

# Wei Zhang

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## RESEARCH INTERESTS

Multi-omics Integration, Machine Learning, Deep Learning, Random Forests, Variable Selection, Meta-analysis, Biomarker Detection, Subtype Clustering, Statistical Genomics, Epigenetics, Neurodegenerative Disease and Cancers


## RESEARCH EXPERIENCE

<b>University of Miami</b> <i>Postdoctoral Associate</i>	<i>Miami, FL</i> Sep 2024 - Present
<ul style="list-style-type: none"><li>◦ Develop and implement advanced computational and machine learning methods for the analysis of large-scale omics data</li><li>◦ Conduct computational analyses to identify biomarkers and therapeutic targets using multi-omics data integration</li><li>◦ Develop and apply machine learning models for predictive analytics in biomedical research</li><li>◦ Maintain and optimize computational clusters and cloud computing environments to support large-scale data analysis</li></ul>	
<i>Graduate Research Assistant</i>	May 2022 - Aug 2024
<ul style="list-style-type: none"><li>◦ Collaborated with a diverse team to research and analyze genomic data for association studies, biomarker discoveries, and disease predictions in late-onset Alzheimer's Disease, triple-negative breast cancer, and colorectal cancer</li><li>◦ Published multiple research papers contributing to the field of biomarker detection and disease prediction</li><li>◦ Supported in drafting and editing grant proposals, ensuring clarity and alignment with project objectives</li></ul>	

## EDUCATION

<b>University of Miami</b> <i>Ph.D. in Biostatistics   Advisor: Chen, X. Steven, Ph.D.</i>	<i>Miami, FL</i> Aug 2024
<ul style="list-style-type: none"><li>◦ Dissertation: Integrative Multi-Omics Analysis Using Multivariate Random Forest</li></ul>	
<b>The George Washington University</b> <i>M.S. in Statistics</i>	<i>Washington, DC</i> May 2019
<b>State University of New York at Binghamton</b> <i>B.S. in Economics Analysis &amp; Actuarial Math</i>	<i>Binghamton, NY</i> May 2017

## PROJECTS

<b>Multivariate Random Forest Framework for Multi-omics Data Integration</b> <i>Tools: R, Random Forest, method development</i>	<i>Ongoing</i>
<ul style="list-style-type: none"><li>◦ Developed a random forest-based method for integrating multi-omics datasets, which improves predictive accuracy compared to single-omics analyses significantly.</li><li>◦ Demonstrated that the proposed method outperforms established integrative techniques in uncovering biologically meaningful biomarkers and pathways through simulations and TCGA data analysis.</li><li>◦ Created comprehensive documentation and methodology pipelines, ensuring replicability of translational research applications.</li><li>◦ Ongoing work in developing multi-omics integration for disease subtyping and data imputation.</li><li>◦ Github Repositories:<ul style="list-style-type: none"><li>*  <a href="#">An Integrative Multi-Omics Random Forest Framework for Robust Biomarker Discovery</a></li></ul></li></ul>	
<b>Tumor and CellLine Transcriptomes Alignment with Deep Neural Networks</b> <i>Tools: Python, Pytorch, Variational Autoencoder (VAE)</i>	<i>Ongoing</i>
<ul style="list-style-type: none"><li>◦ Develop a deep learning framework integrating Variational Autoencoders and domain-adversarial training to align tumor and cell-line transcriptional profiles.</li><li>◦ Improve alignment of tumor and cell-line transcriptomic datasets by projecting them into a common latent space and correcting for systematic, data-specific biases.</li></ul>	
<b>Epigenetic Biomarkers for Alzheimers and Cognitive Health</b> <i>Tools: R, statistical modeling, longitudinal cohort analysis</i>	<i>2023 - 2025</i>
<ul style="list-style-type: none"><li>◦ Identified and validated blood-based DNA methylation signatures predictive of incident dementia in longitudinal cohorts.</li><li>◦ Evaluated reliability of the Illumina MethylationEPIC v1.0 platform for robust epigenomic measurements.</li><li>◦ Discovered distinct cerebrospinal fluid biomarker-associated methylation profiles from Alzheimers patients and cognitively normal subjects.</li></ul>	

- Collaborated on statistical methodology development and comprehensive data analyses to advance cognitive resilience research.
- Github Repositories:
  - \* [Blood DNA Methylation Signature for Incident Dementia: Evidence from Longitudinal Cohorts](#)
  - \* [DNA Methylation Signature of a Lifestyle-based Resilience Index for Cognitive Health](#)
  - \* [Critical Evaluation of the Reliability of DNA Methylation Probes on the Illumina MethylationEPIC v1.0 BeadChip Microarrays](#)
  - \* [Distinct CSF biomarker-associated DNA methylation in Alzheimer's disease and cognitively normal subjects](#)

## • Prediction Models for Cancer Biomarkers

2023 - 2024

Tools: R, WGCNA, meta-analysis

- Developed transcriptome-based prediction models for chemotherapy response using matched colorectal tumor-organoid gene expression data.
- Implemented network-based biomarker selection methods to enhance prediction accuracy in oncology studies.
- Performed a meta-analysis on triple-negative breast cancer datasets to identify robust gene signatures linked to neoadjuvant chemotherapy outcomes.
- Github Repositories:
  - \* [Enhancing Chemotherapy Response Prediction via Matched Colorectal Tumor-Organoid Gene Expression Analysis and Network-Based Biomarker Selection](#)
  - \* [Transcriptome Meta-Analysis of Triple-Negative Breast Cancer Response to Neoadjuvant Chemotherapy](#)

## PUBLICATIONS AND PREPRINTS

J=JOURNAL, S=IN SUBMISSION, T=THESIS

- [J.1] **Zhang W**, Lukacsovich D, Young JI, Gomez L, Schmidt MA, Martin ER, Kunkle BW, Chen X, OShea DM, Galvin JE, Wang L. (2025). [DNA Methylation Signature of a Lifestyle-based Resilience Index for Cognitive Health](#). *Alzheimer's Research & Therapy*, 17, 88. [Impact Factor: 7.9]
- [J.2] **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. [Impact Factor: 13.0]
- [J.3] **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. [Impact Factor: 4.5]
- [S.1] **Zhang W**, Huang H, Wang L, Lehmann BD, Chen XS. (2025). [An Integrative Multi-Omics Random Forest Framework for Robust Biomarker Discovery](#). Manuscript submitted for publication in *GigaScience*. Preprint available at [bioRxiv](#).
- [S.2] 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](#).
- [T.1] **Zhang W**. (2024). [Integrative Multi-Omics Analysis using Multivariate Random Forest](#). PhD Thesis, University of Miami.
- [J.4] **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. [Impact Factor: 2.9]
- [J.5] Lukacsovich D, O'Shea D, Huang H, **Zhang W**, Young JI, Chen XS, et al. (2024). [MIAMI-AD: An integrative knowledgebase facilitating exploration of DNA methylation across sex, aging, and Alzheimers disease](#). *Database*, 2024, baae061. [Impact Factor: 3.4]
- [J.6] **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. [Impact Factor: 7.9]
- [J.7] **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. [Impact Factor: 4.5]
- [J.8] Silva TC, **Zhang W**, Young JI, Gomez L, Schmidt MA, Varma A, Chen XS, Wang L. (2022). [Distinct sex-specific DNA methylation differences in Alzheimers disease](#). *Alzheimer's Research & Therapy*, 14(1), 121. [Impact Factor: 7.9]

## PRESENTATIONS AND POSTERS

O=ORAL, P=POSTER

- [O.1] [An Integrative Multi-Omics Random Forest Framework for Robust Biomarker Discovery](#), *STATGEN: Conference on Statistics in Genomics and Genetics*. May 2025. Minneapolis, MN, USA. Contributed Talk.
- [P.1] [An X chromosome-wide DNA methylation study of Alzheimers disease](#), *Alzheimer's Association International Conference (AAIC)*. Jul 2024. Poster.
- [O.2] [Unlocking the potential of multi-omics data integration using multivariate random forest approach](#), *International Biometric Society Eastern North American Region (ENAR) Annual Meeting*. Mar 2024. Baltimore, MD, USA. Contributed Talk.
- [P.2] [Distinct CSF biomarker-associated DNA methylation in Alzheimer's disease and cognitively normal subjects](#), *Alzheimer's Association International Conference (AAIC)*. Jul 2023. Poster.
- [P.3] [Iterative Multivariate Random Forest for Feature Selection in Integrating Multi-Omics Datasets](#), *Annual American Statistical Association (ASA) Florida Chapter Meeting*. Mar 2023. Gainesville, FL, USA. Poster.

TEACHING EXPERIENCE

TEACHING ASSISTANT

- **EPH705 Advanced Statistical Methods** 2022 - 2024  
Professor: Wang, Lily, Ph.D. | University of Miami
- **STAT6201 Applied Linear Models** 2018  
Professor: Barut, Emre, Ph.D. | The George Washington University

PROFESSIONAL DEVELOPMENT

WORKSHOPS

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

SKILLS

- **Proficient in R/Rstudio and Python** for package building, data analysis, and visualization
- **Comprehensive skills in SAS** for various statistical applications
- **Familiar with Linux** in system and command

HONORS AND AWARDS

- Award of Academic Merit** Aug 2024  
University of Miami
- Student Competition Award** March 2023  
ASA Florida Chapter Meeting [🌐]
  - Best student poster
- Travel Award** Mar 2023  
University of Miami

PROFESSIONAL SERVICES AND ACTIVITIES

- Manuscript Peer Review**  
Manuscript Reviewer
  - Nature Communication; Scientific Reports; Discover Applied Sciences; Biology Direct; Discover Oncology; Medicine in Omics
- Membership**  
Member
  - International Biometric Society (ENAR)
  - American Statistical Association (ASA)
  - International Society to Advance Alzheimer’s Research and Treatment (ISTAART)

ADDITIONAL INFORMATION

**Languages:** English (Proficiency level), Mandarin (Native Speaker), Cantonese (Proficiency level)  
**Interests:** Tennis