

Department of Biostatistics and Medical Informatics Seminar



Chi Zhang, PhD

Associate Professor of Biomedical Engineering
Oregon Health & Science University (OHSU)

Friday, February 28, 2025

12:00-1:00 pm

Health Sciences Learning Center 1345 *or* via Zoom

<https://uwmadison.zoom.us/j/99879638765?pwd=wbtxoucEFllPVCVc9SFbvKB1Av7Xk.1>

Passcode: 343271

Advancing data-driven systems biology approaches to study metabolic variations in cancer

Abstract: The functional activities of biological systems include both intracellular functions such as transcriptional regulation, metabolism, and signaling transduction, and as well as intercellular activities such as cell-microenvironment and cell-cell interactions. In recent years, we focused on developing new systems biology approaches to quantify metabolic activities and metabolic cross-talks in disease tissue microenvironment using omics data. We developed a research framework named, “data-driven and AI empowered systems biology”, which aims to quantify biological processes and approximate its dynamic property using non-time course omics data. We have established mathematical foundations, including computational principles, new learning functions, optimizers, and relevant theories, and generalized its application from metabolic system to biosynthesis and processing of large molecules, transcriptional regulation, signaling transduction and cell-tissue interactions, as well as enabled the usage of multi-omics data. By applying this approach to different disease systems, we identified new drug targets to improve the efficacy of immunotherapy for cancer treatment and predicted the trend of metabolic shifts throughout cancer progression.

Bio: Dr. Chi Zhang is an Associate Professor of Biomedical Engineering at Oregon Health & Science University (OHSU) and a member of the Center for Biomedical Data Science, Brenden-Colson Center for Pancreatic Care and Knight Cancer Institute at OHSU. Dr. Zhang received his bachelor's degree in mathematics from Peking University in 2010 and Ph.D. in Bioinformatics from the University of Georgia with a minor in Statistics in 2015. He joined Indiana University School of Medicine (IUSM) as an assistant professor in 2016, was promoted to a tenured associate professor in 2022, associate director of the Center for Computational Biology and Bioinformatics in 2023, and then joined OHSU in 2024. His research focuses on studying the mathematical representations of biological processes, relations, and functions in omics data; developing new systems biology models and AI methods to enable in silico simulation and perturbation analysis of disease systems; understanding biochemical and metabolic variations in the microenvironment of different diseases; and developing explainable and fair AI models for biomedical data. Dr. Zhang received the NIH NIGMS Maximizing Investigators' Research Award (MIRA) (R35), NSF career award, and American Cancer Society Research Scholar Award, and NLM, NCI R01s. Recent studies led by Dr. Zhang's lab have been published on Nucleic Acids Research; Blood; Journal of Clinical Investigation; Genome Research; Advanced Sciences; Nature Communications; NeurIPS; KDD; AAAI; ICASSP; Biometrics; and Pharmaceutical Statistics. Research driven by applications of the computational methods developed by Dr. Zhang resulted in research articles in the New England Journal of Medicine, Nature Medicine, Cell Metabolism, Nature Genetics, etc.



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