

Zhuoran Zhou

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Cleveland, Ohio, OH44106

EDUCATION

Case Western Reserve University (CWRU)

M.S. in *Bioinformatics*

Cleveland, OH

Aug. 2024 – Present

Michigan State University (MSU)

B.S. in *Human Biology*

East Lansing, MI

Aug. 2019 – Dec. 2023

- **Honors and Awards:** Michigan State University Scholars Award (Aug. 2019-Aug. 2023)

RESEARCH

RNA-Seq and Proteomics Analysis of 5xFAD Mouse Models

2024 – Present

Research Assistant, supervised by Dr. Gurkan Bebek at Case Western Reserve University

- Conducting multi-omics data analysis, focusing on 5xFAD mouse cortex and hippocampus tissues across 4, 8, and 12 months of age.
- Integrating RNA-seq and proteomics data to identify molecular mechanisms underlying neurodegeneration.
- Gaining expertise in data processing, visualization, and inter-omics approaches for precision medicine research.

Research on the Therapeutic Effect of Mindfulness-Based Stress Reduction (MBSR) Therapy among Social Anxiety Disorders (SAD)

June 2023- May 2024

Clinical Psychology Research Assistant, supervised by Elisaveta Shokhrin at University of Michigan

- Performed literature review on MBSR through PubMed and PsycINFO; dissected and summarized research content in terms of research methods, participant characteristics, intervention measures, evaluation indicators, etc. to provide insights for research design
- Cleaned, transformed, and encoded behavioral and neural data using R and conducted descriptive statistics, correlation analysis, regression analysis, etc., to evaluate treatment effects of MBSR on SAD
- Calculated the weighted average of effect sizes to determine the general effectiveness of MBSR in alleviating SAD; identified variables that could potentially impact treatment outcomes, such as the duration and frequency of treatment, and the baseline anxiety levels of patients
- Exploring the distinct effects of MBSR on different types of SAD patients and its long-term consequences
- Applying Random Forest and Support Vector Machines (SVM) to delve deeper into the inherent variability of the data and potential influencing factors

Deep Learning Algorithm Development for the Prediction of Abundance of Cell Surface Proteins based on scRNA-seq Data

July 2021- Jan. 2022

Research Assistant, supervised by Dr. Bin Chen, Bin Chen Lab at MSU

- Supported predictive model development based on cTP-net architecture and Trans-cell architecture using R with Peripheral Blood Mononuclear Cells (PBMC), Cord Blood Mononuclear Cells (CBMC), and Bone Marrow Mononuclear Cells (BMMC) datasets to identify therapeutic candidate for cancer treatment; refined proteomic datasets using SAVER-X denoising and compressing methods to better reflect the actual levels of RNA expression
- Tested and compared the performance of the cTP-net model and Trans-cell model on new datasets using Spearman and Pearson coefficient; analyzed the prediction results to evaluate the model performance on specific cell types and in cross-cell settings; proposed feasible optimization ideas on model generalization and model transferability
- Programmed a random data generator to deal with computing limitation for large datasets

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- Analyzed the relationships and patterns of protein expression within the datasets to validate the model accuracy and biological significance; employed UMAP for categorizing cell types and utilized GO and PPI-based dendrograms to illustrate the interconnections among different proteins
- Identified data deficiencies in existing proteomics datasets and analyzed co-expressions in 37 cell groups to help identify co-expression of protein pairs with high cell-type specificity for the datasets integration and further model training

BIOMEDICAL SHADOWING EXPERIENCE

Department of Dermatology, University of Pennsylvania

June-July 2021

Volunteer

- Supported CAR T cell therapy study that optimized the *in vitro* CAR T cell culture system using cytokine combination of IL-7 and IL-15 to maintain T cell function and increase *in vivo* expansion
- Familiarized with the experimental procedure of CAR T cell generation; acquired the skills of design and generation of CAR constructs, bacterial transformation, plasmid extraction and lentiviral production; developed the skills of T cell *in vitro* activation, lentiviral transduction, T cell expansion and functional evaluation
- Designed CAR constructs using DNADynamo software, order gBlock, clone CAR construct into plasmid, transfect *HEK293T* cells for virus production and transduce healthy donor derived T cells for CAR T cell production under supervision
- Assisted in genome-wide CRISPR-based loss-of-function screen in CAR T cells *in vitro*, trying to respond to factors such as T-cell exhaustion and lack of CAR T-cell persistence that have hampered the effectiveness of CAR T cell therapy

School of Dental Medicine, University of Pennsylvania

June-Aug. 2017

Volunteer

- Supported studying the expression of anti-inflammatory molecule DEL-1 in the gingival crevicular fluid (GCF) following resolution of periodontitis
- Practiced experiment techniques, such as Western blot and employed enzyme-linked immunosorbent assay (ELISA), and essential laboratory skills, including cell culture media preparation and inverted tissue culture microscopes operation
- Performed basic cell culture processes and procedures of both suspension cells and adhesion cells and ELISA to detect concentration of DEL-1 in the collected GCF samples under the supervision of senior researchers

SKILLS

- **Molecular Biology and Cell Biology**
 - Cloning & plasmid preparation; Vector construction; PCR; Western blot; Tissue culture of adhesion and suspension cells; Gene transfection (lipofectamine 2000); Gene transduction (lentivirus); hybridoma
- **Immunology**
 - ELISA; multiparameter flow cytometry; T cell proliferation assay; Cytokine secretion assay, *In vivo* mouse model image
- **Computer**
 - R language, Seruat-based single-cell RNA-sequencing, IDT PrimerQuest Tool, UCSC genome browser search; GraphPad; FlowJo

CLINICAL VOLUNTEERING & LEADERSHIP

Sparrow Hospital

Lansing, MI

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Radiology Volunteer

June 2022 -Mar. 2023

- Cooperated with physicians and technicians to perform radiographic examinations to ensure smooth procedure and maintain patient comfort and safety
- Grasped the operation of medical imaging equipment for accurate and timely image acquisition; learned key points in image analysis, including understanding anatomy and identifying abnormalities or pathology in radiographic images
- Actively participated in discussions and case reviews and developed deeper insights into the interpretation and analysis of radiology images in clinical practice

Inpatient Ward Volunteer

- Provided essential assistance to inpatients, such as providing comfort items, delivering meals, and assisting in mobility; ensured the availability of supplies and equipment for healthcare providers
- Offered culturally responsive services and communications to patients and their families with empathy and compassion

MSUWe54 Union

East Lansing, MI

Leader of the Planning Department

Aug. 2019- Mar. 2020

- Initiated a wide array of activities to build a more diverse, convenient and comfortable life and learning environment for MSU students; sought sponsorships as intermediate liaison
- Organized annual orientation parties and provided life guidance for freshmen to facilitate their adaption to new environments
- Distributed the epidemic prevention materials during COVID-19 to enhance health and safety within the community