SUPERPARAMAGNETIC IRON OXIDES in the MOVE to CANCER NANOTHERANOSTICS

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Nanomedicines are possible thanks to the satisfactory implementation of nanotechnologies to the biomedical field for controlled delivery of therapeutic agents as well as for diagnostic purposes. Their engineering has been improved on the basis of both passive and active targeting strategies. Interestingly, recent advances in Nanoscience and Biomedicine have made possible the creation of multifunctional nanomedicines. They typically combine therapeutic agents (e.g. drugs and genes), and imaging molecules. Such theranostic nanostructures have been engineered to improve cancer diagnosis and treatment, postulating the following step against malignancies: the formulation of personalized medicines.

Superparamagnetic iron oxides have found very promising pharmaceutical and biomedical applications. They are characterized by a very small size, adequate and tunable physical chemistry, high magnetization values, and high magnetic susceptibility. These properties can be advantageously used in the formulation of cancer nanotheranostics.

In this contribution, it will be analyzed how superparamagnetic iron oxides can contribute to the fabrication of efficient cancer theranostics. Special emphasis will be given to preparation procedures and to their inclusion as key materials in hybrid theranostic nanostructures combining tumor therapy and magnetic resonance imaging functionalities.

Short Curriculum Vitae: José L. Arias received his Ph.D. in Pharmaceutical Technology from the University of Granada in 2003. He is currently a professor of Pharmaceutical Technology, Clinical Pharmacy, Drug Delivery, as well as Biopharmacy and Pharmacokinetics, at the Department of Pharmacy and Pharmaceutical Technology in the University of Granada (Spain). He has also worked during the years 2007 and 2008 as Associate Researcher of UMR CNRS 8612 “Physico-chimie, Pharmacotechnie et Biopharmacie” under the direction of Prof. Patrick Couvreur at the Université Paris-Sud, France. His research group is actively involved in the development of colloidal drug delivery systems against severe diseases (cancer, autoimmune diseases, infectious diseases, etc.). His area of specialization includes a focus on the formulation of advanced drug nanocarriers on the basis of passive and active targeting strategies (mainly, magnetic-sensitive nanoplatforms). He is also involved in the development of engineering strategies for the preparation of theranostic nanoparticles.

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