Jiayue Liu

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——EDUCATION——

Vanderbilt University, *2020.8-2024.5*
GPA: 3.77 | Major: Molecular and cellular biology (*Honors Program)* | Minor: Data Science; Chemistry
Dean's list at Vanderbilt College of Art and Sciences (all semesters), 2020-2023
Relevant coursework: Genetics, Microbial Genomics, Machine Learning, Computational Structural Biochem, Cell Biology
Organization: Vanderbilt Institute of Global Health, Vanderbilt Single Cell User Group, Tumor Board, VAW, Next Steps
Volunteer: Scientific Immersion Match, Volunteer Across the World (Guatemala), VU student Volunteer for Science (VSVS)

Johns Hopkins University Summer Program, *2019.6-2019.8*
GPA: 4.00; Selected Coursework: Biochemistry and Protein Engineering Lab, Anatomy and Physiology

——UNDERGRAD RESEARCH EXPERIENCES——

Vanderbilt University College of Arts and Sciences, Department of Chemistry **Nashville, Tennessee**
Undergraduate Researcher, The ZJYang Lab 2023.10 - present

- Currently using NLPs to extract enzyme kinetics data and building Structure–Kinetics Enzymology Database
- Computationally assessed the impact of SARS-CoV-2 Mpro mutations and predicted resistance to Nirmatrelvir drug

Vanderbilt University School of Medicine, Center for Applied AI in Protein Dynamics **Nashville, Tennessee**
Undergraduate Researcher, The Mchaourab Lab (Department of Molecular Physiology and Biophysics) 2023.2 -2023.11

- Investigated conformational diversity from Alphafold2 protein structure prediction
- Collaborated with Dr. Benjamin Brown on developing methods to optimize Potential Energy Surfaces (PES)
- Excelled molecular modeling on transporter proteins using high performance computing (Linux/Shell Scripting)

Vanderbilt University School of Medicine, Department of Cell and Developmental Biology **Nashville, Tennessee**
Undergraduate Researcher, The DelGiorno Lab 2021.6- present

- Currently studying SCFAs and pancreatitis with genetically engineered mouse models (GEMM) and histopathology
- Construting ex vivo acinar cell cultures and ductal organoids derived from mouse and human pancreas tissue
- Conducted drug discovery/repurposing research, oncogene targeting research with lipid nanoparticles, and AI/Machine learning-based staining markers/pathological images quantification/analysis
- Leading data analysis in the lab: single-cell RNA sequencing analysis(R), mass spec (R), and 3D electron microscopy lesion segmentation (python)
- Trained in all molecular biology skills and rodent-working skills in Vanderbilt Animal Care and Use Program
- Developed great design, execution, interpretation, troubleshooting, and reporting skills for *in vitro* experiments

—— SUMMER RESEARCH EXPERIENCES——

Harvard Medical School, Department of Biomedical Informatics **Boston, Massachusetts**
Summer Institute of Biomedical Informatics (SIBMI) Research Fellow, The Manrai Lab 2023.6 -2023.8

- Led an in-depth statistical analysis of the NHANES survey dataset for chronic kidney diseases and comorbidities
- Compared 4 machine learning models (decision trees, linear regression, splines and elastic net) for parameter selection used in estimated glomerular filtration (eGFR) to improve kidney function estimation
- Constructed a cleaned database specialized for kidney and cardiovascular diseases for epidemiological research
- Designed an interactive R Shiny platform for streamlined and generalizable NHANES data exploration

The National Institute of Diabetes Digestive and Kidney Diseases Information Network **San Diego, CA (Hybrid)**
Summer Student 2021.6- 2021.8

- Identified microbiome-cell signaling pathway in pancreatitis using dkNET Signalling Pathway Omnics
- Obtained basics of data management by following 'Findable, Accessible, Interoperable, Reusable' principles

Zhejiang University Basic Medical Sciences, Department of Medical Microbiology and Parasitology **Hangzhou, China**
Research Intern, Jie Yan Lab 2019.5- 2019.10

- Designed an easy detection method of polychlorinated biphenyls (PCBs), created a "Test Lab on Microchip" that is convenient to be used in underdeveloped countries to discover polluted areas by engineering yeast strain Saccharomyces Cerevisiae, with genes from various bacteria that are able to degrade PCBs
- Reduced the detection time from normally 24+ hrs to less than 30 mins

Chinese Academy of Sciences, Shanghai Institute for Biological Sciences **Shanghai, China**
Research Intern, CAS-MPG Partner Institute for Computational Biology, Li Haipeng Lab 2018.6 - 2018.9

- Conducted research on "Accelerated Evolution Driven by Social Hierarchy in Placental Mammals" and assisted in drafting the finding that the accelerated evolution of non-coding regions was important in the emergence of placental mammals and that it provides direct evidence on how social hierarchies could be modulated
- Assisted in the development of a new screen method for placental-accelerated sequences which were identified by comparing the expected and observed evolutionary rate during the time period of placental mammals

——MANUSCRIPTS/POSTERS/ABSTRACTS/CONFERENCE——

1. Trinh V, Ivanov S, Maurer C, Liu J, Wong J, Batardiere M, Ruelas AM, Ankenbauer K, Copeland C, Ben-Levy O, Revetta F, Jyotsana N, Means AL, Maitra A, Tan MCB, DelGiorno KE (2023); Abstracted submitted to DDW2024, Manuscript in prep; **Oncogenic GNAS drives a pyloric-type transcriptomic program in pancreatic intraepithelial papillary mucinous neoplasms through SPDEF.**

2. Liu J, DelGiorno KE (2023); Poster & Conference Abstract; **Pancreatitis induces changes in gut microbiota and short chain fatty acid uptake;** Cell and Developmental Biology Retreat, Vanderbilt School of Medicine. April 15. Nashville, TN. https://medschool.vanderbilt.edu/cdb/wp-content/uploads/sites/31/2023/04/Final-2023-CDB-Retreat-Program-Book_Final-V2.pdf (**Session II P6)** |https://eliv22-23.myportfolio.com/jiayue-liu

3. Trinh V, Jyotsana N, Wong J, Batardiere M, Al Shoukari A, Washington G, Caplan L, Liu J, Means AL, DelGiorno KE, and Tan MCB. (2022); Poster; **Conserved gastric metaplastic lineages in Intraductal Papillary Mucinous Neoplasms redefines dysplasia and subtypes;** American Pancreatic Association Annual Meeting, Orlando, FL.

4. Jyotsana N, Ivanov SV, Koktysh DS, Ta KT, Norin Z, Liu J, and DelGiorno KE. (2022); Poster; **Targeting mutant KRAS and its metabolic dependencies in pancreatic cancer using lipid nanoparticle delivery systems;** American Pancreatic Association Annual Meeting, Orlando, FL.

——PRESENTATIONS——

CardioKid: R-based platform to generalize NHANES analysis
Harvard Medical School Department of Biomedical Informatics Trainee Talk Series (Aug 2023)

Identified microbiome-cell signaling pathway in pancreatitis
NIDDK trainee final presentation (Aug 2021)

——SCHOLARSHIPS AND AWARDS——

- Education Enhancement Fund ($3000), 2023
- Harvard Medical School Summer Institute of Biomedical Informatics Research Fellow Stipend ($4500), 2023
- Vanderbilt Undergraduate Summer Research Program (VUSRP) Little John Fellows Award ($6000), 2022
- dkNET Summer of Data Student Internship Program Scholarship ($1000), 2021
- 3rd Place Winner – Global Surgery Student Alliance (GSSA) Undergraduate Health Case Hackathon, 2021
- Global Silver Medal – International Genetic Engineered Machine Competition (iGEM), 2019

——TECHNICAL SKILLS——

Molecular biology: qRT-PCR, PCR, immunoblotting, immunoprecipitation, RNA/DNA extractions, western blots, protein purifications, RNA scopes, ELISA assays, genotyping, bacterial transfection
Cell/Organoid culture: cell lines, primary cells, acinar cell 3D culture (Matrigel and Hydrogel Systems), cell viability assays, transwell migration assays, scratch assays
Microscopy: optical microscopy (bright field, dark field, phase contrast), fluorescent microscopy, confocal microscopy
Mouse work: breeding, genotyping, IP injections, oral gavage, orthopedic surgery
Histology staining: immunohistochemistry staining, immunofluoresence staining, H&E, and trichrome staining

Bioinformatics analysis: scRNA sequencing (R/python), spatial transcriptomics, MALDI, LC-MS data analysis
Machine learning: Huggingface, Tensorflow, PyTorch, Scikit-learn
Histology Quantification: imageJ, CellProfiler, ilastik
Scientific figure plotting: ggplot2 (R), tidyverse(R), seaborn (python), matplotlib (python), PRISM, Microsoft Office Suite

Computational biology softwares and packages:
single cell RNA Sequencing: Cell ranger, Seurat, scanpy, rosalind, *etc*.
Molecular Modeling: Rosetta, ChimeraX, Pymol, AlphaFold2, AMBER, AutoDock Vina, Bowtie2, I-Tasser, BLAST+, GROMACS, MDtraj, MMSeqs2, MODELLER, openMM, *etc.*
Protein Prediction: Alphafold, ColabFold, RosettaFold, ProteinMPNN
Mass Spectroscopy: Skyline, Fragpipe, msstats

——EMPLOYMENT EXPERIENCES——

Vanderbilt University Medical Center **Nashville, Tennessee**
Undergraduate Lab Technician, Highthroughput Biomarker Core 2023.1 -2022.5

- Operated and maintained the Fluidigm Biomark HD platform to perform high-throughput single cell gene expression analysis, enabling the evaluation of up to 96 live cells for up to 96 different gene expressions
- Executed miRNA and gene expression profiling studies using Illumina NextSeq 2000 Instrument
- Conducted protein quantification studies utilizing Olink Proximity Extension Assays (PEA) on the Fluidigm Biomark HD and Illumina NextSeq 2000 Instrument platforms, enabling accurate and comprehensive protein level analysis across various sample types
- Collaborated closely with interdisciplinary teams, including researchers, bioinformaticians, and statisticians, to integrate high-throughput data generated from multiple platforms for holistic analysis and insights

Lumist Education. LTC **Remote**
Instructor/ Tutor 2023.1 -2022.8

- 1:1 Peer-tutored students (studying at NYU, UCSD, UCSB, UCD, UWM, etc) in college-level courses such as microbiology, anthropology, atmospheric chemistry, plant biology, and biochemistry with novel teaching methods to help students grasp the knowledge better and gain better grades in class
- Gave 3 talks and hosted several seminars on college application preparation and STEM career development

——LEADERSHIP EXPERIENCES——

Vanderbilt Undergraduate Research Journal — *Natural Science Sector Review Board Member* *2023.9- present*

- Currently participating in the review and evaluation of research submissions for 10+ submission
- Trained in scientific writing, scientific communication, and journal review processes

InTranscription (InT) — *Co-Founder* *2021.7- present*

- Built a biotech resource-sharing platform to pave the path for future scientists, entrepreneurs, or investors and transform ideas and technologies into companies and products that can shape globally
- Recruited 300+ members across US colleges, 50+ PhDs/postdocs, 10+ professors and entrepreneurs, 1,000+ followers on social media platform, over 400+ online/in-person activity participants since establishment

Vanderbilt University Chinese Student and Scholars Association — *Vice President* *2021.6- 2022.6*

- Managed 30+ executive members, 500+ active general members, and 5 departments
- Established Vanderbilt China Alumni Association
- Cooperated with 10+ business sponsors and 30+ CSSA; directed 6 cross-school summits/events(1000+ participants)

Vanderbilt Friends of Médecins Sans Frontières/Doctors Without Borders — *Community Service Chair* *2020.9- 2021.6*

- Led a team of 20+ active premed team members; organized 7 public health communication classes for Nashville International Center for Empowerment & 10+ community service events for disabled elderly population in Nashville

——OTHER SKILLS/INTEREST——

Languages: Mandarin Chinese (Native); English (Bilingual); French (Elementary)
Certification: Emergency medical responder, Responsible Conduct of Research (VUBPS RCR for Bio/Physical Sciences)
Interests: Rowing (Former Vanderbilt Rowing Varsity), Photography, A Capella, Drum sets, Social work, and Volunteering