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Synthesis and *in vitro* evaluation of carbamate-linked cationic lipids

Defu Zhi, Yinan Zhao and Shubiao Zhang
Dalian Minzu University, China

Cationic lipids are very promising for gene delivery, as they have the advantages of being easy to prepare, no immunogenicity and low toxicity. Since the first cationic lipid-DOTMA (N- [1-(2, 3-dioleoyloxy) propyl]-N, N, N-trimethylammonium chloride) was used for gene delivery, numerous cationic lipids with different structures have been synthesized and used for the delivery of nucleic acids into cells. Cationic lipids have three basic chemical functional domains: A hydrophilic headgroup, a hydrophobic domain and a linker bond. The linker bond of cationic lipid was between the polar head group and the hydrophobic tail domain, whose nature could influence the stability and the biodegradability of liposomes. Cationic lipids containing carbamate linker have shown great interests as they are stable in the neutral pH condition but liable to acid-catalyzed hydrolysis under appropriate circumstances. We designed and synthesized a series of carbamate-linked lipids bearing quaternary ammonium headgroup and identical length of hydrocarbon chains for *in vitro* gene delivery. The chemical structure of carbamate-linked lipids was confirmed by IR, ^{1}H NMR, ^{13}C NMR and ESI-MS. The liposomes formed from carbamate-linked lipids and helper lipids (Chol or DOPE) could effectively bind and condense plasmid DNA into complex with proper size and zeta-potentials. And the transfection efficiency and cell viability of some of carbamate-linked lipids was superior or parallel to that of two commercial transfection agents, Lipofectamine 2000 and DOTAP. Therefore, the carbamate-linked cationic lipid might be a promising gene carrier that has high transfection efficiency as well as low cytotoxicity and could be considered as carrier for gene delivery *in vivo*.

zhidefu@dlnu.edu.cn

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