

Huanan (Frederick) Shi
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Education

Baylor College of Medicine

Ph.D. in Molecular Physiology and Biophysics

Houston, TX

2016 - 2023

Yale Interdisciplinary Center for Bioethics

Summer Institute in Bioethics

Online

Summer, 2021

Renmin University of China

B.S. in Physics

Beijing, China

2012 - 2016

University of California, Berkeley

Summer Session: Introduction to Biostatistics

Berkeley, CA

2014

Skills

Python:



Machine Learning:



R:



LINUX (HPC cluster, Bash)



GCP and Docker



MATLAB:



SQL:



Experience

Baylor College of Medicine

Ph.D. Candidate

Houston, TX

2016 - 2023

- **Research:** Understanding the gut microbiota and host interaction in the development of hypertension using integrated traditional experimental methods and artificial intelligence (AI).

Bioinformatics (NGS Analysis) and Biostatistics:

- Analyzed microbial 16s ribosome RNA and Internal transcribed spacer (ITS2) sequencing data from clinical studies and animal models for taxonomic profiling, biodiversity analysis, functional prediction, and pathway enrichment. Pioneered the analysis of metagenomic whole genome shotgun sequences and prediction in a hypertensive rat model of microbial whole genome shotgun sequencing.
- Achieved 100% and 88% accuracy for metabolomics functional prediction using random forest models and performed multi-omics and statistical analysis using regression, dimension reduction (PCA and MDA), and other supervised learning models (PLS-DA and LDA). (**Python: scikit learn, statsmodels, pandas**)
- Constructed host and microbial reference databases and established a workflow for small RNA sequences alignment, categorization, and annotation in bacterial extracellular vesicles.
- Consulted for and currently work on microbial metaproteomics characterization of microbial extracellular vesicles.
- Routinely summarized and reported project development; performed data visualization (**Python: matplotlib and seaborn; R: ggplot2**); conducted parametric and nonparametric/robust statistical analysis.

Wet Lab Experience:

- Conducted molecular biology (PCR and qPCR) and biochemistry (Immunoblotting, immunohistochemistry and enzyme activity assay) experiments *in vitro* and in animal models (mouse and rat).

Other Contributions:

- Presented complex concepts of projects in a clear, concise and scientifically accurate manner to audiences with different background. Wrote and edited abstracts and manuscripts, and prepared poster talks for scientific journals and local and national conferences (including 5 co-author papers, 5 international and multiple regional poster presentations; 2 travel or poster awards).
- Evaluated presentations at a national conference. Assisted with peer-review process of manuscripts and NIH grant application.
- Facilitated compassionate conversations within department and with school leadership for racial justices, international student rights, and increased Asian hatred during coronavirus pandemics
- Elected as program representative at Graduate Student Council. (2021-2022)
- Invited as guest speaker for the advisory STEM Scholars class at Bates College. (2022)

NuProbe USA Inc.

Intern - Bioinformatics Scientist I (10-20 hours per week)

Houston, TX

2022 (Current Position)

- Developed and utilized bioinformatics tools for NGS analysis. (**Google Cloud Platform**)
- Assist and collaborate with R&D and the service teams to delivery products.

Enventure

Houston, TX

VICE investment competition (approx. 50 hours total)

2021

- Worked with an interdisciplinary team of PhD candidates, MBA candidate, and biomedical engineer.
- Performed due diligence for three pre-seed and seed round startups.
- Constructed deal memos and provided preliminary investment recommendations for venture capitalists.

Boston Children's Hospital/Yale School of Medicine

Boston, MA/New Haven, CT

Research Assistant (full-time)

2015 - 2016

- Performed general lab setup and management; data analysis and visualization (GraphPad Prism); reproductive physiology experiments; and super-resolution and confocal microscopy imaging.

Leadership

American Society for Microbiology - Texas Medical Center Chapter

Houston, TX

Co-Chair of MicroCast, Media Relations, and Social (approx. 5 hours per week)

2020-2021

- Coordinated and co-hosted multiple COVID-19 seminars with more than 300 attendances to promote science communication.
- Organized online leadership orientation and facilitated career development events for the students and post-docs.

Spectrum, a LGBTQ+ student group at BCM

Houston, TX

Co-founder (approx. 10 hours per week)

2017-2019

- Organized launch event and participation of multi-cultural showcase at BCM.
- Coordinated the collaboration with local LGBTQ+ youth organization at Montrose Center to promote careers in STEM for LGBTQ+ adolescents.
- Recruited volunteers to serve as judges for local LGBTQ+ scholarship selection (Out For Education).

China Youth Network, a youth advocacy group in sexual health and rights.

Beijing, China

Core Team Intern/Volunteer Leader (approx. 10 hours per week)

2012-2013

- Worked with China Family Planning Association and United Nations Population Fund to promote sexual health rights and policies in China.
- Organized volunteer recruitment in Beijing Metro area with more than 100 applicants.
- Reviewed and processed more than 300 college student organization grant applications around China for local youth sexual educational programs.
- Trained more than 100 peer education volunteers and leaders around China for sexual health advocacy.

Publications

Differences in Gut Microbial Community Structure in Germ-Free Rats Following Microbiome Transfer from WKY and SHRSP, and with Aging in Naïve WKY and SHRSP

Huanan Shi, James W. Nelson, Sharon Phillips, Joseph F. Petrosino, Bryan M. Bryan, David J. Durgan

(in prep) (2022)

Restructuring the Gut Microbiota by Intermittent Fasting Lowers Blood Pressure

Huanan Shi, Bojun Zhang, Abo-Hamzy Taylor, James W. Nelson, Chandra Shekar R. Ambati, Joseph F. Petrosino, Bryan M. Bryan, David J. Durgan

Circulation Research 128.9 (2021) pp. 1240–1254

3D in situ Imaging of Female Reproductive Tract Reveals Molecular Signatures of Fertilizing Spermatozoa in Mice

Lukas Ded, Jae Yeon Hwang, Kiyoshi Miki, Huanan F Shi, Jean-Ju Chung

Elife 9 (2020) e62043

Young Versus Aged Microbiota Transplants to Germ-free Mice: Increased Short-chain Fatty Acids and Improved Cognitive Performance

Juneyoung Lee, Venugopal R Venna, David J Durgan, Huanan Shi, Jacob Hudobenko, Nagireddy Putluri, Joseph Petrosino, Louise D McCullough, Robert M Bryan

Gut microbes 12.1 (2020) p. 1814107

CatSper ζ Regulates the Structural Continuity of Sperm Ca²⁺ Signaling Domains and Is Required for Normal Fertility

Jean-Ju Chung, Kiyoshi Miki, Doory Kim, Sang-Hee Shim, Huanan F Shi, Jae Yeon Hwang, Xinjiang Cai, Yusuf Iseri, Xiaowei Zhuang, David E Clapham

Elife 6 (2017) e23082