The **LumiPore™**, a Non-Viral Transfection Platform

Moving Towards Bigger Cargo Delivery

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Introduction

- **Efficient delivery** of exogenous cargo material into cells is crucial in designing **clinical cell therapies,** as it directly determines the number of modified cells, and thus the treatment efficacy. In particular, delivery of larger cargo, such as **protein complexes or plasmid DNA**, remains a challenge for various cell types.

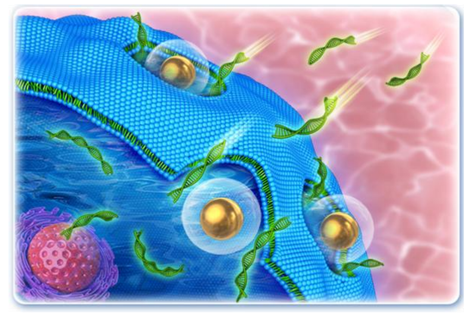
- An attractive solution is the Trince's LumiPore™ transfection platform, which combines laser exposure with photothermal nanoparticles to convert light energy into heat to **transiently permeabilize** the cellular plasma membrane.

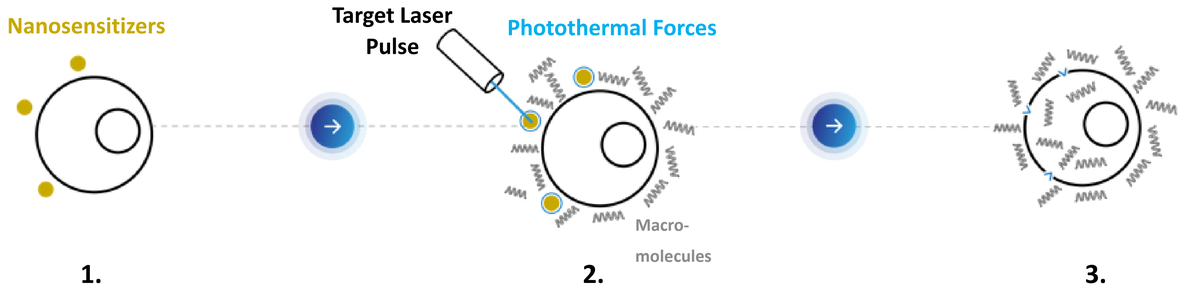
- The platform has a **high-throughput rate** and results in **high viability**, **proliferative capacity** and **functionality** of photoporated cells.

- This method already enabled the delivery of a **wide variety of effector molecules** into both adherent and suspension cells and our new research data on **larger cargo delivery** are **promising.**

Photoporation Method

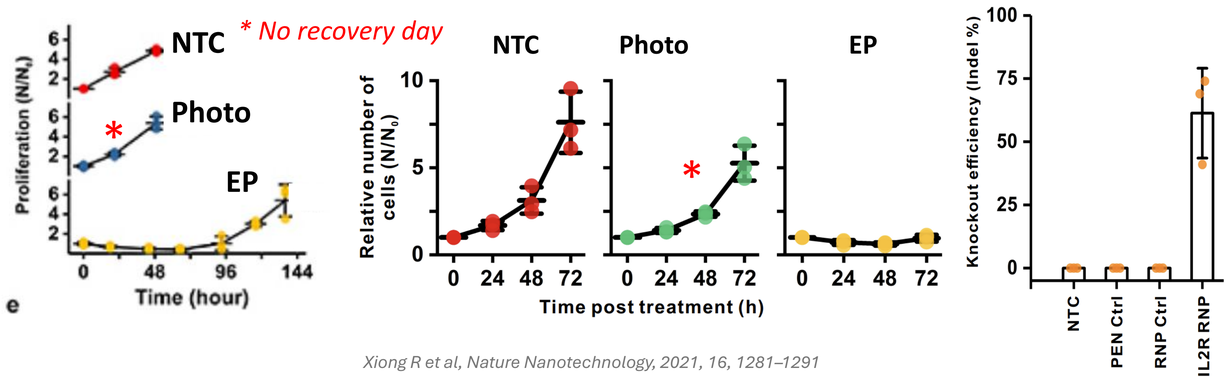
1. Nanosensitizers are added to cells.
2. Pulsed laser irradiation induces heating and vapor nanobubbles (VNBs) of the nanosensitizer.
3. Transient membrane pores are generated which allow passage of macromolecules into the cytosol.





Ramon et al. Current Opinion in Colloid & Interface Science (2021)

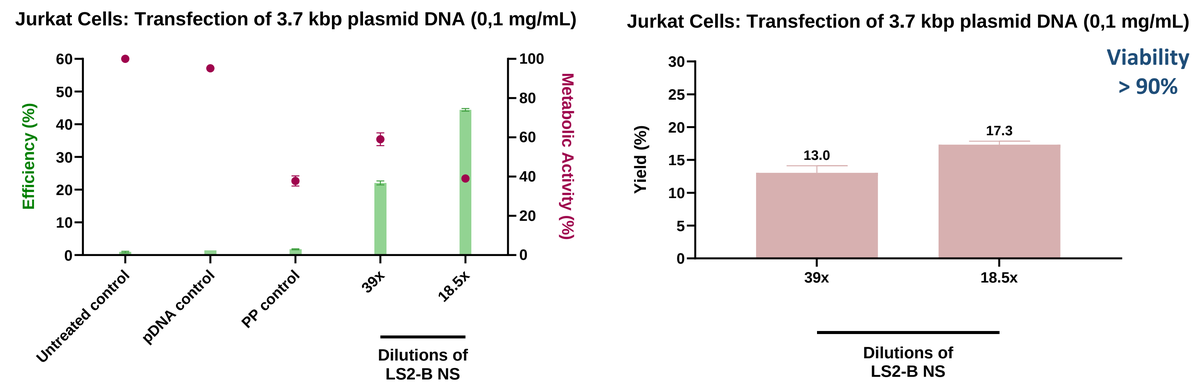
mRNA and CRISPR-Cas9 RNP Transfections in Primary Stem Cells



Xiong R et al, Nature Nanotechnology, 2021, 16, 1281–1291

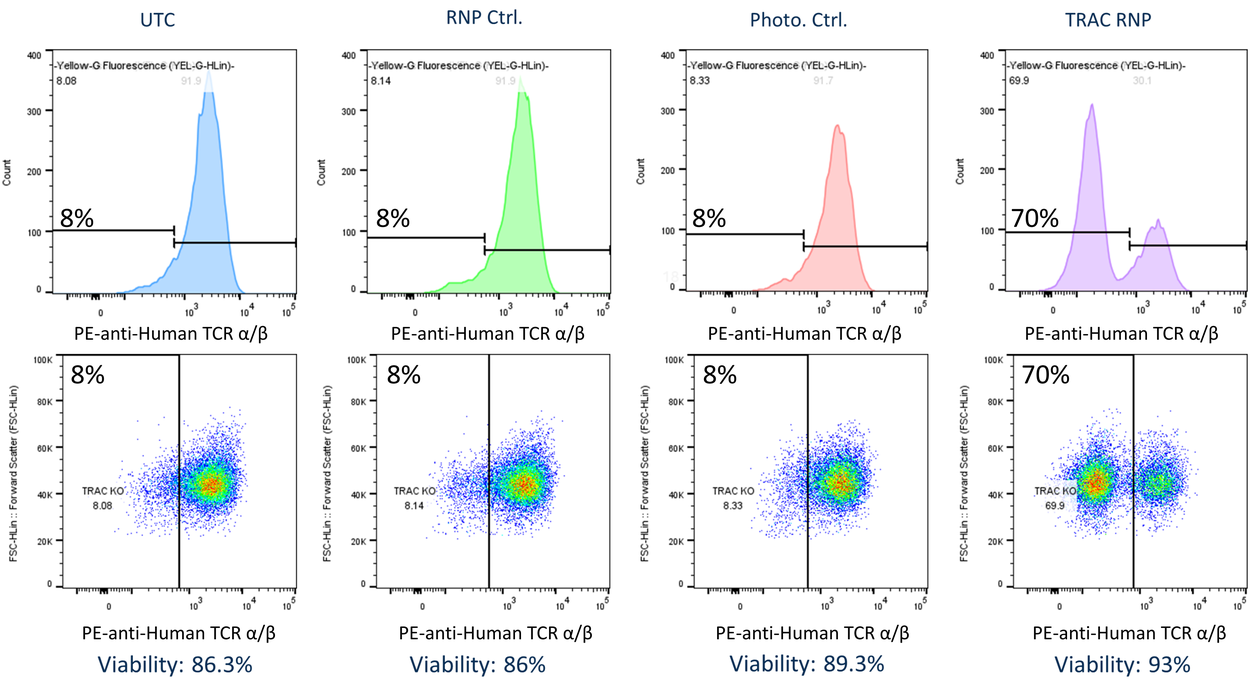
✓ **Photoporation can efficiently induce >60% IL2-R Knock Out in hESCs**

Plasmid DNA Transfection In Jurkat Cells



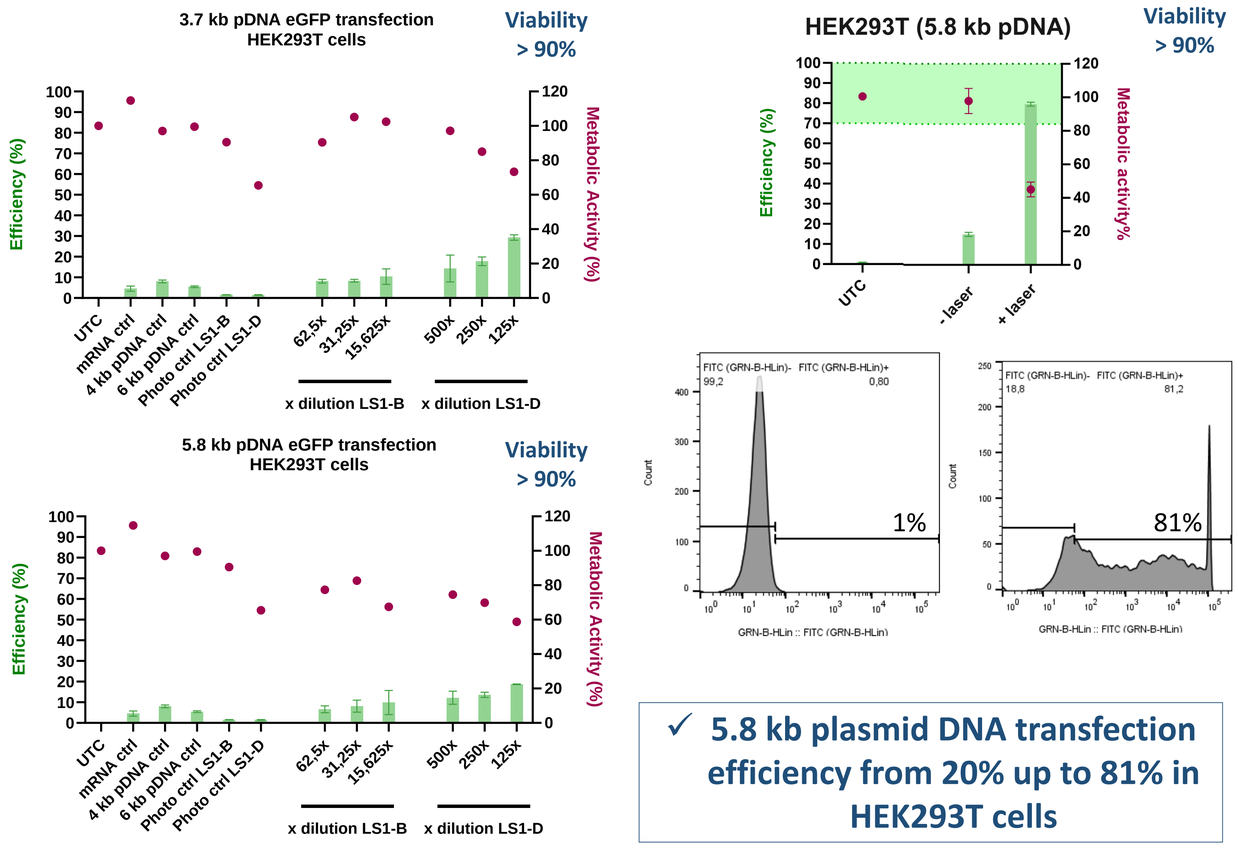
✓ **3.7 kb plasmid DNA transfection efficiency up to 45% in Jurkat Cells**

CRISPR-Cas9 RNP Transfection In Primary Human T Cells



✓ **Photoporation can efficiently induce up to 70% TCR KO in primary human T-cells**

Plasmid DNA Transfection In HEK293T Cells



✓ **5.8 kb plasmid DNA transfection efficiency from 20% up to 81% in HEK293T cells**

LumiPore™ photoporation device



- Benchtop transfection system.
- Delivery of a variety of cargoes.
- Excellent recovery of cells.
- Compatible with well-plates (6-384), flasks and slides.
- Full 96-well plate in < 10 min.
- Special selectivity photoporation.

Conclusion

- Photoporation can deliver both small and large cargoes.
- Photoporation is gentle to cells:
    1. cells have no delay in proliferation after photoporation.
    2. cells maintain a high viability.
- Suspension and adherent cells can be photoporated.
- Photoporation does not require any cell detachment.

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