The Department of Biomedical Engineering

Presents:

Polymers for DNA Vaccine Delivery: Novel Materials and Biological Mechanisms

By

Prof. Chun Wang

Department of Biomedical Engineering
University of Minnesota

ABSTRACT:

DNA vaccination is a highly promising approach to preventing or treating cancer and infections. Typically, a disease-specific antigen is encoded in a DNA plasmid and delivered to the body. The protein antigen is expressed by antigen-presenting cells such as dendritic cells, which, upon proper activation, present the antigen along with co-stimulatory signals to generate antigen-specific immune responses that control diseases.

Unfortunately, "naked" DNA molecules are only weakly immunogenic, and the delivery of DNA to antigen-presenting cells faces multiple hurdles. Our long-term goal is to develop polymer-based delivery approaches that improve the efficacy of DNA vaccines. There are two aspects to our work. First, we are interested in the development of polymeric materials that recapitulate structural and functional features of virus – the natural gene delivery "nano-machine". Some of these features include well-defined molecular structure and responsiveness to acidic pH environment. I will describe the synthesis and characterization of such polymers and discuss potential applications in the delivery of DNA vaccine and anti-cancer drugs. Second, we strive to understand mechanistically the interaction between cationic polymers and dendritic cells. I will discuss our recent findings that may shed light on how polymer-mediated DNA vaccine delivery can be optimized to achieve immune activation.

3:35 – 4:30 P.M.

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Room 2-101 NHH

BMEn 8601 Graduate Seminar

For information, contact Rachel Boehme at bmengp@umn.edu , 612-624-8396.