

CURRICULUM VITAE

Kathryn Maiellaro Rafferty
Assistant Professor- Faculty in Residence

Employment and Education:

- 2015- current Assistant Professor- Faculty in Residence, School of Life Sciences
University of Nevada Las Vegas
Bio 189 Fundamentals of Life Sciences
Bio 453 Immunology
- 2012 - 2014 Assistant Professor-Educator, Department of Biological Sciences
University of Cincinnati, Cincinnati, Ohio
Biol 2081C Genetics and Cell Biology
Biol 4091C Biotechnology Laboratory Methods
- 2010- 2012 Adjunct Assistant Professor, Department of Biological Sciences
University of Cincinnati, Cincinnati, Ohio
- 2010 -2012 Postdoctoral Research Fellow
Heart Institute: Molecular Cardiovascular Biology
Cincinnati Children's Hospital Medical Center, Cincinnati, Ohio
- 2008 -2010 Postdoctoral Research Fellow
Emory University, Atlanta, Georgia
Wallace H. Coulter Department of Biomedical Engineering
- 2003-2008 Georgia Institute of Technology and Emory University School of Medicine, Atlanta,
Georgia
Ph.D., Biomedical Engineering
Wallace H. Coulter Department of Biomedical Engineering
- 2001-2003 University of Florida, Gainesville, Florida
M.E., Biomedical Engineering
Department of Biomedical Engineering
- 1997-2001 University of Florida, Gainesville, Florida
B.S., cum laude, in Engineering Sciences with minor in Biomechanics

Publications:

Maiellaro-Rafferty K, Wansapura JP, Mendsaikhan U, Osinska H, James JF, Taylor MD, Robbins J, Kranias EG, Towbin JA, Purevjav E. Altered regional cardiac wall mechanics are associated with differential cardiomyocyte calcium handling due to nebulin mutations. *J Mol Cell Cardiol.* 60:151-60, 2013.

Pendergrass KD, Boopathy AV, Seshadri G, Maiellaro-Rafferty K, Brown M, Davis ME. Acute Preconditioning of Cardiac Progenitor Cells with Hydrogen Peroxide Enhances Angiogenic Pathways Following Ischemia-Reperfusion Injury. *Stem Cells and Development*, 22(17):2414-24, 2013.

Washington E, O'Donnell R, Maiellaro-Rafferty K, Weiss D, Joseph G, Wan W, Gleason RL, Taylor WR. The Role of Lysyl Oxidase Family Members in the Stabilization of Abdominal Aortic Aneurysms. *AJP: Heart and Circ Phys*, 303(8):H1067-75, 2012.

Maiellaro-Rafferty K, Weiss D, Joseph G, Wan W, Gleason RL, Taylor WR. Catalase overexpression in aortic smooth muscle prevents pathological mechanical changes underlying abdominal aortic aneurysm formation. *AJP: Heart and Circ Phys*, 301(2):H355-62, 2011.

Willett NJ, Long RC Jr, Maiellaro-Rafferty K, Sutliff RL, Schafer R, Oshinski JN, Giddens DP, Guldberg RE, Taylor WR. An In Vivo Murine Model of Low-Magnitude Oscillatory Wall Shear Stress to Address the Molecular Mechanisms of Mechanotransduction--brief report. *Arteriosclerosis, Thrombosis, and Vascular Biology*. 30(11):2099-102, 2010.

Pendergrass KD, Varghese ST, Maiellaro-Rafferty K, Brown ME, Taylor WR, Davis ME. Temporal Effects of Catalase Overexpression on healing following myocardial infarction. *Circulation Heart Failure*. 4(1):98-106, 2010.

Maiellaro KA and Taylor WR. The Role of the Adventitia in Vascular Inflammation. *Cardiovascular Research*. 75:640-648, 2007.

Service and Professional Activities:

- 2014 Presenter, *Variations on the Flipped Classroom*, Center for the Enhancement of Teaching and Learning, University of Cincinnati, October 28, 2014
- Elected to Faculty Senate Academic Affairs Committee, 2014-2016 term
- Planning Committee, UC Biological Sciences Department High School Outreach Symposium
- Nominated as Outstanding Faculty Mentor by an undergraduate recipient of the Darwin T. Turner Scholarship
- Steering Committee and Presenter, 3T: Teaching, Technology, and Techniques Conference, Clermont College, University of Cincinnati, March 8, 2014
- 2013 Moderator, 3T: Teaching, Technology, and Techniques Conference, Clermont College, University of Cincinnati, March 9, 2013
- Attendee, The Flipped Classroom presented by Kathy Koenig, PhD, Center for Enhancement of Teaching and Learning, University of Cincinnati, November 20, 2013
- Attendee, Distance Learning Pedagogy and Practice: A One-Day Workshop for Faculty New to Distance Learning, Center for Enhancement of Teaching and Learning, University of Cincinnati, July 9, 2013
- 2012 Faculty Development Council Pilot Group: Formative Peer Review of Teaching, University of Cincinnati, presented by the Center for the Enhancement of Teaching and Learning and sponsored by the Faculty Development Council
- Women in Science and Engineering (WISE) Faculty Mentor, University of Cincinnati. Study Title: *Attitude and Self-Confidence May Predict Student Success in Science Classes*
- 2011 Attendee, Best Practices in Scholarly Teaching Conference, Cincinnati, OH

	Attendee, Seminar by Dr. Dan Bernstein: Learning From Each Other's Craft, Cincinnati, OH
	Assistant Secretary of Board of Trustees, Families Forward, an Agency of The United Way of Cincinnati
2010-present	Chair of Leadership Development, Junior League of Cincinnati: Develop curriculum to train women to serve Nonprofit Executive Boards in the Greater Cincinnati Community
2010, 2011	High Science Student Symposium Mentor, Cincinnati, OH
2009-2010	Ad-hoc Reviewer, Annals of Biomedical Engineering
2008-2009	Team Leader, Emory Postdoc Association Brown Bag Lunch Series, Atlanta, GA
2007-	Member, American Heart Association
2005-2008	Team Leader, Biosciences Unified Graduate Students Youth Outreach Prosthetic Pete Demo, Atlanta, GA
2006	Biomedical Design Competition Judge, Biosciences Unified Graduate Students, Atlanta, GA

Undergraduate and Graduate Mentorship:

2014 Fall	BIOL 5050: Capstone Mentor to 4 Undergraduate Students, who performed cell-based experiments with Western blotting for p53 protein expression or soft-lithography substrate pattern to direct cell growth.
2014 Spring	BIOL 5050: Capstone Mentor to 13 Undergraduate Students. Students are Assistant TAs in BIOL2081C: Genetics and Cell Biology and develop learning modules & presentations to fulfill Capstone requirements.
2013-2014	Mentor to Undergraduate Student Keith Cox, <i>selected as a 2014 Woodrow Wilson Ohio Teaching Fellow</i> and admitted to the Master of Arts in Secondary Education program at the University of Cincinnati with \$30,000 Fellowship support Mentor to Graduate Student Brian Carlson, PhD candidate in the lab of Dr. Joshua Gross. Brian was awarded the 2014 Biological Science Department Excellence in Teaching Award.
2012 Summer	Women in Science and Engineering Mentor to Catherine Schomaker, University of Cincinnati Research Project titled: "Attitude and Self-Confidence may Predict Student Success in Science Classes"

Fellowships and Grants:

2011	Travel Award for Young Investigators, Pediatric Academic Society Annual Meeting, Denver, Colorado, April 30-May 3, 2011
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- 2009-2011 American Heart Association Greater Southeast Affiliate Postdoctoral Fellowship
- 2009 American Heart Association ATVB Travel Award for Young Investigators, Scientific Sessions, Orlando, Florida, November 14-18, 2009
- 2005-2008 American Heart Association Greater Southeast Affiliate Predoctoral Fellowship
- 2006-2008 Gandy/Diaz Teaching Assistant Fellowship, Georgia Institute of Technology, Atlanta, Georgia
- 2007 Travel Award, 13th Annual Emory Department of Medicine Cardiology Research Symposium, Atlanta, Georgia
- 1997-2001 University of Florida Bright Futures Scholar, Gainesville, Florida

Abstracts Presented:

1. Rafferty KM, Kranias EG, Purevjav E, Towbin JA. Nebulette mutations augment cardiomyocyte calcium signaling in preclinical inherited dilated cardiomyopathy. Pediatric Academic Society Annual Meeting, Denver, Colorado, April 30-May 3, 2011.
2. Maiellaro-Rafferty K, Seshadri G, Slugg A, Davis ME. Oxidative Stress Regulates Cardiac Stem Cell Differentiation in a MicroRNA-Mediated Mechanism. AHA Scientific Sessions, Orlando, Florida, November 14-18, 2009.
3. Maiellaro-Rafferty K, Slugg A, Davis ME. Regulation of Cardiac Stem Cell Differentiation by Hydrogen Peroxide in a MicroRNA-Mediated Mechanism. Basic Cardiovascular Sciences Conference, Lake Las Vegas, Nevada, July 20-23, 2009.
4. Maiellaro KA, Taylor WR. Medial H₂O₂ scavenging Promotes Matrix Events that Prevent Abdominal Aortic Aneurysm. 1st Annual Frontiers in Pharmacology Graduate Symposium, Atlanta, Georgia, May 31, 2008.
5. Maiellaro KA, Taylor WR. Biomechanics of Early Abdominal Aortic Aneurysm Formation. 13th Annual Emory Department of Medicine Cardiology Research Symposium, June 8, 2007.
6. Maiellaro KA, Taylor WR, Biomechanical and Molecular Mechanisms of Early Abdominal Aortic Aneurysm Formation. Arteriosclerosis, Thrombosis, and Vascular Biology X, Chicago, Illinois, April 24-28, 2007.
7. Maiellaro KA, Taylor WR, Molecular Mechanisms of Early Abdominal Aortic Aneurysm Formation. Medical College of Georgia and Emory School of Medicine Graduate Research Symposium, Atlanta, Georgia. January 23, 2007.
8. Maiellaro KA, Tran-Son-Tay R. Microfabricated Silicon Microchannels for Cell Deformation Study. Summer Bioengineering Conference, Key Biscayne, Florida, June 27-30 2003.

Teaching Experience:

01/2012- present, Assistant Professor: Department of Biological Sciences, University of Cincinnati, Cincinnati, OH

I have developed an active learning curriculum for BIOL 2081C Genetics and Cell Biology, which includes daily learning objectives, weekly assessment quizzes, and clicker points to guide student learning. Case studies, scientific literature, and data analysis are employed consistently to maximize student interaction with real world application of science content. I also manage and develop laboratory activities for this large enrollment (300+ students, 12-16 lab sections) course. In one section of this course, I manage an online laboratory curriculum.

From scratch, I developed the curriculum for BIOL 4091C Biotechnology Methods, an upper level laboratory course that meets an industry partner need for new hires skilled in modern biotech

methods. Skills taught include mammalian cell culture, Western Blotting, DNA harvest, and DNA sequencing and SNP analysis.

08/2010- 08/2011, Adjunct Assistant Professor for Bio 301 Cell Structure and Function: Department of Biological Sciences, University of Cincinnati, Cincinnati, OH

Lead professor teaching all lectures, preparing/grading exams, and handling student administrative issues. I use modern active learning methods, including Turning Point Software/Personal Response System, and substitute lengthy lecture for extensive in-class problem solving and application of the material. Also, collect feedback on Biology 301 Laboratory to assist with future lab improvements.

08/08-12/09, Lecturer for Biology 141/142 Foundations of Modern Biology Laboratory: Cell Biology and Classical/Molecular Genetics, Emory University, Atlanta, GA

Teaching responsibilities include lecture/discussion, laboratory activities, and assignment grading under the supervision of Dr. Jennifer Holzman, Emory University Laboratory Director.

2006-present, Research Mentor, Laboratories of Dr. W Robert Taylor and Dr. Michael E. Davis, Emory University, Atlanta, GA

Develop research plans for undergraduate students. Responsibilities include teaching how to perform a literature search, training on lab equipment and protocols, data acquisition, and instruction in how to prepare formal reports and oral presentation of data.

08/05-12/07, Lead Graduate Teaching Assistant and Lecturer, BMED 2210: Concept Principles in Biomedical Engineering, Georgia Tech, Atlanta, GA

Teaching responsibilities included monthly lectures, weekly small group problem solving sessions, and assignment/test grading under the supervision of Dr. Todd McDevitt and Dr. Robert Lee, Associate Professors at Georgia Tech. Developed novel grading system based on students mastering the 20 defined concepts set for this course.

01-05/2005, Graduate Teaching Assistant, BMED 3161 Systems Physiology Laboratory, Georgia Tech, Atlanta, GA

Teaching responsibilities included leading laboratory exercises and grading lab reports under the supervision of Dr. Michele LaPlaca, Associate Professor at Georgia Tech.

08-12/2004, Graduate Teaching Assistant, BMED 8101 Engineering Science II, Georgia Tech, Atlanta, GA

Mentored graduate students solving “black box” physiologic problems and coached them in applying computer-based modeling (SimuLink and MATLAB) to their solutions under the supervision of Dr. Robert Lee.

Research Experience:

02/10-02/12, Postdoctoral fellow in the laboratory of Jeffrey A. Towbin, M.D., The Heart Institute, Children’s Hospital Medical Center, Cincinnati, OH.

Postdoctoral research on the mechanism by which inherited mutations in cardiac Z-disc proteins lead to dilated cardiomyopathy (DCM). The goals of the research were to determine differences in both functional mechanics and molecular signaling in cardiomyocytes from nontransgenic and transgenic mice with the mutated sarcomeric protein nebulin. Data showed that DCM pathogenesis in transgenic mice begins with enhanced phosphorylation of the troponin complex, which is unexpectedly uncoupled to cardiomyocyte relaxation rate. These data provided a link between troponin phosphorylation status and cellular mechanical dysfunction.

08/08- present, Postdoctoral fellow in the laboratory of Michael E. Davis, Ph.D., Biomedical Engineering, Emory School of Medicine, Atlanta, GA.

Postdoctoral research on the redox regulation of adult-derived cardiac progenitor cell differentiation (CPCs). A major lab objective was to engineer CPCs to differentiate into functional cells after myocardial infarction. The goals of this research were first, to determine how H₂O₂ effects CPC differentiation, and second, to reverse the harmful effects of H₂O₂ to promote CPC differentiation in an redox environment. To answer this question, stem cells from the adult rat heart were treated with H₂O₂ and analyzed for specific cellular factors that promote CPC differentiation into functional cells. Data showed that H₂O₂ inhibits CPC differentiation in microRNA-mediated mechanism.

8/03-8/08, Graduate student in the laboratory of W. Robert Taylor, M.D., Ph.D., Biomedical Engineering, Georgia Tech and Emory University, Atlanta, GA.

Dissertation research focused on defining the mechanics and biology of established aneurysms. Specific interest was how oxidative stress leads to the remodeling of the vessel matrix. My work suggested that oxidative stress potentiates vessel dilation by increasing elastin fragmentation and altering strain distribution across the aortic wall.

5/01-8/03, Graduate student in the laboratory of Roger Tran-Son-Tay, Ph.D., Biomedical Engineering, University of Florida, Gainesville, FL.

Masters research focused on the development of silicon microfabricated flow channels for the overall lab objective to study cell deformability, migration, and relaxation. I designed geometry, fabrication protocol, and packaging set-up for a functional microchannel system.