Guojia WU

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RESEARCH INTEREST

With a strong foundation in both basic medicine and bioinformatics, I specialize in applying bioinformatics techniques to investigate cancer biology, particularly focusing on the roles of genomics and epigenetic modifications in tumor development and progression. I am also interested in tumor immune infiltration and its interaction with the genomic and epigenetic landscape. I am passionate about identifying potential therapeutic targets through integrative bioinformatics analyses, and exploring how genetic and methylation alterations contribute to cancer development and treatment response.

EDUCATION

- **TianJin Medical University** *Sep. 2021 - Jun. 2026 (Expected)*
  Bachelor of Science in ***Basic Medicine*** TianJin, China
  - **GPA:** 3.77/4.00; **RANKING :** 1st out of 22 students; **IELTs:** 7.0, C 1;

RESEARCH PROJECTS

- **Pan-Cancer Atlas of TCGA ipaQTM (Independent project)** *Mar. 2025 - Present*
  Supervisor: ***Prof. Yang Yang*** *Supported by YY Lab, TMU;* [GitHub]
  - **Investigated the relationship between DNA methylation and intronic pre-mRNA polyadenylation (IPA) across 23 cancer types using TCGA data, and further explored the underlying mechanisms**, including trans effects from genes such as *CDK12*, *BCL2*, *and CPSF1*, as well as cis effects involving DNA structure and transcription factor binding (e.g., *CTCF*). These findings suggested a novel regulatory layer in cancer transcriptomics.
  - Constructed a pan-cancer ipaQTM (intron polyadenylation quantitative trait methylation) map using Inpact and MatrixEQTL, **identifying over 500,000 cis-/trans- associations, Discovered thousands of putative IPA regulators.**

- **Glycolysis-Related Subtypes in Hepatocellular Carcinoma (Independent project)** *Mar. 2025 - Present*
  Supervisor: ***Prof. Yongmei Li*** *Supported by TMU Yongmei Li Lab;* [GitHub]
  - Identified key glycolysis-related genes (e.g., *SMG1*, *SRRM2*, *STAG1*) associated with hepatocellular carcinoma (HCC) progression through integrative analysis of RNA-seq, somatic mutation, and DNA methylation data. **Constructed a glycolytic gene signature using PCA and CatBoost-based feature selection from 30 candidate genes, and developed a molecular subtyping model based on non-negative matrix factorization (NMF).** This model stratified patients into clinically distinct subtypes with significant differences in survival, tumor stage, and metabolic activity, thereby demonstrating potential diagnostic and prognostic utility.
  - Glycolysis levels inferred from RNA-seq were correlated with immune infiltration patterns by integrating ESTIMATE and CIBERSORT algorithms, revealing subtype-specific immune microenvironments relevant to immunotherapy response.

- **Comprehensive Benchmark of DNN-Based pMHC Predictors (Independent project)** *Sep. 2024 - Jan. 2025*
  Supervisor: ***Prof. Yang Yang*** *Supported by TMU YY Lab;* [GitHub]
  - Benchmarked 17 state-of-the-art DNN-based tools for HLA-I peptide binding prediction using a **self-curated dataset of 290,000+ peptides across 44 alleles. Assessed model accuracy, robustness, and interpretability; incorporated SHAP and LIME to reveal internal mechanisms and feature contributions**.
  - Found self-attention models (STMHCpan, BigMHC) achieved best overall performance, while capsule-based CapsNet-MHC_AN showed strong generalizability. Demonstrated that models trained on eluted ligand data outperform those using binding affinity data; ensemble strategies further improved reliability.
  - Provided actionable guidelines for model selection, data integration, and the design of interpretable, clinically useful immunoinformatics tools.

- **The role of HADH Isoform 3 in Endometrial Cancer (Independent project)** *Mar. 2023 - Aug. 2024*
  Supervisor: ***Prof. Yongmei Li*** *Supported by TMUUROP Fund (1,000 RMB);* [GitHub]
  - **Identified the link between the fatty acid metabolism gene *HADH* and endometrial cancer (EC) using RNA-seq, genomics, and metabolomics data analysis.** Discovered *HADH* isoform 3 is downregulated in EC through *DDX3X* suppression, leading to activation of the *MEK-ERK* signaling pathway and promotion of malignant EC phenotypes.

- Demonstrated the therapeutic potential of *HADH* as a biomarker for EC, and its role in tumor infiltration and microenvironment construction.
- Provided insights for improved EC diagnosis, treatment, and prognosis monitoring by mapping the complete pathway of *HADH-DDX3X-MEK/ERK* interaction.

- **The role of Raptor in Post-Ischemic Angiogenesis (Collaborative project)** *Apr. 2022 - Aug. 2023*
  Supervisor: ***Prof. Ding Ai*** *Supported by TMUUROP Fund (20,000 RMB);* [GitHub]
  - **Investigated the role of Raptor, a core component of the mTORC1 complex, in post-ischemic angiogenesis using both in vivo and in vitro models.**
  - Explored the contribution of mTORC1 signaling in vascular regeneration, providing novel insights into the molecular regulation of ischemia-induced angiogenesis. Potentially offering new therapeutic strategies for peripheral artery disease by targeting the Raptor/mTORC1 pathway to enhance revascularization and tissue recovery.

- **The role of Annexin A2 in Hepatocarcinogenesis (Collaborative project)** *Apr. 2022 - Aug. 2023*
  Supervisor: ***Prof. Chunjiong Wang*** *Supported by TMUUROP Fund (10,000 RMB);* [GitHub]
  - Investigated the differential roles of *ANXA2* in normal liver regeneration and hepatocellular carcinoma (HCC) development. Identified *ANXA2* upregulates cholesterol biosynthesis, enhancing hepatocyte proliferation via increased intracellular cholesterol.
  - **Combined transcriptomic and metabolomic approaches to explore how *ANXA2*-mediated cholesterol regulation contributes to HCC progression.** Found *ANXA2* as a potential dual-function target to simultaneously suppress HCC and promote normal liver regeneration after partial hepatectomy.

PUBLICATIONS

A=Research article, R=Review, P=Publication, S=In Submission [GitHub]

[AS.1] **Wu, G.**, Liu, X., Wang, Y., & Yang, Y. (2025). **omprehensive evaluation and interpretative insights of peptide-HLA binding prediction tools using explainable artificial intelligence.** *bioRxiv.*

[AP.1] **Sun, L., Zhai, S., Wu, G.**, Gu, J., Huang, Y., Hong, D., Wang, J., & Li, Y. (2024). **Diagnostic sensitivity of immune-inflammatory cell proportion in early diagnosis of endometrial cancer**. *Clinical Surgical Oncology.*

[AS.2] **Li, W., Guo, R., Zhang, R.**, Wu, G., Chen, R., & Wang, D. (2025). **A bibliometric analysis of immunotherapy in glioblastoma**. Manuscript under review.

[RP.1] **Wu, G.**, Zhai, S., Sun, X., Huang, Y., Li, Y., & Sun, L. (2024). **progress of the effect of hydroxyacyl-coenzyme A dehydrogenase in cancer development and its mechanism**. *Basic & Clinical Medicine*.

ACADEMIC SKILLS

- **Programming Languages: R, Python, html and Shell.**
- **Wet Lab Techniques:** Western blotting, DNA electrophoresis, plasmid construction and extraction, PCR, cell culture, migration and invasion assays, CCK-8 assay, tumor formation in mice, immunohistochemistry, etc.
- **Bioinformatics Skills:** RNA-seq analysis, database construction, sequence alignment, methylation and mutation analysis, CNV detection, gene enrichment and survival analysis, tumor subtyping, PPI network analysis, immune cell infiltration, Seurat-based single-cell analysis, QTL mapping, XAI teniques(SHAP,LIME) etc.
- **Research Skills:** Operating system proficiency (**Windows, CentOS, Mint, Ubuntu**); Presentation (**LaTeX, PowerPoint, Photoshop, Adobe Illustrator**); Academic writing; Data processing; Reference management, etc.

HONOUR AND SCHOLARSHIP

- **TianJin Medical University Scholarship – Merit Student** *2021 - 2022*
  TianJin Medical University [Web]
  - Ranked in top 1% of students in TianJin Medical University.
- **TianJin Medical University Scholarship – First Prize** *2022 - 2023*
  TianJin Medical University [Web]
  - Ranked in top 5% of students in TianJin Medical University.
- **TianJin Medical University Scholarship – First Prize** *2023 - 2024*
  TianJin Medical University [Web]
  - Ranked in top 5% of students in TianJin Medical University.

EXPERIENCES AND AWARDS

- **Teaching Assistant in Pathogenic Organisms** *Apr. 2023- Jun. 2023*
  TianJin Medical University, College of Basic Medicine in association with ***Prof. Yongmei Li***
- **Executive Member, Basic Medicine Student Association** *Sep. 2021 - Jun. 2025*
  College of Basic Medicine, TianJin Medical University [🌐]
  - Executed a wide range of volunteer programs within the College of Life Sciences, including social practice, community outreach, and campus-wide events such as the university sports meeting and services for the visually impaired.
  - Led the recruitment and training of new volunteers, and designed engaging volunteer initiatives to enhance student union participation in public service.
- **Third Prize, International Forum on Basic Medical Sciences** *Aug. 2024*
  National Demonstration Center for Experimental Education [🌐]
  - Led Tianjin Medical University's first participation in the Belt and Road International Track; responsible for experimental design, and delivered the entire presentation and defense in English as team leader.
- **Third Prize in the Chinese Mathematics Competitions** *Dec. 2023*
  Chinese Mathematical Society [🌐]
- **Third prize, TianJin Chemistry competition** *Oct. 2023*
  Tianjin Municipal Education Commission [🌐]
- **Third prize, TianJin biology experimental competition** *Oct. 2024*
  Tianjin Municipal Education Commission [🌐]
- **First Prize (best), Internet Innovation and Entrepreneurship Competition** *2022 - 2024*
  Ministy of Education of the People's Repubulic of China [🌐]
  - Participated in the entrepreneurship track of the Internet Innovation and Entrepreneurship Competition for three consecutive years, serving as project leader or core member. Got over 8 awards in this competitions.
- **Second Prize (best), Challenge Cup National undergraduate entrepreneurship plan competition** *2023 - 2024*
  Ministy of Education of the People's Repubulic of China [🌐]
  - Participated in the Challenge Cup innovation track for two consecutive years as project leader, successfully leading the proposal submission and project execution each year. Got over 3 awards in this competitions.
- **Second Prize (best), Tianjin medical university TMUSPIP** *2023 - 2024*
  TianJin Medical University [🌐]
  - Participated in TMUSPIP, Tianjin Medical University's social practice initiative, for three consecutive years as a project leader or core team member; each year successfully secured university-level funding and completed the project with approved final reports; Got over 3 awards in TMUSPIP.