Benjamin Liu

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Overview

- Experimental neuroscientist with a rigorous computational background and specialization in electrophysiology, pharmacology, and neural signal processing.

- Experienced in generating innovative project ideas, developing novel experimental/analysis methodologies, and communicating results at an audience-appropriate level.

Technical skills

- Expert in electrophysiological techniques: whole-cell patch clamp, multi-electrode array, implanted 16-channel electrode, intracranial EEG, and bipolar electrode stimulation.

- Extensive experience working on *in vivo* (mouse) and *in vitro* (acute brain slice, organotypic culture, dissociated culture) models of neurological disease: Fragile X (FMR1), Alzheimer's (J20, APP-KI), and Epilepsy (Dravet Syndrome).

- Advanced understanding of statistics, neural data analysis methods, machine learning (dimensionality reduction, classification, regression), and modeling (biophysical models, spiking neural networks) in MATLAB and Python.

- Optogenetics, viral transduction, gene transfection, neuronal culture, histology, imaging and pharmacology.

Education

University of California, Los Angeles
Ph.D. – Neuroscience

Los Angeles, CA
September 2018 – March 2024

Boston University
Bachelor of Arts – Neuroscience

Boston, MA
May 2016

Experience

UCLA Neuroscience Interdepartmental program – Ph.D.
Graduate student researcher (Mentor: Dean Buonomano)

Los Angeles, CA
September 2018 – March 2024

- Led research project on cortical circuit plasticity resulting in 2 first-author publications.
- Collaborated on 2 translational studies (Fragile X, Epilepsy) resulting in 2 co-author publications.
- Executed electrophysiological recordings in organotypic cortical cultures and acute brain slices.
- Developed a novel optogenetic method for creating neuronal ensembles in cortical circuits.
- Designed novel analysis pipelines for electrophysiological, 2-Photon Ca imaging, and behavioral datasets.
- Hired, trained, and supervised research associates, graduate students, and laboratory technicians.

Gladstone Institute of Neurological Disease
Research Associate II (Mentor: Jorge Palop)

San Francisco, CA
July 2016 – August 2018

- Optimized compound-testing pipeline on the MED64-QuadII system (multielectrode array).
- Collaborated with Genentech on ion-channel drug discovery resulting in 1 co-author publication.
- Performed MEA/patch clamp recordings on human MGE-derived neurons (Neurona Therapeutics).
- Analyzed electrophysiological (MEA, patch clamp) and behavioral data (open-field, MWM, linear-track).

Boston University – B.A   Boston, MA
Undergraduate student researcher (Mentor: Jen-wei Lin)   January 2015 – June 2016

- Sharp electrode and extracellular local field potential recordings at the crayfish neuromuscular junction.
- Igor Pro analysis and fitting of postsynaptic potentials under various pharmacological manipulations.
- Preparation of Pyrethroid pesticides (Permethrin) and ion-channel blockers.

Johnson & Johnson (Alios Biopharma)   San Francisco, CA
Laboratory Technician   May 2013 – December 2014

- Prepared experimental compounds, reagents, and equipment for medicinal chemistry experiments.
- Maintained laboratory and documentation to ensure compliance with inspections.

Publications

(Submitted) **Liu, B.,** *& Buonomano, D. V.* **(2024)**. *Ex Vivo Cortical Circuits Learn to Predict and Spontaneously Replay Temporal Patterns.*

Liu, B., Seay, M. J., & Buonomano, D. V. **(2023)**. Creation of Neuronal Ensembles and Cell-Specific Homeostatic Plasticity through Chronic Sparse Optogenetic Stimulation. *Journal of Neuroscience, 43*(1), 82–92.

Kourdougli, N., Suresh, A., **Liu, B.**, Juarez, P., Lin, A., Chung, D. T., Graven Sams, A., Gandal, M. J., Martínez-Cerdeño, V., Buonomano, D. V., Hall, B. J., Mombereau, C., & Portera-Cailliau, C. **(2023)**. Improvement of sensory deficits in fragile X mice by increasing cortical interneuron activity after the critical period. *Neuron, 111*(18), 2863–2880.e6.

Molnár, L., Ferando, I., **Liu, B.**, Mokhtar, P., Domokos, J., & Mody, I. **(2023)**. Capturing the power of seizures: an empirical mode decomposition analysis of epileptic activity in the mouse hippocampus. *Frontiers in molecular neuroscience, 16*, 1121479.

Hanson, J. E., Ma, K., Elstrott, J., Weber, M., Saillet, S., Khan, A. S., Simms, J., **Liu, B.**, Kim, T. A., Yu, G. Q., Chen, Y., Wang, T. M., Jiang, Z., Liederer, B. M., Deshmukh, G., Solanoy, H., Chan, C., Sellers, B. D., Volgraf, M., Schwarz, J. B., … Palop, J. J. **(2020)**. GluN2A NMDA Receptor Enhancement Improves Brain Oscillations, Synchrony, and Cognitive Functions in Dravet Syndrome and Alzheimer's Disease Models. *Cell reports, 30*(2), 381–396.e4.

Awards

University of California Dissertation Year Fellowship Program (2023-2024)

Eva Kavan Prize for Excellence in Research on the Brain – UCLA Brain Research Institute (2023)

UCLA Brain Research Institute Research Travel Award (2021, 2022, 2023)

Notable Courses

35th Methods in Computational Neuroscience – Marine Biological Laboratory (2023)