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Preparation and *in vitro* transfection of modified cationic liposome-linear polyethyleneimine-DNA nanocomplexes for gene delivery

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Liposome-linear polyethyleneimine (PEI)-DNA nanocomplexes have been developed as an effective nonviral vector for gene delivery. We aimed to improve transfection efficiency of these nanocomplexese in this study by modification of liposome.
For this reason, the lipopolymer composed of hexylacrylate and PEI was synthesized. Liposomes containing lipopolymer and DOTAP were prepared and extruded through 100 nm polycarbonate filters. The linear PEI with molecular weights of 2.5, 25 and 250 KDa has been used to prepare nanocomplexes of modified liposome-PEI-DNA. Three C/P ratio of each modified liposome-PEI-DNA complexes were premixed. Size, zeta potential and the DNA condensation ability of nanocomplexes were characterized. Also, transfection efficiency and cytotoxicity of prepared vectors are evaluated on Neuro2A cell line.
Mean particle size of all nanocomplexes were below 220 nm with positive surface charge. Vectors containing modified liposome-PEI 25KDa-DNA showed the best transfection activity. This efficiency was improved by increasing of C/P ratio. In addition, all prepared nanocomplexes didn't show significant cytotoxicity. In conclusion, lipopolyplexes prepared in this study with low, medium, high molecular weight PEI showed the high ability to enhance transfection efficiency.

Keywords: Liposomes; Lipopolyplexes; Polyethyleneimine; Transfection efficiency