Physics Colloquium

Michigan Technological University

Thursday, April 8th, 2010
4:00 pm, Room 139 Fisher Hall

Synergy Between Interstitial Flow, Lymphangiogenesis, and the Extracellular Matrix

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Abstract: Lymphatic function is impaired when lymph vessels are excised during surgery to treat breast cancer. This often results in secondary lymphedema of the arm, a condition of chronic, painful, and disfiguring swelling. It has been hypothesized that increased lymphatic regeneration across the site of injury may increase lymphatic function and reduce swelling in lymphedema. Vascular endothelial growth factor (VEGF)-C, which signals through VEGF Receptor-2 and VEGFR-3 expressed on lymphatic endothelial cells, is necessary for lymphangiogenesis. Excess VEGFR-3 signaling with exogenous VEGF-C has been shown to be ameliorative for lymphedema following lymphatic obstruction in experimental models. However, we have found that lymphangiogenesis may be dependent upon interstitial flows through the extracellular matrix. Because interstitial flows become impaired during lymphedema, the ability of VEGF-C to promote lymphatic regeneration in lymphedema may be limited. This presentation will begin with an overview of the lymphatic system. We then present data showing the synergism between interstitial flow, the extracellular matrix, and lymphangiogenesis and how this synergistic relationship may point towards the development of novel therapies for lymphedema.

Biography: Dr Jeremy Goldman is a faculty member in Biomedical Engineering at Michigan Tech. Dr. Jeremy Goldman received his undergraduate degree in Chemical Engineering from Cornel University and his PhD degree in Biomedical Engineering from Northwestern University. He was a postdoctoral fellow in Swiss Federal Polytechnic Institute (EPFL), Lausanne, Switzerland. His research interests include the biology and physiology of the lymphatic and blood vascular systems.

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