Kareen L. K. Coulombe, Ph.D.

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1. EDUCATION

Ph.D.	Bioengineering, University of Washington (Seattle, WA) *Dissertation title: Investigating the Molecular Mechanisms of Cooperative Tension Generation in Skeletal and Cardiac Muscle by Altering Acto-Myosin Interactions and Engineering Troponin C Calcium Binding Kinetics*	2001 – 2007
B.S.	Biomedical Engineering, University of Rochester (Rochester, NY) *Summa cum laude*	1996 – 2001

2. PROFESSIONAL APPOINTMENTS

Assistant Professor of Engineering, School of Engineering, Brown University	2014 – present
Assistant Professor of Medical Science, Division of Biology and Medicine, Brown University (courtesy appointment)	2014 – present
Senior Fellow, NIH K99 HL115123, Department of Pathology, University of Washington	2012 – 2013
NIH Ruth Kirschstein Postdoctoral Fellow, NIH T32 HL007312, Department of Pathology, University of Washington	2008 – 2011

3. PUBLICATIONS

a. Refereed Journal Articles

Kaiser NJ, Munarin F, **Coulombe KLK**. Custom engineered tissue culture molds from laser-etched masters. *Journal of Visual Experiments*. 2018 May 21;(135):e57239. (Impact factor = 1.325)

Liu M, Shi G, Zhou A, Rupert CE, **Coulombe KLK**, Dudley SC Jr. Activation of the unfolded protein response downregulates cardiac ion channels in human induced pluripotent stem cell-derived cardiomyocytes. *Journal of Molecular and Cellular Cardiology*. 2018 Apr;117:62-71. (Impact factor = 5.68)

Kant RJ and **Coulombe KLK**. Integrated Approaches to Spatiotemporally Directing Angiogenesis in Host and Engineered Tissues. *Acta Biomaterialia*. 2018 Mar 15;69:42-62. (Impact factor = 6.025)

Rupert CE and **Coulombe KLK**. IGF-1 and NRG-1ß Enhance Proliferation, Metabolic Maturity, and the Force-Frequency Response in hESC-derived Engineered Cardiac Tissues. *Stem Cells International.* 2017. 2017:7648409. (Impact factor = 3.540)

Munarin F, Kaiser NJ, Kim TY, Choi BR, **Coulombe KLK**. Laser-Etched Designs for Molding Hydrogel-Based Engineered Tissues. *Tissue Engineering Part C Methods.* 2017 May; 23(5):311-321. (Impact factor = 3.485)

Rupert CE, Chang HH, **Coulombe KLK**. Hypertrophy changes 3D shape of hiPSC-cardiomyocytes: Implications for cellular maturation in regenerative medicine. *Cellular and Molecular Bioengineering.* 2017 Feb; 10(1):54-62. DOI: 10.1007/s12195-016-0462-7 (Impact factor = 2.535)

Roberts MA, Tran D, **Coulombe KL,** Razumova M, Regnier M, Murry CE, Zheng Y. Stromal Cells in Dense Collagen Promote Cardiomyocyte and Microvascular Patterning in Engineered Human Heart Tissue. *Tissue Eng Part A.* 2016 Apr; 22(7-8):633-44. (Impact factor = 3.485)

Munarin F and **KL Coulombe**. A Novel 3-Dimensional Approach for Cardiac Regeneration. *IEEE Proceedings for the 37th Annual International Conference of the IEEE Engineering in Medicine and Biology Society.* Jul 2015. DOI: 10.1109/EMBC.2015.7318714. (Impact factor N/A)

Gerbin KA, Yang X, Murry CE, **Coulombe KL**. Enhanced Electrical Integration of Engineered Human Myocardium via Intramyocardial versus Epicardial Delivery in Infarcted Rat Hearts. *PLOS ONE* 2015; 10(7):e0131446. (Impact factor = 2.806)

Kaiser NJ and **KL Coulombe**. Physiologically inspired cardiac scaffolds for tailored in vivo function and heart regeneration. *Biomed Mater* 2015; 10(3):034003. (Impact factor = 3.361)

Rupert CE and **KL Coulombe**. The roles of neuregulin-1 in cardiac development, homeostasis, and disease. *Biomark Insights* 2015; 10(Suppl 1):1-9. (Impact factor N/A)

Coulombe KLK and Murry CE. Vascular perfusion of implanted human engineered cardiac tissue. *IEEE Proceedings for the 2014 40th Annual Northeast Bioengineering Conference (NEBEC).* Apr 2014. DOI: 10.1109/NEBEC.2014.6972763. (Impact factor N/A)

Coulombe KLK,* Bajpai VK,* Andreadis ST, Murry CE. Heart regeneration with engineered myocardial tissue. *Annu. Rev. Biomed. Eng.* 2014; 16:1-28. *Equal contributions. (Impact factor = 10.514)

Paul J,* **Coulombe KLK**,* Toth PT, Zhang Y, Marsboom G, Bindokas VP, Smith DW, Murry CE, Rehman J. SLIT3-ROBO4 activation promotes vascular network formation in human engineered tissue and angiogenesis in vivo. *J Mol Cell Cardiol.* 2013; 64:124-31. *Equal contributions. (Impact factor = 5.68)

Kreutziger KL, Muskheli V, Johnson P, Braun K, Wight T, Murry CE. Developing vasculature and stroma in engineered human myocardium. *Tissue Eng Part A.* 2011; 17(9-10):1219-28. (Impact factor = 3.485)

Kreutziger KL and Murry CE. Engineered human cardiac tissue. *Pediatr Cardiol.* 2011; 32(3):334-41. (Impact factor = 1.688)

Kreutziger KL, Piroddi N, Tesi C, Poggesi C, Regnier M. Cooperative activation and tension kinetics in cardiac muscle are strongly modulated by calcium binding kinetics of troponin C. *J Mol Cell Cardiol.* 2011; 50(1):165-74. (Impact factor = 5.68)

Mignone JL, **Kreutziger KL**, Paige SL, Murry CE. Cardiogenesis from human embryonic stem cells. *Circ J.* 2010; 74(12):2517-26. (Impact factor = 4.124)

Stevens KR, **Kreutziger KL**, Dupras SK, Korte FS, Regnier M, Muskheli V, Nourse MB, Bendixen K, Reinecke H, Murry CE. Physiological function and transplantation of scaffold-free and vascularized human cardiac muscle tissue. *Proc Natl Acad Sci USA* 2009; 106(39):16568-73. (Impact factor = 9.661)

Kreutziger KL, Piroddi N,Scellini B, Tesi C, Poggesi C, Regnier M. Thin filament Ca^{2+} binding properties and regulatory unit interactions alter kinetics of tension development and relaxation in rabbit skeletal muscle. *J Physiol* 2008; 583(1):337-350. (Impact factor = 4.739)

Kreutziger KL, Gillis TE, Davis JP, Tikunova SB, Regnier M. Influence of enhanced troponin C Ca^{2+} binding affinity on cooperative thin filament activation in skeletal muscle. *J Physiol* 2007; 583.1:337-350. (Impact factor = 4.739)

Martyn DA, Smith L, **Kreutziger KL**, Xu S, Yu LC, Regnier M. The effects of force inhibition by sodium vanadate on cross-bridge binding, force redevelopment, and Ca^{2+} activation in cardiac muscle. *Biophys J* 2007; 92:4379-4390. (Impact factor = 3.632)

Adhikari BB, Regnier M, Rivera AJ, **Kreutziger KL**, Martyn DA. Cardiac length dependence of force and force redevelopment kinetics with altered crossbridge cycling. *Biophys J* 2004; 87(3):1784-94. (Impact factor = 3.632)

Conklin BS, Richter ER, **Kreutziger KL**, Zhong DS, Chen C. Development and evaluation of a novel decellularized vascular xenograft. *Med Eng Phys* 2002; 24(3):173-83. (Impact factor N/A)

b. Conference Abstracts

Coulombe KLK, Kim TY, Wallace TR, Munarin F, Kofron CM, Rupert CE, King ME, Mende U, Choi BR. Development of *In Vitro* Models for Human Cardiac Arrhythmias. *Biomedical Engineering Society Annual Meeting,* Atlanta, GA, Oct 2018.

Coulombe KLK and Colvin V. A Case Study Approach for Teaching Undergraduate Biomaterials. *Biomedical Engineering Society Annual Meeting,* Atlanta, GA, Oct 2018.

Muanrin F, Kabelac C, **Coulombe KLK**. Chemically Modified Alginate Microspheres for Vascularizing Engineered Tissues. *Biomedical Engineering Society Annual Meeting,* Atlanta, GA, Oct 2018.

Rupert CE, Kim TY, Choi BR, **Coulombe KLK**. Cardiac Fibroblasts Modulate the Electromechanical Function of Engineered Human Cardiac Tissue. *Biomedical Engineering Society Annual Meeting,* Atlanta, GA, Oct 2018.

Kaiser NJ and **Coulombe KLK**. An Anisotropic Collagen Microfiber and Hydrogel Composite Scaffold for Cardiac Tissue Engineering. *Gordon Research Conference, Signal Transduction in Engineered Extracellular Matrices,* Andover, NH, Jul 2018. *(Poster Award, Assistant Professor Category.)*

Rupert CE, Kim TY, Choi BR, **Coulombe KLK**. Cardiac fibroblasts in engineered human heart tissues: Cellular engineers of the cardiomyocyte extracellular environment. *Gordon Research Conference, Signal Transduction in Engineered Extracellular Matrices,* Andover, NH, Jul 2018.

Kaiser NJ and **Coulombe KLK**. Cell-matrix interactions modulate stiffness and contractility of engineered 3D human iPSC-derived cardiac tissue. *World Congress of Biomechanics,* Dublin, Ireland, Jul 2018.

Jaganathan D, **Coulombe KLK**, Franck J. Modeling of blood flow in a compliant, stenosed vessel. *18th U.S. National Congress for Theoretical and Applied Mechanics,* Chicago, IL, Jun 2018. *(Poster presentation for DJ)*

Rupert C and **Coulombe KLK**. Developmental biomimicry for maturation of engineered human cardiac tissue. *Biomedical Engineering Society Annual Meeting,* Pheonix, AZ, Oct 2017. *(Invited oral for KLKC)*

Kant RJ, Khoo A, **Coulombe KLK**. Sacrificial fiber patterning for vascularization and inosculation of hiPSC-derived cardiac tissues. *Biomedical Engineering Society Annual Meeting*, Phoenix, AZ, Oct 2017.

Wallace TR, Ruiz D, Kaiser NJ, **Coulombe KLK**. Biophysical creep conditioning of engineered human iPSC-derived cardiac tissue. *Biomedical Engineering Society Annual Meeting*, Phoenix, AZ, Oct 2017.

Kaiser NJ and **Coulombe KLK**. An anisotropic collagen microfiber and hydrogel composite scaffold for cardiac tissue engineering. *National Heart Lung and Blood Institute Symposium on Cardiovascular Regenerative Medicine*, Bethesda, MD, Sep 2017.

Kaiser NJ and **Coulombe KLK**. An anisotropic collagen microfiber and hydrogel composite scaffold for cardiac tissue engineering. *Collagen Gordon Research Conference*, New London, NH, Jul 2017.

Coulombe KLK, Kaiser NJ, Rupert CE, Munarin F, Kim TY, Choi BR. Maturation and integration of engineered human myocardium. *6th Int'l Conference on Tissue Engineering in conjunction with the 3rd Int'l Conference on Regenerative Biomedical Materials*, Heraklion, Crete, Greece, Jun 2017. *(Invited oral for KLKC)*

Rupert CE, Kim TY, Choi BR, **Coulombe KLK**. Genetically engineered cardiac fibroblasts for electrical maturation of hiPSC-cardiomyocytes. *International Society for Stem Cell Research 2017 Annual Meeting*, Boston, MA, Jun 2017.

Kaiser NJ and **Coulombe KLK**. Optimization of a collagen-fibrin matrix for human iPSC-derived cardiac tissue formation and function. *Conference for Cellular and Molecular Bioengineering*, Kona, HI, Jan 2017. *(Rising Star Award, invited oral for KLKC)*

Rupert CE, Kim TY, Choi BR, **Coulombe KLK**. Carbon nanomaterials for engineering conduction into human cardiac tissues. *Conference for Cellular and Molecular Bioengineering*, Kona, HI, Jan 2017.

Coulombe KLK, Munarin F, Kim TY, Mende U, Choi BR. Engineered hiPSC-cardiac tissue propagates electrical impulses to host in infarcted rat hearts. *Biomedical Engineering Society Annual Meeting*, Minneapolis, MN, Oct 2016. *(Oral for KLKC)*

Kaiser NJ and **Coulombe KLK**. Impact of polymer and cell content on tissue development in engineered cardiac constructs. *Biomedical Engineering Society Annual Meeting*, Minneapolis, MN, Oct 2016.

Rupert CE, Chang HH, and **Coulombe KLK**. High throughput image analysis reveals three dimensional morphological changes in hypertrophically stimulated human induced pluripotent stem cell-derived cardiomyocytes. *Biomedical Engineering Society Annual Meeting*, Minneapolis, MN, Oct 2016.

Muanrin F and **Coulombe KLK**. A hybrid biomaterials platform for neovascularization in engineered human iPSC-derived cardiac tissue. *International Society for Applied Cardiovascular Biology 15th Biennial Meeting*, Banff, Calgary, Canada, Sep 2016. *(Invited oral for KLKC)*

Coulombe KLK. Localized growth factor delivery for neovascularization in engineered human iPSC-derived cardiac tissue. *Signal Transduction in Engineered Extracellular Matrices Gordon Research Conference*, Biddeford, ME, Jun 2016.

Rupert CE and **Coulombe KLK**. Hybrid scaffolds with cardiac fibroblasts and conductive carbon nanomaterials increase mechanical and electrical functionality of engineered human cardiac tissue. *Signal Transduction in Engineered Extracellular Matrices Gordon Research Conference*, Biddeford, ME, Jul 2016.

Coulombe KLK and Munarin F. Vascularization of engineered tissue scaffolds using embedded VEGF-releasing alginate microspheres for heart regeneration. *National Heart Lung and Blood Institute Symposium on Cardiovascular Regenerative Medicine*, Bethesda, MD, Sep 2015.

Rupert CE, Kim TY, Choi BR, **Coulombe KLK**. Human iPSC-derived cardiomyocytes and human cardiac fibroblasts for engineering dynamically remodeling myocardium for regenerative medicine. *National Heart Lung and Blood Institute Symposium on Cardiovascular Regenerative Medicine*, Bethesda, MD, Sep 2015.

Muanrin F and **Coulombe KLK**. Collagen-alginate microspheres scaffolds promote neovascularization and cardiac regeneration. *Tissue Engineering and Regenerative Medicine International Society (TERMIS) World Congress*, Boston, MA, Sep 2015.

Rupert CE, Chang H, **Coulombe KLK**. Three-dimensional morphological assessment of hypertrophy in hiPSC-derived cardiomyocytes. *Tissue Engineering and Regenerative Medicine International Society (TERMIS) World Congress*, Boston, MA, Sep 2015.

Kaiser NJ and **Coulombe KLK**. A natural polymer cardiac scaffold for tailored in vivo function. *Tissue Engineering and Regenerative Medicine International Society (TERMIS) World Congress*, Boston, MA, Sep 2015.

Muanrin F and **Coulombe KLK**. A novel collagen-alginate microspheres scaffold releasing VEGF to heal injured hearts. *Angiogenesis Gordon Research Conference*, Newport, RI, Aug 2015.

Rupert CE and **Coulombe KLK**. Neuregulin-1 influences differentiation efficiency and specificity of human induced pluripotent stem cells to cardiomyocytes. *International Society for Stem Cell Research 2015 Annual Meeting*, Stockholm, Sweden, Jun 2015.

Coulombe KLK. Engineering macroscale 3D human cardiac tissue from human pluripotent stem cells. *Functional Analysis & Screening Technologies Congress*, Boston, MA, Nov 2014.

Rupert CE, M Regnier, CE Murry, **Coulombe KLK**. Engineering mature cardiac tissue in vitro: biomechanical and biochemical stimulation of physiological hypertrophy. *Biomedical Engineering Society 2014 Annual Meeting*, San Antonio, TX, Oct 2014.

Rupert CE and **Coulombe KLK**. Engineering the contractile maturation of hESC-derived cardiomyocytes in 3D tissues. *Signal Transduction in Engineered Extracellular Matrices Gordon Research Conference*, Waltham, MA, Jul 2014.

Kreutziger KL, Beres KA, Dupras S, Yang X, Muskheli V, Murry CE. Human ESC-derived cardiac micro-tissue particles as a novel approach for myocardial infarct tepair. *Biomedical Engineering Society Annual Meeting*, Atlanta, GA, Oct 2012. *(Oral for KLK)*

Kreutziger KL, Stevens KR, Dupras S, Muskheli V, Murry CE. Host response and vascularization of hESC-derived engineered cardiac tissue in a rat model of myocardial infarction. *Society for*

Biological Engineering's 3rd International Conference on Stem Cell Engineering, Seattle, WA, Apr 2012. *(Oral for KLK)*

Kreutziger KL, Beres KA, Dupras S, Fernandes S, Yang X, Muskheli V, Murry CE. Human pluripotent stem cell-derived cardiac micro-tissue particles for myocardial infarct tepair. *Society for Biological Engineering's 3rd International Conference on Stem Cell Engineering*, Seattle, WA, Apr 2012.

Kreutziger KL and Murry CE. Vascularization of engineered human cardiac tissue. *International Society for Stem Cell Research 8th Annual Meeting.* San Francisco, CA, Jun 2010.

Kreutziger KL and Murry CE. Developing vasculature in tissue-engineered human cardiac muscle: Studies on VEGF and notch signaling. *Developmental Vascular Biology Workshop IV Meeting of the North American Vascular Biology Organization*, Monterey, CA, Apr 2010. (*Oral for KLK)*

Kreutziger KL, Stevens KR, Murry CE. Stromal cells support vascularization of a human embryonic stem cell-derived cardiac tissue patch. *Vascular Matrix Biology and Bioengineering Workshop II Meeting of the North American Vascular Biology Organization*, Whistler, B.C., Canada, Mar 2009. *(Oral for KLK)*

Kreutziger KL and Regnier M. Coupled interactions of troponin C Ca^{2+}-binding kinetics and strong crossbridge formation in cardiac muscle contraction. *Biophys J* 2008; 94:1323.

Kreutziger KL, Piroddi N, Belus A, Poggesi C, Regnier M. Ca^{2+}-binding kinetics of troponin C influence force generation kinetics in cardiac muscle. *Biophys J* 2007; 92:477a.

Kreutziger KL, Piroddi N, Belus A, Scellini B, Poggesi C, Regnier M. Effect of TnC with altered Ca^{2+} binding kinetics on force generation in striated muscle. *J Muscle Res Cell Motil* 2006; 27:501-2.

Kreutziger KL, Gillis TE, Flint GV, Bezold KL, Piroddi N, Scellini B, Poggesi C, Regnier M. Effects of EMD 57033 on cardiac contractile mechanics and kinetics. *Biophys J* 2006; 90:261a.

Gillis TE, **Kreutziger KL**, Clemmens EW, Rivera AJ, Tikunova SB, Davis JP, Regnier M. Cardiac vs. skeletal muscle: Differences in thin filament regulation of force development. *Biophys J* 2005; 88:315a.

Kreutziger KL, Gillis TE, Tikunova SB, Regnier M. Effects of TnC with increased Ca^{2+} affinity on cooperative activation and force kinetics in skeletal muscle. *Biophys J* 2004; 86(1):213a.

Kreutziger KL, Rivera AJ, Martyn DA, Regnier M. Effect of crossbridge kinetics on sarcomere length dependence of force development in cardiac muscle. *Biophys J* 2003; 84:449a.

Moreno-Gonzalez A, Drapala P, **Kreutziger KL**, Regnier M. Decreased Ca^{2+} binding by troponin C isoforms enhances crossbridge contribution to thin filament activation in skeletal muscle. *Biophys J* 2003; 84:449a.

d. Invited Lectures

New England Cardiovascular Tissue Engineering Symposium, Biomedical Engineering, Tufts University, Medford, MA, Jul 2018.

Cardiovascular Tissue Engineering Symposium, Biomedical Engineering, Yale University, New Haven, CT, Jan 2018.

Cardiovascular Research Center, Rhode Island Hospital, Providence, RI, Sep 2017.

National Institutes of Health, National Heart Lung and Blood Institute, Bethesda, MD, Jul 2017.

Biomedical Engineering, Worcester Polytechnic Institute, Worcester, MA, Mar 2017.

Cardiopulmonary Vascular Biology Group, Providence VA Medical Center, Providence, RI, Jan 2017.

Center for Cardiovascular Biology, University of Washington, Seattle, WA, Aug 2016.

Department of Orthopedics, Rhode Island Hospital, Providence, RI, Mar 2016.

Cardiovascular Research Center, Rhode Island Hospital, Providence, RI, Jan 2016.

Rhode Island Center for Clinical and Translational Science, Brown University, Providence, RI, Jan 2016.

Cardiovascular Research Center, Rhode Island Hospital, Providence, RI, Nov 2014.

Cardiopulmonary Vascular Biology Group, Providence VA Medical Center, Providence, RI, Jul 2014.

Cardiovascular Research Center, Rhode Island Hospital, Providence, RI, May 2014.

Department of Molecular Pharmacology, Physiology, and Biotechnology, Brown University, Providence, RI, Mar 2014.

Center for Cardiovascular Biology, University of Washington, Seattle, WA, Nov 2013.

Biomedical Engineering, University of Virginia, Charlottesville, VA, Mar 2013.

Biomedical Engineering, University of Minnesota, Minneapolis, MN, Feb 2013.

Department of Pharmacology, University of Illinois at Chicago, Chicago, IL, Feb 2013.

School of Engineering, Brown University, Providence, RI, Jan 2013.

Department of Pharmaceutical Sciences, Northeastern University, Boston, MA, Jan 2013.

Thompson Hall Science and Mathematics Seminars, University of Puget Sound, Tacoma, WA, Apr 2010.

Department of Bioengineering, University of Washington, Seattle, WA, May 2007.

Dipartimento di Scienze Fisiologiche, Universitá degli Studi di Firenze, Florence, Italy, Oct 2005.

e. Work in Progress

Minor AJ and **Coulombe KLK**. Engineering matrix for regenerative angiogenesis. (In review)

Kaiser NJ and **Coulombe KLK**. Optimization of a collagen-fibrin matrix for human iPSC-derived cardiac tissue formation and function. (In review)

Munarin F, Kant RJ, Khoo A, Rupert CE, **Coulombe KLK**. Engineered human myocardium with local release of growth factors improves vascularization and cardiac function in injured rat hearts. (In preparation)

Rupert CE, Kim TY, Minor AJ, Kofron CM, Mende U, Choi BR, **Coulombe KLK**. Human cardiac fibroblasts modulate electromechanical function of engineered hiPSC-derived cardiac tissue. (In preparation)

4. RESEARCH GRANTS

a. Active Awards

Source: NIH National Heart, Lung, and Blood Institute, Research Project Grant (R01 HL135091)
Title: Engineered Human Myocardium with Hybrid Biomaterials for Heart Regeneration
Dates: 02/01/2017 – 01/31/2022
Role: PI
Effort: 4.8 months
Total Award Amount: $2,271,191

Source: NIH National Heart, Lung, and Blood Institute, Diversity Supplement for R01 HL135091
Title: Directing Angiogenesis by Patterning ECM-adherent Signaling Molecules in Human Engineered Cardiac Tissue for Improved In Vivo Vascularization
Dates: 06/15/2018 – 01/31/2022
Role: Mentor of Alicia Minor (trainee)
Total Award Amount: $279,400

Source: NIH National Institute of Environmental Health Sciences, Bioengineering Research Partnership (U01 ES028184)
Title: Human 3D Microtissues for Toxicity Testing via Integrated Imaging, Molecular and Functional Analyses
Dates: 09/15/2017 – 07/31/2022
Role: Co-Investigator (PI: Kim Boekelheide)
Effort: 0.6 month
Total Award Amount: $2,562,311 (Coulombe award amount: $136,236)

Source: NIH National Institute of General Medical Sciences (T32 GM077995)
Title: Predoctoral Training Program in Trans-Disciplinary Pharmacological Sciences
Dates: 07/01/2016 – 06/30/2021
Role: Trainer (PI: Julie Kauer)
Total Award Amount: $932,230

b. Completed Awards

Source: NIH National Heart, Lung, and Blood Institute, Pathway to Independence Award (K99/R00 HL115123)
Title: Regenerating the Heart with Engineered Human Cardiac Tissue
Dates: 08/01/2012 – 03/31/2017
Role: PI
Effort: 9 months
Total Award Amount: $891,498

Source: Richard B. Salomon Faculty Research Awards, Office of the Vice President for Research, Brown University
Title: How Shape and 3-dimensional Microenvironment Influences Human Cardiomyocyte Phenotype
Dates: 01/01/2015 – 06/31/2017
Role: PI
Effort: 0.5 month
Total Award Amount: $15,000

Source: The Rhode Island Foundation, Medical Research Grant
Title: Understanding Human Cardiomyocyte Function for Tissue Engineering and Heart Repair
Dates: 05/01/2015 – 01/31/2017
Role: PI
Effort: 0.5 month
Total Award Amount: $15,000

Source: NIH National Heart, Lung, and Blood Institute, Research Project Grant (R01 HL104025)
Title: Na+ Channel mRNA Regulation in Heart Failure
Dates: 06/01/2016 – 05/31/2017
Role: Collaborator (PI: Samuel Dudley)
Effort: 1 month
Total Award Amount: $450,924 (Coulombe award amount: $20,395)

Source: Dean's Emerging Areas of New Science (DEANS) Award, Division of Biology and Medicine, Brown University
Title: Functional Integration of Aligned Engineered Cardiac Tissue in Infarcted Hearts
Dates: 08/01/2014 – 12/31/2015
Role: Co-PI
Effort: 1.5 month
Total Award Amount: $80,000

Source: NIH Loan Repayment Program, Clinical Research, National Heart, Lung, and Blood Institute
Dates: 2009 – 2011
Role: PI

Source: NIH National Heart, Lung, and Blood Institute, Institutional Training Grant (T32 HL007312)
Title: Role of Vascular Cell Co-culture in Scaffold-free Human Engineered Tissue
Dates: 04/15/2008 – 04/14/2011
Role: Postdoctoral trainee

5. SERVICE

a. To the University

Co-Chair, Honors Committee, School of Engineering	2017 – present
Member, BME Graduate Program Committee	2017 – present
Voluntary Faculty Participant, STEM TEAM Program	2017 – present
Faculty Advisory Committee, Graduate Women in Science and Engineering	2017 – present
Search Committee Member, Manager of Research Administration, SOE	2017
Reviewer, Pilot Project Proposals, Advance CTR, Div. of BioMed	2017
Lecturer, Animal Research, Responsible Conduct of Research, Div. of BioMed	2017
Panelist, K99/R00 NIH Pathway to Independence Award Panel, Office of Graduate & Postdoctoral Studies	2017
Panelist, HUGS in STEM@Brown, New Scientist Collective	2017
Interviewee, Pre-college Introduction to Engineering, SPSS	2017
Gingerbread House Competition Judge, Society of Women Engineers	2017
Host for BME Seminar Speakers (2 visitors)	2017
Host for IMNI Distinguished Lecturer (Angela Belcher)	2017
Member, Cardiovascular Research Advisory Board, CVRC, Lifespan/RIH	2016 – present
Member, SOE/RISD Master's Program (MADE) Committee	2016 – present
Voluntary Faculty Participant, Team Enhanced Advising and Mentoring (TEAM)	2016 – 2017
Poster Judge, BME/Biotech Retreat	2016, 2017
Panelist, Lunch Conversations, Women in Science and Engineering	2016, 2017
Judge, Summer Showcase Poster Session, Warren Alpert Medical School	2016
Participant, Community Building Projects, SOE	2016
Laboratory Systems Design Committee, School of Engineering	2015 – 2016
Faculty Mentor, Young Scholars' Conference, GWiSE and the Provost's Office	2015, 2016
Lab Tour for the Corporate Affiliates Board, SOE	2014
Panelist, Negotiating the Job Offer, Brown CareerLAB	2014
Faculty Co-Adviser for the Society of Women Engineers	2014 – present
Sophomore Adviser, School of Engineering	2014 – present
First-Year Adviser, School of Engineering	2014 – present
President, Leadership Institute For Tomorrow, University of Washington	2004 – 2006
Vice President, Bioengineering Students Association, University of Washington	2002 – 2003
President, Tau Beta Pi National Engineering Honor Society, NY Kappa Chapter, University of Rochester	2000 – 2001
Treasurer, Biomedical Engineering Society, University of Rochester	1999 – 2000

b. To the Profession

Mentor Training Program, NIH NIGMS National Research Mentoring Network, Advance-Clinical Translational Research (NIH U54GM115677)	2018
NIH Grant Reviewer: R21, K01 - Diversity	2017 – present
Meeting Chair, Cardiovascular Regenerative Engineering Symposium	2017
Invited Speaker, NIH NHLBI K-to-R01 Investigators Meeting	2017
Session Co-chair and Co-organizer, 6th Int'l Conference on Tissue Engineering	2016
Session Co-chair and Co-organizer, Int'l Society of Applied Cardiovascular Bio.	2016
NSF Grant Reviewer	2015 – 2017
Biomedical Engineering Society, Annual Meeting Session Co-chair	2015 – present
Biomedical Engineering Society, Annual Meeting Abstract Reviewer	2015 – present

Manuscript Reviewer for ACS Biomaterials Science & Engineering, Acta Biomaterialia, Advanced Healthcare Materials, Annuls of Biomedical Engineering, Biomedical Materials, CARBON, Cell Reports, Cell Stem Cell, Cellular and Molecular Bioengineering, J Biomedical Materials Research Part A, Science Advances, Scientific Reports, Tissue Engineering

c. To the Community

Lincoln Lower School, Science Curriculum Development Collaboration	2017 – present
Vartan-Gregorian Science Conference, Providence Public Schools	2016, 2017
Spira Summer Camp for Underserved Girls in RI	2016, 2017
Providence Heart Walk Team, American Heart Association	2015, 2016, 2017
STEM I Middle School Program, Brown University	2016
NBC WJAR Channel 10, Providence Health Check http://turnto10.com/features/health-landing-page/health-check-195m-grant-strengthens-relationships-between-ri-scientists-clinicians	2016
Brown-Lincoln School, Introduction to Engineering, Lecture & Lab Tour	2015, 2016, 2017

6. HONORS AND AWARDS

Poster Award, Assistant Professor Category, Gordon Research Conference, Signal Transduction in Engineered Extracellular Matrices	2018
Rising Star Award, Cellular and Molecular Bioengineering Group, BMES	2017
Athletic Hall of Fame, University of Rochester	2016
Salomon Award, Brown University	2015
BMES Outstanding Contribution, Cardiovascular Engineering	2014
NIH NHLBI K99/R00 Pathway to Independence Award	2011 – 2017
Travel Award, Developmental Vascular Biology Workshop IV, North American Vascular Biology Organization	2010
Howard Hughes Medical Institute Future Faculty Fellow, University of Washington	2009 – 2010
Travel Award, Vascular Matrix Biology and Bioengineering Workshop II, North American Vascular Biology Organization	2009
Biophysical Society Student Travel Grant for the 52nd Annual Meeting	2008
Graduate School Fund for Excellence and Innovation, Travel Award, University of Washington	2007
Whitaker Foundation Pre-doctoral Fellow in Biomedical Engineering	2001 – 2006
NSF Graduate Research Fellowship (declined)	2001
Summa cum laude, B.S. in Biomedical Engineering, University of Rochester	2001
Take Five Scholar, University of Rochester	2000 – 2001
Robert L. Wells Prize for the Top Ranked Senior, School of Engineering, University of Rochester	2000

BME Outstanding Senior Award, University of Rochester	2000
All-American, Second Team, Intercollegiate Women's Lacrosse Coaches Association	2000
Scholar-Athlete and Regional-All American, Intercollegiate Women's Lacrosse Coaches Association	2000
Women's Scholar Athlete Award, University of Rochester	2000
Academic All-America, First Team, Women's Lacrosse, College Sports Information Directors of America	1999 & 2000
Phi Beta Kappa Honor Society	1999
Tau Beta Pi National Engineering Honor Society	1999
Susan B. Anthony Award; University of Rochester	1999
George O. Smith Educational Fund Scholarship in Engineering	1998 – 2000
Rush Rhees Scholarship, University of Rochester	1996 – 2000

7. TEACHING AND ADVISING

a. Courses

Overall average scores shown: 1 = "very effective", 5 = "very ineffective"

Spring 2018	Cardiovascular Engineering (ENGN 1520) 15 students (13 undergraduate, 2 graduate) Effectiveness of course: 1.43 Effectiveness of instruction: 1.38
Fall 2017	Biomaterials (ENGN 1490) 34 students (33 undergraduate, 1 graduate) Effectiveness of course: 1.60 Effectiveness of instruction: 1.65
Spring 2017	Cell-Material Interactions in Tissue Engineering (ENGN 1931K) 6 students (1 undergraduate, 5 graduate) Effectiveness of course: 1.50 Effectiveness of instruction: 1.00
Fall 2016	Cardiovascular Engineering (ENGN 1520) 12 students (10 undergraduate, 2 graduate) Effectiveness of course: 1.63 Effectiveness of instruction: 1.50
Spring 2016	No teaching because NIH R00 grant required 75% research effort
Fall 2015	Cardiovascular Engineering (ENGN 1520) 11 students (9 undergraduate, 2 graduate) Effectiveness of course: 1.40 Effectiveness of instruction: 1.30
Spring 2015	Parental leave
Fall 2014	Cardiovascular Engineering (ENGN 1520) 16 students (3 undergraduate, 13 graduate) Effectiveness of course: 1.31 Effectiveness of instruction: 1.31
Spring 2014	Transport and Biotransport Processes (ENGN 1110); co-instructor with Anita Shukla

41 students (39 undergraduate, 2 graduate)
Effectiveness of course: 3.25 Effectiveness of instruction: 2.83

Guest Lecturer
In Vitro Models of Disease (BIOL 2167, graduate); spring 2014, 2016, 2017

b. Doctoral Theses Directed

Cassady E Rupert, BA (Biomedical Engineering) 2013 – present
Eccleston Fellowship, GAANN Fellowship, NIH F31 (submitted twice, not funded)
Expected completion: Aug 2019
Conductive synthetic and biological scaffolds to engineer mechanically and electrically mature cardiac tissue

Nicholas J Kaiser, BS (Biomedical Engineering) 2014 – present
Expected completion: May 2019
Engineering a mechanically anisotropic collagen microfiber scaffold for tailored cardiac tissue function

Rajeev J Kant, BS (Biomedical Engineering) 2016 – present
Expected completion: May 2021
Patterned microchannels for vascularization of engineered cardiac tissue for heart repair

Alicia J Minor, BS (Biomedical Engineering) 2017 – present
IMSD Trainee (NIH T32), Diversity Fellowship (Brown Graduate School), NIH Diversity Supplement Award (HL135091)
Expected completion: May 2022
Directing Angiogenesis by Patterning ECM-adherent Signaling Molecules in Human Engineered Cardiac Tissue for Improved In Vivo Vascularization

c. Master's Theses Directed

Travis R Wallace, BS (Biomedical Engineering) 2016 – present
Expected completion: Dec 2018
Biophysical creep conditioning of cardiomyocyte maturity in engineered human cardiac tissue

Chinedu Irofuala, ScM in Biomedical Engineering 2017 – 2018
Genetic background influences cardiac differentiation efficiency from human induced pluripotent stem cells

Divya Jaganathan, ScM in Fluids and Thermal Sciences 2016 – 2018
Simulation of Fluid-Structure Interaction of Flow through a Compliant Vessel
Co-advised with Dr. Jennifer Franck, Ph.D.

Maria Paredes, ScM in Biomedical Engineering 2017 – 2018
Patterned shape influences polarization and myofilament structure in single cardiomyocytes derived from human induced pluripotent stem cells

Kyle Meyer, ScM in Biomedical Engineering 2015 – 2016
Current: Hadoop Software Developer, Novetta
A novel high-throughput assay for contractile assessment of hiPSC-derived cardiomyocytes in 3D collagen gels

Bining Lu, ScM in Biotechnology 2014 – 2016
Current: Account Manager, LifeTein LLC
Geometric cues for guiding human induced pluripotent stem cell-derived cardiomyocyte maturation on 2D patterned surfaces

d. Postdoctoral Fellows Advised

Fabiola Munarin, Ph.D. 2014 – present
Project: Guided host vascularization into implanted engineered hiPSC-derived cardiac tissue using embedded growth factor-releasing alginate microspheres.

e. Undergraduate Honors Theses Directed

Colette Bare, Biomedical Engineering, Class of 2019 2018 – 2019
Microchannel patterning for inosculation of engineered human cardiac tissue

Jessica Bellows, Biomedical Engineering, Class of 2019 2018 – 2019
Patterning collagen microfibers for mechanical anisotropy in engineered human cardiac tissue

Kelly Williams, Biomedical Engineering, Class of 2019 2018 – 2019
Optimization of a tissue engineering platform as an in vitro model of myocardial infarct scar

Gian Ignacio, ScB in Biomedical Engineering, Class of 2018 2016 – 2018
Program in Liberal Medical Education
Wet-Spun Carbon Nanotube Encapsulated Microfibers for Cardiac Tissue Repair

Amelia Khoo, ScB in Biomedical Engineering, Class of 2018 2016 – 2018
Inducing vascular growth into patterned engineered cardiac tissue in vivo

Jason Thomas, ScB in Physics, Class of 2017 2016 – 2017
Biophysical characterization of contraction in human induced pluripotent stem cell derived cardiac tissue

Jackie Vu, BA in Engineering, Class of 2017 2016 – 2017
Current:
Fabrication and Mechanical Characterization of a Collagen Microfiber Vascular Scaffold

Heidi H Chang, ScB in Chemical Engineering, Class of 2016 2014 – 2016
Chemical modification of growth factors and optimized detection methods for controlled protein release from alginate microspheres for therapeutic angiogenesis

Jad Nasrallah, ScB in Mechanical Engineering, Class of 2016 2015 – 2016
Evaluation of the Bias Flow Characteristics of Ophidia Inspired Vascular Geometries Through Computational Modeling

Dalia Ruiz, ScB in Biomedical Engineering, Class of 2016 2015 – 2016
How continuous stretch of engineered cardiac tissue influences mechanical function

Carlota Pereda Serras, ScB in Biology, Class of 2015 2014 – 2015
Human cardiac fibroblast heterogeneity for hiPSC-cardiac tissue engineering

Giuliano Marostica, ScB in Biomedical Engineering, Class of 2015 2014 – 2015
Engineering a Cardiac Tissue Tube

f. Doctoral Thesis Committee Service

Harry Cramer, BME, Brown University (Thesis Adviser: Christian Franck)

Bethany Almeida, BME, Brown University (Thesis Adviser: Anita Shukla)

Francis Cui, BME, Brown University (Thesis Adviser: Anubhav Tripathi)

Breanna Duffy, BME, Tufts University (Thesis Adviser: Lauren Black, III)

Elizabeth Leary, BME, Brown University (Thesis Adviser: Jeffrey Morgan)

Manisha Kanthilal Shah, PhD 2017, BME, Brown University (Thesis Adviser: Eric Darling)

Megan Chrobak, PhD 2017, BME, Worcester Polytechnic Institute (Thesis Adviser: George Pins)

Yu-Ting Dingle, PhD 2015, BME, Brown University (Thesis Adviser: Diane Hoffman-Kim)

g. Master's Thesis Committee

Japheth Omonira, ScM 2018, BME (Thesis Adviser: Gerard Nau, Infectious Disease, RIH)

Ki-Soo Jeong, ScM 2018, Biotechnology (Thesis adviser: Jonghwan Lee, BME, Brown)

Rachel Ga Yeon Lee, ScM 2017, BME (Thesis Adviser: Anubhav Tripathi, BME, Brown)

Bella Okiddy, ScM 2016, BME (Thesis Adviser: Eric Darling, BME, Brown)

Payal Patel, ScM 2016, Biotechnology (Thesis Adviser: Diane Hoffman-Kim, BME, Brown)

h. Undergraduate Researchers Advised

Colette Bare[†&], BME, Class of 2019 — 2018 – present

Jessica Bellows*[†], BME, Class of 2019 — 2018 – present

Kelly Williams[†], BME, Class of 2019 — 2018 – present

Jasmine Gabor*, undeclared, Class of 2021 — 2017 – present

Carly Kabelac*, Biomedical Engineering, Class of 2019 — 2017 – present

Joy Aso*[§], Biomedical Engineering, Class of 2019 — 2017 – present

Gian Ignacio*, Biomedical Engineering, Class of 2018 — 2016 – present

Amelia Khoo*, Biomedical Engineering, Class of 2018 — 2016 – present

Maria Muhammad[#§], Chemistry, Tougaloo College, Class of 2018 — 2017

Maria Paredes*[§], ScB in Biomedical Engineering, Class of 2017 — 2015 – 2017
George H. Main '45 Award, School of Engineering, Brown University
Current: 5th year ScM program in BME, Brown University

Chinedu Irofuala*[§], ScB in Biomedical Engineering, Class of 2017 — 2016 – 2017
Current: 5th year ScM program in BME, Brown University

Jason Thomas*[§†], ScB in Physics, Class of 2017 — 2016 – 2017
Current: Medical assistant, The Miriam Hospital

Jackie Vu*[†], BA in Engineering, Class of 2017 — 2016 – 2017
Current: Biomedical Engineer, KINETEKS, LLC

Heidi H Chang*[†‡], ScB in Chemical Engineering, Class of 2016 — 2014 – 2016
Current: Researcher, MediaZen, Inc

Jad Nasrallah*[†], ScB in Mechanical Engineering, Class of 2016 — 2015 – 2016
Joseph Kestin Award, School of Engineering, Brown University
Current: Mechanical Engineer, Nebia

Dalia Ruiz*[§†], ScB in Biomedical Engineering, Class of 2016 — 2015 – 2016
Current: Manufacturing Research Associate, Pacific Biosciences

Shababa Matin*, ScB in Biomedical Engineering, Class of 2017 — 2015
Current: unknown

Kyle Meyer, ScB ’15 in BME, ScM ’16 in BME — 2014 – 2016
Current: Hadoop Software Developer, Novetta

Giuliano Marostica[†], ScB in Biomedical Engineering, Class of 2015 — 2014 – 2015
Domenico A. Ionata Award, School of Engineering, Brown University
Current: Associate, Great Point Partners

Carlotta Pereda Serras[†], ScB in Biology, Class of 2015 — 2014 – 2015
Current: Biotechnology Research Technician, Rumi Scientific

* Undergraduate Teaching and Research Award recipient, [#] Leadership Alliance Summer Research-Early Identification Program (NIH R25 HL088992, PI: Elizabeth Harrington), [&] Royce Fellowship, [§] URM, [†] Honors Thesis, [‡] Co-author on peer-reviewed scientific publication.

i. Other Trainees and Scientists Advised

Jasmine Gabor, high school student summer volunteer — 2017

Giovanni Andrea Micheli, Visiting Scientist — 2016
Master’s candidate, Politechnico di Milano, Milan, Italy

Ananya Anand, ScB (Warren Alpert Medical Student, Brown University) — 2016
Scholarly Concentrations Program, NIH T35 HL094308