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IGF1 and IGF1/VEGF cross-talk on human mesenchymal stromal cells (hMSCs): the role of stem cell sources in bone healing

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Repair of skeletal defects remains a considerable biomedical problem. One of the major obstacles of the different tested strategies still remains the vascularization of engineered scaffolds. To this aim we have examined the ability of IGF1, alone or in association with VEGF, to modulate Periosteum Derived Progenitor Cells (PDPCs) (Ferretti et al., 2012) and Skin-Mesenchymal Stromal Cells (S-MSCs) (Orciani and Di Primio, 2013) osteoblastic or endothelial commitment. A selected gene panel for endothelial and osteoblastic differentiation as well as genes that can affect MAPK and PI3K/AKT signalling pathways were investigated. Our results showed a different commitment of PDPCs and S-MSCs under growth factor stimulation: the former are induced towards an osteoblastic differentiation, whilst the latter seem to be brought to an endothelial phenotype. This commitment is also related to a diverse MAPK or PI3K/AKT signalling pathway activation. Our results open intriguing perspective for the development of innovative bone tissue engineering approaches based on associated angiogenesis and osteogenesis. Further investigations are however necessary to gain insight on the real cross-talk between proliferation and differentiation in adult stem cells.

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References

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Key words
PDPCs, S-MSCs, rhIGF1, rhVEGF, tissue engineering.