

Pharmaceutical Formulations & Drug Delivery

November 23, 2021 | Webinar

Ionic Complexed Nanoparticles for Heparin Drug Delivery

Heparin, a highly sulfated glycosaminoglycan, functions as an anticoagulant drug to prevent common post-surgical complications, such as pulmonary embolisms, and deep vein thrombosis. Currently, it is injected subcutaneously, however, due to the pain associated with injection, and expensive in-patient fees, patients are less likely to comply with the requirements of heparin administration. This project aims to increase patient compliance by creating a targeted approach for heparin oral drug delivery. Heparin is a negatively charged drug due to its carboxyl and sulfate groups. Therefore, it is an excellent candidate for delivery by incorporation in ionic complexed nanoparticles (ICNs). These nanoparticles consist of a cationic polymer entrapping an anionic drug. The cationic polymer being used in this research project is chitosan. It is a naturally occurring amino polysaccharide with repeat units of D-glucosamine linked β -(1 \rightarrow 4). ICNs are pH sensitive such that they can be used to release drugs based on cue within specific pH ranges. We are using this pH sensitivity by designing the heparin bound ICN's to be stable under the acidic conditions (pH 1.5-2.0) within the stomach and for a short time until it is able to enter the small intestines where it will be absorbed by the epithelial layer. To ensure that the designed ICN heparin delivery systems can meet the strict requirements for oral drug delivery, we are studying ICN particle stability and heparin release as a function of time, pH, and temperatures using simulated fluids that mimic the GI tract environment.



Bhagyashree (Gayathri) Subramaniam

Rensselaer Polytechnic Institute, USA

Biography

Gayathri Subramaniam completed her undergraduate studies in biomedical engineering at Rensselaer Polytechnic Institute (RPI) in 2019. From there, she went directly into graduate school to pursue her PhD in chemistry and is now a third year PhD candidate under Dr. Richard Gross at RPI. She has co-authored a paper on bio based epoxy resins and have given multiple talks and presentations on her research. She has worked on drug delivery methods, bio based polymers and creating hydrogels for wound healing and in vivo applications. Gayathri's interest lies in the biomedical applications within the field of chemistry and creating an interdisciplinary field of study.

subrab@rpi.edu