Biopolymeric carriers developed for tissue engineering application and fabricated by Supercritical Emulsion Extraction

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Controlled delivery of human growth factors is still an open challenge in the tissue engineering field, especially in tridimensional cultures using scaffold as support [1-2]. For this task, poly-lactic acid (PLA) and poly-lactic-co-glycolic acid (PLGA) carriers have been recently proposed [3-4].
Here, the microencapsulation of Growth Differentiation Factor 5 (hGDF-5) and Transforming Growth Factor β1 (hTGF-β1), used respectively to induce tenogenesis and chondrogenesis, was tested by processing different emulsions with Supercritical Emulsion Extraction (SEE) technology [5-6]. Polymers molecular weight, surfactant amount in aqueous phases of emulsions as well as phases mixing rate were varied to fabricate carriers with suitable size and loadings. Carriers with mean sizes from 0.4 ± 0.09 μm up to 3 ± 0.9 μm were obtained by SEE technology when processing emulsions with different formulations; carriers were loaded with 3 μg/g and 7 μg/g for hGDF-5 and hTGF-β1 and both assured *in vitro* a controlled growth factor release over 25 days. Carriers fabricated by SEE displayed extremely low cytotoxicity with respect to carriers obtained by conventional evaporation techniques as tested by Hamster Ovary cells line as well as lower reactivity on human peripheral blood mononuclear cells (hPBMCs), suggesting their safety and potential use in tissue engineering protocols.

References

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