ENHANSING THE PERFORMANCE OF MAGNETIC NANOCARRIERS FOR DOXORUBICIN

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Abstract

One of the major challenges in contemporary drug administration technologies is the targeted delivery of bioactives, in order to suppress the systemic distribution and, in turn, the ensuing undesirable side-effects. A possibly effective strategy towards this goal is the entrapment of the drug in magnetically targeted delivery systems.[1] Here, the preparation of such carriers is reported, through alkaline condensation of a single ferrous precursor into magnetite in the presence of poly(methacrylic acid)-graft-poly(ethyleneglycol methacrylate) graft co-polymers (p(MAA-g-EGMA)). Light scattering results indicate that the stability in salted media and human blood plasma is excellent. MagP(MAA-g-EGMA) colloids carry on the polymeric corona an abundance of carboxylates that bind cationic drugs, such as doxorubicin, at high loading (~16 wt %). In order to obtain evidence that the drug-carrier interactions do not affect the activity of Dox, HT-29 cancer cells were incubated with Dox-loaded carriers. Only a minor reduction on the cytotoxicity was observed, as compared to free Dox, possibly due to a fraction of Dox that remained bound and did not enter the cells. Merging high drug loading and pronounced magnetic response is often difficult to attain.[2,3] Nevertheless, the content of the magnetic material of the present nanocarrier was determined at ~87%, leading to very high saturation magnetization of 70 emu/g. This finding, combined with the high drug loading biorepellent properties and controlled drug release, constitute our product unique among the family of magnetic nanocarriers for doxorubicin.

Keywords: nanocarriers, magnetic, doxorubicin, colloids

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