

Stephanie K. Seidlits, Ph.D.

Assistant Professor, Department of Bioengineering

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EDUCATION

Ph.D., 2010, Biomedical Engineering, University of Texas at Austin, Advisors: Christine Schmidt and Jason Shear

M.S., 2006, Biomedical Engineering, University of Texas at Austin, Advisors: Christine Schmidt and Jason Shear

B.S., 2004, Bioengineering, Rice University

RESEARCH EXPERIENCE

- **Assistant Professor in Bioengineering at UCLA** (Los Angeles, CA) Mar. 2014-present
Focused at the interface of engineering, neuroscience and medicine, my research seeks to develop clinical therapies for injury and disorders of the central nervous system (CNS), including spinal cord injury, traumatic brain injury and glioma formation. Using biomaterial microenvironments and advanced imaging tools, my research aims to identify differences between the extracellular environment of diseased and healthy or developing and adult CNS tissues and exploit these mechanistic discoveries to develop novel therapies that target the local environment. Engineered microenvironments enable *ex vivo* investigation of key physiological players within conditions that approximate those *in vivo* so that physiologically relevant data can be obtained in a simplified context. Ultimately, this approach enables the development of new therapeutic strategies based on controlled manipulation of these players. The long-term goal of my research is to translate biomaterial microenvironments to *in vivo* regenerative therapies using hydrogels, gene and protein delivery and cell replacement as building blocks.
- **Post-doctoral Fellow in Chemical and Biological Engineering at Northwestern University** (Evanston, IL) Oct. 2010-Feb. 2014
NIH NRSA F32 Fellowship, Sponsor: Lonnie Shea, Co-Sponsor: Aileen Anderson
- **Post-doctoral Fellow in Biomedical Engineering at the University of Texas** (Austin, TX) May 2010-Sept. 2010
Supervisors: Christine Schmidt and Jason Shear
- **Ph.D. Student in Biomedical Engineering at the University of Texas** (Austin, TX) Aug. 2004-May 2010
Supervisors: Christine Schmidt and Jason Shear
Dissertation: Defined Hydrogel Microenvironments for Optimized Neuronal Culture
- **NSF IGERT Research Intern at the Ecole Polytechnique Fédérale de Lausanne** (Lausanne, Switzerland) May-Jun. 2006
Supervisors: Thomas Barker and Jeffrey Hubbell
- **Summer Research Intern at the Centre for Human Proteomics at the Royal College of Surgeons-Ireland** (Dublin, Ireland) Jun.-Aug. 2004
Supervisor: Derek Murphy
- **Undergraduate Researcher in Bioengineering at Rice University** (Houston, TX) Aug. 2002-Dec. 2004
Supervisors: Antonios Mikos and Kurt Kasper
- **Undergraduate Researcher in Neurobiology and Anatomy at the University of Texas Medical School** (Houston, TX) May 2002-Dec. 2003
Supervisor: Anne Sereno

PUBLICATIONS**Journal Articles**

- D.J. Margul, J. Park, R.M. Boehler, D.R. Smith, M.A. Johnson, D.A. McCreedy, T. He, A. Ataliwala, T.V. Kukushliev, Jesse Liang, Alireza Sohrabi, A.G. Goodman, C.M. Walthers, L.D. Shea*, **S.K. Seidlits*** (co-corresponding authors). (2016) Reducing neuroinflammation by delivery of IL-10 encoding lentivirus from multiple-channel bridges. *Bioeng. & Transl. Med.*, doi: 10.1002/btm2.10018.
- B.P. Bernabé, S. Shin, P.D. Rios, L.J. Broadbelt*, L.D. Shea*, **S.K. Seidlits*** (co-corresponding authors). (2016) Dynamic transcription factor activity networks in response to independently altered mechanical and adhesive microenvironmental cues. *Integrat. Biol.* 8(8):844-60.
- J. Lim, A. Ehsanipour, J.J. Hsu, J. Lu, T. Pedego, A. Wu, C.M. Walthers, L.L. Demer, **S.K. Seidlits**, Y. Tintut. (2016) Inflammation drives retraction, stiffening and nodule formation via cytoskeletal machinery in a 3-dimensional culture model of aortic stenosis. *Am. J. Pathol.*, 186(9):2378-89.
- M. Skoumal, **S.K. Seidlits**, S. Shin, L.D. Shea. Localized lentivirus delivery via peptide interactions. (2016) *Biotech. Bioeng.*, 113(9):2033-40.
- D.S. Hernandez, E.T. Ritschdorff, **S.K. Seidlits**, C.E. Schmidt, J.B. Shear. (2016) Functionalizing micro-3D-printed protein hydrogels for cell adhesion and patterning. *J. Mater. Chem. B*, 4:1818-1826.
- D.A. McCreedy, D.J. Margul, **S.K. Seidlits**, R.M. Boehler, J. Antane, R. Thomas, D.R. Smith, T. He, T.V. Kukushliev, B. Vedia, J. Lamano, S.W. Goldsmith, G. Sissman, L.D. Shea. (2016) Semi-automated counting of axon regeneration in PLG spinal cord bridges. *J. Neurosci. Methods*, 263:15-22.
- A.M. Thomas*, **S.K. Seidlits***, (co-first authors*), A.G. Goodman, T.V. Kukushliev, D.M. Hassani, B.J. Cummings, A.J. Anderson, L.D. Shea. (2014) Sonic hedgehog and neurotrophin-3 increase oligodendrocyte numbers and myelination after spinal cord injury. *Integrative Biology* 6(7):694-705.
- A.M. Thomas, M.B. Kubilius, S.J. Holland, **S.K. Seidlits**, R.M. Boehler, A. J. Anderson, B.J. Cummings, L.D. Shea. (2013) Channel density and porosity of degradable bridging scaffolds on axon growth after spinal injury. *Biomaterials* 34(9):2213-2220.
- Z.Z. Khaing, B.D. Milman, J.E. Vanscoy, **S.K. Seidlits**, R.J. Grill, C.E. Schmidt. (2011) High MW hyaluronic acid limits astrocyte proliferation and scar formation after SCI. *J. Neural Eng.* 8(4):046033.
- **S.K. Seidlits**, C.T. Drinnan, R.R. Petersen, J.B. Shear, L.J. Suggs, C.E. Schmidt. (2011) Fibronectin-hyaluronic acid composites for three-dimensional endothelial cell culture. *Acta Biomaterialia* 7(6):2401-2409.
- Y. Yang, **S.K. Seidlits**, M.M. Adams, Lynch VM, C.E. Schmidt, E.V. Anslyn, J.B. Shear. (2010) A highly selective low-background fluorescent imaging agent for nitric oxide. *J. Am. Chem. Soc.* 132(38):13114-13116.
- **S.K. Seidlits***, Z.Z. Khaing*, (co-first authors*) R.R. Petersen, J.D. Nickels, J.E. Vanscoy, J.B. Shear†, C.E. Schmidt† (co-corresponding authors). (2010) The effects of hyaluronic acid hydrogels with tunable mechanical properties on neural progenitor cell differentiation. *Biomaterials* 31:3930-3940.
- **S.K. Seidlits**, C.E. Schmidt*, J.B. Shear* (co-corresponding authors*). (2009) High-resolution patterning of hydrogels in three dimensions using direct-write photofabrication for cell guidance. *Adv. Funct. Mater.* 19:3543-3551.
- G. Kijanka, R. Barry, H. Chen, E. Gould, **S.K. Seidlits**, J. Schmid, M. Morgan, D.Y. Mason, J. Cordell, D. Murphy. (2009) Defining the molecular target of an antibody derived from nuclear extract of Jurkat cells using protein arrays. *Anal. Biochem.* 395(2):119-124.
- F.K. Kasper, **S.K. Seidlits**, A. Tang, R.S. Crowther, D.H. Carney, M.A. Barry, A.G. Mikos. (2005) In vitro release of plasmid DNA from oligo(poly(ethylene glycol) fumarate) hydrogels. *J Control. Release.* 104(3):521-539.

- **S. Seidlits**, T. Reza, K.A. Briand, A.B. Sereno. (2003) Voluntary spatial attention benefits voluntary not reflexive saccadic eye movements. *TheScientificWorld Journal*; 3:881-902.

Abstracts

- W. Xiao, **S.K. Seidlits**, L. Ta, D.A. Nathanson. (2016) Brain-mimetic microenvironments from culture of primary glioblastoma multiforme cells. *Biophysical J*, 110(3) suppl. 1: 340a.
- J. Lim, A. Ehsanipour, J. Lu, A. Wu, T. Pedego, C. Walthers, L. Demer, **S. Seidlits**, Y. Tintut. (2016) F-actin assembly and cytoskeletal contraction mediate TNF-alpha induced hydrogel retraction stiffness, and nodule formation by murine valvular cells. *FASEB J*, 30(1) suppl. 1b457.
- Z. Khaing, **S. Seidlits**, R. Grill, C. Schmidt. (2008) Biological properties of hyaluronic acid in glial scar formation after SCI. (abstract) *J. of Neurotrauma*, 25(7): 931.
- **S.K. Seidlits**, J.B. Shear, C.E. Schmidt. (2006) 'Direct-Write' of biologically relevant molecules into three-dimensional, submicron structures. (abstract) *Cytherapy*. 8(Suppl. 2): 14-15.

Book Chapters and Reviews

- Z.Z. Khaing, A. Ehsanipour, C.P. Hofstetter, **S.K. Seidlits**. (2016) Injectable hydrogels for spinal cord repair: A focus on swelling and intraspinal pressure. *Cells Tissues Organs*, doi:10.1159/000446697.
- Z.Z. Khaing, **S.K. Seidlits**. (2015) Hyaluronic acid and neural stem cells: Implications for biomaterial design. *J Mater Chem B*, 3:7850-7866.
- Christopher M. Walthers, **S.K. Seidlits**. (2015) Gene delivery strategies for spinal cord repair, *Biomarkers Insights*, *in press*.
- **S.K. Seidlits**, K.A. Hlavaty, L.D. Shea. (2014) "DNA delivery for regeneration" in *Biomaterials and Regenerative Medicine*, ed. P.X. Ma. Cambridge University Press, Cambridge, MA.
- **S.K. Seidlits**, R.M. Gower, J.A. Shepard, L.D. Shea. (2013) Hydrogels for lentiviral gene delivery. *Expert Opinion on Drug Delivery*, 10(4):499-509.
- **S.K. Seidlits**, J.Y. Lee, C.E. Schmidt. (2008) Nanostructured scaffolds for neural applications. *Nanomedicine*, 3(2):183-99.
- **S.K. Seidlits**, N.A. Peppas. (2007) "Star polymers and dendrimers in nanotechnology and drug delivery" in *Nanotechnology in Therapeutics: Current Technology and Applications*, ed. Peppas, N.A., Hilt, J.Z., Thomas, J.B. Horizon Press, pp. 317-348.

GRANTS/AWARDS

- University of California Cancer Research Coordinating Committee (UC-CRCC) Research Award, PI, *Effects of microvasculature ECM on glioblastoma infiltration* Jan. 2017-Dec. 2017
- NIH NINDS/MPI R21 Award, 1R21-NS093199, PI, co-PI: David Nathanson, Title: *Engineered microenvironments as biomimetic culture platforms for studying the role of brain extracellular matrix in acquisition of resistance to EGFR inhibition across multiple biological scales* Sept. 2015-Aug. 2017
- UCLA Faculty Career Development Grant, PI, Title: *Development of Macroporous, Hyaluronic Acid-Based, Injectable Scaffolds to Promote Spinal Cord Regeneration* Jul. 2015-Jun. 2016
- University of California Council on Research Faculty Research Grant, PI, Title: *Development and Application of High-Throughput Methods for Acquisition of Systems-Level Transcriptional Data in Single Human Neural* Jul. 2015-Jun. 2016

Progenitor Cells

- UCLA ARC 3Rs Award, PI, Title: *Ex Vivo Microenvironment as Experimental Models for Glioblastoma Multiforme* Jun. 2015-May 2016
- NIH F32 Award - Ruth L. Kirchstein National Research Service Award (NRSA) for Post-Doctoral Training (NINDS, 1F32NS081961), Title: *Directed Differentiation of Stem Cell Transplants into Myelinating Glia*, Co-Sponsors: Lonnie Shea and Aileen Anderson Dec. 2012-Feb.2014
- Northwestern University Postdoctoral Professional Development Travel Award, for BMES Annual Meeting Jul. 2013
- Best Poster Award (*A large-scale, real-time array to assess dynamic changes in intracellular signaling in response to biomaterial-mediated mechanical and adhesive stimuli*) in Design of Cell-Instructive Materials Symposium at Materials Research Society Spring Meeting Apr. 2013
- Rice University Outstanding Bioengineering Undergraduate Alumna Award Oct. 2011
- Institute for BioNanotechnology in Medicine-Baxter Early Career Award Sept. 2010-Aug. 2012
- P.E.O. (Philanthropic Education Organization) Scholar Award Aug. 2007-Jul.2008
- Completion of Graduate Portfolio in Cellular and Molecular Imaging for Diagnostics and Therapeutics Dec. 2006
- THRUST 2000 Fellowship (Cockrell School, UT-Austin) Aug. 2006-May 2010
- NSF Integrated Graduate Education and Research Trainee (IGERT) Fellowship in Cellular and Molecular Imaging for Diagnostics and Therapeutics Aug. 2004-May 2007
- UT College of Engineering Scholarship Aug. 2004-Dec. 2005
- Best Senior Design Project in Bioengineering (Rice University) May 2004

TEACHING EXPERIENCE

- **UCLA:** BE 167L - Bioengineering Laboratory, Instructor (Spring 2014, 2015), BE177A/177B – CAPSTONE Senior Design, Co-Instructor (Fall 2015, Winter 2016), Instructor (Fall 2016, Winter 2017)
- **Northwestern University:** BIOL SCI 210-3 - Physiology and Cell Biology, Guest Lecturer (Spring 2012, 2013), As part of HHMI-funded nuVIBE program, I developed and taught active learning modules
- **UT-Austin:** BME 382J - Cell and Tissue Engineering, Teaching Assistant (Fall 2005)
BME 314 - Foundations of Biomedical Engineering, Teaching Assistant (Spring 2007)
BME 354 - Molecular Sensors and Nanodevices, Teaching Assistant (Fall 2008)
- **Royal College of Surgeons-Ireland:** Journal Club in Human Proteomics Research for first-year medical students, Instructor (Summer 2004)
- **Rice University:** Bios 311 - Advanced Experimental Biosciences, Laboratory Teaching Assistant (Spring 2002, 2003, 2004)