

Differentiation-inducing factor-1 accelerates bone marrow-derived mesenchymal stem cells differentiation into adipocyte

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Background and aim: Bone marrow-derived mesenchymal stem cells (BM-MSCs) have been demonstrated to be an attractive therapeutic cell source for tissue regeneration and repair. However, it is difficult to obtain a large amount of differentiated cells in the transplanted site due to their low differentiation efficiency. In this study, therefore, we investigated the effects of differentiation-inducing factor-1 (DIF-1) on the BM-MSC differentiation efficacy into adipogenic or osteogenic lineages.

Methods and results: BM-MSCs, which were obtained from Sprague-Dawley rats, were cultured until reaching 100% confluence in 12-well plates. Then, a growth medium was replaced the adipocyte or osteocyte differentiation medium, and the BM-MSCs were maintained for 2 to 3 weeks. In adipocyte differentiation assay, oil red-O positive area and adipocyte fatty acid-binding protein expression were significantly increased by DIF-1-treatment than control. On the other hand, in osteocyte differentiation assay, alizarin red-S positive area and runt-related transcription factor 2 expression were reduced by DIF-1-treatment. Further, the effects of DIF-1 on adipogenic and osteogenic differentiations were attenuated by treatment with glycogen synthase kinase-3 (GSK-3) inhibitor CHIR99021.

Conclusion: It was revealed that DIF-1 promotes adipogenic differentiation of BM-MSCs through activation of GSK-3, whereas osteogenic differentiation was suppressed. These results indicate that DIF-1 may be useful for controlling the lineages of MSC differentiation.