Folic acid functionalized, condensed magnetic nanoparticles for the selective delivery of doxorubicin to cancer cells overexpressing the folic acid receptor.

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Tumor cell-specific drug delivery represents the most desirable approach for preventing side effects in non- diseased tissues and increasing drug accumulation in tumor. The aim of this work was the development of magnetic nanoparticles functionalized with folic acid (FA) on their surface for the targeted delivery of anticancer drug Doxorubicin in cancer cells overexpressing the folate receptor. Magnetic nanoparticles were synthesized in the presence of the polysaccharide alginic acid, and functionalized with PEG and folic acid. Both the conjugation of PEG and FA was achieved through EDC chemistry, and characterized with analytical techniques, such as TGA and ATR. The developed nanoparticles were characterized for their physicochemical characteristics (size, z-potential), magnetic properties, colloidal stability, and loading/release of the drug at different pHs (blood pH and pH 6.0). The stimulation of drug release by the concurrent application of alternating magnetic fields was evaluated as well. in Optimal nanoparticle compositions were studied for their ability to enter (intracellular uptake) and kill human breast adenocarcinoma cell lines expressing (MDA-MB-231) and not expressing (MCF-7) the FRα receptor. The nanoparticles exhibited higher uptake and toxicity against the MDA-MB-231 cells than against the MCF-7 cells. Their anticancer activity was further enhanced in the presence of a static magnetic field in close proximity with the cells.

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