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Titel des Beitrags: [In Vitro and In Vivo Biocompatibility of a Novel, 3-Dimensional Cellulose Matrix Structure].

Abstract: Biological and physical characteristics of matrices are one essential factor in creating bioartificial tissue. In this study, a new 3-dimensional cellulose matrix (Xellulin®) was tested in terms of biocompatibility and applicability for tissue engineering in vitro and in vivo. The tested matrix Xellulin® is a natural hydrological gel-matrix containing bacterial cellulose and water. To evaluate the cell biocompatibility, cell adherence and proliferation characteristics in vitro, the matrix was cultured with human fibroblasts. Further in vivo studies were carried out by transplanting preadipocytes of 4- to 6-week-old Wistar rats with 3 different conditions: a) Xellulin® including 500 000 preadipocytes subcutaneous, b) Xellulin® including 500 000 preadipocytes within an in vivo bioreactor chamber, c) Xellulin® without cells subcutaneous as control. After explantation on day 14 histomorphological and immunohistochemical evaluations were performed. In vitro study revealed an excellent biocompatibility with good cell adherence of the fibroblasts on the matrix and evidence of cell proliferation and creation of a 3-dimensional cell network. In vivo neocapillarisation could be shown in all groups with evidence of erythrocytes (H/E staining) and endothelial vascular cells (RECA-1-staining). A significantly higher vascular density was shown in vascularised bioreactor group (18.4
vessels/100 000 µm² (group b) vs. 8.1 (group a), p<0.05). Cell density was the highest in the vascularised group, but without significant values. No immunogenic reaction to the matrix was noticed. The promising in vitro results concerning cell adherence and proliferation on the tested matrix could be confirmed in vivo with an evidence of 3-dimensional neocapillarisation. Cell survival was higher in the vascularised group, but without significance. Long-term tests (28-42 days) need to be carried out to evaluate long-term cell survival and the matrix stability. Furthermore, studies concerning the implementation of the matrix within anatomic structures as well as long-term biocompatibility are needed.