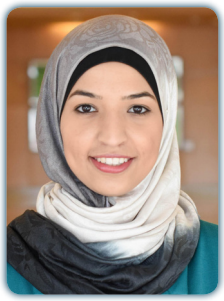
9th International Conference and Exhibition on
TISSUE ENGINEERING AND BIOBANKING
&
9th International Conference and Exhibition on
TISSUE SCIENCE AND REGENERATIVE MEDICINE
April 23-24, 2018 Las Vegas, USA



Tojan B Rahhal

University of Missouri, USA

Pulmonary delivery of butyrylcholinesterase as a model protein to the lung

Pulmonary delivery has great potential for delivering biologics to the lung if the challenges of maintaining activity, stability, and ideal aerosol characteristics can be overcome. To study the interactions of a biologic in the lung, we chose butyrylcholinesterase (BuChE) as our model enzyme, which has application to use as a bioscavenger protecting against organophosphate exposure or for using with pseudocholinesterase deficient patients. In mice, orotracheal administration of free BuChE resulted in 72 h detection in the lungs and 48 h in the broncheoalveolar lavage fluid (BALF). Free BuChE administered to the lung of all mouse backgrounds (Nude, C57BL/6, and BALB/c) showed evidence of an acute cytokine (IL-6, TNF-α, MIP2, and KC) and cellular immune response that subsided within 48 h, indicating relatively safe administration of this non-native biologic. We then developed a formulation of BuChE using Particle Replication in Non-Wetting Templates (PRINT). Aerosol characterization demonstrated biologically active BuChE 1 μm cylindrical particles with a mass median aerodynamic diameter of 2.77 μm, indicative of promising airway deposition via dry powder inhalers (DPI). Furthermore, particulate BuChE delivered via dry powder insufflation showed residence time of 48 h in the lungs and BALF. The in vivo residence time, immune response, and safety of particulate BuChE delivered via a pulmonary route, along with the cascade impaction distribution of dry powder PRINT BuChE, showed promise in the ability to deliver active enzymes with ideal deposition characteristics. These findings provide evidence for the feasibility of optimizing the use of BuChE in the clinic; PRINT BuChE particles can be readily formulated for use in DPIs, providing a convenient and effective treatment option.

Biography

Tojan B Rahhal is an Adjunct Assistant Professor in Bioengineering and the Director of Diversity and Outreach Initiatives at the University of Missouri-Columbia in the College of Engineering. She graduated from North Carolina State University with a BS in Biomedical Engineering. She went on to pursue a PhD in Pharmaceutical Sciences at the University of North Carolina at Chapel Hill (UNC-Ch), working in the lab of Dr. Joseph M. DeSimone. Her research focused on Engineering PRINT Particles for Pulmonary Delivery of Therapeutics and examined the effect of particle parameters (size, shape, composition, and surface chemistry) on residence time, cellular interactions, and immune responses in the lungs. Her work addresses the need for more efficient delivery of active therapeutics/biologics using dry powders that allow for monodisperse aerosolization and accurate deposition in the lungs for treatment of pulmonary diseases. Her work has been published in *Molecular Pharmaceutics and Nanomedicine: Nanotechnology, Biology, and Medicine*.

rahhalt@missouri.edu

Notes: