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

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EDUCATION

University of Pennsylvania — **Philadelphia, PA**
Ph.D., Genetics and Epigenetics — December 2019
Advisor: Benjamin F. Voight

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**
Postdoctoral Researcher — January 2020 - Present
Advisors: Frank Albert, Ran Blekhman, Ellen Demerath

RESEARCH INTERESTS

My research uses tools from human genetics and genomics 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

Awarded:

NIH K99 HD113834 — 2024 – 2026
PI: K. Johnson
Genetic and genomic influences on human milk composition and impacts on infant health
Total Award Amount: $1,000,658

University of Minnesota Masonic Institute for the Developing Brain (MIDB) Postdoctoral Seed Grant — 2023 – 2025
PI: K. Johnson
Impact of human milk cytomegalovirus on the immune system and brain development of preterm infants
Total Award Amount: $20,000

NIH F32 HD105364 — 2021 – 2023
PI: K. Johnson
Genetics and genomics of human breast milk composition
Total Award Amount: $165,007

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
Total Award Amount: $200,000

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
Total Award Amount: $3,852,094

PUBLICATIONS

Manuscripts submitted:

1. Allert M*, Ferretti P*, **Johnson KE**, Heisel T, Gonia S, Knights D, Fields DA, Albert FW, Gale CA, Blekhman R (2024). Assembly, stability, and dynamics of the infant gut microbiome are linked to bacterial strains and functions in mother's milk. Preprint on *Biorxiv*. DOI: 10.1101/2024.01.28.577594.

Peer-reviewed publications:

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 (2024). Human milk variation is shaped by maternal genetics and impacts the infant gut microbiome. *Cell Genomics* 4:100638. DOI: 10.1016/j.xgen.2024.100638.
2. **Johnson KE**, Hernandez-Alvarado N, Blackstad M, Heisel T, Allert M, Fields DA, Isganaitis E, Jacobs KM, Knights D, Lock EF, Rudolph MC, Gale CA, Schleiss MR, Albert FW, Demerath EW, Blekhman R (2024). Human Cytomegalovirus in breast milk is associated with milk composition and the infant gut microbiome and growth. *Nature Communications* 15:6216. DOI: 10.1038/s41467-024-50282-4.
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

International Society for Research in Human Milk and Lactation (ISRHML) Abstract Award	2024
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
James B. Duke Fellowship, Duke University (Declined)	2013
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
Numerous journals including *Bioinformatics, Cell Host & Microbe, mBio, Nature Medicine, Nature Methods, Nature Microbiology, Obesity, PNAS, Science Advances*

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

PRESENTATIONS

Invited Talks

- Division of Nutritional Sciences, Cornell University, April 2024.
- Human Milk Institute Symposium, UC San Diego, March 2024.
- Division of Pediatric Epidemiology and Clinical Research, Department of Pediatrics, University of Minnesota, February 2024.
- Department of Human Genetics, University of Utah, February 2024.
- Center for Genetic Epidemiology, University of Southern California, January 2024.
- Center for Better Beginnings, Department of Pediatrics, UC San Diego, December 2024.
- Division of Neonatology, Children's Hospital of Philadelphia, November 2023.
- Microbiome Virtual International Forum, June 2023.
- Minnesota Institute for the Developing Brain Colloquium, University of Minnesota, April 2023.
- Department of Epidemiology & Community Health, University of Minnesota, March 2022.
- Department of Ecology, Evolution & Behavior, University of Minnesota, February 2022.
- Developmental Biology Center, University of Minnesota, January 2022.

Contributed Talks

- International Society for Research in Human Milk and Lactation, Charleston, SC, December 2024.
- 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 – August 2024
Mattea worked with me as a graduate student in the Blekhman Lab at the University of Minnesota. She characterized the milk microbiome from shotgun metagenomic sequencing data in our MILK study cohort. Mattea also contributed analyses and is a co-author on two milk genomics manuscripts. Mattea is currently a postdoctoral scholar at the University of Minnesota.

Andrew Youssef September 2022 – December 2023
Andrew was 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 using event-related potential (ERP) data to explore the impact of milk composition on infant cognitive development. Andrew is a senior neuroscience major and is currently applying for medical school.

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 test for associations between polygenic risk scores for metabolic traits and milk composition. Liz is now a PhD student in the Blekhman lab at UChicago.

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.