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High throughput transfection of cells: nano-electroporation and mobile magnetic traps M. HOWDYSHELL, D. GALLEGO-PEREZ, G. VIEIRA, V. MALKOC, L.J. LEE, R. SOORYAKUMAR, The Ohio State University — Injection of drugs or genes in vitro into cells is a critical technique for biomedical research; there are currently a number of techniques to perform such injections, but drawbacks include lack of control over dosage rates and sustained cell viability, as well as inability to inject into many cells in parallel. We have previously demonstrated a magnetically actuated nano-channel electroporation technique that multiplexes simultaneous transfection of biomolecules into cells by combining an array of remotely operated micro-magnetic traps with a nano-channel electroporation device. This device allows us to control the dosage delivered to each individual cell and reduce cell death during the experiment. The magnetic traps enable precise positioning of magnetically labeled cells and subsequent relocation of the cells for downstream processing. With this integrated approach, the number of cells transfected simultaneously has been increased nearly tenfold. In the current work, we present recent experiments with different types of cells as well as new multiplexed nano-electroporation device designs that are more high-throughput to streamline the parallel injection process, allowing the device to be implemented for a wider variety of applications.

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