

Monitoring of miRNA level in induced pluripotent stem cells using Fluorescent nano-switch

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MicroRNA (miRNA) is recently regarded as a biomarker, because it has been proved that miRNA plays a role as a regulator in various biological functions; metastasis, proliferation, differentiation and reprogramming of induced pluripotent stem cells (iPSCs). Hence, assessing miRNA expression is useful for identifying cell characters. Herein, we designed miRNA imaging probe (miP) targeting specific miRNA that has fluorescence signal only in presence of target miRNA. It can estimate miRNA level in alive cells. Efficient miP delivery to target cells was achieved by synthesized poly ethylene-glycol grafted poly ethylene-imine (PEI-PEG). miP polyplex (miPP) showed ~96 % of miP uptake efficiency in thirty minutes. Moreover, miP signal had a coherence with qRT-PCR analysis as undifferentiated and differentiated cells have contrary level of specific miRNA. Consequently, this system is able to evaluate specific miRNA level in short time. We expect this system provides a promising tool for monitoring miRNA expression in real-time at the single cell level during reprogramming or differentiation of iPSCs without affecting pluripotency of iPSCs.