Gellan Gum: a Multifunctional Tool to Modulate Cell Microenvironment

Silvia Vieira, Alain da Silva Morais, Rui L. Reis, J. Miguel Oliveira. 1

2ICVS/3B’s – PT Government Associate Laboratory, Braga/Guimarães 4805-017, Portugal.

Cell encapsulation is an alternative to the use of immunosuppressant drugs after cell transplantation. It shields cells from the host immune system, allowing the diffusion of nutrients and oxygen. The alginate - poly-L-lysine – alginate system is the most well-studied method, but biocompatibility issues were reported. This work aims to use methacrylated gellan gum (GG-MA), an anionic heteropolysaccharide, to engineer the microenvironment provided in cell encapsulation strategies. Capsules were formed by gravitational dripping, extruding GG-MA into a Poly-L-Lysine (PLL) bath. Due to the interaction between the carboxylic groups of the GG-MA and the charged PLL amines, a capsule is formed. Morphology was assessed using scanning electron microscopy and micrographs, revealing a diameter of 2.3 ± 0.145 mm. Drug release capacity was quantified using albumin–fluorescein isothiocyanate conjugate (BSA-FITC, 66 kDa) as a model of large glomerular molecules; methylene Blue (MB, 319.85 Da) as a small molecule model; and Dextran-FITC with 4, 20 and 70kDa. While small molecules (MB and 4kDa Dextran-FITC) were rapidly released, the larger molecules had a hampered flow. In vitro tests, using hASC, have shown that cells remain viable after 7 days of culture. In vivo results, using CD1 mice, have shown that GG/PLL complexes do not elicit fibroblast deposition and can tune the microenvironment, from bioactive to biotolerable. Briefly, the results herein presented show the potential of GG-MA/PLL capsules for cell encapsulation as they are: (i) easy to produce, using one-step only; (ii) have selective permeability; (iii) hASC maintained their viability after encapsulation; and (iv) biocompatible.

References:


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