Studies of structure-activity relationships of nanoparticles as novel gene delivery agents.

Karlis Pajuste[1], Aleksandra Vezane[2], Brigita Cekavicus[1], Martins Rucins[1], Oksana Petrichenko[1], Irena Timofejeva[2], Mara Plotniece[1], Klavs Pajuste[1], Arkadij Sobolev[1], Marina Gosteva[1], Tatjana Kozlovska[2], Aiva Plotniece[1]

[1]Latvian Institute of Organic Synthesis, Latvia

[2]Latvian Biomedical Research and Study centre, Latvia

e-mail: kpajuste@osi.lv

Previously we have developed cationic 1,4-dihydropyridine (1,4-DHP) amphiphiles, which have been found capable to condense and efficiently deliver plasmid DNA (pDNA) into different cell lines *in vitro*.[1,2] The parent compound from this class is 1,4-DHP **1** (Fig. 1(B)) which forms liposomes and efficiently acts as gene delivery agent. Recently we have described our findings about the influence of alkyl chains lengths and the effect of lipids head-group on transfection activity[2]; and properties of liposomes[3].

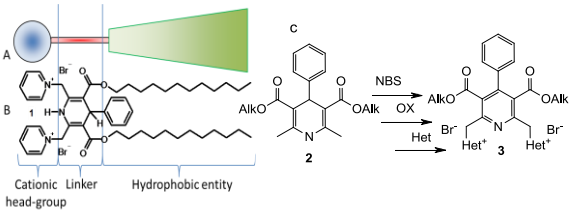

Fig.1 General structure of lipid (A); structure of DHP **1** (B); synthesis of target products structures **3** (C).

The aim of the work is to study the relationships of biological activity and physical-chemical properties of the corresponding oxidized derivatives as its metabolites.

Synthesis of oxidised amphiphiles: from 1,4-DHP derivative according to scheme Fig. 1(C). Delivery activity: as ability of the reagent to bind DNA; DNA/amphiphile complexes transfection in the BHK-21 cells cultures. Preparation and studies of liposomes by DLS.[2]

Group of new fully aromatized amphiphiles with variations in the lipid head-groups were synthesised. According to DLS measurements all new amphiphiles possess self-assembling properties and some of them have significant gene delivery activity.

Acknowledgements: Project InnovaBalt and project ERDF-60

References

[1] Hyvönen Z.; et al. *BBA*, 2000, *1509*, 451; [2] Pajuste K.; et al. *New J.Chem*., 2013, *37*, 3062; [3] Rucins M.; et al. *Adv.Mater. Research*, 2013, *787*, 157; [4] Pajuste K.; et al. *Centr.Eur.J.Chem*. 2011, *9*, 143;