The effect of Dimethyl Sulfoxide on hepatogenic differentiation of Mesenchymal Stem Cells

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Background
Adipose tissue mesenchymal stem cells (AT-MSCs) are suitable choices in treatment of liver associated diseases. Dimethyl Sulfoxide (DMSO) is an amphipathic molecule with potential of delivering both lipophilic and hydrophilic agents into cells. Few protocols used DMSO for induction of AT-MSCs towards hepatocyte like cells but the effect of DMSO on hepatogenic differentiation were not surveyed, previously. In the present study, we aimed at evaluation of the effect of DMSO in differentiation of AT-MSCs into hepatic lineage.
Methods:
We isolated MSCs from adipose tissue then multi-potency and surface markers of AT-MSCs was evaluated. Isolated AT-MSCs randomly dispensed in four groups including group 1: HGF treated, 2: HGF+DMSO treated, 3: HGF+ DMSO+ OMS treated, and group control for a period of 3 weeks in the expansion medium without serum, EGF and bFGF was also included in the first stage of inductions. The morphologic changes during induction period was observed with microscopy. The protein levels of albumin and a-fetoprotein (AFP) of the differentiating MSCs was investigated by ELISA and urea production was evaluated by colorimetric assay. The qRT-PCR was performed for quantitation of hepatocyte marker genes including a-fetoprotein (AFP), CK18, HNF4a, and HNF6. The glycogen storage of differentiated cells was visualized by periodic-acid Schiff's staining.
Results:
The results demonstrate that DMSO speeds up hepatic differentiation of AT-MSCs characterized by rapid changes in morphology, higher expression of hepatic marker gene (AFP) in both mRNA and protein level ($P<0.05$), also, increased transcriptional levels of other hepatic genes including CK18, HNF4a, and HNF6 ($P<0.01$) moreover, greater percentage of glycogen storage($p< 0.05$) in DMSO treated groups.
Conclusion:
DMSO catalyzes hepatic differentiation, therefore using DMSO for acceleration of the hepatogenic protocols of AT-MSCs appears advantageous.
Keywords: Adipose Tissue, Mesenchymal Stem Cells, Hepatic differentiation.

Poster Presentation

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