



CDB SEMINAR

Speaker:

Upinder S. Bhalla

< The National Centre for Biological Sciences >

Title:

“Performing reliable signaling operations with a few molecules.”

Date:	Thursday, December 9
Time:	16:00 P.M. ~ 17:00 P.M.
Place:	1F Auditorium of Building C, CDB

Summary:

In interpreting possible signaling mechanisms in the complex environment of the cell, several issues including specificity, reaction rates and localization must of course be taken into account. We propose that two additional factors - diffusion and noise - must also be major constraints in understanding cellular signaling. We have analyzed the contributions of these factors in a simple geometry of a subcellular region in diffusive contact with a large cell. We come to the disturbing conclusion that most conventionally accepted descriptions of signaling would fail to convey reliable cellular signals unless the process involved most of the cell.

If we consider volumes of typical subcellular signaling regions, we find that diffusive exchange times are of the order of the signaling rates themselves. Thus many activated molecules would simply diffuse away before they could act on their targets. Further, the small numbers of molecules involved in these signals leads to stochasticity in the reactions, and this biochemical noise will often overwhelm the signals themselves. All is not lost, because there are mechanisms which may actually harness these diffusive and stochastic effects not only to function reliably, but to perform interesting new signaling operations. The talk will discuss how such factors may be important in providing additional constraints to signaling mechanisms.

Host: Hiroki Ueda <Systems Biology, CDB>

E-mail hiro@cdb.riken.jp Tel: 078-306-3191 (ext:4211)

RIKEN Center for developmental Biology <http://www.cdb.riken.go.jp/>