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Drug delivery with nano plasma membrane vesicles

Due to a novel, scalable and cost-effective production method, nano plasma membrane vesicles become an attractive alternative to exosomes and other extra cellular vehicles as a versatile drug delivery tool.

Keywords Nano plasma membrane vesicles, drug delivery, exosome replacement

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Background Exosomes are cell derived vesicles with a defined molecular fingerprint inherited from their progenitor cell. They can fuse with cells distant from their origin and induce phenotypic changes in the target cells by releasing their content into these cells. For drug delivery purposes, they can be loaded with nucleic acids, proteins or small molecular weight drugs. Despite a great interest in this approach, progress slowed down due to challenges with scaled up production. Production requires a large amount of donor cells and the isolation, purification and sub-fractioning of exosomes can be complicated, and difficult to standardize.

Invention This invention uses giant plasma membrane vesicles as a starting material that can easily be produced by chemical induced membrane blebbing. Using a novel production process, they are processed to nano plasma membrane vesicles (nPMVs). Like exosomes, nPMVs inherit a distinct lipidomic and proteomic profile form their donor cells. Their physico-chemical characteristics, cellular uptake, intracellular processing, and *in vivo* circulation and tissue distribution in a zebrafish model are similar to the ones of exosomes. Since nPMVs, however, can be produced at high yields in a scalable production process with a production rate that is at least 10 times higher than that of exosomes, nPMVs provide an attractive alternative as a drug delivery tool for exosomes and other extracellular vehicles.

Fields of Use Non-viral gene delivery, antigen delivery, targeted drug delivery

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