major constituent of cartilage, collagen II, was detected by immunocytochemistry. Safranin-O and alcian blue stainings revealed a basophilic ECM deposition, which is characteristic of neocartilage. These findings suggest that the proposed system may provide a suitable self-governing environment for chondrogenic differentiation.

Acknowledgments: We acknowledge the Portuguese FCT (Ph.D.grant-SFRH/BD/69529/2010-ClaraCorreia) and the European Research Council (grant agreement-ERC-2012-ADG 20120216-321266-ComplexiTE).

Reference

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Session: Nanostructured Biomaterials and Functional Surfaces (Part 2)

Date and Time: Thursday, September 10, 2015, 3:00 PM - 4:30 PM

Chondrogenic Differentiation within Magnetic-responsive Multilayered Liquified Capsules Containing Collagen II/TGF-β3 Coated Microparticles

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The use of stem cells is a promising therapeutic approach for the substantial challenge to regenerate cartilage. Considering the two prerequisites, namely the use of a 3D system to enable the chondrogenic differentiation and growth factors to avoid dedifferentiation, the diffusion efficiency of essential biomolecules is an intrinsic issue. We already proposed a liquified bioencapsulation system containing microparticles as cell adhesion sites1. Here, we intend to use the optimized system towards chondrogenic differentiation by encapsulating stem cells and collagen II-TGF-β3 coated PLLA microparticles. As a proof-of-concept, magnetite-nanoparticles were incorporated into the multilayered-membrane. This can be a great advantage after implantation procedures to fixate the capsules *in situ* with the help of an external magnetic patch and for the follow-up through imaging. Results showed that the production of glycosaminoglycans and the expression of cartilage-relevant markers (collagen II, Sox9, aggrecan, and COMP) increased up to 28 days, while hypertrophic (collagen X) and fibrotic (collagen I) markers were downregulated. The presence of nanofibers in the newly deposited ECM was visualized by SEM, which resembles the collagen fibrils of native cartilage. The presence of the