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Inhalable micro/nano-structured systems for macromolecular drug delivery

Sonia Al-Qadi

University of Santiago de Compostela, Spain

This work entails the development of combined micro- and nanoparticulate systems for lung delivery of therapeutic macromolecules, meeting the specific delivery requirements of the lung for efficient outcomes. The proposed micro/nanostructured systems comprised biopolymers (e.g., chitosan, hyaluronic acid), a gelling anion, a protein, and a sugar used as a drying adjuvant. The protein was nanoencapsulated in polymeric matrices, followed by microencapsulation by spray drying in the presence of the drying adjuvant, resulting in micro-scale powders with adequate aerodynamic and morphological features. Extensive physicochemical, elemental, structural and thermal investigations were pursued, with emphasis being placed on structural modifications and interactions of the protein/carrier system, at a molecular level. Afterwards, intratracheal administration of the formulations was performed in

rats. Overall, studies revealed the non-invasiveness of the fabrication techniques to the macromolecule. Moreover, they confirmed the advantageous strategy of macromolecule nanoencapsulation in polymeric matrices prior to transformation into dry powders. These findings corroborated the *in vivo* data which showed a significant biological effect, as compared to the controls, highlighting the great potential of the developed systems for lung delivery of macromolecules intended for systemic or local effects.

Speaker Biography

Sonia Al-Qadi has completed her PhD in Pharmaceutical Technology from the University of Santiago de Compostela in Spain. Then, she pursued two Post-doctoral trainings in Denmark. She also worked as an Assistant Professor at the Faculties of Pharmacy in the Middle-East. Her research interests are focused on nano-drug delivery systems, biomaterials and macromolecules. She has won the Research Fellowships of Schlumberger Foundation and the Alexander von Humboldt.

e: hannaq1996@gmail.com

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