Poster

SYNTHESIS OF NOVEL GLYCOSUPERPARAMAGNETIC NANOPARTICLES AS POTENTIAL CONTRAST AGENTS.

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Magnetic nanoparticle probes are emerging as a novel class of contrast and tracking agents for medical imaging. When used as contrast agents for magnetic resonance imaging (MRI), superparamagnetic iron oxides nanoparticles allow researchers and clinicians to enhance the tissue contrast of the region of interest by increasing the relaxation rate of water. Magnetic nanoparticles offer too exciting new opportunities including hyperthermia treatment for malignant cells and site-specific drug delivery. The development of functional magnetic nanoparticles conjugated to biologically relevant oligosaccharides (GMNPs) and other specific targets (proteins and nucleic acids) for labelling specific cells is one of the most important aims of our group [1].

We have already prepared different biofunctional superparamagnetic nanoparticles with the appropriate size, composition and surface chemistry for further biocompatible modification. The thermal decomposition method developed recently [2] has been demonstrated to be the most effective approach for preparing high quality magnetic nanocrystals. All the structures have been confirmed using different techniques: transmission electron microscopy (TEM), induced coupled plasma optic emission spectroscopy (ICP-OES) and other chemical methods. As these nanoparticles are coated with a hydrophobic organic layer, they are only soluble in hexane and other non-polar or weakly polar organic solvents. These nanoparticles have been transferred to water to be used for biological applications being very stable in aqueous buffers and physiological conditions.

To confirm their application as MRI contrast agents, the longitudinal and transversal relaxation times (T_1 and T_2) of our GMNPs were measured. All the GMNPs showed similar relaxivities and they have values in the range of other commercial available contrast agents.

In view of the application of these constructions in vivo, the cytotoxicity of several of these GMNPs was tested against three different mammalian cell lines (C8 mouse astrocytes, C6 rat glyoma cells, and C33 human carcinoma cells) following the standard MTT protocol [3] with the expected biocompatible results. Also a staining procedure was used to asses the endocytosis of the nanoparticles by C33 cells in vitro. For this purpose, we have modified a tissue staining protocol based on the growth of silver aggregates (visible in an optic microscope) onto the gold shell of our GMNPs.

References:

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