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Monoolein-based nano carriers for medical applications

Over the past 30 years, liposomes have been used as key components in several therapeutic strategies, due to the structure, biocompatibility, biodegradability and low toxicity of these self-assembled nanostructures. The physicochemical characteristics of liposomes have been found to be suitable for the encapsulation and therapeutic delivery of several water soluble molecules, including nucleic acids and proteins. Recently, our group has developed a liposomal formulation based on the helper lipid monoolein (MO) and cationic lipids from the dioctadecyldimethylammonium family (DODAX) that has shown great potential as a drug nanocarrier. In this work, we show that liposomal formulation, composed by DODAB:MO (1:2), can be a suitable nanocarrier for different molecules. DODAB:MO was developed as hybrid vector used for: (i) plasmid DNA (pDNA) and small interfering RNA (siRNA) delivery (ii) drug delivery and also as (iii) an adjuvant to present vaccine antigens to the immune system. The physicochemical properties of the nanocarriers were evaluated by dynamic light scattering (DLS), Differential Scanning Calorimetry (DSC) and Förster Resonance Energy Transfer (FRET). *In vitro* and *in vivo* assays were performed to assess the cytotoxicity, internalization, transfection efficiency or immunostimulation of the different nanoparticles produced. Our results demonstrate that DODAB:MO (1:2) can efficiently deliver different molecules (pDNA, siRNA, drugs and *Candida albicans* cell wall surface proteins (CWSP), without inducing significant cytotoxic effects, which makes this a very versatile nanocarrier system with a great therapeutic potential.

Biography

Maria Elisabete C D Real Oliveira is an Associated Professor with Habilitation at Physics Department of UMinho. She has completed her BSc in Physics, UCoimbra, Portugal, 1975, and her PhD at the University of Salford, UK/University of Minho in 1986. She was Head of the Master's Degree in Biophysics and Bionanosystems, UM (2009-2014), Head of the Research Group Atomic Molecular and Optics Physics, Centre of Physics, UM (2013-present) and President of the Group of Colloids and Polymer (Portuguese Chemical Society), since 2013. She is author of more than 54 full publications (ISI) in reputed journals (h index-16) and author of 2 patents. She was also Founder of the Spin-off Nanodelivery-I&D in Bionanotechnology, LDA

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