



COMPUTATIONAL BIOLOGY WEBINAR @ IMSc

SYSTEMS BIOLOGY OF SMALL AND LARGE SYSTEMS

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Biological processes are regulated at multiple levels ranging from chromatin remodeling for gene expression regulation, to specific localization of enzymes for metabolic regulation. These processes are best understood by analyzing them at different abstraction levels. I will present two studies, one focusing on kinetic modeling of a small system of divergent transcription and another focusing on genome scale metabolic flux balance analysis of gut microorganisms. One of the important factors affecting gene expression is specific promoter arrangement. Divergent promoters are the promoters in which upstream reverse oriented transcription occurs in the regions devoid of annotated genes but shows the presence of core promoter elements. We developed a kinetic model of divergent transcription in order to understand the regulatory effects of the process. We analysed the model using ChIP-seq data and tested the predictions about expression levels using nascent RNA GRO-seq and CAGE data. Moving from a small to whole genome metabolic modeling, I will present our work focusing on analyzing gut microbial metabolic models for post-biotic production abilities. Gut microbiome is now considered as a new organ system in our body. It is known to produce a variety of useful metabolites. We reformed and analysed models of gut microorganisms for their response to various prebiotics and oligosaccharides for post-biotic production. As one of the use-case, we focused on flux redistribution that can lead to vitamin-D precursor synthesis, in microbe-human joint metabolic model.

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