Vesicular Delivery of Interleukin-11 gene for osteoporosis treatment

Elizabeth Bentley, Corinne Farley, Matt Mulvaney, Maria Pozo, Eric Wang

Osteoporosis is a disease characterized by a reduction in bone density, resulting from an imbalance in the rates of bone deposition and bone resorption. Current treatments for osteoporosis include various medications, such as hormone-related therapy, that often put the individual at risk for blood clots, heart disease and several cancers. To address these challenges, gene therapy utilizing extracellular vesicles (EVs) could be used to promote osteoblastogenesis. Due to their self-origin, flexibility, and ability for surface conjugation, EVs mitigate immunogenicity and systemic clearance of other drug delivery systems. Here, we “transfect” EVs with plasmid DNA and carry genetic content to target cells, facilitating gene expression. Specifically, we delivered a model fluorescence plasmid to human embryonic kidney cells and saw observable expression of GFP. Our results indicate the feasibility of patient-derived EVs as personalized plasmid delivery systems.