Forrest Koch

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Google Scholar

*"The important thing is to not stop questioning.
Curiosity has its own reason for existing"*

Education

2021 **BSc (Hons) in Statistics with 1st Class Honours**, UNSW, Sydney.
Supervisors: Dr. Benjamin Daniels, Professor Jake Olivier, & Professor Sallie-Anne Pearson
Thesis Title: *An Interrupted Time Series Analysis of Australian Opioid Dispensings*

2016-2020 **BSc Statistics & BSc Computer Science**, UNSW, Sydney.

Experience

2023-Present **Research Associate**, *School of Biotechnology and Biological Sciences*, UNSW, Sydney.
Supervisors: Associate Professor Fatemeh Vafaee and Professor John Pimanda
- Statistical and computational support to lab members and PhD students.
- Pre-processing and analysis of scRNAseq, ChIPseq, and ATACseq data.
- Development of CD34 Heptad Regulome and BloodchipXtra web-applications.

2022-Present **Statistical Consultant/Data Scientist**, *OmniOmics.ai*.
Client: BCAL Diagnostics
- Development of lipidomics derived biomarker panel and predictive modelling of breast cancer.
- Drafting and implementation of statistical analysis plans.
- Consultation on experimental design.

2021-2023 **Research Officer**, *Transport and Road Safety (TARS) and Medicines Policy Research Unit (MPRU)*, UNSW, Sydney.
TARS supervisor: Associate Professor Soufiane Boufous
- Systematic coding and statistical analysis of police and coroners reports to investigate causes of transport-related pediatric deaths.
- Preparation of technical reports to communicate findings to our funding body.

MPRU supervisor: Dr. Benjamin Daniels
- Planning, implementation, and communication of interrupted time series analyses for routinely collected population pharmaceutical surveillance data.

2021 **Casual Academic Tutor**, *School of Computer Science*, University of Sydney.
- Delivery of online tutorials for INFO1110, an introductory Python course.

2019-2021 **Research Associate**, *School of Biotechnology and Biological Sciences*, UNSW, Sydney.
Supervisor: Associate Professor Fatemeh Vafaee
- Researching applications of machine learning for analysis of large-scale molecular and clinical data.
- Utilization HPC systems for data analysis.
- Assisting team members in performing statistical analysis and implementing computational tools.

2018 **Mathematics and Computer Science Tutor**, *Nura Gili*, UNSW, Sydney.

2017-2020 **Research Assistant**, *Centre for Health Brain Ageing (CHeBA)*, UNSW, Sydney.
Supervisor: Associate Professor Wei Wen
- Develop and deploy software pipelines to process MRI data.
- System administration and maintenance of Rocks (CentOS Linux) HPC cluster.

Awards and Honorary Appointments

2021 AMSI Summer School Scholarship

2020 University Guest (Academic) at the School of Mathematics and Statistics, University of Melbourne

2019 Summer Vacation Research Scholarship (Vafaee Lab)

2019 ALCS Best Talk Genomics Stream

Computing Languages and Technical Skills

- Arduino
- Bash
- C/C++
- MATLAB
- Python
- R
- SAS
- STAN
- HPC
- Linux System administration
- Process automation
- PyTorch & Tensorflow

Peer Review Experience

- AI Reviews (IF: 8.14)
- Briefings in Bioinformatics (IF: 11.62)
- Plos One (IF: 3.24)

Publications

Julie A I Thoms, Forrest C Koch, Alireza Raei, Shruthi Subramanian, Jason W H Wong, Fatemeh Vafaee, and John E Pimanda. BloodChIP xtra: an expanded database of comparative genome-wide transcription factor binding and gene-expression profiles in healthy human stem/progenitor subsets and leukemic cells. *Nucleic Acids Research*, Oct 2023.

Shruthi Subramanian, Julie AI Thoms, Yizhou Huang, Carina Paola Cornejo Paramo, Forrest Charles Koch, Sebastien Jacquelin, Sylvie Shen, Emma Song, Swapna Joshi, Christopher Peter Brownlee, et al. Genome-wide transcription factor binding maps reveal cell-specific changes in the regulatory architecture of human hspc. *Blood Journal*, pages blood–2023021120, 2023.

Mojdeh Dinarvand, Forrest C Koch, Daniel AI Mouiee, Kaylee Vuong, Abhishek Vijayan, Afia Fariha Tanzim, AKM Azad, Anahit Penesyan, Natalia Castaño-Rodríguez, and Fatemeh Vafaee. drnasb: a systems biology approach to decipher dynamics of host–pathogen interactions using temporal dual rna-seq data. *Microbial Genomics*, 8(9), 2022.

Forrest C Koch, Jake Olivier, Sallie-Anne Pearson, and Benjamin Daniels. A multivariate interrupted time series analysis assessing the impacts of half-pack sizes and increased access restrictions on publicly subsidized opioids in australia. In *PHARMACOEPIDEMIOLOGY AND DRUG SAFETY*, volume 31, pages 541–542. WILEY 111 RIVER ST, HOBOKEN 07030-5774, NJ USA, 2022.

Louise Mewton, Briana Lees, Lindsay M Squeglia, Miriam K Forbes, Matthew Sunderland, Robert Krueger, Forrest C Koch, Andrew Baillie, Tim Slade, Nicholas Hoy, et al. The relationship between brain structure and general psychopathology in preadolescents. *Journal of Child Psychology and Psychiatry*, 63(7):734–744, 2022.

Seid Miad Zandavi, Forrest C Koch, Abhishek Vijayan, Fabio Zanini, Fatima Valdes Mora, David Gallego Ortega, and Fatemeh Vafaee. Disentangling single-cell omics representation with a power spectral density-based feature extraction. *Nucleic acids research*, 50(10):5482–5492, 2022.

Abdullah Alqarni, Jiyang Jiang, John D Crawford, Forrest Koch, Henry Brodaty, Perminder Sachdev, and Wei Wen. Sex differences in risk factors for white matter hyperintensities in non-demented older individuals. *Neurobiology of aging*, 98:197–204, 2021.

Jing Du, Forrest C Koch, Aihua Xia, Jiyang Jiang, John D Crawford, Ben CP Lam, Anbupalam Thalamuthu, Teresa Lee, Nicole Kochan, Chloe Fawns-Ritchie, et al. Difference in distribution functions: A new diffusion weighted imaging metric for estimating white matter integrity. *Neuroimage*, 240:118381, 2021.

Heidi Foo, Anbupalam Thalamuthu, Jiyang Jiang, Forrest Koch, Karen A Mather, Wei Wen, and Perminder S Sachdev. Age-and sex-related topological organization of human brain functional networks and their relationship to cognition. *Frontiers in aging neuroscience*, 13:897, 2021.

Heidi Foo, Anbupalam Thalamuthu, Jiyang Jiang, Forrest Koch, Karen A Mather, Wei Wen, and Perminder S Sachdev. Associations between alzheimer's disease polygenic risk scores and hippocampal subfield volumes in 17,161 uk biobank participants. *Neurobiology of Aging*, 98:108–115, 2021.

Heidi Foo, Anbupalam Thalamuthu, Jiyang Jiang, Forrest C Koch, Karen A Mather, Wei Wen, and Perminder S Sachdev. Novel genetic variants associated with brain functional networks in 18,445 adults from the uk biobank. *Scientific reports*, 11(1):14633, 2021.

Forrest C Koch, Gavin J Sutton, Irina Voineagu, and Fatemeh Vafaee. Supervised application of internal validation measures to benchmark dimensionality reduction methods in scrna-seq data. *Briefings in Bioinformatics*, 22(6):bbab304, 2021.

Briana Lees, Lindsay M Squeglia, Lisa M McTeague, Miriam K Forbes, Robert F Krueger, Matthew Sunderland, Andrew J Baillie, Forrest Koch, Maree Teesson, and Louise Mewton. Altered neurocognitive functional connectivity and activation patterns underlie psychopathology in preadolescence. *Biological Psychiatry: Cognitive Neuroscience and Neuroimaging*, 6(4):387–398, 2021.

Haichao Zhao, Jian Cheng, Tao Liu, Jiyang Jiang, Forrest Koch, Perminder S Sachdev, Peter J Basser, Wei Wen, and Alzheimer's Disease Neuroimaging Initiative. Orientational changes of white matter fibers in alzheimer's disease and amnestic mild cognitive impairment. *Human Brain Mapping*, 42(16):5397–5408, 2021.

Jiyang Jiang, Anbupalam Thalamuthu, Forrest C. Koch, Tao Liu, Qun Xu, Julian N. Trollor, David Ames, Margaret J. Wright, Vibeke Catts, Perminder S. Sachdev, and Wei Wen. Cerebral Blood Flow in Community-Based Older Twins Is Moderately Heritable: An Arterial Spin Labeling Perfusion Imaging Study. *Frontiers in Aging Neuroscience*, 11, 2019.

Jiyang Jiang, Anbupalam Thalamuthu, Forrest Koch, Perminder Sachdev, and Wei Wen. Moderate Heritability of Cerebral Blood Flow in Community-based Older Individuals. OHBM, June 2018. OHBM Annual Meeting 2018.