

Jaina Wollowitz

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SUMMARY

Industrious PhD Candidate in the Tri-Institutional Ph.D. Program in Chemical Biology, working in Daniel Heller's lab at Memorial Sloan Kettering Cancer Center. Currently developing novel disease diagnostic platforms featuring chemically modified carbon nanotubes combined with machine learning algorithms. Graduate of Wesleyan University with a Bachelor of Arts in Chemistry and Molecular Biology & Biochemistry and a certificate in Biophysics. Undergraduate research experience in organic and computational chemistry studying reaction mechanisms and energetics. Additional prior experience as a research assistant at the Tisch MS Research Center of NY, investigating the mechanism of action of a stem cell therapy treatment for progressive MS.

EDUCATION

Weill Cornell Medical College, New York, NY July 2022 — Present
Tri-Institutional Ph.D. Program in Chemical Biology
Mentor: Daniel Heller, Memorial Sloan Kettering Cancer Center

Wesleyan University, Middletown, CT September 2016 — May 2020
Bachelor of Arts, Majors: Chemistry and Molecular Biology & Biochemistry; Certificate: Biophysics
GPA: 3.90/4.00
Senior Thesis in Chemistry (High Honors): *A Computational Investigation of the Initiation Mechanisms of Thiol-Vinyl Sulfone Reactions.*

RESEARCH EXPERIENCE

Graduate Student Researcher June 2023 — Present
Memorial Sloan Kettering Cancer Center, New York, NY
Advisor: Daniel A. Heller, PhD

- Synthesize and characterize carbon nanotube-based nanosensors for use in molecular perception nanosensor arrays to detect and predict disease from liquid biopsy.
- Chemically tune carbon nanotubes to enhance sensor chemical diversity using various methods of nanotube functionalization.
- Develop and apply machine learning models that analyze spectrometric data collected from molecular perception nanosensor arrays to differentiate between different disease classes.
- Generate and test novel sensors for live cell measurements of intracellular environmental changes including pH, lipid accumulation, and redox state alterations.
- Mentored students across a range of experience levels in conducting experiments with carbon nanotubes.

Research Assistant June 2020 — May 2022
Tisch MS Research Center of NY, New York, NY
Advisor: Violaine K. Harris, PhD

- Cultured and examined the gene expression and proliferative properties of mesenchymal stem cell-derived neural progenitors (MSC-NPs), which are currently being used to treat progressive multiple sclerosis (MS) patients in a Phase II clinical trial at Tisch MS.
- Established biomarkers of MS progression and improvement by assessing protein expression in patient cerebrospinal fluid, serum, and plasma at different timepoints of MSC-NP treatment.

- Investigated the mechanisms by which MSC-NPs influence cellular responses to inflammation in the central nervous system through in vitro co-culture experiments with microglia and astrocytes derived from MS patient induced pluripotent stem cells.
- Generated and isolated exosomes secreted by MSC-NPs to identify factors that promote repair in multiple sclerosis.
- Trained incoming research assistants, summer interns, and outside collaborators how to culture primary MSC-NPs and iPSC-derived astrocytes and microglia.

Research Assistant

January 2018 — May 2020

Wesleyan University, *Middletown, CT*

Department of Chemistry, Advisor: Brian H. Northrop, PhD

- Applied computational methods with Gaussian software to examine the mechanisms and energetics of thiol-Michael reactions, which can be used to synthesize complex polymers with applications in small molecule drug delivery.
- Located and characterized hundreds of stationary points (minima and transition states) along competing reaction pathways to verify chemical mechanisms to establish which are most favored to occur.
- Combined findings of synthetic and computational modeling experiments to optimize reaction protocols and hypothesize new pathways to be explored.
- Designed computational models of pericyclic reactions to create new pedagogical resources.

TEACHING EXPERIENCE

Teaching Assistant, Pharmacology I: Chemical Biology

August 2023 — October 2023

Weill Cornell Medical College, *New York, NY*

- Directed twice-weekly recitation sessions to enhance students' comprehension of course concepts.
- Provided one-on-one support for students struggling with course material.

Teaching Assistant, Organic Chemistry I & II

September 2018 — May 2020

Wesleyan University, *Middletown, CT*

- Hosted weekly organic chemistry recitation sessions to help students obtain a deeper understanding of course material.
- Strategized new methods for explaining course content to improve student comprehension.
- Began head TA position September 2019.

Teaching Assistant, Biochemistry

September 2019 — December 2019

Wesleyan University, *Middletown, CT*

- Led weekly biochemistry discussion sessions to aid in student comprehension of course information.
- Generated course materials including discussion session problems and exam answer keys.
- Held office hours and provided mentorship to students enrolled in the class.

Peer Tutor, Principles of Biology

September 2017 — December 2017

Wesleyan University, *Middletown, CT*

- Met with students individually and in groups to answer questions and review class information.
- Helped students master course material and develop effective studying techniques.

VOLUNTEERING & OUTREACH EXPERIENCE

Co-chair, Tri-Institutional Outreach Committee

December 2022 — Present

Weill Cornell Medical College, *New York, NY*

- Coordinator of the Tri-Institutional Mentorship Initiative, which provides prospective graduate students with a graduate student mentor to demystify the graduate school application process.
- Organizer and presenter for the Tri-Institutional Outreach Fair, which informs members of the Tri-I of science outreach opportunities within the Tri-I and the greater NYC area.

Chair, TPCB Student Organizing Committee December 2022 — Present

Tri-Institutional PhD Program in Chemical Biology, *New York, NY*

- Coordinated recruitment of prospective graduate students to the TPCB program by acting as a liaison between the program administrators, other committee members, and recruits.
- Selected by program leadership as the committee Chair in December 2023.

Track Scientist, RockEDU May 2023 — Present

Rockefeller University, *New York, NY*

- Mentored high school and early college students in a laboratory and demonstrated cell culture techniques.
- Advised students on how to plan and carry out independent research related to stem cell biology.
- Gave instructional guest lecture to students on the applications of stem cells in biomedical research.

Visiting Scientist March 2023 & 2024

Math, Engineering, and Science Academy, *Brooklyn, NY*

- Introduced high school students from primarily underrepresented in STEM backgrounds to the basics of nanoscience research.
- Led students through hands-on activity to explore the properties of nanoparticles.
- Advised students and provided informative resources for applying to college and summer research opportunities.

Coordinator, Laboratory Visits August 2023

Memorial Sloan Kettering & Rockefeller University, *New York, NY*

- Arranged a panel of graduate students to visit Genspace, a community biology lab in Brooklyn, NY, to meet with high school students from primarily underrepresented in STEM backgrounds to answer their questions about possible career paths in STEM.
- Organized visit of 25 high school students and chaperones to laboratories in Rockefeller University and Memorial Sloan Kettering.

Mentor, Tri-Institutional Mentorship Initiative August 2022 — January 2023

Weill Cornell Medical College, *New York, NY*

- Advised prospective graduate student on how to enhance their graduate school applications.
- Conducted mock interviews and reviewed application materials.

PUBLICATIONS

- Harris, V. K., Stark, J., Williams, A., Roche, M., Malin, M., Kumar, A., Carlson, A. L., Kizilbash, C., **Wollowitz, J.**, Andy, C., Gerber, L. M., & Sadiq, S. A. (2024). *Efficacy of intrathecal mesenchymal stem cell-neural progenitor therapy in progressive MS: results from a phase II, randomized, placebo-controlled clinical trial*. *Stem Cell Research and Therapy*, 15(1).
- Harris, V. K., **Wollowitz, J.**, Greenwald, J., Carlson, A. L., & Sadiq, S. A. (2023). *Mesenchymal stem cell-neural progenitors are enriched in cell signaling molecules implicated in their therapeutic effect in multiple sclerosis*. *PLoS ONE*, 18(8 August).
- Kim, M., Chen, C., Yaari, Z., Frederiksen, R., Randall, E., **Wollowitz, J.**, Cupo, C., Wu, X., Shah, J., Worroll, D., Lagenbacher, R. E., Goerzen, D., Li, Y. M., An, H., Wang, Y. H., & Heller, D. A. (2023).

Nanosensor-based monitoring of autophagy-associated lysosomal acidification in vivo. Nature Chemical Biology, 19(12), 1448–1457.

- Harris, V. K., Bishop, D., **Wollowitz, J.**, Carling, G., Carlson, A. L., Daviaud, N., & Sadiq, S. A. (2023). *Mesenchymal stem cell-derived neural progenitors attenuate proinflammatory microglial activation via paracrine mechanisms.* Regenerative Medicine, 18(3), 259–273.
- Mattheisen, J. M., **Wollowitz, J.**, Huber, T., & Sakmar, T. P. (2023). *Genetic code expansion to enable site-specific bioorthogonal labeling of functional G protein-coupled receptors in live cells.* Protein Science, 32(2).

POSTER PRESENTATIONS

- **Wollowitz, J.**; Goerzen, D; Kim, M; Heller, D. “*Assessment of Biomolecule-Carbon Nanotube Interactions in Machine Perception Nanosensor Arrays.*” Poster presented at: 245th ECS Meeting; May 2024; San Francisco, CA. **Received 2nd Place Poster Award.**
- **Wollowitz, J.**; Goerzen, D; Kim, M; Heller, D. “*Biomarker-Agnostic Nanosensors as Liquid Biopsy Diagnostic Tools.*” Poster presented at: 19th Annual Tri-Institutional Chemical Biology Symposium; September 2023; New York, NY.
- **Wollowitz, J.**; Harris, V; Sadiq, S. “*Mesenchymal stem cell-neural progenitors are enriched for cell signaling molecules implicated in their therapeutic effect in multiple sclerosis.*” Poster presented at: International Society for Stem Cell Research (ISSCR) Annual Meeting; June 2021; Virtual.
- **Wollowitz, J.**; Northrop, B. “*A Computational Investigation of the Mechanisms of Thiol-Vinylsulfone Reactions.*” Poster presented at: Wesleyan University Summer Research Poster Session; July 2019; Middletown, CT.
- **Wollowitz, J.**; Northrop, B. “*A Computational, Energetic Analysis of the Roles of Initiators in Thiol-Vinylsulfone Reactions.*” Poster presented at: Wesleyan University Summer Research Poster Session; July 2018; Middletown, CT.

AWARDS AND HONORS

Phi Beta Kappa, Wesleyan University April 2020
- National academic honor society, limited to the top 12% of each graduating class; by department nomination only.

Wallace C. Pringle Prize for Research in Chemistry, Wesleyan University April 2020
- Gift of Eleanor and Wallace Pringle and their family and friends. This prize is awarded annually by the Chemistry Department to a student for excellence in research.

Hawk Prize, Wesleyan University April 2020
- The gift of Philip B. Hawk, Class of 1898, as a memorial to his wife, Gladys. Awarded by the MB&B Department to the students who have done the most effective work in biochemistry.

ACS Award in Organic Chemistry, Wesleyan University April 2020
- Awarded by the Chemistry Department to a student who has displayed a significant aptitude for organic chemistry

Dean’s List, Wesleyan University Spring 2017 — Spring 2020
- Awarded for earning a semester GPA of 3.8 or above.

Wesleyan Summer Research Fellowship, Wesleyan University

Summer 2019

- Provides research stipend for undergraduate students to perform unique and individualized research throughout the summer. Fellowship concludes with poster presentations at the summer symposium.

SKILLS

Laboratory: Carbon nanotube purification and functionalization, Near-Infrared spectroscopy, Hyperspectral imaging, Cell culture, Flow cytometry, qPCR, ELISA, Bio-Plex, Western blotting, qNano TRPS, Protein purification and characterization, NMR, Organic synthesis.

Computer: Machine Learning, Gaussian 09 & 16, Python, Adobe Photoshop, Adobe Illustrator.

REFERENCES

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