

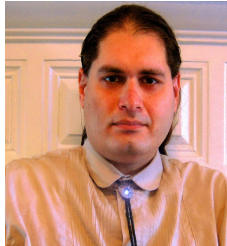


181 Longwood Avenue
Boston, Massachusetts 02115-5804

Department of Medicine
Channing Division of Network Medicine

Channing Microbiome Seminar

March 4, 2016, 11am @ 5th floor conference room



Speaker: Georg K. Gerber, MD, PhD, MPH,
Assistant Professor of Pathology, Harvard Medical School
Co-Director, Massachusetts Host-Microbiome Center, and Director of the
Computational Unit
Associate Pathologist, Center for Advanced Molecular Diagnostics
Department of Pathology, Brigham & Women's Hospital

Computational and synthetic biology approaches for developing bacteriotherapies

Abstract: Bacteriotherapies or “bug as drugs” hold tremendous promise for treating a variety of human diseases including infections, allergies, autoimmune diseases, and cancer. Bacteriotherapies are fundamentally different from conventional drugs, because they must function within the context of a complex and dynamic host-microbial ecosystem. I will present our recent work on novel computational and experimental tools for designing probiotic cocktails and elucidating the functions of their members in the mammalian gut. I will first describe our work on MDSINE, a Bayesian framework for inferring dynamical systems models from microbiome time-series datasets and predicting future behaviors of the microbiota. Using data simulated to mimic key properties of real microbiome studies, we demonstrate that MDSINE significantly outperforms the existing method for microbial dynamical systems inference on multiple metrics. We then demonstrate the utility of our method on two new gnotobiotic mice experimental datasets, investigating infection with an enteric pathogen, *Clostridium difficile*, and stability of an immunomodulatory probiotic cocktail. I will then describe our work on TFUMseq, a synthetic biology platform to functionally mine bacterial genomes for genes that contribute to fitness of commensal bacteria in vivo, with applications to discovering bacterial genes important for colonizing the mammalian intestine over time.

Bio: Dr. Gerber is a computer scientist, microbiologist and physician. He is an Assistant Professor of Pathology at Harvard Medical School, an Associate Pathologist at the BWH Center for Advanced Molecular Diagnostics, and Co-Director of the recently inaugurated Massachusetts Host-Microbiome Center at BWH. His research interests involve building novel computational models and high-throughput experimental systems to understand the role of the microbiota in human diseases, and applying these findings to develop new diagnostic tests and therapeutic interventions to improve patient care. Dr. Gerber's training includes a Fellowship in Infectious Disease Pathology and Molecular Microbiology at BWH, Residency in Clinical Pathology at BWH, MD from HMS, Masters' and PhD in Computer Science (Machine Learning, supervised by David Gifford and Tommi Jaakkola) from MIT, and Masters' in Infectious Diseases and BA in Pure Mathematics from UC Berkeley. Prior to returning to graduate school, he founded several companies focused on developing and applying 3D graphics technologies to create feature and IMAX® films.

Hosted by Yang-Yu Liu