CellPore™ Transfection System

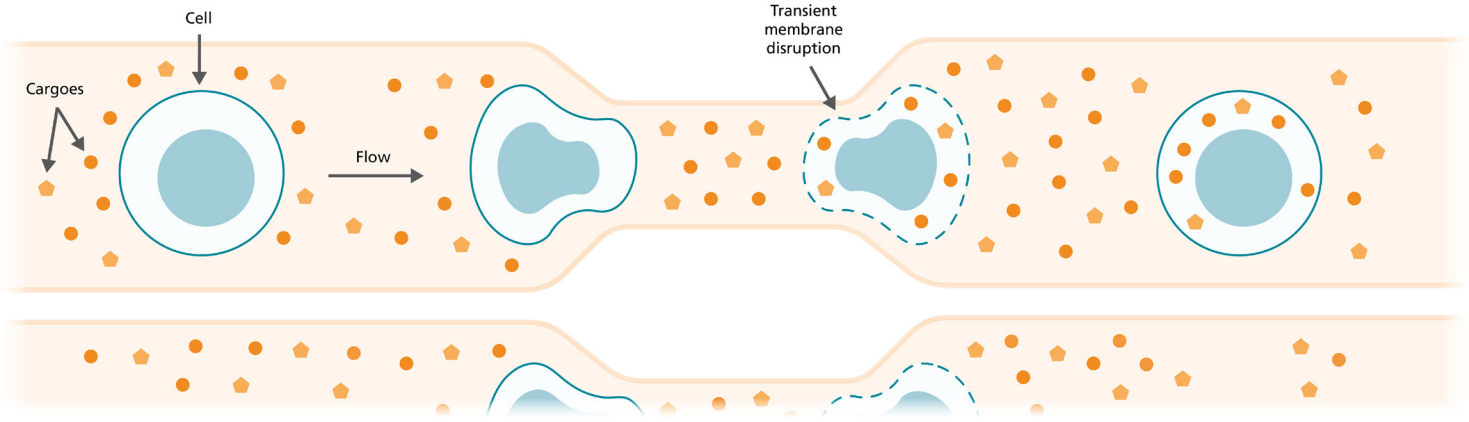
Gentle Intracellular Delivery for T Cell Engineering Applications

Open up new possibilities for T cell engineering by using direct cytosolic delivery with the CellPore™ Transfection System. Consisting of a benchtop instrument and a specialized reagent kit, which includes single-use delivery cartridges, CellPore™ uses gentle microfluidic technology to deliver mRNA and ribonucleoprotein (RNP) for gene editing into human unactivated T cells. The modified cells may then be used for further downstream analyses and applications.

How Does CellPore™ Work?

The CellPore™ Transfection System uses microfluidic technology to deliver target mRNAs and RNPs directly to the cytosol of human unactivated T cells. Using pressure, the cells are squeezed at high speeds through parallel microfluidic channels embedded in a single-use delivery cartridge (included in the CellPore™ Transfection Kit 300). This creates transient cell membrane pores that allow the target cargoes to enter the cytosol before the membrane reseals.

1. Cells and target cargoes are resuspended in delivery medium and added to the disposable cartridge.
2. Cartridge is loaded into the CellPore™ instrument and the cells are gently squeezed through parallel microfluidic channels at high speeds.
3. Transient disruptions to the cell membrane allow target cargoes to enter the cytosol.
4. The cell membrane reseals and cargoes remain inside the cell.



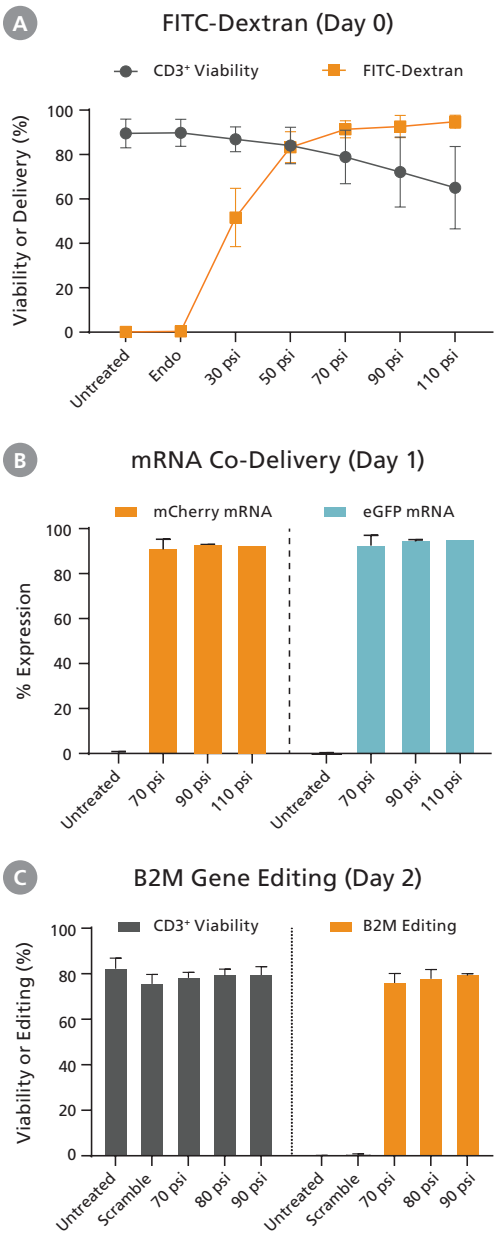


Figure 1. Identification of Optimal CellPore™ Delivery Parameters to Human Unactivated Pan T Cells

(A) CellPore™ FITC-Dextran or (B) mCherry and eGFP mRNA were delivered to 2 x 10^6 unactivated T cells via a pressure sweep, and optimal delivery/expression was measured at 70 - 90 psi. Cas9 RNPs targeting (C) the β-2-microglobulin (B2M) gene measured optimal gene editing efficiency at the 90 psi condition. All conditions were assessed by flow cytometry. Endocytosis (Endo) control represents natural uptake of CellPore™ FITC-Dextran in undelivered samples. Scramble control represents delivery of non-targeting gRNA Cas9 RNP complexes. Data are shown as mean ± SD (n = 2 - 5).

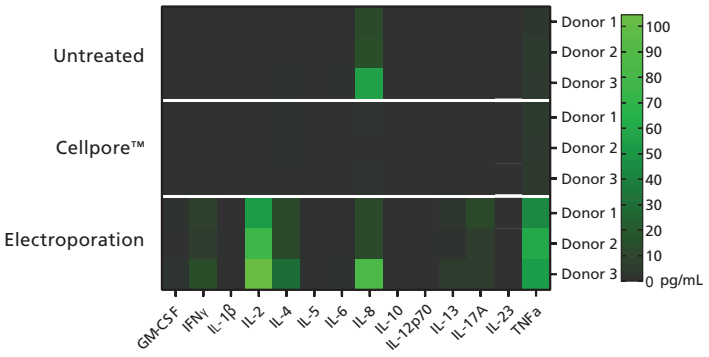


Figure 2. Unactivated Pan T Cells Manipulated by the CellPore™ Transfection System Retain Their Phenotype

Following 24 hours post-delivery of ribonucleoproteins targeting the B2M gene, increased levels of several pro-inflammatory cytokines were measured in the supernatant of electroporated T cell samples. In contrast, samples manipulated by the CellPore™ Transfection System retained baseline secretion levels. Untreated control refers to unmanipulated T cell samples. Data are shown as mean ± SD (n = 3).

Why Use CellPore™ for Cell Engineering?

- Engineer human unactivated T cells while avoiding unwanted electroporation-induced broad gene dysregulation and functional changes
- Deliver target mRNA and RNPs into human unactivated T cell cytosol while retaining the resting human T cell phenotype
- Easily adjust instrument parameters to find your optimal delivery conditions faster

Product Information

Additional data on CellPore™
www.stemcell.com/product-cellpore