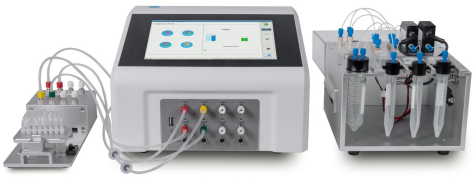
T Cell Transfection by mRNA Lipid Nanoparticles using PreciGenome NanoGenerator System

Since the first FDA approval of chimeric antigen receptor (CAR) T-cell therapy at 2017, T cells engineering is continuously the hottest research field in immunotherapy and cell therapy. Current CAR T cell engineering methods use viral transductions, which induce permanent CAR expression and have potential safety concerns. To overcome this concerns, researchers are highly interested in non-viral gene delivery methods.



Recently, CAR mRNA lipid nanoparticles (LNPs) in T-cell engineering have been widely studied. The transient transduction feature of mRNA LNP make it a safer profile than viral vectors. The size, homogeneousness and mRNA encapsulation efficiency are the key factors for an efficiency T-cell transfection. Using PreciGenome's NanoGenerator system, customer can produce mRNA LNPs with well controlled size, high homogeneousness and excellent encapsulation efficiency.

The following data shows the size and PDI of GFP mRNA lipid nanoparticles synthesized by NanoGenerator Flex system. The transfection efficiency to K562 and HepG2 cell lines and human primary T cells are presented as well.

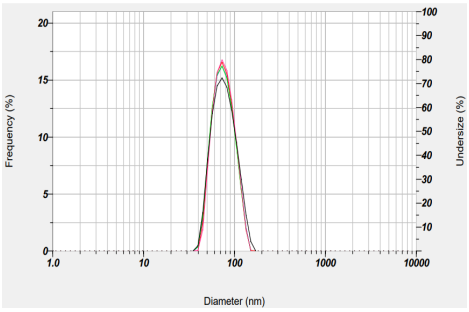


Figure 1. GFP-LNP Synthesized by PreciGenome's NanoGenerator Flex-S. Average sizes is 67.3 nm. PDI is 0.106.

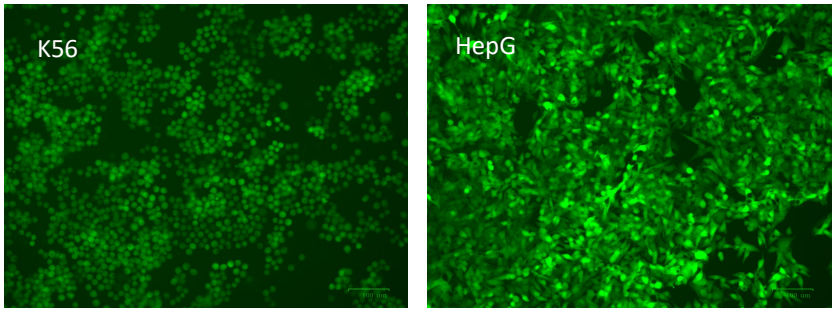
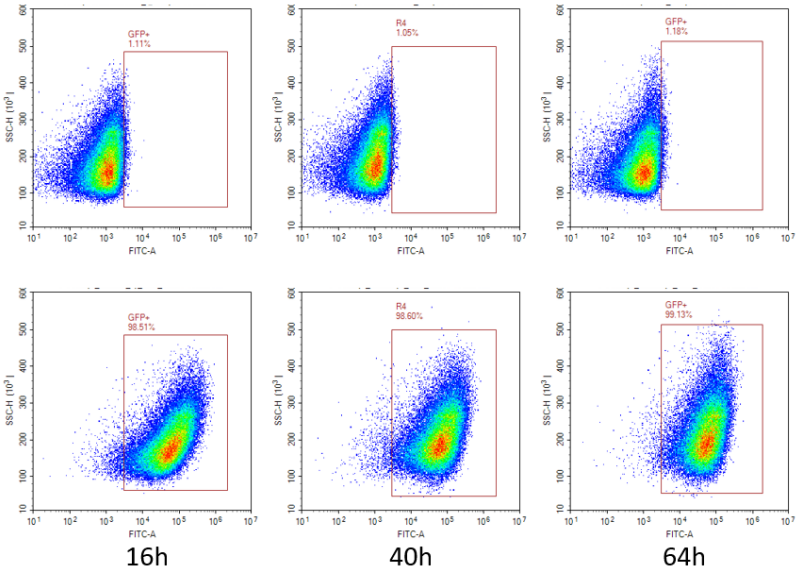


Figure 2. GFP expression in K562 (left) and HepG2 (right) cell lines after 48 hours treated by GFP-LNP synthesized by PreciGenome's NanoGenerator

Figure 3. GFP(+) positive population of control (non-treat) and eGFP LNP treated primary T cells at 16, 40 and 64 hours.
Cells were stained (1:50) using Biolgend 7-AAD Viability Staining for 10 minutes. Gating: First select for individual cells (excluding doublets). Then select for the healthy cell population. Then select for viable cells by excluding cells which are positive for 7-AAD. Gate for FitC-A channel (GFP)



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