Expression of Genes Related to Apoptosis, Hypoxia and Cellular Stress in Biodritin®Microencapsulated Murine Pancreatic Islets

Grazioli, G.; Campos-Lisbôa, A.C.V.; Campanha-Rodrigues, A.L.; Mariani, D.B.; Sogayar, M.C.; Mares-Guia, T.R.

[1] NUCEL – Cell and Molecular Therapy Center, Biochemistry Department , Chemistry Institute, University of São Paulo, Brazil

Microencapsulated pancreatic islet transplantation constitutes an alternative for Type 1 Diabetes Mellitus treatment, in the absence of immunosuppressants. We evaluated the expression of important genes related to cell stress and death in pancreatic islets microencapsulated with 1) Biodritin®, a biopolymer composed of alginate and chondroitin sulfate; 2) Biodritin® supplemented with perfluorocarbon (PFC), which increases oxygen availability to microencapsulated cells. Microencapsulated islets were cultured in normoxia or hypoxia for 48h and gene expression was assessed by qRT-PCR. Significant reduction in the levels of *bad* (0.45±0.04), *bax* (0.58±0.05), *caspase-3* (0.73±0.13), *mcp-1* (0.68±0.16), *hsp70* (0.63±0.01), *lactate dehydrogenase* (0.86±0.07) and increase in *bcl-2* (1.27±0.027), *insulin1*(1.75±0.09), *insulin2* (1.22±0.05) genes were detected in islets microencapsulated with Biodritin®+PFC cultured in normoxia, when compared to islets microencapsulated with Biodritin® only. Islets microencapsulated with Biodritin®+PFC and cultured in hypoxia presented reduction in the expression of *bad* (0.63±0.05), *bax* (0.77±0.013), *mcp-1* (0.33±0.06), *hsp70* (0.79±0.79), *lactate dehydrogenase* (0.73±0.08) and increase in the expression of *bcl-xl* (2.22±0.18), *xiap* (1.55±0.04) and *insulin1* (3.35±0.19). The ratios between *bcl-2/bcl-xl* and *bax* were higher in islets microencapsulated with Biodritin®+PFC, both in normoxia and hypoxia. The metabolism of microencapsulated rat insulinoma RINm5F cells was 40% higher when PFC was incorporated into the capsules, as evaluated by MTT. ^{3}H-Thymidine incorporation revealed a 62% increase in cell proliferation when PFC was present in the microcapsules. In conclusion, microencapsulation with Biodritin®+PFC provides a more appropriate microenvironment for pancreatic islets and cells, with increased oxygen availability and consequent beneficial modulation of gene expression, increased proliferation and metabolism.

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