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Effect of pancreatic extract and signaling methods in direction of embryonic stem cells into β cells

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Diabetes mellitus is caused by loss of insulin-secreting capacity due to an autoimmune destruction of the insulin-producing β cells. Insufficient source of insulin-producing cells (IPCs) is the major limit in using transplantation for therapy diabetes. We present here a method for forming islet-like clusters of IPCs derived from mouse embryonic stem cells (mESCs). The protocol consisted of several steps. Embryoid bodies (EBs) were first cultured and plated in condition medium associated with activin and condition medium, followed by medium supplemented with basic fibroblast growth factor (bFGF). Next bFGF was withdrawn, and cyclopamine and noggin were added. Then the cells were treated with B27 and condition medium for maturation. Our results demonstrated that mESCs differentiated into IPCs. Immunofluorescence and qRT-PCR detected an enhanced expression of pancreatic genes in the differentiated cells and tests by ELISA showed an increased percentage of insulin-expressing cells in the differentiated cells. Moreover insulin, most cells also co expressed others markers of pancreatic cells. This method lead to induction of cells which exhibited higher insulin secretion and further improvement of this IPCs protocol may result in the formation of an unlimited source of cells suitable for transplantation. These evidences indicated that condition medium as critical components of the stem cell niche associated other factors had high potential to differentiate mESCs into IPCs.

Biography

Elham Hoveizi has completed his PhD from Kharazmi University of Tehran. His major area of research is cell and developmental biology and currently he is working as an Assistant Professor in Shahid Chamran University of Ahvaz. He has published more than 24 papers in reputed journals. Currently his research is in the field of neuron and beta cells differentiation.

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