MAGNETIC NANOPARTICLES FOR BIOMEDICAL USE: PRODUCTION, CHARACTERIZATION AND IN VITRO STUDIES

Magnetic nanoparticles (NM) have recently aroused interest in the biomedical and diagnostic field for clinical diagnosis, drug delivery and identification of biological targets. In particular they are proposed to induce magnetic hyperthermia, which represents an alternative therapy in the treatment of some forms of cancer. NMs are nanoparticles made up of magnetic elements such as iron, cobalt and nickel. Among these, iron oxides such as maghemite (γ-Fe_2O_3) and magnetite (Fe_3O_4) have recently become particularly interesting as they are fully biocompatible.

GOALS

- production of magnetic iron oxide nanoparticles through simple precipitation techniques
- their inclusion in a lipid matrix using different formulation techniques to obtain nanoparticulate systems suitable for parenteral administration
- their characterization in terms of size, stability and magnetic properties
- assessment of their activity in vitro and/or in vivo.

INSTRUMENTS AND METHODS

Different production and instrumental techniques will be used, such as HPLC chromatography, photo-correlation spectroscopy (PCS), Sedimentation Field Flow Fractionation (SDFFF), low-angle X-ray spectroscopy (SAXS), optical and electronic microscopy (SEM, TEM, cryo -TEM).

SUBJECTS

Pharmaceutical technology, analytical chemistry, physics, mathematics, physical chemistry, organic and inorganic chemistry

WORKING GROUP

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COLLABORATIONS

The research group makes use of collaborations within the Department of Chemical and Pharmaceutical Sciences (Prof. Contado, Prof. Ferretti, Dott. Bergamini, Prof. Gavioli), at the University of Ferrara (Department of Physics and Earth Sciences: F. Spizzo, L. Del Bianco), with National Universities (Università Politecnica delle Marche, Ancona, Department of Life and Environmental Sciences; University of Verona, Dept. of Neuroscience, Biomedicine and Movement, University of Catania, Department of Pharmaceutical Sciences) and international (Facultade de Pharmacy, Universidade Estadual de Maringà, Paranà, Brazil, Institut Galien Paris-South Faculté de Pharmacie, Université Paris-Sud, France, University of Bayreuth, Macromolecular Chemistry II, Germany)