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# Transcription factors promotes cellular reprogramming of human dental pulp progenitor cells into induced pluripotent stem cells and multilineage differentiation potential into neurogenic, cardiomyocytes and chondrocytes

**Kapil Dev[1], Jaroslav Mokry[1], Tomas Soukup[1], Hana Hrebikova[1], W M Shaikh Qureshi[1], Rishikaysh V Pisal[1] and Govindan Dayanithi[2]**
[1]University of Charles, Czech Republic
[2]Institute of Experimental Medicine, Czech Republic

The advent of induced pluripotent stem cells (iPSCs) knowledge has opened up new vitas to produce patient specific pluripotent stem cells from somatic one. Transcription factors i.e. Oct4, Sox2, c-Myc and Klf4 play an important role in the generation of iPSCs. Many types of somatic cells have been successfully reprogrammed into iPSCs in the mouse model; however reprogramming human cells have been more difficult. To date, human dermal fibroblasts are most accessible and feasible cell source for iPS generation. Dental tissues derived mesenchymal like stem/progenitor cells and extracted from third molar will be a good option without any much ethical issues. Dental pulp cells viability in the 9th passage was over 90%. Our phenotypical analysis was highly positivity for CD29, CD44, CD90 and HLA I, and negative for CD34, CD45, CD71, HLA II. The competency to develop human-iPSCs lines by reprogramming of dental pulp progenitor stem cells through regular transcription factors i.e., Oct4, Klm4, Sox2, c-Myc, Lin28 deals exceptional prospects for elementary and translational neuroscience as well as cardiovascular research. iPSCs showed morphology oblique from human-ESCs in culture, attains alkaline phosphatase staining and expressed human embryonic stem cells (hESCs) markers like Oct4, Klf4, Sox2, SSEA3 and Nanog as confirmed with immunocytochemistry, western blot, molecular and flow cytometry. Furthermore, iPSCs were differentiated *in vitro* into neurons and cardiomyocytes; via N2 supplement with Neural-basal medium and embryoid bodies by hanging drop method, respectively. Neurogenic differentiation were confirmed by GFAP, MAP2, NCAM, NeuN, S100, O4, Nestin and cardiomyocytes by morphological foci formation and Myosin light chain2/3, c-Kit and connexin43 immunocyto markers. Chondrocytes were detected earlier by their morphology and confirm by specific antibodies like Osteopontin and Osteonectin. Electrophysiological based ions channels behaviors of these iPSCs were analyzed within neuron cells and they expressed P2X Purinoceptor 2 and P2X Purinoceptor 7. A huge morphological difference was observed between somatic and iPSCs by electron microscope on the same day of transfection. Differentiated cells behave interestingly during scaffold based tissue engineering. We compare the benefits of iPSCs and ESCs, discuss current approaches to convert pluripotent stem cells into neurogenic and cardiomyocytes and describe the uses against disease and their modeling. These functional differentiation methods will provides an update for researchers, clinicians and scientists interested in the progress of iPS cells towards the regenerative medicine.

kapildchauhan@rediffmail.com
mokry@lfhk.cuni.cz