



*BMES 2010 Rita Schaffer Memorial - Young Investigator Lecturer:*

### **Cynthia Reinhart-King, PhD**

*Assistant Professor, Cornell University*

SATURDAY, OCTOBER 9, 2010

8:00AM

BALLROOM D, CONVENTION CENTER

## How Matrix Properties Control the Self-assembly and Maintenance of Tissues

**T**HE MECHANISM BY which cells organize into tissues is fundamental to developmental biology and tissue engineering. Likewise, disruption of cellular order within tissues is a hallmark of many diseases including cancer and atherosclerosis. Tissue formation is regulated, in part, by a balance between cell-cell cohesion and cell-matrix adhesion. In this lecture, I will discuss my laboratory's investigation into the role of this balance in the formation of vasculature. Specifically, we have found that by decreasing cell-matrix adhesion by either reducing matrix stiffness or matrix ligand density, endothelial cells self-assemble into network-like structures, resembling capillaries. These structures are stabilized by increased localization of VE-cadherin to the cell membrane and the polymerization of the extracellular matrix protein fibronectin. When fibronectin polymerization is inhibited, network formation does not occur. Interestingly this interplay between substrate mechanics, ECM assembly and tissue self-assembly is not limited to endothelial cells, as we have observed it in other cell types as well. These results suggest novel approaches to foster stable cell-cell adhesion and engineer tissues.

**CYNTHIA REINHART-KING** is an Assistant Professor in the Department of Biomedical Engineering at Cornell University, and a member of the graduate faculty in Mechanical and Aerospace Engineering and the Cornell Nanobiotechnology Center. She obtained undergraduate degrees in chemical engineering and biology at MIT. While there, she was awarded the Randolph G. Wei Award for "research at the interface of the life sciences and engineering." As a graduate student at the University of Pennsylvania in the Department of Bioengineering, she received a Whitaker Foundation Graduate Fellowship to support her thesis work on endothelial cell mechanobiology. She then completed postdoctoral training as an Individual NIH NRSA postdoctoral fellow in the Cardiovascular Research Institute at the University of Rochester. Dr. Reinhart-King's current research interests are in the areas of cell-biomaterial interactions, cell mechanics, and vascular cell signaling. Her lab uses a multidisciplinary approach, drawing from cell and molecular biology, biophysics, and biomechanics to quantitatively examine the mechanisms of tissue formation and disease progression. Her lab is funded by the American Heart Association, the National Institutes of Health, and the American Federation of Aging Research, and her recent independent work received a Silver Medal at the 6th World Congress on Biomechanics. She has also received the 2010 Sonny Yau '72 Excellence in Teaching Award, the highest award for teaching in College of Engineering.

*BMES established this award in 2000 to honor Rita M. Schaffer, former BMES Executive Director. Rita's gift of her estate, along with contributions from her family, friends, and associates, has enabled BMES to create the Rita Schaffer Young Investigator Award, which includes the Rita Schaffer Memorial Lecture.*