Stanford

MacKenzie Bolen

Postdoctoral Scholar, Neurology and Neurological Sciences

Bio

BIO

Dr. MacKenzie “Mack” Bolen’s defining research passion is to leverage accessible and modifiable lifestyle factors to mitigate neurodegenerative risk. During her undergraduate education at Austin College in Texas, she began pursuing her interest in neurodegeneration by conducting research focused on the neuroprotective benefits of the ketogenic diet. This work evolved into an honors thesis investigating markers of inflammation in saliva from contact sport athletes and culminated in a TEDx talk on sports-related brain injuries. These experiences cemented her desire to understand the minutiae of the brain and catalyzed her decision to pursue a Ph.D. in Neuroscience at the University of Florida (UF). During Mack’s training under Dr. MG. Tansey at UF, her dissertation work generated global collaborations centered on a multiomic approach that leverages machine learning to identify peripheral biomarkers and novel therapeutic targets to slow the onset or progression of Parkinson’s disease. A hallmark of Mack’s career has been participating in collaborative team science and mentorship of the next generation of scientists, where she has consistently mentored advanced and budding scientists within the Gainesville community and collaborated on several manuscripts from labs across the nation. In addition to her scholarly work, she regularly volunteered at the UF Neuromedicine Intensive Care Unit (Neuro ICU) while pursuing her Ph.D. to better understand the clinical perspective of neurodegeneration.

By blending her Ph.D. training and experiences in the Neuro ICU, Mack hopes to actively improve the treatment of individuals living with neurodegeneration and continue to push the frontier of medicine as a postdoctoral scholar in Neurology and Neurological Sciences at Stanford. Now under the mentorship of Dr. K. Poston, Mack will continue to access essential training at the intersection of immunology and Parkinson’s disease, via the investigation of the gut-brain axis. As a former collegiate soccer player, Mack loves to pretend to relive her glory days during rec-league on the weekends and can also be found struggling through a Yin yoga class.

PROFESSIONAL EDUCATION

- Doctor of Philosophy, University of Florida (2025)
- Bachelor of Arts, Austin College (2021)

STANFORD ADVISORS

- Kathleen Poston, Postdoctoral Faculty Sponsor

Research & Scholarship

LAB AFFILIATIONS

- Kathleen Poston, Poston Lab (7/1/2025)

Publications

PUBLICATIONS

- **Plasma pTau217 as a Prognostic, Monitoring, and Risk-Stratification Biomarker of Clinical Progression in Lewy Body Disease.** *medRxiv : the preprint server for health sciences*

  Lorkiewicz, S. A., Abdelnour, C., Bolen, M., Smith, A. M., Shahid-Besanti, M., Hemachandra, D., Muller-Oehring, E. M., Siddiqui, N., Montoliu-Gaya, L., Arslan, B., Ashton, N. J., Wilson, E. N., Tian, et al

  2026

- **PERK Deficiency Amplifies Molecular, Structural, and Network Vulnerability to Repetitive Mild Traumatic Brain Injury.** *bioRxiv : the preprint server for biology*

  Criado-Marrero, M., Ravi, S., Barroso, D., Garza, T. N., Cuestas Torres, D. M., Lessard, C., Castano, J. P., Bolen, M. L., Rubinovich, U., Prokop, S., Chakrabarty, P., Ranum, L. P., Febo, et al

  2026

- **C1q-dependent clearance of alpha-synuclein allows macrophages to transiently limit enteric synucleinopathy in male mice.** *Nature communications*

  Mackie, P. M., Koshy, J. M., Bhogade, M. H., Hammoor, T., Hachmeister, W., Lloyd, G. M., Paterno, G., Bolen, M. L., Merchak, A., Gamez-Tansey, M., Giasson, B. I., Khoshbouei, H.

  2026

- **Spatial single-cell multiomics reveals peripheral immune dysfunction in Parkinson's and inflammatory bowel disease.** *NPJ Parkinson's disease*

  Bolen, M. L., Buendia, M., Shi, J., Staley, H., Kachergus, J. M., Efron, P. A., Park, G., Nagpal, R., Alvarez, S. D., Xue, Q. S., McFarland, N. R., Zimmermann, E. M., Forsmark, et al

  2026

- **Iron mishandling in the brain and periphery in Parkinson's disease.** *NPJ Parkinson's disease*

  Bolen, M. L., Menees, K. B., Dupreez, A. C., Tansey, M. G.

  2025; 11 (1): 246

- **Single-cell multiomics identifies both shared and unique features of immune dysfunction in Parkinson's disease and inflammatory bowel disease colon, plasma and stool.** *bioRxiv : the preprint server for biology*

  Bolen, M. L., Buendia, M., Shi, J., Staley, H., Kachergus, J. M., Efron, P. A., Park, G., Nagpal, R., Alvarez, S. D., Xue, Q., McFarland, N. R., Zimmermann, E. M., Forsmark, et al

  2025

- **THERAPEUTIC STRATEGIES BASED ON INFLAMMATION/ IMMUNOTHERAPY**

  Tansey, M. G., Bolen, M., Mark, J., Krueger, M., Wallings, R. L.

  ELSEVIER SCI LTD.2025

- **RGS10 attenuates systemic immune dysregulation induced by chronic inflammatory stress** *JOURNAL OF NEUROINFLAMMATION*

  Jernigan, J. E., Staley, H. A., Baty, Z., Bolen, M. L., Gomes, B., Holt, J., Cole, C. L., Neighbarger, N. K., Dheeravath, K., Merchak, A. R., Menees, K. B., Coombes, S. A., Tansey, et al

  2025; 22 (1): 49

- **Peripheral blood immune cells from individuals with Parkinson's disease or inflammatory bowel disease share deficits in iron storage and transport that are modulated by non-steroidal anti-inflammatory drugs** *NEUROBIOLOGY OF DISEASE*

  Bolen, M. L., Gomes, B., Gill, B., Menees, K. B., Staley, H., Jernigan, J., Mcfarland, N. R., Zimmermann, E. M., Forsmark, C. E., Tansey, M.

  2025; 207: 106794

- **Multiplex digital spatial profiling identifies subregion dependent targeted proteome changes across variants of dementia.** *NPJ dementia*

  Bolen, M. L., Menees, K. B., Gearing, M., Gong, J., Ren, Y., Merchak, A. R., Murray, M. E., McEachin, Z. T., Tansey, M. G.

  2025; 1 (1): 10

- **Thinking outside the brain: Gut microbiome influence on innate immunity within neurodegenerative disease** *NEUROTHERAPEUTICS*

  Merchak, A. R., Bolen, M. L., Tansey, M., Menees, K. B.

  2024; 21 (6): e00476

- **Alzheimer's disease-associated protective variant Plcg2-P522R modulates peripheral macrophage function in a sex-dimorphic manner** *JOURNAL OF NEUROINFLAMMATION*
  Staley, H. A., Jernigan, J. E., Bolen, M. L., Titus, A. M., Neighbarger, N., Cole, C., Menees, K. B., Wallings, R. L., Tansey, M.
  2024; 21 (1): 280

- **RGS10 Attenuates Systemic Immune Dysregulation Induced by Chronic Inflammatory Stress.** *bioRxiv : the preprint server for biology*
  Jernigan, J. E., Staley, H. A., Baty, Z., Bolen, M. L., Gomes, B. N., Holt, J., Cole, C. L., Neighbarger, N. K., Dheeravath, K., Merchak, A. R., Menees, K. B., Coombes, S. A., Tansey, et al
  2024

- **Peripheral Blood Immune Cells from Individuals with Parkinson's Disease or Inflammatory Bowel Disease Share Deficits in Iron Storage and Transport that are Modulated by Non-Steroidal Anti-Inflammatory Drugs.** *bioRxiv : the preprint server for biology*
  Bolen, M. L., Nunes Gomes, B., Gill, B., Menees, K. B., Staley, H., Jernigan, J., Tansey, M. G.
  2024

- **Diet-induced metabolic and immune impairments are sex-specifically modulated by soluble TNF signaling in the 5xFAD mouse model of Alzheimer's disease** *NEUROBIOLOGY OF DISEASE*
  De Sousa Rodrigues, M., Bolen, M. L., Blackmer-Raynolds, L., Schwartz, N., Chang, J., Tansey, M., Sampson, T.
  2024; 196: 106511

- **Diet-induced metabolic and immune impairments are sex-specifically modulated by soluble TNF signaling in the 5xFAD mouse model of Alzheimer's disease.** *bioRxiv : the preprint server for biology*
  De Sousa Rodrigues, M. E., Bolen, M. L., Blackmer-Raynolds, L., Schwartz, N., Chang, J., Tansey, M. G., Sampson, T. R.
  2024

- **Complement C1q-dependent engulfment of alpha-synuclein induces ENS-resident macrophage exhaustion and accelerates Parkinson's-like gut pathology.** *bioRxiv : the preprint server for biology*
  Mackie, P. M., Koshy, J., Bhogade, M., Hammoor, T., Hachmeister, W., Lloyd, G. M., Paterno, G., Bolen, M., Tansey, M. G., Giasson, B. I., Khoshbouei, H.
  2023

- **PERK KNOCKDOWN PROTECTS AGAINST REPETITIVE MILD TRAUMATIC BRAIN INJURY-INDUCED CHANGES IN FUNCTIONAL CONNECTIVITY AND ALTERS THE EXPRESSION OF DISEASE-ASSOCIATED PROTEINS**
  Ravi, S., Criado-Marrero, M., Bolen, M., Barroso, D., Rubinovich, U., Hery, G. P., Grudny, M. M., Prokop, S., Febo, M., Abisambra, J.
  MARY ANN LIEBERT, INC.2023: A113

- **Fixed Time-Point Analysis Reveals Repetitive Mild Traumatic Brain Injury Effects on Resting State Functional Magnetic Resonance Imaging Connectivity and Neuro-Spatial Protein Profiles** *JOURNAL OF NEUROTRAUMA*
  Sakthivel, R., Criado-Marrero, M., Barroso, D., Braga, I. M. M., Bolen, M., Rubinovich, U., Hery, G. P. P., Grudny, M. M. M., Koren, J., Prokop, S., Febo, M., Abisambra, J.
  2023; 40 (19-20): 2037-2049

- **DIGITAL SPATIAL PROTEOMIC PROFILING IDENTIFIES REGION SPECIFIC CHANGES FOLLOWING REPETITIVE MILD TRAUMATIC BRAIN INJURY IN MICE**
  Bolen, M., Ravi, S., Abisambra, J.
  MARY ANN LIEBERT, INC.2022: A14

- **REPETITIVE MILD TRAUMATIC BRAIN INJURY PROMOTES INFLAMMATION AND DISRUPTS FUNCTIONAL CONNECTIVITY IN THALAMIC NUCLEI**
  Ravi, S., Braga, I. M., Bolen, M., Barroso, D., Rubinovich, U., Grudny, M. M., Febo, M., Abisambra, J.
  MARY ANN LIEBERT, INC.2022: A28-A29

PRESENTATIONS

- Leveraging multiomic technology to investigate the gut-blood-brain axis in Parkinson’s disease risk and progression - Alzheimer’s and Parkinson’s Diseases and related neurological disorders conference (4/1/2025 - 4/5/2025)
- Gut-first biomarker discovery within Parkinson’s disease: Single-cell spatial molecular imaging identifies molecular patterns of inflammation in the colon - Alzheimer’s and Parkinson’s Diseases and related neurological disorders conference (3/19/2024 - 3/23/2024)
- Digital Spatial Proteomic Profiling Identifies Region Specific Changes Following Repetitive Mild Traumatic Brain Injury in Mice - National Neurotrauma symposium (7/7/2021 - 7/11/2021)
- TEDx 2020 Talk: Why Concussions Have Been Good for Sports - Austin College