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The comparative analysis of differentiation potency between the mesenchymal stem cells derived from the same human normal adipose tissue and atypical lipomatous tumor

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Background: Sarcomas often have depressed function of p53 protein, which has the negative effect on the adipogenic and osteogenic differentiation in mesenchymal stem cells (MSCs). If we consider sarcoma stem cells as abnormal MSCs, that might have depressed p53 functions and could be differentiation-induced to adipocytes and osteoblasts easier than normal MSCs.

Purposes: We researched the effectiveness of differentiation-inducing therapy on sarcoma stem cells.

Methods: For comparing abnormal MSCs with normal counterparts, we chose MSCs of atypical lipomatous tumor (ALT), which have amplified MDM2 gene and suppressed p53 function. We collected MSCs from normal fat and ALT of the same patients. Five patients' tissue was available. Each MSCs were differentiation-induced to adipocytes and osteoblasts. Adipogenic differentiation potency was assessed by the Oil Red O staining, statistically analyzed by Student's t test. Osteogenic differentiation potency was assessed by the ALP and Alizarin Red S staining, then expressed with ratio of the value of ALT to that of normal fat, statistically analyzed by Mann-Whitney U test.

Results: In the adipogenic differentiation, values (normal fat vs ALT) were 0.29 vs 0.29 ($p=0.99$), 0.16 vs 0.13, 0.52 vs 0.41, 0.36 vs 0.20, 0.44 vs 0.28 ($p<0.05$) respectively. In the osteogenic differentiation based on ALP staining, values were 1 vs 2.9, 4.6, 2.9, 90.4, 0.001 ($p<0.01$), respectively. And based on Alizarin Red S staining, values were 1 vs 0.69, 5.13, 12.09, 3.59, 0.65 ($p<0.01$), respectively.

Conclusions: Osteogenic differentiation potency was higher in the MSCs derived from ALT, therefore can be useful for differentiation-inducing therapy.