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Generation of insulin producing cells from umbilical cord mesenchymal stem cells - A tale of two cells

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Background: The number of patients suffering from diabetes mellitus (DM) is growing in an alarming rate. Now, cell therapy treatment options for DM are under extensive study. Interestingly, umbilical cord (UC) has been proved to be a good source of stem cells, either from cord blood (UCB-MSCs) or Wharton's jelly (WJ-MSCs). Nowadays, with the evolving interest in UC stem cells banking, we thought to investigate the difference between these 2 important banking sources and to compare their differentiation potentials towards insulin producing cells (IPCs) *in vitro* and *in vivo*.

Methods: Both UCB-MSCs and WJ-MSCs were isolated and expanded for several passages. Afterwards, both cell types were induced to differentiate into IPCs, then the differentiated cells were assessed by determining the expression of stem cell markers, together with key β -cells markers using qRT-PCR, and functionally by measuring glucose stimulated insulin secretion. Both UCB-MSCs and WJ-MSCs were transplanted in the tail veins of streptozotocin (STZ) induced diabetic rats. Blood glucose levels and body weights were monitored 2 months post transplantation.

Results & Conclusion: WJ appeared to be a much more homogenous and potential source for MSCs as compared to UCB. Interestingly, both UCB-MSCs and WJ-MSCs were successfully differentiated to IPCs. Yet, the resulting IPCs from WJ-MSCs were to a limited extent functioning better than those obtained from UCB-MSCs *in vitro*. Moreover, WJ-MSCs managed to better control hyperglycemia in STZ induced diabetic rats. Our results indicate that WJ could represent a potential source of cells in the field of DM cell therapy.

Biography

Mohamed M Kamal finished his PhD from Faculty of Pharmacy, Ain Shams University, Cairo, Egypt in 2011 on glioblastoma cancer stem cell biology in Genetics Department, M.D. Anderson Cancer Center, Houston, Texas from 2008 through 2010 as part of scholarship from Egyptian Government. In 2014, he got a Fulbright Postdoctoral fellowship in M.D. Anderson Cancer Center, Houston, Texas for nine months. He published 2 papers in *Stem Cells* and *Journal of Neuroscience* as a first coauthor. Also, he has a paper published in *Regenerative Medicine* and a couple of papers under revision in stem cell biology and cancer fields.

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