

Tissue engineered cartilage reconstruction on the polylactic acid-glycolic acid scaffolds

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Objectives : Cartilage defects has been a major problem to otorhinolaryngologic and facial reconstructive surgeons because of a limited capacity of regeneration, especially in adults. In recent years, tissue engineering technique combining cells and biodegradable scaffolds has been embossing as a new generation substitute for tissue reconstruction. Cartilage reconstruction using this tissue engineering could be an alternative way for treatment of cartilage defects and repair in the future. The purpose of this study is to form the neo-cartilage using chondrocytes and biodegradable PLGA scaffolds.

Materials and methods : 1×10^6 of chondrocytes extracted from mouse rib cartilage by collagenase and trypsin were seeded on biodegradable PLGA() scaffolds of disc type(3mm(height) x 10mm (diameter)). Cells-scaffold complex was implanted into nude mouse after cells were cultured upto 20% of cell population in scaffold. After 2 months, the graft was extracted and H/E staining for whole cartilage morphology, RT-PCR for collagen type II specific to cartilage tissue and electronic microscopic

examination of inner cell morphology about the explanted graft were performed.

Results : Culture of chondrocytes on scaffold for 2 weeks had made cell population about 20% of scaffold section and this stage was a good time for implantation of cell-scaffold complex into nude mouse. After 2 months of implantation, the H/E staining results showed cartilage like matrix and tissue specific lacunae and this is thought to be characteristics of typical cartilage tissue. RT-PCR results demonstrated that 3D culture of chondrocytes on scaffold prevented dedifferentiation into collagen type I and helped cells cultured on scaffold to maintain the expression of collagen type II during culture period. Cartilage specific lacunae and matrix displayed in electronic microscopic images(SEM and TEM results) indicated a smooth development of ECM in neo-cartilage tissue.

Conclusions : Implantation of mouse chondrocytes seeded in biodegradable PLGA scaffold resulted in the formation of mature cartilage tissue. This preliminary data would be a cornerstone for repair of cartilage defects using autologous human cells.