

# Zhicheng Ji, Ph.D.

Department of Biostatistics and Bioinformatics  
Duke University School of Medicine

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## Education

2020 Ph.D. in Biostatistics, Johns Hopkins Bloomberg School of Public Health (*Mentor: Hongkai Ji, Ph.D.*)  
2020 M.S.E. in Computer Science, Johns Hopkins Whiting School of Engineering (*Mentor: Suchi Saria, Ph.D.*)  
2013 B.S. in Statistics, Fudan University

## Professional Experience

08/2020-present Tenure-track Assistant Professor  
Department of Biostatistics and Bioinformatics, Duke University School of Medicine  
08/2020-present Co-Director, Statistical and Computational Immunology  
Duke Center for Human Systems Immunology  
04/2021-present Affiliated Faculty  
Computational Biology and Bioinformatics Program, Duke University

## Honors and Awards

2024 Maximizing Investigators' Research Award, National Institute of General Medical Sciences  
2021 Whitehead Scholar, Duke University  
2018 Margaret Merrell Award, Department of Biostatistics, Johns Hopkins University  
2018 June B. Culley Award, Department of Biostatistics, Johns Hopkins University  
2017 Runner-up, ENCODE-DREAM in vivo Transcription Factor Binding Site Prediction Challenge  
2016 ASA Section on Statistics in Genomics and Genetics Distinguished Student Paper Award  
2015 Top Performers, Prostate Cancer DREAM Challenge  
2014 Kocherlakota Award, Department of Biostatistics, Johns Hopkins University

## Publications

[Google Scholar](#)

The white numbers displayed in black boxes represent first-author or senior-author manuscripts attributed to either me or my mentees. The \* represents equal contributions. The <sup>†</sup> represents corresponding author. The underlines represent mentees.

### Research Articles

*Peer-reviewed journal articles*

- 1 Jackson C, Cherry C, Bom S, Dykema AG, Wang R, Thompson E, Zhang M, Li R, **Ji Z**, Hou W, Zhan W, Zhang H, Choi J, Vaghiasa A, Hansen L, Wang W, Bergsneider B, Jones KM, Rodriguez F, Weingart J, Lucas CH, Powell J, Elisseeff J, Yegnasubramanian S, Lim M, Bettegowda C, Ji H, Pardoll D. Distinct myeloid-derived suppressor cell populations in human glioblastoma. *Science*. 2025;387(6731):eabm5214.
- 2 Rosner S, Connor S, Sanber K, Zahurak M, Zhang T, Gurumurthy I, Zeng Z, Presson B, Singh D, Rayes R, Sivapalan L, Pereira G, **Ji Z**, Thummalapalli R, Reuss JE, Broderick SR, Jones DR, Deutsch JS, Cottrell TR, Chaft J, Spicer J, Taube J, Anagnostou V, Brahmer JR, Pardoll DM, Ji H, Forde PM, Marrone KA, Smith KN. Divergent clinical and immunologic outcomes based on STK11 co-mutation status in resectable KRAS-mutant lung cancers following neoadjuvant immune checkpoint blockade. *Clinical Cancer Research*. 2025;31(2):339-351.
- 3 Hou W<sup>†</sup>, **Ji Z**<sup>†</sup>. Comparing large language models and human programmers for generating programming code. *Advanced Science*. 2024;e2412279. [Google Scholar citations: 2]
- 4 Wang Y\*, Zhao J\*, Xu H\*, Han C, Tao Z, Zhou D, Geng T, Liu D<sup>†</sup>, **Ji Z**<sup>†</sup>. A systematic evaluation of computational methods for cell segmentation. *Briefings in Bioinformatics*. 2024;25(5):bbae407. [Google Scholar citations: 5]
- 5 Mahmood K\*, Wang H\*, **Ji Z**, Giovacchini CX, Wahidi MM, Dorry M, Shofer SL, Clarke JM, Antonia SJ, Shaz BH, Steadman K, Weinhold KJ, Yi J. Differences in microenvironment of lung cancer and pleural effusions by single-cell RNA sequencing. *Lung Cancer*. 2024;193:107847.
- 6 Glass M, **Ji Z**, Davis R, Pavlisko E, DiBernardo L, Carney J, Fishbein G, Luthringer D, Miller D, Mitchell R, Larsen B, Butt Y, Bois M, Maleszewski J, Halushka M, Seidman M, Lin CY, Buja M, Stone J, Dov D, Carin L, Glass C. A Machine Learning Algorithm Improves the Diagnostic Accuracy of the Histologic Component of Antibody Mediated Rejection (AMR-H) in Cardiac Transplant Endomyocardial Biopsies. *Cardiovascular Pathology*. 2024;72:107646.
- 7 Gao Q, **Ji Z**, Wang L, Owzar K, Li Q, Chan C, Xie J. SifiNet: A robust and accurate method to identify feature gene sets and annotate cells. *Nucleic Acids Research*. 2024;52(9):e46. [Google Scholar citations: 3]
- 8 Liu M, **Ji Z**, Jain V, Smith VL, Hocke E, Patel AP, McLendon RE, Ashley DM, Gregory SG, López GY. Spatial transcriptomics reveals segregation of tumor cell states in glioblastoma and marked immunosuppression within the perinecrotic niche. *Acta Neuropathologica Communications*. 2024;12(1):64. [Google Scholar citations: 4]
- 9 Hou W<sup>†</sup>, **Ji Z**<sup>†</sup>. Assessing GPT-4 for cell type annotation in single-cell RNA-seq analysis. *Nature Methods*. 2024;21(8):1462-1465. [Google Scholar citations: 69]  
 -Featured in Nature Methods "Embedding AI in biology" and "Toward learning a foundational representation of cells and genes"  
 -Essential Science Indicators (ESI) highly cited paper
- 10 Stephens KE, Moore C, Vinson DA, White BE, Renfro Z, Zhou W, **Ji Z**, Ji H, Zhu H, Guan Y, Taverna SD. Identification of Regulatory Elements in Primary Sensory Neurons Involved in Trauma-Induced Neuropathic Pain. *Molecular Neurobiology*. 2024;61(3):1845-1859.
- 11 Hou W, **Ji Z**, Chen Z, Wherry EJ, Hicks SC, Ji H. A statistical framework for differential pseudotime analysis with multiple single-cell RNA-seq samples. *Nature Communications*. 2023;14(1):7286. [Google Scholar citations: 42]
- 12 Wang Y\*, Wang W\*, Liu D\*, Hou W, Zhou T<sup>†</sup>, **Ji Z**<sup>†</sup>. GeneSegNet: a deep learning framework for cell segmentation by integrating gene expression and imaging. *Genome Biology*. 2023;24(1):235. [Google Scholar citations: 25]
- 13 Dykema AG, Zhang J, Cheung LS, Connor S, Zhang B, Zeng Z, Cherry CM, Li T, Caushi JX, Nishimoto M, Munoz AJ, **Ji Z**, Hou W, Zhan W, Singh D, Zhang T, Rashid R, Mitchell-Flack M, Bom S, Tam A, Ionta N, Aye THK, Wang Y, Sawosik CA, Tirado LE, Tomasovic LM, VanDyke D, Spangler JB, Anagnostou V, Yang S, Spicer J, Rayes R, Taube J, Brahmer JR, Forde PM, Yegnasubramanian S, Ji H, Pardoll DM, Smith KN. Lung tumor-infiltrating Treg have divergent transcriptional profiles and function linked to checkpoint blockade response. *Science Immunology*. 2023;8(87):eadg1487. [Google Scholar citations: 25]
- 14 Loh ZN, Wang ME, Wan C, Asara JM, **Ji Z**, Chen M. Nuclear PTEN Regulates Thymidylate Biosynthesis in Human Prostate Cancer Cell Lines. *Metabolites*. 2023;13(8):939. [Google Scholar citations: 1]

- 15 Gurkar AU, Gerencser AA, Mora AL, Nelson AC, Zhang AR, Lagnado AB, Enniful A, Benz C, Furman D, Beaulieu D, Jurk D, Thompson EL, Wu F, Rodriguez F, Barthel G, Chen H, Phatnani H, Heckenbach I, Chuang JH, Horrell J, Petrescu J, Alder JK, Lee JH, Niedernhofer LJ, Kumar M, Königshoff M, Bueno M, Sokka M, Scheibye-Knudsen M, Neretti N, Eickelberg O, Adams PD, Hu Q, Zhu Q, Porritt RA, Dong R, Peters S, Victorelli S, Pengo T, Khaliullin T, Suryadevara V, Fu X, Bar-Joseph Z, **Ji Z**, Passos JF. Spatial mapping of cellular senescence: emerging challenges and opportunities. *Nature Aging*. 2023;3(7):776-790. [Google Scholar citations: 63]  
-Essential Science Indicators (ESI) highly cited paper
- 16 Khatri A, Todd JL, Kelly FL, Nagler A, **Ji Z**, Jain V, Gregory SG, Weinhold KJ, Palmer SM. JAK-STAT activation contributes to cytotoxic T cell-mediated basal cell death in human chronic lung allograft dysfunction. *JCI Insight*. 2023;8(6):e167082. [Google Scholar citations: 15]
- 17 **Ji Z**<sup>†</sup>, Ma L<sup>†</sup>. Controlling taxa abundance improves metatranscriptomics differential analysis. *BMC Microbiology*. 2023;23(1):60. [Google Scholar citations: 1]
- 18 Liu Y, Huang Z, Liu H, **Ji Z**, Arora A, Cai D, Wang H, Liu M, Simko EAJ, Zhang Y, Periz G, Liu Z, Wang J. DNA-initiated epigenetic cascades driven by C9orf72 hexanucleotide repeat. *Neuron*. 2023;111(8):1205-1221.e9. [Google Scholar citations: 18]  
-Featured in Neuron "The DAXX tax: C9orf72 DNA repeat expansions drive gain- and loss-of-function pathology in c9FTD/ALS"
- 19 Fang Y, **Ji Z**<sup>\*</sup>, Zhou W<sup>\*</sup>, Abante J<sup>\*</sup>, Koldobskiy M, Ji H, Feinberg A. DNA methylation entropy is associated with DNA sequence features and developmental epigenetic divergence. *Nucleic Acids Research*. 2023;51(5):2046-2065. [Google Scholar citations: 7]
- 20 NIH SenNet Consortium to map senescent cells throughout the human lifespan to understand physiological health. (Listed as a consortium coauthor) *Nature Aging*. 2022;2:1090-1100. [Google Scholar citations: 79]
- 21 Zhang J, Wang X, **Ji Z**, Tian W. Large-scale prediction of key dynamic interacting proteins in multiple cancers. *International Journal of Biological Macromolecules*. 2022;220:1124-1132. [Google Scholar citations: 3]
- 22 Hou W, **Ji Z**<sup>†</sup>. Palo: Spatially-aware color palette optimization for single-cell and spatial data. *Bioinformatics*. 2022;38(14):3654-3656. [Google Scholar citations: 6]
- 23 Zhuang H, Wang H, **Ji Z**<sup>†</sup>. findPC: An R package to automatically select number of principal components in single-cell analysis. *Bioinformatics*. 2022;38(10):2949-2951. [Google Scholar citations: 24]
- 24 Lex RK, Zhou W, **Ji Z**, Falkenstein KN, Schuler KE, Windsor KE, Kim JD, Ji H, Vokes SA. GLI transcriptional repression is inert prior to Hedgehog pathway activation. *Nature Communications*. 2022;13(1):808. [Google Scholar citations: 25]
- 25 Hou W, **Ji Z**<sup>†</sup>. Unbiased visualization of single-cell genomic data with SCUBI. *Cell Reports Methods*. 2022;2(1):100135. [Google Scholar citations: 10]
- 26 Stephens KE, Zhou W, Renfro Z, **Ji Z**, Ji H, Guan Y, Taverna SD. Global gene expression and chromatin accessibility of the peripheral nervous system in animal models of persistent pain. *Journal of Neuroinflammation*. 2021;18(1):185. [Google Scholar citations: 13]
- 27 Caushi JX, Zhang J, **Ji Z**, Vaghasia A, Zhang B, Hsiue EH, Mog BJ, Hou W, Justesen S, Blosser R, Tam A, Anagnostou V, Cottrell TR, Guo H, Chan HY, Singh D, Thapa S, Dykema AG, Burman P, Choudhury B, Aparicio L, Cheung LS, Lanis M, Belcaid Z, El Asmar M, Illei PB, Wang R, Meyers J, Schuebel K, Gupta A, Skaist A, Wheelan S, Naidoo J, Marrone KA, Brock M, Ha J, Bush EL, Park BJ, Bott M, Jones DR, Reuss JE, Velculescu VE, Chافت JE, Kinzler KW, Zhou S, Vogelstein B, Taube JM, Hellmann MD, Brahmer JR, Merghoub T, Forde PM, Yegnasubramanian S, Ji H, Pardoll DM, Smith KN. Transcriptional programs of neoantigen-specific TIL in anti-PD-1-treated lung cancers. *Nature*. 2021;596(7870):126-132. [Google Scholar citations: 389]  
-Featured in Nature Reviews Clinical Oncology "Tumour antigen-induced T cell exhaustion – the archenemy of immune-hot malignancies"  
-Essential Science Indicators (ESI) highly cited paper
- 28 Zhang J, Miao G, Hu S, Sun Q, Ding H, **Ji Z**, Guo P, Yan S, Wang C, Kan X, Nie L. Quantification and evolution of mitochondrial genome rearrangement in Amphibians. *BMC Ecology and Evolution*. 2021;21(1):19. [Google Scholar citations: 12]

- 29 Chamling X, Kallman A, Fang W, Berlinicke CA, Mertz JL, Devkota P, Pantoja IEM, Smith MD, **Ji Z**, Chang C, Kaushik A, Chen L, Whartenby KA, Calabresi PA, Mao HQ, Ji H, Wang TH, Zack DJ. Single-cell transcriptomic reveals molecular diversity and developmental heterogeneity of human stem cell-derived oligodendrocyte lineage cells. *Nature Communications*. 2021;12(1):652. [Google Scholar citations: 75]
- 30 Dangi A, Natesh NR, Husain I, **Ji Z**, Barisoni L, Kwun J, Shen X, Thorp EB, Luo X. Single-cell transcriptomics of mouse kidney transplants reveals a myeloid cell pathway for transplant rejection. *JCI Insight*. 2020; 5(20):e14132. [Google Scholar citations: 40]
- 31 Hou W, **Ji Z**, Ji H, Hicks S. A Systematic Evaluation of Single-cell RNA-sequencing Imputation Methods. *Genome Biology*. 2020; 21(1):218. [Google Scholar citations: 301]
- 32** **Ji Z**, Zhou W, Hou W, Ji H. Single-cell ATAC-seq signal extraction and enhancement with SCATE. *Genome Biology*. 2020; 21(1):161. [Google Scholar citations: 42]
- 33 Zhang J, Yan S, Jiang C, **Ji Z**, Wang C, Tian W. Network Properties of Cancer Prognostic Gene Signatures in the Human Protein Interactome. *Genes (Basel)*. 2020; 11(3):247. [Google Scholar citations: 2]
- 34** Zhang J\*, **Ji Z\***, Caushi JX\*, El Asmar M\*, Anagnostou V, Cottrell TR, Chan HY, Suri P, Guo H, Merghoub T, Chaff JE, Reuss JE, Tam AJ, Blosser RL, Abu-Akeel M, Sidhom JW, Zhao N, Ha JS, Jones DR, Marrone KA, Naidoo J, Gabrielson E, Taube JM, Velculescu VE, Brahmer JR, Housseau F, Hellmann MD, Forde PM, Pardoll DM, Ji H, Smith KN. Compartmental Analysis of T-cell Clonal Dynamics as a Function of Pathologic Response to Neoadjuvant PD-1 Blockade in Resectable Non-Small Cell Lung Cancer. *Clinical Cancer Research*. 2020; 26(6):1327-1337. [Google Scholar citations: 129]  
-Featured in Clinical Cancer Research "Elite Intratumoral T-cell Clonotypes (The 1%) Effect 'Trickle-Down Cytotoxicity'"
- 35** Lex RK\*, **Ji Z\***, Falkenstein KN\*, Zhou W, Henry JL, Ji H, Vokes SA. GLI transcriptional repression regulates tissue-specific enhancer activity in response to Hedgehog signaling. *Elife*. 2020; 9:e50670. [Google Scholar citations: 40]
- 36 Stephens KE, Zhou W, **Ji Z**, Chen Z, He S, Ji H, Guan Y, Taverna SD. Sex differences in gene regulation in the dorsal root ganglion after nerve injury. *BMC Genomics*. 2019; 20(1):147. [Google Scholar citations: 80]
- 37** Chen Z\*, **Ji Z\***, Ngiow SF, Manne S, Cai Z, Huang AC, Johnson J, Staupe RP, Bengsch B, Xu C, Yu S, Kurachi M, Herati RS, Vella LA, Baxter AE, Wu JE, Khan O, Beltra JC, Giles JR, Stelekati E, McLane LM, Lau CW, Yang X, Berger SL, Vahedi G, Ji H, Wherry EJ. TCF-1-Centered Transcriptional Network Drives an Effector versus Exhausted CD8 T Cell-Fate Decision. *Immunity*. 2019; 51(5):840-855.e5. [Google Scholar citations: 604]  
-Featured in Immunity "Back to the future: effector fate during T cell exhaustion"  
-Essential Science Indicators (ESI) highly cited paper
- 38 Zhou W, **Ji Z**, Fang W, Ji H. Global prediction of chromatin accessibility using small-cell-number and single-cell RNA-seq. *Nucleic Acids Research*. 2019; 47(19):e121. [Google Scholar citations: 31]
- 39 Kuang Z, **Ji Z**, Boeke JD, Ji H. Dynamic motif occupancy (DynaMO) analysis identifies transcription factors and their binding sites driving dynamic biological processes. *Nucleic Acids Research*. 2018; 46(1):e2. [Google Scholar citations: 10]
- 40 Zhou W, Sherwood B, **Ji Z**, Xue Y, Du F, Bai J, Ying M, Ji H. Genome-wide prediction of DNase I hypersensitivity using gene expression. *Nature Communications*. 2017; 8(1):1038. [Google Scholar citations: 39]
- 41 Han F, Ji H, **Ji Z**, Wang H. A provable smoothing approach for high dimensional generalized regression with applications in genomics. *Electronic Journal of Statistics*. 2017; 11(2):4347-4403. [Google Scholar citations: 19]
- 42 Seyednasrollah F, et al. A DREAM Challenge to Build Prediction Models for Short-Term Discontinuation of Docetaxel in Metastatic Castration-Resistant Prostate Cancer. (Listed as a consortium coauthor). *JCO Clinical Cancer Informatics*. 2017;1:1-15. [Google Scholar citations: 21]
- 43 Guinney J, et al. Prediction of overall survival for patients with metastatic castration-resistant prostate cancer: development of a prognostic model through a crowdsourced challenge with open clinical trial data. (Listed as a consortium coauthor). *Lancet Oncology*. 2017; 18(1):132-142. [Google Scholar citations: 169]

- 44 **Ji Z\***, Zhou W\*, Ji H. Single-cell regulome data analysis by SCRAT. *Bioinformatics*. 2017; 33(18):2930-2932. [Google Scholar citations: 55]
- 45 Li Q, Lex RK, Chung H, Giovanetti SM, **Ji Z**, Ji H, Person MD, Kim J, Vokes SA. The Pluripotency Factor NANOG Binds to GLI Proteins and Represses Hedgehog-mediated Transcription. *Journal of Biological Chemistry*. 2016; 291(13):7171-82. [Google Scholar citations: 33]
- 46 Norrie JL, Li Q, Co S, Huang BL, Ding D, Uy JC, **Ji Z**, Mackem S, Bedford MT, Galli A, Ji H, Vokes SA. PRMT5 is essential for the maintenance of chondrogenic progenitor cells in the limb bud. *Development*. 2016; 143(24):4608-4619. [Google Scholar citations: 28]
- 47 **Ji Z**, Ji H. TSCAN: Pseudo-time reconstruction and evaluation in single-cell RNA-seq analysis. *Nucleic Acids Research*. 2016; 44(13):e117. [Google Scholar citations: 667]  
 -Winner of ASA Section on Statistics in Genomics and Genetics Distinguished Student Paper Award  
 -Featured in Nature Reviews Genetics "Challenges in unsupervised clustering of single-cell RNA-seq data"
- 48 Hong X, Ladd-Acosta C, Hao K, Sherwood B, Ji H, Keet CA, Kumar R, Caruso D, Liu X, Wang G, Chen Z, Ji Y, Mao G, Walker SO, Bartell TR, **Ji Z**, Sun Y, Tsai HJ, Pongracic JA, Weeks DE, Wang X. Epigenome-wide association study links site-specific DNA methylation changes with cow's milk allergy. *Journal of Allergy and Clinical Immunology*. 2016; 138(3):908-911.e9. [Google Scholar citations: 67]
- 49 Wang G, Hu FB, Mistry KB, Zhang C, Ren F, Huo Y, Paige D, Bartell T, Hong X, Caruso D, **Ji Z**, Chen Z, Ji Y, Pearson C, Ji H, Zuckerman B, Cheng TL, Wang X. Association Between Maternal Prepregnancy Body Mass Index and Plasma Folate Concentrations With Child Metabolic Health. *JAMA Pediatrics*. 2016; 170(8):e160845. [Google Scholar citations: 100]
- 50 Deng D, Du Y, **Ji Z**, Rao K, Wu Z, Zhu Y, Coley RY. Predicting survival time for metastatic castration resistant prostate cancer: An iterative imputation approach. *F1000Research*. 2016; 5:2672. [Google Scholar citations: 3]
- 51 **Ji Z**, Vokes SA, Dang CV, Ji H. Turning publicly available gene expression data into discoveries using gene set context analysis. *Nucleic Acids Research*. 2016; 44(1):e8. [Google Scholar citations: 18]

#### Conference proceedings

- 52 Multimodal single cell data integration challenge: results and lessons learned. (Listed as a consortium coauthor). *Proceedings of the NeurIPS 2021 Competitions and Demonstrations Track, Proceedings of Machine Learning Research*. 2022;176:162-176. [Google Scholar citations: 72]

#### Discussion papers

- 53 **Ji Z**, Ji H. Discussion of "Exponential-family Embedding with Application to Cell Developmental Trajectories for Single-cell RNA-seq Data". *Journal of the American Statistical Association*. 2021;116(534):471-474. [Google Scholar citations: 2]

#### Preprints and articles submitted to journals

- 54 Wu J\*, Wan C\*, **Ji Z<sup>†</sup>**, Zhou Y<sup>†</sup>, Hou W<sup>†</sup>. EpiFoundation: A Foundation Model for Single-Cell ATAC-seq via Peak-to-Gene Alignment. [bioRxiv](#).
- 55 Qu Y, Dong R, Gu L, Chan C, Xie J, Glass C, Wang X, Nixon A, **Ji Z<sup>†</sup>**. Single-cell and spatial detection of senescent cells using DeepScience. [bioRxiv](#).
- 56 Hou W<sup>†</sup>, Qu Y, **Ji Z<sup>†</sup>**. Assessing large multimodal models for one-shot learning and interpretability in biomedical image classification. [bioRxiv](#).
- 57 Changxin Wan, Zhiyou Ye, Tianbei Zhang, Huifang Ma, Ming Chen, Wenpin Hou, **Zhicheng Ji<sup>†</sup>**. Comparative analysis of gene regulation in single cells using Compass.
- 58 Qunsheng Dai\*, Changxin Wan\*, Yueyuan Xu, Kaileen Fei, Lindsey A. Olivere, Brianna Garrett, Leo Akers, Derek Peters, James Otto, Christopher D. Kontos, **Zhiceng Ji**, Yarui Diao, Kevin W. Southerland. Vcam1+ Fibro-adipogenic Progenitors Mark Fatty Infiltration in Chronic Limb Threatening Ischemia. [bioRxiv](#).



- 59 Haotian Zhuang, Xinyi Shang, Wenpin Hou<sup>†</sup>, **Zhicheng Ji**<sup>†</sup>. Identifying cell-type-specific spatially variable genes with ctSVG. [Preprint](#).
- 60 Huifang Ma, Yilong Qu, Anru Zhang, **Zhicheng Ji**<sup>†</sup>. Vispro improves imaging analysis for Visium spatial transcriptomics. [bioRxiv](#).
- 61 Haotian Zhuang, Xin Gai, Anru R Zhang, Wenpin Hou, **Zhicheng Ji**, Pixu Shi. Trajectory-guided dimensionality reduction for multi-sample single-cell RNA-seq data reveals biologically relevant sample-level heterogeneity. [bioRxiv](#).
- 62 Zhuang H, **Ji Z**<sup>†</sup>. PreTSA: computationally efficient modeling of temporal and spatial gene expression patterns. [bioRxiv](#).
- 63 Hou W<sup>†</sup>, Xinyi Shang, **Ji Z**<sup>†</sup>. Benchmarking large language models for genomic knowledge with GeneTuring. [bioRxiv](#).
- 64 Wang H, **Ji Z**<sup>†</sup>. T-cell receptor sequences correlate with and predict gene expression levels in T cells. [bioRxiv](#)
- 65 Wan C, **Ji Z**<sup>†</sup>. Integrating multiple single-cell multi-omics samples with Smmit. [bioRxiv](#)
- 66 Hou W<sup>†</sup>, **Ji Z**<sup>†</sup>. Decomposing spatial heterogeneity of cell trajectories with Paella. [bioRxiv](#)
- 67 Zhang B, **Ji Z**, and Ji H. Tree-based Correlation Screen and Visualization for Exploring Phenotype-Cell Type Association in Multiple Sample Single-Cell RNA-Sequencing Experiments. [bioRxiv](#)
- 68 Sheng Li, Paula A. Agudelo Garcia, Constantin Aliferis, Michael J. Becich, Jazmin Calyeca, Benjamin D. Cosgrove, Jennifer Elisseff, Negin Farzad, Elana J. Fertig, Carolyn Glass, Liangcai Guo, Qianjiang Hu, **Zhicheng Ji**, Melanie Königshoff, Nathan K. LeBrasseur, Dongmei Li, Anjun Ma, Qin Ma, Vilas Menon, Jacob T. Mitchell, Ana L. Mora, Sushma Nagaraj, Andrew C. Nelson, Laura J. Niedernhofer, Mauricio Rojas, Jinhua Wang<sup>0</sup>, Siyuan Wang, Pei-Hsun Wu, Jichun Xie, Ming Xu, Miao Yu, Xu Zhang, Yue Zhao, SenNet Consortium, Peter Adams, Cristina Aguayo-Mazzucato, Darren J. Baker, Christopher Benz, David A. Bernlohr, Marta Bueno, Jin Chen, Bennett G. Childs, Jeffrey H. Chuang, Dongjun Chung, Mythili Dileepan, Li Ding, Mingze Dong, Francesca Duncan<sup>0</sup>, Archibald Enniful, William F. Flynn, Ana Catarina Franco, David Furman, Vesna Garovic, Stephanie Halene, Allison B. Herman, Ann V. Hertz, Kanako Iwasaki, Hyeonseon Jeon, Jeon Woong Kang, Shilpita Karmakar, James Kirkland, Ron Korstanje, Erich Kummerfeld, Jun Hee Lee, Yang Liu, Yao Lu, Jose Lugo-Martinez, Helene Martini, Simon Melov, Nicolas Musi, João F. Passos, Samuel T. Peters, Irfan Rahman, Ramalakshmi Ramasamy, Alexandra N. Rindone, Paul D. Robbins, Paul Robson, Jhonny Rodriguez-Lopez, Lorena Rosas, Nadia Rosenthal, Marissa J. Schafer, Birgit Schilling, Elizabeth L. Schmidt, Kevin Schneider, Kaustav Sengupta, Jian Shu, Peter T. C. So, Li Sun<sup>0</sup>, Tamar Tchkonja, Marcos G. Teneche, Natalia Vanegas, Julia Wang, Juan Xie, Shanshan Yin, Ke Zhang, Quan Zhu<sup>0</sup>, Rong Fan. Multi-omics for the biological understanding of the cellular senescence.

## Book Chapters

- 69 **Ji Z**, Ji H. Pseudotime Reconstruction Using TSCAN. *Methods in Molecular Biology*. 2019; 1935:115-124. [Google Scholar citations: 13]
- 70 Zhang J, **Ji Z**, Smith KN. Analysis of TCR  $\beta$  CDR3 sequencing data for tracking anti-tumor immunity. *Methods in Enzymology*. 2019; 629:443-464. [Google Scholar citations: 7]

## Editorial

- 71 Hou L, **Ji Z**, Wang J, Xie J. Editorial: Statistical and computational methods for single-cell sequencing analysis. *Frontiers in Genetics*. 2023;14:1235174.

## Funding Support

The white numbers displayed in black boxes represent grants for which I serve as the PI or core lead.

**Current**

- 1** Title: Computational methods for in situ spatial transcriptomics  
Project Number: R35-GM154865  
PD/PI: Zhicheng Ji  
Source of Support: National Institutes of Health (NIH) / National Institute of General Medical Sciences (NIGMS)  
Project Start and End Date: 8/1/2024 - 6/30/2029  
Role: PI  
Total Award Amount: \$1,963,069  
Effort: 39%
- 2** Title: The Duke Senescent Cell Evaluations in Normal Tissues (SCENT) Mapping Center  
Project Number: U54-AG075936  
PD/PI: Andrew B. Nixon  
Source of Support: National Institutes of Health (NIH) / National Institute on Aging (NIA)  
Project Start and End Date: 9/30/2021 - 8/31/2026  
Role: Data Analysis Core Co-Lead  
Total Award Amount: \$12,705,171  
Effort: 10%
- 3** Title: Training Program in Bioinformatics at the Intersection of Cancer Immunology and Microbiome  
Project Number: R25-CA244070  
PD/PI: Kouros Owzar  
Source of Support: National Institutes of Health (NIH) / National Cancer Institute (NCI)  
Project Start and End Date: 7/1/2020 - 6/30/2025  
Role: Training Faculty  
Total Award Amount: \$1,222,432  
Effort: 5%
- 4** Title: Neural Architecture of the Murine and Human Temporomandibular Joint  
Project Number: UC2-AR082197  
PD/PI: Christopher R. Donnelly  
Source of Support: National Institutes of Health (NIH) / National Institute of Arthritis and Musculoskeletal and Skin Diseases (NIAMS)  
Project Start and End Date: 9/23/2022 - 8/31/2025  
Role: Co-I  
Total Award Amount: \$5,734,560  
Effort: 5%
- 5** Title: A Window-of-Opportunity Trial Using Neoadjuvant Hepatic Artery Chemotherapy for Patients With Localized Pancreas Cancer  
Project Number: 23-14  
PD/PI: Peter J. Allen  
Source of Support: Marc Lustgarten Pancreatic Cancer Foundation  
Project Start and End Date: 12/1/2023 - 8/31/2026  
Role: Co-I  
Total Award Amount: \$1,368,231  
Effort: 5%

- 6 Title: Targeting Ferroptosis in Lethal RB1 Deficient Prostate Cancer  
Project Number: R01-CA269211  
PD/PI: Ming Chen  
Source of Support: National Institutes of Health (NIH) / National Cancer Institute (NCI)  
Project Start and End Date: 4/1/2022 - 3/31/2027  
Role: Co-I  
Total Award Amount: \$2,071,290  
Effort: 4.25%
- 7 Title: NSF Engineering Research Center for Precision Microbiome Engineering (PreMiEr)  
Project Number: EEC-2133504-001  
PD/PI: Claudia Gunsch  
Source of Support: National Science Foundation (NSF)  
Project Start and End Date: 9/1/2022 - 8/31/2027  
Role: Investigator  
Total Award Amount: \$26,000,000  
Effort: 1%
- 8 Title: Perinatal Per- and Polyfluoroalkyl Substances (PFAS) exposure and Immunotoxicity in early life  
Project Number: R01-ES035037  
PD/PI: Liping Feng  
Source of Support: National Institutes of Health (NIH) / National Institute of Environmental Health Sciences (NIEHS)  
Project Start and End Date: 4/20/2023 - 1/31/2028  
Role: Investigator  
Total Award Amount: \$2,476,848  
Effort: 4%

### **Past**

- 9 Title: Whitehead Scholar Award  
PD/PI: Zhicheng Ji  
Source of Support: Duke University School of Medicine  
Project Start and End Date: 2021 -  
Role: PI  
Total Award Amount: \$250,000
- 10 Title: Translating Duke Health Award  
PD/PI: Zhicheng Ji  
Source of Support: Duke University School of Medicine  
Project Start and End Date: 2021 -  
Role: PI  
Total Award Amount: \$50,000



- 11 Title: Single-cell omics approaches to investigate TMD  
 Project Number: UH2-DE032202  
 PD/PI: Shad Smith  
 Source of Support: National Institutes of Health (NIH) / National Institute of Dental and Craniofacial Research (NIDCR)  
 Project Start and End Date: 9/9/2022 - 8/31/2024  
 Role: Statistician  
 Total Award Amount: \$402,487
- 12 Title: Neuro-immune modulation of pain in health and disease  
 Project Number: R01-DE031053  
 PD/PI: Chris Donnelly  
 Source of Support: National Institutes of Health (NIH) / National Institute of Dental and Craniofacial Research (NIDCR)  
 Project Start and End Date: 9/1/2022-8/31/2027  
 Role: Co-I  
 Total Award Amount: \$3,311,196
- 13 Title: Statistical modeling of cross-sample variation and learning of latent structures in microbiome sequencing data  
 Project Number: R01-GM135440  
 PD/PI: Li Ma  
 Source of Support: National Institutes of Health (NIH) / National Institute of General Medical Sciences (NIGMS)  
 Project Start and End Date: 9/15/2020-8/31/2025  
 Role: Investigator  
 Total Award Amount: \$1,717,909

## Editorial Activities

### Editor

Guest editor, [Statistical Genetics and Methodology, Frontiers in Genetics](#)

Review Editor, [Cancer Immunity and Immunotherapy, Frontiers in Immunology](#)

Review Editor, [Integrative Genetics and Genomics, Frontiers in Systems Biology](#)

### Reviewer for Journals (selected)

Nature Biotechnology; Nature Methods; Cell Discovery; Nucleic Acids Research; Nature Communications; Genome Biology; Genome Medicine; npj Digital Medicine; Cell Genomics; Cell Reports; Genome Research; Briefings in Bioinformatics; Genomics, Proteomics & Bioinformatics; GigaScience; Clinical and Translational Medicine; PLOS Computational Biology; PLOS Genetics; Computational and Structural Biotechnology Journal; Bioinformatics

## Mentoring Experience

**Bold** indicates I am the thesis or graduation project advisor

## Current Students

### Postdoctoral Associate

Huifang Ma, Department of Biostatistics and Bioinformatics, Duke University (co-advise with Dr. Anru Zhang)

### Ph.D. Students

**Changxin Wan**, Program of Computational Biology and Bioinformatics, Duke University

-Precision Genomics Collaboratory-OBGE Graduate Student Pilot Research Grant Award

**Huimin Wang**, Department of Biostatistics and Bioinformatics, Duke University (co-advise with Dr. Simon Gregory)

-Precision Genomics Collaboratory-OBGE Graduate Student Pilot Research Grant Award

**Haotian Zhuang**, Department of Biostatistics and Bioinformatics, Duke University

### Master's Students

Jingyun Liu, Department of Biostatistics and Bioinformatics, Duke University

Beijie Ji, Department of Biostatistics and Bioinformatics, Duke University

Zhiyou Ye, Department of Biomedical Engineering, Duke University

## Alumni

### Postdoctoral Associate

Yuxing Wang, Department of Biostatistics and Bioinformatics, Duke University

-Currently Machine Learning Engineer, Nvidia

### Ph.D. Students

**Mengyi (Miko) Liu**, Computational Biology and Bioinformatics Program, Duke University (co-advise with Dr. Simon Gregory)

-Paul and Lauren Ghaffari Graduate Fellowship

Xingyuan Zhang, Program of Computational Biology and Bioinformatics, Duke University (rotation student)

Yuxing Wang, Department of Computer Engineering, Rochester Institute of Technology (visiting student)

Constantine Stavrianidis, Program of Computational Biology and Bioinformatics, Duke University (rotation student)

Tzu-Chieh (Jackie) Liao, Department of Immunology, Duke University (rotation student)

Aybuga Altay, Max Planck Institute for Molecular Genetics (visiting student)

### Master's Students

**Anthony Qu**, Department of Biostatistics and Bioinformatics, Duke University

-Outstanding Master's Project Award

-Currently Research Technician, Department of Biostatistics and Bioinformatics, Duke University

**Yuan Wang**, Department of Biostatistics and Bioinformatics, Duke University (co-advise with Dr. Yarui Diao)

Hao Wang, Department of Statistical Science, Duke University

-Currently PhD student, Department of Biostatistics, University of Pittsburgh

**Constantine Stavrianidis**, M.S. Department of Biostatistics and Bioinformatics, Duke University

-Currently PhD student, Program of Computational Biology and Bioinformatics, Duke University

**Caiwei Zhong**, M.S. Department of Biostatistics and Bioinformatics, Duke University

-Currently statistician, Dana-Farber Cancer Institute

**Huimin Wang**, M.S. in Biostatistics and Bioinformatics, Duke University

-Currently PhD student, Department of Biostatistics and Bioinformatics, Duke University

-Outstanding Master's Project Award

**Haotian Zhuang**, M.S. in Biostatistics and Bioinformatics, Duke University

-Currently PhD student, Department of Biostatistics and Bioinformatics, Duke University

-Degree Marshall Award

-Overall Academic Achievement Award

**Tianbei Zhang**, Department of Biostatistics and Bioinformatics, Duke University

-Currently data analyst, Bloomberg Kimmel Institute for Cancer Immunotherapy, Johns Hopkins University School of Medicine

**Xiaotan Sun**, Department of Biostatistics and Bioinformatics, Duke University (co-advise with Dr. Anru Zhang)

-Currently research data scientist, Cleveland Clinic

**Dezhao Fu**, Department of Biostatistics and Bioinformatics, Duke University

#### Undergraduate Students

**Brian Du**, B.S. in Computer Science, Duke University

-Currently MD student, Baylor College of Medicine

**Wei Wang**, B.S. in Applied Mathematics, The College of William & Mary (Visiting student)

-Currently PhD student, Department of Biostatistics, University of Minnesota

#### **Ph.D. Thesis Committee**

Carol Wang, Department of Statistical Science, Duke University

Qi Gao, Department of Biostatistics and Bioinformatics, Duke University

Arinze Okafor, Department of Cell Biology, Duke University

#### **Ph.D. Preliminary Exam Committee**

Tzu-Chieh (Jackie) Liao, Department of Immunology, Duke University

Zihan Yan, Department of Cell and Molecular Biology, Duke University

Hongbin Liu, Department of Electrical and Computer Engineering, Duke University

## **Teaching Experience**

### **Courses**

BIOSTAT 824. Case Studies in Biomedical Data Science. 2025, Department of Biostatistics and Bioinformatics, Duke University

### **Short Courses and Workshops**

Microbiome Immunology Cancer Bioinformatics Short Course. 2022, Department of Biostatistics and Bioinformatics, Duke University

Practical Genomics Workshop: From Biology to Biostatistics. 2021, Johns Hopkins Center for Computational Genomics.

### **Guest Lecturer**

MATH 590: Advanced Special Topics in Mathematics. 2023, Duke University

BIOSTAT 900: Current Problems in Biostatistics. 2020, Duke University

140.688: Statistics for Genomics. 2018-2020, Johns Hopkins University

### **Teaching Assistant**

140.621: Statistical Methods in Public Health. 2014-2015 & 2016-2019, Johns Hopkins University

## **Professional Activities**

### **Grant Review**

Mail reviewer, NIH Directors Early Independence Awards (DP5).

Ad hoc reviewer, NIH Molecular Neurogenetics (MNG) study section

Ad hoc reviewer, Medical Research Council, UK Research and Innovation (UKRI)

### **Academic Services**

Co-chair, Imaging Mapping Working Group, NIH Common Fund's Cellular Senescence Network (SenNet)

Co-organizer, Duke single cell initiative research in progress seminar series

Organizer, Immunology Data Science Challenge for Master's students, Department of Biostatistics and Bioinformatics, Duke University

Screener, Duke University School of Medicine MD admissions

Reviewer, Duke University School of Medicine Virtual Research Week Poster Session

Reviewer, ASA Section on Statistics in Genomics and Genetics Student Paper Competition

### **Professional Memberships**

American Statistical Association (ASA) (2016-present)

Eastern North American Region (ENAR) (2017-present)

International Society for Computational Biology (ISCB) (2018-2019)

International Chinese Statistical Association (ICSA) (2016-2017)

American Society of Human Genetics (ASHG) (2015-2016)

International Genetic Epidemiology Society (IGES) (2015-2016)

## Presentations

### Invited Talks

Expanding the Horizons of Genomics and Biomedical Analysis: GPT-4's Role in Automated Cell Type Annotation and Beyond. ICIBM. Oct, 2024

Computational methods for decoding cellular senescence. Department Colloquium, Department of Computational Mathematics, Science and Engineering, Michigan State University. Aug, 2024

GeneSegNet: a deep learning framework for cell segmentation by integrating gene expression and imaging. MCBIOS 2024. March, 2024

Democratizing genomic data science with large language models. Statistical Genetics and Genomics Seminar, Department of Biostatistics, Columbia University. November, 2023

Decomposing spatial heterogeneity of cell trajectories for spatial transcriptomics data. ICSA Applied Statistics Symposium, June, 2023

Applications of ChatGPT and GPT models to genomic research. Duke Center for Human Systems Immunology Retreat, June, 2023

Analyzing and Comparing Multiple Spatial Gene Expression Samples with POLYspace. Joint Statistical Meeting, August, 2022

Statistical Methods for Decoding Gene Regulation in Single Cells. Statistical Genetics Seminar, The University of North Carolina at Chapel Hill, March, 2022

Integrative analysis of multi-study single-cell RNA-sequencing datasets identifies conserved immune landscape of COVID-19 patients. Inaugural Duke Center for Human Systems Immunology Virtual Symposium, August, 2021

Integrative analysis of multi-study single-cell RNA-sequencing datasets identifies conserved immune landscape of COVID-19 patients. Single-cell and Spatial Colloquium, Duke University, March, 2021

Computational Methods for Decoding Gene Regulation in Single Cells. Computational Biology and Bioinformatics Seminar, Duke University, February, 2021

Single-cell RNA-seq, power to analyze at a single cell level and broader view of statistical approach to employ in single cell analysis. Duke Transplant Infectious Diseases Research Symposium, November, 2020

### Contributed Talks

Assessing GPT-4 for cell type annotation in single-cell RNA-seq analysis. ENAR, March, 2024

Single-cell Unbiased Visualization with SCUBI. Joint Statistical Meeting, August, 2021

Reconstruction of conserved immune landscape in COVID-19 patients via multi-study integrative analysis of single-cell RNA-sequencing data. Cold Spring Harbor meeting on Systems Immunology, April, 2021

Single-cell ATAC-seq signal extraction and enhancement with SCATE. ENAR, March, 2020

Reproducible interactive data visualization and exploration with iXplore. ENAR, March, 2017

Reproducible interactive data visualization and exploration with iXplore. The 10th International Chinese Statistical Association International Conference, December, 2016

TSCAN: Pseudo-time reconstruction and evaluation in single-cell RNA-seq analysis. Joint Statistical Meeting, August, 2016

## Posters

Single-cell ATAC-seq signal extraction and enhancement with SCATE. RECOMB/ISCB Conference on Regulatory & Systems Genomics, December, 2018

Turning publicly available gene expression data into discoveries using gene set context analysis. The American Society of Human Genetics Annual Meeting, October, 2015

Turning publicly available gene expression data into discoveries using gene set context analysis. International Genetic Epidemiology Society Annual Meeting, October, 2015