

# Kareen L. K. Coulombe, Ph.D.

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## 1. EDUCATION

- Ph.D. Bioengineering, University of Washington (Seattle, WA) 2001 – 2007  
*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*
- B.S. Biomedical Engineering, University of Rochester (Rochester, NY) 1996 – 2001  
*Summa cum laude*

## 2. PROFESSIONAL APPOINTMENTS

- Associate Professor of Engineering, School of Engineering, Brown University 2021 – present
- Director of Graduate Studies in Biomedical Engineering, Brown University 2019 – present
- Assistant Professor of Engineering, School of Engineering, Brown University 2014 – 2021
- Assistant Professor of Medical Science, Division of Biology and Medicine, Brown University (courtesy appointment) 2014 – 2021
- 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

- (47) Kant RJ, Dwyer KD, Lee JH, Polucha C, Kobayashi M, Pyon S, Soepriatna AH, Lee J, **Coulombe KLK**. Patterned Arteriole-Scale Vessels Enhance Engraftment, Perfusion, and Vessel Branching Hierarchy of Engineered Human Myocardium for Heart Regeneration. *Cells*. 2023 Jun 23;12(13):1698. PMID: [PMC10340601](https://pubmed.ncbi.nlm.nih.gov/40601/).
- (46) Dwyer KD, Kant RJ, Soepriatna AH, Roser SM, Daley MC, Sabe SA, Xu CM, Choi BR, Sellke FW, **Coulombe KLK**. One Billion hiPSC-Cardiomyocytes: Upscaling Engineered Cardiac Tissues to Create High Cell Density Therapies for Clinical Translation in Heart Regeneration. *Bioengineering (Basel)*. 2023 May 13;10(5):587. PMID: [PMC10215511](https://pubmed.ncbi.nlm.nih.gov/415511/).

- (45) AH Soepriatna\*, A Navarrete-Welton\*, TY Kim, MC Daley, P Bronk, CM Kofron, U Mende, **KLK Coulombe**, BR Choi. Action Potential Metrics and Automated Data Analysis Pipeline for Cardiotoxicity Testing Using Optically Mapped hiPSC-derived 3D Cardiac Microtissues. *PLOS One*. 2023 Feb 6;18(2):e0280406. doi: [10.1371/journal.pone.0280406](https://doi.org/10.1371/journal.pone.0280406).
- (44) Schmitt PR, Dwyer KD, Minor AJ, **Coulombe KLK**. Wet-Spun Polycaprolactone Scaffolds Provide Customizable Anisotropic Viscoelastic Mechanics for Engineered Cardiac Tissues. *Polymers (Basel)*. 2022 Oct 28;14(21). Doi: [10.3390/polym14214571](https://doi.org/10.3390/polym14214571).
- (43) MC Daley, U Mende, BR Choi, PD McMullen, **KLK Coulombe**. Beyond pharmaceuticals: Fit-for-purpose new approach methodologies for environmental cardiotoxicity testing. *ALTEX - Alternatives to animal experimentation*. Review. Doi: [10.14573/altex.2109131](https://doi.org/10.14573/altex.2109131).
- (42) PR Schmitt, KD Dwyer, **KLK Coulombe**. Current Applications of Polycaprolactone as a Scaffold Material for Heart Regeneration. *ACS Applied Bio Materials* 2022 Jun 20;5-6, 2461–2480. Review. <https://doi.org/10.1021/acsabm.2c00174>
- (41) Kofron CM, Choi BR, **Coulombe KLK**. Arrhythmia Assessment in Heterotypic Human Cardiac Myocyte-Fibroblast Microtissues. *Methods Mol Biol*. 2022;2485:147-157. Doi: 10.1007/978-1-0716-2261-2\_10. PMID: [35618904](https://pubmed.ncbi.nlm.nih.gov/35618904/).
- (40) Minor AJ & **Coulombe KLK**. Stimulating calcium handling in hiPSC-derived engineered cardiac tissues enhances force production. *Stem Cells Translational Medicine*, 2022 Jan;11(1):97–106. Doi: <https://doi.org/10.1093/stcltm/szab002>
- (39) Kant RJ, Bare CF, **Coulombe KLK**. Tissues with patterned vessels or protein release induce vascular chemotaxis in an in vitro platform. *Tissue Eng Part A*. 2021 Oct;27(19-20):1290-1304. doi: [10.1089/ten.TEA.2020.0269](https://doi.org/10.1089/ten.TEA.2020.0269).
- (38) Soepriatna AH, Daley MC, Kim TY, Choi BR, **Coulombe KLK**. Human Atrial Cardiac Microtissues for Chamber-specific Arrhythmic Risk Assessment. *Cellular and Molecular Bioengineering*. 2021 Sep 29;14(5):441-457. doi: [10.1007/s12195-021-00703-x](https://doi.org/10.1007/s12195-021-00703-x). eCollection 2021 Oct.
- (37) Munarin F, Kabelac C, **Coulombe KLK**. Heparin-modified alginate microspheres enhance neovessel formation in hiPSC-derived endothelial cells and heterocellular in vitro models by controlled release of vascular endothelial growth factor. *J Biomed Mater Res A*. 2021 Sep;109(9):1726-1736. doi: [10.1002/jbm.a.37168](https://doi.org/10.1002/jbm.a.37168).
- (36) Bai Y, Kaiser NJ, **Coulombe KLK**, Srivastava V. A continuum model and simulations for large deformation of anisotropic fiber-matrix composites for cardiac tissue engineering. *J Mech Behav Biomed Mater*. 2021 Jun 7;121:104627. doi: [10.1016/j.jmbbm.2021.104627](https://doi.org/10.1016/j.jmbbm.2021.104627).
- (35) Reid JA\*, Dwyer KD\*, Schmitt PD, Soepriatna AH, **Coulombe KLK**<sup>#</sup>, Callanan A<sup>#</sup>. Architected fibrous scaffolds for engineering anisotropic tissues. *Biofabrication*. 2021 Jul 27;13(4). doi: [10.1088/1758-5090/ac0fc9](https://doi.org/10.1088/1758-5090/ac0fc9) \*Equal contributions. <sup>#</sup>Co-corresponding authors.
- (34) Dwyer KD & **Coulombe KLK**. Cardiac Mechanostructure: Using mechanics and anisotropy as inspiration for developing epicardial therapies in treating myocardial infarction. *Bioact Mater*. 2021 Jul;6(7):2198-2220. doi: [10.1016/j.bioactmat.2020.12.015](https://doi.org/10.1016/j.bioactmat.2020.12.015). eCollection 2021 Jul.

- (33) Rountree I, Polucha C, **Coulombe KLK**, Munarin F. Assessing the angiogenic efficacy of pleiotrophin released from injectable heparin-alginate gels. *Tissue Eng Part A*. 2021 Jun;27(11-12):703-713. doi: [10.1089/ten.TEA.2020.0335](https://doi.org/10.1089/ten.TEA.2020.0335). Epub 2021 Feb 22.
- (32) Kofron CM\*, Kim TY\*, Munarin F, Soepriatna AH, Kant RJ, Mende U, Choi BR#, **Coulombe KLK**#. A predictive in vitro risk assessment platform for pro-arrhythmic toxicity using human 3D cardiac microtissues. *Sci Rep*. 2021 May 13;11(1):10228. doi: [10.1038/s41598-021-89478-9](https://doi.org/10.1038/s41598-021-89478-9). \*Equal contributions. #Co-corresponding authors.
- (31) Minor AJ and **Coulombe KLK**. Engineering a Collagen Matrix for Cell-Instructive Regenerative Angiogenesis. *Journal of Biomedical Materials Research: Part B - Applied Biomaterials*. 2020 Aug;108(6):2407-2416. doi: 10.1002/jbm.b.34573. doi: [10.1002/jbm.b.34573](https://doi.org/10.1002/jbm.b.34573)
- (30) Rupert CE, Kim TY, Choi B-R, **Coulombe KLK**. Human cardiac fibroblasts number and activation state modulate electromechanical function of hiPSC-cardiomyocytes in engineered myocardium. *Stem Cells International*. 2020 Jul 16;2020:9363809. doi: [10.1155/2020/9363809](https://doi.org/10.1155/2020/9363809). eCollection 2020.
- (29) Munarin F, Kant RJ, Rupert CE, Khoo A, **Coulombe KLK**. Engineered human myocardium with local release of proangiogenic growth factors improves vascularization and cardiac function in injured rat hearts. *Biomaterials*. 2020 Apr 12;251:120033. doi: [10.1016/j.biomaterials.2020.120033](https://doi.org/10.1016/j.biomaterials.2020.120033).
- (28) Bloise N, Rountree I, Polucha C, Montagna G, Visai L, **Coulombe KLK**, Munarin F. Engineering Immunomodulatory biomaterials for regenerating the infarcted myocardium. *Frontiers in Bioengineering and Biotechnology*. 2020 Apr 7;8:292. doi: [10.3389/fbioe.2020.00292](https://doi.org/10.3389/fbioe.2020.00292)
- (27) Rupert CE, Irofuala C, **Coulombe KLK**. Practical adoption of state-of-the-art hiPSC-cardiomyocyte differentiation techniques. *PLoS One*. 2020 Mar 10;15(3):e0230001. doi: [10.1371/journal.pone.0230001](https://doi.org/10.1371/journal.pone.0230001)
- (26) Kaiser NJ, Bellows JA, Kant RJ, **Coulombe KLK**. Digital Design and Automated Fabrication of Bespoke Collagen Microfiber Scaffolds. *Tissue Eng Part C Methods*. 2019 Nov;25(11):687-700. doi: [10.1089/ten.tec.2018.0379](https://doi.org/10.1089/ten.tec.2018.0379) (Cover Image)
- (25) Kaiser NJ, Kant RJ, Minor AJ, **Coulombe KLK**. Optimizing Blended Collagen-Fibrin Hydrogels for Cardiac Tissue Engineering with Human iPSC-derived Cardiomyocytes. *ACS Biomaterials Science & Engineering*. 2019 Feb 11;5(2):887-899. doi: [10.1021/acsbiomaterials.8b01112](https://doi.org/10.1021/acsbiomaterials.8b01112). Epub 2018 Dec 10.
- (24) Kaiser NJ, Munarin F, **Coulombe KLK**. Custom engineered tissue culture molds from laser-etched masters. *Journal of Visual Experiments*. 2018 May 21;(135):e57239. doi: [10.3791/57239](https://doi.org/10.3791/57239).
- (23) 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. doi: [10.1016/j.yjmcc.2018.02.011](https://doi.org/10.1016/j.yjmcc.2018.02.011). Epub 2018 Feb 21.
- (22) Kant RJ and **Coulombe KLK**. Integrated Approaches to Spatiotemporally Directing Angiogenesis in Host and Engineered Tissues. *Acta Biomaterialia*. 2018 Mar 15;69:42-62. doi: [10.1016/j.actbio.2018.01.017](https://doi.org/10.1016/j.actbio.2018.01.017). Epub 2018 Jan 31.
- (21) Rupert CE and **Coulombe KLK**. IGF-1 and NRG-1 $\beta$  Enhance Proliferation, Metabolic Maturity, and the Force-Frequency Response in hESC-derived Engineered Cardiac Tissues. *Stem Cells International*. 2017. 2017:7648409. doi: [10.1155/2017/7648409](https://doi.org/10.1155/2017/7648409). Epub 2017 Aug 29.

- (20) 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. doi: [10.1089/ten.TEC.2017.0068](https://doi.org/10.1089/ten.TEC.2017.0068).
- (19) 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](https://doi.org/10.1007/s12195-016-0462-7). Epub 2016 Aug 3.
- (18) 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. doi: [10.1089/ten.TEA.2015.0482](https://doi.org/10.1089/ten.TEA.2015.0482). Epub 2016 Mar 31.
- (17) 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*. 2015 Aug;2015:1741-4. doi: [10.1109/EMBC.2015.7318714](https://doi.org/10.1109/EMBC.2015.7318714).
- (16) 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. doi: [10.1371/journal.pone.0131446](https://doi.org/10.1371/journal.pone.0131446). eCollection 2015. (**Top 10% of cited papers in PLOS ONE in 2015**)
- (15) Kaiser NJ and **KL Coulombe**. Physiologically inspired cardiac scaffolds for tailored in vivo function and heart regeneration. *Biomed Mater* 2015; 10(3):034003. doi: [10.1088/1748-6041/10/3/034003](https://doi.org/10.1088/1748-6041/10/3/034003).
- (14) Rupert CE and **KL Coulombe**. The roles of neuregulin-1 in cardiac development, homeostasis, and disease. *Biomark Insights* 2015; 10(Suppl 1):1-9. doi: [10.4137/BMI.S20061](https://doi.org/10.4137/BMI.S20061). eCollection 2015.
- (13) **Coulombe KLK**,\* Bajpai VK,\* Andreadis ST, Murry CE. Heart regeneration with engineered myocardial tissue. *Annu. Rev. Biomed. Eng.* 2014; 16:1-28. doi: [10.1146/annurev-bioeng-071812-152344](https://doi.org/10.1146/annurev-bioeng-071812-152344). Epub 2014 Apr 24. \*Equal contributions.
- (12) **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](https://doi.org/10.1109/NEBEC.2014.6972763).
- (11) 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.
- (10) **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.
- (9) **Kreutziger KL** and Murry CE. Engineered human cardiac tissue. *Pediatr Cardiol*. 2011; 32(3):334-41.
- (8) **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.
- (7) Mignone JL, **Kreutziger KL**, Paige SL, Murry CE. Cardiogenesis from human embryonic stem cells. *Circ J*. 2010; 74(12):2517-26.
- (6) 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.

- (5) **Kreutziger KL**, Piroddi N, Scellini B, Tesi C, Poggesi C, Regnier M. Thin filament  $\text{Ca}^{2+}$  binding properties and regulatory unit interactions alter kinetics of tension development and relaxation in rabbit skeletal muscle. *J Physiol* 2008; 583(1):337-350.
- (4) **Kreutziger KL**, Gillis TE, Davis JP, Tikunova SB, Regnier M. Influence of enhanced troponin C  $\text{Ca}^{2+}$  binding affinity on cooperative thin filament activation in skeletal muscle. *J Physiol* 2007; 583.1:337-350.
- (3) 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  $\text{Ca}^{2+}$  activation in cardiac muscle. *Biophys J* 2007; 92:4379-4390.
- (2) 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.
- (1) 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.

## b. Books & Book Chapters

**Coulombe KLK** and Black LD. 2022. *Cardiac Tissue Engineering: Methods and Protocols*. Humana Press.

Kofron CM, Choi BR, **Coulombe KLK**. (2022) Arrhythmia Assessment in Heterotypic Cardiac Myocyte–Fibroblast Microtissues. In Black LD & **Coulombe KLK** (Eds.). *Methods Mol Biol. Cardiac Tissue Engineering: Methods and Protocols*. Volume 2485, Second Edition (pp.147-157). Humana Press, New York, NY. [Doi: 10.1007/978-1-0716-2261-2\\_10](https://doi.org/10.1007/978-1-0716-2261-2_10).

## c. Conference Abstracts

*Presenter is underlined.*

KD Dwyer, RJ Kant, AH Soepriatna, NJ Kaiser, CE Rupert, CM Kofron, BR Choi, FW Sellke, **KLK Coulombe**. Biomechanics of the Matrix and Remodeling in Engineered Human Myocardium for Heart Regeneration. *9<sup>th</sup> International Conference on Mechanics of Biomaterials and Tissues*. Dec 16-20, 2023, Waikoloa Beach, HI. *In-person oral presentation*.

RJ Kant, SM Roser, KD Dwyer, A Kaul, E Ren, C Polucha, **KLK Coulombe**. Advancing Custom Patterned Vessels in Engineered Human Myocardium as a Revascularization Co-therapy for Heart Regeneration. *NAVBO Vascular Biology 2023 Meeting*. Oct 15-19, 2023, Newport, RI. *In-person oral presentation*.

AM Minor, SM Roser, RJ Kant, K Zahiri, C Polucha, F Munarin, **KLK Coulombe**. Directing Revascularization In Vivo With Local Controlled Release Of An Optimized Angiogenic Growth Factor Cocktail. *American Heart Association, Basic Cardiovascular Sciences Conference*. Jul 31-Aug 3, 2023, Boston, MA. *In-person, poster*.

**KLK Coulombe**. Matrix and Remodeling in Engineered Human Myocardium for Heart Regeneration. International Society for Heart Research North American Section Meeting. June 27-30, 2023, Madison, WI. *Invited oral presentation and Workshop Discussion Panelist.*

KD Dwyer, AH Soepriatna, RJ Kant, MC Daley, SM Roser, AJ Minor, **KLK Coulombe**. Scaling up human engineered myocardium for heart regeneration. *International Society for Stem Cell Research 2023 Annual Meeting*. June 14-17, 2023, Boston, MA. *In-person poster.*

**MC Daley**, U Mende, BR Choi, **KLK Coulombe**. Quantification of Arrhythmia Risk from Chronic Chemical Exposure in Engineered Three-Dimensional Human Cardiac Microtissues. *Society for Toxicology 2023 Annual Meeting*. March 19-23, 2023, Nashville, TN. *In-person selected oral.*

**J Pierson**, C Altrocchi, J An, P Bagam, K Blinova, KW Chaudhary, M Cherubin, BR Choi, **KLK Coulombe**, M Daley, T Eschengagen, S Feng, NA Geisse, S Ghasemi, M Goßmann, V Gryshkova, A Hansen, *et al.* Chronic drug-induced cardiotoxicity assessment using in vitro human iPSC-cardiomyocytes and human heart slices: a multi-platform study conducted by the HESI Stem Cell Working Group. *Society for Toxicology 2023 Annual Meeting*. March 19-23, 2023, Nashville, TN. *In-person poster.*

**Coulombe KLK**. Heart Regeneration with Human Engineered Myocardium. *International Society for Stem Cell Research Boston International Symposium on Translating Pluripotent Stem Cell Discoveries to the Clinic: Preclinical, Manufacturing, and Regulatory Strategies for Success*. Nov 17-19, 2022, Boston, MA. *In-person invited oral presentation.*

**Dwyer KD**, **Coulombe KLK**. One Billion Cells: Engineering Cardiac Tissue with Human Induced Pluripotent Stem Cell Derived Cardiomyocytes for Therapeutic Impact. *International Society for Stem Cell Research Boston International Symposium on Translating Pluripotent Stem Cell Discoveries to the Clinic: Preclinical, Manufacturing, and Regulatory Strategies for Success*. Nov 17-19, 2022, Boston, MA. *In-person oral presentation.*

**Coulombe KLK**. Human Engineered Myocardium with a Revascularization Strategy for Heart Regeneration in a Swine Model of Chronic Myocardial Ischemia. *International Society for Applied Cardiovascular Biology, 18<sup>th</sup> Biennial Meeting*. Sep 28 – Oct 1, 2022, Memphis, TN. *In-person oral presentation.*

**Dwyer KD**, Soepriatna A, **Coulombe KLK**. Electromechanical function of engineered cardiac tissue is modulated by maturation of human induced pluripotent-derived cardiomyocytes. *International Society for Applied Cardiovascular Biology, 18<sup>th</sup> Biennial Meeting*. Sep 28 – Oct 1, 2022, Memphis, TN. *In-person poster.*

**Soepriatna A**, Dwyer KD, Choi BR, **Coulombe KLK**. Tissue Geometry Impacts the Arrhythmogenic State of Engineered Heart Tissues Derived from Human Induced Pluripotent Stem Cells. *International Society for Applied Cardiovascular Biology, 18<sup>th</sup> Biennial Meeting*. Sep 28 – Oct 1, 2022, Memphis, TN. *In-person poster.*

**S Wang**, A Narkar, K Blinova, JM Miller, TMA Mohamed, SL Feng, X Zhang, R Kettenhofen, V Toledo Sales, M Daley, E Kaushik, T Watters, M Ghasemi, M Miller-Smith, G Smith, JB Pierson, M Huang, P Levesque, H Shi, NA Geisse, R Mostafa, A Hansen, S Stölzle-Feix, M Lemme, M Goßmann, P Linder, Y Kanda, BR Choi, **KLK Coulombe**, J An, DH Woo, P Bagam, L Pang, T Heron, T Matsui, KW Chaudhary. Assessment of Chronic Drug Treatment-induced Cardiotoxicity: A Project of the

HESI Stem Cell Working Group. *Safety Pharmacology Society Annual Meeting*. Sep 11-14, 2022, Montreal, Canada. *In-person poster*.

RJ Kant, KD Dwyer, JH Lee, C Polucha, M Kobayashi, S Pyon, A Soepriatna, J Lee, **KLK Coulombe**. Patterned Vessels in hiPSC-derived Engineered Myocardium Enhance Perfusion and Heart Regeneration in a Rat Myocardial Infarction Model. *American Heart Association, Basic Cardiovascular Sciences Conference*. Jul 24-28, 2022, Chicago, IL. *In-person, poster*.

**A Soepriatna**, J Wei, E Song, G Gaudette, BR Choi, **KLK Coulombe**. Bioelectric Sutures Generated From hiPSC-derived Cardiomyocytes Enable In Vitro Electrical Coupling Between Engineered Cardiac Tissues. *American Heart Association, Basic Cardiovascular Sciences Conference*. Jul 24-28, 2022, Chicago, IL. *In-person, poster*.

**AJ Minor**, SM Roser, C Polucha, K Zahiri, E Song, M Kobayashi, **KLK Coulombe**. Engineering Vascular Therapies with Angiogenic Factors for Cardiac Regeneration and Tissue Remodeling. *American Heart Association, Basic Cardiovascular Sciences Conference*. Jul 24-28, 2022, Chicago, IL. *In-person, poster*.

**SM Roser**, AJ Minor, C Polucha, **KLK Coulombe**. Heparinized Alginate and Collagen-Based Hydrogels Enhance Localized Vascularization in Ischemic Tissue. *American Heart Association, Basic Cardiovascular Sciences Conference*. Jul 24-28, 2022, Chicago, IL. *In-person, poster*.

**KD Dwyer**, RJ Kant, **KLK Coulombe**. Scaling Up Engineered Cardiac Tissue For Clinical Translation As A Regenerative Therapy. *American Heart Association, Basic Cardiovascular Sciences Conference*. Jul 24-28, 2022, Chicago, IL. *In-person, poster*.

RJ Kant, KD Dwyer, JH Lee, C Polucha, M Kobayashi, S Pyon, A Soepriatna, J Lee, **KLK Coulombe**. Patterned arteriole-scale vessels enhance engraftment, perfusion, and maturation of engineered human myocardium for heart regeneration. *Gordon Research Conference - Cardiac Regulatory Mechanisms*. Jun 26 – Jul 1, 2022, New London, NH. *In-person, poster*.

**Daley MC**, Moreau M, Fisher J, Mende U, Choi BR, McMullen P, **Coulombe KLK**. Risk Assessment by Combined Three-Dimensional Human Cardiac Microtissues and Pharmacokinetic Modeling. *Society of Toxicology, 2022 Annual Meeting*, Mar 27-31, San Diego, CA. *In-person, poster*. **Biological Modeling Specialty Section - Best Trainee Abstract Finalist; Risk Assessment Specialty Section Award Winner**.

Soepriatna AH, Kim TY, Daley MC, Song E, Choi BR, **Coulombe KLK**. Human Atrial Cardiac Microtissues for Chamber-Specific Arrhythmic Risk Assessment. *2021 Annual Meeting of the Biomedical Engineering Society*. Virtual. Oct 2021. *Oral*. **Young Innovators Award Session**.

**Schmitt PR**, Dwyer KD, **Coulombe KLK**. Wet-spun polycaprolactone scaffolds provide customizable anisotropic support of engineered cardiac tissues. *2021 Annual Meeting of the Biomedical Engineering Society*. Virtual. Oct 2021. *Poster*

**Daley MC**, Soepriatna AH, Choi BR, **Coulombe KLK**. Three-Dimensional Human Cardiac Microtissues for In Vitro Risk Assessment of Arrhythmogenic Cardiotoxicity. *Brown/Yale Cardiovascular Student Research Symposium*. Virtual. May 2021. *Oral*

**Dwyer KD**, **Coulombe KLK**. Engineering anisotropy to promote mechanical function of cardiac tissue in vitro. *Brown/Yale Cardiovascular Student Research Symposium*. Virtual. May 2021. *Oral*

- Kant RJ, Coulombe KLK. Vascular chemotaxis towards patterned vessels informs host-implant inosculation of engineered cardiac tissues for heart regeneration. *Brown/Yale Cardiovascular Student Research Symposium*. Virtual. May 2021. *Oral*
- Minor AJ, Coulombe KLK. Identifying potent combinations of angiogenic factors to engineer regenerative therapies conducive to neovascularization in vivo. *Brown/Yale Cardiovascular Student Research Symposium*. Virtual. May 2021. *Oral*
- Roser S, Munarin F, Coulombe KLK. Optimization of heparinized alginate-based hydrogels to promote vascularization in cardiac disease. *Brown/Yale Cardiovascular Student Research Symposium*. Virtual. May 2021. *Oral*.
- Schmitt PD, Dwyer K, Coulombe KLK. Wet-spun Polycaprolactone Scaffolds Provide Customizable Anisotropic Support of Cardiac Tissues. *Brown/Yale Cardiovascular Student Research Symposium*. Virtual. May 2021. *Oral*
- Soepriatna AH, Kim TY, Daley MC, Choi BR, Coulombe KLK. Human Atrial Cardiac Microtissues for Chamber-Specific Arrhythmic Risk Assessment. *Brown/Yale Cardiovascular Student Research Symposium*. Virtual. May 2021. *Oral*
- Kant RJ, Coulombe KLK. In vitro and ex vivo evaluation of vascular chemotaxis and host-implant inosculation for heart regeneration. *International Society for Applied Cardiovascular Biology*. Mar 2021. Virtual. (*Oral for RJK*)
- Minor AJ, Coulombe KLK. Identifying potent combinations of angiogenic factors to engineer regenerative therapies conducive to neovascularization in vivo. *International Society for Applied Cardiovascular Biology*. Mar 2021. Virtual. (*Oral for AJM*)
- Kaiser NJ, Bai Y, Srivastava V, Coulombe KLK. Precision Collagen Microfiber Architecture for Engineering Tissue Anisotropy. *Regenerative Medicine Workshop at Charleston*, Charleston, SC, Mar 2020. (*Invited oral for KLKC; cancelled due to COVID-19*)
- Kant RJ, Bare C, Coulombe KLK. In Vitro Modeling of Host-Implant Vascular Connections In A Complex Physiological System. *Biomedical Engineering Society Annual Meeting*, Philadelphia, PA, Oct 2019. (*Oral for RJK*)
- Kaiser NJ, Bai Y, Srivastava V, Coulombe KLK. An Integrated Experimental-Computational Approach to Designing Bespoke Collagen Microfiber Architecture in Tissue Scaffolds for Anisotropic Mechanical Performance. *Biomedical Engineering Society Annual Meeting*, Philadelphia, PA, Oct 2019. (*Oral for KLKC*)
- Kofron CM, Kim TY, Munarin F, Williams KM, Mende U, Choi BR, Coulombe KLK. Development of an in vitro screening platform for pro-arrhythmic toxicity testing using human 3D cardiac microtissues. *Biomedical Engineering Society Annual Meeting*, Philadelphia, PA, Oct 2019. (*Oral for KLKC*)
- Minor AJ and Coulombe KLK. Maturation of Calcium Handling in hiPSC-Cardiomyocytes Drives Excitation-Contraction Coupling. *Biomedical Engineering Society Annual Meeting*, Philadelphia, PA, Oct 2019. (*Oral for AJM*)

Freda L, Bloise N, **Coulombe KLK**, Visai L, Munarin F. Engineering Smart Biomaterials with Immunomodulatory Cues for Revascularization Therapy. *Biomedical Engineering Society Annual Meeting*, Philadelphia, PA, Oct 2019. (Poster for FM)

Munarin F, Kant RJ, Rupert CE, Khoo A, **Coulombe KLK**. 2D and 3D assessment of angiogenesis in cardiac engineered tissues implanted on infarcted rat hearts. *American Heart Association Basic Cardiovascular Sciences 2019 Scientific Sessions*, Boston, MA, July 2019. (Poster for FM)

Kofron CM\*, Kim TY\*, Munarin F, Williams K, Mende U, Choi BR<sup>†</sup>, **Coulombe KLK**<sup>†</sup>. Development of an in vitro screening platform for pro-arrhythmic toxicity testing using human 3D cardiac microtissues. *NIH Bioengineering Research Project Annual Retreat*, Providence, RI, April 2019. (Poster for CMK and TYK) \*Equal contributions. <sup>†</sup>Corresponding authors.

Munarin F, Kant RJ, Rupert CE, Khoo A, **Coulombe KLK**. Integrating revascularization therapy with cardiac tissue engineering for treating myocardial infarction. *Society for Biomaterials*, Seattle, WA, April 2019. (Oral for FM)

Rupert CE and **Coulombe KLK**. Modulation of adult cardiac fibroblasts for engineering healthy and vulnerable human cardiac tissue. *Regenerative Medicine Workshop @ Charleston*, Charleston, SC, Mar 2019. (Oral for CER)

**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. (Oral for KLKC)

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

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

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. (Oral for KLKC)

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, KLKC.)

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. (Poster for CER)

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. (Poster for KLKC)

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*, Phoenix, AZ, Oct 2017. (*Invited oral for KLLC*)

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 KLLC*)

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 KLLC*)

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 KLLC*)

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 15<sup>th</sup> 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 Muanrin 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 repair. *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 3<sup>rd</sup> 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 repair. *Society for Biological Engineering's 3<sup>rd</sup> 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 8<sup>th</sup> 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 & Presentations**

University of Rhode Island, Chemical and Biological Engineering Seminar, Angiogenic Biomaterials for Revascularization of Ischemic Tissue. February 29, 2024.

42<sup>nd</sup> International Society for Heart Research North American Section Meeting, Workshop on Advancing Engineered Heart Tissue. Matrix and Remodeling in Engineered Human Myocardium for Heart Regeneration. June 29, 2023, Madison, WI. *In person oral presentation and discussion panelist.*

International Society for Stem Cell Research Boston International Symposium on Translating Pluripotent Stem Cell Discoveries to the Clinic: Preclinical, Manufacturing, and Regulatory Strategies for Success (in person). Heart Regeneration with Human Engineered Myocardium. Nov 17-19, 2022, Boston, MA.

International Society for Applied Cardiovascular Biology, 18<sup>th</sup> Biennial Meeting (in person). Human Engineered Myocardium with a Revascularization Strategy for Heart Regeneration in a Swine Model of Chronic Myocardial Ischemia. Sep 28 – Oct 1, 2022, Memphis, TN.

Tufts University, Biomedical Engineering Seminar (in person). 19 Sep 2022. Engineering Electrical and Vascular Integration of Cardiac Patches for Heart Regeneration.

Biomaterials World Forum BIOMAT-2022, Invited Speaker, Virtual, 17 Mar 2022. Customized Biomaterials for Heart Regeneration with Engineered Myocardium.

CardioPulmonary Vascular Biology COBRE Seminar, Providence VA Medical Center. *Virtual*. 12 Nov 2021. *Oral*. Advancing a Dual Revascularization-Remuscularization Therapy for Heart Regeneration.

2021 Annual Meeting of the Biomedical Engineering Society. *Virtual*. 15 Oct 2021. *Oral*. Young Innovators Award. Human Atrial Cardiac Microtissues for Chamber-Specific Arrhythmic Risk Assessment.

ScitoVation, Inc. Webinar Presentation, July 2021. Cardiac Toxicity Evaluation with a Human Tissue-Engineered Model.

Keynote Presentation, Tissue and Cell Engineering Society Virtual Conference 2021, University of Edinburgh, Scotland, July 2021.

Advancing iPSC-derived Cardiomyocyte Translation Workshop, May 2021. *Virtual*.

Veterans Affairs Providence Healthcare System, Vascular Research Laboratories, June 2021. *Virtual*.

Cardiovascular Institute, Rhode Island Hospital, Cardiology Research In Progress, Feb 2021. *Virtual*.

Cardiovascular Institute, Rhode Island Hospital, Cardiovascular Research Center, Sept 2020.

Syracuse University, Biomedical and Chemical Engineering Department Seminar, Sept 2020. Online seminar due to COVID-19, >30 attendees.

University of Washington, Institute for Stem Cell and Regenerative Medicine and Department of Bioengineering joint Seminar, Apr 2020. Online seminar due to COVID-19, >50 attendees.

University of California, San Diego, Department of Bioengineering Seminar, Apr 2020. Online seminar due to COVID-19, >80 attendees.

University of Pennsylvania, Cardiovascular Institute Seminar co-hosted by the Department of Bioengineering, Philadelphia, PA, Jan 2020.

Rhode Island Hospital, Data Club Seminars, Cardiovascular Research Center, Providence, RI, Oct 2019.

Yale University, Biomedical Engineering Department Seminar Series, New Haven, CT, Oct 2019.

Emory University School of Medicine, Cardiovascular Biology Seminar, Cardiology, Department of Medicine, Atlanta, GA, Jan 2019.

University of Rochester, Biomedical Engineering Department Seminar Series, Rochester, NY, Oct 2018.

Draper Laboratory, Cellular & Tissue Engineering Seminar, Cambridge, MA, Jul 2018.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

### **e. Patents**

Coulombe KLK, Dwyer KD, Kant RJ. Cell and Collagen Compositions for Engineered Cardiac Tissue. U.S. Patent Application No.: 18/513,051. Filing Date: Nov 17, 2023.

Coulombe KLK, Kant RJ, Dwyer KD. Mid-scale vessels in engineered tissue for regeneration. U.S. Patent Application No.: 18/358,808. Filing Date: July 25, 2023.

Coulombe KLK, Choi BR, Soepriatna AH, Kim TY, Daley MC. Atrial cardiac microtissues for chamber-specific arrhythmogenic toxicity responses. U.S. Patent Application No. 17/675,895. Filing Date: February 18, 2022.

Coulombe KLK, Roser S, Munarin F. A novel hydrogel-based biomaterial for the localized delivery of biologics. U.S. Provisional Patent Application No. 63/220,865. Filing Date: July 12, 2021.

Coulombe KLK, Minor AJ. Novel proangiogenic cocktails of growth factors and cytokines to revascularize ischemic tissue. U.S. Provisional Patent Application No. 63/220,859. Filing Date: July 12, 2021.

Choi BR, Coulombe KLK, Kim TY. A Human In Vitro Cardiotoxicity Model. U.S. Patent Application No. 17502800. Filed on October 15, 2021.

Coulombe KLK, Choi BRC, Rupert CE, Kim TY, Kofron C, Mende U. A Human In Vitro Cardiotoxicity Model. International Patent Application No. 405505-601001WO. Filed on May 18, 2020.

Coulombe KLK, Kaiser NJ, Bellows JA. Collagen microfiber scaffolds. U.S. Patent Application Nos. 62/783,456 filed on December 20, 2019.

### **f. Work in Progress**

Daley MC\*, Moreau MS\*, Kofron CM, Soepriatna A, Fisher J, McMullen P, Mende U, Choi BR, **Coulombe KLK**. Using in vitro human 3D microtissue platforms and pharmacokinetic modeling to inform the next generation of risk assessment. *Under review*.

Roser S, Munarin F, Coulombe KLK. Customized delivery strategies for injection and implant of hybrid collagen-alginate angiogenic biomaterials. *In preparation*.

Daley MC, Kofron CM, Mende U, Choi BR, Coulombe KLK. Customizing point-of-departure analyses for new approach methodologies in *in vitro* toxicity testing. *In preparation*.

Minor AJ,\* Roser SM,\* Polucha C, Zahiri K, Song E, Kobayashi M, **Coulombe KLK**. Novel angiogenic cocktails delivered in custom biomaterials improve revascularization response *in vivo*. *In preparation*.

Coulombe KLK, Ralphe JC, Regnier M. Standardization of Engineered Heart Tissues (EHTs) for In Vitro Analyses of Disease Pathogenesis and Therapeutic Opportunities. *Invited ISHR Conference Workshop summary paper. Journal of Molecular and Cellular Cardiology; in preparation*.

## 4. RESEARCH GRANTS

### a. Active Awards as PI

**Source:** NIH NHLBI, Research Project Grant (R01 HL173938)

**Title:** Interdependence of Post-MI Local Revascularization and Remuscularization by Engineered Human Myocardium on Cardiac Remodeling and Regeneration

**Dates:** 03/18/2024 – 03/31/2028

**Role:** PI

**Total Award Amount:** \$3,891,690

**Source:** NIH National Institute of Biomedical Imaging and Bioengineering, Exploratory/Developmental Research Grant Program (R21 EB035030)

**Title:** 3D Bioprinting of a Bioelectric Cell Bridge for Re-engineering Cardiac Conduction

**Dates:** 07/01/2023 – 06/30/2025

**Role:** PI

**Total Award Amount:** \$454,800

**Source:** National Science Foundation, Faculty Early Career Development (CAREER) Program

**Title:** CAREER: Understanding Atrial Arrhythmia Mechanisms with Patient-derived Engineered Tissues

**Dates:** 01/01/2021 – 12/31/2025

**Role:** PI

**Effort:** 1.0 month

**Total Award Amount:** \$647,759

**Source:** Brown Biomedical Innovation to Impact Award, Phase 2, Division of Biology & Medicine

**Title:** Application of the Cardiac-TEEM Platform to Advance Cardiotoxicity Assessment of Cancer Drug Interactions with Immune Responses for Safety and Therapeutic Development

**Dates:** 10/01/2022 – 06/30/2024

**Role:** PI

**Total Award Amount:** \$150,000

**Source:** Brown University, Office of the VP of Research, Seed Award

**Title:** Efficacy of a Novel Reinforced Engineered Cardiac Tissue for Heart Regeneration

**Dates:** 02/01/2023 – 06/30/2024

**Role:** PI

**Total Award Amount:** \$50,000

### b. Active Training Grants as Faculty Trainer/Awards as Mentor

NSF Graduate Research Fellowship Program, 09/01/2021 – 08/31/2024. Mentor to Kiera Dwyer.

NIH National Heart Lung and Blood Institute (T32 HL160517), Cardiovascular Surgery Research Training, 07/01/2022 – 06/30/2027, Role: Trainer (PI: Sellke), \$781,995.

NIH National Institute of General Medical Sciences (T32 GM139793), Interdisciplinary training in pharmacological sciences, 07/01/2021 – 06/30/2026, Role: Trainer (PI: Bowen, Oancea, Zimmermann), \$932,230.

NIH National Heart, Lung, and Blood Institute, NRSA Short-Term Research Training (T35 HL094308), Alpert Medical School Summer Research Program for Basic Translational Research (BTR), 07/01/2019 – 06/30/2024, Role: Faculty Trainer (PI: Elizabeth Harrington), \$71,734.

### c. Completed Awards

Rhode Island Foundation, Medical Research Grant. **Novel Therapy to Prevent Drug-Induced Sudden Cardiac Death.** 04/01/2022 – 09/30/2023. Role: Collaborator. \$20,700 to Coulombe.

NIH National Institute of Environmental Health Sciences, Bioengineering Research Partnership (U01 ES028184). **Human 3D Microtissues for Toxicity Testing via Integrated Imaging, Molecular and Functional Analyses.** 09/15/2017 – 07/31/2023. Role: Co-Investigator, 0.6 month annual effort (PI: Kim Boekelheide). \$2,562,311 (Coulombe award amount: \$466,236).

AHA Transformational Project Award (19TPA34910085). **Bioelectric Sutures for Cardiac Implant Electrical Integration.** 07/01/2019 – 06/30/2023, Role: PI (1.0 month annual effort), \$300,000.

AHA Postdoctoral Fellowship, **Regional Effects of Engineered Human Myocardium on the Mechanical and Electrical Properties of Repaired Infarcts,** 04/01/2021 – 03/31/2023. Mentor to Dr. Arvin Soepriatna.

NIH National Heart, Lung, and Blood Institute, Research Project Grant (R01 HL135091) with Diversity Supplement (to Alicia Minor). **Engineered Human Myocardium with Hybrid Biomaterials for Heart Regeneration.** 02/01/2017 – 01/31/2023, Role: PI (4.8 months annual effort), \$2,550,591.

Brown Biomedical Innovation to Impact Award, Phase 1, Division of Biology & Medicine. **Cardio-Tox TEEM: A Novel Human In Vitro Cardiotoxicity Assay,** 08/01/2020 – 06/30/2022, Role: PI, \$100,000.

Brown University Office of the Vice President for Research, Seed Funds Award. **A novel gene therapy targeting cardiac fibroblast electrical remodeling to reduce fatal arrhythmias after heart attack.** 01/17/2019 – 06/30/2022, Role: PI, \$50,000.

NIH National Institute of General Medical Sciences; CardioPulmonary Vascular Biology COBRE (P20 GM103652) Pilot Project. **Heart Regeneration in a Porcine Model of Chronic Myocardial Ischemia.** 09/20/2021 – 05/31/2022, Role: PI, \$75,000.

(Trainer) NIH National Institute of General Medical Sciences (P20 GM103652), Cardiopulmonary Vascular Biology COBRE, 07/01/2019 – 06/30/2020 (Pilot Project 1), 07/01/2020 – 06/30/2021 (Pilot Project 2), Role: Mentor to PI Fabiola Munarin, \$100,000.

(Mentor) Rhode Island Foundation, Alginate gels for the release of immunomodulatory cues in ischemic skin flaps, 07/01/2019 – 06/30/2021, Role: Mentor to PI Fabiola Munarin, \$25,000.

NIH National Heart, Lung, and Blood Institute, Pathway to Independence Award (K99/R00 HL115123), **Regenerating the Heart with Engineered Human Cardiac Tissue**, 08/01/2012 – 03/31/2017, Role: PI, \$891,498.

Richard B. Salomon Faculty Research Awards, Office of the Vice President for Research, Brown University, **How Shape and 3-dimensional Microenvironment Influences Human Cardiomyocytes Phenotype**, 01/01/2015 – 06/31/2017, Role: PI, \$15,000.

The Rhode Island Foundation, Medical Research Grant, **Understanding Human Cardiomyocyte Function for Tissue Engineering and Heart Repair**, 05/01/2015 – 01/31/2017, Role: PI, \$15,000.

NIH National Heart, Lung, and Blood Institute, Research Project Grant (R01 HL104025), **Na<sup>+</sup> Channel mRNA Regulation in Heart Failure**, 06/01/2016 – 05/31/2017, Role: Collaborator (PI: Samuel Dudley), \$450,924 (Coulombe award amount: \$20,395).

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

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

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

#### **d. Proposals Pending**

**Source:** NIH NHLBI, Institutional Training Grant (T32)  
**Title:** Applied Cardiac and Vascular Biology Training Program  
**Dates:** 12/01/2024 – 11/30/2029  
**Role:** MPI

## **5. SERVICE**

### **a. To the University**

Member, I-BEAM DIAP Committee	2023 – present
Member, SOE DIAP Committee	2023 – present
Member, SOE Target of Opportunity Committee	2023 – present
Member, BioMed Taskforce on Statistics Course Requirements for PhDs	2023
Chair, Graduate School Student Grievance Committee	2023
Member, Graduate School Dean Search Committee	2023
Member, SOE Diversity and Inclusion Action Committee	2022 – present
Member, University Animal Care Governance Committee	2022 – present
Member, Graduate School Dean's Advisory Board	2022 – 2023
Chair, BME Graduate Program Climate & Operations Committee	2022 – present

Member, Faculty Search Committee, Cardiovascular Research Center, Lifespan	2021 – 2022
Member, Tenure Committees (SOE: Kesari, Desai, MCB: Accornero)	2021 – present
<b>Director of Graduate Studies, Biomedical Engineering Program</b>	2019 – present
Chair, BME Graduate Program Committee	2019 – present
Member, SOE Graduate Program Committee	2019 – present
Faculty Advisor, Culture Committee, Center for BME	2019 – 2022
Reviewer, Office of the Vice President for Research, Internal Awards	2018 – present
Member, BME Graduate Program Committee	2017 – 2019
Co-Instructor, NIH IMSD Module “Demystifying the PhD”	2019 – present
Voluntary Faculty Participant, STEM TEAM Program	2017 – 2020
Faculty Advisory Committee, Graduate Women in Science and Engineering	2017 – 2019
Discussion Facilitator, BioMed Diversity & Inclusion Workshop	2020
Member, UTRA Application Review Committee	2018 – 2019
Co-Chair, Honors Committee, School of Engineering	2017 – 2019
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, 2018, 2019
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 – 2019
Host for BME Seminar Speakers	2017 – present
Host for IMNI Distinguished Lecturer (Dr. Angela Belcher)	2017
Ad-hoc Member, Cardiovascular Research Advisory Board, CVRC, RIH	2016 – 2017
Member, SOE/RISD Masters in Design (MADE) Committee	2016 – 2018
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 – 2020
First-Year Adviser, School of Engineering	2014 – 2019
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**

California Institute for Regenerative Medicine Grant Reviewer, Field Expert	2023
NIH Grant Reviewer:	2017 – present
NHLBI Mentored Transition to Independence Panel Member: Jul 2020 – present	
NHLBI K99 Nov 2019	
NIBIB K01/K08/K99/R13 Mar 2019	

NHLBI R21 RFA-HL-17-015 Nov 2018  
 NHLBI K01 Diversity RFA-HL-16-006 Special Emphasis Panel March 2018  
 NHLBI R21 RFA-HL-17-015 Jul 2017

NSF Grant Reviewer	2015 – present
American Heart Association Grant Reviewer	2019 – present
Track Chair, Cardiovascular Engineering Track, Biomedical Engineering Society Annual Meeting	2019
Session Co-chair and Abstract Reviewer, World Congress of Biomechanics	2018
Mentor Training Program, NIH NIGMS National Research Mentoring Network, Advance-Clinical Translational Research (NIH U54GM115677)	2018
Meeting Chair, Cardiovascular Regenerative Engineering Symposium	2017
Invited Speaker, NIH NHLBI K-to-R01 Investigators Meeting	2017
Session Co-chair and Co-organizer, 6 <sup>th</sup> Int’l Conference on Tissue Engineering	2017
Session Co-chair and Co-organizer, Int’l Society of Applied Cardiovascular Bio.	2016
Biomedical Engineering Society, Annual Meeting Abstract Reviewer	2015 – present
Biomedical Engineering Society, Annual Meeting Session Co-chair	2015 – 2019
Manuscript Reviewer for ACS Biomaterials Science & Engineering, Acta Biomaterialia, Advanced Functional Materials, Advanced Healthcare Materials, Annals of Biomedical Engineering, <u>Biomaterials</u> , Biomedical Materials, Cell Reports, <u>Cell Stem Cell</u> , Cellular and Molecular Bioengineering, J Biomedical Materials Research Part A, <u>Nature Biomedical Engineering</u> , <u>Nature Cardiovascular Research</u> , <u>Nature Regenerative Medicine</u> , Science Advances, Scientific Reports, <u>Science Translational Medicine</u> , Tissue Engineering, and others.	

### **c. To the Community**

Brown-Lincoln School, Introduction to Engineering, Brown Faculty Liaison	2022 – present
Lincoln Lower School, Science Curriculum Development Collaboration	2017 – present
Brown-Lincoln School, Introduction to Engineering, Lecture & Lab Tour	2015 – 2019
Vartan-Gregorian Science Conference, Providence Public Schools	2016, 2017
Spira Summer Camp for Underserved Girls in RI	2016 – 2019
Providence Heart Walk Team, American Heart Association	2015 – 2017
STEM I Middle School Program, Brown University	2016
NBC WJAR Channel 10, Providence Health Check <a href="http://turnto10.com/features/health-landing-page/health-check-195m-grant-strengthens-relationships-between-ri-scientists-clinicians">http://turnto10.com/features/health-landing-page/health-check-195m-grant-strengthens-relationships-between-ri-scientists-clinicians</a>	2016

## **6. HONORS AND AWARDS**

Brown Innovation of the Year	2023
NSF CAREER Award	2021
Young Innovator Award, Cellular and Molecular Bioengineering, BMES	2021
Nominated: Fellow of the American Institute for Medical and Biological Engineering	2020
Certificate, Institute for Biomedical Entrepreneurship, Cambridge, MA	2019

Dean's Award for Excellence in Mentoring in Engineering, Sheridan Center for Teaching and Learning, Brown University	2019
Finalist, Young Investigator Award, Regenerative Medicine Workshop at Charleston	2019
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 52 <sup>nd</sup> 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, <i>Kappa</i> chapter President (2000-01)	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 since fall 2019: 1 = “strongly disagree”, 5 = “strongly agree”*

Fall 2023      Biomaterials (ENGN 1490)  
58 students enrolled (54 undergraduate, 5 graduate)  
Effectiveness of course: 4.42      Effectiveness of instruction: 4.33

Spring 2023      *Post-tenure sabbatical*

Fall 2022      Biomaterials (ENGN 1490) – *fully in-person*  
58 students enrolled (49 undergraduate, 9 graduate)  
Effectiveness of course: 4.51      Effectiveness of instruction: 4.56

Spring 2022      Cardiovascular Engineering (ENGN 1520) – *fully in-person*  
17 students (13 undergraduate, 4 graduate)  
Effectiveness of course: 4.60      Effectiveness of instruction: 4.87

Fall 2021      Biomaterials (ENGN 1490) – *fully in-person*  
54 students enrolled (48 undergraduate, 6 graduate)  
Effectiveness of course: 4.45      Effectiveness of instruction: 4.43

Spring 2021      Cardiovascular Engineering (ENGN 1520) – *fully online/remote*  
13 students (7 undergraduate, 6 graduate)  
Effectiveness of course: 4.90      Effectiveness of instruction: 4.49

Fall 2020      Biomaterials (ENGN 1490) – *fully online/remote*  
42 students enrolled (31 undergraduate, 11 graduate)  
Effectiveness of course: 4.46      Effectiveness of instruction: 4.52

Spring 2020      Junior sabbatical

Fall 2019      Biomaterials (ENGN 1490)  
52 students (47 undergraduate, 5 graduate)  
This course is effective: 4.27      Instructor is effective: 4.23

*Overall average scores shown below: 1 = “very effective”, 5 = “very ineffective”*

Spring 2019      Cardiovascular Engineering (ENGN 1520)  
8 students (2 undergraduate, 6 graduate)  
Effectiveness of course: 1.75      Effectiveness of instruction: 1.50

Fall 2018      Biomaterials (ENGN 1490)  
41 students (37 undergraduate, 4 graduate)  
Effectiveness of course: 1.73      Effectiveness of instruction: 1.83

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)  
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

Collaborating PI for Semester-long Group Project

Interdisciplinary Scientific Visualization (CSCI 2370, graduate); fall 2018, 2020

**b. Doctoral Theses Directed**

Cassady E Rupert, PhD (Biomedical Engineering) 2013 – 2019

Eccleston Fellowship, GAANN Fellowship

Completion date: Jul 2019

*Stem Cell-derived Cardiomyocytes for Engineering the Human Heart*

Current position: Chief Scientific Officer, Propria, LLC, Branford, CT

Nicholas J Kaiser, PhD (Biomedical Engineering) 2014 – 2019

Completion date: May 2019

*A Tunable Collagen Microfiber Platform for Engineered Cardiac Tissue*

Current position: Data Scientist, Novartis, Cambridge, MA

Rajeev J Kant, PhD (Biomedical Engineering) 2016 – 2022

Completion date: May 2022

*Patterned arteriole-scale vessels enhance engraftment, perfusion, and maturation of engineered human myocardium for heart regeneration*

Current position: Medical Student, Brown University, Providence, RI

- Alicia J Minor, BS (Biomedical Engineering) 2017 – 2023  
 IMSD Trainee (NIH T32), Diversity Fellowship (Brown Graduate School), NIH Diversity Supplement Award (HL135091)  
 Completion Date: Jan 2023  
*Engineering a Cell-Targeted Therapy for Neovascularization in Ischemic Cardiac Tissue*
- Kiera Dwyer, BS (Biomedical Engineering) 2019 – present  
 Expected completion: May 2024  
*Composite Fiber-Embedded Engineered Human Myocardium for Heart Regeneration*
- Mark Daley, MS (Biomedical Engineering) 2020 – present  
 Expected completion: May 2025  
*Cardiotoxicity and Cardioprotection in a Novel Human In Vitro Engineered Cardiac Tissue Platform*
- Stephanie Roser, ScM (Biomedical Engineering) 2022 – present  
 Expected completion: May 2027  
*Engineered Microvascular Regeneration in the Heart*

### **c. Master's Theses Directed**

- Rojry Basnet, ScB, Biomedical Engineering 2023 – 2024  
*Cardiotoxicity Protection in Oncology Chemotherapeutics*
- Elena Song, ScB, Biomedical Engineering 2023 – 2024  
*Designing a Delivery System for Bioelectric Thread Implementation in Heart Repair*
- Yamini Singh, BS, Biomedical Engineering 2021 – 2023  
*Optimization of Hydrogels for Core-Shell 3D Bioprinting of Patterned Vessels for Vascularization Engineered Cardiac Tissues*
- Prakruthi Vadakattu, BS, Biomedical Engineering 2021 – 2023  
*Arrhythmogenic cardiotoxicity with chronic exposure to drugs and environmental toxicants*
- Stephanie Roser, BS, Biomedical Engineering 2020 – 2022  
*Engineering revascularization for cardiovascular regenerative medicine*  
 Current: PhD student, BME, Coulombe Lab, Brown University
- Chinedu Irofuala, ScM in Biomedical Engineering 2017 – 2018  
*Genetic background influences cardiac differentiation efficiency from human induced pluripotent stem cells*  
 Current: Research Scientist at Wild Type
- 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.  
 Current: PhD student in Physics at the International Centre for Theoretical Sciences
- 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*  
 Current: Senior Project Engineer at Project Farma

Kyle Meyer, ScM in Biomedical Engineering 2015 – 2016  
*A novel high-throughput assay for contractile assessment of hiPSC-derived cardiomyocytes in 3D collagen gels*  
Current: I <3 Big Data Lead Cloud Engineer at MITRE; Adjunct Professor of Data Science at Georgetown University

Cynthia Bining Lu, ScM in Biotechnology 2014 – 2016  
*Geometric cues for guiding human induced pluripotent stem cell-derived cardiomyocyte maturation on 2D patterned surfaces*  
Current: Managing Director for Business Development at LifeTein, LLC

#### **d. Postdoctoral Fellows Advised**

Arvin Soepriatna, Ph.D. 2020 – present  
*Project: Electrical coupling of implanted engineered hiPSC-derived human cardiac tissue.*

Fabiola Munarin, Ph.D. 2014 – 2019  
*Project: Guided host vascularization into implanted engineered hiPSC-derived cardiac tissue using embedded growth factor-releasing alginate microspheres.*  
Current: Senior Scientist, Satellite Bio, Cambridge, MA

#### **e. PhD First-year Rotation Projects Advised**

Melanie Martinsen, MD/PhD Program in Pathobiology. Rotation 08/23 – 10/23.

Yusuke Suita, BS. PhD in Molecular Pharmacology and Physiology. Rotation 12/2018-3/2019

Helen Belato, BS. PhD in Molecular Pharmacology and Physiology. Rotation 1-3/2019

#### **f. Undergraduate Honors Theses Directed**

Caroline Snyder, Biomedical Engineering, Class of 2024 2021 – present  
*Optimization of Cardiomyocyte Maturation for Regenerative Medicine*

Tolu Ogunfowora, Biomedical Engineering, Class of 2024 2022 – present  
*Multi-species Gene Expression Analyses in Cardiac Regenerative Engineering*

Finja Scholz, Biomedical Engineering, Class of 2024 2022 – present  
*Pattern Design for Shear Flow Control in Engineered Vessels for Regeneration*

Stephen Pyon, Biomedical Engineering, Class of 2023 2021 – 2023  
*Engineering a Dynamic Roller Bottle Bioreactor to Improve hiPSC-CM Yield*

Phillip Schmitt, Biomedical Engineering, Class of 2022 2019 – 2022  
*Wet-spun polycaprolactone scaffolds for anisotropic engineered cardiac tissues*

Isobel Rountree, Biomedical Engineering, Class of 2020 2018 – 2020  
*Development of alginate biomaterials for the controlled release of pleiotrophin for revascularization therapy*

Elliot Youth, Computational Biology (Applied Math & Statistics Track) 2019 – 2020  
Class of 2020. *Disease-Driven Changes in Cardiac Gene Expression: Implications for Anti-Arrhythmia Therapeutics*

Colette Bare, Biomedical Engineering, Class of 2019	2018 – 2019
<i>Microchannel patterning for inosculation of engineered human cardiac tissue</i>	
Jessica Bellows, Biomedical Engineering, Class of 2019	2018 – 2019
<i>Patterning collagen microfibers for mechanical anisotropy in engineered human cardiac tissue</i>	
Kelly Williams, Biomedical Engineering, Class of 2019	2018 – 2019
<i>Optimization of a tissue engineering platform as an in vitro model of myocardial infarct scar</i>	
Gian Ignacio, ScB in Biomedical Engineering, Class of 2018	2016 – 2018
Program in Liberal Medical Education	
<i>Wet-Spun Carbon Nanotube Encapsulated Microfibers for Cardiac Tissue Repair</i>	
Amelia Khoo, ScB in Biomedical Engineering, Class of 2018	2016 – 2018
<i>Inducing vascular growth into patterned engineered cardiac tissue in vivo</i>	
Jason Thomas, ScB in Physics, Class of 2017	2016 – 2017
<i>Biophysical characterization of contraction in human induced pluripotent stem cell derived cardiac tissue</i>	
Jackie Vu, BA in Engineering, Class of 2017	2016 – 2017
<i>Fabrication and Mechanical Characterization of a Collagen Microfiber Vascular Scaffold</i>	
Heidi H Chang, ScB in Chemical Engineering, Class of 2016	2014 – 2016
<i>Chemical modification of growth factors and optimized detection methods for controlled protein release from alginate microspheres for therapeutic angiogenesis</i>	
Jad Nasrallah, ScB in Mechanical Engineering, Class of 2016	2015 – 2016
<i>Evaluation of the Bias Flow Characteristics of Ophidia Inspired Vascular Geometries Through Computational Modeling</i>	
Dalia Ruiz, ScB in Biomedical Engineering, Class of 2016	2015 – 2016
<i>How continuous stretch of engineered cardiac tissue influences mechanical function</i>	
Carlota Pereda Serras, ScB in Biology, Class of 2015	2014 – 2015
<i>Human cardiac fibroblast heterogeneity for hiPSC-cardiac tissue engineering</i>	
Giuliano Marostica, ScB in Biomedical Engineering, Class of 2015	2014 – 2015
<i>Engineering a Cardiac Tissue Tube</i>	

### **g. Doctoral Thesis Committee Service**

- Dominick Calvao, BME Qualifying Exam Committee, Brown University (Thesis Adviser: Diane Hoffman-Kim)
- Havi AlGhosain, BME Qualifying Exam Committee, Brown University (Thesis Adviser: Jonghwan Lee)
- Zahra Ahmed, BME Qualifying Exam Committee, Brown University (Thesis Adviser: Vikas Srivastava)
- Brandon Vorrius, BME Qualifying Exam Committee, Brown University (Thesis Adviser: Qian Chen)
- Kristen Fregoso, Molecular Pharmacology and Physiology, Brown University (Thesis Adviser: Nikos Tapinos)
- Alex Hruska, BME, Brown University (Thesis Adviser: Ian Wong)
- Amy Lee, BME, Brown University (Thesis Adviser: Michelle Dawson)
- 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)

#### **h. Master's Thesis Committee**

Japheth Omonira, ScM 2018, BME (Thesis Adviser: Gerard Nau, Infectious Disease, RIH)  
Current: Research Assistant at Harvard Medical School  
Ki-Soo Jeong, ScM 2018, Biotechnology (Thesis Adviser: Jonghwan Lee, BME, Brown)  
Current: PhD student in BME at Brown University  
Rachel Ga Yeon Lee, ScM 2017, BME (Thesis Adviser: Anubhav Tripathi, BME, Brown)  
Bella Okiddy, ScM 2016, BME (Thesis Adviser: Eric Darling, BME, Brown)  
Current: Data Analyst at Ona  
Payal (Patel) Sud, ScM 2016, Biotechnology (Thesis Adviser: Diane Hoffman-Kim, BME, Brown)  
Current: Patent Agent at Fenwick & West

#### **i. Undergraduate Researchers Advised**

Evan Ren, BME, Class of 2026	2023 – present
Anaya Kaul, BME, Class of 2026	2023 – present
Maliha Tasnim, Biology, CUNY, Summer Research (Leadership Alliance)	2023
Valentina Grether, BME, Class of 2024	2022 – present
Tolu Ogunfowora, BME, Class of 2023	2022 – present
Finja Scholz, BME, Class of 2023	2022 – present
Caroline Snyder, BME, Class of 2024	2021 – present
Stephen Pyon*, BME, Class of 2023	2021 – 2023
Keyana Zahiri*, BME, Class of 2023, PLME	2021 – 2023
Momoka Kobayashi*, BME, Class of 2023	2020 – 2022
Jenny Wei*, Applied Math/Computational Biology, Class of 2023	2020 – 2022
Elena Song*, BME, Class of 2023	2020 – present
Mohannad Jabrah <sup>§</sup> , BME, Class of 2022	2020
Phillip Schmitt <sup>¶§</sup> , BME, Class of 2022, PLMI <i>Neal Mitchell Systems Thinking Project Award, School of Engineering, Brown University</i>	2019 – present

Anna House*, BME, Class of 2020 Current: Associate Scientist at Eurofins PSS Insourcing Solutions	2019 – 2020
Isobel Rountree <sup>†</sup> , BME, Class of 2020 Current: Research Associate, Platelet BioGenesis	2019 – 2020
Elliot Youth <sup>†</sup> , Comp Bio, Class of 2020 Current: Research Technician, Taub Institute at Columbia University	2019 – 2020
Colette Bare <sup>†</sup> &, BME, Class of 2019 Current: Consultant at Acel Health	2018 – 2019
Jessica (Bellows) Warwick* <sup>†</sup> ‡, BME, Class of 2019 Current: Rotational Leadership Associate at Amgen	2018 – 2019
Kelly Williams <sup>†</sup> , BME, Class of 2019 Current: Project Associate at International Consulting Associates, Inc.	2018 – 2019
Carly Kabelac <sup>†</sup> *, Biomedical Engineering, Class of 2019 Current: Scientific Analyst at Aetion	2017 – 2019
Jasmine Gabor*, Chemical Engineering, Class of 2021	2017 – 2018
Joy Aso* <sup>§</sup> , Biomedical Engineering, Class of 2019 Current: Associate Clinical Research Specialist at Medtronic	2017 – 2018
Gian Ignacio <sup>†</sup> *, Biomedical Engineering, Class of 2018 Current: M.D. Candidate at Alpert Medical School of Brown University	2016 – 2018
Amelia Khoo*, Biomedical Engineering, Class of 2018 Current: MD/M.Eng. Candidate, EnMed Program at Texas A&M University	2016 – 2018
Maria Muhammad <sup>†</sup> §, Chemistry, Tougaloo College, Class of 2018 Current: PhD student in Neuroscience at the University of Mississippi Medical Center	2017
Maria Paredes* <sup>§</sup> , ScB in Biomedical Engineering, Class of 2017 <i>George H. Main '45 Award, School of Engineering, Brown University</i> Current: Senior Project Engineer at Project Farma	2015 – 2017
Chinedu Irofuala <sup>†</sup> * <sup>§</sup> , ScB in Biomedical Engineering, Class of 2017 Current: Research Scientist at Wild Type	2016 – 2017
Jason Thomas* <sup>†</sup> ‡, ScB in Physics, Class of 2017 Current: Medical student, Harvard University	2016 – 2017
Jackie Vu* <sup>†</sup> , BA in Engineering, Class of 2017 Current: ScribeAmerica Medical Scribe	2016 – 2017
Heidi H Chang* <sup>†</sup> ‡, ScB in Chemical Engineering, Class of 2016 Current: Healthcare Research Analyst at McAllister & Quinn	2014 – 2016
Jad Nasrallah <sup>†</sup> , ScB in Mechanical Engineering, Class of 2016 <i>Joseph Kestin Award, School of Engineering, Brown University</i> Current: Mechanical Engineer at Nebia	2015 – 2016
Dalia Ruiz* <sup>†</sup> §, ScB in Biomedical Engineering, Class of 2016 Current: Masters student in Data Science at the University of Southern California	2015 – 2016
Shababa Matin* <sup>†</sup> ‡, ScB in Biomedical Engineering, Class of 2017 Current: Junior Lecturer at Johns Hopkins Whiting School of Engineering	2015

Kyle Meyer, ScB '15 in BME, ScM '16 in BME 2014 – 2016  
Current: I <3 Big Data Lead Cloud Engineer at MITRE; Adjunct Professor of Data Science at Georgetown University

Giuliano Marostica<sup>ψ†</sup>, ScB in Biomedical Engineering, Class of 2015 2014 – 2015  
*Domenico A. Ionata Award, School of Engineering, Brown University*  
Current: Senior Associate at Great Point Partners

Carlotta Pereda Serras<sup>ψ†</sup>, ScB in Biology, Class of 2015 2014 – 2015  
Current: Investment fellow at Life Science Angels

\* Undergraduate Teaching and Research Award recipient, <sup>ψ</sup> Independent Study, # Leadership Alliance Summer Research-Early Identification Program (NIH R25 HL088992, PI: Elizabeth Harrington), <sup>§</sup> Summer SPRINT (2020), & Royce Fellowship, <sup>§</sup> URM, <sup>†</sup> Honors Thesis, <sup>‡</sup> Co-author on peer-reviewed scientific publication.

#### **j. Other Trainees and Scientists Advised**

James Reid, Visiting Scientist 2020  
PhD candidate, BME, University of Edinburgh, Edinburgh, Scotland

Jasmine Gabor, high school student summer volunteer 2017

Giovanni Andrea Micheli, Visiting Scientist 2016  
Master's candidate, Politecnico di Milano, Milan, Italy

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