OMICS Group Conferences
Accelerating Scientific Discovery

2nd World Congress on
Cell Science & Stem Cell Research

November 12-14, 2012 Hilton San Antonio Airport, USA

Differential signalling through ALK-1 and ALK-5 regulates leptin expression in mesenchymal stem cells

Mustapha Zeddou[1], Biserka Relic[2], Olivier Malaise[2], Edith Charlier[1], Aline Desoroux[1], Yves Beguin[2], Dominique de Seny[2] and Michel G. Malaise[2]
[1]University Mohamed I, Morocco
[2]University and CHU of Liege, Belgium

Leptin plays a central role in maintaining energy balance, with multiple other systemic effects. Despite leptin importance in peripheral regulation of mesenchymal stem cells (MSC)differentiation, little is known on its expression mechanism. Leptin is often described as adipokine, while it is expressed by other cell types. We have recently shown an in vitro leptin expression, enhanced by glucocorticoids in synovial fibroblasts. Here, we investigated leptin expression in MSC from bone marrow (BM-MSC) and cord matrix (UMSC). Results showed that BM-MSC, but not UMSC, expressed leptin that was strongly enhanced by glucocorticoids. TGFβ1 markedly inhibited the endogenous- and glucocorticoid-induced leptin expression in BM-MSC. Since TGF-β1 was shown to signal via ALK-5-Smad2/3 and/or ALK-1-Smad1/5 pathways, we analysed the expression of proteins from both pathways. In BM-MSC, TGF-β1 increased p-Smad2 expression, while ALK-5 inhibitor (SB431542) induced leptin expression and significantly restored TGF-β1-induced leptin inhibition. In addition, both prednisolone and SB431542 increased p-Smad1/5 expression. These results suggested ALK-5-Smad2 pathway as inhibitor of leptin expression, while ALK-1-Smad1/5 as activator. Indeed, Smad1 expression silencing induced leptin expression inhibition. Furthermore, prednisolone enhanced the expression of TGF-βRII while decreasing p-Smad2 in BM-MSC and SVF but not in UMSC. In vitro differentiation revealed differential osteogenic potential in SVF, BM-MSC and UMSC that correlates to their leptin expression potential. Our results suggest that ALK-1/ALK-5 balance regulates leptin expression in MSC. It also underlines UMSC as leptin non-producer MSC for cell therapy protocols where leptin expression is not suitable

mzeddou@hotmail.com