Yike Shen, Ph.D.

Postdoctoral Research Scientist
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EDUCATION AND TRAINING

Postdoctoral Research Scientist 06/2020 – present
Columbia University in the City of New York
Department of Environmental Health Sciences
Mentor: Andrea A. Baccarelli, MD, Ph.D.

Ph.D. Crop and Soil Science – Environmental Toxicology 08/2016 – 05/2020

Ph.D. dual major Environmental Science and Policy 08/2016 – 05/2020
Michigan State University, East Lansing, Michigan, USA
Department of Plant, Soil, and Microbial Sciences
Dissertation: Antibiotic Resistance and Bacterial Microbiome in Lettuce-Soil Systems
Mentor, Advisor: Wei Zhang, Ph.D.
Committee members: Drs. Hui Li, Elliot Ryser, Ashley Shade

B.Sc. Environmental and Conservation Sciences 09/2013 – 06/2016
University of Alberta, Edmonton, Alberta, Canada

RESEARCH INTERESTS

- Environmental health data science
- Microbiome
- Machine learning
- High dimensional data analysis
- Environmental exposures
- Multi-omics
- One health

PUBLICATIONS

Dr. Shen highlighted in **bold**; Corresponding authors marked *
2023

1. **Shen Y**, Kioumourtzoglou MA, Wu H, Spiro A, Vokonas P, Navas-Acien A, Baccarelli AA, Gao F*. Cohort Network: a knowledge graph towards data dissemination and knowledge-driven discovery for cohort studies. Accepted at *Environmental Science & Technology*
    a. Cover art accepted
2. Prada D, Crandall CJ, Kupsco A, Kioumourtzoglou MA, Stewart JD, Liao D, Yanosky J, Ramirez A, Wactawski-Wende J, **Shen Y**, Miller G, Ionita-Laza IL, Whitsel EA, Baccarelli AA. (2023). Air pollution and decreased bone mineral density among Women's Health Initiative participants. *eClinicalMedicine* 57:101864.

3. Chen Z, Zhang W, Peng A, **Shen Y**, Jin X, Boyd SA, Teppen BJ, Tiedje JM, Gu C, Zhu D, Luo Y, Li H*. (2023). Bacterial community assembly and antibiotic resistance genes in soils exposed to antibiotics at environmentally relevant concentrations. *Environmental Microbiology*, Available from: https://doi.org/10.1111/1462-2920.16371.

2022

4. **Shen Y***, Laue HE, Shrubsole MJ, Wu H, Bloomquist TR, Larouche A, Zhao K, Gao F, Boivin A, Prada D, Hunting DJ. Gillet V, Takser L, Baccarelli AA. (2022). Associations of childhood and maternal metal exposure with children's gut microbiomes in a Canadian gestation cohort. *Environmental Health Perspectives* 130 (1): 017007.
5. Gao F, Zhang W, Baccarelli AA, **Shen Y***. (2022). Predicting Chemical Ecotoxicity by Learning Latent Space Chemical Representations. *Environment International* 163, 107224.
6. **Shen Y**, Zhao E, Zhang W*, Baccarelli AA, Gao F*. (2022) Predicting pesticide dissipation half-life intervals in plants with machine learning models. *Journal of Hazardous Materials* 436, 129177.
7. Laue HE*[1], **Shen Y**[1], Bloomquist TR, Wu H, Brennan, KJM, Raphael C, Wilkie E, Gillet V, Desautels A, Abdelouahab N, Bellenger JP, Burris HH, Coull BA, Weisskopf MG, Zhang W, Takser L, Baccarelli AA. (2022). *In utero* exposure to caffeine and acetaminophen, the gut microbiome, and neurodevelopmental outcomes, a prospective birth cohort study. *International Journal of Environmental Research and Public Health* 19(15), 9357. [1]co-first
8. Gao F[1], **Shen Y**[1], Sallach JB, Li H, Zhang W, Li Y*, Liu C*. (2022). Predicting crop root concentration factors of organic contaminants with machine learning models. *Journal of Hazardous Materials* 424,127437. [1]co-first
9. Campana AM*, Laue HE, **Shen Y**, Shrubsole MJ, Baccarelli AA. (2022). Assessing the role of the gut microbiome at the interface between environmental chemical exposures and human health: Current knowledge and challenges. *Environmental Pollution* 315,120380.

2021

10. **Shen Y,** Hamm J, Gao F, Ryser ET, Zhang W*. (2021). Assessing consumer buy and pay preferences for labeled food products with statistical and machine learning methods. *Journal of Food Protection* 84.9 (2021): 1560-1566.
11. **Shen Y**, Ryser ET, Li H, Zhang W*. (2021). Bacterial community assembly and antibiotic resistance genes in the lettuce-soil system upon antibiotic exposure. *Science of the Total Environment* 778, 146255.
12. **Shen Y**, Li H, Ryser ET, Zhang W*. (2021). Comparing root concentration factors of antibiotics for lettuce (*Lactuca sativa*) measured in rhizosphere and bulk soils. *Chemosphere* 262, 127677.
13. Gao F, **Shen Y,** Sallach JB, Li H, Liu C*, Li Y*. (2021). Direct prediction of bioaccumulation of organic contaminants in plant roots from soils with machine learning models based on molecular structures. *Environmental Science & Technology* 55(24):16358-16368.

2019

14. **Shen Y**, Stedtfeld RD, Guo X, Bhalsod GD, Jeon S, Tiedje JM, Li H, Zhang W*. (2019). Pharmaceutical exposure changed antibiotic resistance genes and bacterial communities in soil-surface- and overhead-irrigated greenhouse lettuce. *Environment International* 131, 105031.

Publication summary:
Microbiome: 1) Shen et al., 2022. *Environmental Health Perspectives*; 2) Laue and Shen et al., 2022. *International Journal of Environmental Research and Public Health*; 3) Campana et al., 2022. *Environmental Pollution*. 4) Shen et al., 2021. *Science of the Total Environment*; 5) Shen et al., 2021. *Chemosphere*. 6) Shen et al., 2019. *Environment International*. 7) Chen et al., 2023. *Environmental Microbiology*.

Precision computational environmental health: 1) Shen et al., 2023. Environmental Science & Technology. 2) Shen et al., 2022. *Journal of Hazardous Materials*; 3) Gao et al., 2022. *Environment International* (corresponding author); 4) Gao and Shen et al., 2022. *Journal of Hazardous Materials*; 5) Gao et al., 2021. *Environmental Science & Technology*; 6) Shen et al., 2021. *Journal of Food Protection*.

OUTREACH COMMUNICATIONS

Feature articles
1. **Yike Shen**. (2022). Harnessing high-dimensional data in environmental health sciences. *Research Features*. DOI: 10.26904/RF-144-3452044615. Feature article link: https://researchfeatures.com/wp-content/uploads/2022/11/Yike-Shen.pdf; Issue number: 144

Interviews
2. Women in Science: we have the power to change the world. Episode 6 – **Yike Shen**. UCLA GradSWE interview series hosted by Yifan Gao. December 22, 2022. https://www.youtube.com/watch?v=W0Nmf7P1KAM&ab_channel=GradSWEUCLA

Media coverage
3. Air Pollution Speeds Bone Loss from Osteoporosis: Large Study. (2023). Columbia University Mailman School of Public Health, Public Health Now news article. https://www.publichealth.columbia.edu/public-health-now/news/air-pollution-speeds-bone-loss-osteoporosis-large-study
4. Air pollution 'speeds up osteoporosis' in postmenopausal women. The Guardian. https://www.theguardian.com/environment/2023/mar/10/air-pollution-speeds-up-osteoporosis-postmenopausal-women
5. Air pollution may speed up bone loss in postmenopausal women. NIEHS Papers of the month (May 2023). https://factor.niehs.nih.gov/2023/5/papers/dert

MANUSCRIPTS IN PREPRATION

In preparation
15. **Shen Y**, Domingo-Relloso A, Kupsco A, Kioumourtzoglou MA, Haack K, Zhang Y, Fretts AM, Umans JG, Tellez-Plaza M, Cole S, Martin LW, Casanova R, Schnatz P, Manson J, Wu H, Whitsel EA, Baccarelli AA, Navas-Acien A, Gao F*. AESurv: autoencoder survival analysis assists accurate early prediction of coronary heart disease (preparing manuscript).
16. **Shen Y***, Bloomquist TR, Rauso A, Gao F, Gillet V, Lau FK, Kupsco A, Takser L, Baccarelli AA. Evaluation of bacterial RNA quality and shotgun metatranscriptome sequencing (preparing manuscript).
17. Gao F, **Shen Y***, Wu H, Laue HE, Lau FK, Gillet V, Lai Y, Shrubsole MJ, Prada D, Martiez G, Zhu J, Zhang W, Liu Z, Bellenger JP, Takser L, Baccarelli AA. Associations of stool

metal/element exposure with childhood gut microbiome multi-omics in GESTE (preparing manuscript).

18. Campana AM*, Wu H, **Shen Y**, Laue HE, Larouche A, Bloomquist TR, Desautels A, Gillet V, Wilkie E, Posner J, Takser L, Baccarelli AA. What is the relationship between neurocognitive outcomes and gut microbiota? Facts from a pilot study with GESTE, a Canadian longitudinal cohort.

Analysis in progress

……Coauthors to be added, order may change.

19. **Shen Y***, Gao F, Laue HE, ……, Campana AM, Bellenger JP, Takser L, Posner J, Baccarelli AA. Effects of childhood flame retardants on brain function and attentional deficits in school-age children – brain imaging, neurobehavioral, and gut microbiome studies in GESTE.
20. **Shen Y**, Li C, Liu S, Gao F,……, Busch A, Almansa XF, Norton J, Safferman S, Zhang W*. Impact of biosolids application on agricultural soil microbial community structure and functional potential.
21. Liu S, **Shen Y**, Busch A, Almansa XF, Norton J, Safferman S, Zhang W*. Biosolid application increases nitrogen and phosphorus availability and microbial activities in agricultural soils: a bi-decadal meta-analysis (2000–2020).

TEACHING ASSISTANT EXPERIENCES

- SHARP Python Boot Camp, Columbia University — Summer 2021
- SHARP Epigenetics Boot Camp, Columbia University — Summer 2020
- CSS 340: Applied Soil Physics, Michigan State University — Spring 2018 and Spring 2019
- CSS 330: Soil Chemistry, Michigan State University — Spring 2019
- RenR 299: Environmental and Forestry Spring Field School, University of Alberta — Spring 2015

SKILLS

Computational: R, Python, Linux, Unix, Shell Script, and High-Performance Computing Clusters, Amazon Web Service, GitHub

Data analysis: big data analytics, metagenomics and metatranscriptomics data analysis, machine learning, data visualization

Laboratory: DNA and RNA extraction, PCR, sequencing, gel electrophoresis, molecular biology, bacterial culture, chemical hygiene, laboratory safety, hazardous waste; biosafety principles (level 1 and 2), and lab security awareness

PRESENTATIONS

Presenter highlighted in **bold**

A. Conference Presentations

2023

1. **Yike Shen**, Wei Zhang, Ercheng Zhao, Andrea A. Baccarelli, Feng Gao. 2023. Pesticide exposure assessment and chemical ecotoxicity prediction using machine learning models. Society of Toxicology 62nd annual meeting (SOT 2023). Nashville, TN, March 20-23 (platform oral presentation).

2022

2. **Yike Shen**, Feng Gao, Arce Domingo-Relloso, Allison Kupsco, Marianthi-Anna Kioumourtzoglou, Karin Haack, Maria Tellez-Plaza, Jason G. Umans, Amanda M. Fretts, Ying Zhang, Shelley A. Cole, Haotian Wu, Andrea A. Baccarelli, Ana Navas-Acien. 2022. AESur: autoencoder survival analysis assists accurate early prediction of coronary heart disease in the Strong Heart Study. International Society for Environmental Epidemiology annual meeting – ISEE2022. Athens, Greece, September 18-21 (e-poster presentation).
3. **Yike Shen**, Marianthi-Anna Kioumourtzoglou, Haotian Wu, Apron Spiro 3rd, Pantel Vokonas, Ana Navas-Acien, Andrea A. Baccarelli AA, Feng Gao. Cohort Network: a knowledge graph towards open science and knowledge-driven discovery for cohort studies. 2022. NIEHS Environmental Health Sciences Core Centers (EHSCC) Annual Meeting. New York, NY, July 14 (poster presentation).
4. **Yike Shen**, Feng Gao, Arce Domingo-Relloso, Allison Kupsco, Marianthi-Anna Kioumourtzoglou, Karin Haack, Maria Tellez-Plaza, Jason G. Umans, Amanda M. Fretts, Ying Zhang, Shelley A. Cole, Haotian Wu, Andrea A. Baccarelli, Ana Navas-Acien. 2022. DeepEWAS assists early intervention of coronary heart disease. 8th New York City Epidemiology Forum. New York, NY, May 23 (poster presentation).
5. **Yike Shen**, Feng Gao, Wei Zhang, Andrea A. Baccarelli. 2022. Predicting Chemical Ecotoxicity by Learning Latent Space Chemical Representations. American Chemical Society National Meeting Spring 2022. San Diego, CA, March 20-24 (oral presentation).

2021

6. **Yike Shen,** Hannah E. Laue, Martha J. Shrubsole, Haotian Wu, Tessa R. Bloomquist, Annie Larouche, Kankan Zhao, Feng Gao, Amélie Boivin, Diddier Prada, Darel J. Hunting, Virginie Gillet, Larissa Takser, Andrea A. Baccarelli. 2021. Association of childhood and maternal metal exposure with children gut microbiome in a Canadian gestation cohort. International Society for Environmental Epidemiology annual meeting – ISEE2021. New York, NY. August 24 (virtual spotlight oral presentation).
7. **Yike Shen,** Hannah E. Laue, Martha J. Shrubsole, Haotian Wu, Tessa R. Bloomquist, Annie Larouche, Kankan Zhao, Feng Gao, Amélie Boivin, Diddier Prada, Darel J. Hunting, Virginie Gillet, Larissa Takser, Andrea A. Baccarelli. 2021. Association of childhood and maternal metal exposure with children gut microbiome in a Canadian gestation cohort. American Society of Microbiology Conference – ASM World Microbe Forum, June 21 (e-poster presentation).

2020

8. **Yike Shen,** Elliot T. Ryser, Hui Li, Wei Zhang. 2020. Bacterial Community Assembly and Antibiotic Resistance Genes in the Lettuce-Soil System upon Exposure to Anthropogenic Antibiotics. American Society of Microbiology Conference – ASM Microbe 2020. Chicago, IL, June 18, 2020 (e-poster presentation).

2019

9. **Yike Shen,** Elliot T. Ryser, Hui Li, Wei Zhang. 2019. Uptake and Accumulation of Antibiotics and Associated Impact on Bacterial Microbiome and *Salmonella* Survival in Lettuce. ASA -CSSA-SSSA International Annual Meeting. San Antonio, TX, November12 (oral presentation).
10. **Yike Shen**, Joseph Hamm, Feng Gao, Wei Zhang. 2019. Machine learning and statistical models to predict customers' buy and pay preferences for labeled products. Environmental Science and Policy Research Symposium 2019. East Lansing, MI, Oct 28 (oral presentation).

11. **Yike Shen,** Elliot Ryser, Hui Li, Wei Zhang. 2019. Understanding *Salmonella* Survival and Microbiome Changes in Lettuce Production under Antibiotic Stress. US-China Environment and Sustainability Forum at the University of Michigan. Ann Arbor, MI, October 2 (poster presentation).
12. **Yike Shen**, Elliot T. Ryser, Hui Li, Wei Zhang. 2019. Antibiotic resistance genes, microbiomes and *Salmonella* survival in lettuce exposed to antibiotics via soil surface irrigation. American Chemical Society National Meeting #257. San Diego, CA, August 25-29 (oral presentation).

2018

13. **Yike Shen**, Robert D. Stedtfeld, Xueping Guo, Gemini D. Bhalsod, Sangho Jeon, James M. Tiedje, Hui Li, and Wei Zhang. 2018. Pharmaceutical Exposure Changed Bacterial Community and Antibiotic Resistance Gene Profiles in Surface- and Overhead-Irrigated Greenhouse Lettuce. American Chemical Society National Meeting #256. Boston, MA, August 19-23 (oral presentation).

2017

14. **Yike Shen**, Gemini D. Bhalsod, Xueping Guo, Sangho Jeon, Tiffany Stedtfeld, Robert D. Stedtfeld, James M. Tiedje, Hui Li, and Wei Zhang. 2017. Antibiotic Stress Changed Microbial Community and Distribution of Antibiotic Resistance Genes in Surface and Overhead Irrigated Greenhouse Lettuce. 4th International Symposium on the Environmental Dimension of Antibiotic Resistance. East Lansing, MI, August 13-17 (poster presentation).
15. **Yike Shen**, Gemini D. Bhalsod, Xueping Guo, Luxi Yang, Sangho Jeon, Robert D. Stedtfeld, James M. Tiedje, Hui Li, and Wei Zhang. 2017. Distribution of antibiotic resistance genes in surface and overhead irrigated greenhouse lettuce. American Society for Microbiology Conference - Innovative Microbial Ecology for Mitigation of Antibiotic Resistance and Bacterial Diseases. Crystal City, VA, March 22-25 (oral presentation).

B. Invited Oral Presentations

2023

1. **Yike Shen**. High dimensional exposures, multi-omics, and machine learning in environmental health. February 7, 2023. Invited by University of California, Riverside, Riverside, CA, United States.
2. **Yike Shen**. High dimensional exposures, multi-omics, and machine learning in environmental health. January 27, 2023. Invited by University of Texas at Arlington, Arlington, TX, United States.

2022

3. **Yike Shen**. High dimensional exposures, multi-omics, and machine learning in environmental health. November 18, 2022. Invited by Texas A&M University, College Station, TX, United States.
4. **Yike Shen**. High dimensional exposures, multi-omics, and machine learning in environmental health. October 24, 2022. Invited by University of Kentucky, Lexington, KY, United States.
5. **Yike Shen**. High dimensional exposures, multi-omics, and machine learning in environmental health. October 15, 2022. Invited by Westlake University, Hangzhou, Zhejiang, China (virtual seminar).
6. **Yike Shen**. Harnessing high dimensional exposure and omics data in environmental health sciences. September 15, 2022. Invited by Journal of Eco-Environment & Health. Nanjing, Jiangsu, China (virtual webinar). Over 2000 audiences listened to the webinar.

7. **Yike Shen**. High dimensional exposures, multi-omics, and machine learning in environmental health. September 13, 2022. Invited by Columbia University P30 Center – The NIEHS Center for Environmental Health and Justice in Northern Manhattan, New York, NY, United States (virtual seminar).
8. **Yike Shen**. Navigating Ph.D. July 26, 2022. Invited by Aarhus University, Denmark (virtual seminar).
9. **Yike Shen**. Harnessing High Dimensional Exposure and Omics Data in Environmental Health Sciences. February 21, 2022. Department of Environmental Health Sciences, Columbia University, New York, NY, United States.

2021

10. **Yike Shen**. Deep Learning based Network Analysis in the Normative Aging Study. December 10, 2021. Invited by Columbia University Data Science and Health Initiative, New York, NY, United States (virtual seminar).
11. **Yike Shen.** GESTE Microbiome. June 22, 2021. Invited by Département de Pédiatrie, Université de Sherbrooke, Quebec, Canada (virtual seminar).

2017-2020

12. **Yike Shen**. Antibiotic Resistance in Vegetable Production and Consumer Preferences. April 1, 2020. Invited by Michigan State University, East Lansing, MI, United States.
13. **Yike Shen**. Antibiotic Resistance in Vegetable Production and Consumer Preferences. February 18, 2020. Invited by Columbia University, New York, NY, United States.
14. **Yike Shen.** Assessing Antibiotics, Antibiotic Resistance Genes and Microbiome in Lettuce and Food Safety Related Consumer Preference. (Invited and presented in-person in six institutions)
    a. Invited Westlake University, Hangzhou, Zhejiang, China. January 17, 2020.
    b. Invited by Institute of Nuclear-Agricultural Science, Zhejiang University, Hangzhou, Zhejiang, China. January 16, 2020.
    c. Invited by College of Environmental Science and Engineering, Nankai University, Tianjin, China. January 14, 2020.
    d. Invited by Institute of Plant Protection, Chinese Academy of Agricultural Sciences, Beijing, China. January 13, 2020.
    e. Invited by Institute of Soil-Water Resource and Environment, Zhejiang University, Hangzhou, Zhejiang, China. January 6, 2020.
    f. Invited by the International Youth Scholars Forum of Zhejiang A&F University, Zhejiang A&F University, Hangzhou, Zhejiang, China. December 28, 2019.
15. **Yike Shen**. The T concept of research in Environmental Dimension of Antimicrobial Resistance – Perspectives from an interdisciplinary Environmental Scientist in training. December 25, 2017. Invited by Institute of Soil-Water Resource and Environment, Zhejiang University, Hangzhou, Zhejiang, China.

Mentoring

In progress

1. Boris Minasenko, MS Toxicology, Columbia University, 2023 – present
2. Xingyu Zhang, MPH, Columbia University, 2023 – present

PROFESSIONAL SOCIETIES

Membership

- Society of Toxicology (SOT) 2023 – present
- International Society for Environmental Epidemiology (ISEE) 2021 – present
- American Chemical Society (ACS) 2018 – present
- American Society for Microbiology (ASM) 2017 – present
- Soil Science Society of America (SSSA) 2018 – 2019

Committee

- Associate member, ISEE membership committee 2022-present

PEER REVIEW SERVICE

Journal Articles

1. Environmental Science & Technology (ACS)
2. ACS Environmental Science & Technology Water (ACS)
3. Chemical Research in Toxicology (ACS)
4. The Innovation (CellPress)
5. Environmental Research (Elsevier)
6. Science of the Total Environment (Elsevier)
7. Environmental Pollution (Elsevier)
8. Chemosphere (Elsevier)
9. Applied Soil Ecology (Elsevier)
10. Food Chemistry (Elsevier)
11. Current Research in Food Science (Elsevier)
12. Journal of Environmental Management (Elsevier)
13. BMC Medicine (BioMed Central)
14. BMC Genomics (BioMed Central)
15. Frontiers in Microbiology (Frontiers)
16. Current Environmental Health Reports (Springer Nature)
17. Reviews of Environmental Contamination and Toxicology (Springer Nature)
18. Scientific Reports (Springer Nature)
19. Journal of Trust Research (Taylor & Francis Online)
20. Engineering in Life Sciences (Wiley)
21. International Journal of Environmental Research and Public Health (MDPI)
22. Pathogens (MDPI)
23. Nutrients (MDPI)
24. Microorganisms (MDPI)

Workshops

- Columbia University SHARP Scholarship review

Conferences

- ISEE abstract review

STUDENT RECRUITMENT SERVICE

- Program: Master of Science in Environmental Health Data Science.
  Institution: Columbia University. (2022)

Gathered more than 400 students from China and organized a department information webinar with more than 70 participants.

AWARDS

Awards from Michigan State University:

- Graduate Research Assistantship 2016 – 2020
- Institute for Integrative Toxicology Summer Travel Award 2017 – 2020
- Dissertation Completion Fellowship 2019
- Graduate School Travel Funds 2019
- College of Agriculture and Natural Resources Food Systems Fellowship 2019
- Environmental Science and Policy Program Travel Grant 2017,2019
- Environmental Science and Policy Doctoral Recruitment Fellowship 2016

Other Awards

- ASM Travel Grant (American Society for Microbiology) 2017
- First Class Standing (University of Alberta) 2015, 2016
- Undergraduate Research Grant (Natural Science and Engineering Research Council of Canada - CREATE Grant) 2015
- ALES Student Engagement Fund (University of Alberta) 2015
- ZAFU - UofA (ALES) Award (University of Alberta) 2013
- National Scholarship of China (Ministry of Education in China) 2013

ADDITIONAL EXPERIENCES

Student Research Assistant 06/2015 – 02/2016
Department of Renewable Resources
University of Alberta
Mentor: Scott X. Chang, Ph.D.

LANGUAGES

- English
- Chinese