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Development, characterization, and *in-vivo* assessment of dual targeted nanoparticles for the delivery of anti-cancer drug to glioma cell

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Glioblastoma multiform (GBM), is characterized by high proliferation rate, migration, invasion as well as secretion of angiogenic factors. Effective chemotherapy for glioblastoma requires a smart nanocarrier that can penetrate the blood brain barrier (BBB) and subsequently target the glioma cells. In the study, dual-targeting paclitaxel (Ptx) polymeric nanoparticles (NPs) were produced by conjugating with both folate (FA) and cRGDfK, for the effective penetrating across BBB and targeting glioma, respectively.

FA and cRGDfK modified NPs containing paclitaxel was prepared by nanoprecipitation technique combined with self-assembly. The PLNs was characterized by particle size, shape, zeta potential, entrapment efficiency, *in vitro* release profile, cytotoxicity, hemolysis study, cell uptake, *in vitro* transendothelial transport in brain endothelial cell lines. *In vitro* and *in vivo* studies demonstrated that the dual-targeting NPs could transport across the BBB and mainly distributed in the brain glioma. FA and cRGDfK conjugated NPs had maximum entrapment efficiency $81.34 \pm 3.41\%$ (n=3). AFM showed NPs to be spherical and nanometric in size. The *in vitro* release followed in a biphasic pattern: i.e., an initial burst release followed by slower and sustained release and resulted in least haemolytic toxicity. The anti-tumor effect of the dual-targeting NPs also demonstrated increased survival time, decreased tumor volume and no significant effect on body weight.

The dual-targeted NPs could improve the therapeutic efficacy of brain glioma and were found less toxic than the Ptx solution, showing a dual-targeting effect. These results indicate that dual-targeting NPs are promising potential carrier for glioma chemotherapy.

Biography

Udita Agrawal has completed her MPharm at the age of 26 years from Department of Pharmaceutical Sciences, Dr. H. S. Gour University, India. Presently, she is pursuing her Ph.D. under the supervision of Prof. S P Vyas at Dr. H. S. Gour Central University, India. She is a Gold medalist in BPharm and MPharm level. She has won various awards for the best oral and poster presentations. She has published 6 papers to her credit published in journals of high scientific impact.