

Exhibit K

Declaration of Jacob E. Lemieux, MD, PhD

I, Jacob E. Lemieux, declare as follows:

1. I am an infectious disease researcher and clinician at Massachusetts General Hospital, where I specialize in the genetics and pathophysiology of respiratory viruses and other infectious diseases. I am also a faculty member at Harvard Medical School. Since the COVID-19 pandemic began, I have been actively engaged in researching the transmission of COVID-19 and caring for patients with COVID-19.

2. The opinions expressed herein are based on my medical training, my experience as a physician and researcher, the academic literature on COVID-19, and my review of safety guidelines issued by a variety of government and academic institutions.

Professional Background

3. I am licensed to practice medicine in the State of Massachusetts. I hold a Bachelor of Science from Stanford University; a PhD in molecular parasitology from Oxford University, where I was a Rhodes Scholar and member of the NIH-Oxford Graduate Partnership Program; and an M.D. from Harvard Medical School. I completed my Infectious Diseases Fellowship and Internal Medicine Residency at Massachusetts General Hospital. Attached as Exhibit A is a current, accurate copy of my curriculum vitae.

4. I currently work as an infectious diseases staff physician at Massachusetts General Hospital. I am also a researcher in the Sabeti Lab at Harvard Medical School.

5. My research and clinical practice focus on the genetics, causes, and consequences of infectious diseases, particularly respiratory viruses, red blood cell parasites, and tick-borne diseases.

6. I have been involved in the infection control and clinical care of patients with COVID-19 since March 2020.

7. I am the lead author of a study analyzing the introduction, spread, and epidemiology of COVID-19 in the Boston area.

COVID-19

8. COVID-19 is a respiratory disease caused by the virus SARS-CoV-2.

9. SARS-Co-V-2 has caused a pandemic of COVID-19, with more than 13.7 million confirmed cases and 269,000 deaths in the United States.

10. COVID-19 is highly contagious. The virus is transmitted through large and small respiratory particles, often called droplets and aerosols. Respiratory droplets can be emitted from the oropharynx and nasopharynx. Droplets travel in a projectile fashion from one person's mouth or nose into another person's mouth, nose, eyes, or ears. Aerosols can remain in the air for minutes or hours and can be inhaled by others. Both types of respiratory droplets can be released into the air when an infected person breathes, talks, or otherwise exhales. The relative contribution of large and small droplets to COVID-19 transmission is not clearly understood, but both types of droplets are felt to be important.

11. Because COVID-19 is transmitted through respiratory particles, transmission is most likely in crowded indoor spaces. Accordingly, available guidance from the Infectious Diseases Society of America and the Centers for Disease Control recommends wearing face coverings and physically distancing from other people to reduce the likelihood of transmission.

12. The incubation period for COVID-19—meaning the time from exposure to onset of the disease—can range from 0 to 14 days. The median period is 4-5 days.

13. People infected with COVID-19 can be contagious and spread the virus to others before they have any symptoms. This phenomenon is called pre-symptomatic spread. Some people with COVID-19 never have symptoms, but can still spread the virus to others. This phenomenon is called asymptomatic spread. These phenomena are likely a major reason for COVID-19's rapid spread, because people can transmit the virus for days before they get symptoms and know to isolate.

14. Because of pre-symptomatic and asymptomatic spread, temperature checks will not identify all people with COVID-19 who are capable of infecting others. Likewise, it is not possible to conduct contact tracing or identify emerging clusters without COVID-19 testing. Testing is widely considered an important part of any public health strategy for preventing the rapid spread of the virus.

15. People infected with COVID-19 are also contagious while they have symptoms. It is therefore universally recognized that people sick with COVID-19 should not continue going to work.

16. The signs and symptoms of COVID-19 vary from person to person, but most people with COVID-19 will experience one or more of the following: fever or chills, cough, shortness of breath or difficulty breathing, fatigue, muscle or body aches, headache, new loss of taste or smell, sore throat, congestion or runny nose, nausea or vomiting, and diarrhea.


17. COVID-19 can be lethal. Although the majority of people with COVID-19 experience mild to moderate symptoms, a sizable portion experience severe or critical forms of the disease, resulting in hospitalizations and death.

18. Some patients with COVID-19 experience persistent symptoms after the acute episode. These individuals are sometimes referred to as "long-haulers."

19. Limited data exist about reinfection with SARS-CoV-2 after recovery from COVID-19, but published case reports indicate that reinfection is possible.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Date: 12/2/2020



Jacob E. Lemieux

**The Faculty of Medicine of Harvard University
Curriculum Vitae**

Date Prepared: October 30, 2020
Name: Jacob Lemieux
Office Address: 55 Fruit Street
Boston, MA 02114
Home Address: 27 Harvard Ave, Unit 3
Brookline, MA 02446
Work Phone: 617-726-3906
Work Email: jelemieux@partners.org
Place of Birth: New York, NY

Education:

09/2004- 06/2007	B.S. (Honors and Distinction)	Biology	Stanford University, Stanford, CA
09/2007- 07/2011	D.Phil.	Clinical Medicine (Professor Chris Newbold)	Oxford University, Oxford, United Kingdom
08/2011- 05/2015	M.D. (Magna Cum Laude)	Medicine	Harvard Medical School, Boston, MA

Postdoctoral Training:

07/18-	Postdoctoral researcher	Infectious Diseases (Professor Pardis Sabeti and Professor John Leong)	Broad Institute, Cambridge, MA and Tufts University, Boston, MA
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Faculty Academic Appointments:

07/20	Instructor of Medicine	Department of Medicine	Harvard Medical School
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Appointments at Hospitals/Affiliated Institutions:

06/15-07/17	Resident	Internal Medicine	Massachusetts General Hospital, Boston MA
07/17-	Fellow	Internal Medicine (Infectious Diseases)	Partners Healthcare, Boston, MA
07/20	Assistant in Medicine	Internal Medicine (Infectious Diseases)	Massachusetts General Hospital, Boston, MA

Professional Societies:

2014- Infectious Diseases Society of America
(IDSA)

Editorial Activities:

- Ad hoc Reviewer

Ticks and Tick Borne Diseases
Communications Biology
PLOS ONE

Honors and Prizes:

2006	Barry Goldwater Scholarship	United States Congress	Merit-based scholarship in the natural sciences awarded to undergraduate sophomores and juniors nationwide.
2007	Phi Beta Kappa	Stanford University	
2007	Walk the Talk Award for Service	Haas Center for Public Service at Stanford University	Award recognizing contributions to public service at Stanford University
2007	Rhodes Scholarship	The Rhodes Trust	Academic scholarship for graduate study at Oxford University
2011-2015	NIH Medical Scientist Training Program	National Institutes of Health (NIH)	Tuition, fees, and stipend for medical education and scientist training as a part of the NIH Oxford/Cambridge Scholars Program and Harvard Medical School.
2013	Merit Award	National Institute of Allergy and Infectious Diseases (NIAID)	For contributions to the discovery of GATA2 immunodeficiency
2014	Medical Scholars Award	Infectious Diseases Society of America (IDSA)	To support mentored research by medical students interested in infectious diseases (Mentor: Professor Eric Rosenberg, MGH)

2015	Kass Award	Infectious Diseases Society of America (IDSA)	Travel award for accepted abstract by a trainee to annual IDSA meeting.
2018	Fellowship Award for Teaching	Brigham and Women's Hospital	Awarded by Brigham and Women's Hospital residents for clinical teaching by fellows.
2019	Kass Award for Clinical Excellence in Infectious Disease	Massachusetts General Hospital	Awarded by Massachusetts General Hospital ID Division for clinical excellence during fellowship
2020	Maxwell Finald Award	Massachusetts General Hospital	Awarded by Massachusetts General Hospital ID Division for research excellence during fellowship

Report of Funded and Unfunded Projects

Current

2017-2021	Recruitment of Subjects with Tick-Borne Disease in Collaboration the Lyme disease Biobank Lyme disease biobank; Contract, 2017D003327 Investigator (\$360,000) Identify and enroll subjects with Lyme disease and other tick-borne diseases into a repository for basic, translational, and clinical research.
2019	Point of Care Assay Development for Detection of Sexually Transmitted Infections and Antimicrobial Resistance Medicine Innovation Program Investigator (\$50,000) Development and testing of point-of-care CRISPR-based assays for sexually transmitted disease and antimicrobial resistance markers.
2019-2021	Microbial Determinants of Clinical Heterogeneity Doris Duke Charitable Foundation; Physician Scientist Fellowship, 2019A008416 Principal Investigator (\$200,000) Project to identify microbial genes associated with distinct clinical manifestations of Lyme disease and characterize their gene products in vitro.
2020	BroadIgnite Award Broad Institute Principal Investigator (\$40,000) This award supports SARS-CoV-2 case clusters in near real-time.

- 2020-2022 Ultra-Sensitive Diagnosis of Tick-Borne Pathogens Using Target Capture and Next-Generation Sequencing
Bay Area Lyme Foundation; Emerging Leader Award (\$100,000)
This project uses next-generation sequencing and target capture to diagnose tick-borne pathogens.
- 2020-2022 Real Time SARS-COV-2 Genomic Surveillance to Support Clinical and Public Health Response and Monitor Functionally Relevant Mutations
CDC; BAA 75D30120C09605
Co-Principal Investigator (\$3,000,000 (MGH sub-contract is \$280,000))
This is a collaborative project between the Broad Institute, Massachusetts General Hospital and the University of Massachusetts to 1) sequence 10,000 SARS-CoV-2 genomes representing regional diversity across Massachusetts and New England, including emerging clusters and 2) identify viral variants that are associated with distinct clinical manifestations of COVID-19.
- 2020-2024 Microbial Determinants of Clinical Heterogeneity in Lyme Disease
NIH / NIAID; K99/R00 Transition to Independence Award, K99AI148604
Principal Investigator (\$600,000)
This project conducts evolutionary analysis and genomic association studies of *Borrelia* genomes from patients with distinct clinical manifestations of Lyme disease and then characterizes the phenotype-associated genes in laboratory models of Lyme disease.

Report of Local Teaching and Training

Teaching of Students in Courses:

2019-2019	Introduction To Clinical Medicine Second-year medical student	Harvard Medical School 5 hours / week
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Formal Teaching of Residents, Clinical Fellows and Research Fellows (post-docs):

2019-2019	Ambulatory Lectures on Tick-Borne Disease MGH Medicine Residents	MGH 1.5 hours / week
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Local Invited Presentations:

No presentations below were sponsored by 3rd parties/outside entities

- 2015 Infectious Mononucleosis with Delayed Serological Response in a Renal Transplant Recipient
Society for General Internal Medicine
- 2015 Genomics of Babesiosis, HST Forum Plenary Lecture
Health Sciences and Technology (HST) Forum, Harvard Medical School

- 2016 A global map of genetic diversity in Babesia microti and variants associated with clinical relapse
MGH Department of Medicine Grand Rounds / Invited Oral Presentation
- 2017 Genomics of Tick-Borne Disease
Broad Institute, SPARC Forum 2017 / Invited Oral Presentation
- 2018 Genomic Approaches to Tick Borne Disease
Broad Institute, Genomic Center for Infectious Diseases / Invited Oral Presentation
- 2019 Clinical Pathological Conference, BWH Chief Medical Resident Case Conference / Discussant
MGH Department of Medicine
- 2019 Tick-Borne Disease
MGH, Bullfinch Medical Group
- 2019 Genetic association studies of Lyme disease and babesiosis
Tufts Medical Center, Division of Infectious Diseases Research Conference / Invited Oral Presentation
- 2020 Genetic Association Studies of Lyme Disease and Babesiosis / Invited Oral Presentation
Harvard Joint Infectious Diseases Conference
- 2020 Genomic Epidemiology of SARS-CoV-2 in Massachusetts
Broad Institute, Infectious Disease and Microbiome Program Meeting
- 2020 Genomic Epidemiology of SARS-CoV-2 in Massachusetts
Massachusetts General Hospital, Covid Here and Now Treatment (CHANT) Conference

Report of Regional, National and International Invited Teaching and Presentations

No presentations below were sponsored by 3rd parties/outside entities

Regional

- 2019 Genomic Sequencing and Association Studies in Lyme disease / Time for Lyme Conference / Invited Oral Presentation
University of Connecticut

National

- 2012 Var Gene Expression and Spatial Relationships in the P. falciparum Nucleus / Invited Oral Presentation (selected abstract)
Molecular Parasitology Meeting, Woods Hole, MA

- 2015 Whole Genome Sequencing of Babesia microti from Patients Reveals Recent Origin, Extensive Population Structure, and Recent Expansion of Zoonotic Strains / ID Week / Oral Abstract (Selected abstract, recognized with IDSA Kass award)
San Diego
- 2016 A global map of genetic diversity in Babesia microti and variants associated with clinical relapse / Invited Oral Presentation
MGH Conference on Lyme Disease and Tick-Borne Illnesses
- 2019 Microbial determinants of distinct clinical manifestations of Lyme disease / Invited Oral Presentation
New York, Global Lyme Alliance

International

- 2010 Cell-cycle Progression, Lineage Commitment and Transcriptional Control in Plasmodium falciparum / Invited Oral Presentation
British Society for Parasitology

Report of Clinical Activities and Innovations

Current Licensure and Certification:

- 2019 American Board of Internal Medicine (ABIM)

Report of Teaching and Education Innovations

Report of Technological and Other Scientific Innovations

- Sherlock Assays for Tick-Borne Disease (2019) U.S. Provisional Patent Application No. 62/818,739
Inventors: Pardis Sabeti, Jacob Lemieux, Eric Rosenberg, Gordon Adams
Title: SHERLOCK ASSAYS FOR TICK-BORNE DISEASES
Broad Ref: BI-10509
Harvard Ref: HU 7946
MGH Ref: 25589.01
JMIN Ref: BROD-4100P
I developed multiplexed, point-of-care assays for tick-borne disease using SHERLOCK technology.

Report of Scholarship

ORCID: 0000-0002-2758-4005

Peer-Reviewed Scholarship in print or other media:

Research Investigations

1. Weisberg SP, Hunter D, Huber R, **Lemieux J**, Slaymaker S, Vaddi K, Charo I, Leibel RL, and Ferrante AW Jr. CCR2 modulates inflammatory and metabolic effects of high-fat feeding. *J Clin Invest*. 2006 Jan;116(1):115-24. PMID: 16341265.
2. Ablamunits V, Weisberg SP, **Lemieux JE**, Combs TP, and Klebanov S. Reduced adiposity in ob/ob mice following total body irradiation and bone marrow transplantation. *Obesity (Silver Spring)*. 2007 Jun;15(6):1419-29. PMID: 17557979.
3. **Lemieux JE***, Gomez-Escobar N*, Feller A*, Carret C, Amambua-Ngwa A, Pinches R, Day F, Kyes SA, Conway DJ, Holmes CC, and Newbold CI. Statistical estimation of cell-cycle progression and lineage commitment in *Plasmodium falciparum* reveals a homogeneous pattern of transcription in ex vivo culture. *Proc Natl Acad Sci U S A*. 2009 May 5;106(18):7559-64. PMID: 19376968.
4. **Lemieux JE***, Feller A*, Holmes CC, Newbold CI, "Reply to Wirth et al.: In Vivo profiles show continuous variation between 2 cellular populations", *Proceedings of the National Academy of Sciences* July 7 2009 vol. 106 no. 27 E71-E72
5. López-Barragán MJ, Quiñones M, Cui K, **Lemieux J**, Zhao K, and Su XZ. Effect of PCR extension temperature on high-throughput sequencing. *Mol Biochem Parasitol*. 2011 Mar;176(1):64-7. PMID: 21112355.
6. Hsu AP, Sampaio EP, Khan J, Calvo KR, **Lemieux JE**, Patel SY, Frucht DM, Vinh DC, Auth RD, Freeman AF, Olivier KN, Uzel G, Zerbe CS, Spalding C, Pittaluga S, Raffeld M, Kuhns DB, Ding L, Paulson ML, Marciano BE, Gea-Banacloche JC, Orange JS, Cuellar-Rodriguez J, Hickstein DD, and Holland SM. Mutations in GATA2 are associated with the autosomal dominant and sporadic monocytopenia and mycobacterial infection (MonoMAC) syndrome. *Blood*. 2011 Sep 8;118(10):2653-5. PMID: 21670465.
7. López-Barragán MJ, **Lemieux J**, Quiñones M, Williamson KC, Molina-Cruz A, Cui K, Barillas-Mury C, Zhao K, and Su XZ. Directional gene expression and antisense transcripts in sexual and asexual stages of *Plasmodium falciparum*. *BMC Genomics*. 2011 Nov 30;12:587. PMID: 22129310.
8. Mwai L, Diriye A, Masseno V, Muriithi S, Feltwell T, Musyoki J, **Lemieux J**, Feller A, Mair GR, Marsh K, Newbold C, Nzila A, and Carret CK. Genome wide adaptations of *Plasmodium falciparum* in response to lumefantrine selective drug pressure. *PLoS One*. 2012;7(2):e31623. PMID: 22384044.
9. Hsu AP, Johnson KD, Falcone EL, Sanalkumar R, Sanchez L, Hickstein DD, Cuellar-Rodriguez J, **Lemieux JE**, Zerbe CS, Bresnick EH, and Holland SM. GATA2 haploinsufficiency caused by mutations in a conserved intronic element leads to MonoMAC syndrome. *Blood*. 2013 May 9;121(19):3830-7, S1-7. PMID: 23502222.
10. **Lemieux JE**, Kyes SA, Otto TD, Feller AI, Eastman RT, Pinches RA, Berriman M, Su XZ, and Newbold CI. Genome-wide profiling of chromosome interactions in *Plasmodium*

falciparum characterizes nuclear architecture and reconfigurations associated with antigenic variation. *Mol Microbiol.* 2013 Nov;90(3):519-37. PMID: 23980881.

11. **Lemieux JE**, Tran AD, Freimark L, Schaffner SF, Goethert H, Andersen KG, Bazner S, Li A, McGrath G, Sloan L, Vannier E, Milner D, Pritt B, Rosenberg E, Telford S 3rd, Bailey JA, and Sabeti PC. A global map of genetic diversity in *Babesia microti* reveals strong population structure and identifies variants associated with clinical relapse. *Nat Microbiol.* 2016 Jun 13;1(7):16079. PMID: 27572973.
12. Piantadosi A, Kanjilal S, Ganesh V, Khanna A, Hyle EP, Rosand J, Bold T, Metsky HC, **Lemieux J**, Leone MJ, Freimark L, Matranga CB, Adams G, McGrath G, Zamirpour S, Telford S 3rd, Rosenberg E, Cho T, Frosch MP, Goldberg MB, Mukerji SS, and Sabeti PC. Rapid Detection of Powassan Virus in a Patient With Encephalitis by Metagenomic Sequencing. *Clin Infect Dis.* 2018 Feb 10;66(5):789-792. PMID: 29020227.
13. Baniecki ML, Moon J, Sani K, **Lemieux JE**, Schaffner SF, and Sabeti PC. Development of a SNP barcode to genotype *Babesia microti* infections. *PLoS Negl Trop Dis.* 2019 Mar;13(3):e0007194. PMID: 30908478.
14. Arizti-Sanz J, Freije CA, Stanton AC, Boehm CK, Petros BA, Siddiqui S, Shaw BM, Adams G, Kosoko-Thoroddsen TF, Kemball ME, Gross R, Wronka L, Caviness K, Hensley LE, Bergman NH, MacInnis BL, **Lemieux JE**, Sabeti PC, and Myhrvold C. Integrated sample inactivation, amplification, and Cas13-based detection of SARS-CoV-2. *bioRxiv.* 2020 May 28;. PMID: 32511415. [Accepted at Nature Communications]
15. Branda JA, **Lemieux JE**, Blair L, Ahmed AA, Hong DK, Bercovici S, Blauwkamp TA, Hollemon D, Ho C, Strle K, Damle NS, Lepore TJ, and Pollock NR. Detection of *Borrelia burgdorferi* Cell-free DNA in Human Plasma Samples for Improved Diagnosis of Early Lyme Borreliosis. *Clin Infect Dis.* 2020 Jun 25;. PMID: 32584965.
16. Conklin J, Frosch MP, Mukerji S, Rapalino O, Maher M, Schaefer PW, Lev MH, Gonzalez RG, Das S, Champion SN, Magdamo C, Sen P, Harrold GK, Alabsi H, Normandin E, Shaw B, **Lemieux J**, Sabeti P, Branda JA, Brown EN, Westover MB, Huang SY, and Edlow BL. Cerebral Microvascular Injury in Severe COVID-19. *medRxiv.* 2020 Jul 24;. PMID: 32743599.
17. Yurkovetskiy L, Pascal KE, Tompkins-Tinch C, Nyalile T, Wang Y, Baum A, Diehl WE, Dauphin A, Carbone C, Veinotte K, Egri SB, Schaffner SF, **Lemieux JE**, Munro J, Sabeti PC, Kyratsous C, Shen K, and Luban J. SARS-CoV-2 Spike protein variant D614G increases infectivity and retains sensitivity to antibodies that target the receptor binding domain. *Cell.* 2020 Sep 15 PMID: 32991842
18. **Lemieux J***, Siddle KJ*, Shaw BM, Loreth C, Schaffner S, Gladden-Young A, Adams G, Fink T, Tomkins-Tinch CH, Krasilnikova LA, Deruff KC, Rudy M, Bauer MR, Lagerborg KA, Normandin E, Chapman SB, Reilly SK, Anahtar MN, Lin AE, Carter A, Myhrvold C, Kemball M, Chaluvadi S, Cusick C, Flowers K, Neumann A, Cerrato F, Farhat M, Slater D, Harris JB, Branda J, Hooper D, Gaeta JM, Baggett TP, O'Connell J, Gnirke A, Lieberman

TD, Philippakis A, Burns M, Brown C, Luban J, Ryan ET, Turbett SE, LaRocque RC, Hanage WP, Gallagher G, Madoff LC, Smole S, Pierce VM, Rosenberg ES, Sabeti P, Park DJ, and MacInnis BL. Phylogenetic analysis of SARS-CoV-2 in the Boston area highlights the role of recurrent importation and superspreading events. medRxiv. 2020 Aug 25;. PMID: 32869040.

19. Normandin E, Solomon IH, Zamirpour S, **Lemieux J**, Freije CA, Mukerji SS, Tomkins-Tinch C, Park D, Sabeti PC, and Piantadosi A. Powassan Virus Neuropathology and Genomic Diversity in Patients With Fatal Encephalitis. *Open Forum Infect Dis.* 2020 Oct;7(10):ofaa392. PMID: 33094116.
20. Anahtar MN, Shaw B, Slater D, Byrne EH, Botti-Lodovico Y, Adams G, Schaffner SF, Eversley JS, McGrath G, Gogakos T, Lennerz J, Marble HD, Ritterhouse LL, Batten J, Georgantas NZ, Pellerin R, Signorelli S, Thierauf J, Kemball M, Happi C, Grant DS, Ndiaye D, Siddle KJ, Mehta SB, Harris JB, Ryan ET, Pierce VM, LaRocque RC, **Lemieux J**, Sabeti P, Rosenberg E, Branda J, and Turbett SE. Development of a qualitative real-time RT-PCR assay for the detection of SARS-CoV-2: A guide and case study in setting up an emergency-use, laboratory-developed molecular assay. medRxiv. 2020 Sep 1;. PMID: 32909014.

Non-peer reviewed scholarship in print or other media: Reviews, chapters, monographs and editorials

1. "Prosthetic Valves, Infective Endocarditis and Device Infections" in MGH Cardiology Board Review, Editors Gaggin H, Januzzi J
2. **Lemieux JE**, Sobrin L, Barshak, MB "Ophthalmic Infections in Transplant", Book Chapter in "Emerging Transplant Infections", Editors: Morris MI, Kotton CN, and Wolfe CI
3. Marques A, **Lemieux JE**, Hu L, "Clinical Controversis in Lyme disease", in Samuels, D.S. and Radolf, J.D., eds. (2010) *Borrelia: Molecular Biology, Host Interaction and Pathogenesis*.
4. Radolf, JD, Strle F, **Lemieux J**, Strle K, "Lyme Disease in Humans" in Samuels, D.S. and Radolf, J.D., eds. (2010) *Borrelia: Molecular Biology, Host Interaction and Pathogenesis*.

*equal contribution

Narrative Report

I am a physician-scientist interested in infectious diseases, microbial genomics, and microbial pathogenesis. I completed my fellowship in Infectious Disease at Massachusetts General Hospital in 2020 and am a postdoctoral researcher at the Broad Institute in the laboratory of Professor Pardis Sabeti. In my current role, I am supported by a K99/R00 transition to independence award.

My research investigates the microbial genetic basis of clinical heterogeneity in red cell parasites

(malaria and babesiosis), tick-borne disease, and COVID-19. In my post-doctoral work, I conducted the first-ever analysis of global genetic diversity of *Babesia microti* and identified genetic variants associated with relapsing babesiosis; led one of the largest genomic studies of SARS-CoV-2 genomic epidemiology to date, with over 800 viral genome sequences; and am conducting microbial genetic association studies of Lyme disease and functional characterization of candidate loci.

In previous work, as a graduate student, I studied antigenic variation and statistical patterns of gene expression in *Plasmodium falciparum* under the supervision of Professor Chris Newbold at Oxford University and Dr. Xin-zhuan Su at the National Institutes of Health. I developed new methods for studying chromatin conformation in malaria and co-developed statistical approaches to infer temporal development and lineage commitment of malaria parasites given gene expression data. This work provided fundamental insight into the statistical patterns of gene expression as well as the spatial regulation of mutually exclusive gene expression in *P. falciparum*.

I have a deep interest in all aspects of microbial pathogenesis, host-pathogen interactions, and development of new diagnostics. I devote the vast majority of my time (at least 80%) to basic research goals while maintaining an active clinic in infectious disease throughout my career (less than 20% time). I am board-certified in internal medicine (2019) and am board-eligible in infectious disease (board exam scheduled 11/2020). I remain clinically active as an infectious disease physician for inpatients and outpatients. My goal is to improve the care of patients through basic and translational research into the pathogenesis of tick-borne disease, respiratory viruses, and other infectious diseases.