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# Alleviation of streptozotocin-induced diabetes in nude mice by stem cells derived from human first trimester umbilical cord

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**ABSTRACT.** Cells isolated from human first trimester umbilical cord perivascular layer (hFTM-PV) tissues display the pluripotent characteristics of stem cells. In this study, we examined whether hFTM-PV cells can differentiate into islet-like clusters (ILCs) *in vitro*, and whether transplantation of the hFTM-PV cells with and without differentiation *in vitro* can alleviate diabetes in nude mice. The hFTM-PV cells were differentiated into ILCs *in vitro* through a simple stepwise culture protocol. To examine the *in vivo* effects of the cells, the hFTM-PV cells with and without differentiation *in vitro* were transplanted into the abdominal cavity of nude mice with streptozotocin (STZ)-induced diabetes. Blood glucose levels, body weight, and the survival probability of the diabetic nude mice were then statistically analyzed. The hFTM-PV cells were successfully induced into ILCs that could release insulin in response to elevated concentrations

 

of glucose *in vitro*. In transplantation experiments, we observed that mice transplanted with the undifferentiated hFTM-PV cells, embryonic body-like cell aggregations, or ILCs all demonstrated normalized hyperglycemia and showed improved survival rate compared with those without cell transplantation. The hFTM-PV cells have the ability to differentiate into ILCs *in vitro* and transplantations of undifferentiated and differentiated cells can alleviate STZ-induced diabetes in nude mice. This may offer a potential cell source for stem cell-based therapy for treating diabetes in the future.

**Key words:** Human first trimester umbilical cord; Stem cell; Diabetes

 