Amit Sorathiya et al., Pharm Anal Acta 2015, 6:1
http://dx.doi.org/10.4172/2153-2435.S1.025

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5th International Conference and Exhibition on

Pharmaceutics & Novel Drug Delivery Systems

March 16-18, 2015 Crowne Plaza, Dubai, UAE

Formulation and characterization of mannose surface modified Methotrexate solid lipid nanoparticles for cancer targeting

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The purpose of this study was to investigate the tumor targeting potential of surface tailored mannosylated solid lipid nanoparticles (SLNs) loaded with Methotrexate (MTX). MTX-loaded SLNs were prepared by modified solvent injection method using Pluronic F-127 as surfactant and stearyl amine as lipid. The influence of various formulation factors (drug content, surfactant concentration, stirring speed, stirring time) on particle size, polydispersity index, zeta potential, encapsulation efficiency, *in vitro* drug release were investigated to optimize formulation. Optimized system mannose-SLNs were characterized by transmission electron microscopy (TEM), scanning electron microscopy (SEM) and FT-IR. Particle size and polydispersity index of optimized formulation batch was reported as 271nm; PDI 0.321. Zeta potential of stearyl amine SLNs were found to be +22.1mV. The *in vitro* studies depicted mannose-conjugated SLNs to be least hemolytic and suitable for sustained drug delivery. Dialysis bag diffusion technique was used to study the *in vitro* drug release and optimized batch B2 released 56.2%(±1.24%)drug in first 6 hr. and then followed with slow release of drug 87.9%(±1.37%) in remaining 18 hr which is due to slow diffusion of drug across the lipid shell. The release kinetics of optimized batch was studied by zero order, first order, higuchi and korsemeyer -peppas equation. The percentage entrapment of Methotrexate in solid lipid nanoparticles was noted as 63.27%. In conclusion, the MTX loaded SLN prevent first pass metabolism, increase bioavailability, Enhanced permeability and retention effect (EPR) and can also provide the control and prolong release ofs drug.

Biography

Amit Sorathiya, a post graduate fellow, Indian Institute of Technology (Banaras HindUniversity) Varanasi. His current area of research is mannosylated lipid based nanoparticulate drug delivery system. Before joining here as a postgraduate fellow, he had completed bachelor in pharmacy studies from well known university of Gujarat (M.S.University of Baroda), India with First class. He has qualified GPAT-2013(conducted by AICTE new Delhi) with All India Rank 26. He received financial assistance, from MHRD, Government of India for his post graduation research work.

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