

Michael Francis, Ph. D.

Bioinformatician || Data Scientist

Lawrenceville, GA || mikefrancisphd@gmail.com

Interactive CV here: <https://mikefrancis.surge.sh/CV.html>

Research Experience

Lead Scientist

November 2022 - present

Booz Allen Hamilton, Boston, MA

- Precision health analyses involving genetic factors and human disease traits as a contractor for the Department of Veterans Affairs Million Veteran Program.
- Providing technical writing for proposals related to genetics and genomics.

Nutritional Genomics Laboratory (Doctoral research)

August 2019-present

University of Georgia, Athens, GA

- Quantitative and functional genomic analyses of genes, dietary intake, and their interactions in complex human disease phenotypes.

Micronutrient Proteomic Laboratory (Master's research)

August 2017-July 2019

University of Georgia, Athens, GA

- Genomic motif analyses and cell culture experiments to determine the role of zinc-activated transcription factors and related miRNAs in regulation of human gene expression.

Skills

Programming Languages: Skilled in R, Python, and Shell scripting. Familiar with HTML, CSS. JavaScript, and React.

Statistical Analysis & Modeling: Skilled in statistical testing, predictive modeling, and multivariate analysis using R, and Python.

Computational Tools: Skilled with open-source bioinformatics tools and databases such as PLINK, GCTA suite, bcftools, as well as with version control systems such as GitHub.

Data Analysis & Visualization: Skilled in creating manuscript-quality visualizations using ggplot2, Matplotlib, Seaborn, and in using R Markdown to create dynamic, reproducible data analysis reports and websites.

Education

Doctor of Philosophy in Bioinformatics

Graduated Dec. 2022

University of Georgia, Athens, GA

GPA: 3.96

Master of Science in Nutrition

Graduated July 2019

University of Georgia, Athens, GA

Bachelor of Science in Chemistry

Graduated May 2014

SUNY College of Environmental Science and Forestry (SUNY-ESF), Syracuse, NY

Peer-reviewed publications

1. Gorman BR*, **Francis M***, Nealon C, et al. (2024) A multi-ancestry GWAS of Fuchs corneal dystrophy highlights the contributions of laminins, collagen, and endothelial cell regulation. *Communications Biology* 7, 418. doi:10.1038/s42003-024-06046-3. *Co-first authors.
2. Pan Y, Sun X, Mi X, [and 51 others, including **Francis M**] (2023) Whole-exome sequencing study identifies four novel gene loci associated with diabetic kidney disease. *Human molecular genetics* 32 (6), 1048-1060. doi: 10.1093/hmg/ddac290.
3. **Francis M**, Li C, Sun Y, et al. (2021) Genome-wide association study of fish oil supplementation with continuous lipid traits in 81,246 individuals reveals new interaction loci. *PLOS Genetics* 17(3): e1009431. doi:10.1371/journal.pgen.1009431.
4. Zhou J, Liu C, **Francis M**, et al. (2021) Genetically predicted circulating levels of copper and zinc are associated with osteoarthritis but not with rheumatoid arthritis. *Osteoarthritis and Cartilage* 29(7): 1029-1035. doi:10.1016/j.joca.2021.02.564.
5. Zhou J, Liu C, **Francis M**, et al. (2020) The Causal Effects of Blood Iron and Copper on Lipid Metabolism Disease: Evidence from Phenome-wide Mendelian Randomization Study. *Nutrients* 12(10): 3174. doi:10.3390/nu12103174
6. **Francis M**, Cheng H, Ma P, et al. (2019) Genomic characterization of the zinc transcriptional regulatory element reveals potential functional roles of ZNF658. *Biological Trace Element Research* 192(2):83-90. doi: 10.1007/s12011-019-1650-9
7. **Francis M**, Grider A. (2019) MiRNA-target interactions in osteogenic signaling pathways involving zinc and the metal regulatory element. *Biometals* 32(1):111-121. doi: 10.1007/s10534-018-00162-4
8. **Francis M**, Grider A. (2018) Bioinformatic analysis of the metal response element and zinc-dependent gene regulation via the metal response element-binding transcription factor 1 in Caco-2 cells. *Biometals* 31(4): 639-646. doi:10.1007/s10534-018-0115-5

Publications currently in review

1. **Francis M**, Westerman K, Manning A, et al. Gene-vegetarianism interactions in calcium, testosterone, and eGFR identified in genome-wide analysis across 30 biomarkers. *medRxiv* (pre-print). doi:10.1101/2022.10.21.22281358
2. Xu H, Sun Y, **Francis M**, et al. Shared genetic basis informs the roles of polyunsaturated fatty acids in brain disorders. *In review*.
3. **Francis M**, Sun Y, Xu H, Brenna JT, Ye K. Fifty-one novel, replicated loci identified in genome-wide association study of polyunsaturated and monounsaturated fatty acids in 124,024 European individuals. *medRxiv* (pre-print). doi:10.1101/2022.05.27.22275343.

Media Coverage

Gene-diet genome-wide association study of fish oil supplementation with continuous lipid traits in 81,246 individuals reveals new interaction loci (2021): Article has an Altmetric score of 341 (Top 0.34% of all papers).

University of Georgia Libraries (2020, February). “Libraries’ Capturing Science Contest Encourages Creativity in Science Communication” *Beyond the Pages*, 29, pp.14-15.

Teaching experience

Research Mentor

2018-present

University of Georgia, Athens, GA

- Mentoring a running total of five undergraduate students conducting bioinformatics research projects.

Graduate Teaching Assistant

2017-2019

University of Georgia, Athens, GA

- Nutritional Epidemiology with Dr. Alex Anderson.
- Introduction to Nutrition with Dr. Barbara Grossman.
- Responsibilities: Grading papers, office hours, periodic lecturing.

Instructor of Record

Fall 2018

University of Georgia, Athens, GA

- GRSC 7770, University Teaching and Professional Development.
- A 1-2 variable credit hour class for graduate students, focused on developing skills for teaching assistants and future faculty.

Online Tutor

November 2014-August 2017

Chegg Tutors, USA

- Private tutoring in chemistry, mathematics, using real-time virtual whiteboards with audio and video chat.
- Over 175 positive reviews from students.

Certificates

Carpentries Instructor

November 2019

The Carpentries, USA

Honors and Awards

NIH Training Grant, National Institutes of Health, 2020-2021; 2021-2022.

Communication of Research and Scholarship Grant, University of Georgia, 2020.

Capturing Science Contest, 2nd place, University of Georgia Libraries, “The Music of Life,” 2019.

Research Assistantship, University of Georgia Institute of Bioinformatics, 2019-2020.

Registration Scholarship, University of Washington Summer Institute in Statistical Genetics, 2019.

Teaching Assistantship, University of Georgia Department of Foods and Nutrition, 2017-2019.

Graduate School Teaching Seminar Assistantship, University of Georgia Graduate School, 2018.

Marian Wang Nutrition Scholarship, University of Georgia College of Family and Consumer Sciences, 2018.

Virginia Wilbanks Kilgore Scholarship, University of Georgia College of Family and Consumer Sciences, 2017.

Graduated magna cum laude, SUNY College of Environmental Science and Forestry, 2014.

Service and Leadership

Software Carpentries workshops, Athens, GA

- **Instructor and Organizer:** “Programming with R,” 02-07-2020
- **Instructor:** “The Unix Shell,” 12-04-2019

Clarke County Mentorship Program, Athens, GA

Fall 2018

- **Mentor:** for underprivileged middle school students.

Georgia Science & Engineering Fair, Athens, GA

2018, 2019

- **Junior Division Category Leader:** Judging 6-8th grade science fair entries.

Published abstracts

Li C, **Francis M**, Westbrook A, Zhang R, Shen Y, Ye K, Chen J, He J, Kelly TN. Abstract MP08: Whole Exome Sequencing Study Identified A Novel Variant For Kidney Function And Progression Of Chronic Kidney Disease [abstract]. In: *Circulation*, 2021 May 25.

Francis, M, Grider, A. In silico secondary analysis of the metal regulatory element/MTF-1 within the human genome: relation to zinc-responsive genes [abstract]. In: Current Developments in Nutrition; 2018 June 9-12; Boston, MA. ASN; 2018.

Francis, M, Grider, A. The proximity of the metal regulatory element to microRNA genes within the human genome: in silico analysis [abstract]. In: Current Developments in Nutrition; 2018 June 9-12; Boston, MA. ASN; 2018.

Poster presentations

Genome-wide association study of blood lipids with fish oil supplementation in 81,246 UK Biobank participants identifies new interaction loci. October 2020. Poster Session. ASHG Virtual Meeting 2020—American Society of Human Genetics. San Diego, CA, United States. **Michael Francis**, Changwei Li, Yitang Sun, Jingqi Zhou, J. Thomas Brenna, Kaixiong Ye.

White Blood Cells and Severe COVID-19: a Mendelian Randomization Study. October 2020. Poster Session. ASHG Virtual Meeting 2020—American Society of Human Genetics. San Diego, CA, United States. Yitang Sun, Jingqi Zhou, **Michael Francis**, Kaixiong Ye.

Shared and Unique Clinical Effects of Blood Minerals: A Phenome-wide Mendelian-randomization Study. October 2020. Poster Session. ASHG Virtual Meeting 2020—American Society of Human Genetics. San Diego, CA, United States. Jingqi Zhou, Chang Liu, **Michael Francis**, Yitang Sun, Kaixiong Ye.

In silico secondary analysis of the metal regulatory element and MTF-1 within the human genome: relation to zinc-responsive genes. June 2018. Poster Session. Nutrition 2018—American Society for Nutrition. Boston, MA. **Michael Francis**, Arthur Grider.

The proximity of the metal regulatory element to microRNA genes within the human genome: in silico analysis. June 2018. Poster Session. Nutrition 2018—American Society for Nutrition. Boston, MA. **Michael Francis**, Arthur Grider.

Pheromone Synthesis Using Bromine as a Protecting Group. April 2014. Poster Session. Western New York American Chemical Society Undergraduate Research Symposium. Buffalo, NY. **Michael Francis**, Francis Webster.