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Effect of some gut hormones in the generation of insulin producing cells from mesenchymal stem cells

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Diabetes mellitus is a complex metabolic disease with a huge worldwide prevalence. In vitro generation of β-cells from stem cells may provide bases for diabetes cell therapy. We examine the effect of gut hormones including glucagon like peptide-1(GLP-1) and obestatin in generation of IPCs in-vitro from WJ-MSCs in comparison to exendin-4. WJ-MSCs were isolated from umbilical cords and characterized by immunophenotyping and in vitro differentiation into adipocytes as an example of mesenchymal lineages. WJ-MSCs under proliferation conditions were incubated with either10nM exendin-4, 10nM GLP-1 and 100nM obestatin. Moreover, WJ-MSCs were induced to differentiate into IPCs using either of those factors using short differentiation protocol (10 days) and long differentiation protocol (30 days). The stem cell markers, nestin and Oct-4; and β-cells differentiation markers, Pdx-1, Maf-A and Isl-1, were assessed by qRT-PCR, while, the functionality of the generated IPCs was assessed by glucose stimulated insulin secretion (GSIS).WJ-MSCs exhibit all characteristics of MSCs including plastic adherence, expression of mesenchymal CDs and lacking hematopoietic ones beside their ability to differentiate into adipocytes. Incubation of these cells with either exendin-4, GLP-1 and obestatin under proliferation conditions decreased the expression of stem cell markers, nestin and Oct-4, indicating the exit of these cells from stemness state. Interestingly, using obestatin in short protocol managed to induce expression of Pdx-1 and Maf-A, as was the case with exendin-4. However, GLP-1 failed to show this. In addition, in long protocol, exendin-4, GLP-1 and obestatin generated IPCs showing increased expression of Pdx-1, Maf-A and Isl-1. As for GSIS, both GLP-1 and obestatin showed higher secretion of insulin but failed to show response to increased glucose concentrations. These results may indicate that obestatin can be potentially used in the differentiation protocols for the generation of IPCs from MSCs.

Biography

Prof. Hala El Mesallamy works as Head of Biochemistry Department (since 2001) Professor of Biochemistry since 2006 and served as Vice Dean for Postgraduates Affairs and Scientific research (2013-2015),), ExVice Dean for Community and Environmental Affairs (2007-2009), Member in the permanent committee (since 2013), Faculty of Pharmacy, Ain Shams University. Member in Council Patent of Academy of Scientific Research and Technology in Ministry of Scientific Research (2009-2011), Lecturer and Consultant in Unesco (since 2008), Reviewer in Some International Journals,) Member in the Counseling committee for special prices (since 2012).

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