

Melissa J. Mahoney

Professional Experience

Assistant Professor, Chemical and Biological Engineering	Jan 2005 – present
Post-Doctoral Research Fellow, HHMI and University of Colorado	Dec 2002 – Dec 2004
Post-Doctoral Research Fellow, HHMI and Duke University	Sep 2001 – Sep 2002
Fellow, Neurobiology Course at Woodshole Marine Biology Laboratory	Jun 2001 – Aug 2001

Education

Ph.D. in Chemical Engineering, Cornell University <i>Ithaca, NY</i>	May 2000
B.S. in Chemical Engineering, Northwestern University <i>Evanston, IL</i>	May 1995

Honors and Awards

CU-Chemical & Biological Engineering Outstanding Undergraduate Teaching Award	2007
TR35 MIT Technology Review's Top Innovators under age 35	2005
University of Colorado, Junior Faculty Development Award	2005
BMES Rita Schaffer Memorial Young Investigator Award	2003
Professor Demetrios Papahadjopoulos Award for excellence in drug delivery research	1999
NASA Graduate Student Researchers Program Fellowship	1996-1999
Abel Wolman Graduate Student Fellowship	1995-1996

Mentored Student Awards

Ryan Soderquist, *Poster Award*, Rocky Mountain Regional Neuroscience Group Meeting, Denver, CO, 2008.

Teaching

CHEN3220 Separations and Mass Transfer (Spring 2006, Spring 2007)
CHEN2820 Foundations of Bioengineering (Fall 2006, Spring and Fall 2008)
CHEN 4838 Tissue Engineering and Medical Devices (Spring 2009)

Publications

Research papers

RG Soderquist and **MJ Mahoney** “Microparticle Mediated Delivery for Long-Term Treatment of Neuropathic Pain Following a Single Injection” in press *Pharmaceutical Research*.

K Lampe and **MJ Mahoney** “Neural Precursor Cell Growth in PEG Hydrogels with Different Degradable Macromer Composition” in press *Tissue Engineering Part A*.

K Lampe, R Namba and **MJ Mahoney** “Neural Precursor Cell Growth In Nondegradable PEG Hydrogels with Different Mechanical Properties” in press *Journal of Biomedical Materials Research*.

R Namba and **MJ Mahoney** “Neural Precursor Cell Growth in Fibrin Gel Formulations with Different Mechanical Properties” in press, *Tissue Engineering Part A*.

RG Soderquist, ED Milligan, J Harrison, RA Chavez, KW Johnson, LR Watkins and **MJ Mahoney**, “PEGylation of interleukin-10 for the mitigation of enhanced pain states” in press, *Journal of Biomedical Materials Research*.

MN Mason, Arnold CA, and **MJ Mahoney** “Entrapped collagen type 1 promotes differentiation of embryonic pancreatic precursor cells into glucose-responsive beta-cells when cultured in three-dimensional PEG hydrogels” *Tissue Engineering Part A*, 15:3799-808 (2009).

KJ Lampe, Namba RM, Silverman TR, Bjugstad KB, and **MJ Mahoney**, “Impact of Lactic Acid on cell proliferation and free-radical induced cell death in monolayer cultures of neural precursor cells.” *Biotechnology and Bioengineering*, 103:1214-23 (2009).

Namba, RM, Cole AA, Bjugstad KB, and **Mahoney MJ**, “Development of porous PEG hydrogels that enable efficient, uniform cell-seeding and permit early neural process extension.” *Acta Biomaterialia*, 5:1884-97 (2009).

Seiler MJ, Aramant RB, Seeliger M, Bragadottir R, **Mahoney M**, Narfstrom K, “Functional and structural assessment of retinal sheet allograft transplantation in feline hereditary retinal degeneration.” *Veterinary Ophthalmology*, 12:158-69 (2009).

M. Mason and **MJ Mahoney**, “Selective beta-cell differentiation of dissociated embryonic pancreatic precursor cells cultured in synthetic polyethylene glycol hydrogels.” *Tissue Engineering Part A*, 15:1343-52 (2009).

R. Soderquist, E. Milligan, L. Watkins, and **MJ Mahoney** “Controlled PEGylation of brain derived neurotrophic factor for preserved biological activity and enhanced delivery to the central nervous system.” *Journal of Biomedical Materials Research*, 91:719-29 (2009).

Bjugstad KB, Redmond DE Jr, Lampe KJ, Kern DS, Sladek JR Jr, **Mahoney MJ**, “Biocompatibility of PEG-based hydrogels in primate brain.” *Cell Transplant*, 17:409-15 (2008).

Seiler MJ, Thomas BB, Chen z, Arai S, Chadalavada S, **Mahoney MJ**, Satta SR, Aramant RB, “BDNF-Treated Retinal Progenitor Sheets Transplanted to Degenerate Rats: Improved Restoration of Visual Function.” *Experimental Eye Research*, 86:92-104 (2008).

MJ Mahoney and KS Anseth, “Contrasting effects of collagen and bFGF-2 on neural cell function in degradable synthetic PEG hydrogels.” *J Biomed Mater Res A*, 81: 269-78 (2007).

Milligan ED, Soderquist RG, Malon SM, Mahoney JH, Hughes TS, Langer SJ, Sloane EM, Maier SF, Leinwand LA, Watkins LR, **Mahoney MJ**, “Intrathecal polymer-based interleukin-10 gene delivery for neuropathic pain.” *Neuron Glia Biol*, 2:293-308 (2006).

Mahoney MJ, Miller J, Saltzman WM, “Impact of cell type and density on nerve growth factor distribution and bioactivity in 3-dimensional collagen gel cultures.” *Tissue Engineering*, 12:1915-27 (2006).

M.J. Mahoney and K.S. Anseth, “Direct Visualization of Tissue Development and Function in Three Dimensional Materials by Confocal Microscopy.” *Biomaterials*, 27: 2265-74 (2006).

Milligan ED, Sloane EM, Langer SJ, Hughes TS, Jekich BM, Frank MG, Mahoney JH, Levkoff LH, Maier SF, Cruz PE, Flotte TR, Johnson KW, **Mahoney MJ**, Chavez RA, Leinwand LA, Watkins LR, “Repeated intrathecal injections of plasmid DNA encoding interleukin-10 produce prolonged reversal of neuropathic pain” *Pain*, 126: 294-308 (2006).

Mahoney MJ and Saltzman WM, “Transplantation of brain cells assembled around a programmable, synthetic microenvironment.” *Nature Biotechnology*, 19: 934-939 (2001).

Mahoney MJ and Saltzman WM. “Millimeter-scale positioning of a nerve-growth-factor source and biological activity in the brain.” *Proceedings of the National Academy of Sciences*, 96:4536-39 (1999).

Saltzman WM, Mak MW, **Mahoney MJ**, Duenas ET, and Cleland JL. “Intracranial delivery of recombinant nerve growth factor: release kinetics and protein distribution from three delivery systems.” *Pharmaceutical Research*, 16:232-240 (1999).

Mahoney MJ and Saltzman WM. “Cultures of cells from fetal rat brain: methods to control composition, morphology, and biochemical activity.” *Biotechnology and Bioengineering*, 62:461-467 (1999).

Books

Milligan, ED, Soderquist, RG, and **Mahoney MJ**. Gene therapy via spinal neuroimmune interactions: new targets for clinical pain control. *In: Synaptic Plasticity in Pain*, Malgancio, M. (Ed), Springer, New York (2009), pp367-386. ISBN:978-1-4419-0225-2.

Rickman DW and **Mahoney MJ**. Targets for Neuroprotection. *In Intraocular Drug Delivery*, G.J. Jaffe, P.A. Pearson (Ed.), Marcel Decker, Inc. (2004).

Saltzman WM and **Mahoney MJ**. Cell structure and motion: a) extracellular matrix and cell adhesion. *In Encyclopedia of Animal and Plant Cell Technology*, Spier R (Ed.), Wiley, New York, p. 481-495 (2000).

Review articles

RG Soderquist and **MJ Mahoney** “Intrathecal delivery of large molecular weight therapeutics” Expert Opinion on Drug Delivery, in press.

Alsberg E, von Recum H and **Mahoney MJ**, Environmental cues to guide stem cell fate decision for tissue engineering applications, *Expert Opinion on Biological Therapy*, 6:847-866 (2006).

Mahoney MJ and Saltzman WM, Controlled release of proteins to tissue transplants for the treatment of neurodegenerative disorders, *Journal of Pharmaceutical Science*, 85:1276-1281 (1996).

Manuscripts in revision

K Bjugstad, K Lampe and **MJ Mahoney** “Spatial and temporal biocompatibility of Poly(ethylene glycol)(PEG)-based hydrogels in rodent brain “ submitted revisions to Journal of Biomedical Materials Research.

Manuscripts submitted

M Mason and **MJ Mahoney** “Inhibition of gamma-secretase activity promotes differentiation of rat embryonic pancreatic precursor cells into functional islet-like clusters in PEG hydrogel culture” Tissue Engineering, in review.

M Mason and **MJ Mahoney** “A novel composite construct increases the vascularization potential of PEG hydrogels through the incorporation of large fibrin ribbons” Journal of Biomedical Materials Research, in review.

R Namba and **MJ Mahoney**, “Notch inhibition eliminates astrocytic differentiation from high-cell density neural precursor cell cultures in both PEG hydrogel and monolayer systems” Tissue Engineering, in review.

Manuscripts in preparation

K Lampe, K Bjugstad and **MJ Mahoney** “Impact of growth factors on biocompatibility of Poly(ethylene glycol)(PEG)-based hydrogels in rodent brain” in preparation for submission to Brain Research.

R Namba and **MJ Mahoney**, “Distinct effects of growth factors on neural cell growth in 2D and 3D cultures” in preparation for submission to Tissue Engineering.

Intellectual property

1. Methods and compositions for the treatment of neuropathic pain. Patent Application filed through CU (2009).

Professional activities

Reviewer, Society for biomaterials annual meeting
Scientific advisor, Xalud Therapeutics San Francisco, Ca

Current Research Support

PI, Beta Cell Biology Consortium Seed Grant “Photopolymerized Hydrogels for Pancreatic Precursor Cell Differentiation” \$118,623 11/1/08 – 11/1/10.

PI, Junior Faculty Pilot Award (CCSTI Co-Pilot Program) “Sustained Delivery of IL10 pDNA for Treatment of Neuropathic Pain” 4/1/09 – 4/1/10, \$20,000.

PI, Individual award (CCSTI Co-Pilot Program) “Exploration of novel microparticle-based gene therapy approach for treating diseases of the central nervous system” 1/10 – 1/11, \$50,000.

Completed Research Support

Co-PI, NIH R01 “Reconstruction of Nigrostriatal Pathway by Photopolymerized Neurotrophin Releasing Degradable Gels” \$343,000 4/30/06 – 4/30/09 (collaborator: Dr. Kim Bjugstad, UCHSC).

Pending Research Support

Co-PI, NIH R01 “Spinal Neuroimmune Mechanisms Underlying IL-1 Gene Therapy for Pain Control” \$339,886, 7/10– 7/14 (collaborator: Dr. Erin Milligan, University of New Mexico)

Co-PI, NIH R01 “Neurodegeneration, Photopolymerizing Hydrogels, and the ability to replace lost neural cell populations” \$920,338, 7/10 – 7/14 (collaborator: Dr. Kim Bjugstad, UCHSC).

Co-PI, Beta Cell Biology Consortium U01, “Generation of functional beta cells from stem and progenitor cells” \$726,458, 7/10-7/14 (collaborator: Dr. Gordon Keller, University of Toronto).

Co-PI, NIH R24 “Novel techniques to imaging fetal pancreatic development” \$107,778, 7/10-7/11 (collaborator, Dr. John Hutton, Barbara Davis Center).