

## Accepted Manuscript

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PII: S0928-0987(17)30159-8  
DOI: doi: [10.1016/j.ejps.2017.03.025](https://doi.org/10.1016/j.ejps.2017.03.025)  
Reference: PHASCI 3965

To appear in: *European Journal of Pharmaceutical Sciences*

Received date: 20 December 2016  
Revised date: 17 March 2017  
Accepted date: 17 March 2017

Please cite this article as: Elina Vuorimaa-Laukkanen, Ekaterina S. Lisitsyna, Tiia-Maaria Ketola, Emmanuelle Morin-Pickardat, Huamin Liang, Martina Hanzlíková, Marjo Yliperttula, Difference in the core-shell dynamics of polyethyleneimine and poly(l-lysine) DNA polyplexes. The address for the corresponding author was captured as affiliation for all authors. Please check if appropriate. Phasci(2017), doi: [10.1016/j.ejps.2017.03.025](https://doi.org/10.1016/j.ejps.2017.03.025)

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## Difference in the core-shell dynamics of polyethyleneimine and poly(L-lysine) DNA polyplexes.

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### ABSTRACT

Electrostatic polymer-DNA complexes (polyplexes) have been widely investigated for DNA delivery, and remarkable differences in transfection efficacy have been seen among the materials. For example, polyethyleneimine (PEI) mediates DNA transfection more effectively than poly(L-lysine) (PLL). Biophysical properties of the polyplexes may explain their different properties in gene delivery. We investigated the structural dynamics in DNA polyplexes, especially the material exchange between the core and shell regions of the PEI and PLL polyplexes. Steady-state fluorescence spectroscopy and double labeling based fluorescence resonance energy transfer (FRET) techniques were used to study the DNA polyplexes. According to our results there is a clear difference between these two polymers: core exchange takes place in PEI but not in PLL polyplexes. Such differences in structural dynamics of polyplexes explain, at least partly, the differences in DNA release and transfection efficacy at cellular level.

**Key words:** Polyplex; DNA complexation; fluorescence spectroscopy; non-viral gene delivery; polyethylene imine; poly-L-lysine

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