MICROENCAPSULATION OF HUMAN PANCREATIC ISLETS FOR TREATMENT OF TYPE 1 DIABETES MELLITUS

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Pancreatic islets microencapsulation constitutes an attractive alternative therapy for type 1 diabetes, with the limiting factor being availability of a biocompatible and mechanically stable polymer. We investigated the potential of a novel membrane combining alginate and chondroitin sulfate, the Biodritin® product, which was generated using calcium chloride or barium chloride for gellification into microspheres. These microcapsules were tested for cytotoxicity and suitability for live cell encapsulation using the MTT colorimetric assay, which detected the metabolic activity of entrapped RINm5f murine beta cells. The ability of the membranes to provide immunogenic protection to these encapsulated cells was tested by growing rat islets microcapsules in medium containing macrophages (M) derived from mouse peritoneal liquid. Preliminary results, using semi-quantitative Real Time-PCR and barium-microcapsules, show the absence of IL1-beta cytokine expression. These microcapsules displayed higher membrane resistance and were able to prevent M reactivity, avoiding the intracapsular islet cell damage, contrary to the calcium-microcapsules. *In vivo* biocompatibility tests by subcutaneous injection of empty microcapsules in immunocompetent rats showed that both microcapsules were adequate for transplant. Despite activation of the host immune system, transplantation of encapsulated human islets in diabetic mice restored euglycemia for 60 days. We demonstrated that the barium-Biodritin® capsules can be used for cell entrapment, however, further investigations are required to assess their potential for long-term transplantation and development of bioartificial organs.

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