

MECHANICAL ENGINEERING DEPARTMENT
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**Fluid Dynamics Regulates Specificity in Endothelial Cell Communication
and its Role in the Maintenance of Vascular Homeostasis**

by

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Wednesday, November 7, 2007
3:15 p.m. — Refreshments before the seminar
3:30 p.m. — Graduate Seminar
Room 2-101 Hasselmo Hall

ABSTRACT — The localization of atherosclerotic lesions coincides with regions of disturbed blood flows where endothelial cells of altered phenotype are found adjacent to normal endothelium in undisturbed flow, where the vessel is relatively protected from lesion development. The cellular and molecular mechanisms by which hemodynamics might alter endothelial cell function leading to lesion development remain unclear. The direct passage of small molecules (<1 kD) through endothelial gap junctions play a key role in regulating vascular cell function and maintaining the vessel wall homeostasis. We hypothesize that gradients in fluid shear stress associated with disturbed flows, induce regional changes in endothelial gap junctional communication (GJIC) which in turn, affect cell phenotype, contributing to “functional compartmentalization” of the endothelial monolayer *in vivo* and *in vitro*. In this presentation, I will discuss our findings on flow regulation of GJIC in *in vitro* models of atherogenesis-prone regions of the human vasculature. Various hemodynamic parameters will be considered and biological features associated with altered endothelial phenotype will be presented.
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BIO — **Dr. Natacha DePaola** received the BS in mechanical engineering from the Universidad Simon Bolivar, Caracas-Venezuela, MS in mechanical engineering from MIT, and PhD in Medical Physics and Medical Engineering from the Harvard-MIT Division of Health Sciences and Technology. She completed her postdoctoral training at Columbia University, where she also held a position as an adjunct assistant professor of chemical engineering. She started her academic career at Northwestern University as assistant professor of biomedical engineering and later moved to RPI where she has been for the past 13 years. Dr. DePaola is also an adjunct faculty of the Center for Cardiovascular Sciences at the Albany Medical College. The research interests and activities of Dr. DePaola’s laboratory are in the broad area of biofluid dynamics, cell mechanics, cell and tissue engineering, microgravity research, cell bioreactor design, and bioelectromagnetism at the cell and molecular level. Dr. DePaola is a Fellow of the American Institute for Medical and Biological Engineering and a member of the Biomedical Engineering Society, the American Society of Mechanical Engineers, the American Society for Cell Biology, the American Association for the Advancement of Science, and the American Society for Engineering Education.

Informal Faculty Luncheon: Wednesday, November 7, 2007, 12:00 noon. Meet in 1100 ME and walk to lunch with other faculty. Dr. Natacha DePaola will be able to attend.