

# Michael L. Skowyra

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## CURRENT POSITION

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**Southwestern Medical Foundation Scholar in Biomedical Research** 2025 - present  
Assistant Professor of Biochemistry & Cell Biology  
University of Texas Southwestern Medical Center

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## EDUCATION

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**Harvard Medical School** 2020-2024  
Postdoc, Howard Hughes Medical Institute Fellow of the Helen Hay Whitney Foundation  
Research Focus: Protein import into peroxisomes

**Washington University in St. Louis** 2011 - 2018  
Ph.D., Molecular Cell Biology (with honors)  
Dissertation: Roles of ESCRT Machinery in Endosomal Repair and Recycling

**Saint Louis University** 2004 - 2008  
B.S., Biochemistry (*summa cum laude*)  
B.A., Biology (*summa cum laude*)

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## RESEARCH EXPERIENCE

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**Harvard Medical School** Boston, MA  
Postdoctoral Fellow (Advisor: Tom A. Rapoport, Ph.D.) 2018 - present  
Research focus: Protein import into peroxisomes

- Discovered that proteins are imported into peroxisomes by a selective phase [[link](#)]
- Defined the cycling mechanism of peroxisomal import receptors [[link](#)]
- Developed a cell-free system for studying peroxisomal protein import [[link](#)]
- Deciphered the import mechanism of peroxisomal proteins with an N-terminal signal [in press]

**Washington University School of Medicine in St. Louis** St. Louis, MO  
Graduate Student (Advisor: Phyllis I. Hanson, M.D., Ph.D.) 2011 - 2018  
Research focus: Membrane repair and remodeling by ESCRT proteins

- Discovered a membrane-repair pathway on endolysosomes mediated by ESCRT machinery [[link](#)]
- Helped reveal that ESCRT proteins restrict pathogen escape from phagosomes [[link](#)]
- Helped demonstrate how ESCRT proteins deform membranes [[link](#)]

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|--|---------------|
| <b>Washington University School of Medicine in St. Louis</b>   | St. Louis, MO |
| Research Assistant (Advisor: Tamara L. Doering, M.D., Ph.D.)   | 2009 - 2011   |
| Research focus: Biosynthesis of the polysaccharide capsule of the human pathogen <i>Cryptococcus</i>   |               |
| <ul style="list-style-type: none"> <li>• Implemented RNA interference to screen for capsule biosynthetic genes <a href="#">[link]</a></li> <li>• Helped identify a key transcriptional regulator of capsule biosynthesis <a href="#">[link]</a></li> <li>• Helped determine the location of an elusive sugar in a major capsule glycan <a href="#">[link]</a></li> </ul> |               |

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## RESEARCH SUPPORT

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|   |                |
|---|----------------|
| <b>Endowed Scholar in Medical Science</b>   | 2025 - present |
| UT Southwestern Medical Center  |                |
| <b>HHMI / Helen Hay Whitney Postdoctoral Research Fellowship</b>                            | 2020 - 2023    |
| Harvard Medical School  |                |
| Award no. F-1255  |                |
| <b>NIH Postdoctoral Ruth L. Kirschstein National Research Service Award (NRSA)</b>          | 2019           |
| National Institute of General Medical Sciences (NIGMS)                                      |                |
| Scored in the top 1% of applications, declined in favor of the Helen Hay Whitney Fellowship |                |
| <b>NIH Predoctoral Training Grant in Cellular and Molecular Biology</b>                     | 2011 - 2014    |
| National Institute of General Medical Sciences (NIGMS)                                      |                |
| Award nos. T32 GM007067-37, -38, -39  |                |

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## HONORS & AWARDS

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|---|----------------|
| <b>Southwestern Medical Foundation Scholar in Biomedical Research</b>   | 2025 - present |
| University of Texas Southwestern Medical Center   |                |
| <b>Porter Prize for Research Excellence</b>   | 2023           |
| The American Society for Cell Biology (ASCB)  |                |
| Bestowed on one or two postdoctoral researchers each year, in recognition of their contributions to the advancement of science and the novelty and creativity of their findings |                |
| <b>Spencer T. and Ann W. Olin Medical Science Fellow</b>  | 2019           |
| Washington University School of Medicine in St. Louis   |                |
| Bestowed on top 5% of graduating doctoral students, in recognition of outstanding achievements and potential for a research career  |                |
| <b>Boehringer Ingelheim Stiftung Speaker Award</b>  | 2017           |
| Gordon Research Conference on Molecular Membrane Biology  |                |
| In recognition of outstanding scientific achievement as a graduate student  |                |
| <b>Phi Beta Kappa</b>   | 2007           |
| Saint Louis University  |                |
| Honor bestowed on students of Junior standing who rank in the top 5% of the Senior class  |                |

## Dean's List

2004 - 2008

Saint Louis University

In recognition of a sustained grade-point average (GPA) above 3.7 and at least 12 hours of graded course work per semester

## Missouri Higher Education Academic "Bright Flight" Scholarship

2004 - 2008

Saint Louis University

Awarded to top 3% of high-school Seniors based on a score of 31 or higher on the ACT college-entrance exam, and maintained by a cumulative GPA above 2.5

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## PEER-REVIEWED PUBLICATIONS

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### Original Research Articles

[\[complete bibliography\]](#)

19. **Skowyra ML\*** and Rapoport TA. Import mechanism of peroxisomal proteins with an N-terminal signal sequence. *Nat. Cell Biol.* 2025 [in press]

(\*) Co-corresponding author

18. **Skowyra ML** and Rapoport TA. PEX5 translocation into and out of peroxisomes drives matrix protein import. *Mol Cell.* 2022, 82, 3209-3225.e7 [PMID [35931083](#)]

17. Gao Y\*, **Skowyra ML\***, Feng P, and Rapoport TA. Protein import into peroxisomes occurs through a nuclear pore-like phase. *Science.* 2022, 378, eadf3971 [PMID [36520918](#)]

(\*) Shared first authors

16. **Skowyra ML**, Schlesinger PH, Naismith TV, Hanson PI. Triggered recruitment of ESCRT machinery promotes endolysosomal repair. *Science.* 2018, 360, eaar5078 [PMID [29622626](#)]

Comment in: ESCRTs offer repair service. *Science*, 2018, 360, 33-34

15. Mittal E, **Skowyra ML**, Uwase G, Tinaztepe E, Mehra A, Köster S, Hanson PI, Philips JA. *Mycobacterium tuberculosis* Type VII secretion system effectors differentially impact the ESCRT endomembrane damage response. *mBio.* 2018, 9, e01765-18 [PMID [30482832](#)]

14. McCullough J, Clippinger AK, Talledge N, **Skowyra ML**, Saunders MG, Naismith TV, Colf LA, Afonine P, Arthur C, Sundquist WI, Hanson PI, Frost A. Structure and membrane remodeling activity of ESCRT-III helical polymers. *Science.* 2015, 350, 1548-1551 [PMID [26634441](#)]

13. Maier EJ, Haynes BC, Gish SR, Wang ZA, **Skowyra ML**, Marulli AL, Doering TL, Brent MR. Model-driven mapping of transcriptional networks reveals the circuitry and dynamics of virulence regulation. *Genome Res.* 2015, 25, 690-700 [PMID [25644834](#)]

12. Wang ZA, Griffith CL, **Skowyra ML**, Salinas N, Williams M, Maier EJ, Gish SR, Liu H, Brent MR, Doering TL. *Cryptococcus neoformans* dual GDP-mannose transporters and their role in biology and virulence. *Eukaryot Cell.* 2014, 13, 832-842 [PMID [24747214](#)]

11. Heiss C\*, **Skowyra ML\***, Liu H, Klutts JS, Wang Z, Williams M, Srikanta D, Beverley SM, Azadi P, Doering TL. Unusual galactofuranose modification of a capsule polysaccharide in the pathogenic yeast *Cryptococcus neoformans*. *J Biol Chem.* 2013, 288, 10994-11003 [PMID [23408430](#)]

(\*) Shared first authors

10. Wohlschlager T, Buser R, **Skowyra ML**, Haynes BC, Henrissat B, Doering TL, Künzler M, Aebi M. Identification of the galactosyltransferase of *Cryptococcus neoformans* involved in the biosynthesis of basidiomycete-type glycosylinositolphosphoceramide. *Glycobiol.* 2013, 23, 1210-1219 [PMID [23926231](#)]

9. Haynes BC, **Skowyra ML**, Gish S, Williams M, Held E, Marulli AL, Brent MR, Doering TL. Toward an integrated model of capsule regulation in *Cryptococcus neoformans*. *PLoS Pathog.* 2011, 7, e1002411 [PMID [22174677](#)]
8. Reilly MC, Aoki K, Wang ZA, **Skowyra ML**, Williams M, Tiemeyer M, Doering TL. A xylosylphosphotransferase of *Cryptococcus neoformans* acts in protein O-glycan synthesis. *J Biol Chem.* 2011, 286, 26888-26899 [PMID [21606487](#)]

## Protocols & Methods

7. **Skowyra ML** and Rapoport TA. Reconstituting protein translocation across the peroxisomal membrane using hydrogels. [in preparation]
6. **Skowyra ML** and Rapoport TA. Cell-free reconstitution of peroxisomal protein import using *Xenopus* egg extract. *STAR Protoc.* 2023, 4, 102111 [PMID [36853666](#)]
5. **Skowyra ML** and Doering TL. RNA interference in *Cryptococcus neoformans*. In Brand AC (ed), *Methods in Mol Biol, Host-Fungal Interactions*. Humana Press. 2012, 845, 165-186 [PMID [22328374](#)]

## Review Articles

4. **Skowyra ML** and Rapoport TA. Protein import into peroxisomes. *Annu Rev Biochem.* [invited review, in preparation]
3. **Skowyra ML**, Feng P, and Rapoport TA. Towards solving the mystery of peroxisomal matrix protein import. *Trends Cell Biol.* 2023, S0962-8924(23)00169-1 [PMID [37743160](#)]
2. Feng P, **Skowyra ML**, and Rapoport TA. Structure and function of the peroxisomal ubiquitin ligase complex. *Biochem Soc Trans.* 2022, 50, 1921-1930 [PMID [36421406](#)]
1. Kumar P, Yang M, Haynes BC, **Skowyra ML**, Doering TL. Emerging themes in cryptococcal capsule synthesis. *Curr Opin Struct Biol.* 2011, 21, 597-602 [PMID [21889889](#)]

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## MEETINGS & CONFERENCES

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### Oral Presentations

10. **EMBO Workshop on Protein Translocation.** Sant Feliu de Guixols, Spain. [TBD] 2026. Protein import into peroxisomes.
  - Invited speaker
9. **Gordon Research Conference on Molecular Membrane Biology.** Andover, NH. July 13-18, 2025. Import mechanism of peroxisomal proteins with an N-terminal signal sequence.
8. **9th Open European Peroxisome Meeting (OEPM).** Sant Feliu de Guixols, Spain. September 26-28, 2024. Mechanism of PEX7-mediated protein import into peroxisomes.
  - Award for best oral presentation
7. **Annual Meeting of the American Society for Cell Biology (ASCB).** Boston, MA. December 2-6, 2023. Peroxisomes import proteins by a nuclear pore-like mechanism.
  - Porter Prize recipient
6. **Annual Fellows Meeting of the Helen Hay Whitney Foundation.** Dedham, MA. November 4-6, 2022. Peroxisomes import folded proteins by a nuclear pore-like mechanism.
5. **8th Open European Peroxisome Meeting (OEPM).** Aveiro, Portugal. September 22-24, 2022. Peroxisomes import folded proteins via a nuclear pore-like phase.

4. **Annual Retreat of the Department of Cell Biology & Physiology at Washington University School of Medicine in St. Louis.** New Haven, MO. May 10-11, 2018. Triggered recruitment of ESCRT machinery promotes endolysosomal repair.
  - Award for best oral presentation
3. **41st Annual James L. O’Leary Prizes for Research in Neuroscience.** Washington University School of Medicine in St. Louis, St. Louis, MO. March 6, 2018. Triggered recruitment of ESCRT machinery promotes endolysosomal repair.
2. **Gordon Research Conference on Molecular Membrane Biology.** Andover, NH. July 16-21, 2017. Triggered recruitment of ESCRT machinery facilitates endolysosomal membrane repair.
  - Boehringer Ingelheim Stiftung Speaker Award recipient
1. **Annual Retreat of the Molecular Cell Biology Program at Washington University in St. Louis.** Potosi, MO. October 18-19, 2017. Triggered recruitment of ESCRT machinery promotes endolysosomal repair.

## Poster Presentations

12. **Gordon Research Conference on Molecular Membrane Biology.** Andover, NH. July 13-18, 2025. Import mechanism of peroxisomal proteins with an N-terminal signal sequence.
11. **Gordon Research Seminar on Molecular Membrane Biology.** Andover, NH. July 12-13, 2025. Import mechanism of peroxisomal proteins with an N-terminal signal sequence.
10. **2024 National Postdoctoral Association (NPA) Annual Conference.** Seattle, WA. March 15-16, 2024. Grassroots initiatives for postdoc engagement and career development at Harvard Medical School.
9. **Annual Meeting of the American Society for Cell Biology (ASCB).** Boston, MA. December 2-6, 2023. Peroxisomes import proteins by a nuclear pore-like mechanism.
  - Porter Prize recipient
8. **Annual Retreat of the Department of Cell Biology at Harvard Medical School.** North Falmouth, MA. October 10-11, 2024. Peroxisomes import proteins by a nuclear pore-like mechanism.
7. **Gordon Research Conference and Seminar on Molecular Membrane Biology.** Andover, NH. July 16-21, 2023. Peroxisomes import proteins by a nuclear pore-like mechanism.
  - Award for best poster presentation
6. **EMBO Workshop on New Challenges in Protein Translocation Across Membranes.** Sant Feliu de Guixols, Spain. 17-21 September, 2022. Peroxisomes import folded proteins via a nuclear pore-like phase.
5. **Annual Retreat of the Department of Cell Biology at Harvard Medical School.** North Falmouth, MA. October 15-16, 2019. Protein translocation into peroxisomes: mechanism and regulation.
4. **23rd Annual Graduate Research Symposium.** Washington University in St. Louis, St. Louis, MO. March 20, 2018. Triggered recruitment of ESCRT machinery promotes endolysosomal repair.
3. **Gordon Research Conference and Seminar on Molecular Membrane Biology.** Andover, NH. July 16-21, 2017. Triggered recruitment of ESCRT machinery facilitates endolysosomal membrane repair.
2. **8th International Conference on *Cryptococcus* and Cryptococcosis.** Charleston, SC. May 1-5, 2011. Galactofuranose modification of a capsule polysaccharide.

1. **Sigma Xi Graduate-Undergraduate Research Symposium.** Saint Louis University, St. Louis, MO. February 27, 2008. Chemical genetics strategy for characterizing the function of proteasomal ATPases.
  - Award for best poster presentation

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## INVITED SEMINARS

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4. **Sloan Kettering Institute.** Department of Cell Biology, New York, NY. May 13, 2024. Protein import into peroxisomes: a longstanding mystery.
3. **National Institutes of Health (NIH).** SCBA Membrane Trafficking Virtual Seminar Series, April 19, 2024. Protein import into peroxisomes: a longstanding mystery.
2. **University of Texas Southwestern Medical Center.** Department of Biochemistry, Dallas, TX. February 26, 2024. Protein import into peroxisomes: a longstanding mystery.
1. **Stanford University.** Department of Biochemistry, Palo Alto, CA. February 8, 2024. Protein import into peroxisomes: a longstanding mystery.

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## MENTORING EXPERIENCE

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### Harvard Medical School

Jeremy Bennett

January 2024 - March 2024

Graduate student (Harvard Medical School)

Rotation project: Recycling mechanism of PEX7.

Kirsten Tomas

Summer 2022

Undergraduate student (University of California, Berkeley)

Internship project: Import of specific cargoes into peroxisomes in yeast

Yuliia Motrenko

Fall 2020 - Spring 2021

Undergraduate student (Taras Shevchenko National University of Kiev, Ukraine)

Thesis project: Ubiquitin-mediated recycling of peroxisomal import receptors in *Xenopus* egg extract

### Washington University School of Medicine in St. Louis

Dr. Monica Montero-Lomeli, Ph.D.

Summer 2010

Visiting professor (Universidade Federal do Rio de Janeiro, Brazil)

Provided instruction in disrupting metabolic genes in the pathogenic yeast *Cryptococcus*

Cassandra Andrade

Summer 2009

Latine undergraduate student (University of Arizona)

Internship project: Characterizing virulence genes in *Cryptococcus* using RNA interference

Presented at the 2009 Annual Biomedical Research Conference for Minoritized Scientists

Alyssa Marulli, Elizabeth Held, Stav Dor, and Tianhua Zhou

2009 - 2011

Undergraduate students (Washington University in St. Louis)

Provided instruction in RNA interference and targeted gene disruption in *Cryptococcus*

|   |             |
|---|-------------|
| Brian C. Haynes   | 2009 - 2011 |
| Graduate student (Washington University in St. Louis)                             |             |
| Provided training in molecular biology, microbiology, and biochemistry techniques |             |

### **Saint Louis University**

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| Caroline Shaughnessy   | Summer 2008 |
| High-school student (St. Joseph High School, St. Louis, MO)        |             |
| Provided instruction in molecular cloning and protein purification |             |

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## **TEACHING EXPERIENCE**

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### **Washington University in St. Louis**

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|---|-----------|
| Teaching Assistant, Laboratory on DNA Manipulation (BIO 437)  | Fall 2012 |
| <ul style="list-style-type: none"><li>• Supervised an undergraduate-level teaching laboratory (12 students, 6 h per week)</li><li>• Provided instruction in molecular cloning and production of recombinant proteins</li><li>• Devised and graded exam questions and problem sets, graded lab reports</li></ul> |           |

#### Mentored Teaching Experience (MTE) workshops

|  |                   |
|--|-------------------|
| • Attended a workshop on teaching a laboratory subsection              | November 1, 2012  |
| • Attended a workshop on teaching a discussion subsection              | October 4, 2012   |
| • Attended a workshop on responding to students' concerns about grades | November 21, 2011 |

### **Saint Louis University**

|   |             |
|---|-------------|
| Teaching Assistant, Organic Chemistry 2 Laboratory (CHEM 345)   | Spring 2007 |
| <ul style="list-style-type: none"><li>• Supervised an undergraduate-level teaching laboratory (20 students, 3 hours per week)</li><li>• Delivered pre-lab lectures and instruction in organic chemistry techniques</li><li>• Hosted weekly help sessions, proctored exams, and graded lab reports</li></ul> |             |

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## **LEADERSHIP AND SERVICE**

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### **UT Southwestern Medical Center**

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|-------------------------------------|-------------|
| Qualifying exam committee member    |             |
| • Cory Dottor (Biochemistry)        | Spring 2025 |
| • Mitchell Patterson (Biochemistry) | Spring 2025 |
| • Tucker Burnett (Biochemistry)     | Spring 2025 |

### **Harvard Medical School**

|   |             |
|---|-------------|
| Associate Faculty Member at Faculty Opinions                                      | 2022 - 2025 |
| Evaluated research articles for the scientific community [ <a href="#">link</a> ] |             |

|  |             |
|--|-------------|
| IACUC Liaison for the Rapoport Lab                                     | 2022 - 2025 |
| Ensured compliance with animal care and use protocols (frogs and mice) |             |

|  |             |
|--|-------------|
| Volunteer, Amphibian / Aquatics Facility                                     | 2019 - 2025 |
| Performed weekend check-ups and helped monitor the health of the frog colony |             |

## **Harvard Medical Postdoc Association (HMPA)**

|  |             |
|--|-------------|
| Chair  | 2023 - 2025 |
| <ul style="list-style-type: none"><li>• Represented all postdocs (5000+) at Harvard Medical School and affiliates</li><li>• Led 15 postdoc volunteers in organizing outreach, career development, and other events</li><li>• Advocated for improved benefits and immigration advice for international postdocs</li></ul> |             |
| Vice-Chair   | 2022 - 2023 |
| <ul style="list-style-type: none"><li>• Advocated for more equitable postdoctoral compensation</li><li>• Cooperated with local postdoctoral associations to organize social and networking events</li></ul>  |             |
| Treasurer  | 2020 - 2022 |
| <ul style="list-style-type: none"><li>• Managed the association's budget and expenses</li></ul>  |             |
| Secretary  | 2019 - 2020 |
| <ul style="list-style-type: none"><li>• Recorded board-meeting minutes and maintained member roster</li></ul>  |             |

## **Washington University School of Medicine in St. Louis**

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|---|-------------------|
| Molecular Cell Biology Program Annual Retreat                                   | October 3-4, 2014 |
| Helped organize the retreat, coordinated presentations, and introduced speakers |                   |

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## **OUTREACH**

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### **Harvard Medical School**

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| Research Assistant Association (RAA)  |                          |
| <ul style="list-style-type: none"><li>• Poster judge, Second Annual Research Assistant Symposium (Boston, MA)</li></ul>             | April 22, 2024           |
| Office for Equity, Diversity, Inclusion, and Belonging (EDIB)   |                          |
| <ul style="list-style-type: none"><li>• Reviewed grant applications for the Harvard Culture Lab Innovation Fund</li></ul>           | April 2024               |
| 23rd Annual New England Science Symposium (NESS)  |                          |
| <ul style="list-style-type: none"><li>• Participated in a postdoc info panel for senior graduate students</li></ul>                 | March 23, 2024           |
| Office of Diversity Inclusion and Community Partnership (DICP)  |                          |
| <ul style="list-style-type: none"><li>• Volunteer, Biomedical Science Careers Student Conference (Boston, MA)</li></ul>             | March 31 - April 1, 2023 |
| First-Gen Initiative  |                          |
| <ul style="list-style-type: none"><li>• Helped host the inaugural event of this focus group for first-generation postdocs</li></ul> | October 12, 2023         |
| Office for Postdoctoral Fellows (OPF)   |                          |
| <ul style="list-style-type: none"><li>• Helped organize social and outreach events for postdocs</li></ul>                           | 2019 - present           |

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## **PROFESSIONAL MEMBERSHIPS**

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| American Society for Cell Biology (ASCB)   | 2023 - present |
| National Postdoctoral Association (NPA)    | 2020 - 2025    |
| Harvard Medical Postdoc Association (HMPA) | 2019 - 2025    |

Phi Beta Kappa 2007 - present

Golden Key Honor Society 2006 - present

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## CAREER DEVELOPMENT

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### Harvard Medical School

Leadership and Management Skills March 1, 2024

- Workshop on effective leadership and communication strategies

Responsible Conduct of Research (RCR) 2019 - 2023

- Eight workshops on biomedical research integrity, ethics, and diversity / inclusion, in compliance with recent NIH guidelines (NOT-OD-22-055)

Quantitative imaging: from acquisition to analysis lecture series 2019 - 2021

- Multi-part workshop on light microscopy and digital image analysis, hosted by the Nikon Imaging Center (NIC) at Harvard Medical School

Microscope purchase discussion group January 25, 2019

- Workshop on acquiring and setting up a fluorescence microscope, hosted by the Nikon Imaging Center (NIC) at Harvard Medical School

### Washington University in St. Louis

Communicating science with lay audiences workshop January 11, 2018

8 ways to successfully navigate NIH peer review and get a fellowship grant workshop November 2, 2016

Evidence-based entrepreneurship workshop series 2016

- Participated in all 6 sessions on biomedical entrepreneurship and business strategies, hosted by the Skandalaris Center for Interdisciplinary Innovation and Entrepreneurship

Ethics and Research Science 2013

- Completed a graduate-level course on biomedical research integrity and ethics