IJAE
Vol. 119, n. 1 (Supplement): 89, 2014
ITALIAN JOURNAL OF ANATOMY AND EMBRYOLOGY

# Influence of a biomimetic gelatin porous scaffold in chondrogenic and osteogenic differentiation of mesenchymal stem cells

Stefano Focaroli[1], Sandra Durante[1], Monica Mattioli Belmonte[2], Giovanna Orsini[2], Viviana Salvatore[1], Gabriella Teti[1], Mirella Falconi[1]

[1] Department for Biomedical and Neuromotor Sciences (DIBINEM), University of Bologna, via Irnerio 48, Bologna, 40126 Italy
[2] Department of Clinical and Molecular Sciences, School of Medicine, Università Politecnica delle Marche, Via Tronto 10/60126, Ancona, Italy

Recently, tissue engineering has merged with stem cell technology to develop new sources of transplantable material for injury or disease treatment. Eminently interesting, are bone and joint injuries/disorders because of the low self-regenerating capacity of the matrix secreting cells, particularly chondrocytes (1). Gelatin based scaffolds are considered to be a highly suitable 3D material for tissue regeneration, due to high biocompatibility and adaptation to native tissues.

In the present study, the chondrogenic and osteogenic potential of a porous gelatin based scaffold (2), alone or in combination with hydroxyapatite crystals, was investigated in human mesenchymal stem cells.

Cells were culture up to 4 weeks on the scaffold and on monolayer. MTT assay was performed to evaluate cell viability, light and transmission electron microscopy were carried out to demonstrate cell colonization inside the porous architecture of the biomaterial and scaffold adhesion. The expression of chondrogenic markers such as SOX9, collagen type II, aggregan and versican and osteogenic markers such as Collagen type I, Runx -2, osteopontin and bone matrix protein, were investigated by Real Time PCR.

Results showed an high cell viability, adhesion and colonization of the scaffold. Real Time PCR data demonstrated an up-regulation of all the chondrogenic and osteogenic markers analyzed.

In conclusion, gelatin porous scaffold provides an improved environment for chondrogenic and osteogenic differentiation of stem cells compared to cell monolayer culture system.

## References

[1] Guilak et al. (2010) Multipotent adult stem cells from adipose tissue for musculoskeletal tissue engineering. Clin Orthop Relat Res. 468: 2530 2540.
[2] Panzavolta et al. (2013) 3D interconnected porous biomimetic scaffolds: In vitro cell response. J Biomed Mater Res A. 101: 3560 3570.

Keywords
Tissue engineering, chondrogenic markers, osteogenic markers, ultrastructure.