# Tianyi Liu

+1 (919)537-5533 tianyi.liu.nc@gmail.com Chapel Hill, NC, USA
in/tianyi-liu-157874133 github.com/gr8lawrence x.com/gr8lawrence

## Profile

I am a biostatistics researcher with a Ph.D. and a profound passion for advancing public health research and pharmaceutical discoveries. My doctoral research focuses on cell type deconvolution and precision medicine using genetic and observational data by employing a range of statistical and machine learning models. I also collaborate with a diverse group of experts to address real-world challenges in health-related disciplines and has experience as a pre-clinical and clinical statistician in the pharmaceutical industry.

## Education

**PhD Biostatistics** *University of North Carolina at Chapel Hill* **Chapel Hill, NC** *08/2024*
Advisors: Dr. Quefeng Li and Dr. Fei Zou.

**MS Biostatistics** *University of North Carolina at Chapel Hill* **Chapel Hill, NC** *05/2023*
Mentors: Dr. Bahjat Qaqish and Dr. Miroslav (Mirek) Stýblo.

**BSPH Biostatistics & BA Mathematics** *University of North Carolina at Chapel Hill* **Chapel Hill, NC** *05/2019*
Graduated with Highest Distinction and Highest Honors.

## Areas of Expertise

Statistical Modeling - Statistical Computing - Biostatistics & Bioinformatics - Multi-Omics - Precision Medicine - Probability Theory - Data Visualization - Statistical Consulting - Cross-Discipline Collaboration

## Professional Experience

**Principal Biostatistician,** *(Incyte Corp.)* **Wilmington, DE** *08/2024 -*

- Participate in the analysis of clinical trial data for IND and NDA applications.

**Consulting Statistician,** *(UNC School of Medicine)* **Chapel Hill, NC** *06/2023 -*
Consulted on the following projects:

- Inferred demographic factors and social determinants of health influencing the receiving 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-beings 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 two peer-reviewed academic publications in journals like *Frontiers in Psychology*.

**Research Statistics Intern,** *(GSK)* **Collegeville, PA** *06/2021 - 08/2021*
Supervised by Dr. Hoang Tran of the pre-clinical statistics team:

- Constructed random forest models to profile and identify dozens of gene and metabolite markers from a pool of over 17,000 genes and 20,000 metabolites that contributed synthetically to the inhibition of 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,** *(UNC Gillings School of Global Public Health)* **Chapel Hill, NC** *08/2019 - 05/2024*
Collaborated with a scientific team led by Dr. Miroslav (Mirek) Stýblo. and Dr. Rebecca Fry:

- Spearheaded statistical and bioinformatics analysis to determine trans-generational 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.
- Co-authored three peer-reviewed articles in top-tier toxicological journals such as *Archives of Toxicology*, with two more manuscripts in preparation or peer review.
- Mentored a undergraduate trainee on mastering bioinformatic tools for handling epigenetic data.

## Publications

Google Scholar citation: 27, h-index: 3.

- Liu, T., Liu, C., Li, Q., Zheng, X., & Zou, F. (2024). Adaptive Regularized Tri-Factor Non-Negative Matrix Factorization for Cell Type Deconvolution. *bioRxiv*.
- 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. (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

## Manuscripts

- Liu, T., Li Q., Zheng X., Zou F. (2024+). Cell Type Deconvolution Under Latent Structures of Unwanted Variation.
- Zikry, T. M., Liu T., Freeman N. L. B., Spelke B., Savy N., Kosorok M. R. (2024+). Optimal When-to-Treat Policies Under Dynamic Resource Constraints.
- Hartwell H., Shang B., Douillet C., Bousquet A. G., Liu T., Zou F., Ideraabdullah F., Stýblo M., Fry R. C. (2024+). Heritable Dysregulation of DNA Methylation May Underlie the Diabetogenic Effects of Paternal Preconception Exposure to Inorganic Arsenic in C57BL/6J Mice.

## Presentations

- 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 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 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, guaranteed 5-year funding support for doctoral research (awarded only to the first batch of admitted students each year).
- William W. and Ida W. Taylor Mentored Research Fellowship, $4,000 in undergraduated summer research.

## Languages

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