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Fang-Chi Hsu Ph.D.

E-Mail: fchsu@sacfamerica.org / mfchsu@gmail.com

Research Interests

AI-Driven Multimodal Risk Analysis and Translational Oncology

My recent research focuses on AI-driven multimodal risk analysis, genetic susceptibility, and metabolic reprogramming in gastrointestinal (GI) cancers, with an emphasis on early-onset colorectal cancer. By integrating deep learning, GWAS, and multi-omics modeling, I map genetic risk to functional tumor states to advance early detection, patient stratification, and precision oncology.

Professional Experiences

- **Sino-American Cancer Foundation** Jan. 2025 – Present
  Scientist – Bioinformatics, Computational Biology, and Proteomics:
  - Manage and integrate multi-omics data from databases and public repositories, transforming it into user-friendly formats for analysis. Develop, test, and maintain bioinformatics pipelines, perform NGS data analysis, and support genome sequencing, assembly, annotation, and metagenomic studies for research and publication.
- **Harvard Medical School: Department of Global Health and Social Medicine** Jan. 2023 – Dec. 2024
  Research fellow:
  - I specialize in genomic epidemiology, primarily focusing on the analysis of human and bacterial sequencing data. My research is dedicated to exploring the intricate relationships between genotypes and phenotypes. This encompasses immunophenotyping to assess T cell composition and genotyping of bacteria as part of my research pursuits.
  - Applied single-cell CITE-seq to profile T cell immunophenotypes from patient-derived PBMCs, identifying lineage specific susceptibility-associated T cell subpopulations linked to progression to active tuberculosis.
- **National Yang Ming Chiao Tung University: Research Center for Epidemic Prevention and One Health** Aug. 2022 – Jan. 2023
  Doctoral Research Associate/Biostatistician
  - analyzed the epigenetic data and genomic data and clinical information from cohort database of COVID-19 patients.
  - Lead and publish 2 risk models for COVID-19 neutralizing antibody titer by using Bayesian and MCMC algorithm.
- **Johns Hopkins University: School of Medicine, Sidney Kimmel Comprehensive Cancer Center** Feb. 2018 – Apr. 2022
  Research Trainee/Visiting Student:
  - Collaboration with Dr. Alison P. Klein's genome-wide associate study (GWAS) team with whole-genome sequencing data from NFPTR pancreatic cancer cohorts and identifying genetic risk factors /variants by a Bayesian-based fine-mapping algorithm.
  - To explore the risk and causal effects of DNA damage repair genes in pancreatic cancer and estimate cumulative risks with familial genotyping data.
- **State University of New York, Downstate Medical Center: Department of Anesthesiology** May 2012 – Jan. 2014
  Visiting Researcher/Graduated student:
  - Joined Dr. Ming Zhang's project for myocardial ischemia/reperfusion injury immune responses for a heart transplant and animal experiments.
  - New drug target evaluation, statistical analysis, and experiment execution for an immune modulator drug leads to cardiac ischemia-reperfusion injury.
- **Taipei Medical University.** Dec 2011 – Aug. 2017
  Project Manager:
  - Handling pre-clinical evaluation for an IVF assistant microfluidic biochip, FDA 510(k) documents preparation and application. Fundraising and patent documentary with government grants, investors, and Technology Transfer.
- **National Administration Projects of Research and Development of Medical Device** Aug. 2010 – Aug. 2011
  Project Manager:
  - Collaborated with Prof. Li-Chern Pan (TMU) and Prof. Fan-Gang Tseng (NTHU) to design a microfluidic system for sperm sorting and *in-vitro* fertilization treatment.
  - Monitored project progress and coordinated clinical groups and manufactory groups.
  - Grant proposal preparation, report writing, and FDA 510(k) statement correlated with pre-clinical/clinical research organization.
- **Centers for Disease Control, R.O.C. (Taiwan CDC): The Division of Chronic Infectious Diseases** Jun. 2010 – Sep. 2010
  Internship:
  - Participated in HIV prevention administrative works, documentation, grant writing and reference review.

Patent

- Pan, Richard Li-Chern, and **Hsu, Fang-Chi**. "Kit and method for the capture of tumor cells." U.S. Patent No. 8,709,801. 29 Apr. 2014.
- **Hsu, Fang-Chi** and Pan, Richard Li-Chern. "Kit and method for the capture of tumor cells." U.S. Patent No. 8,900,843. 2 Dec. 2014.

- Pan, Richard Li-Chern, and **Hsu, Fang-Chi**. "Kit and method for the capture of tumor cells." R.O.C. Patent No. I474000. 21 Feb. 2015.

Selected Publication

- **Hsu, F. C.**, & Yen, Y. (2024). Tumor Mutational Load: A Novel Predictor for Clinical Benefit of Pembrolizumab. Clinical Cancer Research, 30(17), 3652-3654.
- Chuang, Y. C., Hsia, Y., Chu, C. H., Maharajan, S., **Hsu, F. C.,** Lee, H. L., ... & Lo, L. W. (2024). Photothermal temperature-modulated cancer metastasis harnessed using proteinase-triggered assembly of near-infrared II photoacoustic/photothermal nanotheranostics. ACS Applied Materials & Interfaces, 16(31), 40611-40627.
- **Hsu, F. C.**, Pan, L. C., Huang, Y. F., Yang, C. H., Shiu, M. N., & Lin, H. J. (2024). A Dynamic Model for Estimating the Retention Duration of Neutralizing Antibody Titers After Vaccination in a COVID-19 Convalescent Population. The Journal of Infectious Diseases, 229(2), 398-402.
- Huang, Y. F.*, **Hsu, F. C.***, Wu, J. J., Lin, Y. L., Liu, M. T., Yang, C. H., ... & Chou, Y. J. (2023). Longitudinal Neutralizing Antibody Responses after SARS-CoV-2 Infection: A Convalescent Cohort Study in Taiwan. Journal of Microbiology, Immunology and Infection. (*Co-first author)
- Wang, Y., Huang, P., Wang, B. G., Murdock, T., Cope, L., **Hsu, F. C.**, ... & Shih, I. M. (2022). Spatial transcriptomic analysis of ovarian cancer precursors reveals reactivation of IGFBP2 during pathogenesis. Cancer Research.
- **Hsu, F. C.**, Lee, H. L., Chen, Y. J., Shen, Y. A., Tsai, Y. C., Wu, M. H., ... & Chiou, J. F. (2022). A Few-Shot Learning Approach Assists in the Prognosis Prediction of Magnetic Resonance-Guided Focused Ultrasound for the Local Control of Bone Metastatic Lesions. Cancers, 14(2), 445.
- **Hsu, F. C.,** Roberts, N. J., Childs, E., Porter, N., Rabe, K. G., Borgida, A., ... & Klein, A. P. (2021). Risk of Pancreatic Cancer Among Individuals with Pathogenic Variants in the ATM gene. *JAMA oncology*, 7(11), 1664-1668.
- Lin, K. C., Ting, L. L., Chang, C. L., Lu, L. S., Lee, H. L., **Hsu, F. C.**, ... & Chen, Y. J. (2021). Ex vivo expanded circulating tumor cells for clinical anti-cancer drug prediction in patients with head and neck cancer. *Cancers*, 13(23), 6076.
- Shen, Y. A., Jung, J., Shimberg, G. D., **Hsu, F. C**., Rahmanto, Y. S., Gaillard, S. L., ... & Wang, T. L. (2021). Development of Small Molecule Inhibitors Targeting PBX1 Transcription Signaling as a Novel Cancer Therapeutic Strategy. *iScience*.
- Shen, Y. A., Hong, J., Asaka, R., Asaka, S., **Hsu, F. C**., Rahmanto, Y. S., ... & Wang, T. L. (2020). Inhibition of the MYC-Regulated Glutaminase Metabolic Axis Is an Effective Synthetic Lethal Approach for Treating Chemoresistant Ovarian Cancers. *Cancer Research*, 80(20), 4514-4526.
- Tsai, Y.C., Lee, H.L., Kuo, C.C., Chen, C.Y., Hsieh, K.L.C., Wu, M.H., Wen, Y.C., Yu, H.W., **Hsu, F.C**., Tsai, J.T. and Chiou, J.F., 2019. Prognostic and predictive factors for clinical and radiographic responses in patients with painful bone metastasis treated with magnetic resonance-guided focused ultrasound surgery. International Journal of Hyperthermia, 36(1), pp.931-936.

Selected Published Conference Abstracts:

- **Fang-Chi Hsu**, …, Yun Yen. (2026) Bayesian Multimodal Modeling with Explainable Artificial Intelligence to Predict Response to GBE1-Targeted Metabolic Therapy in Colorectal Cancer. 2026 American Society of Clinical Oncology Breakthrough in Singapore.
- **Fang-Chi Hsu**, Ruochia Tseng, Chieh Yang, …, Yun Yen. (2026) Glycogen Branching Enzyme 1 as a Prognostic Metabolic Node in CMS4 Subtype Colorectal Cancer. 2026 American Association for Cancer Research Annual Meeting.
- **Fang-Chi Hsu**, Yun Yen. (2025) Mechanistic Insights into GBE1-Driven Metabolic Reprogramming in Colorectal Cancer. 2025 Annual Meeting of MOHW Cancer Research Projects and International Symposium on Health Promotion: Defeating Cancer-From Early Intervention to Precision Therapy.
- **Fang-Chi Hsu**, C-C Huang, …, Megan Murray. (2023) Memory T-cell composition contributes to lineage-specific host susceptibility to Mycobacterium tuberculosis. The Union World Conference on Lung Health.
- **Fang-Chi Hsu**, Hsin-Lun Lee, Yin-Ju Chen, Chia-Chun Kuo, Jeng-Fong Chiou. (2019) Tumour Ablation Induced Thermal Necrosis Modulates Immune-related Cytokines by Magnetic Resonance-guided Focused Ultrasound Surgery in Bone Metastatic Lesions. The 36th Annual meeting of the Society for Thermal Medicine.
- **Fang-Chi Hsu**, Hsin-Lun Lee, Yi-Chieh Tsai, Chia-Chun Kuo, Jeng-Fong Chiou. (2016) Simulation and Evaluation of Enhanced Thermal Necrosis Distribution via High Intensity Focused Ultrasound Hyperthermia Therapy. The 5th International Symposium on Focused Ultrasound 2016.

Award and Funding

- Awarded Student, Graduate Students Study Abroad Program (千里馬計畫 109-2917-I-038-001), Ministry of Science and Technology, Republic of China (Taiwan), 2019.
- Awarded Student, International Excellent Research Incubation and Development (教育部補助大學校院推展國際共同人才培育計畫), Ministry of Education, ROC (Taiwan), 2018.

Education

- **Taipei Medical University** and **Academia Sinica** —Taipei, Taiwan
  Ph.D. Program in Translational Medicine Graduation Date: June 2022
- **New York University Tandon School of Engineering**—Brooklyn, NY
  M.S. in Biomedical Engineering Graduation Date: January 2014
- **Taipei Medical University**—Taipei, Taiwan
  B.S. in Public Health Graduation Date: June 2011