HOSSEIN KHIABANIAN

RUTGERS UNIVERSITY
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EDUCATION

Ph.D. in Physics, **Brown University,** Providence, RI (2008)
Sc. B. in Physics, **Sharif University of Technology**, Tehran, Iran (2001)

INTERESTS

Cancer genomics, Systems biology & bioinformatics, Evolutionary biology, Molecular epidemiology
In my past life: Observational cosmology, Gravitational lensing, General relativity

APPOINTMENTS

Regeneron Pharmaceuticals, Regeneron Genetics Center
Associate Director, Therapeutic Area Genetics-Oncology (2022–)

Rutgers University, Rutgers Cancer Institute of New Jersey
Adjunct Professor (2022–), Associate Professor (2020–2022), Assistant Professor (2015–2020)

Columbia University, Departments of Biomedical Informatics & Systems Biology
Associate Research Scientist (2013–2015), Postdoctoral Research Scientist (2008–2012)

SCIENTIFIC & PROFESSIONAL ACTIVITIES

Rutgers University (2015–)

- Designs computational methods rooted in statistics, information theory, and biclustering for detecting genomic alterations, inferring phenotype-genotype relationships, and capturing global structural properties in high-dimensional molecular and sequencing data.
- Leads the development, implementation, and validation of bioinformatics tools to address the challenges in interpreting clinical sequencing in cross-disciplinary, precision-oncology settings.
- Profiled and currently investigates the clinical impact of solid tumor-infiltrating blood cells mutated due to coexistent hematological malignancies or age-associated clonal hematopoiesis.
- Co-led the discovery of pervasive hypermutation in regulatory regions as a new layer of genetic alterations dysregulating oncogenic gene expression in B-cell lymphoma.
- Studies the adaptation of chronic lymphocytic leukemia to ibrutinib monotherapy demonstrating epigenetic plasticity and non-genetic mechanism of by-pass signaling in residual disease.
- Promotes multidisciplinary research and bridges communication barriers between the fields by organizing lectures built upon didactic components in quantitative and biomedical sciences.
- Advises trainees with diverse backgrounds to practice scientific rigor in their respective fields and across disciplines, including 5 postdocs, 6 Ph.D. candidates, and 11 M.S. and B.S. students to date.
- Directed an independent research program supported by >4.5 million dollars of external funding from the National Cancer Institute and philanthropic foundations.

Columbia University (2008–2015)

- Investigated tumor clonal evolution and elucidated the role of mutated subclones as strong predictors of survival and therapeutic response in chronic lymphocytic leukemia.
- Designed analytical and visualization models based on spaces of phylogenetic trees to describe evolutionary patterns and discover relapse-driving mutations in acute lymphoblastic leukemia.
- Studied the mutational landscape of B-cell and T-cell lymphomas and helped identify the genes implicated in tumor initiation, disease transformation, and therapeutic resistance.
- Devised statistical measures for early detection of pathogenic outbreaks and near real-time surveillance of the origin and evolution of viral clonal expansions.

Brown University (2001–2008)

- Developed novel algorithms to model and study galaxy clusters and distribution of dark matter structures using weak gravitational lensing, the bending of a distant light by a massive object.
- Shared responsibility of collecting, reducing, interpreting, and maintaining very large, unique astronomical imaging data as a part of the Deep Lens Survey project.

SELECTED PUBLICATIONS

‡ co-lead
† equal contribution

1 Singh A, **Khiabanian H**. Feature selection followed by a residuals-based normalization simplifies & improves single-cell gene expression analysis. *bioRxiv* 2023

2 Bal E, Kumar R, Hadigol M, Holmes A, Hilton L, Loh J-W, Dreval K, Wong J, Soni R, Vlasevska S, Corinaldesi C, Basso K, Morin R, **Khiabanian H**‡, Pasqualucci L‡, Dalla-Favera R‡. Super-Enhancer Hypermutation Alters Oncogene Expression in B-cell Lymphoma. *Nature* 2022

3 Jalloul N, Gomy I, Stokes S, Gusev A, Johnson BE, Lindeman N, Macconaill L, Ganesan S, Garber JE[‡], **Khiabanian H**[‡]. Germline testing data validate inferences of mutational status for variants detected from tumor-only sequencing. *JCO Precision Oncology* 2021

4 Loh J-W, Guccione C, DiClemente F, Riedlinger G, Ganesan S, **Khiabanian H**. AllFIT: Allele-Frequency-based Imputation of Tumor Purity from High-Depth Data. *Bioinformatics* 2020

5 Singh A, Bhanot, G, **Khiabanian H**. TuBA: Tunable Biclustering Algorithm reveals clinically relevant tumor transcriptional profiles in breast cancer. *GigaScience* 2019

6 Severson EA, Riedlinger GM, Connelly CF, Vergilio J, Goldfinger M, Ramkissoon S, Frampton GM, Ross JS, Fratella-Calabrese A, Gay L, Ali S, Miller V, Elvin J, Hadigol M, Hirshfield KM, Rodriguez-Rodriguez L, Ganesan S[‡], **Khiabanian H**[‡]. Detection of Clonal Hematopoiesis of Indeterminate Potential in Clinical Sequencing of Solid Tumor Specimens. *Blood* 2018

7 Oshima K[†], **Khiabanian H**[†], da Silva-Almeida AC, Tzoneva G, Abate F, Ambesi-Impiombato A, Sanchez-Martin M, Carpenter Z, Penson A, Perez-Garcia A, Eckert C, Nicolas C, Balbin M, Sulis ML, Kato M, Koh K, Paganin M, Basso G, Gastier-Foster JM, Devidas M, Loh ML, Kirschner-Schwabe R, Palomero T, Rabadan R, Ferrando AA. Mutational landscape, clonal evolution patterns and role of RAS mutations in relapsed acute lymphoblastic leukemia. *PNAS* 2016

8 Rossi D[†], **Khiabanian H**[†], Spina V, Ciardullo C, Bruscaggin A, Famà R, Rasi S, Monti S, Deambrogi C, De Paoli L, Wang J, Gattei V, Guarini A, Foà R, Rabadan R, Gaidano G. Clinical impact of small *TP53* mutated subclones in chronic lymphocytic leukemia. *Blood* 2014

9 Palomero T[†], Couronné L[†], **Khiabanian H**[†], Kim MY, Ambesi-Impiombato A, Perez-Garcia A, Carpenter Z, Abate F, Allegretta M, Haydu JE, Jiang X, Lossos IS, Nicolas C, Balbin M, Bastard C, Bhagat G, Piris MA, Campo E, Bernard OA, Rabadan R, Ferrando AA. Recurrent mutations in epigenetic regulators, *RHOA* and *FYN* kinase in peripheral T cell lymphomas. *Nature Genetics* 2014

10 Trifonov V, **Khiabanian H**, Rabadan R. Geographic Dependence, Surveillance and the Origins of the 2009 Influenza A (H1N1) Virus. *New England Journal of Medicine* 2009

11 **Khiabanian H** and Dell'Antonio I. A Multi-Resolution Weak Lensing Reconstruction Method. *Astrophysical Journal* 2008

◊ Full list of publications on Google Scholar

Hossein grew up in Tehran, Iran and moved to the U.S. in September 2001. He adopted New York as his home in summer of 2008 and is a frequent visitor to the Met, Carnegie Hall, and the Strand. He is a photography enthusiast–published in print and online at PhotoVogue–and has prepared pots and platters of Persian food since he learned astronomers' career prospects are not bright. Although he is an eager reader of the history of arts, sciences, and the world, he was incredibly surprised when Beethoven died at the end of his biography!