

# Zhou (Joe) Lan

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## SUMMARY

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I am a computational and statistical investigator at Brigham and Women's Hospital and Harvard Medical School with focuses on biomedical data, particularly neuroscience, genetics, oncology, and cardiovascular research. My work spans the **full spectrum** of biomedical/clinical investigation, including (a) pre-clinical studies for biological discovery using data science and digital health approaches, (b) clinical trials for treatment evaluation using robust statistical approaches, and (c) epidemiological real-world studies and outcomes research for assessing treatment effectiveness/safety using causal inference methods. I have participated in a number of studies as a leading biostatistics investigator and a statistics collaborator.

As a leading biostatistics investigator, I have served as a lead author on more than 15 publications in leading journals such as *Imaging Neuroscience*, *NeuroImage: Clinical*, *Bioinformatics*, *Data Science in Science*, and *JAMIA Open* with open codes and software available at <https://github.com/lanzhouBWH>. As a statistics collaborator, I have co-authored over 50 collaborative papers in high-impact biomedical and clinical journals, including *The New England Journal of Medicine*, *Journal of the American Heart Association*, *Circulation*, *Human Brain Mapping*, *Neuro-Oncology* and *Radiology*. Currently, my work is expanding to incorporate artificial intelligence to advance biomedical discovery and accelerate clinical translation. I also actively engage with FDA guidelines to strengthen the translational impact of my work and prepare for opportunities in the pharmaceutical industry.

## WORK EXPERIENCE

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| <b>Brigham and Women's Hospital, Harvard Medical School</b><br><i>Biostatistics Investigator; Instructor in Medicine</i> | Oct 2022 – present  |
| <b>Center for Outcomes Research and Evaluation, Yale Medical School</b><br><i>Statistician Consultant</i>                | Jul 2020 – Sep 2022 |
| <b>Pennsylvania State University</b><br><i>Bruce Lindsay Visiting Assistant Professor</i>                                | Aug 2019 – Jul 2020 |
| <b>Eli Lilly &amp; Company</b><br><i>Ph.D. Statistics Intern</i>   | May 2018 – Aug 2018 |
| <b>Ventana Medical Systems (Roche)</b><br><i>Imaging Scientist Intern</i>  | May 2016 – Jul 2016 |

## EDUCATION

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| <b>North Carolina State University</b> , Raleigh, North Carolina<br>Ph.D. in Statistics, July 2019    |
| <b>Georgia Institute of Technology</b> , Atlanta, Georgia<br>M.S., Statistics (Mathematics), May 2015 |
| <b>Zhejiang University</b> , Hangzhou, China<br>B.S., Biology, May 2012                               |

## EXPERTISE

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| <b>Programming</b>                       | Python, R, C/C++, Bash, Slurm Workload Manager, SAS   |
| <b>Statistics &amp; Machine Learning</b> | Survival Analysis, Bayesian Modeling, Probabilistic Graphical Models, Quantile Regression, Spatial Statistics, Matrix-Variate Methods, High-Dimensional Data Analysis, Causal Inference |
| <b>Computation</b>                       | High-Performance Computing, Parallel Computing, Algorithm Development   |
| <b>Biomedical Applications</b>           | Neuroimaging, Radiology, Genetics, Diffusion MRI, Magnetic Resonance Spectroscopy, Oncology, Cardiology   |

## WORK AUTHORIZATION

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United States Permanent Resident (Green Card)

# MAIN PROJECTS

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## Pre-Clinical Studies for Biological Discovery

- **Project 1:** Fiber Microstructure Quantile (FMQ) Regression for Analyzing Brain White Matter Bundles (Lauren J. O'Donnell at Brigham and Women's Hospital, Harvard Medical School)
  - Used the established imaging processing pipelines (*UKFTractography*: <https://github.com/pnlbwh/ukftractography> and *whitematteranalysis*: <https://github.com/SlicerDMRI/whitematteranalysis>) for Human Connectome Project-Young Adults to derive human's tractography data.
  - Led development of statistical and computational methods for analyzing diffusion MRI tractography to address high dimensionality, spatial correlation, using quintile regression method, allowing analyzing diffusion MRI tractography from periphery to core.  
(Github Code: <https://github.com/lanzhouBWH/Fiber-Microstructure-Quantile-FMQ-Regression>)
  - Representative Publications:
    - \* [Zhou Lan](#), Yuqian Chen, Jarrett Rushmore, Leo Zekelman, Nikos Makris, Yogesh Rath, Alexandra J. Golby, Fan Zhang, and Lauren J. O'Donnell, "Fiber Microstructure Quantile (FMQ) Regression: A Novel Statistical Approach for Analyzing White Matter Bundles from Periphery to Core", *Imaging Neuroscience* **3**, 11 (2025).(doi: 10.1162/imag\_a.00569)
    - \* Legarreta, Jon Haitz, [Zhou Lan](#), Yuqian Chen, Fan Zhang, Edward Yeterian, Nikos Makris, Jarrett Rushmore, Yogesh Rath, and Lauren J. O'Donnell, "Towards an Informed Choice of Diffusion MRI Image Contrasts for Cerebellar Segmentation", *Human Brain Mapping* **46**, 11 (2025).(doi: doi.org/10.1002/hbm.70317)
- **Project 2:** Neurometabolic network (NMetNet) for functional neurological disorder in children and adolescents (Collaborator: Alexander P. Lin at the Center for Clinical Spectroscopy at Brigham and Women's Hospital, Harvard Medical School)
  - Led the invention of NMetNet, which is a novel network-based statistical approach (Bayesian graphical lasso) in analyzing the alteration of metabolites between functional neurological disorders (FND) and controls.
  - Representative Publications:
    - \* [Zhou Lan](#), Sheryl Foster, Molly Charney, Max van Grinsven, Katherine Breedlove, Kasia Kozłowska, Alexander Lin, "Neurometabolic Network (NMetNet) for Functional Neurological Disorder in Children and Adolescents", *NeuroImage: Clinical* **46**, (2025).(doi.org/10.1016/j.nicl.2025.103767)
- **Project 3:** Novel automated pipeline development to assess MR spectroscopy data quality (Collaborator: Alexander P. Lin at the Center for Clinical Spectroscopy at Brigham and Women's Hospital, Harvard Medical School)
  - Mentored an intern to develop an automatic MRS data processing pipeline using signal processing approaches, avoiding manual data quality control.
  - Representative Publications: Beroukhim B, McComas S, Joyce JM, Schuhmacher LS, Koerte I, [Lan Z](#), Lin A, "A novel automated pipeline to assess MR spectroscopy quality control: Comparing current standards and manual assessment.", *J Neuroimaging* **35**, 1 (2025). (DOI: doi.org/10.1080/26941899.2024.2412017)
- **Project 4:** Non-invasive radiological biomarkers derived from MRI/PET for predicting molecular biomarkers obtained from non-invasive biopsy (Collaborator: Radiologists at Department of Radiology)
  - Maintained a large database derived from medical records for studying performance of non-invasive radiological biomarkers
  - Used predictive modeling approaches including logistic regression, Receiver operating characteristic, lasso to investigate the predictive performance of non-invasive radiological biomarkers for molecular biomarkers obtained from non-invasive biopsy
  - Representative Publications:
    - \* Allyson L Chesebro, Susan C Lester, [Zhou Lan](#), Catherine S Giess, "Imaging, Patient, and Diagnostic Radiologist Factors Associated With Malignancy for Mammographic Asymmetries Undergoing Biopsy", *Journal of Breast Imaging* **7**, 4 (2025). (DOI: doi.org/10.1093/jbi/wbaf008)
    - \* Jirarat Jirarayapong, Leah H Portnow, Jayender Jagadeesan, Dylan C Kwait, [Zhou Lan](#), Thanh U Barbie, Melissa A Mallory, Leah Kim, Mehra Golshan, Eva C Gombos, "Intraoperative Supine Breast MRI for Residual Tumor Assessment after Breast-Conserving Therapy in Early-Stage Breast Cancer", *Radiology: Imaging Cancer* **7**, 2 (2025). (DOI: doi.org/10.1148/rycan.240158)
    - \* Jessie L Chai, Lauren A Roller, Xiaoyang Liu, [Zhou Lan](#), Matthew Mossanen, Stuart G Silverman, Atul B Shinagare, "Performance of VI-RADS in predicting muscle-invasive bladder cancer after transurethral resection: a single center retrospective analysis", *Abdominal Radiology* **49**, 5 (2025). (DOI: doi.org/10.1007/s00261-024-04245-4)

## Clinical Trials for Treatment Evaluation

- **Project 1:** Apixaban for Extended Treatment of Provoked Venous Thromboembolism (HI-PRO Trial) (Brigham and Women's Hospital Thrombosis Research Group <https://thrombosisresearch.bwh.harvard.edu>)
  - Led development of the Statistical Analysis Plan (SAP), cohort/end-point derivation, and main analyses.
  - Contributed to statistical sections of the clinical manuscript.
  - Representative Publications:
    - \* Gregory Piazza, Behnood Bikdeli, Arvind K. Pandey, Darsiya Krishnathasan, Candrika D. Khairani, Antoine Bejjani, Ruth H. Morrison, Heather Hogan, Sina Rashedi, Mariana Pfeferman, Junyang Lou, John Fanikos, Nicole Porio, Lisa Rosenbaum, Piotr Sobieszczyk, Zhou Lan, Marie Gerhard-Herman, Umberto Campia, Samuel Z. Goldhaber, for the HI-PRO Trial Investigators, “Apixaban for Extended Treatment of Provoked Venous Thromboembolism (HI-PRO Trial)”, *New England Journal of Medicine* **393**, (2025). (DOI: 10.1056/NEJMoa2509426)

## Epidemiological Real-World Studies for Assessing Treatment Effectiveness/Safety

- **Project 1:** Using survival analysis and causal inference to the impact of therapies on cardiovascular outcomes in patients with diabetes.
  - Conducted analyses using propensity score weighting, mediation models, and competing-risks Cox regression.
  - Co-authored manuscripts and wrote statistical methods and results sections.
    - \* Shah, Nisarg, Zhou Lan, C. Justin Brown, Seth S. Martin, and Alexander Turchin, “Impact of Statin Nonacceptance on Cardiovascular Outcomes in Patients With Diabetes”, *Journal of the American Heart Association* **14**, 11 (2025). (doi: <https://doi.org/10.1161/JAHA.124.040464>)
    - \* C. Justin Brown, PharmD; Lee-Shing Chang, MD; Naoshi Hosomura, DDS, DMSc, MBA; Shervin Malmasi, PhD; Fritha Morrison, PhD; Maria Shubina, ScD; Zhou Lan, PhD; Alexander Turchin, MD, MS, “Assessment of Sex Disparities in Nonacceptance of Statin Therapy and Low-Density Lipoprotein Cholesterol Levels Among Patients at High Cardiovascular Risk”, *JAMA Network Open* **6**, 2 (2023). (doi:10.1001/jamanetworkopen.2023.1047)
- **Project 2:** Impact of possible errors in natural language processing-derived data on downstream epidemiologic analysis
  - Conceived the idea to study possible errors in natural language processing-derived data on downstream epidemiologic analysis
  - Using High-performance computing to carry out Monte Carlo experiments for evaluation. (Github Code: <https://github.com/lanzhouBWH/NLP-Downstream-Impact>)
  - Representative Publications:
    - \* Zhou Lan, Alexander Turchin, “Impact of Possible Errors in NLP-Derived Data on Downstream Epidemiologic Analysis”, *JAMIA Open* **6**, 4 (2023). (DOI: 10.1093/jamiaopen/ooad111)
- **Project 3:** Clinical, molecular and radiological associated with overall survival (OS) and progression-free survival (PSF) for patients with brain tumor
  - Constructed cohorts from EHR database for clinical investigation
  - Used predictive modeling and survival analysis approaches to identify clinical, molecular and radiological predictors associated with overall survival (OS) and progression-free survival (PSF) for patients with brain tumor.
  - Used weighted cox regression handling non-proportional hazard.
  - Used multiple imputation approaches for handling missing data.
  - Representative Publications:
    - \* Aleksandra B Lasica, Zhou Lan, Julie J Miller, Albert Jiao, Ian Pan, Loai Aker, Prem Prabhakar, Julia Japo, Alyssa Russ, Catharina Westergaard, Elisa Aquilanti, Ugonma Chukwueke, L Nicolas Gonzalez Castro, J Ricardo McFaline Figueroa, Eudocia Quant Lee, Lakshmi Nayak, Rameen Beroukhim, Tracy T Batchelor, Daniel P Cahill, Vihang Nakhate, Tyler Lanman, Juan Pablo Ospina, Natalie Stec, Ruchit V Patel, David M Meredith, Wenya Linda Bi, David A Reardon, Keith L Ligon, Raymond Y Huang, Patrick Y Wen, Gilbert Youssef, “Clinical, molecular and radiological predictors of prognosis in newly diagnosed astrocytoma, IDH-mutant, WHO grade 4”, *Neuro-Oncology* **7**, 1 (2025). (doi: <https://doi.org/10.1093/neuonc/noaf133>)
    - \* Tyler A Lanman, Gilbert Youssef, Raymond Huang, Rifaquat Rahman, Matthew DeSalvo, Thomas Flood, Elmira Hassanzadeh, Min Lang, Jason Lauer, Christopher Potter, Albert Jiao, Ian Pan, Daniel P Cahill, Zhou Lan, Juan Pablo Ospina, Vihang Nakhate, Natalie E Stec, Diana Shi, Wenya Linda Bi, Samuel K McBrayer, Isabel Arrillaga-Romany, Eudocia Q Lee, Ugonma N Chukwueke, Lakshmi Nayak, Deborah A Forst, Elizabeth R Gerstner, Justin T Jordan, Jorg Dietrich, Julie Miller, Tracy T Batchelor, David A Reardon, Patrick Y Wen, L Nicolas Gonzalez Castro, “Ivosidenib for the Treatment of IDH1-mutant Glioma, Grades 2 to 4: Tolerability, Predictors of Response, and Outcomes”, *Neuro-Oncology Advances* **7**, 1 (2025). (doi: <https://doi.org/10.1093/oaajnl/vdae227>)

- **Project 4:** Large Registry Data Analysis for National Inpatient Sample (<https://hcup-us.ahrq.gov/db/nation/nis/nisdbdocumentation.jsp>)
  - Constructed a python toolbox software for National Inpatient Sample (Github: <https://github.com/lanzhouBWH/Toolbox-for-National-Inpatient-Sample--NIS->)
  - Provided epidemiological analysis for Aspirin for Venous Thromboembolism Prophylaxis in Hip Fracture, Total Knee, and Hip Arthroplasty
  - Representative Publications:
    - \* Leyva, H., Fanikos, J., Lan, Z., Scimeca, G., Bikdeli, B., Piazza, G. and Goldhaber, S.Z, “Aspirin for Venous Thromboembolism Prophylaxis in Hip Fracture, Total Knee, and Hip Arthroplasty”, *The American journal of medicine* **138**, 9 (2025).(doi: <https://doi.org/10.1016/j.amjmed.2025.03.020>)
- **Project 5:** Multi-center Analysis of CORONA-VTE Network for COVID-19 Analysis
  - Constructed a harmonized database from 5 clinical centers.
  - Carry out cluster cox regression model accounting for site effect.
  - Longitudinal analysis for investigating the effect of vaccination on cardiovascular outcomes of inpatients and outpatients during COVID-19 pandemic
  - Representative Publications:
    - \* Giovanni Scimeca, Darsiya Krishnathasan, Sina Rashedi, Zhou Lan, Alyssa Sato, Nada Hamade, Antoine Bejjani, Candrika D Khairani, Julia Davies, Nicole Porio, Ali A Assi, Andre Armero, Anthony Tristani, Marcos D Ortiz-Rios, Victor Nauffal, Zaid Almarzooq, Eric Wei, Valeria Zuluaga-Sanchez, Mehrdad Zarghami, Aditya Achanta, Sirius J Jesudasan, Bruce Tiu, Geno J Merli, Orly Leiva, John Fanikos, Aditya Sharma, Samantha Rizzo, Mariana B Pfeferman, Ruth B Morrison, Alec Vishnevsky, Judith Hsia, Mark R Nehler, James Welker, Marc P Bonaca, Brett Carroll, Samuel Z Goldhaber, Umberto Campia, Behnood Bikdeli, Gregory Piazza, “Predictors of venous thromboembolic events in hospitalized patients with COVID-19”, *Journal of Thrombosis and Thrombolysis* **58**, 4 (2025).(doi: <https://doi.org/10.1007/s11239-025-03078-2>)
    - \* B Bikdeli, D Krishnathasan, CD Khairani, A Bejjani, A Tristani, N Porio, A Assi, U Campia, E Wei, B Tiu, J Hsia, A Vishnevsky, Z Lan, S Goldhaber, G Piazza, “Adjudicated cardiovascular events in a cotemporary multicenter cohort of patients with COVID-19: findings from the CORONA-VTE Registry”, *European Heart Journal* **138**, 9 (2025).(doi: <https://doi.org/10.1093/eurheartj/ehad655.1223>)
    - \* Behnood Bikdeli, Darsiya Krishnathasan, Candrika D Khairani, Antoine Bejjani, Julia Davies, Nicole Porio, Anthony Tristani, Andre Armero, Ali A Assi, Victor Nauffal, Umberto Campia, Zaid Almarzooq, Eric Wei, Marcos D Ortiz-Rios, Valeria Zuluaga-Sánchez, Aditya Achanta, Sirius J Jesudasan, Bruce Tiu, Geno J Merli, Orly Leiva, John Fanikos, Elvira Grandone, Aditya Sharma, Samantha Rizzo, Mariana B Pfeferman, Ruth B Morrison, Alec Vishnevsky, Judith Hsia, Mark R Nehler, James Welker, Marc P Bonaca, Brett Carroll, Samuel Z Goldhaber, Zhou Lan, Gregory Piazza, CORONA-VTE-Network Investigators, “Low absolute risk of thrombotic and cardiovascular events in outpatient pregnant women with COVID-19”, *European Heart Journal* **138**, 9 (2025).(doi: <https://doi.org/10.1016/j.thromres.2024.02.021>)

## PHARMACEUTICAL, BIOTECH, AND HEALTHCARE ANALYTICS PARTNERSHIP

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- Eli Lilly And Company (Complications of Obesity),
- Pfizer Inc (Flutemetamol-ATTR),
- Janssen Research and Development (Covid-19 PREVENT-HD)
- Boston Scientific Corporation (OPTALYSE-PE Trial)

## PUBLICATIONS

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Complete List of Published Work and Preprints in google scholar <https://scholar.google.com/citations?user=fB87flgAAAAJ>

## PATENTS

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Chukka Srinivas, Zhou Lan, “System and Method for Color Deconvolution of a Slide Image to Assist in the Analysis of Tissue”, , US20200167965A1 (Priority Date: 2017/08/04; Publication Date: 5/28/2020 ).