

Lung Inhalation of Biologicals using Nanotechnology

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Abstract

The pulmonary route has been encouraged by the large surface area of the lungs with the thin epithelial membrane and dense vasculature making the lung delivery a suitable route of administration of biologicals for local or systemic targets. Delivery of biologicals (such as therapeutic proteins, vaccines, genes etc.) to the lungs has many challenges: for example, overcoming the barriers at sites of administration and action, recognition and elimination by immune system, stability of the drug. Nanoparticles provide platforms to overcome these challenges of biopharmaceuticals with better outcomes. However, nanoparticle formulation methods face many challenges and is a critical factor, which can affect their physicochemical properties on the pharmacokinetics or the therapeutic effects.

We have developed polymer-based nanocarrier systems incorporating biologicals (miRNA, vaccine candidates, antimicrobial peptides). Furthermore, we have incorporated these into microcarriers using spraydrying technology suitable for lung delivery. We have managed to retain biological stability and activity of biologicals, and nanocarrier size following redispersion after spraydrying, and performed aerosolisation studies demonstrating suitability for lung delivery. We have applied the technology in the treatment and management of local lung diseases (COPD, lung infections) and vaccination.



Biography

Professor Imran Saleem is a professor in nanomedicine within the School of Pharmacy & Biomolecular Sciences, Liverpool John Moores University, UK. His research is aimed at developing novel delivery systems for targeting therapeutic agents to their site of action, with particular emphasis on lung diseases via pulmonary delivery. He has over 20 years' experience in the area of micro/nanoparticle formulation and drug delivery systems, and has published extensively in peer-reviewed journals, conference abstracts and book chapters. His research group is focused on the design and development of nanocarriers for delivery of biomacromolecules including, genes, peptides, vaccines and drugs.

Publications

- Evaluation of polymer choice on immunogenicity of chitosan coated PLGA NPs with surface-adsorbed pneumococcal protein antigen PspA4Pro
- In Vitro Characterization of Inhalable Cationic Hybrid Nanoparticles as Potential Vaccine Carriers
- . Pulmonary delivery of Nanocomposite Microparticles (NCMPs) incorporating miR-146a for treatment of COPD
- Polymeric Nanoparticles for the Delivery of miRNA to Treat Chronic Obstructive Pulmonary Disease (COPD)
- Surfactant Effects on Lipid-Based Vesicle Properties

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