

**CENTER FOR FLUID MECHANICS  
AND  
THE FLUIDS, THERMAL AND CHEMICAL PROCESSES GROUP  
OF  
THE DIVISION OF ENGINEERING  
SEMINAR SERIES**

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**Multi-scale Analyses of Tumor Physiology and Blood Vessel Dynamics**

Recent cancer therapies have targeted tumor blood vessels with inconsistent results. Some treatments show promise while others fail, underscoring a frustrating lack of understanding of the mechanisms that control blood vessel formation, destruction and function . A major difficulty lies in the fact that the mechanisms of vessel formation and remodeling operate at multiple scales, each with its own set of controls, and each critical to the overall function of the blood vessel network. Most importantly, “rare” events occurring at the single cell level can dominate overall vessel network function, and therefore, tumor growth. We are developing analytical approaches--both experimental and computational-- that span the size scale from single cells to bulk tumor in order to incorporate the relevant parameters critical for understanding tumor growth. Experimentally, intravital microscopy allows determination of single-vessel hematocrit, blood velocity, permeability as well as vessel and network morphology over time. Mathematical models of blood flow, vessel growth & remodeling, and tumor growth and invasion span the size scale from cells to tissue to elucidate the cellular events that influence tissue-scale physiology. These tools provide a framework for studying the effects of anti-tumor therapies and improving their efficacy.

**TUESDAY – MARCH 31, 2009  
Barus & Holley, Room 190  
4:00pm**