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# Mesenchymal stem cell-based tissue engineering strategy for cartilage regeneration: A morphomolecular study

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Articular cartilage is an avascular and aneural tissue with poor self-repair capacity. Pathological conditions leading to the cartilage degeneration, such as osteoarthritis (OA), have prompted the development of strategies aimed to its regeneration, such as mesenchymal stem cells (MSCs)-based tissue engineering approach. The aim of this study was to investigate if chondrocytes, differentiated from rat adipose tissue derived-MSCs (AMSCs) and seeded on Collagen Cell Carrier (CCC) scaffolds, are able to constitute a morphologically and biochemically healthy hyaline cartilage. To this purpose the AMSCs were primarily differentiated in chondrocytes through chondrogenic medium and subsequently cultured for 6 weeks on CCC scaffolds. The expression of osteoblast (Runt-related transcription factor 2 (RUNX2) and osteocalcin), chondrocyte (collagen I, II and lubricin) and apoptosis (caspase-3) biomarkers were evaluated in undifferentiated AMSCs, AMSCs-derived chondrocytes cultured in monolayer and AMSCs-derived chondrocytes seeded on CCC scaffolds, by different techniques such as immunohistochemistry, ELISA, Western blot and gene expression analyses. AMSCs-derived chondrocytes cultured on CCC scaffolds showed the increased expression of collagen II and lubricin, whereas the expression of collagen I, RUNX2, osteocalcin and caspase-3 resulted decreased when compared to the other groups. In conclusion, the results of this study suggest a possible role of AMSCs and the use of CCC scaffolds for therapeutic strategies aimed to the articular cartilage regeneration.

Keywords

Mesenchymal Stem Cells, Collagen Cell Carrier, Cartilage, Apoptosis, Lubricin, RUNX2