

Multicellular growth factor in the repair of articular cartilage defects with chondrocyte-improved fibrin glue bracket. [Chinese]

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Abstract:

Aim: To study the effect of improved fibrin glue bracket, chondrocyte module, constructed by multicellular growth factors such as fibroblast growth factor (FGF) beta, transforming growth factor (TGF) beta1 and bone induction morphogenetic protein-6 in repairing the defection of articular cartilage. **Methods:** The experiment was conducted in the Central Laboratory and Department of Orthopedics of Zhujiang Hospital Affiliated to Southern Medical University between December 2004 and June 2005. Forty-nine healthy New Zealand rabbits were selected, including one rabbit of 3 weeks old and 48 rabbits of 3 months old. Autoallergic chondrocytes were obtained from rabbit of 3 weeks old to culture in vitro, which were then transplanted to improved fibrin glue bracket for in vitro culture. Cells were divided into growth factor (GF) group, simple cytoskeleton group, simple bracket group as well as blank group. Cultured chondrocyte modules were randomly implanted into 48 3-month rabbit models of cartilage defect with 12 rabbits in each group to culture in vivo for 2-12 weeks. In vitro cell growth was observed and rabbits were executed respectively on the 2nd; 6th and 12th weeks of in vivo culture. The chondrocyte modules were histologically observed and scored in tissue engineering. **Results:** A total of 48 rabbits were involved in the analysis of results. (1) In vitro culture: The doubling time in simple cytoskeleton group was 5.0 days and that in multicellular growth factor culture system group was 3.8 days. There were significant differences in the growth velocity between the two groups. (2) In vivo culture: The repaired cartilage in cell growth factor group was closely integrated with adjacent cartilage with coincident thickness and the most cell number, which had better secretory capacity. The repaired cartilage in simple cytoskeleton group was not closely

integrated with adjacent cartilage with poor thickness and less cells, which had a certain secretory capacity. While those in simple bracket group were covered by fibrous tissue, and those in blank group were covered with noncohesive fibrous scar tissues and there were partial inflammatory cells. The score of tissue engineering was obviously better in the cell growth factor group than that in simple cytoskeleton group [blank group (10.94 \pm 1.77) points, simple bracket group (9.38 \pm 1.89) points, cytoskeleton group (7.31 \pm 1.54) points, growth factor group (3.81 \pm 1.10) points, $P < 0.01$]. Multicellular growth factor could accelerate the proliferation of cartilage cells and formation of cartilage modules in tissue engineering in the construction of cartilage module for repairing defect in articular cartilage. Conclusion: Multicellular growth factor, working on the improved fibrin glue bracket can significantly accelerate the construction of compound and reparation of articular cartilage defection.