Encapsulation of growth factors inside thermoresponsive hydrogel loaded with microgels based on a marine exopolysaccharide for tissue regeneration

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Osteochondral defects are relatively common and appear with aging or as a result of trauma. If these injuries are untreated, they often evolve to osteoarthritis and ultimately lead to total joint replacement [1]. One promising strategy to regenerate osteochondral lesions is the use of the tissue engineering approach. Association of cells and signaling proteins, such as growth factors, with a biocompatible hydrogel may lead to the regeneration of the healthy tissue. In this context, the aim of the present study was to encapsulate Transforming Growth Factor-β1 (TGF-β1), used for cartilage regeneration, and Bone Morphogenetic Protein 2 (BMP-2), used to induce bone formation, into microgels. These microcarriers were used to enhance both growth factor bioactivity and bioavailability. To this end, a capillary microfluidic approach was applied. These microgels were then incorporated into a thermoresponsive hydrogel. Both microgels and hydrogel were based on infernan, a marine bacterial exopolysaccharide (EPS) endowed with glycosaminoglycan (GAG)-mimetic properties [2,3,4]. The microgels stability and growth factors release profiles were assessed. Different release kinetics from hydrogels were observed for free and microgel encapsulated growth factors. The biological evaluation of the bifunctional hydrogel loaded with growth factor microcarriers to repair osteochondral defects will then be assessed *in vitro* and *in vivo*.

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