

ANDREW LONGHINI, PH.D.

Biochemistry • Neurotherapeutics • Stem Cell Biology

• longhini@mailbox.sc.edu • (661)-904-8617 [LinkedIn](#) • ORCID: 0000-0002-0599-5030

EDUCATION

Ph.D., Biochemistry, University of Maryland, College Park — 2017

Dissertation: The Development of Site-Selectively Isotopically Labeled Nucleotides for RNA Structural Studies and their Application to Structural Studies of the Hepatitis B Virus Epsilon Element

Advisor: Theodore Kwaku Dayie, Ph.D.

B.S., Biochemistry, University of California, Santa Barbara — 2010

Minor: Mathematics

RESEARCH EXPERIENCE

Assistant Professor, Biochemistry, University of South Carolina — August 2026–Present

Principal investigator of the Integrative Neurodegeneration Lab, developing interdisciplinary approaches to understand and treat protein-misfolding diseases. The lab integrates molecular neuroscience, therapeutic design, iPSC-derived brain organoids, and in vivo models to investigate mechanisms of neurodegeneration and develop next-generation biologics targeting pathogenic protein aggregation.

Assistant Project Scientist, UCSB Neuroscience Research Institute — 2024–2026

Lead investigator in a therapeutic development project targeting tauopathies, coordinating inter-institutional collaborations that produced patented polymer therapeutics. In addition to this flagship effort, I write competitive grants and lead multiple independent and collaborative research projects spanning molecular neuroscience, therapeutic design, and organoid modeling.

Postdoctoral Fellow, UCSB Neuroscience Research Institute — 2018–2024

Conducted molecular and cellular assays of tau fibrils in stem cell-derived organoids. Co-wrote funded NIH proposals; trained graduate students in molecular protocols.

Graduate Student Researcher, UMD Center for Biomolecular Structure — 2012–2017

Developed chemo-enzymatic isotopic labeling strategies for RNA structure determination.

Assigned and solved the structure of the HBV- ϵ RNA element.

AWARDS AND HONORS

- Margaret T. Getman and Willa Service to Students Award Nominee – 2024
 - New Venture Business Competition 2nd Place – 2024
 - Annual MCDB Postdoctoral Presentation Award – 2024
 - Rainwater 30th Anniversary Tau Leadership Award – 2022
 - National Cancer Institute Research Training Award (CRTA) – 2016
 - CRNA Trainee Travel Award, NCMI 30th Anniversary Cryo-EM – 2015
 - Top Presentation, Small Angle Neutron Scattering Course – 2012
-

GRANTS & FUNDING

- California Institute of Regenerative Medicine Fellow – 2022–2024
 - TCIM 23 Consortium Fellow – 2023–2024
 - Otis Williams Bioengineering Fellowship – 2019–2021
 - Hockmeyer Fellowship – 2017
 - Jenny T. Sih Endowed Memorial Fellowship – 2014
 - Dean's Fellowship – 2012
 - Dean's Summer Research Fellowship – 2012
-

PUBLICATIONS

- [1] *Protein-like Polymer for Inhibition of Tau Fibril Propagation in Human-Derived Models of Neurodegeneration.* Longhini, A.P., Fattah, M.A., Sala-Jarque, J., Dubose, A., Rivera, E.K., Sclafani, O.R., Zhou, J., Anatot, J.E., Thompson, M.P., Unger, M.T., Beckett, E.R., Fagan, C., Nakamura, D., Morimoto, R., Han, S., Qiao, B., Gianneschi, N.C., Kosik, K.S. (2025), *BioRxiv*.
<https://doi.org/10.1101/2025.02.02.636155>
- [2] *Structure-Specific Mini-Prion for Alzheimer's Disease Tau Fibrils.* Vijayan, V., Merz G.E., Tsay K., Longhini, A.P., Lobo, S., Quddus, A., Nakagawa, K.L.S., Vigers, M.P., Melo, A.A., Tse, E., Shea, J.E., Shell, M.S., Kosik, K.S., Southworth, D.R., Han, S. (2025), *BioRxiv*.
<https://doi.org/10.1101/2025.06.23.661111>
- [3] *Water-directed Pinning is Key to Tau Prion Formation.* Vigers, M.P., Lobo, S., Najafi, S., DuBose, A., Tsay, K., Ganguly, P., Longhini, A.P., Jin, Y., Buratto, S.K., Kosik, K.S., Shell, M.S., Shea, J.E., Han, S. (2025) *Proceeding of the National Academy of Sciences*, vol. 122, no. 18, pp. e2421391122.
<https://doi.org/10.1073/pnas.2421391122>
- [4] *Precision Proteoform Design for 4R Tau Isoform Selective Templated Aggregation.* Longhini, A.P., DuBose, A., Lobo, S., Vijayan B., Bai, Y., Rivera, E.K., Sala-Jarque, J.,

- Nikitina, A., Carrettiero, D.C., Unger, M., Sclafani, O., Fu, V., Vigers, M., Buee, L., Landrieu, I., Shell, S., Shea, J.E., Han, S., Kosik, K.S. (2024) *Proceeding of the National Academy of Sciences*, vol. 121, no. 15, pp. e2320456121.
<https://doi.org/10.1073/pnas.2320456121>
- [5] *Single-Cell Mapping of Lipid Metabolites Using Infrared Probe in Human-Derived Model Systems*. Bai, Y., Camargo, C.M., Glasauer, S., Gifford, R., Tian, X., **Longhini, A.P.**, Kosik, K.S. (2023) *Nature Communications*, vol. 15, no. 350.
<https://doi.org/10.1038/s41467-023-44675-0>
- [6] *Hepatitis B Virus Epsilon (ϵ) RNA Element: Dynamic Regulator of Viral Replication and Attractive Therapeutic Target*. Olenginski, L.T., Attionu, S.L., Henninger, E.N., LeBlanc, R.M., **Longhini, A.P.**, Dayie, T.K. (2023) *Viruses*, vol. 15, pp. 1913.
<https://doi.org/10.3390/v15091913>
- [7] *Cross-Correlated Relaxation Rates Provide Facile Exchange Signature in Selectively Labeled RNA* Taiwo, M.K., Nam, H., LeBlanc, R.M., **Longhini, A.P.**, Dayie, T.K. (2022) *Journal of Magnetic Resonance*, vol. 342, pp. 107245.
<https://doi.org/10.1016/j.jmr.2022.107245>
- [8] *Stress Routes Clients to the Proteasome via a BAG2 Ubiquitin-Independent Degradation Condensate*. Carrettiero, D.C., Almeida, M.C., **Longhini, A.P.**, Rauch, J.N., Han, D., Zhang, X., Najafi, S., Gestwicki, J.E., Kosik, K.S. (2022) *Nature Communications*, vol. 13, no. 1, pp. 1-16.
<https://doi.org/10.1038/s41467-022-30751-4>
- [9] *Dynamic Assembly of the mRNA m⁶A Methyltransferase Complex is Regulated by METTL3 Phase Separation*. **Longhini, A.P.**, Han, D., Zhang, X., Hoang, V., Wilson, M.Z., Kosik, K.S. (2022) *PLOS Biology*, vol. 20, no. 2, pp. e3001535.
<https://doi.org/10.1371/journal.pbio.3001535>
- [10] *Liquid-Liquid Phase Separation of Tau Driven by Hydrophobic Interactions Facilitates Fibrilization of Tau*. Lin, Y., Fichou, Y., **Longhini, A.P.**, Llanes, L.C., Yin, P., Bazan, G.C., Kosik, K.S., Han, S. (2021) *Journal of Molecular Biology*, vol. 433, no. 22, pp. 166731.
<https://doi.org/10.1016/j.jmb.2020.166731>
- [11] *Liquid-Liquid Phase Separation of Tau by Self and Complex Coacervation*. Najafi, S., Lin, Y., **Longhini, A.P.**, Zhang, X., Delaney, K.T., Kosik, K.S., Fredrickson, G.H., Shea, J.E., Han, S. (2021) *Proteins*, vol. 30, pp. 1393-1407.
<https://doi.org/10.1002/pro.4101>
- [12] *Structural Insights of the Conserved 'Priming Loop' of Hepatitis B Virus Pre-Genomic RNA*. LeBlanc, R.M., Kasprzak, W.K., **Longhini, A.P.**, Olenginski, L.T., Abulwerdi, F., Ginocchio, S., Shields, D., Nyman, J., Svirydava, M., Del Vecchio, C., Ivanic, J., Schneckloth Jr., J.S., Shapiro, B.A., Dayie, T.K., Le Grice, S.F.J. (2021) *Journal of Biomolecular Structure and Dynamics*, vol. 40, no. 20, pp. 9761-9773.
<https://doi.org/10.1080/07391102.2021.1934544>
- [13] *CCR5 RNA Pseudoknots: Residue and Site-Specific Labeling Correlate Internal Motions in microRNA Binding*. Chen, B., **Longhini, A.P.**, Nußbaumer, F., Kreutz, C., Dinman, J.,

- Dayie, T.K. (2018) *Chemistry-A European Journal*, vol. 24, no. 21, pp. 5462-5468.
<https://doi.org/10.1002/chem.201705948>
- [14] CPMG $^{13}\text{CH}_2$ Relaxation Dispersion Experiment for Probing Invisible Excited States in Selectively Labeled RNAs. LeBlanc, R.M., Longhini, A.P., Turgarinov, V., Dayie, T.K. (2018) *Journal of Biomolecular NMR*, vol. 71, pp. 165-172.
<https://doi.org/10.1007/s10858-018-0184-3>
- [15] Combining Asymmetric ^{13}C -Labeling and Isotopic Filter/Edit NOESY: A Novel Strategy for Rapid and Logical RNA Resonance Assignment. LeBlanc, R.M., Longhini, A.P., Dayie, T.K. (2017) *Nucleic Acid Research*, vol. 45, no. 16, pp. e146.
<https://doi.org/10.1093/nar/gkx591>
- [16] Chemo-Enzymatic Labeling for Rapid Assignment of RNA Molecules. Longhini, A.P., LeBlanc, R.M., Dayie, T.K. (2016) *Methods*, vol. 103, pp. 11-17.
<https://doi.org/10.1016/j.ymeth.2016.03.015>
- [17] Chemo-Enzymatic Synthesis of Site-Specific Isotopically Labeled Nucleotides for Use in NMR Resonance Assignment, Dynamics and Structural Characterizations. Longhini, A.P., LeBlanc, R.M., Becette, O., Salguero, C., Wunderlich, C.H., Johnson, B.A., D'Souza, V.M., Kreutz, C., Dayie, T.K. (2015) *Nucleic Acids Research*, vol. 44, no. 6, pp. e52.
<https://doi.org/10.1093/nar/gkv1333>
- [18] Stable Isotope-Labeled RNA Phosphoramidites to Facilitate Dynamics by NMR. Wunderlich, C.H., Juen, M., LeBlanc, R.M., Longhini, A.P., Dayie, T.K., Kreutz, C. (2015) *Methods in Enzymology*, vol. 565, pp. 469-494.
<https://doi.org/10.1016/bs.mie.2015.06.013>
- [19] Chemo-Enzymatic Synthesis of Selectively $^{13}\text{C}/^{15}\text{N}$ -Labeled RNA for NMR Structural and Dynamic Studies. Alvarado, L.J., Longhini, A.P., LeBlanc, R.M., Chen, B., Kreutz, C., Dayie, T.K. (2014) *Methods in Enzymology*, vol. 549, pp. 133-162.
<https://doi.org/10.1016/B978-0-12-801122-5.00007-6>
- [20] Regio-Selective Chemical-Enzymatic Synthesis of Pyrimidine Nucleotide Facilitate RNA Structure and Dynamics. Alvarado, L.J., LeBlanc, R.M., Longhini, A.P., Kean, S.C., Niyati, J., Yildiz, Z.F., Tolbert, B.S., D'Souza, V.M., Summers, M.F., Kreutz, C., Dayie, T.K. (2014) *ChemBioChem*, vol. 15., no. 11, pp. 1573-1577.
<https://doi.org/10.1002/cbic.201402130>
- [21] Deriving Quantitative Dynamics Information for Proteins and RNAs using ROTDIF with a Graphical User Interface. Berlin, K., Longhini, A.P., Dayie, T.K., Fushman, D. (2013) *Journal of Biomolecular NMR*, vol. 57, no. 4, pp. 333-352.
<https://doi.org/10.1007/s10858-013-9791-1>
-

PRESENTATIONS

- [1] International Society for Molecular Neurodegeneration NextGen 2025 Meeting
Invited Speaker. Virtual. August 2025.

"Multivalent Protein-like Polymers Selectively Inhibit 4R Tau Seeding in Cellular, Organoid, and Mouse Models"

[2] **American Chemical Society Fall 2025 Meeting**

Invited Speaker. Washington, District of Columbia. August 2025.

"Multivalent Protein-like Polymers as Therapeutics for Tauopathies by Blocking Tau Fibril Propagation"

[3] **Northwestern University – Chemistry of Life Processes (CLP) Seminar Series**

Invited Speaker. Evanston, IL. June 2025.

"Structural Targeting of Tau Propagation: A New Therapeutic Platform for Neurodegeneration"

[4] **University of Oxford – Partners in Tau Symposium**

Presenter. Oxford, UK. April 2025.

"Protein-Like-Polymers as a Targeted Approach to Prevent Tau Spread"

[5] **Tau Global Conference**

Poster. London, UK. April 2025.

"Protein-Like-Polymers as Therapeutics to Halt Disease-Associated Tau Fibril Propagation"

[6] **Louisiana State University – Department of Biological Sciences Seminar Series**

Invited Speaker. Baton Rouge, LA. November 2024.

"Unraveling Tau Aggregation and Spread: An Integrative Biochemical Approach Across Structural, Cellular, and Comparative Models"

[7] **University of California, Santa Barbara – Department of Molecular, Cellular, and Developmental Biology 6th Annual Symposium**

Presenter (Postdoctoral Award Winner). Santa Barbara, CA. April 2024.

"A Short Peptide for 4R Tau Isoform Selective Templated Aggregation"

[8] **Tau2024 Global Conference**

Poster. Washington, DC. March 2024.

"Precision Proteoform Design for 4R Tau Isoform Selective Templated Aggregation"

[9] **University of California, Santa Barbara – Artificial Intelligence Systems of Practice Symposium**

Roundtable Session Presenter. Santa Barbara, CA. January 2024.

"Exploring AI-Driven Opportunities for Enhanced Student Engagement in Higher Education"

[10] **University of California, Santa Barbara – Neuroscience Research Institute Annual Retreat**

Invited Speaker. Santa Barbara, CA. September 2024.

"4R Tauopathy Specific Peptides"

PATENTS

- [1] Dubose, A., Vigers, M., **Longhini, A.P.**, Vijayan, V., Kosik, K.S., Lobo, S., Ryffel, P., Han, S., *TauSeek: Disease-Specific Tau Protein Fibrils & Seeding Proteins*. Northwestern University Invention Disclosure, Case NU2024-139. U.S. Provisional Patent Application filed 2024. **Status:** Pending.
 - [2] Gianneschi, N.C., **Longhini, A.P.**, Fattah, M.A., Morimoto, R.I., Kosik, K.S., *Regulation of tau using protein-like polymers and uses thereof*. International Patent Application WO2024015930A1; European Application EP4554606A1, Non-provisional filed 1/8/2026. **Status:** Pending.
-

TEACHING EXPERIENCE

University of Maryland, College Park

Introductory Biochemistry | 200 Students | Role: Teaching Assistant | Format: Discussions | 2016

General Chemistry for Engineers | 150 Students | Role: Teaching Assistant | Format: Discussions | 2016

Fundamentals of Analytical and Bioanalytical Chemistry Laboratory | 30 Students | Role: Teaching Assistant | Format: Laboratory Class | 2014-2016

Organic Chemistry I | 200 Students | Role: Teaching Assistant | Format: Discussion and Laboratory | 2015

Organic Chemistry II | 200 Students | Role: Teaching Assistant | Format: Discussion and Laboratory | 2011-2015

Biochemistry Laboratory | 50 Students | Role: Teaching Assistant | Format: Laboratory | 2013

Biochemistry of Nucleic Acids | 100 Students | Role: Teaching Assistant | Format: Laboratory | 2012, 2013, 2016

University of California, Santa Barbara

Biophysical and Bioanalytical Laboratory | 60 Students | Role: Teaching Assistant | Format: Laboratory | 2011

Laboratory Techniques in Biochemistry | 60 Students | Role: Teaching Assistant | Format: Laboratory | 2010

Introductory Biochemistry Laboratory | 60 Students | Role: Teaching Assistant | Format: Laboratory | 2010

MENTORSHIP

Senior CIRM Scholar & Mentor— 2024-Present

As a senior CIRM Scholar and former trainee, I mentor undergraduate and graduate CIRM trainees in stem cell biology and professional development at the university level. I provide guidance on research, career planning, and scientific communication. I also participate in CIRM annual conferences to support trainee development and contribute to broader training initiatives.

UCSB SEEDS Mentor— 2024-Present

Provide academic and career mentorship to undergraduate students in STEM through quarterly one-on-one meetings. Offer guidance on research opportunities, graduate school preparation, and professional development.

Apprentice Researchers Program — 2024

Mentored two high school students in an intensive 6-week research program at UCSB, teaching them mammalian cell culture, confocal fluorescence imaging, qPCR, and data analysis. Guided them in independently conducting a project on the role of the oxidative stress pathway in tau-based neurodegeneration and helped them prepare and present their findings.

Research Mentorship Program — 2022

Mentored an extremely motivated high-school student from an underrepresented background for an intensive 6-week research program in which he learned mammalian cell culture, arrayed functional genomics screening, confocal fluorescence microscopy, qPCR, and advanced image analysis. He continued working remotely in the laboratory for the year after the program and is now at the University of California, Berkeley.

Selected Undergraduate Mentees

Over the past decade, I have mentored numerous undergraduate researchers in the laboratory of Dr. Kenneth Kosik at UC Santa Barbara. My mentorship spans molecular neuroscience, biophysics, stem cell biology, and computational analysis. Many of these students have gone on to receive prestigious fellowships, participate in international research programs, present at national and international conferences, and enter competitive graduate or medical programs.

Selected Mentees

- **Olivia Sclafani (2022–2025)**

Mentored in all aspects of molecular neuroscience and stem cell biology.

Recipient of a highly competitive California Institute of Regenerative Medicine (CIRM) COMPASS Fellowship (covers two years of tuition plus a competitive stipend) for leading an independent project in comparative stem cell biology.

Attending the University of California, San Francisco for a Ph.D. in Stem Cell Biology.

- **Matthew Unger (2022–2025)**
Mentored in computational image analysis and biophysical techniques. Awarded a Goldwater Fellowship and presented research at two international conferences. Attending Harvard University for a Ph.D. in Biophysics.
- **Emily Beckett (2022–2025)**
Mentored in biophysics and molecular neurobiology. Selected for a summer research fellowship at UC Berkeley (2024) and a biophysics research internship in Osaka, Japan (Fall 2024). Attending the University of Madison, Wisconsin for a Ph.D. in Biophysics.
- **Vivian Huang (2020–2023)**
Mentored in molecular neurobiology. Currently a graduate student in Dr. Ken Cadwell's lab at the Perelman School of Medicine, University of Pennsylvania, studying immunology.
- **Salman Sadakkadulla (2018–2022)**
Mentored in molecular neurobiology. Currently a medical student at Tulane University School of Medicine.

COMMUNITY OUTREACH

Brandon School Science Night — *Organizer & Presenter, 2023–2025*

Led annual science nights at Brandon Elementary School, a Title I school with a diverse and historically underrepresented student population. Collaborated with a team of California Institute for Regenerative Medicine (CIRM) undergraduate and graduate fellows to design and deliver hands-on, interactive science activities. The program aimed to foster early engagement with STEM by creating an inclusive and inspiring environment for young learners, encouraging curiosity and building confidence in scientific exploration.

Goldwater Undergraduate Poster Judge — *2024-Current*

Served as a judge for undergraduate poster presentations in the biological sciences at the GSC Conference. Provided constructive feedback to aspiring researchers and supported the professional development of promising undergraduate scientists.