# Wei Zhang, Ph.D.

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Division of Biostatistics, Department of Public Health Sciences
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## Research Interests

- Statistical machine learning methods for integrative multi-omics analysis and representation learning
- Method development for biomarker discovery and disease subtyping in neurodegenerative diseases and cancer
- Interpretable and scalable models for high-dimensional genomic, epigenomic, and neuroimaging data

## Education

**University of Miami** *Miami, FL*
*Ph.D. in Biostatistics* (Advisor: X. Steven Chen, Ph.D.) Aug 2024

- Dissertation: *Integrative Multi-Omics Analysis Using Multivariate Random Forest*

**The George Washington University** *Washington, DC*
*M.S. in Statistics* May 2019

**State University of New York at Binghamton** *Binghamton, NY*
*B.S. in Economics Analysis & Actuarial Mathematics* May 2017

## Research Positions

**University of Miami, Miller School of Medicine** *Miami, FL*
*Postdoctoral Associate, Dept. of Public Health Sciences* Sep 2024 – Present

- Develop novel statistical and computational methods for integrating multi-omics data (genomics, epigenomics, transcriptomics) to identify biomarkers and therapeutic targets.
- Lead multi-omics random forest framework development for biomarker discovery, disease subtyping, and cross-modal data integration.
- Conduct genome-wide DNA methylation studies in Alzheimer's cohorts and cancer datasets (TCGA, ADNI).
- Develop integrative aging biomarkers combining blood DNA methylation and brain MRI for Alzheimer's disease prognosis.
- Design deep learning architectures (VAE with domain-adversarial training) for aligning tumor and cell-line transcriptomic profiles.

*Graduate Research Assistant, Dept. of Public Health Sciences* May 2022 – Aug 2024

- Performed integrative genomic and epigenomic analyses for Alzheimer's biomarker discovery, triple-negative breast cancer, and colorectal cancer.
- Developed and validated transcriptome-based prediction models and network-based biomarker selection methods.
- Contributed to grant proposal preparation and multi-institutional collaborative research.

## Publications & Preprints

[*] *Corresponding author. Full list: Google Scholar*

### Peer-Reviewed Journal Articles

1. O'Shea DM*, Wang L, Lukacsovich D, Dhanekula D, **Zhang W**, Galvin C, Joshi M, Besser L, Rundek T, Galvin JE. (2026). "Development and Validation of MethylCog, a Blood DNA Methylation Proxy for Cognition." *Alzheimer's & Dementia*, accepted. [IF: 11.1]
2. Lukacsovich D, Young J, Gomez L, Kunkle B, Mao Z, **Zhang W**, Chen XS, . . . , Wang L*. (2026). "Blood DNA Methylation Signature of Cognitive Reserve Moderates the Association between CSF Tau Pathology and Memory in Prodromal Alzheimer's Disease." *Alzheimer's & Dementia: Translational Research & Clinical Interventions*, accepted. [IF: 6.8]
3. **Zhang W**, Lukacsovich D, Young JI, Gomez L, Schmidt MA, Kunkle B, Chen XS, Martin ER, Wang L*. (2025). "The Aging Epigenome: Integrative Analyses Reveal Functional Overlap with Alzheimer's Disease." *GeroScience*, accepted. [IF: 5.4]
4. **Zhang W***, Huang H, Wang L, Lehmann BD, Chen XS*. (2025). "An Integrative Multi-Omics Random Forest Framework for Robust Biomarker Discovery." *GigaScience*, giaf148. [IF: 3.9]
5. **Zhang W**, Lukacsovich D, Young JI, Gomez L, Schmidt MA, Martin ER, Kunkle BW, Chen X, O'Shea DM*, Galvin JE*, Wang L*. (2025). "DNA Methylation Signature of a Lifestyle-based Resilience Index for Cognitive Health." *Alzheimer's Research & Therapy*, 17, 88. [IF: 7.6]
6. **Zhang W**, Young JI, Gomez L, Schmidt MA, Lukacsovich D, Kunkle B, Chen XS, Martin ER, Wang L*. (2025). "Blood DNA Methylation Signature for Incident Dementia: Evidence from Longitudinal Cohorts." *Alzheimer's & Dementia*, 21:e14496. [IF: 11.1]
7. **Zhang W**, Wu C, Huang H, Bleu P, Zambare W, Alvarez J, Wang L, Paty PB, Romesser PB, Smith JJ*, Chen XS*. (2025). "Enhancing Chemotherapy Response Prediction via Matched Colorectal Tumor-Organoid Gene Expression Analysis and Network-Based Biomarker Selection." *Translational Oncology*, 52:102238. [IF: 4.1]
8. Lukacsovich D, O'Shea D, Huang H, **Zhang W**, Young JI, Chen XS, . . . , Wang L*. (2024). "MIAMI-AD: An Integrative Knowledgebase Facilitating Exploration of DNA Methylation across Sex, Aging, and Alzheimer's Disease." *Database*, 2024, baae061. [IF: 3.6]
9. **Zhang W**, Young JI, Gomez L, Schmidt MA, Lukacsovich D, Varma A, Chen XS, Kunkle B, Martin ER, Wang L*. (2024). "Critical Evaluation of the Reliability of DNA Methylation Probes on the Illumina MethylationEPIC v1.0 BeadChip Microarrays." *Epigenetics*, 19(1):2333660. [IF: 3.2]
10. **Zhang W**, Young JI, Gomez L, Schmidt MA, Lukacsovich D, Varma A, Chen XS, Martin ER, Wang L*. (2023). "Distinct CSF Biomarker-Associated DNA Methylation in Alzheimer's Disease and Cognitively Normal Subjects." *Alzheimer's Research & Therapy*, 15:78. [IF: 7.6]
11. **Zhang W**, Li E, Wang L, Lehmann BD, Chen XS*. (2023). "Transcriptome Meta-Analysis of Triple-Negative Breast Cancer Response to Neoadjuvant Chemotherapy." *Cancers*, 15(8):2194. [IF: 4.4]
12. Silva TC, **Zhang W**, Young JI, Gomez L, Schmidt MA, Varma A, Chen XS, Wang L*. (2022). "Distinct Sex-Specific DNA Methylation Differences in Alzheimer's Disease." *Alzheimer's Research & Therapy*, 14(1), 121. [IF: 7.6]

### Preprints & Manuscripts in Preparation

- **Zhang W**, et al. (2026). "A Disease-Focused Integrative Epigenetic and Neurostructural Age Clock for Alzheimer's Risk." *Manuscript in preparation.*
- **Zhang W**, et al. (2026). "Multivariate Random Forest-Induced Reconstruction Similarity for Cross-Modal Integration." *Manuscript in preparation.*
- Lukacsovich D, Young JI, Gomez L, Schmidt MA, **Zhang W**, Kunkle BW, Chen XS, Martin ER, Wang L*. (2025). "From Aging to Alzheimer's Disease: Concordant Brain DNA Methylation Changes in Late Life." *Preprint available at medRxiv.*
- Chen XS, Lukacsovich D, Zambare W, Wu C, Huang H, **Zhang W**, Kim MJ, et al. (2025). "Integrating Tumor and Organoid DNA Methylation Profiles Reveals Robust Predictors of Chemotherapy Response

in Rectal Cancer." *Preprint available at medRxiv.*

### Thesis

- **Zhang W**. (2024). *Integrative Multi-Omics Analysis Using Multivariate Random Forest.* Ph.D. Thesis, University of Miami.

## Research Funding

- **NIH K99/R00 Pathway to Independence Award** Submitted, Oct 2025
  *Integrative Aging Biomarker of Blood DNA Methylation and Brain MRI for Alzheimer's Disease Prognosis*
  PI: Wei Zhang *Under review*
  Mentor: Lily Wang, Ph.D.; Co-Mentors: Tatjana Rundek, M.D., Ph.D.; David Loewenstein, Ph.D.
- **Alzheimer's Association Research Fellowship for All (AARFA)** Submitted, Oct 2025
  *Integrative Aging Biomarker of Blood DNA Methylation and Brain MRI for Alzheimer's Disease Prognosis*
  PI: Wei Zhang
  Mentor: Lily Wang, Ph.D.; Co-Mentors: Tatjana Rundek, M.D., Ph.D.; David Loewenstein, Ph.D.
  Reviewer scores: 3 (Excellent), 1 (Exceptional), 2 (Outstanding) on a 1–9 scale (1 = best)

## Software & Open-Source Tools

- **multiRF**: An R package for integrating matched multi-omics datasets with multivariate random forests. It fits directed forest models across omics blocks, learns sample-by-sample similarity from shared terminal-node structure, and decomposes the result into shared and omics-specific components for clustering, variable selection, and visualization. [GitHub]

## Presentations

O = Oral; P = Poster; Presenting author

[**O.1**] **Zhang W** and Chen XS. "Multivariate Random Forest-Based Clustering for Integrative Multi-Omics Analysis." *ASA Florida Chapter Annual Meeting*, Mar 2026. Miami, FL. Contributed Talk.

[**O.2**] **Zhang W** and Chen XS. "An Integrative Multi-Omics Random Forest Framework for Robust Biomarker Discovery." *STATGEN*, May 2025. Minneapolis, MN. Contributed Talk.

[**O.3**] **Zhang W** and Chen XS. "Unlocking the Potential of Multi-Omics Data Integration Using Multivariate Random Forest Approach." *ENAR Annual Meeting*, Mar 2024. Baltimore, MD. Contributed Talk.

[**P.1**] **Zhang W**, Rundek T, Loewenstein D, Wang L. "A Disease-Focused Integrative Epigenetic and Neurostructural Age Clock for Alzheimer's Risk." *Alzheimer's Association International Conference (AAIC)*, Jul 2026. Virtual. Poster.

[**P.2**] **Zhang W**, et al. "Multivariate Random Forest-Based Clustering for Integrative Multi-Omics Analysis." *Joint Statistical Meetings (JSM)*, Aug 2026. Boston, MA. Poster.

[**P.3**] Wang L, **Zhang W**, Gomez L, Kunkle BW, Lukacsovich D, Schmidt MA, Varma A, Griswold AJ, Bush WS, Martin ER. "An X Chromosome-Wide DNA Methylation Study of Alzheimer's Disease." *AAIC*, Jul 2024.

[**P.4**] Wang L, **Zhang W**, Young JI, Gomez L, Schmidt MA, Lukacsovich D, Varma A, Chen XS, Martin ER. "Distinct CSF Biomarker-Associated DNA Methylation in Alzheimer's Disease and Cognitively Normal Subjects." *AAIC*, Jul 2023.

[**P.5**] **Zhang W** and Chen XS. "Iterative Multivariate Random Forest for Feature Selection in Integrating Multi-Omics Datasets." *ASA Florida Chapter Annual Meeting*, Mar 2023. Gainesville, FL.

## Teaching Experience

**EPH 705: Advanced Statistical Methods** — *University of Miami*
*Teaching Assistant* (Instructor: Lily Wang, Ph.D.) — 2022 – 2024

**STAT 6201: Applied Linear Models** — *The George Washington University*
*Teaching Assistant* (Instructor: Emre Barut, Ph.D.) — 2018

## Honors & Awards

- **Award of Academic Merit**, University of Miami — Aug 2024
- **Best Student Poster Award**, ASA Florida Chapter Meeting — Mar 2023
- **Travel Award**, University of Miami — Mar 2023

## Professional Development

- **Duke Electronic Health Records Study Design Workshop**, Duke University — Dec 2024
- **Code Rigor and Reproducibility with R Boot Camp**, Columbia University — Jul 2023

## Professional Service

### Peer Review

- Nature Communications, Neurobiology of Aging, Statistics in Medicine, Scientific Reports, Discover Applied Sciences, Biology Direct, Discover Oncology, Medicine in Omics

### Other Service

- Reviewer, ASA South Florida Student Data Challenge (2026)

### Professional Memberships

- International Biometric Society, Eastern North American Region (ENAR)
- American Statistical Association (ASA)
- International Society to Advance Alzheimer's Research and Treatment (ISTAART)

## Technical Skills

- **Programming:** R, Python, SAS, SQL
- **Methods:** Machine learning, random forests, multi-omics integration, deep learning
- **Infrastructure:** Linux, HPC, Git
- **Bioinformatics:** DNA methylation, RNA-seq, EWAS, GWAS

## Languages

English (professional), Mandarin Chinese (native), Cantonese (fluent)