Bindu S. Govindan

Research Summary:

The motor proteins MCAK belonging to the kinesin-13 family are crucial for regulating microtubule dynamics during cell division. Recent experimental observations have shown that MCAK uses surface diffusion on the microtubule as an effective way to enhance the rate of its binding to the microtubule ends, thus inducing its depolymerization. We have developed a mathematical model of this process based on the dynamical instability mechanism and random walk theory. Our theory shows how the kinetic parameters are modified by the action of MCAK and the predictions are verified against experimental results.

The search, capture and segregation of chromosomes by microtubules during cell division is a fascinating process. The central question of how microtubules accomplish this task within a reasonable time scale, to a high degree of precision, is still unanswered to a large extent. A systematic study of this problem using stochastic dynamics and numerical simulations is currently being pursued.

Preprints:

1. Bindu S Govindan, Manoj Gopalakrishnan, Debashis Chowdhury *Enhanced depolymerization of microtubules by MCAK proteins* (in preparation)

Conference/Workshops Attended:

1. *Modeling infectious diseases: From Cell to Society*, Institute of Mathematical Sciences, Chennai, India, September 2006.

Visits to other Institutes:

1. Indian Institute of Technology Kanpur, Kanpur, India, August 2006.

Academic recognition/Awards:

- DST Fast-Track Young Scientist Fellowship, 2006.
- Selected for short term visit to the Statistical Physics and Condensed Matter group, ICTP, Trieste, Italy, 2007.