Chemical and Biomolecular Engineering
Fall 2009 Seminar Series

Eric V. Shusta

Associate Professor of Chemical and Biological Engineering, University of Wisconsin - Madison

"Engineering Strategies for Mimicking the Blood-Brain Barrier In Vitro and Overcoming it In Vivo"

Abstract

Millions of people worldwide are afflicted with neurological diseases such as Parkinson's disease, Alzheimer's disease, brain cancer, and cerebral AIDS. Although many new drugs are being developed to combat these and other brain diseases, few new treatments have made it to the clinic. The impermeable nature of the brain vasculature, also known as the blood-brain barrier (BBB), is at least partially responsible for the paucity of new brain therapeutics. As examples, approximately 98% of small molecule pharmaceuticals do not enter the brain after intravenous administration, and the BBB prevents nearly all protein and gene medicines from entering the brain. Our research group is therefore focused on developing tools for the analysis of the brain drug delivery process and identifying novel strategies for circumventing this transport barrier. This presentation will detail our recent work regarding the development of cell-based *in vitro* experimental models that accurately mimic the BBB characteristics observed *in vivo.* Such models are amenable to drug permeability screening and *a priori* prediction of brain uptake. In addition, I will discuss our efforts to overcome BBB restrictions on brain drug delivery. To this end, we are mining large antibody libraries to identify antibodies that can target and act as artificial substrates for endogenous receptor-mediated BBB nutrient transport systems. After conjugation to drug payloads that can include small molecules, proteins, or DNA therapeutics, these antibodies have the potential to deliver medicines across the BBB noninvasively.

Wednesday, October 14, 2009, 3:00 P.M.
Wu and Chen Auditorium, Levine Hall

Penn Engineering

Department of Chemical and Biomolecular Engineering, University of Pennsylvania, 220 South 33rd Street, Philadelphia, Pennsylvania 19104-6393 215.898.8351