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Tailored silver nanoparticles capped with gallic acid and its potential toxicity via ROS mediated pathway against osteosarcoma cells

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Abstract

Chemotherapeutic agents used to treat cancer cells does not kill cancer cells only but healthy cells as well. Silver nanoparticles (SNP) broad toxicity towards the cancer cells have attracted people to find the alternative anticancer agent. Therefore, in this work we biosynthesize SNP from *E. coli* and coated with gallic acid. Characterized process carried out through UV–visible spectrophotometer, Fourier transform infrared spectroscopy (FTIR), Thermic gravimetric analysis, scanning electron microscopy (SEM) Energy dispersive X- rays (EDX) and Transmission electron microscopy (TEM) showed particles are well dispersed, well stable, and particle size ranges from 11.44 to 34.97nm. The gallic acid coated silver nanoparticles(gSNP) showed excellent toxicity at 20µg/ml IC50 towards SAOS-2 osteosarcoma cancer while less toxicity towards normal 3T3 cells. Further analysis confirms the cell cycle inhibition takes place at S and G2/M phase while acridine orange and ethidium bromide (AO/EB) staining confirms the apoptosis, showed membrane blebbing, chromatin condensation and morphological changes in the treated cell through flow cytometry showed the release of higher percentages of apoptotic bodies. The gSNPs induces the production of ROS in the treated cancer cell through 2',7'-Dichlorofluorescin diacetate method. The gSNP also showed the upregulation of p53 and caspase 9 proteins through flow cytometry. This study showed that gSNP could become a promising candidate in medicine and pharmaceutical applications for targeted drug delivery against cancer therapy.