

Nanometer Trojan horses

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Abstract

One of the most challenging aspects of drug delivery is the intra-cellular delivery of active agents. Several drugs and especially nucleic acids all need to be delivered within the cell interior to exert their therapeutic action. Small hydrophobic molecules can permeate cell membranes with relative ease, but hydrophilic molecules and especially large macromolecules such as proteins and nucleic acids require a vector to assist their transport across the cell membrane. This must be designed so as to ensure intracellular delivery without compromising cell viability. We have recently achieved this by using pH-sensitive diblock copolymers that self-assemble to form vesicles in aqueous solution. These nanoscopic polymer vesicles (a.k.a. polymersomes) have the ability to delivery large quantity of their cargo within the cytosol without affecting the cell metabolic activity.

We show the effective cytosolic delivery of nucleic acids, proteins, hydrophobic molecules, amphiphilic molecules, and hydrophilic molecules without affecting the viability of cells or even triggering inflammatory pathways.

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