

Human umbilical cord derivatives regenerate intervertebral disc.

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Abstract

Intervertebral disc (IVD) degeneration is characterized by the loss of nucleus pulposus (NP), which is a common cause for lower back pain. Although, currently, there is no cure for the degenerative disc disease, stem cell therapy is increasingly being considered for its treatment. In this study, we investigated the feasibility and efficacy of human umbilical cord mesenchymal stem cells (MSCs) and chondroprogenitor cells (CPCs) derived from those cells to regenerate damaged IVD in a rabbit model. Transplanted cells survived, engrafted and dispersed into NP in situ. Significant improvement in the histology, cellularity, extracellular matrix proteins, and water and glycosaminoglycan contents in IVD recipients of CPCs was observed compared to MSCs. In addition, IVDs receiving CPCs exhibited higher expression of NP-specific human markers, SOX9, aggrecan, collagen 2, FOXF1 and KRT19. The novelty of the study is that in vitro differentiated CPCs derived from umbilical cord MSCs, demonstrated far greater capacity to regenerate damaged IVDs, which provides basis and impetus for stem cell based clinical studies to treat degenerative disc disease. Copyright © 2016 John Wiley & Sons, Ltd.

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