Chemical Engineering Seminars – MT 2011

Week 2, Tuesday October 18th 2011, 4:00PM-5:00PM
Lecture Room 3, Thom Building, Engineering Science

Water and Solute Transport across the Blood-Brain Barrier

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Abstract

The blood-brain barrier (BBB) is a dynamic barrier between the circulating blood and the brain tissue, which is essential for maintaining the micro-environment of the brain. Its special anatomical features determine its protective role for the central nervous system. On the other hand, poor penetration of the BBB is a major impediment to treating diseases of the brain. Understanding where and how water and solute transport through the BBB at cellular and molecular levels is crucial for developing strategies in drug delivery to treat various brain diseases. This talk will introduce the mathematical models that describe water and solute transport across the BBB. These models, combined with the experimental results for rat pial microvessels, are used to evaluate the role of the structural components in the paracellular pathway of the BBB as determinants of its permeability properties. The paracellular pathway of the BBB is formed by the endothelial surface glycocalyx, the tight junction openings, the basement membrane and the openings between adjacent astrocyte foot processes.

Bio

Dr. Bingmei Fu received her B.S., M.S. from the Department of Modern Mechanics of the University of Science and Technology of China in 1985 and 1988, respectively. Then she worked as an assistant professor for one year in Southwest Jiaotong University before she came to the U.S. in 1989. She had been working with Dr. Sheldon Weinbaum to develop transport models for the inter-endothelial cleft and obtained a Ph.D. in Mechanical Engineering from the City University of New York in 1995. After working with Dr. Roy Curry on *in vivo* single microvessel permeability for three years as a NIH postdoctoral fellow in the School of Medicine, University of California, Davis, she joined the Department of Mechanical Engineering at the University of Nevada, Las Vegas in 1998 as an assistant professor and was promoted to a tenured associate professor in early 2004. She moved to the Department of Biomedical Engineering of the City College of the City University of New York as a tenured associate professor in the fall of 2004 and was promoted to a full professor in 2010.