

**Center for Fluid Mechanics, Division of Applied Mathematics
Fluids, Thermal and Chemical Processes Group, School of Engineering
Joint Seminar Series**

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**The Structure and Function of the Endothelial Glycocalyx and Its Amazing
Application to the Design of a Futuristic Jet Ski Train**

Over the past decade and a half, since it was first observed in vivo, there has been an explosion of interest in the thin (~500 nm), gel-like endothelial glycocalyx layer (EGL) that coats the luminal surface of our blood vessels. In this lecture we examine the mechanical and biochemical properties of this layer and its interaction with the cellular components of blood. In particular, we show why red cells are such excellent skiers and why they are able to move through tightly fitting capillaries with negligible friction. We also examine the role of the EGL in modulating the oncotic forces that regulate the exchange of water in microvessels (revised Starling hypothesis) and in transducing fluid shear stress (FSS) into the intracellular cytoskeleton of ECs in initiating intracellular signaling and its effect on cytoskeletal reorganization. Finally we use the lessons learned from red cells as skiers to design a futuristic jet ski train that can ski on a soft porous track at 700 km/hr using 1/5 the energy of commercial jet aircraft with the same passenger load.

**Tuesday September 14, 2010
3:00 PM
Barus & Holley Room 190**