

# Novel magnetoliposomes containing magnetic nanoparticles covered with gold as nanocarriers for new antitumor tricyclic lactones

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The potential of drug nanocarriers containing magnetic or gold nanoparticles has been recognized in biomedical applications. Magnetic nanoparticles can enable magnetic drug targeting and hyperthermia, while gold nanoparticles ensure effective local heating (photothermia) using relatively low energies for gold excitation. Considering cancer therapy, the combination of these capabilities in a single multifunctional nanosystem allows magnetic guidance and production of local heat, the latter promoting triggered drug release and synergistic cytotoxic effect in cancer cells (combined chemo/phototherapy).<sup>1</sup>

In this work, core/shell magnetic nanoparticles of manganese ferrite/gold were prepared and characterized. In order to develop applications in combined cancer therapy, the prepared nanoparticles were covered with a lipid bilayer (forming magnetoliposomes), these systems being able to transport drugs. TEM and DLS measurements indicated that these systems exhibit sizes around 120 nm (Figure 1).

Two new potential antitumor tricyclic lactones, prepared by some of us (Figure 2), active against the human tumor cell lines HCT15 (colorectal adenocarcinoma) and NCI-H460 (non-small cell lung cancer), and presenting  $GI_{50} \leq 10\mu\text{M}$  using the sulforhodamine B assay in both cell lines,<sup>2</sup> were successfully encapsulated in these nanocarriers.

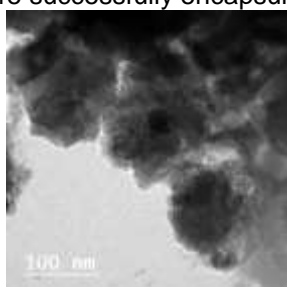


Figure 1. TEM image of magnetoliposomes containing manganese ferrite/gold core/shell nanoparticles.

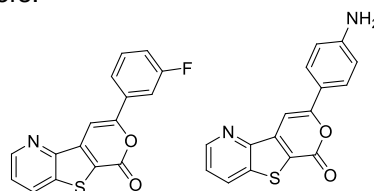


Figure 2. Antitumor tricyclic lactones.

The heating capabilities of the developed nanosystems were evaluated upon excitation with a light source. These multifunctional nanosystems have shown promising results for application combined cancer therapy (chemo/phototherapy).

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1 A. R. O. Rodrigues *et al.*, *Pharmaceutics* **2019**, *11*(1), 10.

2 M.-J. R. P. Queiroz *et al.*, *Tetrahedron* **2019**, *75*, 1387-1397.