

University of Houston - Biomedical Engineering Seminar

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Via Zoom: <https://uofh.zoom.us/j/92470065206>

Drugs should be designed with delivery in mind (and vice versa)



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Abstract

Basic principles have emerged for oral and intravenous drug design, but fewer efforts have aimed to create drugs that persist at the administration site or molecular structures that promote drainage to regional lymphatic networks. Examples are:(1) Pharmaceutical aerosols that must transit anatomical barriers to reach the desired target, a pathogen for example. Novel structures that persist in mucus to eradicate pathogens will be presented. (2) We designed soluble antigen arrays (SAGAs) to promote the drainage of autoantigens to secondary lymphoid organs to treat autoimmune diseases by inducing immune tolerance.(3) We designed immunostimulants that persist in tumor tissue after intratumoral/perilesional injection. Intratumoral immunotherapy is proposed to work synergistically with checkpoint inhibitors making a nonresponsive 'cold' tumor 'hot' by recruiting and activating tumor infiltrating lymphocytes. Systemic immune-related adverse reactions can occur if immunostimulant escapes the site of administration. This can be prevented by electrostatic mechanisms. These examples show the need for rational design of drug molecules or formulations based upon the route of delivery and biological barriers encountered.

Biosketch

Cory Berkland holds the Solon E. Summerfield Distinguished Professorship in the Department of Pharmaceutical Chemistry and in the Department of Chemical Engineering at The University of Kansas. He received MS and PhD degrees from the Department of Chemical and Biomolecular Engineering at the University of Illinois in Urbana-Champaign and a BS degree in Chemical Engineering from Iowa State University in Ames. His lab studies pharmaceuticals and biomaterials with a particular emphasis on molecular design and transport in the human body. Prof. Berkland is a co-founder of Orbis Biosciences (purchased by Adare Pharmaceuticals), Savara Pharmaceuticals (NASDAQ: SVRA), Bond Biosciences, and Orion BioScience.