Alexander L. Han

haalexan@umich.edu | alexander-han.com | github.com/alhanster | linkedin.com/in/alexanderlhan/

EDUCATION

University of Michigan | M.D. Ph.D. Candidate (MSTP Fellow) 2025 - Present

- M.D. curriculum (2025 - Fall 2027); no Ph.D. coursework or rotations to date

Rice University | B.A. Statistics, B.S. Biochemistry 2020 - 2024

- GPA: 3.98/4.00 *summa cum laude* (School of Engineering) & Phi Beta Kappa
- Full-Ride Merit Scholarship: Trustee Distinguished Scholar and Century Scholar
- National finalist: Rhodes Scholarship 2024 and Marshall Scholarship 2024

RESEARCH INTERESTS

Generative Genomics, Systems Biology, Statistical Genomics

PUBLICATIONS

Journal Articles

Han, A. L.*, Sands, C. F.*, Matelska, D., Butts, J. C., Ravanmehr, V., Hu, F., Gonzalez, E. V., Katsanis, N., Bustamante, C. D., Wang, Q., Petrovski, S., Vitsios, D., & Dhindsa, R. S. (2025). Diverse ancestral representation improves genetic intolerance metrics. *Nature Communications*, 16, 2648. https://doi.org/10.1038/s41467-025-57885-5

Yoo, S. Y.*, **Han, A. L.***, Park, S., & Lee, J. Y. (2022). Incidence and cognitive decline of Alzheimer's disease and other dementia by apolipoprotein ε4 allele presence: A community-based cohort study in Korean elderly. *Psychiatry Investigation*, 19(3), 190–196. https://doi.org/10.30773/pi.2021.0347

In Revision

Chung, D. C., Deng, X., Yalamanchili, H., Revelli, J. P., **Han, A. L.**, Tadros, B., Richman, R., Dias, M., Naini, F. A., Boeynaems, S., Hyman, B. T., & Zoghbi, H. Y. The big tau splice isoform resists Alzheimer's-related pathological changes. *Nature*. Preprint: https://doi.org/10.1101/2024.07.30.605685

Ham, H.*, **Han, A. L.*,** Bae, M., Lee, H., Son, J., Yeo, J., Yoon, E. J., Lee, S.-I., Lim, J.-I., Kim, K. Y., Jeon, S. Y., Kim, Y. K., & Lee, J. Y. Vocal acoustic biomarkers predict amyloid positivity in non-demented individuals.

Under Review

Han, A. L., Slotnik, M., Fox, D. A., Gudjonsson, J.E., Kahlenberg J. M., & Welch, J. D. Genome-scale perturbation signatures from primary human CD4+ T cells improve genetics-based prioritization of immune drug targets. Preprint: https://doi.org/10.64898/2026.09.12.748195

* Joint/Co-first authorship

RESEARCH EXPERIENCE

Computational Research

University of Michigan, Ann Arbor, MI

Independent Researcher, Collaborating with Joshua Welch 2026 - Present

- Developed IGNITE, the first model that prioritizes therapeutic targets by combining human genetic priors with single-cell perturbation data.
- IGNITE outperformed genetics-only model in recovering approved targets, held-out in-trial targets, and in temporal validation. https://ignite.eecs.umich.edu/

Alexander L. Han

haalexan@umich.edu | alexander-han.com | github.com/alhanster | linkedin.com/in/alexanderlhan/

Baylor College of Medicine, Houston, TX
Researcher, Ryan Dhindsa Lab 2023 - 2025

- Computed genic and sub-genic intolerance metrics across 460,000 UK Biobank and 126,000 gnomAD exomes; MTR trained on 43,000 multi-ancestry exomes outperformed a 10-fold larger European-only cohort, with European-only scores approaching saturation (*Nat Commun* 2025).
- Identified plasma proteomic biomarkers for *SYNGAP1*-related neurodevelopmental disorder using Olink Explore HT (~5,400 proteins).
- Built a positive-unlabeled learning pipeline (Random Forest, XGBoost, SVM) for drug-target prioritization, integrating Open Targets, DrugBank, OMIM, ClinVar, gnomAD, and UniProt.

University of Barcelona, Barcelona, Spain
Visiting Researcher, Alzheimer's disease group 2024 - 2026

- Built ML models predicting Alzheimer's progression from MRI scans and neuropsychological exams.
- Demonstrated neither sex nor *APOE4* explains variability in progression trajectories (AAIC Next 2025).

Seoul National University College of Medicine, Seoul, South Korea
Researcher, Jun-Young Lee Lab 2019 - Present

- Analyzed vocal acoustic features and created ridge regression and linear SVM classifiers that can predict amyloid positivity in non-demented individuals.
- Examined *APOE4*-stratified dementia incidence and cognitive decline in Korean elderly cohort.

Experimental Research
Baylor College of Medicine, Houston, TX
Researcher, Huda Zoghbi Lab (HHMI) 2021 - 2024

- Investigated unique biochemical properties of understudied tau isoform (big tau) across wild-type mouse brain, HEK293T and mouse models, and human post-mortem cerebellum.
- Optimized co-IP mass-spec screen to identify big tau-specific interactors; validated top interactors across mouse cerebellum and three cell lines (HEK293T, N1E-115, and N2a); mapped their binding domain.
- Contributed to CRISPR-based genetic screen for novel regulators of tau and big tau.
- Completed 4 independent projects and 2 full summers, amounting to ~3000 total hrs.

SELECTED CONFERENCE PRESENTATIONS / POSTERS

Ham, H.*, **Han, A. L.***, Bae, M., Lee, H., Son, J., Yeo, J., & Lee, J. Y. Voice biomarkers across the Alzheimer's disease continuum: From amyloid pathology to clinical severity. *Alzheimer's Association International Conference (AAIC),* London, United Kingdom, 2026. [Poster Presentation]

Han, A. L., Falgàs, N., Bosch, B., Balasa, M., Sánchez-Valle, R., & Pérez-Millan, A. Sex and APOE4 does not explain variability in Alzheimer's disease progression observed from structural MRI. *Alzheimer's Association International Conference (AAIC) Neuroscience Next*, Barcelona, Spain, 2025. [Poster Presentation]

Han, A. L., Sands, C. F., Matelska, D., Butts, J. C., Ravanmehr, V., Hu, F., Gonzalez, E. V., Katsanis, N., Bustamante, C. D., Wang, Q., Petrovski, S., Vitsios, D., & Dhindsa, R. S. Increased representation of human genetic ancestries improves genetic intolerance metrics. *American Society of Human Genetics (ASHG),* Denver, CO, USA, 2025. [Poster Presentation]

Chung, D. C., Deng, X., Yalamanchili, H., Revelli, J. P., **Han, A. L.**, Tadros, B., Richman, R., Dias, M., Naini, F. A., Boeynaems, S., Hyman, B. T., & Zoghbi, H. Y. The big tau isoform resists Alzheimer's-related pathological changes. *Keystone Symposium on Neurodegeneration*, British Columbia, Canada, 2023. [Poster Presentation]

Alexander L. Han

haalexan@umich.edu | alexander-han.com | github.com/alhanster | linkedin.com/in/alexanderlhan/

Chung, D. C., Deng, X., Yalamanchili, H., Revelli, J. P., **Han, A. L.**, Tadros, B., Richman, R., Dias, M., Naini, F. A., Boeynaems, S., Hyman, B. T., & Zoghbi, H. Y. Big tau isoform resists pathological changes. *Annual Meeting of Society for Neuroscience (SfN),* San Diego, CA, USA, 2022. [Poster Presentation]

SOFTWARE

Genetic intolerance metrics, Primary Developer
github.com/alhanster/ancestral_diversity

IGNITE, Primary Developer
github.com/alhanster/ignite_public

SELECTED FUNDING & HONORS

Funding
$20,000 compute grant through Anthropic and MIT (AI For Science Program) 2026
Travel Award, AAIC Neuroscience Next 2025
Wagoner Foreign Study Scholarship ($15,000), Rice University 2024

Honors
Selected Participant (Top 8%), Built with Claude Life Sciences, Anthropic 2026
Alumni in Medicine Research Award, Rice University 2025
Distinction in Research, Department of Statistics, Rice University 2024
Distinction in Research, Department of Biosciences, Rice University 2024
Engineering Alumni Leadership Excellence Award, Rice University 2023, 2024

Technical Skills

Languages & Tools: Python (PyTorch, scikit-learn), R, SQL, MATLAB, Claude Code
Computational Genomics: Population genetics, whole exome/genome analysis, constraint metrics, rare-variant gene-level collapsing analysis, high-throughput proteomics, Perturb-seq analysis, database integration (OMIM, Open Targets, DrugBank, ClinVar, gnomAD, All by All, AstraZeneca PheWAS).
Wet Lab (~3000 hrs): Co-IP, SDS-PAGE, western blot (near-infrared and chemiluminescent), silver staining, quantitative ELISA, qPCR, RNA purification and cDNA synthesis, mouse genotyping, cell culture, transient transfection, brain tissue harvest and fixation

Teaching and Mentorship

Baylor College of Medicine, Houston, TX
Research Mentor, Ryan Dhindsa Lab 2025
- Masha Zaitsev, Undergraduate Independent Research Course, Rice University

Rice University, Houston, TX
Academic Fellow & Peer Academic Advisor 2020 – 2024
- tutored statistics and chemistry on weekly basis for residential college
- assisted in course and career planning

President, Empower 2020 – 2024
- organized hands-on STEM programming for middle and high schools in lower-income districts

Grader, STAT 310 (Probability & Statistics) 2023

Leadership & Service

Co-founder, CEO, Board Member Biokind Analytics - biokind.org 2022 - Present

Alexander L. Han

haalexan@umich.edu | alexander-han.com | github.com/alhanster | linkedin.com/in/alexanderlhan/

- Provided pro bono data analytics, infrastructure, and predictive modeling services for healthcare non-profits
- Established 23 regional chapters (e.g. University of Virginia, University of Sydney, University of Toronto)
- Partnered with 80+ organizations (Make-A-Wish, ALS Association, and National Alliance on Mental Illness), analyzing $900M+ in combined donations
- Finalist for Classy Awards 2023 (50 out of approx. 1500 non-profits operating in 150 countries)
- Story covered by Houston Chronicle (bit.ly/biokindarticle)

Co-President, Alzheimer's Buddies, Rice University 2020 - 2024

- Led weekly activities at dementia care clinics and raised funding for Alzheimer's research.
- Organized annual student research symposiums on Alzheimer's.