

# ALISHA LILLY SIEMINSKI

## EMPLOYMENT

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**Franklin W. Olin College of Engineering**, Needham, MA  
Assistant Professor of Bioengineering

January 2010-present  
September 2005-May 2009

*Research Summary:* Investigation of microscopic biomaterial remodeling during capillary morphogenesis using confocal microscopy; investigation of the roles and interactions of tumor suppressor, RASSF1A, and substrate stiffness in tumorigenic cell behaviors; incorporation of disease states into a math model of vascular remodeling.

*Teaching:* Courses taught include Topics in Bioengineering, Transport in Biological Systems, Tissue Engineering (lab-based), Cellular Bioengineering, and Biological Thermodynamics for Engineers; faculty advisor for Olin Self Studies and Senior Consulting Project in Engineering (SCOPE); mentoring of research students and advisees.

*Other Activities:* Active collaborative grant writing with colleagues at Olin and other institutions; service on various committees and continuous involvement in admissions process; development work for Bioengineering SCOPE projects; management, policy development, and negotiation of equipment acquisition for biological laboratory.

**Pfizer, Inc.**, Cambridge, MA  
Principal Scientist, Quantitative Biotherapeutics Group

May 2009-December 2009

**Massachusetts Institute of Technology**, Cambridge, MA  
Biological Engineering Post-doctoral Fellow, Laboratory of Dr. Roger Kamm

September 2003-August 2005

*Research Summary:* Use of novel self-assembling peptide biomaterial to investigate cell-biomaterial interactions and the effects of stiffness on endothelial capillary morphogenesis; role of Ena/VASP proteins in endothelial barrier function, force generation, and capillary morphogenesis; and study of neurite outgrowth in a 3D culture system.

## EDUCATION/RESEARCH EXPERIENCE

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**University of Pennsylvania**, Philadelphia, PA  
Ph.D. in Bioengineering

September 1998-August 2003

*Thesis:* In Vitro and In Vivo Evaluation of Endothelial Cells in Microvascular Networks

*Research Advisor:* Dr. Keith J. Gooch

*Summary:* Tissue-engineered microvascular networks made from vessel- and bone marrow-derived human endothelial cells for delivery of proteins to the circulation in gene therapy applications or vascularizing engineered tissues; role of supporting cells and various matrix supports.

**Massachusetts Institute of Technology**, Cambridge, MA  
BS in Chemical Engineering

February 1996-June 1998

*Research Advisor:* Dr. Robert Langer

*Summary:* Effects of growth factors and mechanical environment on composition of tissue-engineered cartilage; tissue-engineered microvascular networks for delivery of proteins to the circulation in gene therapy applications.

**University of Washington**, Seattle, WA  
Completed basic mathematics, science (honors), and engineering courses.

September 1992-June 1995

## PUBLICATIONS & MANUSCRIPTS

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Biomaterial-Microvasculature Interactions. Sieminski AL and Gooch KJ. *Biomaterials* 2000; 21(22): 2232-41.

IGF-I and Mechanical Environment Interact to Modulate Engineered Cartilage Development. Gooch KJ, Blunk T, Courter DL, Sieminski AL, Bursac PM, Vunjak-Novakovic G, Freed LE. *Biochemical Biophysical Research Communications* 2001; 286 (5): 909-15.

Differential Effects of Growth Factors on Tissue-Engineered Cartilage. Blunk T, Sieminski AL, Gooch KJ, Courter DL, Hollander A, Nahir AM, Langer R, Vunjak-Novakovic G, and Freed LE. *Tissue Engineering* 2002; 8(1):73-84.

Bone Morphogenetic Proteins-2, -12, and -13 Modulate In Vitro Development of Engineered Cartilage. Gooch KJ, Blunk T, Courter DL, Sieminski AL, Vunjak-Novakovic G, Freed LE. *Tissue Engineering* 2002; 8(4): 591-601.

- Systemic Delivery of hGH Using Genetically Modified Tissue-Engineered Microvascular Networks: Prolonged Delivery and Endothelial Survival with Inclusion of Non-Endothelial Cells. Sieminski AL, Padera RF, Blunk T, Gooch KJ. *Tissue Engineering* 2002; 8(6): 1057-1069.
- Bone Morphogenetic Protein-9: A Potent Stimulant of Cartilage Development and Mineralization. Blunk T, Sieminski AL, Croft C, Courter DL, Chieh J, Khurana JS, and Gooch KJ. *Growth Factor* 2003; 21(2):71-8.
- Salmon fibrin supports comparable sprout length, increased sprout number, and decreased degradation relative to human fibrin in an in vitro angiogenesis model. Sieminski AL and Gooch KJ. *Journal of Biomaterials Science, Polymer Edition*, 2004; 15(2): 237-42.
- The Relative Magnitudes of Endothelial Force Generation and Matrix Stiffness Modulate Capillary Morphogenesis In Vitro. Sieminski AL, Hebbel RP, and Gooch KJ. *Experimental Cell Research*, 2004; 297(2): 574-84.
- Self-assembling short oligopeptides and the promotion of angiogenesis. Narmoneva DA, Oni O, Sieminski AL, Zhang S, Gertler JP, Kamm RD, Lee RT. *Biomaterials*, 2005; 26(23):4837-46.
- Improved microvascular network in vitro by human blood outgrowth endothelial cells relative to vessel-derived endothelial cells. Sieminski AL, Hebbel RP, and Gooch KJ. *Tissue Engineering* 2005; 11(9-10): 1332-45.
- Micropatterned Polymer Surfaces Improve Retention of Endothelial Cells Exposed to Flow-Induced Shear Stress. Daxini SC, Nichol JW, Sieminski AL, Smith G, Gooch KJ, Shastri VP. *Biorheology*. 2006; 43(1): 45-55.
- Migration of tumor cells in 3D matrices is governed by matrix stiffness along with cell-matrix adhesion and proteolysis. Zaman MH, Trapani LM, Sieminski A, Mackellar D, Gong H, Kamm RD, Wells A, Lauffenburger DA, Matsudaira P. *PNAS* 2006;103(29): 10889-94.
- The Stiffness of Three-Dimensional Ionic Self-Assembling Peptide Gels Affects the Extent of Microvascular Network Formation. Sieminski AL, Was AS, Kim G, Kamm RD. *Cell Biochemistry and Biophysics* 2007; 49(2): 73-83.
- Ena/VASP is Required for Endothelial Barrier Function *In Vivo*. Furman C, Sieminski AL, Kwiatkowski AV, Rubinson D, Vasile E, Bronson RT, Fässler R, and Gertler FB. *Journal of Cell Biology* 2007; 179(4): 761-75.
- Primary Sequence of Ionic Self-Assembling Peptide Gels Affects Endothelial Cell Adhesion and Capillary Morphogenesis. Sieminski AL, Semino CE, Gong H, Kamm RD. *Journal of Biomedical Materials Research* 2008; 87(2):494-504.
- VASP involvement in force-mediated adherens junction strengthening. Kris AS, Kamm RD, Sieminski AL. *Biochemical Biophysical Research Communications* 2008; 375(1): 134-8.
- Basement membrane presentation and remodeling are critical for MEC morphogenesis. Leight JL, Johnson KR, Sieminski AL, Spirio L, Wong Y, and Weaver VM (*in preparation*)
- Geometry and Stability of Microvessels. Shafer I, Boes M, Nancollas R, Geddes JB, and Sieminski AL (*submitted to Mathematical Medicine and Biology* 5/09)
- Pericellular conditions regulate extent of cell-mediated compaction of collagen gels. Stevenson MD, Sieminski AL, McLeod CM, Byfield FJ, Barocas VH, Gooch KJ (*submitted to Biophysical Journal* 9/09)
- Basement membrane presentation and remodeling are critical for MEC morphogenesis. Leight JL, Johnson KR, Sieminski AL, Spirio L, Wong Y, and Weaver VM (*in preparation*)
- Microscopic matrix remodeling precedes endothelial morphological changes during capillary morphogenesis. McLeod CM, Miroshnikova YA, Sieminski AL (*in preparation*)

#### OTHER ACTIVITIES

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*Consulting:* Consulting with 3DMatrix and associated partners on use of Puramatrix (2004-present)

*Invited Talks:* Endothelial Cell-Biomaterial Interactions During the Formation of Capillary-Like Networks, University of Regensburg, Regensburg, Germany (2006), GEM<sup>4</sup> Summer School, MIT (2006)

*Awards & Honors:* Ruth Kirschstein NRSA Post-doctoral Fellowship, Fall 2003 (accepted), Whitaker Foundation Pre-doctoral Fellowship, Fall 1998 (accepted), NSF Pre-doctoral Fellowship, Fall 1998 (declined)

*Ad Hoc Reviewer:* American Journal of Physiology – Heart and Circulatory Physiology (2006), Cell Biology International (2006), Physical Review E (2007), Acta Biomaterialia (2007), Tissue Engineering (2008), Trends Biotechnology (2009).

*Member:* Biomedical Engineering Society, Society of Women Engineers