CHAPTER 6

Isolation and Culture of the Most Important Cell Types in Adipose Tissue Engineering

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Summary

Adipose tissue engineering aims at the reconstruction of soft tissue defects and is mainly based on specific biodegradable carriers seeded with autologous adipocyte precursor cells, so called preadipocytes. However, a closer approach to the natural composition of mature adipose tissue also requires the use of endothelial cells and fibroblasts. In this article we present our isolation techniques for preadipocytes, endothelial cells and fibroblasts from human adipose tissue and the differentiation of preadipocytes into mature fat cells. The harvested cell types in combination with the underlying new methods of cell isolation are discussed, especially in comparison to alternative techniques in the field of adipose tissue engineering. The presented isolation procedures of preadipocytes, endothelial cells and fibroblasts from human adipose tissue provide an effective and defined cell yield with only minimal contamination by other cell types. It allows the use of defined cocultures adapted to the individual situation. The incorporation of endothelial cells in the preadipocyte seeded matrix is a major tool for the further development of adipose tissue engineering from its experimental level to the clinical application as it helps to reduce the risk of hypoxic graft loss by supporting angiogenesis.

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