AB007. Tissue engineering of a choroidal substitute with pseudo-vascularization

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Background: The goal of this study was to engineer an epithelialized and endothelialized pigmented choroidal substitute using the self-assembly approach of tissue engineering.
Methods: Cells from human choroids were isolated and cultured. Culture purity was assessed using immunostaining (CD31, HMB45, vimentin, keratins 8/18). To engineer the choroid, fibroblasts were cultured in the presence of serum and ascorbic acid to promote extracellular matrix (ECM) assembly. Endothelial cells, melanocytes or RPE cells were separately seeded on the stromal substitutes. Choroidal substitutes were further characterized by histology, mass spectrometry, immunostaining, and compared to native human choroids.
Results: The technique used to isolate choroidal cells yielded pure cultures of fibroblasts, melanocytes and vascular endothelial cells. The stromal substitutes engineered using the self-assembly approach were composed of collagen (types I, VI, XII and XIV), proteoglycans (decorin, lumican) and other ECM proteins. Protein expression was confirmed using immunostaining. Endothelial cells spontaneously assembled into capillary-like structures and vascular networks when cocultured with fibroblast-containing ECM sheets.
Conclusions: This study shows that the self-assembly approach of tissue engineering can be used to reconstruct a choroid using native cells. This model represents a unique tool to better understand the crosstalk between the different choroidal cell types and cell-ECM interactions.
Keywords: Tissue engineering; choroid; self-assembly

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