IJAE
Vol. 122, n. 1 (Supplement): 160, 2017
ITALIAN JOURNAL OF ANATOMY AND EMBRYOLOGY

Human adipose stem cell differentiation is highly affected by cancer cells both in vitro and in vivo: implication for autologous fat grafting

Francesca Paino[1], Marcella La Noce[1], Diego Di Nucci[2], Gianfranco Nicoletti[3], Rosa Salzillo[3], Alfredo De Rosa[3], Giuseppe Andrea Ferraro[3], Gianpaolo Papaccio[1], Vincenzo Desiderio[1], Virginia Tirino[1]

[1] Dipartimento di Medicina Sperimentale, Sezione di Biotecnologie, Istologia Medica e Biologia Molecolare, Seconda Università degli Studi di Napoli, Napoli, Italy
[2] Dipartimento di Medicina Sperimentale, Stabulario, Seconda Università degli Studi di Napoli, Napoli, Italy
[3] Dipartimento Multidisciplinare di Specialità Medico-Chirurgiche ed Odontoiatriche, Seconda Università degli Studi di Napoli, Napoli, Italy

Recent studies showed that mesenchymal stem cells derived from adipose tissue can promote tumour progression, raising some concerns regarding their use in regenerative medicine. In this context, we co-cultured either SAOS2 osteosarcoma or MCF7 breast cancer cells with human adipose stem cells (hASCs), in order to evaluate potential effects of cancer cells on hASCs differentiation, in vitro and in vivo. In this study we observed that both SAOS2 and MCF7 cell lines induced an increase in hASCs proliferation, compared to hASCs alone, but, surprisingly, neither changes in the expression of CD90, CD29, CD324 and vimentin, nor variations in the Twist and Slug mRNAs were detectable. Noteworthy, SAOS2 and MCF7 cells induced in hASCs an upregulation of CD34 expression and Stemness genes, including OCT3/4, Nanog, Sox2 and leptin, and a decrease in angiogenic factors, including CD31, PDGFα, PDGFRα, PDGFRβ and VEGF. SMAD and pSMAD2/3 increased only in hASCs alone. After 21 days of co-culture, hASCs differentiated both in adipocytes and endothelial cells. Moreover, co-injection of MCF7 cells with hASCs led to the formation of a highly vascularized tumour. Taken together our findings suggest that mesenchymal stem cells, under tumour cell induction, do not differentiate in vitro or facilitate the angiogenesis of the tumour in vivo, thus opening interesting new scenarios in the relationship between cancer and stem cells. These findings may also lead to greater caution, when managing autologous fat grafts in cancer patients.

Keywords
Adipose stem cells, cancer cells, breast cancer, co-culture, pSMAD2/3