CARTILAGE TISSUE ENGINEERING USING A FLOW PERFUSION BIOREACTOR

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Joint diseases include several conditions that have great impact on society, such as rheumatoid arthritis or osteoarthritis. Tissue engineering is one of the most promising alternatives to overcome the low capacity of cartilage self-repair in those debilitating diseases context.
Chitosan-polybutylene succinate (C-PBS) scaffolds have been studied for their suitability for cartilage tissue engineering. Previous works have shown that these scaffolds support chondrocytes primary cultures, its growth and ECM production. C-PBS fiber meshes were produced by fiber extrusion, followed by hot compression, producing a 3D non-woven mesh of variable pore size. These fiber meshes were used for supporting human mesenchymal stem cells (hMSCs) chondrogenic differentiation. hMSCs isolated from human bone marrow were expanded until passage 2. Afterwards, 100.00 cells were statically seeded in each C-PBS fiber mesh, in a total of 20. Afterwards, constructs were transferred to a flow perfusion bioreactor. Perfusion rate was 0,1 mL/h per scaffold. Constructs were cultured for 28 days, with chondrogenic differentiation medium. Differentiation was evaluated by SEM, histology and immunolocalisation of collagens. Preliminary results indicate that cells are able to proliferate and to differentiate into chondrocytes, at 14 days of culture. Results indicate that C-PBS fiber meshes are able to support hMSCs chondrogenic differentiation and extracellular matrix production.

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