IJAE
Vol. 116, n. 1 (Supplement): 80, 2011
ITALIAN JOURNAL OF ANATOMY AND EMBRYOLOGY

In vitro concurrent endothelial and osteogenic commitment of adipose-derived stem cells and their genomical analyses through CGH array: novel strategies to increase the succesfull engraftement of a tissue engineered bone grafts

Gardin C., Abatangelo G., Bressan E., Ferroni L., Nalesso E., Vindigni V., Pinton P., Sivolella S., Zavan B.

Department of Histology, Microbiology and Medical Biotechnology, University of Padova, Via G. Colombo 3, 35100 Padova, Italy

In the field of tissue engineering, adult stem cells are increasingly recognized as an important tool for in vitro reconstructed tissue-engineered grafts. In the world of cell therapies, mesenchymal stem cells from bone marrow or adipose tissue are undoubtedly the most promising progenitors for tissue engineering applications. In this setting, adipose-derived stem cells (ASC) are generally similar to those derived from bone marrow and are most conveniently extracted from tissue removed in elective cosmetic liposuction procedures; they also show a great potential for endothelization.

The aim of the present work was to investigate how the co-commitment into a vascular and bone phenotype of ASC could be a usefull tools for improving the *in vitro* and *in vivo* reconstruction of a vascularized bone graft. Human ASC obtained from abdominoplasty procedures were loaded in a hydroxyapatite clinical-grade scaffold, co-differentiated and tested for proliferation, cell distribution, and osteogenic and vasculogenic gene expression. The chromosomal stability of the cultures was investigated using the CGH array for 3D cultures. ASC adhesion, distribution, proliferation and gene expression not only demonstrated a full osteogenic and vasculogenic commitment in vitro and in vivo, but also showed that endothelization strongly improves their osteogenic commitment. In the end, genetic analyses confirmed that no genomical alteration in long-term *in vitro* culture of ASC in 3D scaffolds occurs.

Keywords: Adipose-derived stem cells, bone, hydroxyapatite scaffolds, CGH array; vasculogenesis