

AARON SILVERSTEIN

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(270) 559-2243

Education

- **MD/PhD Program, University of Kentucky College of Medicine, Lexington, KY**
2019-Present
 - Doctor of Philosophy, Neuroscience, Defended May 2025
 - Doctor of Medicine Candidate, Current MS-3
- **Undergraduate Education, University of Kentucky College of Arts & Sciences, Lexington, KY**
Dual Bachelor of Science Degrees
2015-2019
 - Graduated Summa Cum Laude with Honors, GPA: 3.977
 - Bachelor of Science in Neuroscience
 - Departmental Honors
 - Bachelor of Science in Psychology
 - Minor in Violin Performance
 - Related experience: Five-week music study abroad program in Salzburg, Austria (Summer 2016, coordinated by UK Education Abroad and Western Kentucky University)

Research and Clinical Experience

- Warren J. Alilain Laboratory, University of Kentucky, Lexington, KY** 2017- 2025
- MD/PhD Researcher 2019-2025
 - PhD dissertation research on post-SCI neuroinflammation and breathing recovery; obtained T32 funding for ethanol-centered breathing plasticity project; authored multiple first-author publications; applied/re-applied for NIH F30 grant opportunities; mentored trainees across educational levels.
 - Undergraduate Researcher 2017-2019
 - Conducted independent projects on respiratory motor recovery after cervical SCI; presented results at local and national conferences; contributed to experimental design, data acquisition, and manuscript preparation.
- Brandon A. Miller Laboratory, University of Kentucky Lexington, KY** May 2019-July 2019
- Rotating Research Assistant
 - Conducted independent research and assisted with projects exploring hydrocephalus, intraventricular hemorrhage, and developmental white matter injury *in vitro* or *in vivo* utilizing primary rat microglia, oligodendrocyte progenitor cells, or astrocytes in culture.
- NeuroRestorative, Paducah, KY** June 2017-August 2017
- Life Skills Trainer
 - Provided direct care for individuals with acquired brain injuries in a residential rehabilitation setting, including assistance with medications, ADLs, and rehabilitation training for 40+ hours weekly, on a 3:1 patient:staff ratio.

Theses and Dissertations

- **Silverstein, A.L. (2025)** Leveraging clinical standards to improve the translational relevance of therapies for experimental spinal cord injury. Theses and Dissertations--Neuroscience. 40.
https://uknowledge.uky.edu/neurobio_etds/40

Publications

First-Authored Works

- **Silverstein, A.L.**, Calulot, C. M., McLouth, C., Gensel, J. C., and Alilain, W. J. (2026) CatWalk XT enables sensitive detection of locomotor deficits after C2 hemisection and integrates readily into ongoing experimental workflows in adult female rats. *Neurotrauma Reports*. Feb;7:1 doi:10.1177/2689288X261418910. **In press.**
- **Silverstein AL**, Calulot CM, McLouth CJ, Gensel JC, Alilain WJ. (2026) Liposome-encapsulated clodronate and COX-2 inhibitor treatment impair ventilatory recovery but improve compensatory locomotor function following cervical spinal cord injury in rats. *Exp Neurol*. Feb;396:115522. doi:10.1016/j.expneurol.2025.115522.
- **Silverstein, A.L.** and Alilain, W. J. (2024) Ethanol abolishes ventilatory long-term facilitation and blunts the ventilatory response to hypoxia in female rats. *Respir Physiol Neurobiol*. Epub ahead of print. doi: 10.1016/j.resp.2024.104373.
- **Silverstein, A. L.**, Lawson, K. G., Farhadi, F., & Alilain, W. (2023). Contrasting experimental rodent aftercare with human clinical treatment for cervical spinal cord injury: Bridging the translational "Valley of Death". *J Neurotrauma*. doi:10.1089/neu.2023.0314
- **Silverstein, A.L.** and Alilain, W.J. (2021) Intermittent hypoxia induces greater functional breathing motor recovery as a fixed rather than varied duration treatment after cervical spinal cord injury in rats. *Neurotrauma Reports* 2:1, 1–11, doi:10.1089/neur.2021.0004.

Co-Authored Works

- Stanback, M., Stanback, A. E., Akhtar, S., Basham, R., Chithrala, B., Collis, B., Heberle, B. A., Higgins, E., Lane, A., Marella, S., Ponder, M., Raichur, P., **Silverstein, A. L.**, Stanley, C., Vela, K., and Cooper, R. L. (2019) The Effect of Lipopolysaccharides on Primary Sensory Neurons in Crustacean Models. *Impulse: The Premier Undergraduate Neuroscience Journal (Columbia, S.C.)*, <https://impulse.pubpub.org/pub/exe0q917/release/1>

Abstracts and Presentations

Invited Oral Presentations

- **American Spinal Injury Association (ASIA) 2025 Annual Scientific Meeting** 2025
 - *"Depletion of peripheral monocyte-derived macrophages and COX-2 inhibition differentially affect ventilatory and locomotor recovery following cervical spinal cord injury in rats"* | **Silverstein, A.L.**, Calulot, C.M., Gensel, J.C., and Alilain, W.J. | Abstract and Oral Presentation | Scottsdale, AZ
- **"Hot Topics" Control of Breathing Mixer (Experimental Biology Conference)** 2022
 - *"Towards optimization of therapeutic hypoxia treatment to promote neuronal sprouting and regeneration: A potential role for HIF-1α and VEGF"* | **Silverstein, A.L.**, Yoo, J.H., Devine, C.E., Speed, S.L., Calulot, C.M., Sunshine, M.D., Miller, B.A., and Alilain, W.J. | Oral Presentation | Philadelphia, PA
- **"Hot Topics" Control of Breathing Mixer (Experimental Biology Conference)** 2019
 - *"Approaching Regrowth after Cervical Spinal Cord Injury—Breathing Motor Outcomes Following Blockade of the Alpha-2-Delta-2 Subunit of Voltage-Gated Calcium Channels"* | **Silverstein, A.L.**, Stoltz, D.R., Strattan, L.E.H., Calulot, C.M., Maggard, R.S.J., Huffman, E.E., Ritter, K.J., and Alilain, W.J. | Oral Presentation | Orlando, FL

Intramural Oral Presentations

- **PhD Dissertation Defense Seminar, UK Department of Neuroscience** 2025
 - *“Leveraging clinical standards to improve the translational relevance of therapies for experimental spinal cord injury”* | **Silverstein, A.L.** | Oral Presentation | Lexington, KY
- **Graduate Student Seminar, UK Department of Neuroscience** 2022-2023
 - *“Breathing dysfunction after ethanol exposure or spinal cord injury: Cardiovascular, respiratory, and immune system approaches”* | **Silverstein, A.L.**, Calulot, C.M., Gensel, J.C., and Alilain, W.J. | 2023 Oral Presentation | Lexington, KY
 - *“Optimizing neuroplastic response to intermittent hypoxia treatment following experimental spinal cord injury”* | **Silverstein, A.L.**, Lawson, K. G., Yoo, J.H., Devine, C.E., and Alilain, W.J. | 2023 Oral Presentation | Lexington, KY
 - *“Optimizing intermittent hypoxia treatment through adaptation to individual differences: Towards personalized treatment following spinal cord injury”* | **Silverstein, A.L.**, Yoo, J.H., Devine, C.E., and Alilain, W.J. | 2022 Oral Presentation | Lexington, KY
- **UK Clinical and Translational Science Seminar** 2022
 - *“Intermittent Hypoxia Treatment as Precision Medicine: Towards Restoration of Respiratory Motor Function Following Cervical Spinal Cord Injury”* | **Silverstein, A.L.**, Yoo, J.H., Devine, C.E., and Alilain, W.J. | Oral Presentation | Lexington, KY
- **UK Professional Student Mentored Research Fellowship Seminar** 2021
 - *“Exploring Neural Cell Response to Intermittent and Sustained Hypoxia Treatment: Towards Better Therapies Following Cervical Spinal Cord Injury”* | **Silverstein, A.L.**, Miller, B. A., and Alilain, W.J. | Oral Presentation | Lexington, KY
- **Kentucky Neuroscience Institute Clinical-Translational Research Symposium** 2018
 - *“Exploring Approaches to Promote Respiratory Motor Plasticity Through Varied and Fixed Interval Intermittent Hypoxia”* | **Silverstein, A.L.**, Stoltz, D.R., Hager, L.E., Calulot, C.M., Maggard, R.S.J., Huffman, E.E., Ritter, K.J., Alilain, W.J. | Abstract and Oral Presentation | Lexington, KY

First Author Abstracts and Poster Presentations

- **29th Annual Kentucky Spinal Cord and Head Injury Research Trust Conference** 2024
 - *“Depletion of peripheral monocyte-derived macrophages leads to breathing motor and ventilatory deficits following C2 hemisection in adult female rats”* | **Silverstein, A.L.**, Calulot, C.M., Gensel, J.C., and Alilain, W.J. | Abstract and Poster Presentation | Louisville, KY
- **American Physiology Society Summit** 2024
 - *Ethanol pre-exposure attenuates the hypoxic ventilatory response and may attenuate expression of long-term facilitation following intermittent hypoxia treatment in adult rats”* | **Silverstein, A.L.** and Alilain, W.J. | Abstract and Poster Presentation | Long Beach, CA
- **American Physiology Society Summit** 2023
 - *“Serotonin supplementation and response-based optimization of intermittent hypoxia procedure improve expression of respiratory neuroplasticity”* | **Silverstein, A.L.**, Lawson, K. G., Yoo, J.H., Devine, C.E., and Alilain, W.J. | Abstract and Poster Presentation | Long Beach, CA
- **27th Annual Kentucky Spinal Cord and Head Injury Research Trust Conference** 2022

- “*Respiratory Response-Based Intermittent Hypoxia Treatment Leads to Diaphragmatic Long Term Facilitation in Adult Rats*” | **Silverstein, A.L.**, Yoo, J.H., Devine, C.E., and Alilain, W.J. | Abstract and Poster Presentation | Louisville, KY
- **Experimental Biology Research Conference (American Physiological Society)** 2022
 - “*Respiratory Response-Based Intermittent Hypoxia Treatment Leads to Diaphragmatic Long Term Facilitation in Adult Rats*” | **Silverstein, A.L.**, Yoo, J.H., Devine, C.E., and Alilain, W.J. | Abstract and Poster Presentation | Philadelphia, PA
- **Neuroscience 2021 (Society for Neuroscience Annual Meeting)** 2021
 - “*Intermittent Hypoxia, Sustained Hypoxia, and Normoxia Treatments Induce Differential Patterns of HIF-1 α and VEGF expression in the Central Nervous System of Uninjured Adult Rats*” | **Silverstein, A.L.**, Miller, B.A., and Alilain, W.J. | Abstract and Poster Presentation | Virtual
- **UK Center for Clinical and Translational Science Spring Conference** 2019
 - “*Improving Breathing Motor Ability by Exploration of a Novel Intermittent Hypoxia Treatment Paradigm After Cervical Spinal Cord Injury*” | **Silverstein, A.L.**, Stoltz, D.R., Hager, L.E., Calulot, C.M., Maggard, R.S.J., Huffman, E.E., Ritter, K.J., Alilain, W.J. | Abstract and Poster Presentation | Lexington, KY
- **Experimental Biology Research Conference (American Physiological Society)** 2019
 - “*Reversing Breathing Paralysis Through Optimization of Intermittent Hypoxia Treatment After Cervical Spinal Cord Injury*” | **Silverstein, A.L.**, Stoltz, D.R., Hager, L.E., Calulot, C.M., Maggard, R.S.J., Huffman, E.E., Ritter, K.J., Alilain, W.J. | Abstract and Poster Presentation | Orlando, FL
- **Posters at the Capitol Statewide Undergraduate Research Fair** 2019
 - “*Exploring Approaches to Promote Respiratory Motor Plasticity Through Varied and Fixed Interval Intermittent Hypoxia*” | **Silverstein, A.L.**, Stoltz, D.R., Hager, L.E., Calulot, C.M., Maggard, R.S.J., Huffman, E.E., Ritter, K.J., Alilain, W.J. | Abstract and Poster Presentation | Frankfort, KY
- **Neuroscience 2018 (Society for Neuroscience Annual Meeting)** 2018
 - “*Exploring Approaches to Promote Respiratory Motor Plasticity Through Varied and Fixed Interval Intermittent Hypoxia*” | **Silverstein, A.L.**, Ritter, K.J., Stoltz, D.R., Hager, L.E., Calulot, C.M., Maggard, R.S.J., Huffman, E.E., Witt, W.S., Alilain, W.J. | Abstract and Poster Presentation | San Diego, CA
- **Kentucky Neuroscience Institute Clinical-Translational Research Symposium** 2018
 - “*From Paralysis to Regrowth—Inducing Breathing Motor Recovery after Cervical Spinal Cord Injury*” | **Silverstein, A.L.**, Stoltz, D.R., Hager, L.E., Calulot, C.M., Maggard, R.S.J., Huffman, E.E., Ritter, K.J., Alilain, W.J. | Abstract and Poster Presentation | Lexington, KY
- **UK Dept. of Neuroscience IBS Graduate Program Introduction** 2018
 - “*Reversing Breathing Paralysis Through Optimization of Intermittent Hypoxia Treatment After Cervical Spinal Cord Injury*” | **Silverstein, A.L.**, Stoltz, D.R., Hager, L.E., Calulot, C.M., Maggard, R.S.J., Huffman, E.E., Ritter, K.J., Alilain, W.J. | Poster Presentation | Lexington, KY
- **UK Center for Clinical and Translational Science Spring Conference** 2018
 - “*Exploring Approaches to Promote Respiratory Motor Plasticity Through Varied and Fixed Intermittent Hypoxia*” | **Silverstein, A.L.**, Ritter, K.J., Stoltz, D.R., Hager, L.E., Calulot, C.M., Maggard, R.S.J., Huffman, E.E., Witt, W.S., Alilain, W.J. | Abstract and Poster Presentation | Lexington, KY
- **UK Undergraduate Research Fair** 2017

- “*Reversing Breathing Paralysis after Traumatic Spinal Cord Injury*” | **Silverstein, A.L.**, Hager, L.E., Alilain, W.J. | Abstract and Poster Presentation | Lexington, KY

Co-authored Abstracts and Posters

- **29th Annual Kentucky Spinal Cord and Head Injury Research Trust Conference** 2024
 - “*Investigating evidence of spontaneous intravascular coagulation after experimentally induced spinal cord injury in rats*” | Khalid, M., Mansilla, R., **Silverstein, A.L.**, and Alilain, W.J. | Abstract and Poster Presentation | Louisville, KY
- **UK Undergraduate Research Fair** 2024
 - “*Investigating evidence of deep vein thrombosis after experimentally induced spinal cord injury in rats*” | Mansilla, R., Khalid, M., **Silverstein, A.L.**, and Alilain, W.J. | Abstract and Poster Presentation | Lexington, KY
- **30th International Symposium on Cerebral Blood Flow, Metabolism, and Function** 2022
 - “*Pilot study to determine if High-Low training induces functional recovery in chronic spinal cord injury*” | Britsch, D.R.S., Cotter, K.M., Malone, M.K., Mendenhall, L.E., Newton, J.S., Ujas, T.A., **Silverstein, A.L.**, Turchan-Cholewo, J., Alilain, W.J., and Stowe, A.M. | Abstract and Poster Presentation | Glasgow, Scotland, UK
- **Society for Neuroscience Annual Meeting** 2018 and 2021
 - “*Naïve mice expressing human ApoE4 genotype exhibit greater baseline respiratory rate and less robust hypoxic ventilatory response than ApoE3 mice as measured by whole body plethysmography*” | Taylor, C. E., Newton, J.E., Calulot, C.M., **Silverstein, A.L.**, Strattan, L.E., Johnson, L.A., and Alilain, W.J. | 2021 Abstract and Poster Presentation | Virtual
 - “*Balancing neuroprotection with functional recovery: The role of the perineuronal net in preventing excitotoxicity after spinal cord injury.*” | Stoltz, D.R., Ritter, K.J., Huffman, E.E., **Silverstein, A.L.**, Hager, L.E., Maggard, R.S.J., Alilain, W.J. | 2018 Abstract and Poster Presentation | San Diego, CA.
- **Kentucky Academy of Sciences Annual Meeting** 2018
 - “*Effects of TEA and 4-AP on Firing Frequency of Proprioceptive Neurons in Crustaceans.*” | Higgins, E., Vela, K., Basham, R., Stanback, A.E., Stanback, M., Heberle, B.A., **Silverstein, A.L.**, Lane, A., Collis, B., Chithrala, B., Stanley, C., Ponder, M., Raichur, P., Akhtar, S., Marella, S. and Cooper, R.L. | Abstract and Poster Presentation | Bowling Green, KY.
 - “*The Influence of Endotoxic LPS on Primary Sensory Neurons in Crustaceans.*” | Stanback, M., Higgins, E., Vela, K., Basham, R., Stanback, A.E., Heberle, B.A., **Silverstein, A.L.**, Lane, A., Collis, B., Chithrala, B., Stanley, C., Ponder, M., Raichur, P., Akhtar, S., Marella, S. and Cooper, R.L. | Abstract and Poster Presentation | Bowling Green, KY.
- **Kentucky Neuroscience Institute Clinical-Translational Research Symposium** 2018
 - “*Effects of TEA and 4-AP on firing frequency of proprioceptive neurons in crustaceans.*” | Lane, A., Vela, K., Basham, R., Stanback, A.E., Stanback, M., Heberle, B.A., **Silverstein, A.L.**, Collis, B., Chithrala, B., Stanley, C., Higgins, E., Ponder, M., Raichur, P., Akhtar, S., Marella, S. and Cooper, R.L. | Abstract and Poster Presentation | Lexington, KY
 - “*The influence of endotoxic LPS on primary sensory neurons in crustaceans: Impact on human proprioception.*” | Vela, K., Basham, R., Stanback, A.E., Stanback, M., Heberle, B.A., **Silverstein, A.L.**, Lane, A., Collis, B., Chithrala, B., Stanley, C., Higgins, E., Ponder, M., Raichur, P., Akhtar, S., Marella, S. and Cooper, R.L. | Abstract and Poster Presentation | Lexington, KY

Honors, Awards, and Grants

Interdisciplinary Training in Alcohol Research T32

2022-2024

- NIH 5T32AA027488-04: Project leader Mark Fillmore, PhD & Co-I Mark Prendergast. My published project was to study the effects of alcohol exposure on expression of key respiratory plasticity induced by intermittent hypoxia in adult rats, due to the significance of such plasticity in obstructive sleep apnea, sudden infant death syndrome, and following traumatic spinal cord injury.

Professional Student Mentored Research Fellowship

2020-2021

- Grant awarded by the University of Kentucky to health profession students who independently write a compelling application describing the importance of their proposed project with adequate scientific detail in coordination with their research mentors.

Sandra J. Legan Award for Outstanding Neuroscience Research

2019

- Awarded by faculty mentor nomination at the University of Kentucky to one neuroscience undergraduate student per year for outstanding commitment to and achievement in research.

Dean's List Recipient

2015-2019

- Awarded for each of my 8 undergraduate semesters, merited by taking 12 or more hours of graded coursework and achieving a 3.6 GPA or above.

Horwitz/Horowitz Undergraduate Abstract Award

2019

- American Physiological Society award for outstanding abstract submitted by an undergraduate for presentation at the Experimental Biology meeting in Orlando, FL.

Horwitz/Horowitz Excellence in Undergraduate Research Award

2019

- American Physiological Society award for outstanding poster presentation of an independent research project by an undergraduate at the Experimental Biology meeting in Orlando, FL.

Chellgren Fellowship

2016-2017

- Competitive University of Kentucky Fellowship program for academic excellence, geared towards preparing motivated undergraduate students for competitive national and international awards, focusing on research and academically enhancing experiences.

Psychology Scholar

2015

- Granted to approximately 25 high-achieving incoming freshmen Psychology majors performing well in high school-level academic writing and testing.

Academic Service, Activities, and Leadership

Invited Peer-Reviewer for the following Journals:

11+ Manuscripts Reviewed to date

- Spinal Cord (Nature Publishing Group, 2026)
- Journal of Pain Research (Dove Medical Press, 2025)
- Therapeutics and Clinical Risk Management (Dove Medical Press, 2025)
- Orthopedic Research and Reviews (Dove Medical Press, 2025)
- Risk Management and Healthcare Policy (Dove Medical Press, 2025)
- International Journal of General Medicine (Dove Medical Press, 2025)
- International Medical Case Reports Journal (Dove Medical Press, 2025)
- Journal of Inflammation Research (Dove Medical Press, 2023)

- Scientific Reports (Nature Portfolio, 2023)
- Neural Regeneration Research (Wolters Kluwer Medknow Publications, 2022)

Member of University of KY MD/PhD Program Monthly Meeting Committee

2025-Present

Approx. 5 service hours to date

- Assist with planning and programming of MD/PhD program educational meetings
- Organize, prepare, and present monthly clinical case conferences derived from patient care experience
- Focus on interdisciplinary clinical education and translational relevance.

Member of University of KY MD/PhD Program Admissions Committee

2023-2025

Approx. 50 service hours, 30-60 applications reviewed

- Reviewed new and repeat MD/PhD applications across two admissions cycles
- Participated in applicant interviews and admissions deliberations
- Contributed to interview selection and acceptance recommendations

University of KY Senior Associate Dean for Medical Student Education Search Committee Member

2021-2022

Approx. 25 service hours

- Invited member of institutional leadership search committee
- Participated in application review, candidate evaluation, and interview processes
- Contributed to virtual and in-person interviews and candidate selection activities

Professional Memberships and Affiliations

- American Spinal Injury Association 2024
- American Society for Neurochemistry 2022-2023
- Society for Neuroscience (SfN) Member 2017-2019, 2021-2022
- American Physiological Society (APS) Member 2017-2019, 2021-2024

Mentorship and Teaching

Mentorship

As a PhD student within the Alilain Laboratory, University of Kentucky

2021-2025

- Medical Students:
 - Ms. Stefani Deschner, current MS-3 at University of Kentucky
- Master's Students:
 - Mr. Jae Hyun Yoo, graduated 2022, current M4 medical student at Ross University
- Undergraduate Students:
 - Ms. Katelyn Lawson, graduated 2023, current PT student at New York Medical College
 - Ms. Taylor Higgins, graduated 2025
 - Ms. Muznah Khalid
 - Ms. Rachel Mansilla
 - Mr. Mohit Patel
- High-School Students:
 - Ms. Caroline Devine, current University of Kentucky undergraduate, accepted into the Early Assurance Program for Medical School at the University of Kentucky

Teaching

As a Peer Leader for the UK Department of Chemistry, Lexington, KY

2017-2019

- Led twice-weekly recitation-style workshops for Organic Chemistry 1 and 2, emphasizing reaction mechanisms, synthesis strategies, and exam preparation on a 12:1 student:leader ratio.

As a Tutor for The Tutoring Club, Lexington, KY

2016-2019

- Provided academic tutoring to K-12 students in subjects including mathematics, chemistry, reading, and standardized test preparation on a 1:1 to 3:1 student:tutor ratio.

Community Service, Activities, and Leadership

Deacon in Christ Covenant Presbyterian Church

2022-Present

Approx. 310 service hours to date

- Elected member of church diaconate responsible for practical ministry, facility renovation and upkeep, and preparation for weekly worship services
- Organized charitable outreach initiatives, donation programs, and congregational service efforts
- Coordinated committees and churchwide projects supporting community engagement and internal community building

Christ Covenant Presbyterian Church Violinist

2015-Present

Approx. 500 service hours to date

- Perform solo and accompanied music during worship services on a volunteer basis
- Provide instrumental support for hymns and service interludes

Outreach Committee Member in Christ Covenant Presbyterian Church

2019- 2021

Approx. 35 service hours

- Participated in planning and development of community service initiatives
- Contributed to outreach strategy development and community engagement programming
- Assisted with modernization of church online presence and visitor engagement systems

Skills and Certifications

American Heart Association Advanced Cardiovascular Life Support

- Completed cognitive and skills training with examination on June 18, 2025, eCard code 265402732189.

CPI Nonviolent Crisis Intervention Certification

- Completed 8 hours of training on June 9, 2017 in recognizing and responding to violent crises safely and without injury to oneself or the aggressor.

Violinist

- Played violin for 23 years, 15 of which with a private teacher.
- Past participant in the University of Kentucky Symphony and Philharmonic Orchestras.

Limited Working Proficiency in Spanish Language

- Studied Spanish for 4 years in high school.
- Tested into 200 level classwork upon entry to University of Kentucky in Spanish, fulfilling all language requirements.
- Traveled to El Salvador for 1 week on a mission trip (2015), using largely skills in Spanish to communicate.