



COLLEGE OF PHARMACY
PHARMACEUTICAL SCIENCES
UNIVERSITY OF MICHIGAN
Pharmaceutical Sciences Special Seminar

Thursday, April 26, 2018

North Campus Research Complex 10 011S010 Research Auditorium

4:00-5:00 pm

“Addressing Human Body’s Biological Barriers for Drug Delivery”



Presented by:

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Abstract: Effective delivery of drugs is a major problem in today’s healthcare. At a fundamental level, the challenge of drug delivery reflects the fact that the drug distribution in the body is limited by body’s natural metabolic processes and transport barriers. These biological barriers, while serving an important purpose of regulating body’s metabolic functions, limit the drug dose that ultimately reaches the target site. Accordingly, many drugs fail to reach their full therapeutic potential. Our research aims at developing a fundamental understanding of body’s key biological barriers such as skin and intestinal epithelium, and utilizing this understanding to develop novel means to negotiate these barriers to deliver drugs.

Human skin is one of the most challenging and well-engineered biological barriers in the human body. In principle, it offers an ideal interface to administer drugs into the body through the use of a transdermal patch. However, its formidable barrier properties limit the drug dose that can enter the body. Our research has led to the understanding of how skin’s structure and transport properties can be modulated using external stimuli such as ultrasonic waves, fluid microjets and amphiphiles, and how these stimuli can be controlled to enable transdermal delivery of drugs that were once thought undeliverable. We have also extended the lessons learned from our skin exploration to understand and negotiate other biological barriers in the body, in particular intestinal epithelium, reticuloendothelial system and tumors. Using transdermal-inspired approaches, we have advanced ways to understand and enhance drug delivery across the intestinal epithelium via oral route using patches. We have also designed patches that can be delivered within the body using circulatory cells such as red blood cells and macrophages by navigating through the internal biological barriers of the liver, lung, brain and tumors. I will present an overview of the lessons learned from our exploration of these biological barriers.

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