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Formulation and investigation of cyclodextrin polymer-based siRNA delivery systems

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Cyclodextrin polymers are widely used excipients mainly in the pharmaceutical industry for increasing the water solubility of lipophilic drugs, as well as monomeric cyclodextrin molecules.

Cyclodextrin-based systems are also used as siRNA delivery agents [1], so we aimed to investigate the siRNA carrying capacity of two cyclodextrin polymers, quaternary amino beta-cyclodextrin polymer (QABCDP) and amino beta-cyclodextrin polymer (NHBCDP) and the polyethyleneimine (PEI).

The different polymer solutions effects on Caco-2 cell proliferation were measured by RTCA method. The properties of the formulated polyplexes were investigated by dynamic light scattering technology (DLS) and zeta potential measurements. The cellular uptake of the polyplexes was investigated by confocal microscopy and flow cytometry.

Based on our RTCA studies, it can be stated that 50 and 100 nM polymer solutions did not affect cell proliferation. The complexation was successful, as the size and zeta-potential of both siRNA and polymer changed after complexation. Confocal microscopy and flow cytometry experiments revealed, that QABCDP polyplexes are taken up by cells and localized in the cytoplasm. Complexes formed with PEI were found along the cell membrane, even polyplexes formulated with NHBCD polymer were not taken up.

References:

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