

Brendan F. Miller

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National Institutes of Health
National Human Genome
Research Institute
Room 4C08
49 Convent Drive, Building 49
Bethesda, MD 20892

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 – 2020
PhD in Molecular 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	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, con't

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 – 2020

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, con't**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, con't

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, Thomas R. Pisanic II, Gennady Margolin, Hanna M. Petrykowska, Pornpat Athamanolap, Akosua Osei-Tutu, Christina M. Annunziata, Tza-Huei Wang, Laura Elnitski. A Methylation Density Binary Classifier for Predicting and Optimizing the Performance of Methylation Biomarkers in Clinical Samples. Poster presented at: Advances in Genome Biology and Technology; 2020; Marco Island, FL, 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: 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.

PREPRINT 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>.

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

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>.

PEER-REVIEWED PUBLICATIONS, con't

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>.

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>.

SOFTWARE

EpiClass

Optimizing and predicting performance of DNA methylation biomarkers using sequence methylation density information. <https://github.com/bmill3r/EpiClass>.

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)

SKILLS AND PROFICIENCIES, con't

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 – 2020

National Institutes of Health
Research Webinar Committee Member
Standards Committee Member

REFERENCES

Dr. Laura Elnitski
National Institutes of Health
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Building 49, 4A18
49 Convent Drive
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