Brendan F. Miller

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National Human Genome
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SUMMARY

- Molecular biologist with strong background in clinical diagnostics and cancer biology.
- Extensive experience developing liquid biopsy-based assays using methylated DNA biomarkers for use in the clinic.
- Focused on developing computational tools to predict and improve performance of methylated biomarkers using DNA sequencing data.

EDUCATION

Johns Hopkins University — Baltimore, MD
National Institutes of Health, Graduate Partnership Program — 2014 – Present
PhD Candidate in Biology
Dissertation: “Investigating Blood-based Biomarkers and Patterns of DNA Methylation in Tumors.”

University of Vermont — Burlington, VT
B.S. in Biochemistry — 2008 – 2012
Minor in Pharmacology
GPA 3.50

AWARDS AND HONORS

NIH Fellows Award for Research Excellence — Recipient for 2020
National Institutes of Health
National Human Genome Research Institute

NIH Graduate Student Research Award — 2019
Pharmacology and Clinical and Translational Science
National Institutes of Health
15th Annual NIH Graduate Student Research Symposium

NIH Fellows Award for Research Excellence — 2017
National Institutes of Health
National Human Genome Research Institute

AWARDS AND HONORS, cont

NIH Post-Baccalaureate Outstanding Poster Award 2013
National Institutes of Health
National Institute of Diabetes and Digestive and Kidney Diseases

NIH Post-Baccalaureate Training Award 2012 – 2014
National Institutes of Health
National Institute of Diabetes and Digestive and Kidney Diseases

John Thanassi Research Award for Outstanding Achievements in Biochemistry 2012
University of Vermont

RESEARCH EXPERIENCE

Graduate Student Research Fellow 2014 – Present
Johns Hopkins University, Baltimore, MD
National Institutes of Health, Bethesda, MD
Advisor: Dr. Laura Elnitski
Project 1: "Detection of Methylated Cancer Biomarkers in Cell Free DNA."
Project 2: "Elucidation of Molecular Commonalities in CIMP Tumors Across Cancer Types."

Post-Baccalaureate Research Fellow 2012 – 2014
National Institutes of Health, Bethesda, MD
Advisor: Dr. Anthony Furano
Project: "Factors that Determine Strand Selection During Repair of T/G Mismatches."

Undergraduate Research Assistant 2011 – 2012
University of Vermont, Burlington, VT
Advisor: Dr. Wolfgang Dostmann
Project: "Purification and Long-term Storage of Toxoplasma gondii PKGII Protein."

Undergraduate Research Assistant 2011
University of Vermont, Burlington, VT
Advisor: Dr. Anne Mason
Project: "Identification of Key Residues of Human Transferrin and Transferrin Receptor."

RESEARCH EXPERIENCE, cont

Summer Research Assistant 2007
University of Massachusetts, Lowell, MA
Advisor: Dr. Brian Bettencourt
Project: "Variation in Hsp70 Expression During Natural Thermal Stress Drives Differential Suppression of poly-Q Toxicity."

TEACHING EXPERIENCE

National Institutes of Health Bethesda, MD
Lecturer – Research Tools for Studying Disease 2015 – 2016
Developed syllabus, overall course structure, and administered grades for "Proteins I" and "Computational Biology" lectures.

Johns Hopkins University Baltimore, MD
Teaching Assistant – General Biology 2015
Managed laboratory section, which included experimental setup, development of instructional lectures, and administration of assignments and exams.

Health Education Outreach Program Bethesda, MD
Program Leader 2012 – 2014
Taught topics in medicine and healthcare to underprivileged and underrepresented communities.

University of Vermont Burlington, VT
Tutor – General Chemistry and Organic Chemistry 2010 – 2012
Established and oversaw individual and group tutoring sessions.

CONFERENCE PRESENTATIONS

Invited Speaker:

Brendan F. Miller, Thomas R. Pisanic II, Hanna M. Petrykowska, Pornpat Athamanolap, Gennady Margolin, Akosua Osei-Tutu, Tza-Huei Wang, Christina Annunziata, Laura Elnitski. Advancement in ovarian carcinoma detection using circulating cell-free DNA from patient plasma samples. Invited speaker at: National Human Genome Research Institute Symposium; 2018 November; Bethesda, MD, USA.

Brendan F. Miller, Thomas R. Pisanic II, Hanna M. Petrykowska, Pornpat Athamanolap, Gennady Margolin, Akosua Osei-Tutu, Tza-Huei Wang, Christina Annunziata, Laura Elnitski. Detecting DNA Methylation Patterns in Patient Plasma to Improve Cancer Diagnostics. Invited speaker at: NIEHS Inflammation Faculty Workshop: Circulating Cell Free DNA: Applications in the Clinical and Toxicology Setting; 2018 September; Research Triangle Park, NC, USA.

CONFERENCE PRESENTATIONS, cont

Brendan F. Miller, Thomas R. Pisanic II, Hanna M. Petrykowska, Pornpat Athamanolap, Gennady Margolin, Akosua Osei-Tutu, Tza-Huei Wang, Christina Annunziata, Laura Elnitski. Detecting DNA Methylation Patterns in Patient Plasma to Improve Cancer Diagnostics. Invited speaker at: The 3rd Annual Liquid Biopsy Summit; 2018 June; San Francisco, CA, USA.

Poster Presentations:

Brendan F. Miller, Hania Petrykowska, Nader Jameel, Gennady Margolin, Thomas Pisanic II, Laura Elnitski. Detecting DNA Methylation in Blood for Cancer Diagnostics. Poster presented at: Next Generation Diagnostics Summit; 2017 August; Washington, DC, USA.

Brendan F. Miller, Hania Petrykowska, Nader Jameel, Gennady Margolin, Thomas Pisanic II, Laura Elnitski. Detecting DNA Methylation in Blood for Cancer Diagnostics. Poster presented at: EMBO Chromatin and Epigenetics Meeting; 2017 May; Heidelberg, Germany.

Brendan F. Miller, Jia Chen, Anthony V. Furano. Factors That Determine Strand Selection During Repair of T/G Mismatches. Poster presented at: 13th Annual Postbac Poster Day; 2013 May; Bethesda, MD.

PEER-REVIEWED PUBLICATIONS

Brendan F. Miller, Thomas R. Pisanic II, Gennady Margolin, Hanna M. Petrykowska, Pornpat Athamanolap, Akosua Osei-Tutu, Tza-Huei Wang, Christina Annunziata, Laura Elnitski. A Methylation Density Binary Classifier for Predicting and Optimizing the Performance of Methylation Biomarkers in Clinical Samples. bioRxiv 579839. https://doi.org/10.1101/579839.

Di Huang, Hanna M. Petrykowska, **Brendan F. Miller**, Laura Elnitski, Ivan Ovcharenko. Identification of human silencers by correlating cross-tissue epigenetic profiles and gene expression. Genome Research. 2019 March; 29(3):1-11. https://doi.org/10.1101/gr.247007.118.

Valeriya Gaysinskaya, **Brendan F. Miller**, Godfried W. van der Heijden, Kasper D. Hansen, Alex Bortvin. Transient reduction of DNA methylation at the onset of meiosis in male mice. Epigenetics and Chromatin. 2018 April; 11:15. https://doi.org/10.1186/s13072-018-0186-0.

Brendan F. Miller, Francisco Sanchez-Vega, Laura Elnitski. The emergence of pan-cancer CIMP and its elusive interpretation. Biomolecules. 2016 Nov; 6(4):45. https://doi.org/10.3390/biom6040045.

Ben Busby, Allissa Dillman, Claire L. Simpson, Ian Fingerman, Sijung Yun, David M. Kristensen, Lisa Federer, Naisha Shah, Matthew C. LaFave, Laura Jimenez-Barron, Manusha Pande, Wen Luo, **Brendan Miller**, Cem Mayden, Dhruva Chandramohan, Kipper Fletez-Brant, Paul W. Bible, Sergej Nowoshilow, Alfred Chan, Eric JC Galvez, Jeremy Chignell, Joseph N. Paulson, Manoj Kandpal, Suhyeon Yoon, Esther Asaki, Abhinav Nellore, Adam Stine, Robert Sanders, Jesse Becker, Matt Lesko, Mordechai Abzug, Eugene Yaschenko. Building Genomic Analysis Pipelines in a Hackathon Setting with Bioinformatician Teams: DNA-Seq, Epigenomics, Metagenomics and RNA-Seq. bioRxiv 018085. https://doi.org/10.1101/018085.

PEER-REVIEWED PUBLICATIONS, cont

Jia Chen, **Brendan F. Miller**, Anthony V. Furano. Repair of naturally occurring mispairs can induce mutations in flanking DNA. eLife 2014;3:e02001. https://doi.org/10.7554/eLife.02001.

Ashley N. Steere, N. Dennis Chasteen, **Brendan F. Miller**, Valerie C. Smith, Ross T. A. MacGillivray, Anne B. Mason. Structure-based Mutagenesis Reveals Critical Residues in the Transferrin Receptor Participating in the Mechanism of pH-induced Release of Iron from Human Serum Transferrin. Biochemistry. 2012 Feb; 51(10):2113-21. https://doi.org/10.1021/bi3001038.

Ashley N. Steere, **Brendan F. Miller**, Samantha E. Roberts, Shaina L. Byrne, N. Dennis Chasteen, Valerie C. Smith, Ross T. A. MacGillivray, Anne B. Mason. Ionic Residues of Human Serum Transferrin that Affect Binding to the Transferrin Receptor and Iron Release from the Complex. Biochemistry. 2012 Dec; 51(2):686-94. https://doi.org/10.1021/bi201661g.

SKILLS AND PROFICIENCIES

Biochemistry
Column Chromatography • SDS-PAGE • Spectrophotometry (UV/vis) • Western Blotting

Communication
Grant Writing • Microsoft Office Suite • Scientific Conference and Seminar Presentations
Scientific Research Article Writing

Computational Biology
BLAST • BLAT • Python Data Visualization and Analysis (matplotlib, numpy, pandas, scipy, sklearn)
R • Unix Shell Scripting • Version control (git)

Diagnostics and Sequencing
Droplet Digital PCR • High Resolution Melt Analysis • Next Generation Sequencing
Real-time Quantitative PCR • Sanger Sequencing

Molecular Biology
DNA Bisulfite Conversion • DNA Extraction and Purification (patient samples: plasma, stool)
Gel Electrophoresis • Mammalian Cell Culture • Plasmid Cloning • RNA Extraction
siRNA Knockdown • DNA Transfection and Transformation

SERVICE

Journal Reviewer 2019
Epigenomics – Short Communication

Circulating Nucleic Acids/Liquid Biopsy Interest Group 2019
National Institutes of Health
Research Webinar Committee Member
Standards Committee Member

REFERENCES

Dr. Laura Elnitski
National Institutes of Health
National Human Genome Research Institute
Building 49, 4A18
49 Convent Drive
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Dr. Thomas Pisanic II
Johns Hopkins University
Department of Mechanical Engineering
Shaffer Hall 200A
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Dr. James Taylor
Johns Hopkins University
Department of Biology
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Dr. Srinivasan Yegnasubramanian
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