Fabrication and evaluation of PLGA nanoparticles containing pemetrexed for effective lung targeting and treatment of Non-Small Cell Lung Carcinoma (NSCLC)

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Pemetrexed is a chemotherapy drug used to treat non-small cell lung cancer and pleural mesothelioma. This study demonstrated the fabrication and evaluation of pemetrexed loaded nanoparticles and compared its targeting efficiency with pure form of pemetrexed. The pemetrexed loaded nanoparticles were prepared by nano precipitation method using PLGA. Nanoparticles of different core: Coat ratio were formulated and were evaluated for its particle size, zeta potential, drug content, drug loading efficiency, drug entrapment efficiency, in vitro drug release, kinetic studies and in vivo bio-distribution studies. The prepared nanoparticles were white, free flowing and spherical in shape. Prior to the formulation a compatibility study using FTIR was being carried out. After interpretation of the spectra it was confirmed that there was no major shifting, loss or appearance of functional peaks between the spectra of drug, PLGA, physical mixture of drug and PLGA. From the IR study, it was concluded that, the selected polymer were found to be compatible with pemetrexed. The DSC curve of pemetrexed exhibit corresponding endothermic peak (T peak=195.56ºC) corresponding to its melting point. This data also supports there is no interaction between the drug and PLGA. The optimized batch of drug loaded PLGA nanoparticles possess a mean diameter 251 nm, zeta potential of -8.82 mV, drug content of 4.2 mg, drug loading of 11.7% and entrapment efficiency of 84.70%. The in vitro release behavior of drug from nanoparticles was found to follow first order kinetics obeying Fickian diffusion. The bio-distribution study revealed that the nanoparticles formulation exhibited a 1.81 folds increase in drug concentrations in lungs when compared to pure drug after 2 hours of drug administration.

Biography
Annesha Deb is currently pursuing MPharm in the Department of Pharmaceutics at JSS College of Pharmacy, India. Presently she is carrying out the project in the area of brain targeted delivery of trihexyphenidyl loaded with solid lipid nanoparticles for effective management of Parkinsonism.

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