DNA nanocarriers for systemic administration: characterization and in vivo bioimaging in healthy mice.

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We hereby present different DNA nanocarriers consisting of new multimodular systems (MMS), containing the cationic lipid dioleylaminesuccinylparomomycin (DNA MMS DOSP), or bis (guanidinium)-tren-cholesterol (DNA MMS BGTC), and DNA lipid nanocapsules (DNA LNCs). Active targeting of the asialoglycoprotein receptor (ASGP-R) using galactose as a ligand for DNA MMS (GAL DNA MMS) and passive targeting using a polyethylene glycol coating for DNA LNCs (PEG DNA LNCs) should improve the properties of these DNA nanocarriers. All systems were characterized via physicochemical methods and the DNA payload of DNA LNCs was quantified for the first time. Afterwards, their biodistribution in healthy mice was analyzed after encapsulation of a fluorescent dye via in vivo biofluorescence imaging (BFI), revealing various distribution profiles depending on the cationic lipid used and their surface characteristics. Furthermore, the two vectors with the best prolonged circulation profile were administered twice in healthy mice revealing that the new DNA MMS DOSP vectors showed no toxicity and the same distribution profile for both injections, contrary to PEG DNA LNCs which showed a rapid clearance after the second injection, certainly due to the accelerated blood clearance phenomenon. Molecular Therapy - Nucleic Acids (2013) 2, e64; doi:10.1038/mtna.2012.56; published online 8 January 2013.
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