

Tenogenic Induction of Human Adipose-Derived Mesenchymal Stem Cells by Combined Growth Factors

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"Background: Mesenchymal stem cells (MSCs) have become extremely interesting for regenerative medicine and tissue engineering. Stem cell-based therapy has been proven to be a powerful and successful instrument, in particular for the healing of tendon lesions. This study aimed to determine whether adipose-derived MSCs (AMSCs) could be induced to differentiate into tendon-like cells in response to exogenous platelet-derived growth factor-BB (PDGF-BB) and growth differentiation factor-6 (GDF-6).

Materials and Methods: human AMSCs (hAMSCs) were isolated and cultured into flasks with culture medium, containing DMEM, 10% fetal bovine serum and 1% penicillin/streptomycin. The cells at passage 5 (P5) were treated with specific medium containing PDGF-BB (20 ng/ml) and GDF-6 (20 ng/ml), L-Proline and Ascorbic Acid as tenogenic differentiation medium. The cells at control group were cultured in medium without the mentioned supplements. This culture condition was continued for 14 days. Sirius Red staining was used to determine Col3A1 production. For analysis, the absorbance was measured at 540 nm and data are presented as mean \pm SD (n = 3). H&E staining was used to assess cell morphology.

Results: The differentiated cells were more slender, elongated and spindle shaped. A tenocyte-like elongated morphology was observed in treated AMSC after 3-days. A t-test analysis revealed that amount of collagen production is higher in treatment group compared with control group (p=0.05). Moreover, hAMSCs showed a tenocyte-like aligned distribution after 14 days.

Conclusion: These findings suggest that in general, PDGF and GDF-6 may have tenogenic effect on hAMSCs. Our data support that hAMSCs can be considered as a suitable candidate for therapeutic approaches in tendon lesion "

Keywords: Mesenchymal Stem Cells, Tenogenic Differentiation, PDGF-BB, GDF-6