ELAN SCHONFELD
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EDUCATION

Columbia University in the City of New York, Columbia College — **New York, NY**
Bachelor of Arts in Computational Biology — **Expected May 2027**

Northwestern University — **Evanston, IL**
Concentration in Mathematics (Non-Degree Seeking Student) — **June 2023**

RESEARCH EXPERIENCE

Gabriele Bartoli Brain Tumor Lab, Columbia Medicine — **New York, NY**
Undergraduate Researcher — **June 2024 - Present**

- Designed and implemented an integrated machine learning and bioinformatics pipeline to analyze single-nuclei RNA sequencing data, characterizing genetic heterogeneity in cells that survive novel therapeutics, and identifying and testing in vitro potential vulnerabilities in these "super-survivor" cell populations.
- Conducted experiments measuring calcium transients and cell signaling protein release in microglial cells to model the tumor microenvironment.

Neuro-Spine Research Group, Columbia Neurosurgery — **New York, NY**
Undergraduate Researcher — **July 2023 - Present**

- Assessed the impact of psychosocial factors on patient outcomes following surgery to treat degenerative vertebral slippage (spondylolisthesis). (Published, Journal of Neurosurgery: Spine.)
- Performed a joint unsupervised/supervised machine-learning predictive analysis (K-Means + feature selection on a tree-based gradient boosted model) to identify factors that predict inferior vs. superior outcomes for elderly patients who received surgery to treat lumbar spondylolisthesis. (Published, Journal of Neurosurgery: Spine.)

Awatramani Lab, Northwestern Medicine — **Chicago, IL**
Undergraduate Researcher — **July 2020 - Present**

- Identified 20 distinct subtypes of dopamine neurons from snRNA-seq data and mapped their locations using spatial transcriptomics. Showed that in a mouse model of genetic Parkinson's Disease (PD), the subtypes are preserved and exhibit distinct gene expression changes. Led analysis of genome-wide association studies, revealing that PD risk is highest in a subtype defined by expression of the gene ANXA1. (Published, eLife.)
- Led project training a Mixture of Experts (MoE) pipeline for the classification of dopamine neurons from human scRNA-seq data into PD vulnerable vs. non-vulnerable, and then further predicting human cell types using trained "expert" models with convolutional neural network architecture. This system was then used to predict human cell type identities in mouse snRNA-seq data, revealing trends between mouse and human dopamine neuron subtypes.

SELECTED PUBLICATIONS & ORAL PRESENTATIONS

- Gaertner et al. Molecular and spatial transcriptomic classification of midbrain dopamine neurons and their alterations in an $LRRK2^{G2019S}$ model of Parkinson's disease. eLife.
- Schonfeld et al. Lateralized Deficits in Motor, Sensory, and Olfactory Domains in Dementia. J Alzheimers Dis.
- Prasad et al. Deep learning applied to polysomnography to predict blood pressure in obstructive sleep apnea and obesity hypoventilation: a proof-of-concept study. Journal of clinical sleep medicine.
- Schonfeld et al. Autocatalytic-protection for an unknown locus CRISPR-Cas countermeasure for undesired mutagenic chain reactions. Journal of Theoretical Biology.
- Yang et al. Does Back Pain Catastrophizing Influence 5-year Surgical Outcomes for Patients with Degenerative Lumbar Spondylolisthesis? A Quality Outcomes Database Study. 2025 DSPN Spine Summit. (**Mummaneni Award)**
- Yang et al. Which Machine Learning Algorithms Best Predict 5-Year Minimum Clinically Important Differences in QOD Lumbar Spondylolisthesis Patients? 2024 AANS Annual Scientific Meeting.

SKILLS

- **Technical:** Emergency Medical Technician (Basic), Python, PyTorch, TensorFlow, Keras, scikit-learn, R, Seurat.
- **Laboratory:** Immunohistochemistry, RT-qPCR, Gel Electrophoresis, PCR, Intersectional Genomics.
- **Research:** Machine Learning, Deep Learning, Bioinformatics, Single-Cell/Nucleus RNA Sequencing Analysis.