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FCT FACULDADE DE CIÊNCIAS E TECNOLOGIA UNIVERSIDADE NOVA DE LISBOA

Chemistry Department

Design of Magnetic Nanoparticles for Targeted Cancer Diagnostics and Therapy

Susana Palma and A. Cecília Roque

REQUIMTE, Biomolecular Engineering Laboratory

http://sites.fct.unl.pt/biomolecular_eng/

Susana Palma

PhD Student

s.palma@campus.fct.unl.pt

- 2012: Visting student at ICMM, Madrid, Spain
- 2011: Honorable mention, SHIC'11
- 2010- : MIT-Portugal PhD. Program, Bioengineering Systems, FCT-UNL
- 2006-2010: Researcher, PLUX wireless biosignals S.A.
- 2001-2006: MSc. Biomedical Engineering, IST-UTL

Objectives

• The aim of this project is to design, produce and optimize magnetic nanoparticles (MNP) for cancer theranostics: cancer-specific drug nanocarriers with MRI contrast proprieties (figure 1).

• This nano-system, with hydrodynamic diameter <100 nm, is composed by a superparamagnetic iron oxide core (that gives the MRI visibility) functionalized with biological layers that provide biocompatibility, cell penetration properties and specificity to cancer cells (figure 2).

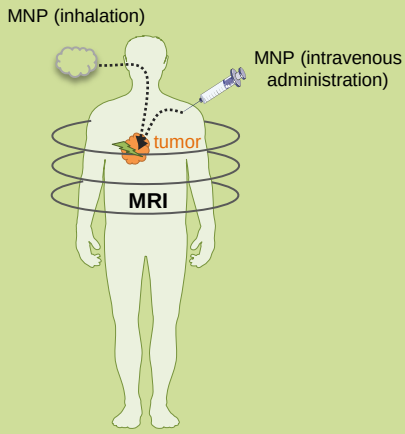

Figure 1. Theranostic magnetic nanoparticles (MNPs) allow to treat and, at the same time, monitor the evolution of the disease.

Methodology

synthesis of monodisperse MNPs with stable proprieties in physiological conditions

functionalization with biologically active and biocompatible molecules

OPTIMIZATION

characterization of size, morphological, colloidal , surface and magnetic proprieties

in vitro evaluation of cell uptake and toxicity profiles using tumoral and healthy cells

Expected Results

• A proof-of-concept for a magnetic theranostic will be developed and fully characterized in terms of morphology, size, chemical composition, cytotoxicity and drug release profiles.

• We expect to contribute to the state-of-the art with a new magnetic nanoparticle with dual function: MRI contrast agent and drug delivery system at cancer cells.

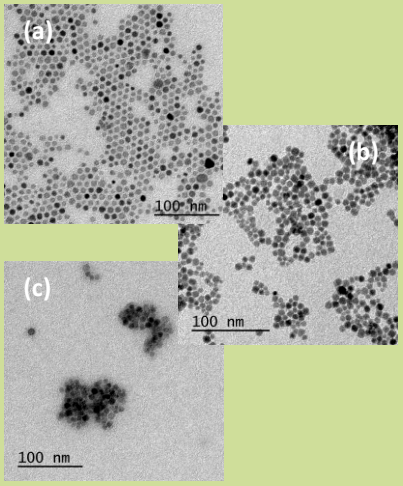

Figure 2. Transmission Electron Microscopy images of hydrophobic MNPs (a), hydrophylic MNPs (b) and MNPs coated with functionalizing layers (c).

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