

Abstract

Extracellular vesicles (EVs) have emerged as promising nanocarriers for the delivery of nucleic acids, offering a biocompatible and efficient platform for DNA transfer into target cells. This proposal explores the exploitation of EVs for DNA delivery to engineer cells for applications in synthetic biology and immunotherapy. By harnessing the natural targeting capabilities and low immunogenicity of EVs, we aim to develop a robust system for precise genetic modulation. To accelerate discovery and optimization, we propose integrating high-throughput screening approaches with quantitative biology and proteomics analyses. This combined strategy will enable systematic evaluation of EV-mediated delivery efficiency, cellular responses, and proteomic alterations, paving the way for scalable and tunable cell engineering platforms in therapeutic and synthetic biology contexts.