



**November 2, 2009**  
**(Monday)**  
**4:30 – 5:30 PM**  
**Doherty Hall 1212**



## **Professor Helim Aranda-Espinoza**

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### *"Adhesion and mechanotactic aspects in leukocyte transmigration"*

Cardiovascular disease (CVD) is the leading cause of death in the world. One type of CVD, atherosclerosis, occurs due to an over-accumulation of leukocytes which adhere to the vascular wall, transmigrate through the endothelium, take up lipid particles, and form plaques causing obstruction to blood flow. This process leads to an overall stiffening of the arteries and often heart attack or stroke. It is understood that in addition to biological signaling events, physical force propagation through endothelial cells (ECs) is crucial in regulating the health of the vasculature; thus, it is important to study the biophysical aspects of ECs during leukocyte transmigration. In this study we used polyacrylamide (PA) gels of varying stiffness with extracellular matrix proteins incorporated to mimic the basement membrane, plate human umbilical vein ECs (HUVECs) onto the surface of the substrates, and allow them to form monolayers. We observe that substrate mechanical properties affect the morphology, cytoskeletal arrangement, and stiffness of HUVEC monolayers, suggesting that EC force propagation occurs differently in diseased arteries. We find that mean HUVEC monolayer stiffness, as measured by atomic force microscopy, increases with increasing substrate stiffness:  $2.3 \pm 0.2$  kPa on 0.9 kPa gels,  $3.2 \pm 0.2$  kPa on 5.2 kPa gels, and  $4.4 \pm 0.3$  kPa on 100 kPa gels. However, when the monolayers are treated with TNF- $\alpha$  the effect of the substrate stiffness is abrogated and all monolayers show similar stiffness. Still, we have found that leukocyte migration on the HUVECs is biphasic with substrate stiffness, as our previous results on PA gels have shown.

