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Synthesis of bovine serum albumin modified chlorogenic acid nanoparticles and its selective cytotoxic, apoptotic, growth inhibitory and tumor regressive efficacy in cancer cells

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Limited efficacy of current first-line treatment for cancer draws attention for further development of efficient strategies. Currently, researchers are paying significant attention to the development of drugs at the nanoscale level to increase their target specificity and to reduce their concentrations. In the present study, we report a cost-effective and eco-friendly synthetic strategy to prepare biogenic bovine serum albumin (BSA) modified chlorogenic acid nanoparticles (AgNPs-CGA-BSA) and its antineoplastic activity. AgNPs-CGA-BSA was characterized and *in vitro* and *in vivo* studies were performed to explore its cytotoxic, redox status altering capability, apoptosis inducing and antineoplastic efficacy in Jurkat cells and Dalton's ascites lymphoma (DLA) cells. AgNPs-CGA-BSA exhibited cytotoxicity and induced apoptosis by elevating reactive oxygen species, chromatin condensation, DNA fragmentation, cell cycle arrest at G₀/G₁, expression of proapoptotic proteins and causing mitochondrial dysfunction. The immunofluorescence studies of cytoskeletal and nuclear morphology showed that after AgNPs-CGA-BSA treatment, the regular reorganization of actin filaments in cancer cells became chaotic. In DLA-induced mouse xenograft model, AgNPs-CGA-BSA significantly reduced angiogenesis, cell proliferation and caused tumor regression. AgNPs-CGA-BSA increased lifespan of DLA-bearing mice through induction of antioxidant status and restoration of hematological parameters. These findings indicate the efficacy of biogenic AgNPs-CGA-BSA to exhibit excellent cytotoxic effect against cancer cells and it may be a promising drug candidate to overcome cancer. Together, these findings offer novel mechanistic insight into AgNPs-CGA-BSA mediated inhibition of cancer cell and may potentially open up new avenues for further research.

Biography

Sujata Maiti Choudhury has completed her MSc and MPhil degree from University of Calcutta, Kolkata. She was awarded Doctor of Philosophy in 1995 from Jadavpur University, Kolkata. At present, she is a Professor in the Postgraduate Department of Human Physiology with Community Health of Vidyasagar University and In-charge of Biochemistry, Molecular Endocrinology and Reproductive Physiology Laboratory. She has supervised several PhD theses. Her research thrust areas are cancer and nano-therapeutics and molecular toxicology. She has 36 quality research publications in peer reviewed journals and she is an Editorial Board Member of reputed journals.

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