

Title:

Single-Molecule Dissection of Cytoplasmic Dynein Motion and Force Generation

Abstract:

Cytoplasmic dynein is a highly processive biomolecular motor protein with two motor domains ('heads') that generates force and motion toward the minus ends of microtubules in eukaryotic cells. It contains four AAA+ (AAA: ATPase associated with various cellular activities) domains per head that can bind ATP, and has the ability to take hundreds of nanometer-scale steps along microtubules before it dissociates and diffuses away. Such continuous movement requires coordination of the mechanochemical cycles of both motor domains so that the front head remains bound to the track while the rear head detaches and moves forward. However, the molecular mechanism that underlies dynein's motion and force generation remains unknown. In this seminar, I will present our most recent combined structure-function and single-molecule optical tweezers studies that provide new insights into the coordination and force generation of the dynein motor domains. In addition, I will discuss the evolutionary differences in the force generation of metazoan and non-metazoan dyneins.