

Enhanced Gene Delivery Efficiency with Magnetic Force in Human neural stem cells

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Over the last few years, Gene therapy has been studied and spotlighted for identifying the molecular signals such as stem cell fates and cancerous growths, but current delivery vehicles or mechanisms still have limitations to integrate clinical trials. Here, we report that magnetically guided a adeno-associated virus (AAV) delivery system for gene delivery to human neural stem cells (hNSCs). This system resulted in short delivery times of vectors on target cells induced by forced penetration of the vectors across the plasma membranes. To complex AAV vectors with the magnetically guided delivery, AAV was genetically modified to display hexa-histidine at the physically exposed loop, which combined with nickel ions chelated on NTA-biotin conjugated to streptavidin-coated superparamagnetic iron oxide nanoparticles (NiStNPs). NiStNP-6xHis AAV delivery with magnetic force led to significantly enhanced transgene expressions in hNSCs, just for 2~10minutes. Since it was demonstrated an effective and powerful tool to enhance gene delivery efficiency in human neural stem cells (hNSCs).