

CURRICULUM VITAE
Boyoung Shin
California Institute of Technology

PERSONAL INFORMATION:

Name: Boyoung Shin
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CURRENT POSITION:

Title: Postdoctoral Fellow
Department: The Division of Biology and Biological Engineering
Address: California Institute of Technology,
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RESEARCH INTERESTS:

My research interests are focused on gene regulatory networks underlying cell fate decisions in T cells and other hematopoietic lineage cells. 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 AND WORK EXPERIENCES:

2018-present	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
2011-2012	Research Assistant, Biomedical Sciences	Korea University
2010-2011	Global Engineering Education Exchange Program Trainee in Biomedical Engineering	University of Wisconsin at Madison
2006-2011	B.S., Life Science (Cum Laude)	Handong University

FELLOWSHIP SUPPORTS:

07/01/2022 – Present	Baxter Postdoctoral Fellowship	California Institute of Technology/ Baxter Foundation
	The molecular mechanisms underlying dynamic Runx factor binding site choice in early T cell development	
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 16PRE29650004; Shin (PI)	American Heart Association
	Regulation of Th17 cell pathogenicity during atherosclerosis	

AWARDS AND HONORS:

2022	First Place Oral Presentation UC Irvine 20 th Annual Immunology Fair	The American Association of Immunologists
2020	AAI presentation Award 2020 ThymUS	The American Association of Immunologists
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
2010	Undergraduate Winter Research Program Scholarship	Korean Ministry of Education
2009	Merit-based Scholarship, Nuri Achievement Scholarship	Korean Ministry of Education
2006	Dean's List, Merit-based Scholarship	Handong University

PROFESSIONAL SOCIETIES:

American Association of Immunologists (2014 - present)

International Society for Experimental Hematology (2023 - present)

PUBLICATIONS:

1. **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. Epub 2023 Aug 10. PMID: 37563311.
2. 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.
3. **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.
4. 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.
5. **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.
6. 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.
7. **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.

8. **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. Epub 2018 Jun 18. PMID: 29915024; PMCID: PMC6028516.

PREPRINTS:

9. Schulte S, **Shin B**, Rothenberg EV, Pierce AN. Multiplex, quantitative, high-resolution imaging of protein:protein complexes via hybridization chain reaction. *BioRxiv.* (2023) doi: 10.1101/2023.07.22.550181.
10. Spolski R, Li P, Chandra V, **Shin B**, Liu C, Oh J, Ren M, Enomoto Y, West EE, Christensen S, Wan ECK, Ge M, Lin J, Vijayanand P, Rothenberg EV, Leonard WJ. Distinct super-enhancer elements differentially control Il2ra gene expression in a cell-type specific fashion. *BioRxiv.* (2022) doi: 10.1101/2022.11.18.517146.

ORAL PRESENTATIONS:

1. **Shin B**. “Runx factors launch T-cell and innate lymphoid cell programs via direct and gene network-based mechanisms.” 20th Annual UCI Immunology Fair. Dec 2022
2. **Shin B**. “Runx factors launch T-cell and innate lymphoid cell programs via direct and gene network-based mechanisms.” Caltech Biology, Biological Engineering Retreat. Nov 2022
3. **Shin B**. “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
4. **Shin B**. “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
5. **Shin B**. “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
6. **Shin B**. “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
7. **Shin B**. “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
8. **Shin B**. “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. Ap 2018
9. **Shin B**. “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
10. **Shin B**. “Differential metabolic features and pathogenic potential of effector CD4 T cells associated with IFN γ production during intestinal inflammation.” The American Association of Immunologists annual meeting – Immunology 2015, New Orleans, LA. May 2015.
11. **Shin B**. “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
12. **Shin B**. “Regulation of effector CD4 T cells during chronic intestinal inflammation.” T cell biology group meeting. University of Alabama at Birmingham, Birmingham, AL. Mar 2015.
13. **Shin B**. “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.

14. **Shin B.** "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.

POSTER PRESENTATIONS:

1. **Shin B,** Zhou W, Wang J, Gao F, and Rothenberg EV. "Runx factors launch T cell and innate lymphoid cell programs via direct and gene network-based mechanisms." International Society of Experimental Hematology (ISEH) 52nd Annual Scientific Meeting, New York City, NY. Aug 2023
2. **Shin B,** Zhou W, Wang J, and Rothenberg EV. "Concentration-dependent Runx transcription factor binding site choice in early T-development and its functional significance in regulating selective gene network modules." International Cancer Immunotherapy Conference (CICON), New York City, NY. Sep 2022
3. **Shin B,** Zhou W, Wang J, and Rothenberg EV. "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
4. **Shin B,** Hosokawa H, Romero-Wolf M, Zhou W, Masuhara K, Tobin VR, Levanon D, Groner Y, and Rothenberg EV. "Runx transcription factors play phase-specific roles in early thymic T cell development." Gene Expression and Signaling in the Immune System Meeting (Virtual). Oct 2020
5. **Shin B,** Hosokawa H, Romero-Wolf M, Zhou W, and Rothenberg EV. "Runx transcription factors play phase-specific roles in early thymic T cell development." Cold Spring Harbor Laboratory Course, Computational Genomics Course, Cold Spring Harbor Laboratory, Cold Spring Harbor, NY. Dec 2019
6. **Shin B,** Hosokawa H, Romero-Wolf M, Zhou W, and Rothenberg EV. "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
7. **Shin B,** Benavides GA, Darley-USmar VM, Hu H, Koralov SB, and Harrington LE. "Mitochondrial oxidative phosphorylation regulates the fate decision between pathogenic Th17 and regulatory T cells." Southeastern Immunology Symposium, Nashville, TN. Jun 2017
8. **Shin B,** Benavides GA, Darley-USmar VM, Hu H, Koralov SB, and Harrington LE. "Mitochondrial oxidative phosphorylation regulates the fate decision between pathogenic Th17 and regulatory T cells." Keystone symposia on Integrating Metabolism and Immunity, Dublin, Ireland. May 2017
9. **Shin B,** Benavides GA, Darley-USmar VM, Koralov SB, and Harrington LE. "Mitochondrial oxidative phosphorylation fine-tunes Th17 and Treg fate decision by controlling a critical pioneer transcription factor." Comprehensive Cancer Center 18th annual research retreat, University of Alabama at Birmingham, Birmingham, AL. Oct 2016
10. **Shin B,** Kramer PA, Darley-USmar VM, Bellis, S.L., and Harrington LE. "Effector CD4 T cells with stem cell-like properties mediate chronic intestinal inflammation." Southeastern Immunology Symposium, Durham, NC. Jun 2016
11. **Shin B,** Kramer PA, Darley-USmar VM, Bellis, S.L., and Harrington LE. "Effector CD4 T cells with stem cell-like properties mediate chronic intestinal inflammation." Gene Expression and Signaling in the Immune System Meeting. Cold Spring Harbor Laboratory, Cold Spring Harbor, NY. May 2016
12. **Shin B,** Kramer PA, Darley-USmar VM, and Harrington LE. "Differential metabolic features and pathogenic potential of effector CD4 T cells associated with IFN γ production during intestinal inflammation." Multiple Sclerosis Symposium. University of Alabama at Birmingham, Birmingham, AL. Jun 2015
13. **Shin B,** Kramer PA, Darley-USmar VM, and Harrington LE. "Differential metabolic features and pathogenic potential of effector CD4 T cells associated with IFN γ production during intestinal inflammation." The American Association of Immunologists annual meeting – Immunology 2015, New Orleans, LA. May 2015.

14. **Shin B**, Yeh W, Poholek C, and Harrington LE. "T-bet controls chronic intestinal inflammation via regulation of IL-10 production by CD4 T cells." Southeastern Immunology Symposium, Atlanta, GA. Jun 2014.
15. **Shin B**, Yeh W, Poholek C, and Harrington LE. "T-bet controls chronic intestinal inflammation via regulation of IL-10 production by CD4 T cells." Graduate Student Research Day. University of Alabama at Birmingham, Birmingham, AL. May 2014.
16. **Shin B**, Yeh W, Poholek C, and Harrington LE. "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.
17. Jung Y, Kim Y, **Shin B**, and Song J. "Serum microRNAs are novel biomarkers for ovarian cancer diagnosis." The 27th Spring Symposium of Korean Society of Gynecologic Oncology, Gwangju, South Korea. Apr 2012.
18. **Shin B**, Hong C. and So, I. "The effects of oxidation and reduction of disulfide bonds on the activation of human TRPC5." The Winter Research Program Research Day, Seoul National University, Seoul, South Korea. Feb 2010.