

DANIEL ABEBAYEHU

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EDUCATION

Virginia Commonwealth University, School of Engineering
Doctor of Philosophy in Biomedical Engineering

Richmond, VA
August 2011 – March 2017

University of Virginia, School of Engineering and Applied Science
Bachelors of Science in Biomedical Engineering

Charlottesville, VA
August 2007 - May 2011

EXPERIENCE

Matrix Biology and Engineering Lab
Department of Biomedical Engineering, Robert Berne Cardiovascular
Research Center (CVRC),
University of Virginia

Charlottesville, VA
April 2017 - Present

Postdoctoral Fellow

Advisor: Dr. Thomas Barker, Ph.D.

- Investigating the role innate immunity plays in promoting fibroblast heterogeneity and myofibroblastic differentiation in the context of idiopathic pulmonary fibrosis.
- Examining how inflammatory cytokines alter the surface marker expression of Thy-1, a negative regulator of fibrogenesis, as well as whether inflammatory cytokines promote acute shedding or epigenetic silencing.
- Using single cell RNA-Seq to characterize fibroblast heterogeneity in response to inflammatory cytokines to better characterize the immune-stromal axis.
- Used novel hydrogel systems to determine how fibroblast subpopulations contribute to biomaterial-mediated fibrosis.
- Using the bleomycin-induced pulmonary fibrosis model in C57BL/6 and Thy-1 KO mice to determine immune cell recruitment in resolving and non-resolving fibrosis.

Tissue Engineering Laboratory and Molecular Immunology Laboratory
Department of Biomedical Engineering and Department of Biology,
Virginia Commonwealth University

Richmond, VA
August 2011 – March 2017

Graduate Research Assistant

Advisors: Drs. John Ryan, Ph.D. and Gary Bowlin, Ph.D.

- Electrospinning scaffolds of natural and synthetic polymers (e.g. lyophilized platelet-rich plasma, polydioxanone, poly-L-lactic acid, and polycaprolactone) at different concentrations and on different mandrels to adjust fiber diameter and porosity.
- Characterizing scaffold morphology using scanning electron microscopy and mechanical strength using uniaxial tensile testing.
- Animal surgeries to harvest bone marrow and spleens from C57BL/6 mice to isolate and culture spleen derived neutrophils and bone marrow derived macrophages and mast cells, as well as *in vivo* work to measure passive systemic anaphylaxis and IL-33-mediated neutrophil recruitment
- Investigating IL-33 and LPS mediated interactions of scaffolds with neutrophil, macrophage, and mast cell interactions and examining cytokine production and signaling expression via ELISA and Western blot
- Evaluating cell-scaffold interactions by measuring cytokine production, cell surface marker expression, and changes in signaling using ELISA, Western blot, and flow cytometry.
- Investigating how lactic acid alters IgE- and IL-33-mediated signaling and activation of mast cells by measuring cytokine secretion via ELISA, mRNA and microRNA expression via qPCR, signaling with western blotting, and gene knockdown using AMAXA electroporation.

Teaching Assistant

Richmond, VA

Department of Biomedical Engineering, Virginia Commonwealth University Fall 2013 – Fall 2015

Courses: EGRB 101 (Biomedical Engineering Practicum I), EGRB 102 (Introduction to Engineering) and EGRB 303 (Biotransport Processes)

- Leading students in EGRB 101 course through various VCU hospital departments
- Coordinating with professor of EGRB 101 and physicians to organize clinical rotations and the medical equipment that needed to be covered.
- Teaching two lab sections for EGRB 102, as well as grading all course and lab materials.
- Grading quizzes, homework, and exams for EGRB 303 and assisting professor in course administrative duties.

Laboratory for Tissue Engineering

Charlottesville, VA

Department of Biomedical Engineering, University of Virginia

Spring 2008 – Spring 2011

Undergraduate Research Assistant

Advisor: Dr. Edward Botchwey, Ph.D.

- Electrospun reconstituted basement membrane (RBM) blended with polycaprolactone (PCL) at various concentrations to develop scaffolds for peripheral nerve regeneration
- Harvested murine dorsal root ganglion to seed on RBM-PCL scaffolds to examine *ex vivo* neurite extension using fluorescence microscopy
- Submitted a capstone thesis that examined electrospinning aligned nanofiber scaffolds of blended RBM and PCL by investigating the mechanical properties and the neurite extension and attachment of PC12 cells (a neuron-like cell line).

PRESENTATIONS AND PUBLICATIONS:

Publications

1. Moretti L, **Ababayehu D**, Stalfort J, Barker TH. “Scarless healing: A remote goal now in reach.” Manuscript submitted to *Journal of Biological Chemistry*.
2. Taruselli MT, Kolawole EM, Qayum AA, Haque T, Caslin HL, **Ababayehu D**, Kee SA, Dailey J, Jackson K, Spence AJ, Pondicherry N, Barnstein BO, Gomez G, Straus DB, Ryan JJ. “Fluvastatin enhances IL-33-mediated Mast Cell IL-6 and TNF production” Manuscript submitted to *Cellular Immunology*.
3. Melchor SJ, Hatter JA, Castillo EALT, Saunders CM, Byrnes KA, Sanders I, **Ababayehu D**, Barker TH, Coutermarsh-Ott S, Ewald S (2020). “T. gondii infection induces IL-1R dependent chronic cachexia and perivascular fibrosis in the liver and skeletal muscle.” *Scientific Reports*, 10(1): 15724.
4. Melchor SJ, Hatter JA, Castillo EALT, Saunders CM, Byrnes KA, Sanders I, **Ababayehu D**, Barker TH, Coutermarsh-Ott S, Ewald S (2019). “Cachexia and fibrosis are costs of chronic IL-1R-mediated disease tolerance in T. gondii infection.” *bioRxiv*, doi.org/10.1101/783316.
5. **Ababayehu D**, Spence AJ, McClure MJ, Haque TT, Rivera K, and Ryan JJ (2019). “Polymer Scaffold Architecture is a Key Determinant in Mast Cell Inflammatory and Angiogenic Responses” *Journal of Biomedical Materials Research Part A*, 107(4): 884-892.
6. Witherel CE, **Ababayehu D**, Barker TH, and Spiller KL (2019). “Macrophage and fibroblast interactions in biomaterial-mediated fibrosis.” *Advanced Healthcare Materials*, 8(4): e1801451.
7. **Ababayehu D**, Spence AJ, Caslin HL, Taruselli MT, Haque T, Kiwanuka K, Kolawole EM, Chumanovich A, Sell SA, Oskeritizian C, and Ryan JJ (2019). “Lactic acid suppresses IgE-mediated mast cell function in vitro and in vivo.” *Cellular Immunology*, 341: 103918.
8. Caslin HL, **Ababayehu D**, Qayum AA, Haque TT, Taruselli MT, Paez PA, Pondicherry N, Barnstein BO, Hoferlin LA, Chalfant CE, and Ryan JJ (2019). “Lactic acid inhibits Lipopolysaccharide-induced mast cell function by limiting glycolysis and ATP availability.” *Journal of Immunology*, 203(2): 453-464.
9. **Ababayehu D**, Spence AJ, Boyan BD, Schwartz Z, Ryan JJ, and McClure MJ (2017). “Galectin-1 Promotes and M2 Macrophage Response to Polydioxanone Scaffolds.” *Journal of Biomedical Materials Research Part A*, 105(9): 2562-2571.

10. **Ababayehu D** (Co-first author), Ndaw VS (Co-first author), Spence AJ, Paez PA, Kolawole EM, Taruselli MT, Caslin HL, Chumanevich AP, Paranjape A, Baker B, Barnstein BO, Oskeritzian CA, and Ryan JJ (2017). "TGFβ1 Suppresses IL-33-induced Mast Cell Function." *Journal of Immunology*, 199(3): 866-873.
11. **Ababayehu D** (2017). "Modulating the Innate Immune Response to Electrospun Scaffolds and Polymer Degradative Byproducts." Dissertation.
12. **Ababayehu D** (Co-first author), Spence AJ (Co-first author), Abdul Qayum A, Taruselli MT, McLeod JJA, Caslin HL, Chumanveich AP, Montunrayo EM, Paranjape A, Baker B, Ndaw VS, Barnstein BO, Oskeritzian CA, Sell SA, and Ryan JJ (2016). "Lactic Acid Suppresses IL-33-mediated Mast Cell Inflammatory Responses via Hypoxia Inducible Factor (HIF)-1α-dependent miR-155 Suppression" *Journal of Immunology*, 197(7): 2909-17.
13. Paranjape AR, Chernushevich O, Qayum AA, Spence AJ, Taruselli MT, **Ababayehu D**, Barnstein BO, McLeod JJA, Baker B, Oskeritzian CA, and Ryan JJ (2016). "Dexamethasone rapidly suppresses IL-33-stimulated mast cell function by blocking transcription factor activity" *Journal of Leukocyte Biology*, 100(6): 1395-1404.
14. Qayum AA, Paranjape A, **Ababayehu D**, Kolawole EM, Haque TT, McLeod JJA, Spence AJ, Caslin HL, Baker B, Taruselli MT, Oskeritzian CA, and Ryan JJ. (2016). "IL-10-induced miR-155 targets SOCS1 to enhance IgE-mediated mast cell activation and passive systemic anaphylaxis in mice" *Journal of Immunology*, 196(11): 4457-4467.
15. Kolawole EM, McLeod JJA, Ndaw VS, **Ababayehu D**, Barnstein BO, Faber T, Spence AJ, Taruselli MT, Paranjape A, Haque TT, Qayum AA, Kazmi QA, Wijesinghe DS, Sturgill JL, Chalfant CE, Straus DB Oskeritzian CA, and Ryan JJ. (2016). "Fluvastatin suppresses mast cell and basophil IgE responses: Genotype-dependent effects" *Journal of Immunology*, 196(4): 1461-70.
16. Neal RA, Lenz SM, Wang T, **Ababayehu D**, Brooks B, Ogle R, and Botchwey EA (2014). "Laminin- and basement membrane-polycaprolactone blend nanofibers as a scaffold for regenerative medicine" *Nanomaterials and the Environment*, 2(1): 1-12.
17. **Ababayehu D**, Spence AJ, and Sell SA. "The present and the potential of manuka honey in dermal regenerative medicine" in *Cellular and Molecular Mechanisms of Honey Wound Healing*, Ranzato E and Martinotti S, Eds. New York: Nova Science Publishers, 2014, pp. 79-105.

Oral Presentations

1. Ababayehu D, Bingham GC, Bhatti S, Pfaff B, Miller D, Griffin D, Barker TH "Inflammatory Thy-1 negative fibroblasts are critical for pulmonary and biomaterial-mediated fibrosis." Invited seminar for UVA BME Department, January 2021.
2. Ababayehu D, Barker TH. "Immuno-stromal axes in Immuno-engineering and Regenerative Medicine" Rising Stars in Engineering and Health Symposium, December 2020.
3. Ababayehu D, Ewald SE, Barker TH. "Inflammatory Cytokines induce unique immuno-fibroblast subpopulations prone to myofibroblastic differentiation." Fibrosis and Tissue Repair Keystone Symposium, February 2020, Victoria, Canada.
4. Ababayehu D, Ewald SE, Barker TH. "Inflammatory Cytokines induce unique immuno-fibroblast subpopulations prone to myofibroblastic differentiation." Seminar at BME department at Virginia Commonwealth University, January 2020, Richmond, VA.
5. Ababayehu D, Ewald SE, Barker TH. "Inflammatory Cytokines induce unique immuno-fibroblast subpopulations prone to myofibroblastic differentiation." Seminar at BME department at Brown University, January 2020, Providence, RI.
6. Ababayehu D, Ewald SE, and Barker TH. "Inflammatory cytokines induce unique immuno-fibroblast subpopulations prone to myofibroblastic differentiation." Pulmonary and Critical Care Medicine Research Group. Charlottesville, VA January 2020.
7. Ababayehu D, Ewald SE, Barker TH. "Inflammatory Cytokines Promote Pro-Fibrotic Phenotype in Lung Fibroblast Subpopulations." BMES National Meeting, October 2019, Philadelphia, PA.

8. Abebayehu D, Ewald SE, Barker TH. “Inflammatory Cytokines Promote Pro-Fibrotic Phenotype in Lung Fibroblast Subpopulations.” UVA Graduate BME Research Symposium, Charlottesville, VA October 2019.
9. Abebayehu D and Barker TH. “Inflammatory Cytokines Promote Pro-Fibrotic Phenotype in Lung Fibroblast Subpopulations.” Cardiovascular Research Center Research In Progress Seminar Series, Charlottesville, VA November 2018
10. Abebayehu D, Spence AJ, Sell SA, Ryan JJ, and Bowlin GL. “Modulating the Innate Immune Response of Electrospun Bioresorbable Vascular Grafts” VCU IMSD Summer Near Peer Seminar Series July 2015, Richmond, VA.
11. Abebayehu D “Characterizing bone marrow-derived mast cell interaction with electrospun bioresorbable vascular graft” VCU Center of Health Disparities Brown Bag Lunch Seminar Series July 2014, Richmond, VA.
12. Abebayehu D, Lenz SM, Laurencin CT, Botchwey EA, et al. “Basement Membrane-Polycaprolactone Blend Nanofibers as a Scaffold for Tissue Engineering,” Tissue Engineering and Regenerative Medicine International Society, TERMIS – NA Meeting, December 2010, Orlando, FL

HONORS AND AWARDS:

- Instructor for Cellular and Molecular Biology for Engineers (upcoming Spring 2021 semester)
- 2020 Rising Star in Engineering in Health from Columbia BME
- NIH Loan Repayment Award (2020)
- NIH NRSA F32 Postdoctoral Fellowship
- 1st place prize at the 2019 UVA Graduate BME Research Symposium
- 2019 Regenerative Medicine Workshop Travel Award
- Robert Berne Cardiovascular Research Center Training Grant Postdoctoral Fellowship (T32 fellowship)
- 2016 AAI Trainee Poster Award
- Initiative for Maximizing Student Development (IMSD) PhD Fellowship (R25 training grant)
- 1ST place award winner at the 2014 VCU Graduate Student Association Research Symposium
- 2014 and 2015 Federation of American Societies for Experimental Biology/Maximizing Access to Research Careers Travel Award Winner (\$1850)
- Finalist at the 2010 TERMIS-NA meeting poster competition in the Student & Young Investigator Section

STUDENT TRAINEES:

Undergraduate Students

1. Kevin Rivera (2011-2013); 2 publications; graduated with PhD from UCSF in December 2020
2. Neha Pondicherry (2016-2017); Co-authored 1 publication together and went on to co-author another paper after I left; now in medical school at UCSF
3. Surhabi Ghatti (2019 – Present)

Masters Students

1. Andrew Spence (2013-2015); Co-authored 8 papers; now in a Physician Assistant graduate program

Graduate Rotation Students

1. Xuan Qu (Jack Whitewolf; 2018)
2. Mackenzie Grubb (2019)

FUNDING:

- 05/10/2019 – Present
1F32HL147405-01
NIH NRSA F32 Fellowship (Role: PI)
Inflammatory Cytokines Promotes Pro-Fibrotic Thy-1 Negative Fibroblast Subpopulations in Lung Fibrosis
- 04/10/2017 – 03/31/2019

2T32HL007284-41 (Role: Trainee)

University of Virginia T32 Basic Cardiovascular Research Training Grant

Trains and supports pre- and post-doctoral trainees to pursue research careers in addressing cardiovascular disease.

- 03/09/2015 – 03/07/2017

5R25GM090084-06 (Role: Trainee)

Virginia Commonwealth University R25 Grant Initiative for Maximizing Student Diversity

Trains and supports underrepresented minorities at the undergraduate and graduate levels in the biomedical sciences.

PROFESSIONAL ORGANIZATIONS AND VOLUNTEER SERVICE:

Memberships

American Society of Matrix Biology	June 2018 - Present
Phi Kappa Phi Honor Society	Fall 2015 – Present
American Association of Immunologists Member	January 2014 - Present
Biomedical Engineering Society Member (National)	Fall 2010-Present
Tissue Engineering and Regenerative Medicine International Society Member	Fall 2010-Present

Volunteer and Outreach

Co-Organizer for BlackInImmuno	October 2020 - Present
UVA BME Dept's Faculty Committee on Diversity, Equity, and Inclusion	October 2019 – Present
UVA Cardiovascular Research Center Career Development Seminar Series Committee	October 2017 – Present
Poster Judge at VCU IMSD Undergraduate Poster Symposium	Fall 2016
Health Career Explorers program Volunteer	February 2014
Science Fair Judge at Our Lady of Lourdes Catholic School	March 2013
