

BIOENGINEERING SEMINAR

at 4:00 PM on March 21st, 2014 (Friday)
Seminar Hall, 1st floor, Chemical Engineering Building

Dynamics of Cytoplasmic Dynein *in vivo*

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Cytoplasmic dynein is a ubiquitous motor protein that is solely responsible for the transport a variety of cellular cargo from the cell periphery to the cell interior by travelling along self-assembling tracks called microtubules. By being anchored, typically at the cell membrane, dynein can also exert force on microtubules. The key question is: By what mechanism do single dyneins accumulate at sites where they can generate large collective forces? We directly observed and tracked single dyneins using custom software in fission yeast, which allowed us to identify the main steps of the dynein targeting process: (i) from the cytoplasm to the microtubule, and (ii) from the microtubule to the cortical anchors. We uncovered that dyneins on the microtubule move, surprisingly, either in a diffusive or a directed manner, with the switch from diffusion to directed movement occurring upon binding of dynein to the cortex. This dual behavior of dynein on the microtubule, together with the two steps of binding, constitute the mechanism by which dyneins find cortical anchors in order to generate large-scale movements in the cell. In the last part of my talk, I will touch upon my future plans which concern the study of spatial and temporal regulation of dynein in the cell.

About the speaker:

Dr. Vaishnavi Ananthanarayanan is a Postdoctoral Fellow with Dr. Satyajit Mayor at the National Centre for Biological Sciences. She obtained her Ph.D. in Biophysics from the Max Planck Institute of Molecular Cell Biology and Genetics, Dresden, Germany, where she worked on the single-molecule observation of the motor protein dynein *in vivo*. Her work led to the discovery of the targeting mechanism of dynein from the cytoplasm to cortical anchors, as well as a novel mode of dynein regulation. Prior to her Ph.D., Vaishnavi pursued a dual degree in M.Sc. Biological Sciences and B.E. Computer Science at BITS-Pilani, Goa. Following her graduation from BITS-Pilani, she had a stint at Microsoft Research India, where she developed a programming language for expressing Biology protocols. Her future interest lies in understanding the spatial and temporal regulation of dynein *in vivo*, by employing single-molecule live-cell microscopy, image processing and analysis and biophysical techniques.