**Title:** Novel biodegradable heparin-based nanocomposite system for targeted drug delivery against human ovarian cancer

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**Abstract:**
Introduction: Many heparin (HP)-drug conjugates have been developed for cancer chemotherapy as macromolecular prodrugs. Taking advantage of excellent properties of HP and polymer-drug conjugates, we have successfully synthesized a HP based SPIO NP drug conjugate, carrying two different anticancer drugs, DOX and PTX, for intratumoral drug delivery. The cytotoxicity response of the drug loaded HP-SPIO NPs was determined on the biochemical parameters and survival of human ovarian cancer cell lines of OVCAR-3 and A2780. Method: The bare (~10 nm) and heparin (HP)-coated superparamagnetic iron oxide nanoparticles (SPIO NPs; 42 nm) were formulated by co-precipitation technique. Results: The as-prepared HP-SPIO NPs had the saturation magnetization of 50-55 emu/g at 300 K. The anticancer drugs, doxorubicin and paclitaxel, were successfully partitioned in the SPIO core. Incubation with A2780 and OVCAR-3 human ovarian cancer cells revealed that the DOX-HP-SPIO NPs (85 nm) and PTX-HP-SPIO NPs (71 nm) showed sustained and pH-sensitive release of DOX (87%) and PTX (75%) at pH 6.0, even for up to 15 days. While, 5 µg/ml DOX-HP-SPIO NPs and PTX-HP-SPIO NP caused 93 and 87.1% apoptosis in A2780 and OVCAR-3 cells, respectively, with a sharp decrease in the level of bcl-2 and survivin proteins and increased expression of proapoptotic proteins, like bax and NF-κB. Conclusions: The presently formed nanocomposite-based drug delivery system was readily internalized into tumor cells and induced a higher apoptosis rate.

**Human ovarian cancer, Iron oxide, Heparin, Drug release, Loading efficiency, Apoptosis.**

**Presentation:** Poster