TITLE: **Monoolein as helper lipid for non-viral transfection in mammals**

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ABSTRACT SUMMARY:

Lipoplexes composed of pDNA and DODAB/MO at different molar ratios (4:1, 2:1 and 1:1) and different cationic lipid/DNA charge ratios were investigated. The physicochemical properties of the lipoplexes (size and charge), the pDNA complexation, and the effect of heparin on pDNA release, were studied by Dynamic Light Scattering, Zeta Potential, and Ethidium Bromide exclusion assays. The cytotoxicity, transfection efficiency and the intracellular localization of DNA were evaluated on 293T cells.

INTRODUCTION:

Cationic liposomes/DNA (lipoplexes) have been widely used as non-viral vectors for transfection, the role of the neutral lipid in liposome formulation being determinant for the efficiency of this process [1]. It was stated that the inclusion of helper lipids in the liposomal formulation facilitated the fusion of the complexes with the cell membrane, due to its propensity to form nonlamellar structures with negative curvature that are akin to membrane fusion intermediates [2, 3]. In this work, we have studied the potential of monoolein (MO) as helper lipid for cellular transfection.

EXPERIMENTAL METHODS:

Dynamic Light Scattering, Zeta Potential, and Ethidium Bromide exclusion assays for physicochemical characterization. LDH for cytotoxicity measurement, β-gal expression assay for transfection efficiency determination, and Fluorescein/Hoechst Epi-Fluorescence Microscopy for Cell Imaging.

RESULT AND DISCUSSION:

It was found that the presence of MO not only increases the efficiency of pDNA compactation, but also affects the physicochemical properties of lipoplexes, which could possibly interfere with lipoplex-cell interactions. The DODAB:MO (2:1) and (4:1) formulations were capable of efficiently mediate in vitro cell transfection. These results were consistent with fluorescence microscopy studies, which illustrated that lipoplexes were able to entry into the cytosol and deliver pDNA to the nucleus.
The understanding the structure–activity relationship of MO based lipoplexes will be of primordial importance for the improvement of safe and efficient gene delivery systems.

CONCLUSION:

Monoolein-based lipoplexes have shown to be efficient non-viral vectors for *in vitro* mammalian cell transfection. The complexation efficiency of DNA does not seem to be directly related with DNA release or transfection efficiency, but all are dependant on MO content.

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