Role of Adsorbed Serum Protein Corona on Lipid Nanoparticle Interactions with Cells and Transfection of Small Interfering RNA

Dongyu Chen¹, Jared Auclair², Utsav Saxena³, Shanthi Ganesh³, Weimin Wang⁴, and Mansoor Amiji⁵,*

¹Department of Pharmaceutical Sciences, School of Pharmacy, Northeastern University, Boston, MA 02115; ²Biopharmaceutical Analysis Training Lab, Northeastern University Burlington Campus, MA and ³Dicerna Pharmaceuticals, Inc., Cambridge, MA 02140. Correspondence: (m.amiji@northeastern.edu)

ABSTRACT
Purpose: Surface modification of systemically-administered nanoparticles by plasma proteins is a major factor in site-specific delivery and cellular interactions. The main goal of this project was to evaluate how the protein corona affects lipid nanoparticle (LNP) cell interactions and subsequent transfection of small interfering RNA (siRNA).

RESULTS
Design and Synthesis of siRNA Encapsulated LNPs

Quantification of Gene Silencing by qPCR Assay (Continued)

Protein Adsorption on LNPs, Separation and SDS-PAGE Analysis

Protein Identification by LC-MS/MS (Continued)

CONCLUSIONS
Slight differences in LNP design unexpectedly resulted in differential transfection efficiency and gene knockdown in the HepG2 cell model. The addition of FBS facilitated transfection and gene silencing for F3 and F4; slightly hampered transfection of F2, while showed no effect on F1.

Evaluation of protein binding revealed differences in binding patterns and relative protein intensity among the four formulations. Further experiments are needed to confirm the individual protein’s effect on cellular interaction and in vivo biodistribution.

IMPAKTS
This research explored nanoparticles’ "biological identity" and its effects on cellular uptake, aiming to find correlations between nanoparticle surface chemistry and protein corona, so as to guide future delivery vehicle design for endogenous targeting to tumor and beyond.

REFERENCES

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