

Synthesis of Drug Loaded Magnetic Nanocomposite and Investigation of Cytotoxic Properties

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This aims of study to develop drug delivery systems providing an alternative solution to cancer chemotherapy. Firstly, carboxymethyl dextran which has magnetic properties (MD), was synthesized as stated in the literature.^{1,3} Its structure was elucidated with various analytical devices. Then, loading studies were carried out on the nanocomposite with topotecan (TP) (in the range of 0.2-40 μ M in phosphate buffer at pH 5) as an anticancer drug. The cytotoxic properties of MD, TP, drug loaded MD (MD-TP), and free TP were studied on human prostate cancer cell (Du145) and human healthy prostate cell (PNT1A) line. The synthesized MD and MD-TP nanocomposites were characterized by different analytical devices such as FTIR, XPS, UV-VIS, VSM, TEM, SEM and DLS. According to the FTIR results, the presence of peaks belonging to functional groups in the expected places indicates that MD was successfully synthesized and TP was successfully loaded on nanocomposite. According to TEM image, the MD particles showed a spherical structure, and also, the particle size was measured as 9 ± 1.8 nm. The SEM image of MD indicated that the nanoparticles were aggregated. Furthermore, after the loading TP, the brightly colored particles of TP were observed on some parts of the surface of MD. Moreover, DLS measurements of the nanoparticles were taken before and after loading the drug. Due to high agglomeration of the magnetic nanoparticle, it showed polydispersity. In addition, cytotoxicity effects of drug loaded nanocomposites on Du145 and PNT1A cell lines were investigated and the results were found to be statistically significant. The topotecan loaded MD-TP nanocomposite have shown cell viability to be reduced by up to 20 %. It has been shown that synthesized polymer coated superparamagnetic nanocomposites with these properties can be used in drug targeting studies.

References:

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