conferenceseries.com SciTechnol

Nayab Tahir et.al., J Pharm Drug Deliv Res 2018, Volume 7
DOI: 10.4172/2325-9604-C2-029

Merging the two worlds: Lipid-polymer hybrid nanoparticles for the controlled drug delivery of chemotherapeutic agents

Nayab Tahir[1,2,3], Asadullah Madni[1], Vimal kumar Balasubramanian[3], Mubashar Rehman[1], Alexandra Correia[3], Abdul jabar[1] and Helder A Santos[3]
[1]*Islamia University, Pakistan*
[2]*University of Sargodha, Pakistan*
[3]*University of Helsinki, Finland*

Lipid-polymer hybrid nanoparticles (LPHNPs) are emerging platforms for drug delivery applications. In the present study, Methotrexate loaded LPHNPs consisted of PLGA and Lipoid S100 were fabricated by employing a single-step modified nanoprecipitation method combined with self-assembly. A three factor, three level Box Behnken design using Design-Expert® software was employed to access the influence of three independent variables on the particle size, drug entrapment and percentage drug release. The optimized formulation was selected through numeric optimization approach. The results were supported with the ANOVA analysis, regression equations and response surface plots. Transmission electron microscope images indicated the nanosized and spherical shape of the LPHNPs with fair size distribution. The nanoparticles ranged from 176-308 nm, which increases with increase in polymer concentration. The increase in polymer and lipid concentration also increased the drug entrapment efficiency. The *in vitro* drug release was in range 70.34-91.95% and the release mechanism follow the Higuchi model (R2=0.9888) and Fickian diffusion (n<0.5). The *in vitro* cytotoxicity assay and confocal microscopy of the optimized formulation demonstrate the good safety and better internalization of the LPHNPs. The cell anti-proliferation showed the spatial and controlled action of the nanoformulation as compared to the plain drug solution. The results suggest that LPHNPs can be a promising delivery system envisioned to safe, stable and potentially controlled delivery of methotrexate to the cancer cells to achieve better therapeutic outcomes.

Biography

Nayab Tahir has received PharmD and MPhil (Pharmaceutics) in 2011 and 2014 from University of Sargodha and Islamia University of Bahawalpur, respectively. He is currently a PhD Scholar under the supervision of Dr. Asadullah Madni in the Faculty of Pharmacy and Alternative Medicine, Islamia University of Bahawalpur, Pakistan. His research focuses on the formulation of nanocarriers for the delivery of chemotherapeutic agents. He has also worked as a Visiting Scholar under the supervision of Dr. Helder A Santos, in the Division of Pharmaceutical Chemistry and Technology, Faculty of Pharmacy, University of Helsinki, Finland on the fabrication of lipid polymer hybrid nanoparticles for the targeted delivery of anticancer drugs.

nayabtahir132@gmail.com

Notes: