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Responsive nanoparticles for efficient gene delivery in immuno-oncology

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ABSTRACT (2882/**3000** characters)

AIM: Here, we present a targeting strategy to overcome actual clinical therapeutic problems associated with viral safety, developing a capsid-like nanoparticle, which combines into one system the sensitivity of poly-cations used to complex the acid nucleic molecules, with surface degradation of the outer layers of the nanoparticles.

METHODS: Our nanosystems are composed by an outer shell of FDA approved polymers with a soft and stiff domain and by an inner core of acid nucleic molecules complexed with different responsive polycation polymers in order to guarantee high loading, stability, and controlled plasmid release over time.

RESULTS & DISCUSSIONS: Our nanoparticles are hemocompatible, not cytotoxic and have the ability to protect the gene cargo from DNase and serum protease action. Further, our nanoparticles show a controlled and sustained transfection of different human cells, as human T lymphocyte cells, human neuroblastoma cells and human cervix carcinoma cells, respect to transfection with commercial Lipofectamine 3000. In addition, our nanoparticles showed the ability to penetrate into 3D spheroids allowing transfection of inner cells.

CONCLUSIONS: Our capsid-like NPs thanks their properties, as biocompatibility, biodegradability, hemocompatibility, sustained plasmid release can be used as efficient tool of transfection overcome viral vector problems.