Gellan Gum: a Multifunctional Tool to Modulate Cell Microenvironment

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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[1]. The alginate - poly-L-lysine – alginate system is the most well-studied method[2], but biocompatibility issues were reported[3]. 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[4]. 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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