

R. MICHAEL GOWER, Principal Investigator

Assistant Professor
Department of Chemical Engineering
Biomedical Engineering Program
University of South Carolina

301 Main Street
Room 2C02
Columbia, SC 29208
gowerrm@mailbox.sc.edu
(803)-777-1541

EDUCATION

Ph.D., Biomedical Engineering, University of California, Davis CA, June 2010.

Dissertation: *Monocyte Priming During Dyslipidemia: Elevated beta2-integrin CD11c/CD18 Orchestrates Enhanced Adhesion to VCAM-1.*

Advisor: Professor Scott I. Simon, Ph.D.

B.S., Chemical Engineering, Colorado School of Mines, Golden CO, May 2004.

RESEARCH EXPERIENCE

Project	PI
Employed biomaterial scaffolds engineered as gene and protein delivery vehicles as a platform for extra-hepatic islet transplant.	Lonnie Shea, Northwestern University
Developed a microfluidic device for immunofluorescence detection of inflammatory monocytes in human and mouse whole blood.	Scott Simon, University of California, Davis
Studied the effect of postprandial hypertriglyceridemia on monocyte inflammation and initiation of atherosclerosis.	Scott Simon, University of California, Davis
Designed microfluidic devices to measure activated clotting time of blood.	David Marr, Colorado School of Mines

PROFESSIONAL EXPERIENCE

Duration	Position	Employer
2014 - Present	Assistant Professor	University of South Carolina, Columbia
2011 - 2014	Postdoctoral Researcher	Northwestern University, Chicago IL
2010 - 2011	Postdoctoral Researcher	University of California, Davis

HONORS AND AWARDS

Honor/Award Name	Bestowed By	Year
Young Investigator Travel Award	National IDeA Symposium of Biomedical Research Excellence	2016
Postdoc Presentation Award	Northwestern Postdoctoral Forum	2013
IBIS Travel Award	Northwestern University, Chicago IL	2012
Distinguished Presentation Award	University of California Bioengineering Symposium	2009
Basic and Translational Cardiovascular Science Fellowship	University of California, Davis	2008
I2CAM Travel Award	University of California, Davis	2007
HHMI Med into Grad Initiative Fellowship	University of California, Davis	2006
President's Scholarship	Colorado School of Mines, Golden CO	2000

PUBLICATIONS

- Liu JM, Zhang J, Zhang X, Hlavaty KA, Ricci CF, Leonard JN, Shea LD, and **Gower RM**. Transforming growth factor-beta 1 delivery from microporous scaffolds decreases inflammation post-implant and enhances function of transplanted islets. *Biomaterials* Feb;80:11-9, **2016**.
- Azarin SM, Yi J, **Gower RM**, Aguado BA, Sullivan ME, Goodman AG, Jiang EJ, Rao SS, Ren Y, Backman V, Jeruss JS, and LD Shea. In vivo capture and label-free detection of early metastatic cells. *Nature Communications*. Sep 8;6:8094, **2015**.
- Boehler RM, Kuo R, Shin S, Goodman AG, Pilecki MA, **Gower RM**, Leonard JN, and Shea LD. Lentivirus delivery of IL-10 to promote and sustain macrophage polarization towards an anti-inflammatory phenotype. *Biotechnol Bioeng*. 111(7):1469-80, **2014**.
- Gower RM**, Boehler RM, Azarin SM, Ricci CF, Leonard JN, and Shea LD. Modulation of leukocyte infiltration and phenotype in microporous tissue engineering scaffolds via vector induced IL-10 expression. *Biomaterials*. 35(6):2024-31, **2014**.
- Foster GA, **Gower RM**, Stanhope KL, Havel PJ, Simon SI, Armstrong EA. On-chip Phenotypic Analysis of Inflammatory Monocytes in Atherogenesis and Myocardial Infarction. *Proc Natl Acad Sci U S A*. 110(34):13944-9, **2013**.
- Boehler RM, Shin S, Fast AG, **Gower RM**, and Shea LD. A PLG/Hap composite scaffold for lentivirus delivery. *Biomaterials*. 34(21):5431-8, **2013**.
- Graham JG, Zhang X, Goodman A, Pothoven K, Houlihan J, Wang S, **Gower RM**, Luo X, and Shea LD. PLG Scaffold Delivered Antigen-Specific Regulatory T Cells Induce Systemic Tolerance in Autoimmune Diabetes. *Tissue Eng Part A*. 19(11-12):1465-75, **2013**.
- Seidlits SK, **Gower RM**, Shepard JA, and Shea LD. Hydrogels for lentiviral gene delivery. *Expert Opin Drug Deliv*. 10(4):499-509, **2013**.
- Glaser DE, **Gower RM**, Lauer NE, Tam K, Blancas AA, Shih AJ, Simon SI, and McCloskey KE. Functional characterization of embryonic stem cell-derived endothelial cells. *J Vasc Res*. 48(5):415-428, **2011**.
- Gower RM**, Wu H, Foster GA, Ballantyne CM, Knowlton AA, and Simon SI. CD11c/CD18 expression is upregulated on blood monocytes during hypertriglyceridemia and enhances adhesion to Vascular Cell Adhesion Molecule-1. *Arterioscler Thromb Vasc Biol*. 31(1):160-6, **2011**.
- Wu H, **Gower RM**, Wang H, Perrard XY, Ma R, Bullard DC, Burns AR, Paul A, Smith CW, Simon SI, Ballantyne CM. Functional role of CD11c+ monocytes in atherogenesis associated with hypercholesterolemia. *Circulation*. 119(20):2708-17, **2009**.
- Phillipson M, Heit B, Parsons SA, Petri B, Mullaly SC, Colarusso P, **Gower RM**, Neely G, Simon SI, Kubes P. Vav1 is essential for mechanotactic crawling and migration of neutrophils out of the inflamed microvasculature. *J Immunol*. 182(11):6870-8, **2009**.
- Tsou JK, **Gower RM**, Ting HJ, Schaff UY, Insana MF, Passerini AG, Simon SI. Spatial regulation of inflammation by human aortic endothelial cells in a linear gradient of shear stress. *Microcirculation*. 15(4):311-23, **2008**.

BOOK CHAPTERS

- Gower RM**, Shea LD. Biomaterial Scaffolds for Controlled, Localized Gene Delivery of Regenerative Factors. *Wound Healing Society Year Book (WHSYB)-Advances in Wound Care*, vol 3. **2011**.
- Gower RM** and Simon SI. Vascular Mimetic Microfluidic Systems for the Study of Endothelial Activation and Leukocyte Recruitment in Models of Atherogenesis. In: *Hemodynamics and Mechanobiology of the Endothelium*, edited by Hsiai TK, Blackman B, and Jo H. World Scientific, pp313-329, **2010**.

PATENTS and INVENTION DISCLOSURES

Gower RM and Hendley MA. "Drug Releasing Polymer Implants for the Treatment of Metabolic Disorders," US Patent Application No. 62/355486, Filed June 28, 2016.

Shea LD, Azarin SM, **Gower RM**, and Jeruss JJ. "Synthetic scaffolds for metastasis detection," US Patent Application No. 61/700703, Filed September 13, 2012. Licensed to Pioneer Pioneer Biosolutions Inc.

PRESENTATIONS

Seminars

Strategies of Engineering Immunity and Metabolism. Medical University of South Carolina. Department of Regenerative Medicine and Cell Biology Seminar Series, Charleston SC, **05/2015**.

Engineering Microenvironments with Biomaterial Scaffolds. Yonsei University Chemical and Biomolecular Engineering & Northwestern University Chemical and Biological Engineering Joint Workshop. Northwestern University, Evanston IL, **02/2013**.

Biomarkers and Adhesion Molecules in Atherogenesis. David Jeffrey & Benjamin Alan Gelber Lecture Series, Section of Leukocyte Biology, Baylor School of Medicine, Houston TX, **05/2008**.

Conference Oral Presentations

Murphy K, Zhang Y, Pena M, **Gower RM**. *Chemokine Releasing Polymer Implants to Direct Immune Cell Migration in the Setting of Colon Cancer*. American Institute for Chemical Engineers Meeting, San Francisco CA, **2016**.

Gower RM, Hendley MA, *Resveratrol Scaffolds Promote Lipid Metabolism in Adipose Tissue*. National IDEa Symposium of Biomedical Research Excellence, Washington DC, **2016**.

Hendley MA, **Gower RM**. *Resveratrol Releasing Scaffolds for Adipose Tissue Engineering*. Institute for Biological Engineering Annual Meeting, Greenville SC, **2016**.

Murphy KP, Zhang Y, Peña M, **Gower RM**. *Tissue-Engineering Scaffolds for the Prevention of Metastatic Colorectal Cancer*. Grad Student Day. University of South Carolina, Columbia. **2016**.

Gower RM, Zhang J, Liu JM, Zhang X, Shea LD. *Scaffolds Engineered to Release TGF- β 1 Improve Islet Graft Function*. Society for Biomaterials Annual Meeting, Charlotte NC, **2015**.

Gower RM, Zhang X, Zhang J, Liu J, Ricci CF, Shea LD. *Immunomodulatory Scaffolds for Enhanced Cell Transplant*. Biomedical Engineering Society Meeting, San Antonio TX, **2014**.

Gower RM, Shea LD. *Biomaterial Scaffolds for Local Immunomodulation*. American Institute for Chemical Engineers Meeting. San Francisco CA, **2013**.

Gower RM, Shea LD. *Gene-Releasing Scaffolds for Immunomodulation*. Biomedical Engineering Society Meeting, Seattle WA, **2013**.

Gower RM, Shea LD. *Gene Releasing Scaffolds for Local Immunomodulation and Enhanced Cell Transplant*. Biomedical Engineering Society Meeting, Atlanta GA, **2012**.

Gower RM, Simon SI. *CD11c/CD18 expression is increased on blood monocytes during hypertriglyceridemia and enhances adhesion to VCAM-1*. 12th Biennial Meeting of the International Society for Applied Cardiovascular Biology, Boston MA, **2010**.

Gower RM, Simon SI. *CD11c/CD18 expression is increased on blood monocytes during hypertriglyceridemia and enhances adhesion to VCAM-1*. 16th International Vascular Biology Meeting, Los Angeles CA, **2010**.

Gower RM, Simon SI. *Adhesion molecules and monocyte recruitment in atherogenesis*. 10th Annual University of California System-wide Bioengineering Symposium, University of California, Merced CA, **2009**.

Gower RM, Simon SI. *Targeting molecules in atherosclerosis: A functional role for CD11c in monocyte recruitment*. Annual Biomedical Engineering Society Meeting, Saint Louis MO, **2008**.

Gower RM, Simon SI. *Spatial Regulation of Inflammation by Human Aortic Endothelial Cells in a Linear Gradient of Shear Stress*. Annual Experimental Biology Meeting, Biomedical Engineering Society Symposium: Mechano-Sensing at the Vessel Wall in Regulation of Atherogenesis, San Diego CA, **2008**.

Conference Poster Presentations

Hendley MA and Gower RM. *Resveratrol Releasing Scaffolds to Promote Lipid Metabolism in Adipose Tissue*. Biomedical Engineering Society Meeting, Minneapolis MN, **2016**.

Struckman H, Olgivie R, and **Gower RM**. *Characterization of the Immune Environment within Tissue Engineering Scaffolds*. Institute for Biological Engineering Annual Meeting, Greenville SC, **2016**.

Pond K, Kiaris H, and **Gower RM**. *CCL8-loaded Implants for the Study and Treatment of Colon Cancer*. Institute for Biological Engineering Annual Meeting, Greenville SC, **2016**.

Marker S, Hendley M, and Gower RM. *Polymer Scaffolds for Adipose Tissue Engineering*. Institute for Biological Engineering Annual Meeting, Greenville SC, **2016**.

Struckman H and Gower RM. *Immunomodulatory Scaffolds for Treatment of Colon Cancer*. Discovery Day. University of South Carolina, Columbia. **2015**.

TEACHING EXPERIENCE

<u>Course Title</u>	<u>Term</u>
Electrophysiology and Biomonitoring	Fall 2014 - Present
Immunoengineering	Spring 2014 - Present

STUDENTS MENTORED

Doctoral in Progress

<u>Name</u>	<u>Program</u>	<u>Duration</u>	<u>Project Title</u>
1 Chris Isley	ECHE	08/2016 - Present	Particles for Drug Delivery to the Liver
2 Kendall Murphy	ECHE	07/2015 - Present	Immunomodulatory Scaffolds to Treat Colon Cancer
3 Michael Hendley	BMEN	08/2014 - Present	Engineering Thermogenic Adipose Tissue

Undergraduate in Progress

<u>Name</u>	<u>Program</u>	<u>Duration</u>	<u>Project Title</u>
1 Milaan Shah	BMEN	01/2016 - Present	NT-3 Delivery from Biomaterial Scaffolds
2 Kristina Pond	BMEN	01/2016 - Present	CCL8 Delivery from Biomaterial Scaffolds
3 Skyler Marker	ECHE	01/2015 - Present	TGF-beta1 Delivery from Biomaterial Scaffolds
4 Heather Struckman	BMEN	01/2015 - Present	Immunomodulatory Scaffolds to Treat Colon Cancer

Undergraduate Completed

Name	Program	Duration	Project Title
1 Felicia Canipe	BMEN	08/2015 - 06/2016	Mass Production of Biomaterial Scaffolds
2 Mary Margovio	BMEN	08/2015 - 06/2016	Mass Production of Biomaterial Scaffolds
3 Juline Deppen	BMEN	08/2015 - 06/2016	Mass Production of Biomaterial Scaffolds
4 Chris Haycook	BMEN	10/2014 - 06/2016	Engineering Thermogenic Adipose Tissue
5 Ludjelic Manigat	BMEN	05/2015 - 08/2015	Biomaterials to activate adipose stem cells
6 Jesse Zhang	ECHE	03/2013 - 12/2014	TGF-beta1 Scaffolds for Islet Transplant
7 Eric Jiang	ECHE	03/2012 - 07/2014	Scaffolds for the Detection of Metastatic Cancer
8 Christine Ricci	ECHE	01/2012 - 05/2013	IL-10 Scaffolds for Local Immunomodulation
9 Shreya Rajan	ECHE	01/2012 - 05/2013	Particles of Immune Tolerance
10 Kayan Tam	BMEN	01/2006 - 06/2011	Inflammatory Reponse of Endothelial Progenitors

Trainee Awards

Name	Program	Award	Award Duration	Award Amount
1 Michael Hendley	BMEN	SPARC Graduate Research Grant	05/2016 - 07/2017	\$4,708
2 Heather Struckman	BMEN	Magellan Scholar	Summer-Fall 2016	\$2,500
3 Kristina Pond	BMEN	Magellan Mini-Grant	Fall 2015	\$1,000
4 Milaan Shah	BMEN	Magellan Mini-Grant	Fall 2015	\$1,000
5 Skyler Marker	BMEN	Magellan Apprentice	Spring 2015	\$1,000
6 Heather Struckman	BMEN	Magellan Mini-Grant	Spring 2015	\$800

ACADEMIC SERVICE

Professional Community

Associate Editor	Annals of Biomedical Engineering
Faculty Advisor	Biomedical Engineering Society, University of South Carolina Student Chapter
Session Chair	Biomedical Engineering Society Annual Meeting
Session Chair	American Institute of Chemical Engineers Annual Meeting, Materials Engineering and Sciences Division, Biomaterials for Immunological Applications
Abstract Reviewer	Biomedical Engineering Society Annual Meeting
Manuscript Reviewer	Annals of Biomedical Engineering

University of South Carolina

Committee Member	Task Force for USC Core Facilities Website Update and Organization
Committee Member	COBRE/BME Junior Faculty Search

ACTIVE FUNDING

- Award: Pilot Project - P20 GM103641
Agency: NIH NIGMS COBRE - Center for Inflammation and Dietary Supplements
Amount: \$205,500
Period: June 1, 2016 to May 31, 2018
PI: Michael Gower
Effort: 50%
Co-PI: None
Title: Resveratrol Scaffolds for the Treatment of Obesity and Insulin Resistance

COMPLETED FUNDING

1. Award: Pilot Project - P20 GM103641
Agency: NIH NIGMS COBRE - Center for Inflammation and Dietary Supplements
Amount: \$205,500
Period: June 1, 2014 to May 31, 2016
PI: Michael Gower
Effort: 20%
Co-PI: None
Title: Materials for Engineering Thermogenic Adipose Tissue

- 2 Award: ASPIRE III Infrastructure Award
Agency: University of South Carolina Office of the Vice President for Research
Amount: \$100,000
Period: May 16, 2015 to August 15, 2016
PI: Michael Gower
Co-PI: Marj Peña (Dept. of Biological Sciences, U of SC)
Title: Proposal for an *In Vivo* Animal Imager