



Repair of articular cartilage defects by tissue-engineered cartilage constructed with adipose-derived stem cells and acellular cartilaginous matrix in rabbits

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ABSTRACT. After injury, inflammation, or degeneration, articular cartilage has limited self-repair ability. We aimed to explore the feasibility of repair of articular cartilage defects with tissue-engineered cartilage constructed by acellular cartilage matrices (ACMs) seeded with adipose-derived stem cells (ADSCs). The ADSCs were isolated from 3-month-old New Zealand albino rabbit by using collagenase and cultured and amplified *in vitro*. Fresh cartilage isolated from adult New Zealand albino rabbit were freeze-dried for 12 h and treated with Triton X-100, DNase, and RNase to obtain ACMs. ADSCs were seeded in the acellular cartilaginous matrix at 2×10^7 /mL, and cultured in chondrogenic differentiation medium for 2 weeks to construct tissue-engineered cartilage. Twenty-four New Zealand white rabbits were randomly divided into A, B, and C groups. Engineered cartilage was transplanted into cartilage defect position of rabbits in group A, group B obtained ACMs, and group C did not receive any transplants. The

rabbits were sacrificed in week 12. The restored tissue was evaluated using macroscopy, histology, immunohistochemistry, and transmission electron microscopy (TEM). In the tissue-engineered cartilage group (group A), articular cartilage defects of the rabbits were filled with chondrocyte-like tissue with smooth surface. Immunohistochemistry showed type II-collagen expression and Alcian blue staining was positive. TEM showed chondrocytes in the recesses, with plenty of secretory matrix particles. In the scaffold group (group B), the defect was filled with fibrous tissue. No repaired tissue was found in the blank group (group C). Tissue-engineered cartilage using ACM seeded with ADSCs can help repair articular cartilage defects in rabbits.

Key words: Adipose-derived stem cell; Acellular cartilaginous matrix; Cartilage; Tissue engineering