Tianyi Liu

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Profile

I am a **biostatistician** with a Ph.D. and profound passion for advancing public health research and pharmaceutical development. Academically, my doctoral research focused on **cellular deconvolution** and **precision medicine** using genomic, single-cell, and observational data by employing a wide range of **statistical** and **machine learning** methods. I have also collaborated with experts in diverse fields of study including **clinical trials**, **neuroscience**, **infectious diseases**, **environmental toxicology**, and **neonatal cares** to address real-world public health challenges. Professionally, I boast experience as a statistician in both pre-clinical and clinical domains in the pharmaceutical industry. I currently lead or provide support for projects on analysis of clinical trial data, while continuing my contribution to academic and industrial research in clinical development and public health.

Education

Ph.D., Biostatistics *The University of North Carolina at Chapel Hill* **Chapel Hill, NC** *08/2024*
M.S., Biostatistics *05/2023*
B.S.P.H., Biostatistics (with Highest Honors) & B.A., Mathematics *05/2019*
Graduated with Highest Distinction
Doctoral dissertation: *Algorithms for Cell-Type Deconvolution Under Constraints and Latent Structural Unwanted Variation*. Advised by Fei Zou and Quefeng Li.

Areas of Expertise

Probability Theory - Data Engineering & Visualization - Statistical Inference - Statistical Computing - Biostatistics & Bioinformatics - Multi-Omics - Precision Medicine - Clinical Trials

Professional Experience

Principal Biostatistician *Incyte Corporation* **Wilmington, DE** *08/2024 - Present*

- Led or participated in the (single-trial, ISE, and ISS) analyses, regulatory submissions, and academic publications of phase 1-3 clinical trial results on various autoimmune dermatological and oncological indications.
- Provided statistical inputs for clinical trial design, data monitoring and integration, primary efficacy analysis methodology, as well as other strategic discussion.
- Contributed to Protocol, Statistical Analysis Plan (SAP), and Clinical Study Report (CSR) authoring.
- Led annual compound-level IB/DSUR and other integrated safety signal analysis required by regulatory agencies.
- Spearheaded the data science and AI initiatives of the Incyte biostatistics department. Responsible for the following projects:
  - Clinical biomarker cutoff determination using data from early-phase trials.
  - Early drop-out prediction of subjects diagnosed with diffuse large B-cell lymphoma participating in oncology studies on data integrated from multiple phase 1-3 trials.
  - Efficacy prediction of povorcitinib on clinical trial participants diagnosed with hidradenitis suppurativa using early-phase clinical data.
  - Discovery of important baseline clinical variables underlying the differences in patients enrolled in two identical phase 3 trials.
  - Automated generation of clinical trial safety summaries using AI.

Research Statistics Intern *GlaxoSmithKline* **Collegeville, PA** *06/2021 - 08/2021*

- Constructed random forest models to profile and identify dozens of gene and metabolite markers from a pool of more than 17,000 genes and 20,000 metabolites that contributed synthetically to inhibit cancer cell growth with DepMap gene knockouts.
- Validated the efficacy of experimental cancer drug compounds in tumor microenvironments by quantifying lymphocyte-cancer cell interactions using linear mixed-effects models on imaging mass spectrometry data.

Graduate Research Assistant *The University of North Carolina at Chapel Hill* **Chapel Hill, NC** *08/2019 - 07/2024*

- Led statistical and bioinformatics analysis to determine transgenerational genetic and epigenetic signatures of Type 2 diabetes associated with exposures to arsenites in drinking water using laboratory mice from 100+ samples.
- Performed statistical modeling to characterize trans-generational Type 2 diabetes phenotypes associated with arsenite exposures in laboratory mice.
- Conducted the statistical investigation of genetic signatures associated with arsenite exposures in laboratory mice under folate-enriched diets.
- Inferred demographic factors and social determinants of health influencing the reception of pediatric physical therapy (PT) services using observational data from 191 North Carolina infants.
- Examined the effectiveness of a pain control procedure for neonatal eye exams using data on 48 preterm infants.
- Assessed the impacts of an intervention procedure on the mental well-being of preterm newborn infants' parents and devised the plan for a follow-up randomized clinical trial for the procedure using observational data on 65 clinical visits.
- Co-authored and published 7 peer-reviewed articles in top-tier journals.
- Mentored an undergraduate lab trainee on bioinformatic tools for analyzing epigenetic data.

Peer-Reviewed Publications

Authorship **boldfaced**.

- Shang B., **Liu T.**, Hartwell H., Douillet C., Venkatratnam A., Qing S., Miller M., Zou F., Krupenko S. A., Ideraabdullah F. Y., Pardo-Manuel de Villena F., Fry R.C., Stýblo M. (2025). Transgenerational diabetogenic effects of preconception exposure to inorganic arsenic in C57BL/6 mice are associated with dysregulation of DNA methylation and gene expression in G1 and G2 offspring. *Archives of Toxicology*.
- **Liu, T.**, Liu, C., Li, Q., Zheng, X., & Zou, F. (2025). ARTdeConv: adaptive regularized tri-factor non-negative matrix factorization for cell type deconvolution. *NAR Genetics And Bioinformatics*, 7(2), lqaf046. **(Editor's Choice article)**
- Hartwell H., Shang B., Douillet C., Bousquet A. G., **Liu T.**, Zou F., Ideraabdullah F., Stýblo M., Fry R. C. (2025). Heritable dysregulation of DNA methylation may underlie the diabetogenic effects of paternal preconception exposure to inorganic arsenic in C57BL/6J mice. *Toxicology and Applied Pharmacology*, 117242.
- McCarty, D. B., Clary-Williams, E., LeBLond, K. D., **Liu, T.**, Zbornik-Thompson, T., Ulrich, J. N., & Go, M. S. (2024). Interdisciplinary collaborative eye examinations to protect preterm infant neurodevelopment: a quality improvement project. *Frontiers in Psychology*, 15.
- McCarty, D. B., Dusing, S. C., Thorpe, D., Weinberger, M., Pusek, S., Gilbert, A., **Liu, T.**, Blazek, K., Hammond, S., & O'Shea, T. M. (2023). A feasibility study of a physical and occupational therapy-led and parent-administered program to improve parent mental health and infant development. *Physical & Occupational Therapy in Pediatrics*, 1–20.
- Shang, B., Venkatratnam, A., **Liu, T.**, Douillet, C., Shi, Q., Miller, M., Cable, P., Zou, F., Ideraabdullah, F. Y., Fry, R. C., & Stýblo, M. (2023). Sex-specific transgenerational effects of preconception exposure to arsenite: metabolic phenotypes of C57BL/6 offspring. *Archives of Toxicology*, 97(11), 2879–2892.
- Shang, B., Venkatratnam, A., Hartwell, H., Douillet, C., Cable, P., **Liu, T.**, Zou, F., Ideraabdullah, F. Y., Fry, R. C., & Stýblo, M. (2022). Ex vivo exposures to arsenite and its methylated trivalent metabolites alter gene transcription in mouse sperm cells. *Toxicology and Applied Pharmacology*, 455, 116266.
- Xenakis, J. G., Douillet, C., Bell, T. A., Hock, P., Farrington, J., **Liu, T.**, Murphy, C. E. Y., Saraswatula, A., Shaw, G. D., Nativio, G., Shi, Q., Venkatratnam, A., Zou, F., Fry, R. C., Stýblo, M., & Pardo-Manuel de Villena, F. (2022). An interaction of inorganic arsenic exposure with body weight and composition on type 2 diabetes indicators in Diversity Outbred mice. *Mammalian Genome*, 33(4), 575–589.
- Krupa, O., Fragola, G., Hadden-Ford, E., Mory, J. T., **Liu, T.**, Humphrey, Z., Rees, B. W., Krishnamurthy, A., Snider, W. D., Zylka, M. J., Wu, G., Xing, L., & Stein, J. L. (2021). NuMorph: Tools for cortical cellular phenotyping in tissue-cleared whole-brain images. *Cell Reports*, 37(2), 109802.
- Wang, Q., Wang, S., Zhu, X., **Liu, T.**, Humphrey, Z., et al. (2017). Accurate and high throughput cell segmentation method for mouse brain nuclei using cascaded convolutional neural network. *-Based Techniques in ...*. https://link.springer.com/chapter/10.1007/978-3-319-67434-67

Published Pre-Prints

- Zhang Y., **Liu T.**, Liu C., Sun X., Liu P., Hagood J. S., Pickles R. J., Zou F., & Zheng X. (2024). Temporal High-Resolution Atlas of Human Blood Leukocyte Composition in Response to Respiratory Virus Inoculation. *bioRxiv*.

Accepted Manuscripts

- Zikry, T. M. & **Liu T.** Precision Medicine Meets Sports Analytics: Promise, Pitfalls, and Lessons from the Field (2026). *In Press* as a chapeter of *Empirical Processes and Statistical Reinforcement Learning: A Festschrift in Honor of Michael R. Kosorok*.

Manuscripts

- **Liu, T.**, Li Q., Zheng X., & Zou F. (2026+). Cell Type Deconvolution Under Latent Structures of Unwanted Variation. *In Preparation*.
- Zikry, T. M., **Liu T.**, Freeman N. L. B., Spelke B., Savy N., & Kosorok M. R. (2026+). Optimal When-to-Treat Policies Under Dynamic Resource Constraints. *In Preparation*.

Teaching

- Short Course Instructor at International Biometric Conference (IBC) 2026. "A Hands-On Guide to Precision Medicine: Methods and Applications". Seoul, South Korea.

Presentations

- Contributed Talk at Joint Statistical Meetings (JSM) 2024. "A Novel Approach for Reference-Based Cell Type Deconvolution Under Latent Unwanted Variation". Portland, OR, USA.
- Contributed Poster at Winter q-Bio 2024. "Cell Type Deconvolution under Latent Structures of Unwanted Variation." Kapolei, HI, USA.
- Contributed Talk at JSM 2023. "Adaptive Regularized Tri-factor Nonnegative Matrix Factorization for Cell Type Deconvolution." Toronto, ON, Canada.
- Contributed Talk at Eastern North America Region of the International Biometrics Society (ENAR) 2023. "ARTdeConv: Adaptive Regularized Tri-factor Nonnegative Matrix Factorization Method for Flexible Deconvolution of Bulk Tissue Cell Types." Nashville, TN, USA.
- Contributed Poster at Society of Toxicology (SOT) Annual Meeting 2023. "Effects of Dietary Folate Intake on Gene Transcription in Sperm of BORCS7/AS3MT Humanized Mice Exposed to Inorganic Arsenic." Nashville, TN, USA.

Awards

- Merit-Based Research Assistantship, UNC Department of Biostatistics.
- William W. and Ida W. Taylor Mentored Research Fellowship, UNC-Chapel Hill.

Languages

- **English** [Fluent]
- **Chinese** [Native]
- **French** [Basic] - Learning