OFFICIAL ABSTRACT and CERTIFICATION

Examining the Paracrine Effects of Adipose-Derived Mesenchymal Stem Cells in a Bovine Model of Osteoarthritis

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Osteoarthritis is a common joint disease affecting approximately 27 million Americans. Due to stem cells' abilities to differentiate into other specialized cells, they can be utilized in the treatment of many diseases, including osteoarthritis. However, research and many more clinical trials still need to be done before stem cell therapy can have a widespread use. The protective paracrine effects of swine adipose-derived stem cells on bovine cartilage plugs were investigated under the presence of Interleukin-1β and Interleukin-6. IL-1β and IL-6 are inflammatory markers that can induce the degeneration of the extracellular matrix, a major cause for osteoarthritis. In order to test its effects, four groups were created: a regular control which consisted of cartilage not exposed to ADSCs nor IL-1β/IL-6, a negative control which consisted of IL-1β/IL-6 but no ADSCs, a positive control which consisted of ADSCs but no IL-1β/IL-6, and an experimental group which contained both ADSCs and IL-1β/IL-6. Data from three timepoints, day 1, 3, and 7, were collected, and the results were analyzed through histology and immunohistochemistry. The stains revealed that ADSCs prevented the complete degeneration of the extracellular matrix. Furthermore, IHC demonstrated that there was an increased expression of SOX 9, which is present in healthy cartilage. The results promote the idea that paracrine factors of ADSCs can be utilized to treat osteoarthritis, rather than utilizing the ADSCs themselves, to minimize the threat of rejection. It also supports the idea that ADSCs can be used cross-species, making them more easily attainable.

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