



# Northeastern University

## College of Engineering

Please join us for a  
**Chemical Engineering Seminar**

**Wednesday, September 26, 2012**  
**108 West Village H**  
**11:45 a.m. – 1:00 p.m.**

***“Hemodynamics, Glycocalyx, and  
Endothelial Cell Function in Health and Atherosclerosis”***

**ENO E. EBONG, Ph.D.**

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### **ABSTRACT**

The vascular endothelial cell (EC) layer is a mechanical signal-transduction interface between flowing blood and the vessel wall. Normal EC resides in areas of undisturbed flow where the vessel is relatively protected from lesion development (Fig. 1). On the other hand, EC of altered phenotype are found in disturbed flow regions and co-localized with atherosclerotic lesions (Fig. 1). The mechanisms by which flow alters EC function to prevent or promote atherosclerosis remain unclear. The EC glycocalyx (GCX) layer, at the apical cell surface and linked to basal matrix and cell-to-cell junctions via the cytoskeleton (Fig. 2), is a prime candidate participant in mechanotransduction mechanisms. In this research, the morphology of healthy and disease-prone GCX is revealed. Glycocalyx involvement in flow-regulated endothelial cell behavior, vascular function, and the development of atherosclerosis is also explored. This work uniquely combines engineering with advanced microscopy, cell and molecular biology, and animal pathophysiology to lay the foundation for translational development of GCX restoration methods to treat vascular disease.

**BIOGRAPHY:** Dr. Eno Essien Ebong holds Engineering degrees from the Massachusetts Institute of Technology (S.B.) and the Rensselaer Polytechnic Institute (M.Eng and Ph.D). In her dissertation work, Dr. Ebong integrated biofluid mechanics and blood vessel cell biology to demonstrate, for the first time, that fluid shear stress augments cell-to-cell communication in human endothelial cells (EC) that line the blood vessel wall (Ebong et al., American Journal of Physiology Heart and Circulatory Physiology, 2006). For her achievements, she was awarded the 2006 Karen and Lester Gerhardt Prize by Rensselaer and the 2006 Zelda and David G. Gisser Prize in Biomedical Engineering by the Rensselaer Department of Biomedical Engineering. Dr. Ebong is currently a researcher working jointly with Dr. John M. Tarbell in the Biomedical Engineering Department at The City College of New York (CCNY) and Dr. David C. Spray at Albert Einstein College of Medicine. Using rapid cryopreservation and transmission electron microscopy techniques, she has begun to define the structure and blood flow pattern induced reorganization of the endothelial cell sugar coat, called the glycocalyx, which sheds in vascular disease (Ebong et al., Arteriosclerosis Thrombosis and Vascular Biology, 2011). This work was the basis for the initiation of a new NIH-funded CCNY/Einstein research project. Dr. Ebong also studies the mechanisms by which the glycocalyx participates in the conversion of blood fluid forces into endothelial cell functions and dysfunction associated with vascular health and disease, respectively. Her long term career goal is to identify mechanically-regulated cellular and molecular targets and develop novel tools to prevent, diagnose, and treat disease.

**Refreshments will be served**