In vitro prefabrication of human cartilage shapes using fibrin glue and human chondrocytes.

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Abstract:

We report the first generation of human cartilage from fibrin glue using a technique of molding chondrocytes in fibrin glue developed in our laboratory. Human costal chondrocytes were suspended in cryoprecipitate and polymerized into a human nasal shape with bovine thrombin. After culture in vitro for 4 weeks, this construct was implanted subcutaneously into a nude mouse. The final construct harvested after 4 weeks in vivo demonstrated some preservation of its original features. Histological analysis showed features of native cartilage, including matrix synthesis and viable chondrocytes by nuclear staining. Biochemical analysis demonstrated active matrix production. Biomechanical testing was performed. To our knowledge this is the first reported creation of human cartilage from fibrin glue, and the first creation of human cartilage in vitro. This technique may become a promising means of engineering precisely designed autogenous cartilage for human reconstruction.