

Cindy M. Liu, M.D., M.P.H., Ph.D.

HOME

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OFFICE

Department of Environmental and Occupational Health
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EDUCATION

- 2015 Johns Hopkins School of Medicine, Baltimore, MD
Residency in Clinical Pathology
- 2013 Northern Arizona University, Department of Biology, Flagstaff, AZ
Doctor of Philosophy in Biology (Advisor: Paul S. Keim, Ph.D.).
- 2007 New York University, School of Medicine, New York, NY
Doctor of Medicine
- 2006 The Johns Hopkins University, Bloomberg School of Public Health, Baltimore, MD
Masters in Public Health in Epidemiology/Biostatistics Methods in Public Health and Clinical Research. Note: this degree was earned between 3rd and 4th years of medical school.
- 2002 The Johns Hopkins University, School of Arts and Sciences, Baltimore, MD
Bachelor of Arts in International Studies with International Health Concentration

PROFESSIONAL EXPERIENCE

- 07/15-current George Washington University, Department of Environmental and Occupational Health, Washington, DC
Assistant Research Professor
- 07/15-current George Washington University, Antibiotic Resistance Action Center, Washington, DC
Chief Medical Officer
- 07/15-current Johns Hopkins University, Department of Medicine, Division of Infectious Diseases, Baltimore, MD
Adjunct Assistant Professor
- 07/13-06/15 Johns Hopkins University, Department of Pathology, Baltimore, MD
Resident
- 07/12-06/13 Johns Hopkins University, Department of Pathology, Baltimore, MD
Intern
- 02/09-05/12 Northern Arizona University, Center for Microbial Genetics and Genomics, Flagstaff, AZ
Research Associate (Advisor: Paul S. Keim, Ph.D.)
- 02/09-05/12 Translational Genomics Research Institute (TGen), Flagstaff, AZ
Adjunct Associate Investigator

06/07-02/09 Translational Genomics Research Institute (TGen), Division of Pathogen Genomics, Flagstaff, AZ
Post-Doctoral Fellowship (Advisor: Paul S. Keim, Ph.D.)

MEDICAL LICENSURE

Maryland License No. D0078893

BOARD CERTIFICATION

Clinical Pathology, American Board of Pathology 07/28/15-07/27/25

FUNDING

Current	NIH/NIAID R01 AI28779A	02/01/17-01/31/21
	<i>Penile microbiome, inflammation and HIV susceptibility during sexual debut and maturation among male adolescents</i>	
	<ul style="list-style-type: none"> • Co-Investigator (Impact Score: 18) 	
Current	Bill & Melinda Gates Foundation	01/01/17-12/31/18
	<i>Evaluation of the ShangRing vs. Mogen Clamp for Early Infant Male Circumcision in sub-Saharan Africa</i>	
	<ul style="list-style-type: none"> • Co-Investigator 	
Current	National Health and Medical Research Council, Australia	01/01/17-12/31/19
	<i>Resolving Human Immunodeficiency Virus (HIV) transmission</i>	
	<ul style="list-style-type: none"> • Co-Investigator 	
Current	Merck Global Population Health Division	01/01/17-12/31/17
	<i>Promoting Better Antibiotic Stewardship in Urgent Care Medicine</i>	
	<ul style="list-style-type: none"> • Co-Investigator 	
Current	NIH/NIAID R01 AI123002-01	07/01/16-06/30/21
	<i>The role of penile bacteria and inflammation in HIV susceptibility: Rakai, Uganda</i>	
	<ul style="list-style-type: none"> • Co-Investigator 	
Current	NIH/NIAID R01 AI125562-01	07/01/16-06/30/21
	<i>The dynamics of nasal bacterial ecology and <i>S. aureus</i> antagonism</i>	
	<ul style="list-style-type: none"> • Co-Investigator 	
Current	NIH/NIAID/NICHD R21 AI123840-01	04/01/16-03/31/18
	<i>Modeling <i>Staphylococcus aureus</i> antagonism in pediatric nasal bacterial communities</i>	
	<ul style="list-style-type: none"> • Principal Investigator 	
Current	National Science Foundation Innovative Corps Teams Program	01/01/16-03/01/17
	<i>Improving care, decreasing cost, and preserving antibiotics through rapid diagnostics</i>	
	<ul style="list-style-type: none"> • Co-PI 	
Current	Canadian Institute of Health Research	10/01/15-09/30/20
	<i>Understanding mucosal protection against HIV: delineating interactions between the immune system, microbiome and mucus</i>	

	<ul style="list-style-type: none"> • Co-Investigator 	
Completed	Canadian Institute of Health Research MOP-115020 <i>Defining the clinical and immune causes of disproportionately high HIV levels in semen</i>	10/01/11-09/30/15
	<ul style="list-style-type: none"> • Co-Investigator 	
Completed	NIH/NIAID/NIDCR R15 DE021194-01 <i>Microbial ecology in the Chronic Rhinosinusitis Microbiome</i>	09/01/10-08/31/14
	<ul style="list-style-type: none"> • Principle Investigator (transferred to Jeff Foster, Ph.D. prior to residency) 	
Completed	NIH/NIAID R01 AI087409-01A1 <i>Genital Anaerobes, Inflammation and HIV Risk; Rakai</i>	07/01/10-06/30/14
	<ul style="list-style-type: none"> • Collaborator 	
Completed	TGen 2008 Sylvia Chase Post-Doctoral Fellowship Grant <i>Microbiome of the human paranasal sinus: a pilot study on the microbial communities in the healthy and Chronic Rhinosinusitis maxillary sinus.</i>	06/1/08-05/31/09
	<ul style="list-style-type: none"> • Principle Investigator 	

DISTINCTIONS

Honors

1999-2002	<i>Dean's List (4 semesters)</i>
2001	<i>AEA Pre-medical Honor Society</i>
2001	<i>International Studies Honor Society</i>
2002	<i>Graduated with Departmental Honors in International Studies with honors thesis, "Schooling for rural Chinese women and girls as a viable solution for China's population issues and gender inequalities"</i>
2002	<i>Graduated with General Honors</i>

Awards

2001	<i>The Johns Hopkins Goodman Award</i>
2010	<i>Philanthropic Education Organization Scholar Award</i>
2011	<i>Lindau Nobel Laureate Meeting, United States representative</i>
2013	<i>Young Investigator Award – Conference on Retroviruses and Opportunistic Infections (CROI)</i>
2016	<i>ICAAC Young Investigator Award – American Society for Microbiology</i>
2016	<i>Extramural Loan Repayment Program, Clinical Research – NIH/NIAID</i>

PUBLICATIONS BY RESEARCH AREA

Peer-reviewed Human Microbiome Manuscripts

1. Dubin MG, Liu C, Lin SY, Senior BA. American rhinologic society member survey on "maximal medical therapy" for chronic rhinosinusitis. *Am J Rhinol.* 2007;21(4): 483-488.

2. Price LB, **Liu CM**, Melendez JH, Frankel YM, Engelthaler D, Aziz M, Bowers J, Rattray R, Ravel J, Kingsley C, Keim PS, Lazarus GS, Zenilman JM. Community analysis of chronic wound bacteria using 16S rRNA gene-based pyrosequencing: impact of diabetes and antibiotics on chronic wound microbiota. *PLoS One*. 2009 Jul 31;4(7):e6462.
3. Price LB*, **Liu CM***, Johnson KE, Aziz M, Lau MK, Bowers J, Ravel J, Keim PS, Serwadda D, Wawer MJ, Gray RH. The effects of circumcision on the penis microbiome. *PLoS One*. 2010 Jan 6;5(1):e8422. Note: * denotes co-first authorship.
4. Price LB, **Liu CM**, Frankel YM, Melendez JH, Aziz M, Buchhagen J, Contente-Cuomo T, Engelthaler DM, Keim PS, Ravel J, Lazarus GS, Zenilman JM. Macroscale spatial variation in chronic wound microbiota: A cross-sectional study. *Wound Repair and Regeneration*. 2011 Jan-Feb;19(1):80-8.
5. **Liu CM**, Cosetti MK, Aziz M, Buchhagen JL, Contente-Cuomo TL, Price LB, Keim PS, Lalwani AK. The Otolologic Microbiome: A study of the bacterial microbiota in a pediatric patient with chronic otitis media using 16S rRNA gene-based pyrosequencing. *Arch Otolaryngol Head Neck Surg*. 2011 Jul;137(7):664-8
6. **Liu CM**, Hungate BA, Tobian AA, Serwadda D, Ravel J, Lester R, Kigozi G, Aziz M, Galiwango RM, Nalugoda F, Contente-Cuomo TL, Wawer MJ, Keim P, Gray RH, Price LB. Male circumcision significantly reduces prevalence and load of genital anaerobic bacteria. *mBio*. 2013 Apr 16;4(2):e00076.
7. **Liu CM**, Soldanova K, Nordstrom L, Dwan MG, Moss OL, Contente-Cuomo TL, Keim P, Price LB, Lane AP. Medical therapy reduces microbiota diversity and evenness in surgically recalcitrant chronic rhinosinusitis. *Int Forum Allergy Rhinol*. 2013 Jul 10. PMID: PMC4007209.
8. Hong P, **Liu CM**, Nordstrom L, Lalwani AK. The role of the human microbiome in otolaryngology-head and neck surgery: A contemporary review. *Laryngoscope*. 2013 Nov 1.
9. **Liu CM**, Osborne BJW, Hungate BA, Shahabi K, Huibner S, Lester R, Dwan MG, Kovacs C, Contente-Cuomo TL, Benko E, Aziz M, Price LB, Kaul R. The semen microbiome and its relationship with local immunology and viral load in HIV infection. *PLoS Pathog*. 2014 Jul 24;10(7):e1004262.
10. **Liu CM**, Kohanski MA, Mendiola M, Soldanova K, Dwan MG, Lester R, Nordstorm L, Price LB, Lane AP. Impact of saline irrigation and topical corticosteroids on the post-surgical sinonasal microbiota. *Int Forum Allergy Rhinol*. 2015 Mar;5(3):185-90.
11. **Liu CM**, Hungate BA, Tobian AA, Ravel J, Prodger JL, Serwadda D, Kigozi G, Galiwango RM, Nalugoda F, Keim P, Wawer MJ, Price LB, Gray RH. Penile microbiota and female partner bacterial vaginosis in Rakai, Uganda. *mBio*. 2015 June;6(3): e00589-15.
12. **Liu CM**, Price LB, Hungate BA, Abraham A, Larsen LA, Christensen K, Stegger M, Skov R, Andersen PS. *Staphylococcus aureus* and the ecology of the nasal microbiome. *Sci Adv*. 2015 June;1(5): e1400216.
13. **Liu CM**, Tobian AA, Kigozi G, Prodger J, Serwadda D, Nalugoda F, Kighoma N, Price LB, Gray RH. The PrePex male circumcision device and genital anaerobic bacterial overgrowth in Rakai, Uganda. *J Infect Dis*. 2016 Aug 15;214(4):595-8.
14. **Liu CM**, Tobian AA, Gray RH. Ockham's Razor and the PrePex male circumcision device. *J Infect Dis*. 2016 Jul 11. pii: jiw277.
15. Prodger JL, Gray RH, Shannon B, Shahabi K, Kong X, Grabowski K, Kigozi G, Nalugoda F, Serwadda D, Wawer MJ, Reynolds SJ, **Liu CM**, Tobian AA, Kaul R. Chemokine levels in the penile coronal sulcus correlate with hiv-1 acquisition and are reduced by male circumcision in Rakai, Uganda. *PLoS Pathog*. 2016 Nov 29;12(11):e1006025.
16. **Liu CM**, Prodger JL, Tobian AAR, Abraham A, Kigozi G, Hungate BA, Aziz M, Nalugoda F, Sariya S, Serwadda D, Kaul R, Gray RH, Price LB. Penile anaerobic dysbiosis: a novel risk factor for HIV infection. *Submitted*.

17. Liu CM, Driebe EM, Schupp J, Kelley E, Nguyen JT, McSharry JJ, Weng Q, Engelthaler DM, Keim PS. Rapid quantification of single-nucleotide mutations in mixed influenza A viral populations using allele-specific mixture analysis. *J Virol Methods*. 2010 Jan;163(1):109-15.
18. Liu CM, Aziz M, Kachur S, Hsueh PR, Huang YT, Keim P, Price LB. BactQuant: an enhanced broad-coverage bacterial quantitative real-time PCR assay. *BMC Microbiol*. 2012 Apr 17;12:56. PMID: PMC3464140.
19. Foster JT, Price LB, Beckstrom-Sternberg SM, Pearson T, Brown WD, Kiesling DM, Allen CA, Liu CM, Beckstrom-Sternberg J, Roberto FF, Keim P. Genotyping of *Brucella* species using clade specific SNPs. *BMC Microbiol*. 2012 Apr 17;12:56.
20. Liu CM, Kachur S, Dwan MG, Abraham AG, Aziz M, Hsueh PR, Huang YT, Busch JD, Lamit LJ, Gehring CA, Keim P, Price LB. FungiQuant: a broad-coverage fungal quantitative real-time PCR assay. *BMC Microbiol*. 2012 Nov 8;12:25. PMID: PMC3565980.
21. Stegger M*, Liu CM*, Larsen J, Soldanova K, Azis M, Contente-Cuomo T, Petersen A, Vandendriessche S, Jiménez JN, Mammina C, van Belkum A, Salmenlinna S, Laurent F, Skov RL, Larsen AR, Andersen PS, and Lance B. Price. Rapid differentiation between livestock-associated and livestock-independent *Staphylococcus aureus* CC398 clades. *PLoS One* 2013 Nov 14;8(11): e79645. Note: * denotes co-first authorship.

Peer-reviewed Environmental Health and Food Manuscripts

22. Waters AE, Contente-Cuomo T, Buchhagen J, Liu CM, Watson L, Pearce K, Foster JT, Bowers J, Driebe EM, Engelthaler DM, Keim PS, Price LB. Multidrug-resistant *Staphylococcus aureus* in US meat and poultry. *Clin Infect Dis*. 2011 May;52(10):1227-30.
23. Davis MF, Price LB, Liu CM, Silbergeld EK. An ecological perspective on U.S. industrial poultry production: the role of artificial ecosystems on the emergence of drug-resistant bacteria from agricultural environments. *Curr Opin Microbiol*. 2011 Jun;14(3):244-50.
24. Price LB, Stegger M, Hasman H, Aziz M, Larsen J, Andersen PS, Pearson T, Waters AE, Foster JT, Schupp J, Gillette J, Driebe E, Liu CM, Springer B, Zdovc I, Battisti A, Franco A, Zmudzki J, Schwarz S, Butaye P, Jouy E, Pomba C, Porrero MC, Ruimy R, Smith TC, Robinson DA, Weese JS, Arriola CS, Yu F, Laurent F, Keim P, Skov R, Aarestrup FM. *Staphylococcus aureus* CC398: host adaptation and emergence of methicillin resistance in livestock. *mBio*. 2012 Feb 21;3(1).
25. Nordstrom L, Liu CM, Price LB. Foodborne urinary tract infections: a new paradigm for antimicrobial-resistant foodborne illness. *Front Microbiol*. 2013;4:29.
26. Wymore AS, Compson ZG, Liu CM, Price LB, Whitham TG, Keim P, Marks JC. Contrasting rRNA gene abundance patterns for aquatic fungi and bacteria in response to leaf-litter chemistry. *Freshwater Science*. Jun 2013; 32(2): 663-672.
27. Hornstra HM, Hilsabeck R, Gates LT, Olivas SM, Birdsell DN, Hall CM, German S, Cook JM, Seymour ML, Priestley R, Kondas AV, Clark Friedman CL, Price EP, Schupp J, Liu CM, Price LB, Massung RF, Kersh GJ, Keim PS. High prevalence and two dominant host-specific genotypes of *Coxiella burnetii* in U.S. milk. *BMC Microbiol*. 2014 Feb 14;41.
28. Mau RL, Liu CM, Aziz M, Schwartz E, Dijkstra P, Marks JC, Price LB, Keim PS, Hungate BA. Linking soil bacterial biodiversity and soil carbon stability. *ISME J*. 2014 Oct 28.
29. Muller E, Pinel N, Laczny C, Hoopman M, Lebrun L, Roume H, May P, Hicks N, Liu CM, Price LB, Gillette J, Guignard C, Schupp J, Nikos V, Moritz R, Baliga N, Keim P, Wilnes P. Community integrated omics links the dominance of a microbial generalist to fine-tuned resource usage. *Nat Commun*. 2014 Nov; 5: 5603.
30. Davis GS, Waits K, Nordstrom L, Weaver B, Aziz M, Gauld L, Grande H, Bigler R, Horwinski J, Porter S, Stegger M, Johnson JR, Liu CM, Price LB. Intermingled *Klebsiella pneumoniae* populations between retail meats and human urinary tract infections. *Clin Infect Dis*. 2015 Jul 22. pii: civ428

31. Hungate BA, Mau RL, Schwartz E, Caporaso JG, Dijkstra P, van Gestel N, Koch BJ, **Liu CM**, McHugh TA, Marks JC, Morrissey E, Price LB. Quantitative microbial ecology through stable isotope probing. *Appl Environ Microbiol.* 2015 Nov 1;81(21):7570-81.
32. Wymore AS, **Liu CM**, Hungate BA, Schwartz E, Price LB, Whitham, TG, Marks JC. The influence of time and plant species on the composition of decomposing bacteria in a stream ecosystem. *Microbial Ecology.* 2016 May;71(4):825-34.
33. Morrissey EM, Mau RL, Schwartz E, Caporaso JG, Dijkstra P, van Gestel N, Koch BJ, **Liu CM**, Hayer M, McHugh TA, Marks JC, Price LB, Hungate BA. Phylogenetic organization of bacterial activity. *ISME J.* 2016 Sep;10(9):2336-40.
34. Johnson TJ, Aziz M, **Liu CM**, Sokurenko E, Kisiela DI, Paul S, Andersen P, Johnson JR, Price LB Complete Genome Sequence of a CTX-M-15-Producing *Escherichia coli* Strain from the H30Rx Subclone of Sequence Type 131 from a Patient with Recurrent Urinary Tract Infections, Closely Related to a Lethal Urosepsis Isolate from the Patient's Sister. *Genome Announc.* 2016 May 12;4(3). pii: e00334-16.
35. Price LB, Hungate BA, Koch BJ, Davis GS, **Liu CM**. Colonizing opportunistic pathogens (COPs): the beasts in all of us. Under major revision at *PLoS Pathog.*
36. **Liu CM***, Stegger M*, Aziz M, Johnson TJ, Waits K, Nordstrom L, Gauld L, Weaver B, Rolland D, Statham S, Horwinski J, Sariya S, Davis GS, Sokurenko E, Keim P, Johnson JR, Price LB. *Escherichia coli* ST131-H22 as a foodborne uropathogen. Under review at *Clinical Infectious Diseases* Note: * denotes equal contribution.

PRESENTATIONS

Invited plenary sessions and conferences

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| 2016 | <i>Keynote Speaker, Opening Plenary Session.</i> Australasian HIV & AIDS Conference 2016. Adelaide, Australia. November, 2016. |
| 2016 | <i>Symposium on Biobanks and Industries Working Together to Advance Precision Medicine.</i> International Society for Biological and Environmental Repositories 2016 Annual Meeting. Berlin, Germany. April, 2016. |
| 2015 | <i>Plenary Session on Genital Microbiome and Susceptibility to Sexually-Transmitted Infections.</i> World STI & HIV Congress 2015, Brisbane, Australia. September, 2015. |
| 2015 | <i>Penile Microbiome and the PrePex Device.</i> WHO Informal Consultation on Tetanus and Voluntary Medical Male Circumcision, Geneva, Switzerland. March 9 th , 2015. |

Invited talks

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| 2014 | <i>Uncovering the Impact of Male Circumcision on HIV and the Microbiome.</i> Infectious Disease/Microbiology Interdisciplinary Research Symposium. Northwestern University Feinberg School of Medicine. May 14 th , 2014. |
| 2014 | <i>Ecology of Staphylococcus aureus and commensals in the human nose.</i> 20 th Annual International Meeting on Microbial Genomics. Sep. 14 th , 2014. |

Oral presentations

- 2017 **Liu CM**, Prodger JL, Tobian AAR, Kaul K, Abraham A, Kigozi G, Nalugoda F, Serwadda D, Price LB, Gray RH. *Abundance of penile anaerobes, IL-8, and the risk of HIV acquisition, Rakai, Uganda*. 23rd Conference on Retroviruses and Opportunistic Infections (CROI).
- 2014 **Liu CM**, Kohanski MA, Price, LB, Lane, AP. *Nasal Irrigation Is Not Associated with Decreased Staphylococcus aureus or Pseudomonas in Post-Surgical Sinonasal Cavity*. AAO-HNSF Spring Meeting 2014.
- 2014 **Liu CM**, Kohanski MA, Price, LB, Lane, AP. *Nasal Irrigation Is Not Associated with Decreased Staphylococcus aureus or Pseudomonas in Post-Surgical Sinonasal Cavity*. AAO-HNSF Spring Meeting 2014.
- 2013 **Liu CM**, Keim, PS, Price, LB, Lane, AP. *Medical therapy reduces microbiota diversity and evenness in surgically recalcitrant chronic rhinosinusitis*. AAO-HNSF Spring Meeting 2013.
- 2010 **Liu CM**, Cosetti MK, Price LB, Keim PS, Lalwani AK. *The Otologic Microbiome: A Preliminary Report of Otopathogens In Cholesteatoma And Chronic Suppurative Otitis Media Using 16S rRNA Gene-Based Pyrosequencing Analysis*. Collegium Oto-Rhino-Laryngologicum Amicitiae Sacrum Annual Meeting.
- 2010 **Liu CM**, Lane AP, Aziz M, Buchhagen JL, Contente-Cuomo TL, Price LB, Keim PS. *The Human Paranasal Sinus Microbiota in Health and Disease*. NIH Human Microbiome Research Conference.
- 2010 **Liu CM**. *The Penis Microbiome: Uncovering the Impact of Male Circumcision*. 18th Annual International Meeting on Microbial Genomics.
- 2010 **Liu CM**, Cosetti MK, Price LP, Keim PK, Lalwani AK. *Pyrosequencing-Based Analysis of the Middle Ear Microbiota*. AAO-HNSF Annual Meeting.
- 2008 Driebe EM, **Liu CM**, Bowers J, Schmoker M, Bosch C, Engelthaler DE. *Counting cocci: Quantitation of Coccidioides using real-time PCR*. Coccidioidomycosis Study Group Annual Meeting.
- 2006 Tan BK, **Liu CM**, Lin S, Lane AP, Dubin MG. *Failure of the frontal sinus obliteration procedure*. American Rhinologic Society Annual Meeting.
- 2006 Dubin MG, **Liu CM**, Senior BA, Lin S. *American Rhinologic Society member survey on "Maximal medical therapy"*. American Rhinologic Society Annual Meeting.
- 2006 **Liu CM**, Dubin MG, Martin B, Lane AP. *Effect of smoking on maximal medical therapy for chronic rhinosinusitis*. American Rhinologic Society Annual Meeting.

Poster presentations

- 2015 **Liu CM**, Tobian AA, Prodger JL, Serwadda D, Kigozi G, Nalugoda F, Wawer MJ, Kaul R, Price LB, Gray RH. *Association between foreskin microbiota and local cytokines in men from Rakai, Uganda*. 21st Conference on Retroviruses and Opportunistic Infections (CROI).
- 2014 **Liu CM**, Hungate BA, Tobian AA, Ravel J, Prodger JL, Serwadda D, Nalugoda F, Wawer MJ, Gray RH, Price LB. *Female partner bacterial vaginosis and the penis microbiome: Rakai, Uganda*. 20th Conference on Retroviruses and Opportunistic Infections (CROI).
- 2013 **Liu CM**, Hungate BA, Tobian AA, Serwadda D, Lester R, Kigozi G, Galiwango RM, Wawer MJ,

- Keim P, Gray RH, Price LB. The Impact of Male Circumcision on the Penis Microbiome: Analyses from Rakai, Uganda. 19th Conference on Retroviruses and Opportunistic Infections (CROI).
- 2010 **Liu CM**, Cosetti, MK, Aziz M, Buchhagen JL, Contente-Cuomo TL, Price LB, Lalwani, AK, Keim PS. *A Comparative Study of The Middle Ear Microbiota in Chronic Suppurative Otitis Media and Cholesteatoma*. NIH Human Microbiome Research Conference.
- 2010 **Liu CM**, Cosetti MK, Price LP, Keim PK, Lalwani AK. *The Otologic Microbiome: A case study of the bacterial microbiota in a pediatric patient with chronic suppurative otitis media*. American Society of Pediatric Otolaryngology Spring Meeting.
- 2009 Price L, Johnson K, Rattray R, **Liu C**, Ravel J, Keim P, Engelthaler D, Serwadda D, Wawer M, Gray R. *Circumcision is Associated with Significant Changes in the Penis Bacterial Microbiota*. Conference on Retroviruses and Opportunistic Infections (CROI).
- 2009 **Liu CM**, Keim PS, Lane AP. *Characterization of Bacterial Microbiota in Post-Surgical Maxillary Sinus of Chronic Rhinosinusitis (CRS) Patients Using Molecular 16S rRNA Gene-Based Analyses*. American Rhinologic Society Annual Meeting.
- 2008 Nguyen J, Hoopes J, **Liu CM**, Scheff K, Smee D, Driebe E, Le M, Engelthaler D, Keim P, Went G. *Modeling the kinetics of the Influenza A resistance under drug pressure*. CAAC/IDSA Annual Meeting.
- 2004 **Liu CM**, Keller AS, Hindin MJ (2004). *Counter Measures to Intimate Partner Violence in Metro Cebu, Philippines*. International Health & Medical Education Consortium (IHMEC) Conference.

PATENTS

1. U.S. Patent No. 8,722,335, Methods and Kits Used in The Detection of Fungus, issued on May 13th, 2014.
2. U.S. Patent Application No. 12,908,536, Compositions and Methods To Detect Influenza Variants, published on April 21st, 2011.

HOBBIES

Classical piano, five-string banjo, and jogging.