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Multimodal magnetic lipid nanocarriers for cancer therapies

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The advances made on the field of nanotechnology have brought a variety of new possibilities into drug discovery and medical therapy [1]. In this context, nano-scaled carriers have revolutionized drug delivery systems, allowing for therapeutic agents to be selectively targeted to a specific tissue, thus decreasing exposure of healthy tissue to drugs. Nanostructured lipid carriers (NLCs) are the second generation of lipid nanoparticles, which have been drawing much attention of researchers due to their safe and biocompatible features [2]. Additionally, their low cost can boost their translation from the bench to the bedside. Particularly, NLCs have several advantages when compared with other lipid drug delivery systems (for example liposomes or niosomes), such as, great kinetic stability, stable morphology and high load capacity. In this work, we developed, physico-chemically characterized and tested in vitro, two distinct NLCs formulations, for the targeted delivery of an anticancer drug –Doxorubicin (DOX). The overall results are very promising, however the combination with magnetic nanoparticles (SPIONs), nanowires and nanodiscs, developed in a parallel study, may further improve the therapeutic index of the formulations. The strategy of developing core-shell structures with a predefined set of hierarchical functionalities allows magnetic nanoparticles, nanowires and nanodiscs to be used in multipurpose applications that can simultaneously provide magnetic resonance images, enhanced drug delivery and hyperthermia by magnetic excitation. Hence, these hybrid nanoparticles should lead to negligible systemic and reduced side effects of DOX.

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