

AARON SILVERSTEIN

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(270) 559-2243

Education

University of Kentucky, Lexington, KY May 2019-Present
MD/PhD Program
Current G2, PhD Candidate
Alilain Lab, Department of Neuroscience

University of Kentucky, Lexington, KY Graduated Summa Cum Laude May 2019
B.S. in Psychology, B.S. in Neuroscience
Minor in Violin Performance
Departmental Honors in Neuroscience
Lewis Honors College
GPA: 3.977

Western Kentucky University, Bowling Green, KY Summer 2016
Five week-long summer study abroad music program held in Salzburg, Austria
GPA: 4.0

Experience

PhD Candidate, Alilain Laboratory, Lexington, KY July 2022-Present
Post-PhD Qualifying Exam MD/PhD Student funded by NIH 5T32AA027488-04

- Plan and carry out dissertation research on post-SCI intermittent hypoxia (IH) therapy optimization, compose corresponding NIH F30 grant application, perform ethanol-centered IH project for T32 grant, mentor more junior Alilain Lab members, and assist whole lab with various projects and collaborations.

Graduate Student Researcher Alilain Laboratory, Lexington, KY May 2021-July 2022
MD/PhD Graduate Student on Alilain Lab Grant Funding (until 5-2022) and NIH 5T32AA027488-04 (beginning 5-2022)

- Create and complete experimentation towards dissertation work focusing on improvement of intermittent hypoxia treatment following experimental cervical spinal cord injury, from a physiological and psychological perspective. Appropriately author scientific papers for publication from completed experiments.
- Conduct, synthesize, and write literature review(s) on subjects related to cervical spinal cord injury and treatments while assisting fellow graduate students and other lab members with their projects and lab duties.

Medical Student Researcher Alilain Laboratory, Lexington, KY July 2019-April 2021
MD/PhD Student Researcher- Professional Student Mentored Research Fellowship (PSMRF) and Alilain Lab Funding

- Create and begin experiment evaluating molecular response of neural cells to various patterns of intermittent hypoxia training in rats, based upon PSMRF grant mentored by Dr. Warren Alilain, PhD, and Dr. Brandon Miller, MD, PhD.
- Continue manuscript revisions for a first author publication from previous work, submit for publication, and respond to revisions of submitted manuscript.

Rotating Research Assistant Miller Laboratory, Lexington, KY May 2019-July 2019
MD/PhD Student Researcher-Miller Lab Funded

- Conduct independent research studies and assist other lab members in research 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 or perinatal rats.

Researcher Alilain Laboratory, Lexington, KY August 2018-May 2019
Undergraduate Researcher-Alilain Lab Funded

- Conduct and continue two original independent research projects on reversing breathing motor paralysis after traumatic cervical level spinal injury in rat models utilizing approaches inspired by pharmacological and psychological concepts, and author communication of primary research to publish in relevant journal.
- Develop collaborative improvements on measurement of breathing frequency using piezoelectrics, practice laboratory skills, assist with other lab members' projects, present recent findings, and participate in conceptual teaching and learning of scientific concepts and literature relevant to the lab's focus for 20 hours per week.

UK Department of Chemistry, Lexington, KY

August 2017-May 2019

Peer Leader-Paid

- Acting as primary instructor of a recitation-like workshop course devoted to review of undergraduate level organic chemistry I & II for peers enrolled in the accompanying lecture.
- Leading in-depth practice of concepts, mechanisms, synthesis strategies, test-taking and test-preparation strategies during class meetings with a 12:1 student:leader ratio on a twice-weekly basis during the fall and spring semesters.

Tutoring Club, Lexington, KY

February 2016-May 2019

Tutor-Paid

- Tutor students, preschool through high-school, for an average of 7 hours per week during the school semester. Subjects include Mathematics (Arithmetic through Calculus III), Phonics, Spelling, Chemistry, Spanish, Reading, ACT and SAT Prep, Writing, and Statistics.

KSCHIRT Researcher Alilain Laboratory, Lexington, KY

June 2018-August 2018

Summer Student Intern-Paid

- Conduct and continue two original independent research projects on reversing breathing motor paralysis after traumatic cervical level spinal injury in rat models utilizing approaches inspired by pharmacological and psychological concepts.
- Practice laboratory skills, assist with other lab members' projects, present recent findings, and participate in conceptual teaching and learning of scientific concepts and literature relevant to the lab's focus for 40 hours per week.

Researcher Alilain Laboratory, Lexington, KY

January 2017-May 2018

Undergraduate Researcher-Unpaid (obtained class credit)

- Conduct independent research projects on respiratory function after traumatic spinal injury and assist with other lab members' work for minimum of 10 hours weekly.
- Develop and implement skills including care for and handling of rats, conduction of aseptic technique, surgeries modeling spinal injuries in live, anesthetized rat models, tissue perfusion, injection of medication, imaging, scientific presentation and writing, as well as related techniques.

NeuroRestorative, Paducah, KY

June 2017-August 2017

Life Skills Trainer-Paid

- Taking care of individuals with acquired brain injuries, including medication administration, personal hygiene, cooking, and housework for 40+ hours a week.
- Participating in implementing rehabilitation training, such as helping each individual complete necessary tasks at an increasing level of independence, and constantly supervising individuals on an average patient to staff ratio of 3:1.

Academic Service, Activities, and Leadership

Invited Reviewer for Neural Regeneration Research

November 2022-Present

- Even as a trainee, I was invited and successfully completed a manuscript review for the journal Neural Regeneration Research because of my published work demonstrating expertise in neurotrauma and hypoxia.

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

October 2021-July 2022

- Contribute to a leadership search committee by invitation of the Acting Dean of the UK College of Medicine tasked with pursuing, evaluating, and interviewing qualified applicants for the position of Senior Associate Dean for Medical Student Education, whose responsibilities include overseeing medical student curriculum and insuring proper administration of all aspects of medical education across multiple regional campuses in accordance with accreditation standards for medical schools.

Graduate Student Mentor of Alilain Lab Junior Members

August 2021-Present

- Act as an individual mentor for junior members of the Alilain Lab under Dr. Alilain's authority to inspire, assist, and guide them in their independent research projects, scientific writing, and career goals. To date, mentored individuals have included Ms. Caroline Devine, a high-schooled student, and Mr. Jae Hyun Yoo, a master's degree student. I have assisted additional undergraduate students and newly joined graduate students as appropriate.

Honors, Awards, and Grants

Interdisciplinary Training in Alcohol Research T32

May 2022-Present

- NIH 5T32AA027488-04: Project leader Mark Fillmore, PhD & Co-I Mark Prendergast. My proposed project is 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

January 2020-April 2021

- Grant awarded (\$3000) 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

May 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

December 2015-May 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

April 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

April 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

August 2016-May 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

August 2015

- Granted to approximately 25 high-achieving incoming freshmen Psychology majors performing well in high school-level academic writing and testing.
- Provided students with personalized attention from professors, increased opportunities and requirement of undergraduate research, smaller class sizes, priority registration, and coaching for success.

Community Service, Activities, and Leadership

Deacon in Christ Covenant Presbyterian Church

October 2022-Present

- Minister to the practical needs of our church through preparation for weekly worship, charitable services and donations for those in need, and in organization of congregational committees and efforts for community building and churchwide projects as part of a diaconate of three members which reports to the church's governing session.

Outreach Committee Member in Christ Covenant Presbyterian Church

October 2019-Present

- Participate in a 4-person committee dedicated to the discovery and planning of effective service opportunities for our church to minister to our local community in relational, spiritual, and practical ways.
- Update and improve our church's online presence and methods for greeting and corresponding with visitors to our church, and personally present to our church's governing session and our congregation on outreach committee progress.

Christ Covenant Presbyterian Church Violinist

October 2015-Present

- Play solo and accompanied music during interludes and hymns of church service on a volunteer basis.

Skills and Certifications

American Heart Association Heartsaver® First Aid CPR AED Certification

- Completed cognitive and skills training with examination on adult first aid, CPR, and AED training on June 7, 2017.

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 18 years, 15 of which with a private teacher.
- 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, using largely skills in Spanish to communicate.

Professional Memberships and Affiliations

- American Society for Neurochemistry December 2022-Present
- Society for Neuroscience (SfN) Member November 2017-2019, 2021-Present
- American Physiological Society (APS) Member April 2017-2019, 2021-Present

Publications

- **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.
- 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.)*, 1-20.

Abstracts and Presentations

- **27th Annual Kentucky Spinal Cord and Head Injury Research Trust Conference** May 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
- **Univ. of Kentucky Clinical and Translational Science Seminar** April 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
- **Experimental Biology Research Conference (American Physiological Society)** April 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
- **“Hot Topics” Control of Breathing Mixer (Experimental Biology)** April 2022
 - “Towards optimization of therapeutic hypoxia treatment to promote neuronal sprouting and regeneration: A potential role for HIF-1 α 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
- **Neuroscience 2021 (Society for Neuroscience Annual Meeting)** November 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
 - “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. | Abstract and Poster Presentation | Virtual
- **Univ. of Kentucky Professional Student Mentored Research Fellowship Seminar** March 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
- **Univ. of Kentucky Center for Clinical and Translational Science Spring Conference** April 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)** April 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

- **“Hot Topics” Control of Breathing Mixer (Experimental Biology)** April 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

- **Posters at the Capitol Statewide Undergraduate Research Fair** February 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)** November 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
 - *“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. | Abstract and Poster Presentation | San Diego, CA.

- **Kentucky Academy of Sciences Annual Meeting** November, 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** October 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
 - *“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
 - *“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
 - *“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

- **Univ. of Kentucky Dept. of Neuroscience IBS Graduate Program Introduction** August 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

- **Univ. of Kentucky Center for Clinical and Translational Science Spring Conference** April 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

- **Univ. of Kentucky Undergraduate Research Fair** April 2017
 - *“Reversing Breathing Paralysis after Traumatic Spinal Cord Injury”* | **Silverstein, A.L.**, Hager, L.E., Alilain, W.J. | Abstract and Poster Presentation | Lexington, KY