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Differentiation of mesenchymal stem cells derived from umbilical cord blood into hepatocyteNoha M Abd El Fadel¹, Nagwan A Sabek², Taghrid B El Abaseri² and Emad F Ismail³

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Background: The liver is a central multifunctional organ in our body. Hepatocyte dysfunction induced by viral hepatitis and cirrhosis may progress to liver failure. Stem cells (SCs) based therapy is a promising technique for the treatment of liver diseases. Umbilical cord-derived mesenchymal stem cells (UC MSCs) do not express the major histocompatibility complex class II antigens, thus they are potentially favorable SCs source for liver transplantation.

Aim: The aim of our study was to investigate the *in vitro* hepatic differentiation potential of umbilical cord-derived mesenchymal stem cells.

Methods: MSCs were cultured and induced to differentiate under pro-hepatogenic conditions using mainly hepatic growth factor (HGF) and fibroblastic growth factor. Differentiated hepatocyte-like cells were investigated based on three main criteria including its morphology, expression of hepatocyte-specific genes, and specific functionality.

Results: After 21 days of treatment, the differentiated cells acquired hepatocytes-like oval shape. Using reverse transcriptase-polymerase chain reaction (RT-PCR), the expression of hepatocyte-specific genes including albumin (ALB), α -fetoprotein (AFP) and cytokeratin-18 significantly increased in differentiated UC-MSCs compared to control untreated cells ($P < 0.05$). In addition, levels of albumin and AFP in the culture media showed a three folds increase in differentiated cells compared to control cells.

Conclusion: We conclude that this protocol for the *in vitro* differentiation of UC MSCs produced viable functional hepatocytes. Our future goal is to test the *in vivo* effectiveness in treating end-stage liver diseases.

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