

# Laurel E. Hind

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Department of Chemical and Biological Engineering  
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## RESEARCH OBJECTIVES

My research interests lie in understanding how the tissue microenvironment alters immune cell function. I am specifically interested in how diverse pathogens, the cells of the vasculature, tissue resident cells, and the physical properties of the infectious microenvironment modulate the functions of leukocytes during an infection. I am also interested in studying the functions of new and diverse immune cell populations during infection. By combining engineered devices and cutting-edge biological techniques, I aim to model the infectious microenvironment and investigate the signals that drive immune cell function.

## EDUCATION

### UNIVERSITY OF PENNSYLVANIA

Doctor of Philosophy, Bioengineering, March 2015  
Advisor: Professor Daniel A. Hammer

### UNIVERSITY OF WISCONSIN-MADISON

Bachelor of Science, Chemical and Biological Engineering, August 2009  
Advisor: Professor Sean Palecek

## PROFESSIONAL EXPERIENCE

01/20 – present

### ASSISTANT PROFESSOR

UNIVERSITY OF COLORADO-BOULDER  
DEPARTMENT OF CHEMICAL AND BIOLOGICAL ENGINEERING

04/15 – 12/19

**POSTDOCTORAL RESEARCH FELLOW**, Supervised by Anna Huttenlocher  
UNIVERSITY OF WISCONSIN-MADISON  
DEPARTMENT OF MEDICAL MICROBIOLOGY AND IMMUNOLOGY

- Designed a model to investigate neutrophil response to infection *in vitro*
- Studying multicellular interactions in the infection model
- Studying neutrophil response to bacterial clinical isolates

09/09 – 04/15

**GRADUATE STUDENT RESEARCHER**, Supervised by Daniel A. Hammer  
UNIVERSITY OF PENNSYLVANIA  
DEPARTMENT OF BIOENGINEERING

- Developed a microcontact printing platform for studying macrophage migration
- Measured motility parameters of immortalized macrophages
- Measured force generation by immortalized and primary macrophages
- Determined the role of macrophage polarization on migration and force generation

05/06 – 05/09

**MERCK UNDERGRADUATE RESEARCH SCHOLAR**, Supervised by Sean Palecek  
UNIVERSITY OF WISCONSIN-MADISON  
DEPARTMENT OF CHEMICAL AND BIOLOGICAL ENGINEERING

- Developed FRET biosensor for protein binding between Cbl and Crkl

- Measure levels of epithelial specific proteins in differentiated embryonic stem cells

05/06-08/06 **INSTITUTES FOR DISCOVERY**, Supervised by James Thomson  
UNIVERSITY OF WISCONSIN-MADISON  
Assisted in general lab management

05/05-08/05 **ENGINEERING PHYSICS DEPARTMENT**, Supervised by Michael Litzgow  
UNIVERSITY OF WISCONSIN-MADISON  
Developed an eTEACH presentation to educate the public on stem cell biology

## HONORS AND AWARDS

2020 – 2023	Norviel Award
2015 – 2017	T32 Training Grant in Hematology
2010 – 2013	National Science Foundation Graduate Research Fellowship
2007	Merck Corporation Scholar for Undergraduate Research
2007	Kimberly Clark Corporation
2005 – 2009	Wisconsin Higher Education Aids Board

## PUBLICATIONS

1. McMinn PH, **Hind LE**, Huttenlocher A, Beebe DJ. “Neutrophil trafficking on-a-chip: an in vitro, organotypic model for investigating neutrophil priming, extravasation, and migration with spatiotemporal control,” *Lab Chip*, 2019 Nov 7;19(21):3697-3705.
2. Giese MA\*, **Hind LE\***, Huttenlocher A. “Neutrophil plasticity in the tumor microenvironment,” *Blood*, 2019 May 16;133(20):2159-2167. \*These authors contributed equally.
3. **Hind LE** and Huttenlocher A. “Neutrophil Reverse Migration and a Chemokinetic Resolution,” *Developmental Cell*, 2018 Nov 19; 47(4):404-405.
4. **Hind LE**, Ingram PN, Beebe DJ, Huttenlocher A. “Interaction with an endothelial lumen increases neutrophil lifetime and motility in response to *P. aeruginosa*,” *Blood*, 2018 Oct 25;132(17):1818-1828.
5. Ingram PN, **Hind LE**, Jiminez-Torres JA, Huttenlocher A, Beebe DJ. An Accessible Organotypic Microvessel Model using iPSC-Derived Endothelium. *Advanced Healthcare Materials*. 2018 Jan;7(2).
6. Powell D, Tausin S, **Hind LE**, Deng Q, Beebe DJ, Huttenlocher A. “Chemokine Signaling and the Regulation of Bidirectional Leukocyte Migration in Interstitial Tissues,” *Cell Reports*. 2017 May 23; 19(8): 1572-1585.
7. **Hind LE**, Lurier EB, Dembo M, Spiller KL, Hammer DA. “Effect of M1-M2 Polarization on the Motility and Traction Stresses of Primary Human Macrophages,” *Cellular and molecular bioengineering*. 2016 September; 9(3):455-465.
8. **Hind LE**, Vincent WJ, Huttenlocher A. “Leading from the Back: The Role of the Uropod in Neutrophil Polarization and Migration,” *Developmental Cell*. 2016 Jul 25;38(2):161-9.
9. Yamahashi Y\*, Cavnar PJ\*, **Hind LE\***, Berthier E, Bennin DA, Beebe D, Huttenlocher A. “Integrin associated proteins differentially regulate neutrophil polarity and directed migration in 2D and 3D,” *Biomedical Microdevices*. 2015 Oct;17(5):100. \*These authors contributed equally.
10. **Hind LE**, Dembo M, Hammer DA, “Macrophage motility is driven by frontal-towing with a force magnitude dependent on substrate stiffness,” *Integrative Biology*, 2015 Apr; 7(4):447-453.
11. **Hind LE**, MacKay JL, Cox D, Hammer, DA, “Two-dimensional motility of a macrophage cell line on microcontact-printed fibronectin,” *Cytoskeleton*, 2014 Sep; 71(9):542-554.
12. Kamat NP, Liao Z, **Moses LE**, Rawson J, Therien MJ, Dmoczowski IJ, Hammer DA, “Sensing membrane stress with near IR-emissive porphyrins,” *Proc Natl Acad Sci*, 2011 Aug 23; 108(34).
13. Metallo CM, Azarin SM, **Moses LE**, Ji L, de Pablo J, Palecek S, “Human embryonic stem cell-derived keratinocytes exhibit an epidermal transcription program and undergo epithelial morphogenesis in engineered tissue constructs,” *Tissue Engineering, Vol. A*, (2009).

## ORAL PRESENTATIONS

1. **Hind LE**, Keller N, Beebe DJ, Huttenlocher A. *The presence of an Endothelial Lumen Drives Fungal Germination and Neutrophil Migration in a Physiologically Relevant in vitro Model of Infection*. American Institute of Chemical Engineers Annual Meeting, Orlando, FL, 2019.
2. **Hind LE**. *A physiologically relevant in vitro model for studying the neutrophil response to infection*. Immunology Work in Progress Seminar, Madison, WI 2019.
3. **Hind LE**. *The Role of the Microenvironment in Directing Innate Immune Cell Motility*. Medical Microbiology and Immunology Seminar, Madison, WI, 2018.
4. **Hind LE**, Ingram PN, Beebe DJ, Huttenlocher A. *Heterotypic Interactions with an Endothelial Lumen Increase Neutrophil Lifetime and Motility to Pseudomonas Aeruginosa via IL6 Signaling*. American Institute of Chemical Engineers Annual Meeting, Pittsburgh, PA, 2018.
5. **Hind LE**, Ingram PN, Beebe DJ, Huttenlocher A. *Heterotypic Interactions with an Endothelial Lumen Increase Neutrophil Lifetime and Motility to Pseudomonas Aeruginosa via IL6 Signaling*. Biomedical Engineering Society Annual Meeting, Atlanta, GA, 2018.
6. **Hind LE**, Ingram PN, Beebe DJ, Huttenlocher A. *Engineering Infection: Discovering a Novel Role for Blood Vessels in Immune Cell Function*. UW-Madison Postdoc Symposium, Madison, WI, 2018.
7. **Hind LE**, Lurier EB, Dembo M, Spiller KL, Hammer DA. *M1-M2 Polarization Alters the Motility and Force Generation of Primary Human Macrophages*. Biomedical Engineering Society Annual Meeting, Tampa, FL, 2015.
8. **Hind LE**, Dembo M, Hammer DA. *Force Generation of Migrating Macrophages on Compliant Surfaces*. Directed Cell Gordon Research Seminar, Galveston, TX, 2015.
9. **Hind LE**, Dembo M, Hammer DA. *The Biochemical and Biophysical Mechanisms of Macrophage Migration*. Bioengineering Graduate Research Symposium, Philadelphia, PA, 2015.
10. **Hind LE**, Cox D, Hammer DA. *Macrophage Chemokinesis on Microcontact Printed Surfaces and Force Generation*. Biomedical Engineering Society Annual Meeting, Seattle, WA, 2013.

## POSTER PRESENTATIONS

1. **Hind LE**, Keller N, Beebe DJ, Huttenlocher A. *The presence of an Endothelial Lumen Drives Fungal Germination and Neutrophil Migration in a Physiologically Relevant in vitro Model of Infection*. Biomedical Engineering Society Annual Meeting, Philadelphia, PA, 2019.
2. **Hind LE**, Keller NJ, Beebe DJ, Huttenlocher A. *Interaction with an Endothelial Vessel Promotes Neutrophil Migration and Lifetime during Infection*. Directed Cell Migration Gordon Conference, Galveston, TX, 2019.
3. **Hind LE**, Ingram PN, Huttenlocher A, Beebe DJ. *The Role of Neutrophil-Endothelial Interactions in Neutrophil Extravasation and Migration using Organotypic Microvessels*. Biomedical Engineering Society Annual Meeting, Phoenix, AZ, 2017.
4. **Hind LE**, Bennin DA, Huttenlocher A. *PTP1B Plays an Important Role in Neutrophil Migration*. Directed Cell Migration Gordon Conference, Galveston, TX, 2017.
5. **Hind LE**, Bennin DA, Huttenlocher A. *Characterization of Human Stem Cell Derived Neutrophils*. Biomedical Engineering Society Annual Meeting, Minneapolis, MN, 2016.
6. **Hind LE**, Dembo M, Hammer DA. *Force Generation of Migrating Macrophages on Compliant Surfaces*. Directed Cell Migration Gordon Conference, Galveston, TX, 2015.
7. **Hind LE**, Dembo M, Hammer DA. *Traction Forces of Primary Human Macrophages on Compliant Surfaces*. Bioengineering Graduate Research Symposium, Philadelphia, PA, 2015.
8. **Hind LE**, Dembo M, Hammer DA. *Traction Forces of Primary Human Macrophages*. American Society for Cell Biology Annual Meeting, Philadelphia, PA, 2014.
9. **Hind LE**, Dembo M, Hammer DA. *Force Generation During Primary Human Macrophage Migration on Compliant Surfaces*. Biomedical Engineering Society Annual Meeting, San Antonio, TX, 2014.
10. **Hind LE**, Cox D, Hammer DA. *Macrophage Migration and the Roles of PI3K, WASp, and Cdc42*. Biophysical Society Meeting, Philadelphia, PA, 2013.

11. **Hind LE**, Cox D, Hammer DA. *Macrophage Chemokinesis on Microcontact Printed Fibronectin and the Roles of WASp, Cdc42, PI3K, and ROCK*. Directed Cell Migration Gordon Conference, Galveston, TX, 2013.

## **PROFESSIONAL DEVELOPMENT**

Research Mentor Training for Postdocs, University of Wisconsin-Madison, Madison, WI (2018)  
Research Ethics and Career Development, University of Wisconsin-Madison, Madison, WI (2016)  
NextProf Fall Engineering Workshop, University of Michigan, Ann Arbor, MI (2015)

## **STUDENTS AND RESEARCHERS MENTORED**

### **Graduate Students**

Christopher Calo, Chemical Engineering Graduate Student, University of Colorado-Boulder, (2020-present)  
Isaac Richardson, Chemical Engineering Graduate Student, University of Colorado-Boulder, (2020-present)  
Morgan Giese, Rotating Graduate Student, University of Wisconsin-Madison (Fall 2017)  
Lucas Klemm, Rotating Graduate Student, University of Wisconsin-Madison (Fall 2015)

### **Undergraduate Students**

David Luzzio, Undergraduate Student Researcher, University of Wisconsin-Madison (2016-2017)  
Amulya Surash, High School Researcher, University of Wisconsin-Madison (Summer 2016)  
Kelsey Murphy, Undergraduate Student Researcher, University of Wisconsin-Madison (2015-2016)  
Christina Hum, Undergraduate Student Researcher, University of Pennsylvania (2014-2015)  
Ava Mennin, High School Researcher, University of Pennsylvania (Summer 2014)  
Courtney Bender, Undergraduate Student Researcher, University of Pennsylvania (2012-2014)  
Sarah Nims, Undergraduate Student Researcher, University of Pennsylvania (2012-2014)  
Martha Wolnicki, High School Researcher, University of Pennsylvania (Summer 2013)  
Dhruv Pillai, High School Researcher, University of Pennsylvania (Summer 2012)  
Summer Academy in Science and Technology, Graduate Student Mentor, University of Pennsylvania (2010-2013)  
PennGEMS (Girls in Engineering, Math, and Science), Counselor, University of Pennsylvania (Summer 2011)  
PennGEMS (Girls in Engineering, Math, and Science), Instructor, University of Pennsylvania (Summer 2013 and 2014)