

# Nyasha Chambwe

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## EDUCATION

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**Weill Medical College of Cornell University**, *Ph.D., Computational Biology* 2008-2014

Dissertation title: Computational Analyses of DNA Methylation and Gene Expression for the Molecular Profiling of Disease States

**Jackson State University**, *B.S., Biology, Summa Cum Laude* 2004-2008

## Research Experience

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**Research Scientist**, Institute for Systems Biology, Seattle, WA 2018–present

**Postdoctoral Fellow**, Institute for Systems Biology, Seattle, WA 2014–2018

*Adviser: Ilya Shmulevich*

- Developed a cloud-based integrated resource for cancer type-specific synthetic lethal genetic interactions and data mining for functional genomic studies
- Implemented workflow for the analysis of epigenetic silencing and multivariate survival analysis in the DNA Damage Response Pathway as part of The Cancer Genome Atlas (TCGA) Pan-Cancer Network DNA Damage and Response Analysis Working Group
- Participated in a multi-institution collaborative project to integrate publicly available cancer genomic characterization datasets with locally-generated cohorts in order to understand mechanisms of therapeutic response in Glioblastoma
- Performed integrative analysis across multiple 'omic' data types to characterize the genomic and molecular basis of preterm birth

**Graduate Research Assistant**, Weill Cornell Medical College, New York, NY 2008–2014

*Adviser: Fabien Campagne*

- Developed a DNA-methylation variability-based patient stratification method for Diffuse Large B Cell Lymphoma that differentiates patients according to prognostic risk categories
- Developed and optimized analysis pipelines for high-throughput sequencing and microarray datasets to find association with disease (e.g. DNA-Seq (WGS and Exome), WGBS, RRBS and RNA-Seq)
- Contributed to the development of software for automated biomarker discovery in high dimensional datasets

**Undergraduate Research Fellow**, Jackson State University, Jackson, MS 2007-2008

*Adviser: Raphael Isokpehi*

- Acquired basic computational research skills through a mentored undergraduate research experience
- Assessed the significance of sequence conservation and functional similarity of human and protozoan parasite aquaporins with the goal of understanding their therapeutic potential

**Summer Research Fellow**, Princeton University, Princeton, NJ Summer 2007

*Adviser: Thomas J. Silhavy*

- Investigated the role of cancer causing genes in suppressing transport across the cell membrane using bacteria as a model organism
- Developed experimental skills in bacterial culture maintenance, DNA/RNA extraction, gel electrophoresis, RT-PCR and western blotting

## PUBLICATIONS

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\* *Equal contribution*

### Peer-reviewed

1. Knijnenburg TA\*, Vockley JG\*, Chambwe N\*, Gibbs DL\*, Humphries C, Huddleston KC, Klein E, Kothiyal P, Tasseff R, Dhankani V, Bodian DL, Wong WSW, Glusman G, Mauldin DE, Miller M, Slagel J, Elasady S, Roach JC, Kramer R, Leinonen K, Linthorst J, Baveja R, Baker R, Solomon BD, Eley G, Iyer RK, Maxwell GL, Bernard B, Shmulevich I, Hood L, Niederhuber JE. **Genomic and molecular characterization of preterm birth**. Proc Natl Acad Sci U S A. 2019 Mar 19;116(12):5819-5827. doi:10.1073/pnas.1716314116. Epub 2019 Mar 4. PubMed PMID: 30833390

2. Juarez E, Chambwe N, Tang W, Mitchell AD, Owen N, Kumari A, Monnat RJ Jr, McCullough AK. **An RNAi screen in human cell lines reveals conserved DNA damage repair pathways that mitigate formaldehyde sensitivity.** DNA Repair (Amst). 2018 Dec; 72:1-9.
3. Rutherford SC, Fachel AA, Li S, Sawh S, Muley A, Ishii J, Saxena A, Dominguez PM, Caldas Lopes E, Agirre X, Chambwe N, Correa F, Jiang Y, Richards KL, Betel D, Shaknovich R. **Extracellular vesicles in DLBCL provide abundant clues to aberrant transcriptional programming and genomic alterations.** Blood. 2018 Aug 16;132(7):e13-e23.
4. Knijnenburg TA\*, Wang L\*, Zimmermann MT\*, Chambwe N\*, Gao GF, Cherniack AD, Fan H, Shen H, Way GP, Greene CS, Liu Y, Akbani R, Feng B, Donehower LA, Miller C, Shen Y, Karimi M, Chen H, Kim P, Jia P, Shinbrot E, Zhang S, Liu J, Hu H, Bailey MH, Yau C, Wolf D, Zhao Z, Weinstein JN, Li L, Ding L, Mills GB, Laird PW, Wheeler DA, Shmulevich I; Cancer Genome Atlas Research Network, Monnat RJ Jr., Xiao Y, Wang C. **Genomic and Molecular Landscape of DNA Damage Repair Deficiency across The Cancer Genome Atlas.** Cell Rep. 2018 Apr 3;23(1):239-254.e6
5. Dominguez P.M., Teater M, Chambwe N, Kormaksson M, Redmond D, Ishii J, Vuong B, Chaudhuri J, Melnick A, Vasanthakumar A, Godley LA, Papavasiliou F.N., Elemento O, Shaknovich R. **DNA Methylation Dynamics of Germinal Center B Cells Are Mediated by AID.** Cell Rep. 2015 Sep 29;12(12): 2086-98.
6. Béguelin W, Sawh S, Chambwe N, Chan F.C., Jiang Y, Choo J.W., Scott D.W., Chalmers A, Geng H, Tsikitas L, Tam W, Bhagat G, Gascoyne R.D., Shaknovich R. **IL10 receptor is a novel therapeutic target in DLBCLs.** Leukemia. 2015 Aug;29(8):1684-94
7. Chambwe N, Kormaksson M, Geng H, De S, Michor F, Johnson N.A., Morin R.D., Scott D.W., Godley L.A., Gascoyne R.D., Melnick A, Campagne F, Shaknovich R. **Variability in DNA methylation defines novel epigenetic subgroups of DLBCL associated with different clinical outcomes.** Blood. 2014 Mar 13; 123(11):1699-708.
  - o Commentary by: Lossos I.S. The DNA methylome: a novel biomarker. Blood. 2014 Mar 13;123(11):1627-8. doi: <https://doi.org/10.1182/blood-2014-01-548586>
8. Campagne F, Dorff K.C., Chambwe N, Robinson J.T., Mesirov J.P. **Compression of structured high-throughput sequencing data.** PLoS One. 2013 Nov 18;8(11):e79871.
9. Dorff K.C., Chambwe N, Zeno Z, Simi M, Shaknovich R, Campagne F. **GobyWeb: simplified management and analysis of gene expression and DNA methylation sequencing data.** PLoS One. 2013 Jul 23;8(7): e69666
10. Oh J.E., Chambwe N, Klein S, Gal J, Andrews S, Gleason G, Shaknovich R, Melnick A, Campagne F, Toth M. **Differential gene body methylation and reduced expression of cell adhesion and neurotransmitter receptor genes in adverse maternal environment.** Transl Psychiatry. 2013 Jan 22;3:e218.
11. Dorff K.C., Chambwe N, Srdanovic M, Campagne F. **BDVal: reproducible large-scale predictive model development and validation in high-throughput datasets.** Bioinformatics. 2010 Oct 1; 26(19): 2472-3.

### Publications in Review

1. Carrot-Zhang J\*, Chambwe N\*, Damrauer J.S\*, Knijnenburg T.A\*, Robertson G.A.\*, Yau C\*, Zhou W\*, Berger A.C\*, Huang K\*, Mashl R.J., Newberg J, Romanel A, Sayaman R.W, Demichelis F, Felau I, Frampton G, Han Seunghun, Hoadley K.A., Kemal A, Laird P.W., Lazar A.J., Le X, Oak N, Shen H, Wong C.K., Zenklusen J.C., Ziv E, Cancer Genome Atlas Network, Cherniack A.D., Beroukhir R. **Comprehensive Analysis of Genetic Ancestry and Its Molecular Correlates in Cancer.** Cancer Cell (*in review*)

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## PRESENTATIONS

### Selected Presentations (Invited)

1. Chambwe N. 2019. Genomic and Molecular Characterization of Disease States. *Invited talk, St Jude Children's Hospital, Memphis TN.*
2. Chambwe N. 2019. A Cloud-based Resource for Synthetic Lethal Interaction Prioritization. *Invited talk, Genomics in Action Symposium. University of Oregon, Eugene OR.*

3. Chambwe N. 2018. Pan-cancer Analysis of DNA Damage Deficiency. *Invited talk, Sydney Brenner Institute for Molecular Bioscience, University of Witwatersrand, Johannesburg, South Africa.*
4. Chambwe N. 2018. Synthetic lethal Interaction Prioritization: A Cloud-based Resource. *Invited talk, Cancer Targets Discovery and Development Network Face to Face Meeting, Bethesda, MD.*
5. Chambwe N. 2018. Becoming a Computational Biologist. *Keynote presentation at Expanding Your Horizons Conference for Girls. Bellevue College, Bellevue WA.*
6. Chambwe N. 2018. Identifying Gene Interactions in Cancer Cells to Identify New Therapeutic Targets. *Invited talk, University of Washington, Bothell WA.*

### Selected Presentations (Contributed)

1. Chambwe N, Mauldin D, Vockley J.G., Niederhuber J.E., Shmulevich I, Roach J.C. Whole-Genome Sequence Identity-by-Descent Segment Sharing in Diverse Ancestries. 2015. *Poster presentation, American Society of Human Genetics Annual Meeting, Baltimore, MD*
2. Dorff K.C., Chambwe N, Wu T.D., Robinson J.T. and Campagne F. 2011. Goby framework: native support in GSNAP, BWA and IGV 2.0. *Poster presentation, Bioinformatics Open Source Conference, Vienna, Austria*
3. Campagne F, Chambwe N, Oh J, Wu T.D., Robinson J.T., Dorff K.C. and Toth, M. 2011. Analysis of DNA methylation rates with GSNAP, Goby and IGV. *Poster presentation, High Throughput Sequencing Special Interest Group Meeting, Vienna Austria*
4. Chambwe N, Kormaksson M, De S, Michor F, Johnson N, Scott D.W., Gascoyne R.D., Melnick A, Campagne F and Shaknovich R. 2011. Epigenetic Profiling of Primary DLBCLs Reveals Novel DNA Methylation-Based Clusters and New Underlying Mechanisms of Lymphomagenesis. *Oral presentation, American Society of Hematology (ASH) Annual Meeting, San Diego, CA*
5. Chambwe N, Dorff K.C., Srdanovic M, Andrews J.D., Campagne F. 2010. Practical Approaches for RNA-Seq Data Analysis. *Poster presentation, Vincent du Vigneaud Symposium, New York NY*
6. Chambwe N, Dorff K.C., Srdanovic M, Deng X, Andrews J.D., Campagne F. 2010. The Goby framework: towards efficient next-generation sequencing data analysis. *Oral presentation, Bioinformatics Open Source Conference, Boston, MA*
7. Chambwe N, Campagne F. Commercial Platform for Dependable Predictive Model Development and Evaluation. 2009. *Poster presentation, French American Innovation Day, Boston, MA*
8. Chambwe N, Isokpehi R.D., Murray J.M., Cohly H.H.P., Varadharajan S, Rajnarayanan R.V. 2007. Comparative Sequence Analysis of Host and Parasite Aquaporins. *Poster presentation, Annual Biomedical Research Conference for Minority Students, Austin TX*
9. Chambwe N, Isokpehi R.D., Murray J.M., Cohly H.H.P., Varadharajan S, Rajnarayanan R.V. 2007. Information Superstructure for Comparative Analyses of Host and Parasite Aquaporins. *Oral presentation, Louis Stokes Mississippi Alliance for Minority Participation Program (LSMAMP) National Research Conference, Jackson, MS*
10. Chambwe N, Isokpehi R.D., Murray J.M., Cohly H.H.P., Varadharajan S, Rajnarayanan R.V. 2007. Building a Corpus of Literature Articles on *Giardia lamblia*. *Poster presentation, Biology, Nanotechnology, Toxicology and Applications Research Meeting, Little Rock, AR*
11. Chambwe N, Isokpehi R.D., Murray J.M., Cohly H.H.P., Varadharajan S, Rajnarayanan R.V. 2007. Information Superstructure for Comparative Analyses of Host and Parasite Aquaporins. *Poster presentation, International Symposium on Recent Advances in Environmental Health Research, Jackson MS.*
12. Chambwe N, Jeffries C.D., Cohly H.H.P., Rajnarayanan R.V., Isokpehi R.D. 2007. Building a Corpus of Literature Articles on *Giardia lamblia*. *Poster presentation, International Symposium on Recent Advances in Environmental Health Research, Jackson MS.*
13. Chambwe N, Isokpehi R.D., Murray J.M., Cohly H.H.P., Varadharajan S, Rajnarayanan R.V. 2007. Comparative Sequence Analysis of Host and Parasite Aquaporins. *Poster presentation, Mississippi Computational Biology Consortium (MCBC) Research Workshop, Jackson MS*

### AWARDS

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| 2019 | Institute for Systems Biology Innovator Award 2019. "Central Dogma–The development of an interactive gaming pipeline that teaches critical STEM concepts directly to the classroom" (Co-investigator; \$93,3764) |
| 2019 | Christine Schaeffer Award for Exemplary Service to STEM Education  |
| 2017 | Judge Travel Award for the Annual Biomedical Research Conference for Minority Students   |
| 2011 | Abstract Achievement Award for the American Society for Hematology Annual Meeting  |
| 2008 | Jackson State University Women's Basketball Take Charge Award  |
| 2008 | NCAA South West Athletic Conference (SWAC) Woman of the Year Award   |
| 2008 | NCAA South West Athletic Conference (SWAC) All Academic First Team   |
| 2008 | Chi Alpha Sigma National Collegiate Athletic Honor Society   |

- 2007 1<sup>st</sup> Place, Poster Award, Mississippi Computational Biology Consortium Research Workshop
- 2007 2<sup>nd</sup> Place Poster Award, Symposium on Recent Advances in Environmental Health Research
- 2007 Louis Stokes MS Alliance for Minority Participation Program Undergraduate Research Fellowship
- 2006 Mississippi Halbrook Award Recipient for Achievement by a Student Athlete
- 2005 Alpha Lambda Delta Honor Society

## TEACHING EXPERIENCE

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### Classroom Teaching

**Instructor**, Introduction to Systems Biology (Module I) Summer 2017; 2018; 2019  
 Institute for Systems Biology, Seattle WA  
 Designed and taught computational data analysis sessions on patient stratification using molecular data for students enrolled in one-week introductory systems biology course.

**Instructor**, BIOL 485: Cut and Paste: Genome Editing in the 21st Century Winter 2016  
 University of Washington, Seattle WA  
 Designed and co-taught a seminar for advanced biology majors with A Gupta and S Zimmerman as part of the Science Teaching Experience for Postdocs (STEP) Program. Mentor: RM Price.

**Guest Lecturer**, Bioinformatics II (BIO3352), Spring 2014  
 City University of New York (CUNY) City Tech, Brooklyn, NY  
 Presented a special topics lecture on state-of-the-art analysis methods for high-throughput DNA methylation datasets and their applications

**Instructor**, Introduction to Bioinformatics Workshop Summer 2008  
 Jackson State University, Jackson, MS  
 Designed a high-school level curriculum and developed workshop resources, lectured and supervised computational labs. Supervised five high school student's independent research projects that culminated in presentations at a mini-symposium at the end of the workshop.

### Teaching Assistantships

**Facilitator** Summer Institute on Scientific Teaching (NW Region) Summer 2018  
 Served as a group facilitator for a training program for transforming learning and teaching through evidence-based practices to improve STEM education

**Facilitator**, Entering Research Undergraduate Research Course Summer 2017; 2018  
 Institute for Systems Biology, Seattle, WA  
 Led multiple sessions as part of a course designed to teach undergraduates about the nature of research, develop research skills and undertake career planning.

**Teaching Assistant**, Introduction to Systems Biology Summer 2015  
 Institute for Systems Biology, Seattle, WA  
 Assisted in running computational application labs for students enrolled in one-week introductory systems biology course.

### Research Mentoring

#### Students mentored in independent research

Carolina Heimann. Mining drug effects in cell lines in the context of immune response January – June 2019  
 Loeb A. Pan-Cancer Analysis of DNA Damage Response mRNA Expression Summer 2016  
 Adam S. Comparative Analysis of Gene Expression in Acute Chronic Rejection Summer 2011

### Professional Development for Teaching

**HHMI Scientific Teaching Fellow**, Summer Institute on Scientific Teaching (NW Region) Summer 2017  
 Training program for transforming learning and teaching through evidence-based practices to improve education

**Fellow**, Science Teaching Experience for Postdocs (STEP), Univ of WA, Seattle, WA 2015-2016  
 Mentored teaching apprenticeship to learn how to teach scientifically with effective student-centered pedagogies. Co-designed and co-taught a 10-week special topics seminar on genome editing for junior and senior biology majors.

**STEM Fellow**, Washington Alliance for Better Schools 2015-2016

Collaborated with K-12 teachers and STEM industry professionals to enhance and revise K-12 curriculum in Washington to meet the Next Generation Science Standards (NGSS).

**Participant**, Using Case Studies in Teaching Workshop, FHCRC, Seattle, WA Summer 2016  
Three-day workshop to learn how to apply case-based teaching in the classroom and to develop material for a course

## **SERVICE**

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### **Professional**

**Reviewer**, PLoS Computational Biology; Systems Program Committee, European Conference on Computational Biology (ECCB) (2016-2018)

**Committee Member**, Institute for Systems Biology Postdoctoral Advisory board (2014-2016); Tri-Institutional Training Program in Computational Biology and Medicine Recruitment Committee (2009-2014); Graduate Student Executive Council Dean Search Committee (Spring 2013); Vincent du Vigneaud Memorial Symposium Planning Committee (2012); Tri-Institutional Training Programs Student Symposium Organizing Committee (2010, 2011)

### **Professional Memberships**

International Society for Computational Biology (ISCB), American Society of Human Genetics (ASHG), American Society for Cell Biology (ASCB), American Society for Hematology (ASH), New York Academy of Sciences (NYAS), National Research Mentoring Network (NRMN)

### **Education/Science Outreach**

**Panelist**, North Seattle Community College Diversity in Stem (May 2017), MESA Awards Dinner, Highline Community College (May 2017)

**Facilitator**, STEM Jobs ISB Discussion Group (July 2015); Workshop on STEM Careers ISB summer interns (July 2015)

**Mentoring**, Lisa Nguyen (2018 Washington State Opportunity Scholarship Skills that Shine Mentoring Program)

**Judging**, Annual Biomedical Research Conference for Minority Students Undergraduate Posters (2017; 2018), Northwest Association for Biomedical Research Student BioExpo (Spring 2017, 2018); Technology Access Foundation Science Expo Robotics and App Design Competition (June 2015);

**STEM Tour Guide**, Meet and greet with college and high students, professors and principals on ISB Visits from South Seattle Community College, Seattle Central College, PNW Louis Stokes Alliance for Minority Participation, Pacific Lutheran University, Port Angeles High School, Bellingham School District, Washington State Governor's STEM Education Alliance, Lake Stevens School District, Washington State Community College Faculty, Access Program - University of Puget Sound (2014-present)

**Reading Tutor**, Mississippi Learning Institute, Blackburn Middle School, Jackson, MS (Summer 2005)