w[illegible]h 10[illegible] fetal bovine serum. Samples of these islets were c[illegible]ect[illegible] a[illegible]0[illegible]4[illegible] d[illegible]h[illegible]se[illegible] islet mass, insulin content, glucose sensitive insulin re[illegible]ase[illegible] m[illegible]is[illegible] is[illegible]g[illegible]

Results: [illegible]h in culture, MSC treated and untreated islets demonstrated no difference in D[illegible]A ([illegible] ± 17.3% vs 54.1 ± 12.2%, n=4) or insulin content (44.0 ± 5.5% vs 39.3 ± 5.5%, n[illegible]) normalized to islets at 0 h. However, islet mass decreased between 24 and 72h while insulin content remained unchanged in MSC treated and untreated islets. Glucose sensitive insulin release of two human islet preparations revealed improved stimulation indices from co-cultured islets compared to islets alone after 24 and 72h.

Conclusion: Culture conditions appear to preserve beta cell mass independent of mesenchymal factors. However, co-culture of mesenchymal stem cells with encapsulated islets may be a way to maintain glucose sensitive islet function in vitro.

Key words: Islet transplantation, Mesenchymal stem cells, Co-culture