Fabrication of pH responsive DOX Conjugated PEGylated Palladium Nanoparticle Mediated Drug Delivery System: an *In vitro* and *In vivo* evaluation

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ABSTRACT

Efficient delivery of therapeutics into tumor cells to increase the intra cellular drug concentration is one of the key issues in cancer therapy. In this work, we designed pH responsive palladium nano particles (PdNPs) as an anticancer drug nanocarrier system for effective drug delivery. The synthesis of the nanocarrier involved conjugation of Doxorubicin (DOX) to the surface of palladium nano particles PdNPs via a hydrazone interaction. The nanoparticles were characterized by UV-spectroscopy, Transmission electron microscope (TEM), Dynamic light scattering(DLS), Zeta potential, Fourier transmission infrared spectroscopy(FT-IR), X-ray diffraction(XRD) and Nuclear Magnetic Resonance(NMR). The drug release behaviour was subsequently studied at different pH conditions. The results showed a sustained release of doxorubicin(DOX) preferentially at the desired endosmal pH (5.5). The biological activity of the doxorubicin (DOX) conjugated palladium nano particles (PdNPs) was studied by an MTT assay, flurosence microscopy, and apotosis. Intracellular uptake studies revealed preferential uptake of this NPs into HeLa cancer cells. The in vitro apotosis study revealed that doxorubicin(DOX) conjugated palladium nano particles(PdNPs) caused significant death into HeLa cells. Further , blank PEGylated palladium nano particle(PdNPs) displayed low toxicity and good biocompatibility. Doxorubicin (DOX) conjugated palladium nano particle(PdNPs) had the strongest anti-tumor efficacy against HeLa tumor xenograft models in vivo. These findings demonstrated that PEGylated palladium nano particles (PdNPs) were deemed as a potential drug nano carrier for cancer therapy.

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