New magnetic nanocomposites for theranostic applications

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Abstract

Nanostructured materials are of increasing interest in biological and biomedical applications in recent years[1]. Currently, promising strategies are being developed that aim at combining diagnosis and therapy capabilities into clinically effective formulations[2]. There is a growing interest in developing smart theranostic platforms that can concurrently diagnose disease, externally trigger treatment and monitor response. A range of different hybrid systems have been proposed within the scientific community as bioactive encapsulating agents and carriers due to their biocompatibility, low toxicity and ability to influence the delivery profile of pharmacological agents[3,4]. In this context, hybrid organic-inorganic magnetic nanocomposites (mNCs) are being explored to synergistically combine the modified bioactive release provided by the organic encapsulation and the intrinsic physico-chemical properties from the inorganic counterpar[5].

Here, we present new drug loaded magnetic nanocomposites showing good multifunctional performance as heat generating sources in magnetic hyperthermia (MH) therapy, T2-contrast agents in magnetic resonance imaging (MRI) and responsive drug delivery vehicles. Their design, synthesis and physicochemical characterization will be shown, as well as their biocompatibility and functional validation in vitro. The high ability to simultaneously encapsulate both therapeutic agents and magnetic nanoparticles enables an external control over the drug release profile and opens the door to personalized oncology through integrating tumor diagnosis and therapy. The outstanding performance shown by mNCs *in vitro* allows to propose them as next generation drugs for the diagnosis and therapy of cancer.

References

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Figures

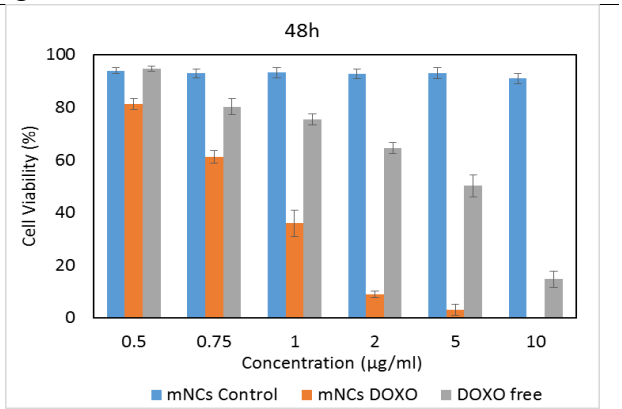

Figure 1: Viability of breast cancer cells. mNCs encapsulated with doxorubicin induced enhanced apoptosis of the cells, showing better results than free drug.