

3<sup>rd</sup> International Conference on

# Medical Physics & Biomedical Engineering

November 07-08, 2016 Barcelona, Spain

## The nanotherapy revolution: Three different applications of lipid nanosystems in therapeutics

Maria Elisabete C D Real Oliveira, E Fernandes, J Silva, T Soares and M Lucio  
University of Minho, Portugal

Nanotechnology promises to be a wave turner in various medical and pharmaceutical fields such as drug delivery, diagnostics and in the pharmacokinetic profiling of drugs. In order to obtain an efficient therapeutic effect, lipid nanosystems have demonstrated to be promising drug delivery systems since their lipophilic and hydrophilic components allow carrying a great diversity of compounds while protecting it from an early release or elimination. Furthermore, their great storage capacity and high reproducibility associated with tunable nature favours their transport greatly improving their efficacy. On the other hand, lipid nanosystems are also invaluable mimetic models of biomembranes used in biophysical studies to predict drugs' therapeutic performance. In the drug delivery field, our research group focus on two distinct medical applications. Curcumin, a natural compound, is known to interact with multiple molecular targets involved in the neurodegeneration cascade. Therefore, in order to improve curcumin's bioavailability, we developed neuroprotective liposomes specialized in brain delivery. Aiming for the prevention and treatment of herpetic infections, we also developed nanostructured lipid carriers (NLC) containing a co-encapsulated antiviral drug (acyclovir) and cell regeneration activators (omega-3 fatty acids). The NLC formulation is expected to improve the pharmacokinetic properties of acyclovir. In a different application, the lipid nanosystems developed by our research group are also used as membrane model systems, capable of mimicking diverse physiologic environments. These models have been used to predict aspects of the absorption and distribution of drugs allowing the optimization or redesign of the new formulations to achieve increased efficacy and reduced side effects.

### Biography

Maria Elisabete C D Real Oliveira is an Associate Professor in Habilitation in Physics Department of UMinho, completed her BSc in Physics and PhD at University of Salford, UK/University of Minho, in 1986. She was Head of the Master Degree in Biophysics and Bionanosystems, Head of the Research Group Atomic Molecular and Optics Physics (FAMO), Centre of Physics, UM and President of the Group of Colloids and Polymer (Portuguese Chemical Society). She is an author of more than 54 full publications (ISI) in repute journals (h index-16) and author of two patents. She was also Founder of the Spin-off NanoDelivery-I&D in Bionanotechnology, LDA.

beta@fisica.uminho.pt

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