Executive Summary of the UGC-MAJOR RESEARCH PROJECT

(F. No. 43-493/2014 (SR) dated 04/01/2016)

TITLE OF THE PROJECT:

Development of novel biodegradable polymeric nanocarriers for viral reservoir targeting of anti-HIV drugs

PRINCIPAL INVESTIGATOR:

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OBJECTIVES OF THE PROJECT:

(a) Development and evaluation of surface modified biodegradable polymeric nanoparticles with size below 100 nm for passive viral reservoir targeting of anti-HIV drugs

(b) To study the targeting efficacy of the optimized formulations across *in vitro* BBB model constituting neuronal cell lines

(c) To study the biodistribution pattern and targeting efficacy of the optimized polymeric nanoparticles after intravenous and oral administration in small animal models

SUMMARY OF THE FINDINGS:

Antiretroviral polymeric nano formulations were formulated by Central composite design with the help of "Design-Expert® Software Version 10". The formulations were designed with the quantity of PLGA (10 - 30 mg), quantity of

Pluronic F68 (0.5 - 1.5%) and stirring speed (400 – 600 rpm) as independent variables considering particle size (nm), PDI, EE (%), DL (%) and zeta potential (-eV) as dependent variables. The appropriate selection of solvent system important in the preparation of polymeric nanoperticles. The solvent having partial water solubility results in high % Drug Entrapment efficiency, smaller particle size as compared to the water immiscible solvents. The homogeneous particles with nanometric size and higher drug loading were developed by nanoprecipitation method. The higher drug loading may help in the development of injectable nanoformulation with a lower dose of polymeric nanoparticles. The FT-IR, DSC and XRD analysis of drug, polymer, physical mixtures and drug loaded nanoparticle formulation confirmed the drug loading as amorphous form and drug-excipient compatibility. The developed nanoformulations showed sustained release profile over a period of 48 hours as compared to the free drug. The physical coating of nanoparticles with HAS and lactoferrin slightly increased the particle size with no significant changes in drug loading and entrapment efficiency. The coated nanoparticles showed slower drug release as compared to the uncoated nanoparticles. The developed nanoformulations were found to be stable up to 6 months at refrigerated conditions.

ACHIEVEMENTS FROM THE PROJECT:

- Formulation, optimization, and characterization of polymeric nanoparticles containing antiretroviral drugs, Efavirenz and Nevirapine

- Ph D enrolled out of the project: 1
- Number of publication out of the project: Journal Paper: 1; Conference Presentation: 1

CONTRIBUTION TO THE SOCIETY:

Towards antiretroviral nanomedicines for improvement of health and wellbeing of HIV/ AIDS patients.