Anti Proliferative and Apoptotic Effects of Ellagic Acid Functionalyzed Iron Oxide Nano Particles on Endometrial Cancer (AN3CA) Cells

Fernando, Parana Muhandiramge

Nanotechnology has integrated with bioscience to offer several remedial actions against cancer. In this study, the known cancer inhibitory action of the ellagic acid (EA) was tested on chemo - endocrine resistant endometrial cancer cells AN3CA by coating EA on to magnetic iron oxide nanoparticles (IONPs). Synthesis of IONPS were carried out by co-precipitation method using Fe2+ and Fe3+ salts in the presence of polyethylene glycol (PEG). EA coated IONPs (EA-IONPs) were then prepared by post coating treatment. Synthesized nanoparticles were characterized using FTIR and TEM. Anti-proliferative effects of pure EA, IONPs and EA-IONPs on AN3CA cells were evaluated by Sulphorodamine B assay and induction of apoptosis was tested by evaluating morphological changes. Pro apoptotic effects of EA-IONPs on AN3CA cells were further confirmed by (a) assessing Acridine Orange / Ethedium Bromide staining under the fluorescent microscopy, (b) evaluating levels of caspase 3/7 in treated AN3CA at 48 h post incubation. EA-IONPs exerted a significant dose dependent cytotoxicity to AN3CA as evident from SRB assay (IC50 = 6.6 µg/mL) while EA shows comparatively less cytotoxicity (IC50 = 24.7 µg/mL). Characteristic morphological changes associated with apoptosis in EA-IONPs treated AN3CA cells were observed using phase contrast and fluorescent microscopy. EA-IONPs significantly ($P<0.05$) increased the caspase-3/7 levels dose dependently and has increased the mRNA expression ($P<0.05$) of tumor suppressor gene p53. The EA-IONPs may therefore mediate its anti-cancer effect, through modulation of cytotoxicity and apoptosis via, p53, caspase 3/ 7 mediated pathways in AN3CA. Based on overall results EA-IONPs exhibit an improved capacity to inhibit the growth of cancer cells.