Adriana Blazeski, PhD

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EDUCATION

2010-2018 **Ph.D. in Biomedical Engineering**
Department of Biomedical Engineering, Johns Hopkins University, Baltimore, MD
2009-2010 **M.S.E. in Biomedical Engineering**
Department of Biomedical Engineering, University of Michigan, Ann Arbor, MI
2005-2009 **B.S.E. in Biomedical Engineering**
Department of Biomedical Engineering, University of Michigan, Ann Arbor, MI

RESEARCH APPOINTMENTS AND EXPERIENCE

Research Fellow Affiliate 2021-present
Broad Institute of MIT and Harvard, Cambridge, MA
- Analyzing single cell-RNA sequencing data of large-scale endothelial cell screen to identify flow-regulated pathways

Postdoctoral Fellow 2019-present
Center for Excellence in Vascular Biology, Brigham and Women's Hospital, Harvard Medical School, Boston, MA
Laboratory of Dr. Guillermo García-Cardeña
- Developing a perfusable cardiac organoid culture that incorporates human stem cell-derived cardiomyocytes to investigate the role of flow-induced endothelial cell phenotype on cardiac contraction
- Established a microfluidic device with engineered microvascular networks containing endothelial cells with a fluid flow-sensitive reporter
- Collaborating with Charles Stark Draper Laboratory in Cambridge, MA to investigate mechanisms of long-term cancer drug toxicity in high-throughput microfluidic model of cardiac vasculature

Postdoctoral Fellow 2019-present
Mechanical Engineering Department, Massachusetts Institute of Technology, Cambridge, MA
Laboratory of Dr. Roger D. Kamm
- Developing microfluidic chips and pumps for the culture of microvascular networks under flow
- Investigating the effects of intravascular flow on engineered vessel morphology, function, and gene expression
- Training in computational modeling of flow within vascular networks

Postdoctoral Fellow 2018-2019
Department of Cardiology, Johns Hopkins University, Baltimore, MD
Laboratory of Dr. Gordon F. Tomaselli
- Developed engineered heart slices with cardiomyocytes from patients harboring mutations associated with arrhythmogenic cardiomyopathy (AC)
- Discovered that tissue engineered heart slices promote the expression of the AC disease phenotype and demonstrated their use in modeling reentrant arrhythmias

Whitaker International Summer Fellow 2013
University Medical Center, Georg-August University Göttingen, Germany
Laboratory of Dr. Wolfram-Hubertus Zimmermann
- Learned to make engineered heart muscle composed of cardiomyocytes from pluripotent sources and hydrogels
- Evaluated and optimized protocol for extraction of cardiomyocytes from engineered heart muscle for single cell studies

Graduate Research Fellow 2010-2018
Department of Biomedical Engineering, Johns Hopkins University, Baltimore, MD
Laboratory of Dr. Leslie Tung
Thesis: Engineered Heart Slices for Studies of Human Pluripotent Stem Cell-Derived Cardiomyocytes

- Developed the engineered heart slice, a tissue engineered platform based on decellularized native myocardium that allows for cardiac syncytial studies and can be maintained in culture for hundreds of days
- Differentiated and cultured cardiomyocytes derived from pluripotent sources, including human induced pluripotent stem cells, for use in engineered heart slices
- Evaluated the electrophysiological and contractile function of engineered heart slices through optical mapping and contraction measurements

Master's Research Fellow 2009-2010
Departments of Biomedical Engineering and Radiology, University of Michigan, Ann Arbor, MI
Laboratories of Dr. Ken M. Kozloff and Dr. Peter J.H. Scott

- Developed method for detection and quantification of pamidronate, a bone loss drug, using high performance liquid chromatography (HPLC)

Undergraduate Research Fellow 2008
Mayo Clinic, Rochester, MN
Laboratory of Dr. Kai-Nan An

- Developed testing protocol for tracking thumb motion during laboratory pipetting to characterize the kinematics of repetitive motion that leads to joint pain

Undergraduate Research Opportunity Program (UROP) Summer Engineering Fellow 2007
Department of Biomedical Engineering, University of Michigan, Ann Arbor, MI
Laboratory of Dr. Richard E. Hughes

- Wrote and tested a program that calculates joint angles in hip radiographs to assist in diagnosis of femoral acetabular impingement

AWARDS AND HONORS

2021 Travel award, Keystone Symposium: Engineering Multi-Cellular Living Systems
2019 Selected to attend Rising Stars in Biomedical: Women, MIT IMPACT Program
2019 Best Speaker Award, Cardiac Arrhythmia Mechanisms Gordon Research Seminar
2017 Siebel Scholar - award given annually for academic excellence and demonstrated leadership to selected students from several of the world's leading graduate schools
2017 Travel Award, Future of Science Fund, Keystone Symposium: Engineered Cells and Tissues as Platforms for Discovery and Disease
2015 Finalist, Johns Hopkins Bootcamp for Technology Entrepreneurs Shark Tank
2013 Third Place, National Collegiate Inventors and Innovators Alliance (NCIIA) BMEidea
2006 Branstrom Freshman Prize for Academic Excellence, University of Michigan
2005-2009 Engineering Scholarship of Honor, Robert C. Byrd Honors Scholarship, and Regents Merit Scholarship, University of Michigan

FUNDING

2021-2023 Appointed Trainee, T32 Training Grant "Organ Design and Engineering Training Program" Brigham and Women's Hospital (5T32EB016652-09, NIH)
2020-2021 Appointed Trainee, T32 Training Grant "Vascular, Pulmonary and Renal Injury" Brigham and Women's Hospital (5T32HL007627-35, NIH)
2018-2020 Principal Investigator, Postdoctoral Fellowship, Maryland Stem Cell Research Fund "Study of arrhythmogenic cardiomyopathy using a syncytial model of hiPSCs" (2018-MSCRFF-4299), $130,000

2015-2016 Principal Investigator, Predoctoral Fellowship, American Heart Association
"Effects of cardiac chamber-specific extracellular matrix on hiPSC-CM phenotype and response to drugs" (15PRE25670045), $25,000
2013 Awardee, Whitaker International Program Summer Grant, $10,000
2013-2015 Principal Investigator, Predoctoral Fellowship, American Heart Association
"Human induced pluripotent stem cell-derived cardiomyocyte maturation in native matrix" (13PRE17070107), $50,000
2008 Awardee, Summer Mentored Undergraduate Research Fellowship, Mayo Clinic
2007 Awardee, Undergraduate Research Opportunity Program Summer Engineering Fellowship

PUBLICATIONS

20. **Blazeski A**, García-Cardeña G, Kamm RD. Advancing Cardiac Organoid Engineering Through Application of Biophysical Forces. *IEEE Reviews in Biomedical Engineering* (2024). Invited manuscript, under review

19. **Blazeski A**, Floryan MA, Zhang Y, Fajardo-Ramírez OR, Meibalan E, Ortiz-Urbina J, Angelidakis E, Shelton SE, Kamm RD, García-Cardeña G. Engineering microvascular networks using a *KLF2* reporter to probe flow-dependent endothelial cell function. *Biomaterials* (2024). doi: https://doi.org/10.1101/2023.10.31.565021.

18. He J, **Blazeski A**, Nilanthi U, Menéndez J, Pirani SC, Levic DS, Bagnat M, Singh MK, Raya JG, García-Cardeña G, Torres-Vázquez J. Plxnd1-mediated mechanosensing of blood flow controls the caliber of the Dorsal Aorta via the transcription factor Klf2. *bioRxiv* (2024). doi: https://doi.org/10.1101/2024.01.24.576555.

17. Linna-Kuosmanen S, Schmauch E, Galani K, Ojanen J, Boix CA, Örd T, Toropainen A, Singha PK, Moreau PR, Harju K, **Blazeski A**, Segerstolpe Å, Lahtinen V, Hou L, Kang K, Meibalan E, Agudelo LZ, Kokki H, Halonen J, Jalkanen J, Gunn J, MacRae CA, Hollmén M, Hartikainen J, Kaikkonen MU, García-Cardeña G, Tavi P, Kiviniemi T, Kellis M. Transcriptomic and spatial dissection of human *ex vivo* right atrial tissue reveals proinflammatory microvascular changes in ischemic heart disease. *Cell Reports Medicine* 5(5), 101556 (2024). doi: https://doi.org/10.1016/j.xcrm.2024.101556.

16. Chen S, **Blazeski A**, Zhang S, Shelton SE, Offeddu GS, Kamm RD. Development of a perfusable, hierarchical microvasculature-on-a-chip model. *Lab on a Chip* 23, 4552-4564 (2023). doi:10.1039/D3LC00512G.

15. Grass M, McDougal AD, **Blazeski A**, Kamm RD, García-Cardeña G, Dewey CF. A computational model of cardiomyocyte metabolism predicts unique reperfusion protocols capable of reducing cell damage during ischemia/reperfusion. *Journal of Biological Chemistry* 298(5), 101693 (2022).

14. Duong T, Rose R, **Blazeski A**, Fine N, Woods CE, Thole JF, Sotoodehnia N, Soliman EZ, Tung L, McCallion AS, Arking DE. Development and optimization of an in vivo electrocardiogram recording method and analysis program for adult zebrafish. *Disease Models & Mechanisms* 14(8), (2021).

13. Hawthorne RN, **Blazeski A**, Lowenthal J, Kannan S, Teuben R, DiSilvestre D, Morrissette-McAlmon J, Saffitz JE, Boheler KR, James CA, Chelko SP, Tomaselli G, Tung L. Altered Electrical, Biomolecular, and Immunologic Phenotypes in a Novel Patient-Derived Stem Cell Model of Desmoglein-2 Mutant ARVC. *J Clin Med* 10(14), (2021).

12. **Blazeski A**, Zhu R, Ewoldt J, Boheler KR, Tung L. Functional properties of engineered heart slices incorporating human induced pluripotent stem cell-derived cardiomyocytes. *Stem Cell Reports* 12(5), 982 (2019).

11. **Blazeski A***, Lowenthal J*, Wang Y, Teuben R, Zhu R, Gerecht S, Tomaselli G, Tung L. Engineered Heart Slice Model of Arrhythmogenic Cardiomyopathy Using Plakophilin-2 Mutant Myocytes. *Tissue Engineering Part A* 25(9-10), 725 (2018). **Journal Cover**

10. Morrissette-McAlmon J, **Blazeski A**, Somers S, Kostecki G, Tung L, Grayson WL. Adipose-derived perivascular mesenchymal stromal/stem cells promote functional vascular tissue engineering for cardiac regenerative purposes. *Journal of Tissue Engineering and Regenerative Medicine* 12(2), e962 (2017).

9. Ong CS, Fukunishi T, Nashed A, **Blazeski A**, Zhang H, Hardy S, DiSilvestre D, Vricella L, Conte J, Tung L, Tomaselli G, Hibino N. Creation of Cardiac Tissue Exhibiting Mechanical Integration of Spheroids Using 3D Bioprinting. *Journal of Visualized Experiments* e55438, (2017).
8. Ong CS, Fukunishi T, Zhang H, Huang CY, Nashed A, **Blazeski A**, DiSilvestre D, Vricella L, Conte J, Tung L, Tomaselli GF, Hibino N. Biomaterial-Free Three-Dimensional Bioprinting of Cardiac Tissue using Human Induced Pluripotent Stem Cell Derived Cardiomyocytes. *Scientific Reports* 7, 4566 (2017).
7. **Blazeski A***, Kostecki GM*, Tung L. Engineered heart slices for electrophysiological and contractile studies. *Biomaterials* 55, 119-128 (2015).
6. Zhu R, **Blazeski A**, Poon E, Costa K, Tung L, Boheler KR. Physical developmental cues for the maturation of human pluripotent stem cell-derived cardiomyocytes. *Stem Cell Research & Therapy* 5, 117 (2014).
5. Thompson SA, **Blazeski A**, Copeland CR, Cohen DM, Chen CS, Reich DM, Tung L. Acute slowing of cardiac conduction in response to myofibroblast coupling to cardiomyocytes through N-cadherin. *Journal of Molecular and Cellular Cardiology* 68, 29-37 (2014).
4. **Blazeski A**, Zhu R, Hunter DW, Weinberg SH, Boheler KR, Tung L. Electrophysiological and contractile function of cardiomyocytes derived from human embryonic stem cells. *Progress in Biophysics & Molecular Biology* 110, 178-95 (2012).
3. **Blazeski A**, Zhu R, Hunter DW, Weinberg SH, Zambidis ET, Tung L. Cardiomyocytes derived from human induced pluripotent stem cells as models for normal and diseased cardiac electrophysiology and contractility. *Progress in Biophysics & Molecular Biology* 110, 166-77 (2012).
2. **Blazeski A**, Kozloff K, Scott PJH. Besilesomab for imaging inflammation and infection in peripheral bone in adults with suspected osteomyelitis. *Reports in Medical Imaging* 3, 17-27 (2010).
1. Zhao K, Berglund L, **Blazeski A**, Tung W-L., and An K-N. A Method for Quantifying Pipette Ergonomics. *The Annual Meeting for the American Society of Biomechanics*, State College, PA (2009).

* indicates co-first authorship

PATENTS

Blazeski A, Tung L, "Grid of responses indicating drug sensitivity" U.S. Patent Application 62/826,030, filed March 29, 2019.

Tung L, **Blazeski A**, "Engineered cardiac derived compositions and methods of use" U.S. Patent 20170173215, issued January 22, 2019.

TEACHING EXPERIENCE

2018 Guest Lecturer, Miracles of Modern Medicine Course, Johns Hopkins University
Lecture Topic - "Stem Cells: Scientific Breakthroughs and Biomedical Applications"

2014 Teaching Assistant, undergraduate Molecules and Cells Course, Johns Hopkins University
Held weekly small group section to review concepts covered in lectures and office hours to answer student questions

2014 Teaching Assistant, undergraduate/graduate Tissue Engineering Course, Johns Hopkins University

OUTREACH AND LEADERSHIP

2023-2024 Mentor, Mentoring Circles Program, Brigham and Women's Hospital
- Leading monthly mentoring sessions for a group of 7 early-stage postdocs to support these mentees and share advice on navigating career choices

2022 Mentor, Harvard Stem Cell Institute Undergraduate Internship Program
- Mentored student on experimental design, laboratory techniques, and data presentation within project to create vascularized cardiac organoids.

2021 Mentor, Translational Research for Untapped Science Talent (TRUST), Brigham and Women's Hospital
- Engaged with undergraduate mentee through literature review, feedback on project proposal, and instruction in cell culture and other laboratory techniques through program providing research experience for Harvard undergraduates who are underrepresented in science and medicine.

2014-2017 Co-founder, Graduate Women's Empowerment Network (GWEN), Johns Hopkins University
- Brought together graduate students in the School of Medicine to form a network between women in STEM across the university and provide leadership opportunities for students.

2012-2015 Mentor, Women in Science and Engineering (WISE) Program, Johns Hopkins University
- Guided high school students from a girl's school in Baltimore County in independent mini-projects in the laboratory (mentored three students).

2013-2014 Member, Kohana, Inc.
- Worked in start-up that is designing and building a discreet and wearable breast pump for breastfeeding women.

2012-2013 Tutor, Paul Robeson Academic International School of Excellence
- Taught weekly PSAT preparation class as part of a program of academic and cultural enrichment for Black and Latino young men attending high school in Baltimore City.

MENTORED STUDENTS

Graduate Students
- Jules Allbritton-King (Medical Student, Harvard Medical School, 2023-present)
- Andrew Masteller (Master's Student, Biomedical Engineering, Johns Hopkins University, 2019; *Research Associate, Massachusetts Institute of Technology*)

Undergraduate Students
- Seychelle Doyley (Undergraduate, Biomedical Engineering, Harvard University, 2024)
- Pedro Pousa (Harvard Stem Cell Institute Undergraduate Intern, 2022; *Medical Student, Federal University of Minas Gerais, Brazil*)
- Megan Curry (Undergraduate, Molecular and Cellular Biology, Harvard University, 2021)
- Himanshu Dashora (Undergraduate, Biomedical Engineering, Johns Hopkins University, 2016-2017; *MD/PhD student, Case Western Reserve University School of Medicine and the Cleveland Clinic*)
- Parker Dubee (Undergraduate, Biomedical Engineering, Johns Hopkins University, 2015-2016; *Research Assistant, NASA*)
- Jourdan Ewoldt (Undergraduate, Biomedical Engineering, Johns Hopkins University, 2014-2017; *PhD student, Boston University*)
  Won BMES Mid-Atlantic Undergraduate Research Day First Place for mentored project
- Mario Padilla (Undergraduate, Biomedical Engineering, Johns Hopkins University, 2012-2015; *Master's Student, Duke University*)

High School Students
- Brooke Fruman (High School Student, Garrison Forest School, Maryland, 2015; *Undergraduate student in Behavioral and Community Health at the University of Maryland*)
- Grace Booth (High School Student, Garrison Forest School, Maryland, 2013-2014)
- Alexandra Ioannou (High School Student, Garrison Forest School, Maryland, 2012; *Undergraduate nursing student, University of Southern Carolina-Columbia*)

SELECTED PRESENTATIONS

Oral

***Upcoming*:** "Engineering vascularization in a heart-on-a-chip system to investigate the effects of intravascular flow on cardiac contraction." Biomedical Engineering Society (BMES) Annual Meeting, Baltimore, MD, 2024

Upcoming: "Flow in a Vascularized Heart-on-a-chip Model." 28th International Conference on Miniaturized Systems for Chemistry and Life Sciences – Micro-Total Analysis Systems (μTAS), Montréal, QC Canada, 2024

"Microphysiological Models of the Heart." Seminar, Cardiovascular Innovations and Research Center (CIRC), University of California, Irvine, CA, 2024

"Engineering Microfluidic Systems for Modeling Human Physiology and Disease." Gabriel Popescu Memorial and Annual Center for Label-free and Multiscale Biophotonic (CLIMB) Research Symposium, Urbana, IL, 2023

"Engineered Heart Slice Preparation for Drug Studies and Disease Modeling." Cardiac Arrhythmia Mechanisms Gordon Research Conference, Barga, Italy, 2019

"Engineered Heart Slices Represent A Syncytial Model of Arrhythmogenic Cardiomyopathy." Keystone Symposium: Engineered Cells and Tissues as Platforms for Discovery and Disease, Boston, MA, 2017

"Functional Studies of Human Pluripotent Stem Cell-Derived Cardiomyocytes on Engineered Heart Slices." Cardiac Arrhythmia Mechanisms Gordon Research Seminar, Barga, Italy, 2015

"Stable human induced pluripotent stem cell-derived cardiomyocyte syncytium that supports paced electrical activities and responds to I_{Kr} blockage." Biomedical Engineering Society Conference, San Antonio, TX, 2014

"Functional studies of human pluripotent stem cell-derived cardiomyocytes on engineered heart slices." JHU Research in Progress Stem Cell/Cell Engineering Meeting, Baltimore, MD, 2014

Poster

"Engineering Perfused Cardiac Organoids to Probe Endothelial Cell-Cardiomyocyte Interactions." National Institute of Biomedical Imaging and Bioengineering's Training Grantees Meeting, Bethesda, MD, 2023

"An Engineered Organotypic Model for the Study of Flow-Dependent Endothelial Cell-Cardiomyocyte Interactions." Harvard Medical School Pathology Research Retreat, Boston, MA, 2023

"An Engineered Organotypic Model for the Study of Flow-Dependent Endothelial Cell-Cardiomyocyte Interactions." Vascular Cell Biology Gordon Research Conference, Ventura, CA, 2023

"A Novel Model for the Study of Flow-Dependent Endothelial Cell-Cardiomyocyte Interactions." International Vascular Biology Meeting, Oakland, CA, 2022

"Microvascular Networks Expressing Flow-Dependent KLF2 Reporter Exhibit Structural Remodeling in Response to Intravascular Flow." Northeast Bioengineering Conference, New York, NY, 2022

"Microphysiological Model for the Study of Endothelial Cell-Cardiomyocyte Interactions in the Presence of Intravascular Flow." Engineering Multi-Cellular Living Systems Keystone Meeting, Keystone, CO, 2022

"A Computational Model of Cardiomyocyte Metabolism in Response to Ischemia/Reperfusion Episodes of Variable Severity." International Cardiac Physiome Workshop, virtual, 2021

"Electrophysiology and Drug Responses of Engineered Heart Slices." Tissue Engineering and Regenerative Medicine International Society – American Chapter Annual Meeting, San Diego, CA, 2016

"Functional Studies of Human Induced Pluripotent Stem Cell-Derived Cardiomyocytes on Engineered Heart Slices." Biomedical Engineering Society Annual Meeting, Tampa, FL, 2015

PROFESSIONAL ACTIVITIES

Peer Reviewer
Nature Biomedical Engineering
Cell Stem Cell
Scientific Reports
Bioengineering & Translational Medicine