

# Tzu-Yang Tseng

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## EDUCATION

### National Taiwan University (NTU), Taipei, Taiwan

- 2022/09 – 2023/06 M.S. – Graduate Institute of Biomedical Electronics and Bioinformatics
- Graduated 1<sup>st</sup> out of 60
  - Graduate Representative
  - Thesis: Transcriptional regulation of T cell exhaustion in immune checkpoint blockade resistance at single-cell resolution (Advisor: Dr. Hsueh-Fen Juan)
- 2018/09 – 2022/06 B.S. – Major in Life Science, Minor in Economics
- Thesis: Drug discovery by integrative single-cell RNA sequencing and perturbational gene-expression data (Advisor: Dr. Hsueh-Fen Juan)
- 2020/09 – 2023/06 Credit Program – Biotechnology Program (Total credits: 25)
- 2020/09 – 2022/06 Credit Program – Molecular Medical Sciences Program (Total credits: 25)

## WORK EXPERIENCE

### National Taiwan University (NTU), Taipei, Taiwan

- 2023/08 – 2025/01 Research Assistant (R&D Substitute Services; Advisor: Dr. Hsueh-Fen Juan)

### Osaka University (OU), Osaka, Japan

- 2023/12 – 2024/01 Visiting Scholar (Host: Dr. Mariko Okada)

## RESEARCH EXPERIENCE

- 2019/06 – 2025/01 **Systems Biology Lab (Advisor: Dr. Hsueh-Fen Juan)**
- Studied single-cell multiomics sequencing analysis (scATAC-seq and scRNA-seq) with a focus on gene regulatory network, trajectory inference and drug discovery of exhausted T cell that acquired resistance to immune checkpoint inhibitor in hepatocellular carcinoma.
  - Developed a distance-based module detection method capable of revealing module dynamics and identifying transitional genes between cancer stages.
  - Investigated lncRNA and gene regulatory network in neuroblastoma progression via scRNA-seq.
  - Proposed a combinatorial treatment approach targeting the cholesterol biosynthesis pathway and HER2 in breast cancer based on scRNA-seq analysis.
  - Experienced in cell culture and cell viability assays.
  - Wrote grant applications and drafted manuscripts.
- 2023/12 – 2024/01 **Laboratory for Cell Systems (Host: Dr. Mariko Okada)**
- Studied mathematical modelling and cell signaling systems.
  - Established a mathematical model of cellular senescence and simulated the nuclear NFκB level under different conditions.
- 2023/07 – 2023/10 **Collaborate with Dr. Paul Charles Evans, Queen Mary University of London, London, UK**
- Focused on heart disease and used the scDrug pipeline to identify drugs targeting disease-causing endothelial cell clusters.

## GRANTS AND AWARDS

- 2023/12 – 2024/01 **NTU International Cooperation Add-on Project** (with Dr. Mariko Okada, Osaka University)
- Two-month visit to Osaka University. (*Grant: 112L8503*)
- 2021/11 **Presidential Award**, National Taiwan University (NTU), Taiwan. (Awarded to the top 5%)
- 2021/07 – 2021/08 **Summer College Student Fellowship**, NTU Center of Developmental Biology and Regenerative Medicine, Taipei, Taiwan.
- 2021/06 **University Student Research Creativity Award**, National Science and Technology Council, Taiwan.
- 2020/07 – 2021/02 **Research Grant for University Student**, National Science and Technology Council, Taiwan.
- “Drug discovery for breast cancer by integrative single-cell RNA sequencing and perturbational gene-expression data” (*Grant: 109-2813-C-002-053-E*)

## PUBLICATIONS

- **Tzu-Yang Tseng**, Ching-Hung Hsieh, Hsuan-Cheng Huang, Yu-Ching Wu, Chiun Hsu, Chia-Lang Hsu, Da-Liang Ou, Hsueh-Fen Juan. “Transcriptional dynamics of T-cell exhaustion in immune checkpoint resistance at single-cell resolution” (Manuscript under preparation).

- **Tzu-Yang Tseng**, Chiao-Hui Hsieh, Jie-Yu Liu, Hsuan-Cheng Huang, Hsueh-Fen Juan. “Single-cell RNA sequencing unveils cholesterol biosynthesis as a therapeutic target in malignant breast cancer: a combinatorial treatment approach” *Computational and Structural Biotechnology Journal*, 27, 1719-1731. (2025)
- Chiao-Hui Hsieh, Yi-Xuan Chen, **Tzu-Yang Tseng**, Albert Li, Hsuan-Cheng Huang, Hsueh-Fen Juan. “Transcriptionally distinct malignant neuroblastoma populations show selective response to adavosertib treatment” *Neurotherapeutics*, 22(3), e00575. (2025)
- Yih-Yun Sun, Chiao-Yu Hsieh, Jian-Hung Wen, **Tzu-Yang Tseng**, Jia-Hsin Huang, Yen-Jen Oyang, Hsuan-Cheng Huang, Hsueh-Fen Juan. “scDrug+: predicting drug-responses using single-cell transcriptomics and molecular structure” *Biomedicine & Pharmacotherapy*, 177, 117070. (2024)
- Chiao-Yu Hsieh, Jian-Hung Wen, Shih-Ming Lin, **Tzu-Yang Tseng**, Jia-Hsin Huang, Hsuan-Cheng Huang, Hsueh-Fen Juan. “scDrug: From single-cell RNA-seq to drug response prediction” *Computational and Structural Biotechnology Journal*, 21, 150-157. (2022)

#### TALKS

2024/04	<b>NTU-OsakaU Bilateral Symposium on Systems Biology in Human Disease</b> , Taipei, Taiwan. “Transcriptional regulation of T cell exhaustion in immune checkpoint blockade resistance at single-cell resolution”
2022/03	<b>International Symposium on Evolutionary Genomics and Bioinformatics 2022 – co-hosted with the Institute for Protein Research (IPR), Osaka University</b> , Taipei, Taiwan. “Drug discovery by integrative single-cell RNA sequencing and perturbational gene-expression data” (Oral Presentation Award)

#### CONFERENCE ABSTRACTS

2024/09	<b>2024 The 83<sup>rd</sup> annual meeting of the Japanese cancer association</b> , Fukuoka, Japan. “A distance-based module detection method infers transitional gene sets and drug discovery via single-cell RNA sequencing”
2024/05	<b>2024 Conference of Advanced Computing and Imaging in Biomedicine – Asia Pacific Spatial Omics Technology</b> , Taipei, Taiwan. “Transcriptional regulation of T cell exhaustion in immune checkpoint inhibitor resistance by integrative single-cell RNA-seq and spatial transcriptomics data”
2023/11	<b>2023 Multiomics and precision medicine joint conference</b> , Taipei, Taiwan. “Single-cell RNA-seq uncovers cancer-associated fibroblast subgroup linked to immune resistance in hepatocellular carcinoma” (Poster Award)
2023/09	<b>2023 The 82<sup>nd</sup> annual meeting of the Japanese cancer association</b> , Yokohama, Japan. “Transcriptional regulation of T cell exhaustion in immune checkpoint blockade resistance at single-cell resolution” (Travel Grant)
2022/11	<b>2022 Multiomics and precision medicine joint conference</b> , Taipei, Taiwan. “Single-cell multi-omics analysis reveals transcriptional regulatory network of CD8+ T cell exhaustion under anti-PD-1 resistance in hepatocellular carcinoma and predicts potential small molecular drug to avoid T cell dysfunction” (Poster Award)

#### TEACHING AND MENTORING

2022/05 – 2025/01	<b>Mentorship</b> , mentored <b>four</b> medical school students and <b>one</b> undergraduate student at Dr. Juan’s lab. <ul style="list-style-type: none"> <li>• Three received <b>Research Grant for University Student</b> and one won <b>University Student Research Creativity Award</b> from National Science and Technology Council, Taiwan. (Grant: 112-2813-C-002-025-E, 112-2813-C-002-027-E and 113-2813-C-002-028-E)</li> <li>• Three attended <b>2024 SMBE Regional Meeting in Taiwan: Evolutionary Genomics &amp; Bioinformatics</b> (poster) and one won <b>best poster award</b>.</li> <li>• Two received <b>Summer College Student Fellowship</b>, NTU Center of Developmental Biology and Regenerative Medicine, Taipei, Taiwan.</li> </ul>
2023/02 – 2023/06	<b>Teaching Assistant</b> for <b>Bioinformatics (3)</b> and <b>Advanced in Computational and Systems Biology (4)</b>

#### EXTRACURRICULAR ACTIVITIES

2024/03	Volunteer at 2024 SMBE Regional Meeting in Taiwan: Evolutionary Genomics & Bioinformatics.
2017/10	<b>TMU-MIT Sana Hackathon</b> : Evolving IIoT Big Data to Health Artificial Intelligence
2016/08	Completed <b>Dale Carnegie Training Course</b> and got <b>Highest Award for Achievement</b> .