A COMPARISON BETWEEN HUMAN CARTILAGE PROGENITOR CELLS AND HUMAN ADIPOSE STEM CELLS SPHEROIDS FOR TISSUE ENGINEERING

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The demand for alternative therapies for the treatment of degenerative joint diseases drives the field of tissue engineering for new scalable biofabrication methods. Progenitor cells of human nasal septum cartilage are a promising source of cells due to their high chondrogenic potential and adipose stem cells (ASCs) are promising because of their multipotency to mesodermal lineages, and also their distribution and accessibility. Spheroids cultured on microfabricated devices with non-adherent surfaces besides facilitate the understanding of the mechanisms of formation and maintenance of living tissues, offers a reproducible methodology. Our objective was to standardize spheroids culture of stem and progenitor cells from micromolded non-adhesive hydrogel, assessing morphological parameters related to chondrogenic differentiation through histological and immunohistochemistry analyses. Cartilage progenitor cells derived from human nasoseptal cartilage fragments and ASCs obtained from liposuction samples (according to local ethical committee), were expanded, and after 90% of monolayer confluence the cell suspension was centrifuged and seeded on microfabricated devices with non-adherent surfaces for spheroids formation. Comparing both types of cells, their morphology was very similar and consistent with the induction, and the presence of sulfated glycosaminoglycans (GAGS) was detected (through Hematoxylin & Eosin and Safranin O analysis respectively). Immunohistochemistry revealed the presence of collagen type II and IV and GAGS, important to the structure of the produced ECM but showing subtle differences, where ASCs presented stronger staining for collagen type II and cartilage progenitor cells for GAGs such as chondroitin sulfate and aggrecan. The stainings and quantification of ECM components assess the quality of the formed ECM in the scalable process indicating the chances of success in it.