Dokumenttyp: journal article

Autor(en) des Beitrags:
Bermueller, Christian; Schwarz, Silke; Elsaesser, Alexander F; Sewing, Judith; Baur, Nina; von Bomhard, Achim; Scheithauer, Marc; Notbohm, Holger; Rotter, Nicole

Titel des Beitrags:

Abstract:
Autologous grafts are frequently needed for nasal septum reconstruction. Because they are only available in limited amounts, there is a need for new cartilage replacement strategies. Tissue engineering based on the use of autologous chondrocytes and resorbable matrices might be a suitable option. So far, an optimal material for nasal septum reconstruction has not been identified. The aim of our study was to provide the first evaluation of marine collagen for use in nasal cartilage repair. First, we studied the suitability of marine collagen as a cartilage replacement matrix in the context of in vitro three dimensional cultures by analyzing cell migration, cytotoxicity, and extracellular matrix formation using human and rat nasal septal chondrocytes. Second, we worked toward developing a suitable orthotopic animal model for nasal septum repair, while simultaneously evaluating the biocompatibility of marine collagen. Seeded and unseeded scaffolds were transplanted into nasal septum defects in an orthotopic rat model for 1, 4, and 12 weeks. Explanted scaffolds were histologically and immunohistochemically evaluated. Scaffolds did not induce any cytotoxic reactions in vitro. Chondrocytes were able to adhere to marine collagen and
produce cartilaginous matrix proteins, such as collagen type II. Treating septal cartilage defects in vivo with seeded and unseeded scaffolds led to a significant reduction in the number of nasal septum perforations compared to no replacement. In summary, we demonstrated that marine collagen matrices provide excellent properties for cartilage tissue engineering. Marine collagen scaffolds are able to prevent septal perforations in an autologous, orthotopic rat model. This newly described experimental surgical procedure is a suitable way to evaluate new scaffold materials for their applicability in the context of nasal cartilage repair.