

Stability and Biocompatibility Studies of Biodritin® Microcapsules

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Development of polymeric materials has been increasingly emphasized in Biomedicine. Here, we investigated the use of a new biomaterial suitable for cell microencapsulation, namely Biodritin®, composed of alginate and chondroitin sulphate, which is capable of gelation in the presence of barium or calcium ions. Numerous encapsulation methodologies utilizing a variety of alginates and purification technologies have been reported. Our comparative study involves encapsulation using a commercial ultra-pure alginate versus a commercial non-purified alginate. Microcapsules were generated, characterized, and implanted into the peritoneal cavity of Balb/c mice. Among the different biomaterial formulations evaluated, barium-Biodritin microcapsules with commercial ultra-pure alginate displayed the best performance in the physico-chemical tests, with scanning electronic microscopy revealing that these microcapsules maintain their morphology and structural stability after 30 days of implantation into the peritoneal cavity. Pre-implantation analysis showed a marked increase in structural integrity of microcapsules made with commercial ultra-pure alginate compared with the commercial non-purified alginate. In addition, barium-Biodritin microcapsules displayed improved morphology when compared with calcium-Biodritin ones. Histological analysis revealed no cellular adhesion on the surface of explanted barium-Biodritin microcapsules made with commercial ultra-pure alginate. Permeability studies defined the medium pore size of barium-Biodritin microcapsules, allowing proteins of up to 70 kDa to pass through the biomaterial, while calcium-Biodritin pores accommodate proteins of up to 100 kDa. The microcapsule composition of barium-Biodritin conferred advantages in physical strength and longevity, indicating that small changes in encapsulation methodologies and materials can dramatically impact the stability and longevity of alginate microcapsules and their contents.

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