CURRICULUM VITAE

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CURRENT POSITION:

Title: Assistant Professor
Department: Department of Microbiology and Immunology
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Atlanta, Georgia 30322
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RESEARCH INTERESTS:

My research interests are focused on gene regulatory networks underlying cell fate decisions in thymic progenitor cells and mature T cells with progenitor-like properties. I study how multilineage-expressed transcription factors regulate cell type-specific gene expression programs by comparing and perturbing transcription factors' activities across different cellular contexts. Collectively, I seek to provide new insights into how broadly expressed transcription factors drive both normal and pathological immune cell development and function.

EDUCATION:

2025-present	Assistant Professor	Emory University
2018-2025	Postdoctoral Fellow (Mentor: Dr. Ellen V. Rothenberg)	California Institute of Technology
2012-2018	Ph.D., Immunology (Mentor: Dr. Laurie E. Harrington)	University of Alabama at Birmingham
2010-2011	Global Engineering Education Exchange Program Trainee in Biomedical Engineering (Mentor: Dr. M. Suresh)	University of Wisconsin at Madison
2006-2011	B.S., Life Science (Cum Laude) (Undergraduate thesis mentor: Dr. MyoungSool Do)	Handong Global University

PROFESSIONAL SOCIETIES:

American Association of Immunologists (2014 - present)
International Society for Experimental Hematology (2023 - present)

FELLOWSHIP SUPPORTS/GRANT:

09/16/2025-present	Pathway to Independence Award (R00) The molecular mechanisms underlying context-specific Runx factor functions in directing hematopoietic cell identity	National Institute of Health National Heart, Lung, and Blood Institute
09/17/2024 – 09/16/2025	Pathway to Independence Award (K99) The molecular mechanisms underlying context-specific Runx factor functions in directing hematopoietic cell identity	National Institute of Health National Heart, Lung, and Blood Institute
07/01/2022 – 06/30/2024	Baxter Postdoctoral Fellowship The molecular mechanisms underlying dynamic Runx factor binding site choice in early T cell development	California Institute of Technology/ Baxter Foundation

07/01/2019 – 06/30/2022 CRI Irvington Postdoctoral Fellowship Cancer Research Institute
The molecular mechanisms of Runx transcription factors
in early thymic T cell development

07/01/2016 – 06/30/2018 AHA Predoctoral Fellowship American Heart Association
Regulation of Th17 cell pathogenicity during atherosclerosis

AWARDS AND HONORS:

2025 Ellen Rothenberg Award FASEB
The Mechanisms of Immune Cell Development & Function
2023 AAI Oral Presentation Award The American Association of Immunologists
La Jolla Immunology Conference
2022 First Place Oral Presentation The American Association of Immunologists
UC Irvine 20th Annual Immunology Fair
2020 AAI presentation Award The American Association of Immunologists
2020 ThymUS
2019 Computational Genomics Course Scholarship National Human Genome Research Institute
2019 Cold Spring Harbor Laboratory Course
2017 AAI Young Investigator Award The American Association of Immunologists
Southeastern Immunology Symposium
2017 Keystone Symposia Future of Science Scholarship Keystone Symposia
Integrating Metabolism and Immunity
2016 AAI Young Investigator Award The American Association of Immunologists
Southeastern Immunology Symposium
2015 Graduate Student Association Travel Award University of Alabama at Birmingham
2015 AAI Trainee Abstract Award The American Association of Immunologists
Immunology 2015
2014 First Place Oral Presentation University of Alabama at Birmingham
GBSO Research Day
2014 AAI Trainee Abstract Award The American Association of Immunologists
Immunology 2014
2014 Graduate Student Association Travel Award University of Alabama at Birmingham
2011 Cum Laude Handong University

PREPRINTS:

1. **Shin B**, Chang SJ, MacNabb BW, Sidwell T, Williams BA, Rothenberg EV. T cell development from expanded hematopoietic progenitors reveals progression control by Lmo2, Erg, Spi1, Hoxa9, and Meis1. *bioRxiv*. (2025) April. doi: https://doi.org/10.1101/2025.04.22.649893

PUBLICATIONS:

1. **Shin B**, Chang SJ, MacNabb BW, Rothenberg EV. Transcriptional Network dynamics in early T cell development. *J Exp Med*. (2024) Oct 7;221(10):e20230893. doi: 10.1084/jem.20230893. PMID: 39167073; PMCID: PMC11338287.
2. Schulte SJ, **Shin B**, Rothenberg EV, Pierce NA. Multiplex, Quantitative, High-Resolution Imaging of Protein:Protein Complexes via Hybridization Chain Reaction. *ACS Chem Biol.* (2024) Feb 16;19(2):280-288. doi: 10.1021/acschembio.3c00431. PMID: 38232374; PMCID: PMC10877569.
3. **Shin B,** Zhou W, Wang J, Gao F, Rothenberg EV. Runx factors launch T cell and innate lymphoid programs via direct and gene network-based mechanisms. *Nat Immunol.* (2023) Sep;24(9):1458-1472. doi: 10.1038/s41590-023-01585-z. PMID: 37563311.

4. **Shin B**, Rothenberg EV. Multi-modular structure of the gene regulatory network for specification and commitment of murine T cells. *Front Immunol*. (2023) Jan 31;14:1108368. doi: 10.3389/fimmu.2023.1108368. PMID: 36817475; PMCID: PMC9928580.
5. Spolski R, Li P, Chandra V, **Shin B,** Goel S, Sakamoto K, Liu C, Oh J, Ren M, Enomoto Y, West EE, Christensen SM, Wan ECK, Ge M, Lin JX, Yan B, Kazemian M, Yu ZX, Nagao K, Vijayanand P, Rothenberg EV, Leonard WJ. Distinct use of super-enhancer elements controls cell type-specific CD25 transcription and function. *Sci Immunol.* 2023 Nov 3;8(89):eadi8217. doi: 10.1126/sciimmunol.adi8217. PMID: 37922339.
6. Buzzelli AA, McWilliams IL, **Shin B,** Bryars MT, Harrington LE. Intrinsic STAT4 Expression Controls Effector CD4 T Cell Migration and Th17 Pathogenicity. *J Immunol.* (2023) Jun 1;210(11):1667-1676. doi: 10.4049/jimmunol.2200606. PMID: 37093664.
7. Bhalerao N, Chakraborty A, Marciel MP, Hwang J, Britain CM, Silva AD, Eltoum IE, Jones RB, Alexander KL, Smythies LE, Smith PD, Crossman DK, Crowley MR, **Shin B,** Harrington LE, Yan Z, Bethea MM, Hunter CS, Klug CA, Buchsbaum DJ, Bellis SL. ST6GAL1 sialyltransferase promotes acinar to ductal metaplasia and pancreatic cancer progression. *JCI Insight*. (2023) Aug 29:e161563. doi: 10.1172/jci.insight.161563. PMID: 37643018.
8. **Shin B**, Hosokawa H, Romero-Wolf M, Zhou W, Masuhara K, Tobin VR, Levanon D, Groner Y, Rothenberg EV. Runx1 and Runx3 drive progenitor to T-lineage transcriptome conversion in mouse T cell commitment via dynamic genomic site switching. *Proc Natl Acad Sci USA.* (2021) Jan 26;118(4):e2019655118. doi: 10.1073/pnas.2019655118. PMID: 33479171; PMCID: PMC7848575.
9. Romero-Wolf M, **Shin B,** Zhou W, Koizumi M, Rothenberg EV, Hosokawa H. Notch2 complements Notch1 to mediate inductive signaling that initiates early T cell development. *J Cell Biol.* (2020) Oct 5;219(10):e202005093. doi: 10.1083/jcb.202005093. PMID: 32756905; PMCID: PMC7659720.
10. **Shin B,** Benavides GA, Geng J, Koralov SB, Hu H, Darley-Usmar VM, Harrington LE. Mitochondrial Oxidative Phosphorylation Regulates the Fate Decision between Pathogenic Th17 and Regulatory T Cells. *Cell Rep.* (2020) Feb 11;30(6):1898-1909.e4. doi: 10.1016/j.celrep.2020.01.022. PMID: 32049019; PMCID: PMC9059282.
11. **Shin B,** Kress RL, Kramer PA, Darley-Usmar VM, Bellis SL, Harrington LE. Effector CD4 T cells with progenitor potential mediate chronic intestinal inflammation. *J Exp Med*. (2018) Jul 2;215(7):1803-1812. doi: 10.1084/jem.20172335. PMID: 29915024; PMCID: PMC6028516.

INVITED TALKS:

1. "Dissecting environmental and transcription factor inputs that convert multipotent bone marrow progenitor cells into early T-progenitor cells using a new *in vitro* system." RIKEN IMS-JSI International Symposium on Immunology 2024, Tokyo, Japan. June 2024
2. "How Runx transcription factors shape immune cell gene networks." European Molecular Biology Laboratory, Virtual. May 2024

CONFERENCE ORAL PRESENTATIONS:

1. "Stage-specific chromatin dynamics and Runx factor engagement during the T-program entry." FASEB The Molecular Mechanisms of Immune Cell Development and Function, Niagara Falls, NY, CA. August 2025
2. "T cell development from expanded hematopoietic progenitors reveals new progression controllers." City of Hope Thymus Symposium. Duarte, CA. Nov 2024
3. "Runx factors launch T-cell and innate lymphoid cell programs via direct and gene network-based mechanisms." Gene Expression and Signaling in the Immune System Meeting. Cold Spring Harbor Laboratory, Cold Spring Harbor, NY. Apr 2024

4. "Dissecting the gene regulatory networks converting multipotent bone marrow progenitor cells to early T-progenitor cells using a new *in vitro* system." FASEB The Molecular Mechanisms of Immune Cell Development and Function, Sacramento, CA. Nov 2023
5. "Runx factors launch T-cell and innate lymphoid cell programs via direct and gene network-based mechanisms." La Jolla Immunology Conference, La Jolla, CA. Oct 2023
6. "Runx factors launch T-cell and innate lymphoid cell programs via direct and gene network-based mechanisms." 20th Annual UCI Immunology Fair. Dec 2022
7. "Runx factors launch T-cell and innate lymphoid cell programs via direct and gene network-based mechanisms." Caltech Biology, Biological Engineering Retreat. Nov 2022
8. "Concentration-dependent Runx transcription factor binding site choice in early T-development and its functional significance in regulating selective gene network modules." FASEB The Molecular Mechanisms of Immune Cell Development and Function, Nova Scotia, Canada. Aug 2022
9. "How Runx Transcription Factors Instruct Early Thymic T-cell Development" Center for Molecular and Cellular Medicine Seminar Series. California Institute of Technology, Virtual. Apr 2021
10. "Who moved Runx? – dynamic binding site shifts during T-lineage commitment and its dose-dependent role in development speed" Bioinformatics in Biology Seminars. California Institute of Technology, Virtual. Oct 2021
11. "Runx1 and Runx3 Drive Progenitor to T-Lineage Transcriptome Conversion in Mouse T-Cell Commitment via Dynamic Genomic Site Switching" ThymUS Virtual Meeting. Nov 2020
12. "Runx transcription factors play phase-specific roles in early thymic T cell development." FASEB The Molecular Mechanisms of Immune Cell Development and Function, Palm Springs, CA. Jul 2019
13. "Mitochondrial oxidative phosphorylation regulates the fate decision between pathogenic Th17 and regulatory T cells." Gene Expression and Signaling in the Immune System Meeting. Cold Spring Harbor Laboratory, Cold Spring Harbor, NY. Apr 2018
14. "Effector CD4 T cells with stem cell-like properties mediate chronic intestinal inflammation." The Robert Stroud Advanced Graduate Trainee Seminar. University of Alabama at Birmingham, Birmingham, AL. Mar 2017
15. "Differential metabolic features and pathogenic potential of effector CD4 T cells associated with IFNγ production during intestinal inflammation." The American Association of Immunologists annual meeting – Immunology 2015, New Orleans, LA. May 2015.
16. "T-bet controls chronic intestinal inflammation via regulation of IL-10 production by CD4 T cells." Research in progress seminar series. University of Alabama at Birmingham, Birmingham, AL. Apr 2015
17. "Regulation of effector CD4 T cells during chronic intestinal inflammation." T cell biology group meeting. University of Alabama at Birmingham, Birmingham, AL. Mar 2015.
18. "T-bet controls chronic intestinal inflammation via regulation of IL-10 production by CD4 T cells." Graduate Biomedical Sciences Organization Research Day. University of Alabama at Birmingham, Birmingham, AL. May 2014.
19. "T-bet controls chronic intestinal inflammation via regulation of IL-10 production by CD4 T cells." The American Association of Immunologists annual meeting – Immunology 2014, Pittsburgh, PA. May 2014.