BRIGHAM AND WOMEN'S HOSPITAL

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Department of Medicine
Channing Division of Network Medicine

Channing Microbiome Seminar
March 31 (Friday), 2017, 11am @ 5th floor conference room

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How do we model gut microbial dynamics?

Abstract: Dynamics reveal crucial information about how a system functions. However, it is not yet known what the relevant timescales or models are for understanding microbial dynamics in the gut. For example, gut microbial population dynamics may be largely internal, and the stool samples we obtain likely represent the end-point of these internal dynamics. In this talk, I describe a statistical approach for disentangling different components of dynamics within the human gut microbiome: autoregressive and non-autoregressive. Autoregressive dynamics involve recovery from large deviations in community structure. These recovery processes appear to involve the blooming of facultative anaerobes and aerotolerant taxa, likely due to transient shifts in redox potential, followed by re-establishment of obligate anaerobes. Non-autoregressive dynamics carry a strong phylogenetic signal, wherein highly related taxa fluctuate coherently. These non-autoregressive dynamics appear to be driven by external, non-autoregressive variables like diet. Most of the community variance is driven by day-to-day fluctuations in the environment, with occasional autoregressive dynamics as the system recovers from larger shocks. Despite frequently observed disruptions to the gut ecosystem, there exists a returning force that continually pushes the gut microbiome back towards its steady-state configuration.

Bio: Sean is a postdoctoral researcher in the Department of Biological Engineering at MIT and the Center for Microbial Informatics and Therapeutics at The Broad Institute, working with Prof. Eric Alm. He is a quantitative ecologist who is currently studying microbial community dynamics in the human gut. Sean is interested in using microbial ecosystems as empirical models for exploring the boundary between ecology and evolution. Prior to joining the Alm lab, he completed his PhD in biophysics at the University of Chicago with Prof. Jack Gilbert and Prof. Maureen Coleman. His dissertation work focused on how ecological disturbances shape microbial community diversity.

Hosted by Yang-Yu Liu

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