

グローバル COE 特別セミナー

生物化学専攻セミナー

日時：平成 20 年 12 月 11 日（木） 17:00~18:30

場所：理学部 3 号館 4 階 412 号室

講師：**Roger Brent**
Molecular Sciences Institute
Center for Quantitative Genome Function
Berkeley, California

演題：**Systems biology and genetic regulation of cellular signal transmission in yeast**

要旨：

We have made significant progress in understanding the quantitative physiology of the yeast pheromone response system, a prototypic eukaryotic cell signaling system. We have defined key quantitative aspects of function ("systems level" quantitative behaviors, or SLQBs), and defined genetic mechanisms that govern these quantitative behaviors.

The workhorse experiment is to stimulate the system with defined input by exposing yeast cells to defined concentrations of pheromone. Cells are all descended from a reference strain but differ in reporters they carry and in other defined genetic loci. Progress relies on genetics, fluidic technology, optical means to interrogate cells, protein mass spectrometry, and computational, mathematical, and conceptual work to explain the findings and abstract key elements from them.

In this system, at each point along the transmission chain, signal overshoots and is reduced toward equilibrium by negative feedback. The effect of the feedback is to maximize information transmitted through the system about percent receptor occupancy. Put differently, one major function of this "systems level" behavior is to align dose and response (DoRA) and thus preserve the signal information content, by preventing information about dose carried by the signal from being degraded. Preservation of dose information and control of other systems level behaviors depends on a complex concert of phosphorylation feedback events revealed by mass spectrometric exploration of the deep system phosphoproteome and tested by single cell experiments. These and other behaviors and mechanisms appear fundamental (in the sense of wide conservation) to the operation of many eukaryotic systems that sense and information about outside conditions and relay it into the cell.

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