EFFECTS OF ADIPONECTIN ON THE MORPHOLOGY AND PROLIFERATION OF HUMAN ADIPOSE DERIVED MESENCHYMAL STROMAL CELLS

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Introduction: The repair of tendon injuries presents a major challenge to the orthopaedic practice due to its slow healing process because of tissue hypovascularity and hypocellularity. Currently, mesenchymal stromal cells (MSCs) are recognized as the most suitable candidate for tendon regeneration due to immunomodulatory properties and ability to differentiate into tenocytes. Adiponectin, an adipokine secreted primarily by adipose tissues was reported to function as a growth factor and induce tenogenic differentiation in tendon progenitor cells. However, the role of adiponectin on human MSCs (hMSCs) activity have not been previously elucidated. A study was thus conducted to investigate the effect of adiponectin on the morphology and proliferation of hMSCs in vitro.

Methodology: hMSCs from adipose tissue were isolated, expanded in vitro, and sub-cultured until passage-2. These hMSCs were characterized from their surface markers and differentiation potential. Different adiponectin concentration (7.5 ng/ml, 15 ng/ml, 30 ng/ml, 50 ng/ml, 100 ng/ml, and 200 ng/ml) was added to the culture for 24, 48 and 72 hours. The cell proliferation at different time point was analysed by alamarBlue® assay whilst cells morphological was captured using inverted microscope.

Results: The isolated cells appeared to conform to the characteristics expected of MSCs, including 1) spindle-shaped plastic adherent features; 2) positive markers for CD90 and CD105 while being devoid of CD34 and CD45; 3) able to undergo tri-lineage differentiation. Our results indicate that cell proliferation was highest when 100ng/mL of adiponectin was applied to the MSCs. Cells treated at the concentration of 100ng/mL and below showed normal fibroblastic appearance of MSCs. Cells treated with higher concentration showed reduction in cell number.

Conclusion: This study demonstrated that cell morphology and proliferation of human adipose derived MSCs can be modulated by using adiponectin. This preliminary finding provides us the basic reference of the potential use of adiponectin in improving MSCs proliferation in vitro.