Kelsey E. Johnson
Postdoctoral Fellow
Department of Genetics, Cell Biology & Development
University of Minnesota—Twin Cities

kej@umn.edu
608.220.9739
kejohnson.org
Google Scholar

EDUCATION

University of Pennsylvania   **Philadelphia, PA**
Ph.D., Genetics and Epigenetics   December 2019
Advisor: Benjamin F. Voight
Thesis: "Haplotype-based approaches for the study of human evolution"

University of Wisconsin—Madison   **Madison, WI**
B.S., Zoology with Honors in the Major & Distinction   May 2012
Advisor: Carol E. Lee

CURRENT POSITION

University of Minnesota—Twin Cities   **Minneapolis, MN**
NRSA Postdoctoral Fellow   January 2020 - Present
Advisors: Ran Blekhman, Frank Albert, Ellen Demerath

RESEARCH INTERESTS

My research uses tools from human genetics, genomics, systems biology, and microbiome science to understand the biological processes shaping human milk, and how variation in this system impacts maternal and infant health. My independent research group will focus on three areas:

1. Identifying genetic influences on lactation and milk composition in diverse human populations
2. Leveraging human genetic variation to understand the impacts of lactation and milk composition on infant and maternal risk for disease
3. Characterizing host-microbe interactions in the mother-milk-infant system

FUNDING

Pending:

NIH K99 HD113834
PI: K. Johnson
Genetic and genomic influences on human milk composition and impacts on infant health
First submission impact score: 36; NICHD 2023 payline: 37

Awarded:

University of Minnesota Masonic Institute for the Developing Brain (MIDB)   2023 –
Postdoctoral Seed Grant   Present
PI: K. Johnson
Impact of human milk cytomegalovirus on the immune system and brain development of preterm infants

NIH F32 HD105364   2021 – 2023
PI: K. Johnson
Genetics and genomics of human breast milk composition

University of Minnesota Dept. of Pediatrics Masonic Cross-Departmental Grant in Children's Health Research   2021 – 2022
PIs: C. Gale, E. Demerath, R. Blekhman, F. Albert; Co-I: K. Johnson
Genomics of Human Milk Composition and Its Effects on Infant Growth and Development
Role: Conceptualization, developed study design and data analysis plan, wrote first draft

NIH T32 DE007288   2020 – 2021
MinnCResT Postdoctoral Training Grant, University of Minnesota
Role: Postdoctoral Fellow

NIH T32 GM008216   2014 – 2017
Genetics Predoctoral Training Grant, University of Pennsylvania
Role: Predoctoral Fellow

Undergraduate Research Grant, Department of Zoology, UW-Madison   2011

Honors Thesis Grant, College of Letters & Science, UW-Madison   2011

Contributor:

NIH R01 HD109830   2022 – 2027
PIs: E. Demerath, R. Blekhman, C. Gale
Milk-Omics: Systems Biology of Human Milk and Its Links to Maternal and Infant Health
Role: Conceptualization, co-developed study design and analysis plan, co-wrote first draft

PUBLICATIONS

Manuscripts submitted:

1. **Johnson KE**, Heisel T, Allert M, Furst A, Yerabandi N, Knights D, Jacobs KM, Lock EF, Bode L, Fields DA, Rudolph MC, Gale CA, Albert FW, Demerath EW, Blekhman R (2023). Human milk variation is shaped by maternal genetics and impacts the infant gut microbiome. In revision for *Cell*; preprint on *Biorxiv*. DOI: 10.1101/2023.01.24.525211.

2. **Johnson KE**, Heisel T, Fields DA, Isganaitis E, Jacobs KM, Knights D, Lock EF, Rudolph MC, Gale CA, Schleiss MR, Albert FW, Demerath EW, Blekhman R (2023). Human Cytomegalovirus in breast milk is associated with milk composition, the infant gut microbiome, and infant growth. Under review at *Nature Communications*; preprint on *Biorxiv*. DOI: 10.1101/2023.07.19.549370.

Peer-reviewed publications:

3. Nagel EM, Elgersma K, Gallagher T, **Johnson KE**, Gale C, Demerath EW (2023). Importance of human milk for infants in the clinical setting: Updates and mechanistic links. *Nutrition in Clinical Practice* 2023;38:S39–S55. DOI: 10.1002/ncp.11037.

4. **Johnson KE**, Adams CJ, Voight BF (2022). Identifying rare variants inconsistent with identity-by-descent in population-scale whole-genome sequencing data. *Methods in Ecology and Evolution* 13(11):2429–2442. DOI: 10.1111/2041-210X.13991.

5. Nagel EM, Kummer L, Jacobs DR, Foster L, Duncan K, **Johnson KE**, Harnack L, Haapala J, Kharoud H, Gallagher T, Kharbanda EO, Pierce S, Fields DA, Demerath EW (2021). Human milk glucose, leptin, and insulin predict cessation of full breastfeeding and initiation of formula use. *Breastfeeding Medicine* 16(12):978-986. DOI: 10.1089/bfm.2021.0131.

6. Nagel EM, Jacobs DR, **Johnson KE**, Foster L, Duncan K, Kharbanda EO, Gregg B, Harnack L, Fields DA, Demerath EW (2021). Maternal Dietary Intake of Total Fat, Saturated Fat, and Added Sugar Is

Associated with Infant Adiposity and Weight Status at 6 mo of Age. *The Journal of Nutrition* 151(8):23532360. DOI: 10.1093/jn/nxab101.

7. **Johnson KE***, Siewert KM*, Klarin D, Damrauer SM, Chang K-M, Tsao PS, Assimes TL, the VA Million Veteran Program, Maxwell KM, Voight BF (2020). The relationship between circulating lipids and breast cancer risk: A Mendelian randomization study. *PLoS Medicine* 17(9): e1003302. DOI: 10.1371/journal.pmed.1003302.

8. Aikens RC, **Johnson KE**, Voight BF (2019). Signals of variation in human mutation rate at multiple levels of sequence context. *Molecular Biology & Evolution* 35(5):955-65. DOI: 10.1093/molbev/msz023.

9. **Johnson KE**, Voight BF (2018). Patterns of shared signatures of recent positive selection across human populations. *Nature Ecology & Evolution* 2(4):713-20. DOI: 10.1038/s41559-018-0478-6.

10. **Johnson KE**, Perreau L, Charmantier G, Charmantier-Daures M, Lee CE (2014). Without gills: localization of osmoregulatory function in the copepod *Eurytemora affinis*. *Physiological and Biochemical Zoology* 87(2):310-24. DOI: 10.1086/674319.

11. Lee CE, Moss WE, Olson N, Chau KF, Chang YM, **Johnson KE** (2013). Feasting in fresh water: Impacts of food concentration on freshwater tolerance and the evolution of food x salinity response during the expansion from saline into freshwater habitats. *Evolutionary Applications* 6(4):673-89. DOI: 10.1111/eva.12054.

HONORS & AWARDS

UMN Pediatric Research, Education & Scholarship Symposium (PRESS) Abstract Award	2023
UMN Postdoctoral Association Career Development Award	2023
Reviewers Choice Abstract, American Society for Human Genetics Meeting	2015
Phi Beta Kappa, UW–Madison	2012
National Merit Finalist Scholarship	2008

OUTREACH & SERVICE

Global Representation Chair — 2023 – Present
International Society for Research in Human Milk and Lactation Trainee Interest Group

Postdoctoral Representative — 2020 – 2023
UMN Senate Committee on Faculty Affairs

Steering Committee Member — 2020 – 2023
UMN Postdoctoral Association

Volunteer Judge — 2020 – 2022
Minnesota State Science and Engineering Fair

Peer reviewer — 2015 – Present
Cell Host & Microbe, mBio, Nature Medicine, Obesity, Bioinformatics, Microbiome, Nature Microbiology, Nature Methods

Lead Organizer: Penn Genetics Outreach — 2014 – 2018
Philadelphia Science Carnival

PRESENTATIONS — PAST AND SCHEDULED

Invited Talks
- UC San Diego Human Milk Institute Symposium, March 2024.
- Children's Hospital of Philadelphia Division of Neonatology Research Seminar Series, November 2023.
- Microbiome Virtual International Forum, June 2023.

- Minnesota Institute for the Developing Brain Colloquium, University of Minnesota, April 2023.
- Dept. of Epidemiology & Community Health Seminar Series, University of Minnesota, March 2022.
- Dept. of Ecology, Evolution & Behavior Seminar Series, University of Minnesota, February 2022.
- Developmental Biology Center Seminar Series, University of Minnesota, January 2022.

Contributed Talks
- International Milk Genomics Consortium, Cork, Ireland, September 2023.
- Pediatric Research, Education & Scholarship Symposium, University of Minnesota, March 2023.
- International Milk Genomics Consortium, Davis, CA, October 2022.
- US DOHaD Society Meeting, Minneapolis, MN, October 2022.
- Biology of Genomes Conference, Cold Spring Harbor Laboratory, May 2022.
- Probabilistic Modeling in Genomics Conference, Cold Spring Harbor Laboratory, November 2018.
- Symposium on Advances in Genomics, Epidemiology, and Statistics, Philadelphia, PA, June 2018.

Posters
- American Society of Human Genetics, Washington, DC, November 2023.
- Pediatric Academic Societies Meeting, Washington, DC, April 2023.
- International Society for Research on Human Milk and Lactation, Panama City, Panama, October 2022.
- American Society of Human Genetics, Houston, TX, October 2019.
- GSA Population, Evolutionary, and Quantitative Genetics Conference, Madison, WI, May 2018.
- American Society of Human Genetics, Orlando, FL, October 2017.
- International Conference on Quantitative Genetics, Madison, WI, June 2016.
- American Society of Human Genetics, Baltimore, MD, October 2015.

TEACHING EXPERIENCE

Guest Lecture: "Complex Trait Genetics"   Spring 2021 – 2023
GCD4143: Human Genetics & Genomics, University of Minnesota

Teaching Certificate   2019
Center for Teaching and Learning, University of Pennsylvania
Program included didactic workshops and teaching observations.

Teaching Assistant: Introduction to Bioinformatics   Spring 2017, 2018
Perelman School of Medicine, University of Pennsylvania

Tutor: CAMB550 Genetic Principles   2016
Perelman School of Medicine, University of Pennsylvania

Tutor: CHEM103 General Chemistry, GEN466 General Genetics   2011 – 2012
Center for Educational Opportunity, University of Wisconsin-Madison

MENTORSHIP EXPERIENCE

Mattea Allert   January 2023 –
Mattea is a graduate student in the Blekhman Lab at the University of Minnesota. She   Present
is characterizing the milk microbiome from shotgun metagenomic sequencing data in
our MILK study cohort. Mattea also contributed analyses and is a co-author on our
milk genomics manuscript under revision.

Liz Gibbons   Summer 2023
Liz worked with me during her graduate student rotation in the Blekhman Lab at the
University of Chicago. Liz utilized maternal genetic data from our MILK study cohort to

calculate polygenic risk scores for metabolic traits and test for associations with milk composition and the infant gut microbiome.

Andrew Youssef   September 2022 – Present

Andrew is an undergraduate researcher in the Blekhman Lab at the University of Chicago. He is integrating milk multi-omics data to interrogate relationships between milk gene expression, the milk metabolome, and the infant gut microbiome. He is implementing pipelines such as multi-omics factor analysis (MOFA) in this work and will be a co-author on our manuscript in preparation. He is also interested in using event-related potential (ERP) data to explore the impact of milk composition on infant cognitive development. Andrew is a senior at UChicago and is currently applying for medical school.

Madilyn Stahl   Summer 2022

Madi worked with me during her PhD student rotation in the Albert Lab at the University of Minnesota. Madi calculated polygenic risk scores for breast cancer using our MILK study cohort and tested for relationships with milk gene expression. Madi is currently a PhD student in the Largaespada Lab at the University of Minnesota.

Monica Iram   Spring 2020

Monica was an undergraduate Math major who did a semester-long research project in the Blekhman lab. She applied Mendelian randomization approaches to investigate potential causal relationships between diet and the gut microbiome. Monica recently completed an MS in Biostatistics at the University of Minnesota.