

Generation of human iPSC cells with cationic nanoparticle delivery of microRNA

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Induced Pluripotent Stem Cells (iPSCs) which can be generated from human somatic cells has drawn much attention, so that various transfection methods have been developed such as viral vectors, plasmid vectors, protein, mRNA and microRNA (miRNA). However, the viral mediated transfection poses high risk of possible to be cancer-like cell. Among transfection methods except viral based, miRNAs would be the most safe and confident way to generate iPSCs without producing cancer-like cell.

Herein, we introduced several types of biocompatible nanoparticles for delivery of miRNAs for iPSCs generation. Precisely, as biocompatible nanovectors we used 1) mesoporous silica nanoparticle (MSN 23), 2) polyethylene glycol (PEG) grafted branched polyethyleneimine (PEI) and 3) liposome. From the results in miRNA delivery by using these nanovectors, the ES (embryonic stem cell) like colonies appeared and maintained their shape indicating that they have ES cell marker by immunostaining analysis. Consequently, liposome showed the highest transfection efficiency (30 % and 10% higher compared to MSN23 and polyplex, respectively) because the biocompatibility of delivery vehicle may become a critical issue for iPSCs generation.