J Bioequiv Availab, 4.3
doi: http://dx.doi.org/10.4172/0975-0851.S1.11

OMICS Group Conferences
Accelerating Scientific Discovery

3rd World Congress on
Bioavailability & Bioequivalence

March 26-28, 2012 Marriott Hotel & Convention Centre, Hyderabad, India

Pharmaceutical and immunological evaluation of ligand grafted pegylated PLGA nanoparticles for oral vaccine delivery

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Nanotechnology has been applied to improve vaccine delivery and to develop a nano-sized vaccine delivery system. Nanoparticles have been developed as an important strategy to deliver biomacromolecules such as antigens or DNA. In fussy, polymeric nanoparticles with entrapped antigens represent an exciting approach to sustain release of vaccine antigens and to optimize the desired immune response via selective targeting of the antigen to the specified cells like M cells. The efficiency of orally delivered vaccines, PEGylated PLGA-based nanoparticles displaying ligand molecules at their surface were designed to target human M cells. In this research we were attempt to prepare ligand grafted PEGylated PLGA nanoparticles by double emulsion method, and the M cell targeting ligand grafting was performed by photografting which covalently linked with ligand mainly on the PEG moiety of the PCL–PEG, included in the formulation. Similarly non-targeted formulations with size and zeta potential adapted to M cell uptake and stable in gastro-intestinal fluids, were developed. The physio - chemical parameters like Zeta potentials, particle size and entrapment efficiency, Antigen integrity was performed for PEGylated PLGA nanoparticles. In vitro and In vivo studies were performed to evaluate the oral vaccine (M cell targeting and immunological efficiency of nanoparticles). From the results we strongly demonstrated that the NP transport by an in vitro model of the human Follicle associated epithelium (co-cultures) was largely increased as compared to mono-cultures (Caco-2 cells). M cell targeting ligand grafting nanoparticles significantly increased their transport by co-cultures, due to interactions between the ligand and the β1 intregrins detected at the apical surface of co-cultures. In vivo studies demonstrated that ligand grafted PEGylated PLGA nanoparticles particularly concentrated in M cells. In conclusion, OVA-loaded ligand grafted PEGylated PLGA nanoparticles were orally administrated to mice and evaluated for its induction of an IgG response, and related an immune response after oral delivery.

Development of self micro emulsifying drug delivery system (SMEDDS) for oral bioavailability enhancement of Candesartan Celexetil

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The main purpose is to prepare self micro emulsifying drug delivery system (SMEEDS) for oral bioavailability enhancement of a poorly water soluble drug, Candesartan cilexetil. Solubility of Candesartan cilexetil was determined in various vehicles. SMEEDS is mixture of oils, surfactants, and cosurfactants, which are emulsified in aqueous media under conditions of gentle agitation and digestive motility that would be encountered in the gastro intestinal (GI) tract. Various compositions of oils, surfactants, and cosurfactants in which drug is soluble and physically stable were determined. Existence of micro emulsion region was identified from the pseudo ternary phase diagrams and composition of formulations was selected. The efficiency of self micro emulsification was also determined by diluting with water.