AMANDA L. SMYTHERS

Postdoctoral Fellow

Dana Farber Cancer Institute | Cancer Biology
Harvard Medical School | Cell Biology
Amanda_Smythers@DFCI.Harvard.edu

Education

University of North Carolina at Chapel Hill — Chapel Hill, NC
Ph.D. Analytical Chemistry — May 2023

Marshall University — Huntington, WV
M.S. Chemistry — May 2019
B.S. Biochemistry — May 2017

Experience

Postdoctoral Fellow — July 2023 – Present
Dept. of Cancer Biology, Dana-Farber Cancer Institute
PI: Bruce Spiegelman
co-PI: Edward Chouchani
Dept. of Cell Biology, Harvard Medical School
co-PI: Steven Gygi

Visiting Scholar — Jan. – June, 2023
Dept. of Chemistry, University of North Carolina at Chapel Hill
PI: Marcey Waters

Research Assistant — Aug. 2019 – Dec. 2022
Dept. of Chemistry, University of North Carolina at Chapel Hill
PI: Leslie Hicks

Research Assistant — Jan. 2015 – July 2019
Dept. of Chemistry, Marshall University
PI: Derrick Kolling

Funding

Dana-Farber Trustee Science Committee Fellowship ($450K)	2025 – 2028
T32 Training Program in Cardiovascular Research (trainee) ($130K)	2024 – 2026
NC Space Grant Graduate Research Fellow ($30K)	2020 – 2023
Ford Foundation Predoctoral Fellowship ($81K)	2021 – 2023
Eastman Chemical Fellowship in Analytical Chemistry & Polymer Characterization ($8K)	2021
NASA WV Space Consortium Graduate Fellow ($24K)	2020 – 2021
NASA WV Space Consortium Undergraduate Fellow ($2K)	2016, 2017

Publications

ORCID: 0000-0002-1552-6705 | *denotes equal contributors

23. Sprenger, H; Mittenbühler, M; Sun, Y; Vranken, J; Schindler, S; Jayaraj, A; Khetarpal, S; **Smythers, A**; Vargas-Castillo, A; Puszynska, A; Spinelli, J; Armani, A; Kunchok, T; Ryback, B; Seo, H; Song, K; Sebastian, L; O'Young, C; Braithwaite, C; Dhe-Paganon, S; Burger, N; Mills, E; Gygi, S; Paulo, J; Arthanari, H; Chouchani, E; Sabatini, D; Spiegelman, B. Ergothioneine controls mitochondrial function and exercise performance via direct activation of MPST. *Cell Metabolism*. **2025**, 37(4):857-869.e9. doi: 10.1016/j.cmet.2025.01.024

22. Burger, N; Mittenbühler, M; Xiao, H; Shin, S; Wei, S; Henze, E; Schindler, S; Mehravar, S; Petrocelli, J; Sun, Y; Sprenger, H; **Smythers, A**; Bozi, L; Darabedian, N; Latorre-Muro, P; Zhu, Y; Seo, H; Dhe-Paganon, S; Che, J; Chouchani, E. A landscape of the zinc binding human cysteine proteome. *Cell.* **2024**, 188(3):832-850. doi: 10.1016/j.cell.2024.11.025

21. Mittenbühler, M; **Smythers, A**; Spiegelman, B. Proteomic profiling of extracellular fluids to identify secreted proteins from muscle and fat tissues. *Methods in Cell Biology*. **2024**, doi: 10.1016/bs.mcb.2024.08.004

20. Vargas-Castillo, A; Sun, Y; **Smythers, A**; Grauvogel, L; Dumesic, P; Emont, M; Tsai, L; Rosen, E; Shaffer, S; Ordonez, M; Chouchani, E; Gygi, S; Wang, T; Wolfrum, C; Spiegelman, B. Development of a Functional Beige Fat Cell Line: Evidence for Independent Subclasses of Cells Expressing UCP1 and the Futile Creatine Cycle. *Cell Metabolism*. **2024**, 36(9):2146-2155.e5. doi: 10.1016/j.cmet.2024.07.002

19. Flinn, B; O'Dell, H; Joseph, K; **Smythers, A**; Neff, D; Hicks, L; Norton, M; Kolling, D. Fluorescence Shadow Imaging of *Hypsibius exemplaris* Reveals Morphological Differences Between Sucrose- and $CaCl_2$-Induced Osmobiotes. *Scientific Reports*. **2024**, 14(1):11845. doi: 10.1038/s41598-024-61374-y

18. **Smythers, A**; Joseph, K; O'Dell, H; Clark, T; Crislip, J; Flinn, B; Daughtridge, M; Stair, E; Mubarek, S; Lewis, H; Salas, A; Hnilica, M; Kolling, D; Hicks. L. Chemobiosis reveals tardigrade run formation is dependent on reversible cysteine oxidation. *PLOS One*. **2024**, 19(1), e0295062. doi: 10.1371/journal.pone.0295062

17. Eskew, N; **Smythers, A**; Hutson, B. Research and Service Learning in a Garden of Chemistry. *J. Chem. Ed.* **2023**, 100(11), 4395 – 4405. doi: 0.1021/acs.jchemed.3c00246

16. **Smythers, A**; Crislip, J; Slone, D; Flinn, B; Chaffins, J; Camp, K; McFeeley, E; Kolling, D. Excess manganese increases photosynthetic activity via enhanced reducing center and antenna plasticity in *Chlorella vulgaris*. *Scientific Reports*. **2023**, 13(11301). doi: 10.1038/s41598-023-35895-x

15. Quiñones, R; Moreno, S; **Smythers, A**; Sullins, C; Pijor, H; Brown, G; Trouten, A; Richards-Waugh, L; Siddig, A. Quantification of Cannabis in infused consumer products and their residues on skin. *ACS Pharmacology & Translational Science*. **2022**, 5(8):642-651. doi: 10.1021/acsptsci.2c00077

14. **Smythers, A**; Bhatnagar, N; Ha, C; Majumdar, P; McConnell, E; Mohanasundaram, B; Hicks, L; Pandey, S. Abscisic acid controlled redox proteome of *Arabidopsis* and its regulation by heterotrimeric Gβ protein. *New Phytologist.* **2022,** 236(2):447-463. doi: 10.1111/nph.18348

13. Couso, I; **Smythers, A;** Ford, M; Umen, J; Crespo, J; Hicks, L. Inositol polyphosphates and target of rapamycin kinase signaling govern photosystem II protein phosphorylation and photosynthetic function under light stress in *Chlamydomonas*. *New Phytologist.* **2021,** 232(5), 2011-25**.** doi: 10.1111/nph.17741

12. **Smythers, A*;** Iannetta, A*; Hicks, L. Crosslinking mass spectrometry unveils novel interactions and structural distinctions in the model green alga *Chlamydomonas reinhardtii*. *Molecular Omics*. **2021**, 6(17), 917-928. doi: 10.1039/d1mo00197c

11. Sun, X; Kolling, D; **Smythers, A**; Deal, R. Investigations of the Photochemical Charge-Transfer Reduction of Uranyl UO_2^{2+}(VI) to Uranyl UO_2^{+}(V) by Benzene-1,4-diol [1,4-$C_6H_4(OH)_2$] and Oxalate ($C_2O_4^{2-}$) by UV-Vis, Electron Paramagnetic Resonance, and Fluorescence Spectroscopies. *Inorganica Chimica Acta*. **2021**, 525.

doi: 10.1016/j.ica.2021.120451

10. **Smythers, A;** Ford, M; Hawkins, D; Connor; Lawrence, K; Stanton, C; Gayton, A; Hicks, L. Modernizing the analytical laboratory: the design and implementation of a modular protein-centered course. *J. Chem. Educ*. **2021,** 98(5)**.** doi: 10.1021/acs.jchemed.0c01269

9. **Smythers, A;** Hicks, L. Mapping the plant proteome: tools for surveying coordinating pathways. *Emerging Topics in Life Sciences.* **2021,** ETLS2020027. doi: 10.1042/ETLS20200270

8. **Smythers, A;** McConnell, E; Lewis, H; Mubarek, S; Hicks, L. Photosynthetic Metabolism and Nitrogen Reshuffling Are Regulated by Reversible Cysteine Thiol Oxidation Following Nitrogen Deprivation in Chlamydomonas. *Plants*. **2020**, 9(6), 784. doi:10.3390/plants9060784

7. McConnell, E; **Smythers, A**; Hicks, L. Maleimide-Based Chemical Proteomics for Quantitative Analysis of Cysteine Reactivity. *Journal of the American Society of Mass Spectrometry*. **2020**, 31(8), 1697 – 1705. doi:10.1021/jasms.0c00116

6. Parsley, N; **Smythers, A**; Hicks, L. Implementation of microfluidics for antimicrobial susceptibility assays: issues and optimization requirements. *Frontiers in Cellular and Infection Microbiology.* **2020**, 10, 547177. doi: 10.3389/fcimb.2020.547177

5. Ford, M*; **Smythers, A***; McConnell, E*; Lowery, S; Kolling, D; Hicks, L. Inhibition of TOR in *C. reinhardtii* leads to rapid cysteine oxidation reflecting sustained physiological changes. *Cells.* **2019**, 8(10), E1171. doi:10.3390/cells8101171

4. **Smythers, A;** Napier, E; Higginbotham, E; Holland, A; Stephenson, A; Kolling, D. Direct incorporation of exogenous glycerol leads to increased triacylglycerol formation in *Chlorella vulgaris*. *ACS Energy & Fuels.* **2019**, 33(11), 11125-11134. doi:10.1021/acs.energyfuels.9b02653

3. **Smythers, A*;** Perry, N*; Kolling, D. *Chlorella vulgaris* bioaccumulated excess manganese up to 55x under photomixotrophic conditions. *Algal Research*. **2019**, 43, 101641. doi:10.1016/j.algal.2019.101641

2. **Smythers, A**.; Garmany, A.; Perry, N; Higginbotham, E; Adkins, P; Kolling, D. Characterizing the effect of Poast on *Chlorella vulgaris*, a non-target organism. *Chemosphere* **2019**, 219, 704-712. doi:10.1016/j.chemosphere.2018.12.050

1. Quinones, R; Kolling, D; Shoup, D; **Smythers, A**; Westfall, T; Epperly, C; Coplin, M. Comparing free radicals in sunscreen-treated pig skin as revealed by Electron Paramagnetic Resonance (EPR) Spectroscopy. *J. Chem. Educ*. **2019**, 96, 2021-2028. doi:10.1021/acs.jchemed.8b00768

Manuscripts in Review

24. Khetarpal, S; Li, H; Vitale, T; Rhee, J; **Smythers, A**; Grauvogel, L; Castro, C; Mittenbühler, M; Houstis, N; Vargas-Castillo, A; Liu, J; Curtin, C; Sprenger, H; Blackmore, K; Kuznetsov, A; Freeman, R; Bogoslavski, D; Ellinor, P; Asnani, A; Dumesic, P; Puigserver, P; Rohl, J; Spiegelman, B; Rosenzweig, A. Cardiomyocyte PGC-1α enables physiological adaptations to endurance exercise in part through suppression of GDF15 and cardiac atrophy. Under review. 2024.

25. **Smythers, A**; Orsburn, B. The current economics and throughput of single cell proteomics by liquid chromatography mass spectrometry. Under review. 2024.

26. Xiao, H; Ordonez, M; Fink, E; Covington, T; Woldemichael, H; Chen, J; Jain, M; Rohatgi, M; Wei, S; Burger, N; Sharif, M; Wang, Y; Petrocelli, J; Blackmore, K; **Smythers, A**; Zhang, B; Gilbert, M; Cheong, H; Jan, J; Khetarpal, S; Smith, A; Bogoslavski, D; Lei, Y; Vaites, L; McAllister, F; Van Bruggen, N; Donovan, K; Huttlin, E; Mills, E; Fischer, E; Chouchani, E. Metabolite-protein covariation architecture identifies a cysteine shunt regulating liver cholesterol. Under review. 2025.

Awards, honors, and recognitions

HUPO Travel Award 2022
For travel to HUPO World Congress in Cancun, Mexico
Anna Louise Hoffman Award for Outstanding Achievement in Graduate Research 2022
Outstanding achievement in chemical research by a woman graduate student
ASBMB Graduate Travel Award 2022, 2020, 2018
For travel to the annual meeting of the ASBMB
Alpha Chi Sigma Graduate Research Award 2019
Outstanding achievement in chemistry by a MS student
International Phycology Society Paul C. Silva Travel Award 2018
For travel to the annual meeting of the ACS
MU Advance Path Forward Travel Award 2017
For travel to the annual meeting of the ACS
Iota Sigma Pi Members at Large Re-entry Award 2017
Recognizes potential excellence in chemistry for a returning student
Outstanding Achievement in Research – Council on Undergraduate Research 2017
Recognition upon selection to present research at Posters on the Hill

Posters and presentations

HUPO Annual Meeting: Dresden, Germany. **Talk**. 10/2024.
Max Planck Institute for Biology of Ageing. Cologne, Germany. **Invited talk.** 10/2024.
72nd ASMS Annual Meeting: Anaheim, CA. **Poster.** 6/2024.
US HUPO Annual Meeting: Portland, OR. **Poster and lightning talk.** 3/2024.
US HUPO Annual Meeting: Chicago, IL. **Poster.** 3/2023.
Thermo Fisher Young Chemists Webinar: Virtual. **Invited talk.** 01/2023.
HUPO Annual Meeting: Cancun, Mexico. **Poster.** 12/2022.
ASPB Annual Meeting: Portland, OR. **Invited talk**. 07/2022.
ASBMB Annual Meeting: Philadelphia, PA. **Poster**. 04/2022.
US HUPO Annual Conference: Charleston, SC. **Poster and lightning talk.** 02/2022.
69th ASMS Annual Meeting: Philadelphia, PA. **Poster.** 11/2021.
US HUPO Annual Conference: Virtual. **Poster and lightning talk.** 03/2021.
Society for Redox Biology Annual Conference: Virtual. **Poster**. 11/2020.
Marshall University Department of Chemistry: Huntington, WV. **Invited talk**. 10/2020.
68th ASMS Annual Meeting: Houston, TX. **Poster.** 06/2020.*Held virtually due to COVID-19
ASBMB Annual Meeting: Orlando, FL. **Poster**. 04/2019.
257th ACS National Meeting and Exposition: Orlando, FL. **Oral presentation**. 03/2019.
ASBMB Annual Meeting: San Diego, CA. **Poster and oral presentation**. 04/2018.
255th ACS National Meeting and Exposition: New Orleans, LA. **Poster and invited talk**. 03/2018.
Ohio River Basin Consortium for Research and Education: Huntington, WV. **Poster**. 09/2017.
ASBMB Annual Meeting: Chicago, IL. **Poster and oral presentation**. 04/2017.
Council on Undergraduate's Research 21st Annual Posters on the Hill: Washington, D.C. **Poster**. 04/2017.
252nd ACS National Meeting & Exposition: Philadelphia, PA. **Poster**. 08/2016.
91st Annual Meeting of the West Virginia Academy of Science: Huntington, WV. **Poster**. 04/2016.
13th Annual Undergraduate Research Day at the Capitol: Charleston, WV. **Poster**. 02/2016.

Teaching experience

University of North Carolina at Chapel Hill
Graduate Research Consultant

The purpose of a graduate research consultant is to integrate ongoing research into classroom curricula.
Honors Analytical Methods Laboratory — Fall 2019, Fall 2021

Teaching Assistant
Chemistry of Purslane — Spring 2020

Marshall University

Instructor
Principles of Chemistry Laboratory I — Fall 2018

Teaching Assistant
Principles of Chemistry Laboratory II — Fall 2016
Honors Principles of Chemistry Honors Laboratory II – Intro to NMR — Spring 2016
Principles of Chemistry Laboratory I — Fall 2015

Graduate Research Consultant
The purpose of a learning assistant is to provide additional dictation sections for students.
Principles of Chemistry I — Fall 2016

Mentorship

Mentor to *high school*, undergraduate, and master's level students
* *Indicates publication co-authorship*

University of North Carolina at Chapel Hill **Aug. 2019 – May 2024**
Saher Mubarek*, Hailey Lewis*, Abel Salas*, Meredith Daughtridge*, Megan Hnilica*

Marshall University **June 2015 – May 2024**
Jessica Crislip*, Danielle Slone*, Ethan Napier*, Nicole Perry*, Annabella Pauley, Aaron Roberts, Pimporn Wiwekwin, Ethan Higginbotham*, Blass Morrone, Kara Joseph*, Hayden O'Dell*, Trace Clark*, Brendin Flinn*, *Khaled El-Shazly*, *Eli McFeeley**

Mentor: Females in Mass Spectrometry Discussion Pod **Fall 2023 – Present**
Met monthly with a group of six early career trainees in mass spectrometry to discuss emerging issues in professional development.

Mentor: CHEM102 H Undergraduate Team **Fall 2020**
Worked with a group of four undergraduate students to develop a module involving cysteine oxidation for their CHEM 102 project.

Service

US HUPO ECR Committee **Spring 2023 – Present**
Chair (2024, 2025)
VC of Communications and Outreach (2023)
The purpose of the ECR committee is to represent early career researchers when liaising with other US HUPO committees and to plan ECR-centered events in-person at the annual conference and virtually via webinars.
Specific Activities:
Moderator for three webinars (July 2023, Sept. 2023, Nov. 2023)
ECR Representative for the US HUPO 2025 Planning Committee
ECR Representative for the US HUPO Mentorship Working Group

Summer Undergraduate Research Opportunity in Chemistry REU **Feb. 2020 – Dec. 2023**
Program Officer
SUROC is an REU designed to give underrepresented students opportunities in chemistry laboratories at UNC

Chapel Hill. As program officer, I was responsible for advertising and recruiting for the REU, providing a filtered candidate list to our faculty selection committee, matching candidates with laboratories, and the organization and implementation of the summer program. Summer programming included weekly professional development breakfast meetings as well as biweekly seminars and social outings.

Graduate and Professional Student Government, UNC Chapel Hill **2020 – 2022**

Director of Public Relations and Marketing (2020 – 2021)
Chief of Staff (2021 – 2022)

The graduate and professional student government served the students of UNC Chapel Hill by advocating for student issues to both university leadership and the North Carolina legislature.

Specific Activities:

Served on the UNC COVID Vaccine Distribution Committee (2020 – 2021)
Served on the board for WXYC Radio (2020 – 2021)
Served on the UNC Public Health Committee (2021 – 2022)
Served on the Provost Leadership Committee (2021 – 2022)
Served on the Faculty Senate DEI Committee (2021 – 2022)
Served on the Administrative Board of the Library (2021 – 2022)

Marshall University Dept. of Chemistry Learning Assistant **2016 – 2019**

Coordinator

The Learning Assistant program paired at least 2 senior level chemistry students with all sections of general and organic chemistry. Senior students would sit in the lecture and conduct recitation sections on a drop-in basis for junior level students. My responsibilities included interviewing senior students, assigning learning assistants to courses, and scheduling 20 h of recitation hours per week.

Science Fair Judging

North Carolina Science and Engineering Fair Judge **2021**
Fairland Middle/High School Regional Science Fair Judge **2016, 2017, 2018**
West Virginia Science Olympiad Volunteer Judge Coordinator **2016**

Outreach

North Carolina Science Day **2022**

Presenter

The Pipettepen **2019 - 2023**

Staff Writer

North Carolina Scientific Research and Education Network **2020**

Lesson plan contributor

Alpha Chi Sigma

UNC Chapter of Alpha Chi Sigma Science Day Presenter **2019**
Marshall University Alpha Chi Sigma Outreach Coordinator **2017 – 2019**

Cabell County Schools Chemistry Outreach **2016 – 2019**

Planned/facilitated 13 outreach demonstrations for >1000 pre-K – grade 5 students

Marshall University Water Festival

Presenter **2017 – 2019**