

Rheoporation: A Simple, Reliable Technique for Transfection and Macromolecular Loading of Cells in Suspension

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Cultured Chinese hamster ovary (CHO) cells suspended in their growth medium were forced by gas pressure through the uniformly sized micropores of filter membranes. This procedure caused transient damage to the plasma membrane, which increased the permeability of the cells to exogenous molecules. This "rheoporation" was indicated by uptake of fluorescent dextran molecules up to 500, 000 MW in cells deemed viable by Trypan blue dyes exclusion. The macromolecular uptake was increase if the driving pressure was increased at constant micropore size, or if the micropore size was decreased at constant driving pressure. Larger membrane perturbations permitted uptake of a luciferase reporter plasmid, which resulted in transfection of the CHO cells with the surviving cells expressing luciferase activity after two days in culture. This simple and general new method of porating cells in suspension may be optimized to incorporate the desired macromolecules while retaining the maximum viability.

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