EFFICIENT AND GENTLE NON-VIRAL ENGINEERING OF iPSCs BY PHOTOPORATION

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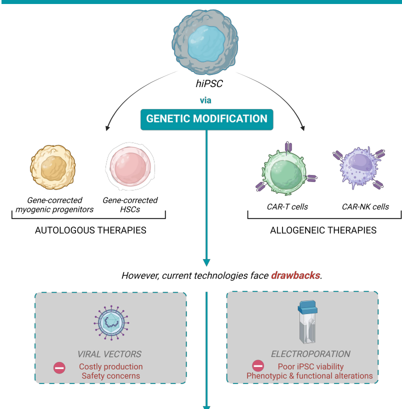
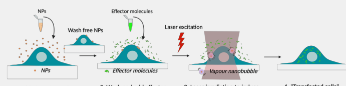
INTRODUCTION



PHOTOPORATION

WHAT Photoporation is a novel and innovative **intracellular delivery** technique.

HOW In its traditional form, photoporation uses a combination of **laserlight** and **photothermal nanoparticles** to generate pores in the cell membrane (1,2).



Alternatively, **Photothermal Electrospun Nanofiber (PEN) photoporation** (3, P799) can be used, which has the advantage of **avoiding direct contact of cells with nanoparticles**, reducing toxicity and regulatory concerns when engineered cells are to be used for cell therapeutic applications.

WHY Photoporation offers a **gentler** alternative, thus better preserving the quality of the final engineered cell product. This technology can be used **spatially-selective** and in **high throughput** (4).

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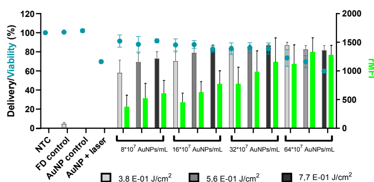
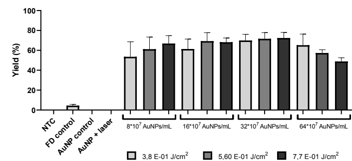
METHODS

- 60 nm cationic gold nanoparticles (PDDAC) were used as photothermal sensitizers.
- FITC-labelled dextran of 10kDa (FD10) was used a model cargo molecule (2 mg/mL).
- Delivery efficiency and relative mean fluorescence intensity were quantified using flow cytometry.
- Viability was measured by means of the metabolic activity assay CellTiter-Glo.

RESULTS



Graph 1. *Intracellular delivery of FD10 in iPSCs for increasing concentrations AuNPs. Delivery efficiency (left y-axis, grey bars) and relative mean fluorescence intensity (right y-axis, green). The corresponding metabolic activity (left y-axis, blue dots) was determined with the CellTiter-Glo assay.*



Graph 2. *Delivery yield of FD10 in iPSCs, defined as the fraction of cells that are both viable and FD10 positive.*

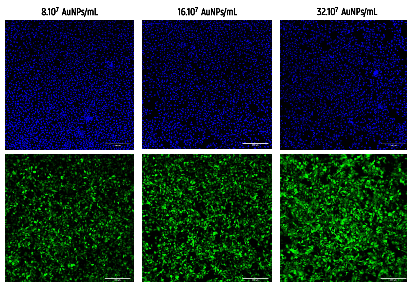


Figure 1. *Confocal microscopy mages of iPSCs after AuNP-photoporation with FD10 (green channel, bottom row). Nuclei were stained with Hoechst 33342 (blue channel, top row). Increasing concentrations of AuNPs (from left to right) were used. Scale bar: 250 µm.*

CONCLUSION and FUTURE PERSPECTIVES

AuNP-Photoporation can reach **high delivery percentages while maintaining high viability in iPSCs.** Other cargo molecules and photosensitizers will be tested to further discover this promising technology for the transfection of iPSCs.

This research is part of the NOVI STEM project (P496)

European Innovation Council
Funded by the European Union

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Other posters on photoporation: P515 (C. Hinnekens), P799 (C. De Clercq), P760 (A. Harizaj)