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Hormonal manipulation induces differentiation of pancreatic progenitor cells into insulin-secreting islet β -cells

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Diabetes is a kind of metabolic disease, which causes considerable morbidity in the world. Although pancreas transplantation and islet transplantation has prominent future, we still confront the main difficulty of organ shortage. Thus, a primary and fundamental effective therapy for diabetes is to develop ways to increase beta cell numbers. Here, we reported that under the stimuli of hormones, pancreatic duct epithelial cells, also known as pancreatic progenitor cells, could be differentiated into insulin-secreting islet β -cells. In this study, we collected pregnant rat serum and added to the culturing medium of isolated rat pancreatic duct epithelial cells. After 7 days of culturing, the pancreatic progenitor cells will be aggregated. Then we compared the gender difference of the pancreatic progenitor cells, and also the dosage of pregnant serum on the efficiency of differentiation. As observed in Figure 2, all cells treated with pregnant serum experienced expansion (A-D), aggregation (E-H), and islet-like cells formation (I-L) stages. Higher concentration of pregnant serum treated cells (L, J) generate more islet-like cells compared to those of lower ones (I, K). Pancreatic duct epithelial cells isolated from female rats formed larger islet-like sphere compared to those of male ones. However, pancreatic duct epithelial cells cultured with FBS could not form islet-like cells (N, low concentration of FBS control; O, high concentration of FBS control). Then the differentiated islet-like cells were determined by dithizone staining (P) and aggregated pancreatic duct cells were determined by insulin staining (M). Judged from these two pictures, no matter the aggregated cells or the sphere-shaped ones are capable of secreting insulin. In conclusion, the pancreatic progenitor cells could be differentiated to insulin-secreting islet β -cells by the pregnant serum, which indicates the therapeutic potential of hormone therapy in preventing and/or treating diabetes.

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