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

- **Basic Medical Science College, TianJin Medical University** *Sep. 2021 - Jun. 2026 (Expected)*
  *Bachelor of Science in **Basic Medicine (Chu Hsien-I class)*** TianJin, China
  - **GPA:** 3.77/4.00 (Overall); **RANKING :** 2nd (Third year)/1st (Overall) out of 22 students;
  - **IELTs:** 7.0, C1 (Validated Score, R:8.0, L:7.0, S:6.0, W:6.0);

RESEARCH PROJECTS

- **Pan-Cancer Atlas of TCGA ipaQTM (Independent project)** *Mar. 2025 - Present*
  *Supervisor: **Prof. Yang Yang** Supported by YY Lab, TMU;* [ ]
  - Investigated the relationship between DNA methylation and intronic pre-mRNA polyadenylation (IPA) across 23 cancer types using TCGA data.
  - 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.**
  - Investigating the mechanism behind DNA methylation and IPA, including trans effects from genes such as *CDK12, BCL2, and CPSF1*, and cis effects involving DNA structure and transcription factor (such as *CTCF*) binding.**Uncovered mechanistic links between DNA methylation and RNA polyadenylation, providing a novel regulatory layer in cancer transcriptomics.**

- **Glycolysis-Related Subtypes in Hepatocellular Carcinoma (Independent project)** *Mar. 2025 - Present*
  *Supervisor: **Prof. Yongmei Li** Supported by TMU Yongmei Li Lab;* [ ]
  - Identified key glycolysis-related genes (e.g., *SMG1*, *SRRM2*, *STAG1*) strongly associated with HCC progression through multi-omics integration (RNA-seq, mutation, methylation).
  - Constructed a robust glycolytic gene map via PCA and CatBoost-based feature selection from 30 candidate genes.**Developed an NMF-based molecular subtyping model validated against clinical and cellular data, providing diagnostic value for HCC.**
  - Explored associations between glycolysis levels and immune infiltration patterns in different HCC subtypes.

- **Comprehensive Benchmark of DNN-Based pMHC Predictors (Independent project)** *Sep. 2024 - Jan. 2025*
  *Supervisor: **Prof. Yang Yang** Supported by TMU YY Lab;* [ ]
  - 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, 10 people in Basic Medicine College);* [ ]

- **First identified the link between the fatty acid metabolism gene *HADH* and endometrial cancer (EC)** using RNA-seq, genomics, and metabolomics data analysis.
- Discovered that *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, 20 people in TianJin Medical University);* [GitHub]
  - Peripheral artery disease (PAD) is characterized by arterial narrowing/occlusion leading to ischemia, often progressing to ulcers, gangrene, or limb amputation without timely revascularization.We 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. Our findings could offer new therapeutic strategies for PAD 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, 40 students);* [GitHub]
  - Investigated the differential roles of **Annexin A2 (ANXA2)** in normal liver regeneration and hepatocellular carcinoma (HCC) development.We identified that 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.The findings suggest 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]

[AP.1] Guojia Wu, et al. (2024). **Diagnostic sensitivity of immune-inflammatory cell proportion in early diagnosis of endometrial cancer**. publication in *Clinical Surgical Oncology*.

[AS.1] Guojia Wu, et al. (2025). **Comprehensive evaluation and interpretative insights of peptide-HLA binding prediction tools using explainable artificial intelligence**. Manuscript submitted for publication in *BioArxiv*.

[AS.2] Wei Li, Guojia Wu, et al. (2025). **A bibliometric analysis of immunotherapy in glioblastoma**. Manuscript under review.

[RP.1] Guojia Wu, et al. (2024). **progress of the effect of hydroxyacyl-coenzyme A dehydrogenase in cancer development and its mechanism**. publication in *Basic & Clinical Medicine*.

ACADEMIC SKILLS

- **Programming Languages:** Experienced in R, Python, html and Shell; adaptively learning languages and tools based on project requirements.
- **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:** Familiar with operating sysmtem (Windows 7, 8, 10; Linux centOS, mint, ubuntu);Proficient in visualization tools including PowerPoint, Photoshop, and Adobe Illustrator; skilled in LaTeX, Word, and Excel for academic writing and data processing; experienced in using EndNote for reference management with strong literature search and data organization abilities.

Honors and Scholarship

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

Leadership, Social Engagement, and Other Achievements

- **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 [🌐]
- **Over 10 awards, Internet Innovation and Entrepreneurship Competition** *2022 - 2024*
  Ministy of Education of the People's Repubulic of China [🌐]
- **Over 3 awards, Challenge Cup National undergraduate entrepreneurship plan competition** *2023 - 2024*
  Ministy of Education of the People's Repubulic of China [🌐]
- **Over 3 awards, Tianjin medical university TMUSPIP** *2023 - 2024*
  TianJin Medical University [🌐]
  ◦ Participated in TMUSPIP, Tianjin Medical Universitys 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.