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Sedona N. Ewbank

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Summary

Curious and intrinsically motivated researcher with 9 years of experience in computational and experimental neuroscience. Strong record of employing state-of-the-art computational tools and resources to create and use pipelines for visualizing, analyzing, modeling, and simulating neural activity, brain structure, and behavior across organisms. Extensive domain knowledge of neuroscience combined with working proficiency in machine learning. Keen interest in solving the big questions in neuroscience.

Education

Stanford University *Sept. 2019 – present*
PhD in Neurosciences
National Sciences Foundation Graduate Research Fellow
Thesis: "Profiling the effects of subanesthetic ketamine on naturalistic behavior and brain microstructure"

University of Washington *Sept. 2015 – Aug. 2018*
BS in Neurobiology and Biochemistry
Departmental distinction; magna cum laude; Washington Research Fellow
Honor's Thesis: "Chronic AgRP Neuronal Stimulation is Not Sufficient to Cause Chronically Increased Food Intake in Mice"

Experience

Graduate Research Assistant *Sept. 2020 – Present*
Stanford University *Stanford, CA*
Advised by Raag D. Airan, MD, PhD

Research Technician *Aug. 2017 – Aug. 2019*
Howard Hughes Medical Institute / University of Washington *Seattle, WA*
Advised by Richard D. Palmiter, PhD

Summer Research Fellow *July 2017 – Aug. 2017*
École Polytechnique Fédérale de Lausanne *Lausanne, VD, CH*
Advised by Brian D. McCabe, PhD

Undergraduate Research Fellow *April 2016 – June 2017*
University of Washington *Seattle, WA*
Advised by Leo J. Pallanck, PhD

Research and Development Intern *July 2015 – Sept. 2015*
Aervoe Industries, Inc. *Gardnerville, NV*

Skills

Computational
- Languages: Python, Matlab, Shell, R
- Tools: scikit-learn, scipy, numpy, statsmodels, tensorflow, matplotlib, NetworkX, MNE, FSL, nibabel, nilearn, DeepLabCut, KeyPoint-MoSeq, VAME, B-SOiD
- Systems: high-performance computing, containerized software
- Methods: signal processing, biomedical image analysis, machine learning, statistics, pharmacokinetic modeling, simulation

Experimental
- Rodent husbandry, stereotactic surgery, behavior, histology, and functional ultrasound imaging
- *D. melanogaster* husbandry, genetics, behavior, and histology
- Immunohistochemistry

Research Support

Ongoing

- National Science Foundation Graduate Research Fellowship — $138,000 *2021-2026*
  "Focal Neuromodulation by Ultrasound-Gated Nanoparticle Release of a $GABA_A$ Receptor Antagonist"

Past

- Neuroscience Preclinical Imaging Lab Neuroimaging Pilot Grant — $5,000 *2023-2024*
  "Developing a translational diffusion MRI-based biomarker for the therapeutic action of psychedelics"
- Washington Research Foundation Fellowship — $7,500 *2017-2018*
  "Investigating whether AgRP neuronal maintenance of energy homeostasis involves regulation of the gut microbiota in mice"
- University of Washington Mary Gates Research Scholarship — $5,000 *2017*
  "Genetic screen for modifiers of GBA1 pathogenicity in D. melanogaster model of GBA1 deficiency"

Awards & Honors

- International Society for Magnetic Resonance in Medicine Magna Cum Laude Merit Award *2025*
- International Society for Magnetic Resonance in Medicine Trainee Educational Stipend *2025*
- Stanford University Mind, Brain, Computation, & Technology Program *2022*
- Stanford University School of Medicine Bertarelli Fellowship *2021*
- Society for Neuroscience Trainee Professional Development Award *2018*
- University of Washington Undergraduate Research Conference Travel Award *2018*
- University of Washington Husky 100 Award *2018*
- University of Washington Rex J. and Ruth C. Robinson Scholarship Fund in Chemistry *2017*
- ThinkSwiss Summer School Scholarship *2017*
- University of Washington Purple and Gold Scholarship *2015*
- National AP Scholar and AP Scholar with Distinction *2015*
- Nevada Prize Exam in Mathematics Certificate of Merit and Best Paper awards *2014*

Publications

Yu BJ, Purohit M, Sinha Roy K, Xiang Y, **Ewbank SN**, ... Airan RD. "Acoustically activatable liposomes as a translational nanotechnology for site-targeted drug delivery and noninvasive neuromodulation." Nat Nanotechnol. 2025 Aug 18;ePub. doi:10.1038/s41565-025-01990-5

Muwanga GPB, Pang A, **Ewbank SN**, Siliezar-Doyle J, Nippert A, Airan RD, Tawfik VL. "Ethological profiling of pain and analgesia in a mouse model of complex regional pain syndrome." bioRxiv. 2025 April 01. doi: 10.1101/2025.03.28.644648

Di Ianni T, **Ewbank SN**, Levinstein MR, Azadian MM, Budinich RC, Michaelides M, Airan RD. "Sex dependence of opioid-mediated responses to subanesthetic ketamine in rats." Nat Commun. 2024 Jan 30;15,893. doi:10.1038/s41467-024-45157-7

Ewbank SN, Campos CA, ... Palmiter RD. "Chronic Gq signaling in AgRP neurons does not cause obesity." Proc Natl Acad Sci USA. 2020 Aug 25;117(34):20874-20880. doi:10.1073/pnas.2004941117

Presentations

Oral

Ewbank SN, Hart AR, Dai E, Gopal DN, St. Laurent RM, Vo I, Magana O, Mukunda P, McNab JA, Rodriguez CI, Airan RD. "Cross-species quantification of the effect of ketamine on gray matter microstructure in obsessive-compulsive disorder." Oral presentation. International Society for Magnetic Resonance in Medicine (ISMRM) Annual Meeting & Exhibition. Honolulu, HI. *2025*

Ewbank SN, Muwanga GPB, Gopal DN, Yu BJ, Tawfik VL, Airan RD. "Quantitative ethological profiling of the psychopharmacology and pain-alleviating effects of subanesthetic ketamine." Oral presentation. Society for Neuroscience. Chicago, IL. *2024*

Ewbank SN. "Noninvasive quantification of ketamine-induced structural plasticity in mice using multishell diffusion weighted imaging." Oral presentation. Wu Tsai Neuroscience Preclinical Imaging Lab Symposium. Stanford, CA. *2024*

Poster

Ewbank SN, Habib P, Liang X, Noristani R, Kim J, Bliss TM, Airan RD, Steinberg G. "Leveraging a reproducible diffusion MRI analysis pipeline to characterize stem cell-driven structural recovery in stroke-injured rat brains." Poster. Knight Initiative for Brain Resilience Symposium. Stanford, CA. *2025*

Ewbank S, Hart A, Muwanga G, Gopal D, Sinha Roy K, Yu B, St. Laurent R, Tawfik V, Rodriguez C, McNab J, Airan R. "Quantitative Profiling of the Effects of Subanesthetic Ketamine on Naturalistic Behavior and Brain Microstructure." Poster. American College of Neuropsychopharmacology Annual Meeting. Phoenix, AZ. *2024*

Ewbank S, Hart A, Muwanga G, Gopal D, Sinha Roy K, Yu B, St. Laurent R, Tawfik V, Rodriguez C, McNab J, Airan R. "Quantitative profiling of the effects of subanesthetic ketamine on naturalistic behavior and brain microstructure." Poster. Wu Tsai Neurosciences Institute Symposium: Brains & Machines: The Co-Evolution of Neuroscience and AI. Stanford, CA. *2024*

Ewbank SN, Hart AR, Casey AB, McNab JA, Heifets BD, and Airan RD. "Noninvasive quantification of ketamine-induced structural plasticity in mice using multishell diffusion weighted imaging." Poster. International Society for Magnetic Resonance in Medicine (ISMRM) Annual Meeting & Exhibition. Singapore. *2024*

Ewbank SN, Gopal DN, Airan RD. "Quantitative ethological profiling of the effects of subanesthetic ketamine in health, chronic pain, and substance withdrawal in rats." Poster. NIH HEAL Initiative Scientific Meeting. Rockville, MD. *2024*

Ewbank SN, Di Ianni T, Bishop JH, Airan RD. "Computational analysis of ketamine's effects on naturalistic behaviors and pain in rats." Poster. Wu Tsai Neurosciences Institute Retreat Symposium. Santa Cruz, CA. *2022*

Ewbank SN, Campos CA, Padilla SL, Bowen AJ, Palmiter RD. "The role of AgRP neurons in shaping the composition and energy harvest capacity of the gut microbiota." Poster. Society for Neuroscience. San Diego, CA. *2018*

Ewbank SN, Campos CA, Padilla SL, Bowen AJ, Palmiter RD. "Energy Homeostasis Neural Circuitry In the Brain Regulates the Composition of the Gut Microbiota." Poster. University of Washington Undergraduate Research Symposium. Seattle, WA. *2018*

Ewbank SN, Asadzadeh J, McCabe BD. "Establishing a Drosophila Model System to Study Tau Imbalance and Spreading in Neural Circuits." Poster. École Polytechnique Fédérale de Lausanne Summer Research Program Poster Symposium. Lausanne, VD, CH. *2018*

Ewbank SN, Germanos AA, Pallanck LJ, Davis MY. "Using a Drosophila melanogaster Model to Understand the Role of Mutations in the Glucosidase, Beta Acid 1 Gene in Parkinson's Disease." Poster. UW Department of Neurology Trainee Research Symposium. Seattle, WA. *2017*

Ewbank SN, Germanos AA, Pallanck LJ, Davis MY. "Using a Drosophila melanogaster Model to Understand the Role of Mutations in the Glucosidase, Beta Acid 1 Gene in Parkinson's Disease." Poster. University of Washington Undergraduate Research Symposium. Seattle, WA. *2017*

Teaching & Service

Service

- Stanford Bio-X Science Day, Volunteer *2025*
- Stanford Future Advancers of Science and Technology (FAST), Mentor *2020-2022*
- Stanford Neurosciences Application Assistance Program (SNAAP), Mentor *2020-2022*
- Stanford Biosciences Student Association, NSF GRFP Application Mentor *2021*

- PATH (People Assisting The Homeless) Thanksgiving Dinner, Volunteer *2021*
- WeHOPE Shelter Christmas Dinner and Concert, Volunteer Mandolinist and Server *2019*
- University of Washington Undergraduate Research Program, Leader *2017-2018*
- Bethany Community Church Women's Shelter, Overnight Volunteer *2017-2019*
- University of Washington Grey Matters, Writer *2018*
- Alzheimer's Association, Seattle Walk to End Alzheimer's Planning Team *2017*

Teaching

- Stanford Neurosciences Preclinical Imaging Laboratory Data Processing Workshop, Instructor *2024*
- Stanford Neuroscience Undergraduate Research Opportunity Fellowship, Teaching Assistant *2022*
- Stanford Intensive Neurosciences Boot Camp (NEPR 299), Teaching Assistant *2020*

Peer Reviewing

- Biological Psychiatry, *ad hoc* reviewer *2025*
- Neuropsychopharmacology, *ad hoc* reviewer *2025*
- Neuropharmacology, *ad hoc* reviewer *2022*