Heath E. Johnson

EDUCATION

2008-2015	**North Carolina State University**	Raleigh, NC, USA
2015	Ph.D., Chemical Engineering Dissertation: *Cytoskeletal and Signaling Dynamics Underlying Directional Persistence of Cell Migration*	
2010	M.S., Chemical Engineering	
2003-2008	**The University of Tennessee**	Knoxville, TN, USA
2008	B.S., Chemical Engineering Minor: Chemistry	

RESEARCH EXPERIENCE

2022 - **The University of Hong Kong** Hong Kong, SAR China
Assistant Professor, School of Biological Sciences

2015-2021 **Princeton University** Princeton, NJ, USA
NRSA Postdoctoral Fellow, Department of Molecular Biology
Sponsor: Prof. Jared Toettcher and Stas Shvartsman

2008-2015 **North Carolina State University** Raleigh, NC, USA
Research Assistant, Department of Chemical and Biomolecular Engineering
Advisor: Prof. Jason Haugh

2007-2008 **The University of Tennessee** Knoxville, TN, USA
Research Assistant, Department of Chemical Engineering
Advisor: Prof. Bamin Khomami

TEACHING

2023 -	Instructor - BIOL3416 Developmental Biology
2022 -	Course Coordinator - BIOL8021 Research Seminars in Molecular Biology
2022 -	Course Coordinator - BIOL3402 Cell Biology and Technology
2017	EMBO Practical Course: Optogenetics and Cell Signaling (trainer)
2012	Teaching Assistant, ChE 551: Biochemical Engineering
2009	Teaching Assistant, ChE 205: Chemical Process Principles
2009	Teaching Assistant, ChE 225: Intro to Chemical Engineering Analysis

SERVICE

2025	SRP Judge
2024-25	HKU Information Day
2024	HKSEMR ASM Abstract Judge
2024-25	Science Master Class Admissions Pannel
2023-	Young Scientist Scheme Mentor (3 Students)
2023-2024	SRF Panelist
2022-25	Academic Advisor
2022-2023	HKU MCB Symposium Organizer
2011	Graduate Recruiting Captain
2006	AIChE Student Chapter Vice President
2006	Engineer's Day Coordinator

AWARDS / RECONITION

2022	HKU-100 Scholar
2018	Drosophila Image Award - Honorable mention
2017	Art of Science (WSJ Feature)
2016-2019	Ruth Kirschstein National Research Service Fellow
2008	Provost's Fellowship

PUBLICATIONS

Peer-Reviewed Research Articles:

1. Xiong M, Leong TL, M Chen, J Chen, Lee TC, Yu, C, Efremov AK & **Johnson HE*.** Optogenetic construction of *de novo* integrin-adhesion complexes reveals role for biocondensation in adhesion nucleation. *BioRxiv*.
2. Liu P, Wang Q, Dai X, Pei L, Wang J, Zhao W, **Johnson HE**, Yao M, and Efremov AK. Elastic properties of force-transmitting linkages determine multistable mechanosensitive behavior of cell adhesion. *Nat. Physics.* (2025).
3. Ho, EK., Oatman HR, McFann SE, Yang L, **Johnson HE**, Shvartsman SY, and Toettcher JE., Dynamics of an Incoherent Feedforward Loop Drive ERK-Dependent Pattern Formation in the Early Drosophila Embryo., *Development* 150, no. 17 (2023)
4. Colonnetta MM, Goyal Y, **Johnson HE**, Syal S, Schedl P, and Deshpande G. Preformation and epigenesis converge to specify primordial germ cell fate in the early Drosophila embryo., *PLOS Genetics* 18(1): e1010002. (2022)
5. **Johnson HE,** Djabrayan, NJV, Shvartsman SY, and Toettcher JE. Optogenetic rescue of a patterning mutant., *Current Biology,* 30, 1-11 (2020)
6. **Johnson HE** and Toettcher JE. Signaling dynamics control cell fate in the early Drosophila embryo. *Developmental Cell,* 48 (3), 361-370. (2019)

7. Asokan, SB, **Johnson HE,** Sondek JD, Shutova MS, Svitkina TM, Haugh JM, Bear JE. Lysophosphatidic acid provokes fibroblast chemotaxis through combinatorial regulation of myosin II. *BioRxiv*.
8. Winer BY, Shirvani-Dastgerdi E, Bram Y, Sellau J, Low BE, **Johnson HE** , Huang T, Hrebikova G, Heller B, Sharon Y, Giersch K , Gerges S, Pais MA, Frankel AS , Chiriboga L, Cullen J, Lutgehetmann M, Toettcher J , Wiles MV , Schwartz RE , Ploss A., Preclinical assessment of antiviral combination therapy in a genetically humanized mouse model for persistent hepatitis delta virus infection. *Science Trans. Med*. 10 (447) (2018)
9. **Johnson HE**, Goyal Y, Pannucci N, Schüpbach T, Shvartsman SY, and Toettcher JE. The spatiotemporal limits of developmental Erk signaling. *Developmental Cell*, 40 (2), 185-192. (2017) [Journal Cover; Best of 2017]
10. **Johnson HE**, and Haugh JM. Are filopodia privileged signaling structures in migrating cells? *Biophysical Journal*, 111 (9), 1827-1830. (2016)
11. King SJ, Asokan SB, Haynes EM, Zimmerman SP, Rotty JD, Alb. Jr. JG, Tagliatela A, Blake D, Lebedeva IP, Marston D, **Johnson HE**, Parsons M, Sharpless NE, Kuhlman B, Haugh JM, and Bear JE. Lamellipodia are critical for haptotactic sensing and response. *Journal of Cell Science,* 129(12):2329-42. (2016)
12. Haynes EM , Asokan SB, King SJ, **Johnson HE**, Haugh JM, and Bear JE. GMFβ controls branched actin content and lamellipodial retraction in fibroblasts. *Journal of Cell Biology,* 209, 803–812 (2015).
13. **Johnson HE**, King SJ, Asokan SB, Rotty JD, Bear JE, and Haugh JM. F-actin bundles direct the initiation and orientation of lamellipodia through adhesion-based signaling. *Journal of Cell Biology*, 208, 443–455. (2015).
14. Rotty JD, Wu C, Haynes EM, Winkelman JD, Suarez C, **Johnson HE**, Haugh JM, Kovar DR, and Bear JE. Profilin-1 Serves as a Gatekeeper for Actin Assembly by Arp2/3-Dependent and -Independent Pathways. *Developmental Cell*, 32, 54–67 (2015).
15. Asokan, SB, **Johnson, HE**, Rahman, A, King, SJ, Rotty, JD, Lebedeva, IP, Haugh, JM, and Bear, JE. Mesenchymal Chemotaxis Requires Selective Inactivation of Myosin II at the Leading Edge via a Noncanonical PLCγ/PKCα Pathway. *Developmental Cell,* 31, 747–760 (2014).
16. Welf ES, **Johnson HE**, and Haugh JM. Bidirectional coupling between integrin-mediated signaling and actomyosin mechanics explains matrix-dependent intermittency of leading-edge motility. *Molecular Biology of the Cell*, 24:3945–55 (2013).
17. Welf ES, Ahmed S, **Johnson HE**, Melvin AT, Haugh JM. Migrating fibroblasts reorient directionality by a metastable, PI3K-dependent mechanism. *Journal of Cell Biology,* 197(1):105-14 (2012).

Review Articles, Methods Articles and Book Chapters:

18. **Johnson HE*** Application of optogenetics to probe the signaling dynamics of cell fate decision making. *Methods in Molecular Biology,* v2634 (2023)
19. **Johnson HE**, and Toettcher JE. Illuminating developmental biology with cellular optogenetics. *Current Opinion in Biotechnology*. 52:42–48 (2018)
20. **Johnson HE** and Toettcher JE. The Duty of an Intracellular Signal: Illuminating Calcium's Role in Transcriptional Control. *Cell Systems*, 2(4):223-224. (2016)
21. **Johnson HE** and Haugh JM. Quantitative Analysis of Phosphoinositide 3-Kinase (PI3K) Signaling Using Live-Cell Total Internal Reflection Fluorescence (TIRF) Microscopy. *Current Protocols in Cell Biology*, 61:14.14.1-14.14.24 (2013).

External Scientific Presentations (2022-Present)

2025	MBI-MPG: Mechanobiology in Space and time
2025	GRC: Fibronectin, Integrins and Related Molecules
2024	The American Society of Cell Biologists Annual Meeting
2024	76th Annual Meeting of the Japan Society for Cell Biology
2024	3rd Symposium of Physical Biology and Biological Physics
2023	Photopharmacology IV
2022	SynBio YSS
2022	The American Society of Cell Biologists Annual Meeting

GRANTS

2024-25 RGC General Research Fund 1.4M HKD -Awarded – PI
Optogenetic interrogation of adhesion signaling dynamics in cell migration.
2023-24 URC Seed Fund for Basic Research 0.1M HKD Awarded – PI
Optogenetic tools for dynamic control of JAK-STAT signaling.
2022-23 URC Seed Fund for Basic Research 0.1MHKD Awarded – PI
Optogenetic tools for modulation of integrin and adhesion signaling.
2022 HKU -100 0.2M HKD - Awarded – PI
2021-22 RGC Early Career Scheme 1.2M HKD - Awarded – PI
Optogenetic decoding of adult body size.
2015-2016 NIH F32 ~2M HKD - Awarded – PI
Optogenetic control of spatio-temporal patterning in early embryogenesis