



# QBiC SEMINAR

Speaker

**Ahmet Yildiz, Ph. D.**

*University of California, Berkeley*

Date & Location

**Tuesday, September 25, 2012**  
**13:30 - 14:30**

OLABB 3F Conference room

(6-2-3, Furuedai, Suita, Osaka 565-0874)

\*There will be a video broadcast in CDB Bldg. D, E-206

Title

**The Mechanism of Cytoplasmic Dynein Motility**

Abstract

Cytoplasmic dynein is a homodimeric AAA+ motor that transports a multitude of cargos towards the microtubule minus end. The mechanism of dynein processivity and interhead coordination remain unclear due to its large size (2.6 MDa) and the complexity of its structure. In contrast to kinesins and myosins, we directly observed that dynein heads move independently along the microtubule. Stepping behavior of the heads varies as a function of interhead separation and establishing the basis of high variability in dynein step size. By engineering the mechanical and catalytic properties of the dynein motor domain, we show that a rigid linkage between monomers and dimerization between N-terminal tail domains are not essential for processive movement. Instead, dynein processivity minimally requires the linker domain of one active monomer to be attached to an inert MT tether retaining only the MT-binding domain. The release of a dynein monomer from the MT can be mediated either by nucleotide binding or external load. However, nucleotide dependent release is inhibited when force was applied to the linker domain. Force dependent release is significantly asymmetric, with faster release towards the minus-end. On the basis of these measurements, we developed a model that describes the basis of dynein processivity, directionality and force generation.

Host

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