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Relative value of human umbilical blood cord and rat bone marrow mesenchymal stem on streptozotocin induced type-1 diabetes mellitus

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Background: Human umbilical cord blood (UCB) cells and rat bone marrow mesenchymal stem cells (BM-MSCs) have many advantages. The aim of this study was to investigate the impact of human UCB cells and rat BM-MSCs on reversal of diabetes in a rat model of streptozotocin-induced diabetes and on the recovery of pancreatic β-cells in rats with type-1 diabetes.

Material & Method: Human $CD34^+$ stem cells were isolated with magnetic cell sorting (MACS). Rat BM-MSCs were isolated, cultured and propagated. Forty rats were divided into 4 groups: Group-1 (control group), Group-2 (streptozotocin group DM): Rats were injected with a intraperitoneally on 3 consecutive days to induce type-1 DM (30 mg/kg of STZ solution in acidified 0.9% saline; Group-3 (DM/$CD34^+$ group): STZ induced type-1 DM in rats and injected with human undifferentiated cells (UBCs) (107, intravenously) and group 4 (DM/BM-MSCs group): STZ induced type-1 DM in rats and injected with bone marrow undifferentiated cells (BM-MSCs) (107, intravenously). Blood samples were driven from rats at 4, 8 and 12 weeks to measure serum level of fasting blood glucose (FBG), serum creatinine, insulin, urea and 24 hours urine. Quantitative expression of insulin like growth factor-I (IGF-I), insulin like growth factor-II (IGF-II), collagen Iα, MMP-2, MMP-9 and TNF-α were measured by real-time polymerase chain reaction (RT-PCR).

Results: Stem cells administration recovered pancreatic function that confirmed by histopathological examination of the pancreatic tissue. GFP labeled cells were detected in groups injected with stem cells. Concerning gene expression, stem cells administration reduced gene expressions of all genes with lower expression in the DM/$CD34^+$ group compared to higher expression in the DM/BM-MSCs group.

Conclusion: Human UCB $CD34^+$ stem cells were more effective in alleviation of streptozotocin-induced DM in rat than BM-MSCs. This study highlighted an important role of human UCB $CD34^+$ stem cells in diabetes mellitus therapy.

Biography

Naglaa Kamal Idriss has completed her PhD from Birmingham University and Postdoctoral studies from Southampton School of Medicine. She is the Member of International Society for Stem Cell Research (ISSCR) and European Society of Cardiology, ESC working group on Coronary pathophysiology and microcirculation. She has published more than 15 papers in reputed journals.

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