DOXORUBICIN-LOADED MAGNETIC NANOPARTICLES FOR TUMOR THERAPY AND IMAGING

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Abstract

Amount of people, who die from cancer diseases, is dramatically growing. Early diagnostics and effective therapy of these diseases are necessary. Magnetic nanoparticles (MNP) may be used for this goal.We obtained iron oxide MNP with dual function: cancer cell imaging (MRI) and doxorubicin (Dox) delivery. The shell of MNP consists of bovine serum albumin (BSA) and polyethyleneglycol (PEG). These MNP can form electrostatic complex with Dox (MNP-Dox). The relaxivity values were determined by magnetic resonance tomograph. Dox-loading in MNP-BSA-PEG was performed with analysis of electrostatic complex. Dox release was observed in different pH-values. Two . Fractions of MNP-BSA differed in hydrodynamic diameter (85±10 and 36±4nm) and BSA-content in the MNP shell (38,3% and 54,9% respectively) were obtained. Big MNP had larger relaxivity than small ones, but the were not stable in solution. Therefore, following experiments were performed with small MNP. When Dox-content in MNP-Dox reached 8% (by weight), we could see increase of complex size and colloidal instability. The part of released drug under pH=7,4 didn't exceed 25% of initial Dox-content in complex. Dox release was more intensive for pH=6,5 and 5,5 - 55 and 80% respectively. In the case of HEK293 cells cytotoxic activity of MNP-Dox was similar with free drug activity. In the case of C6 cells, MNP-Dox had higher toxicity rather than free Dox.Thus, we obtained complex Dox-MNP, which is perspective as MRI-agent and anti-cancer drug.

Keywords: Magnetic nanoparticles, drug delivery, antitumor therapy

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