Electrical and Computer Engineering Seminar Series
Wednesday, February 2nd, 2011, 1:30-3PM
Hall of Fame Conference Room

Study of mechanical motor protein myosin V on Total Internal Reflection Fluorescent Microscopy (TIRFM)
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Myosin V is an unconventional myosin that transports cargo such as vesicles, melanosomes or mRNA on actin filaments. Myosin V consist of an N-terminal head containing the actin-binding and ATP hydrolysis site, extended neck domain including six IQ motifs, and a tail domain consisting of a coiled-coil region attached to a C-terminal globular domain. In vitro studies have shown that myosin V moves processively on actin and taking multiple 36nm steps that coincide with the helical repeat of actin. Electron microscopy showed that the two heads of myosin V molecule could bind to actin simultaneously with a 36nm spacing. This allows the molecule to "walk" across the top of an actin filament, a feature necessary for moving large vesicles along an actin filament bound to the cytoskeleton. Myosin-V is a two-headed motor, which moves processively along actin with ADP-release as the rate limiting step. The kinetic cycles of the two heads are gated by the internal strain each places on the other. Thus ADP release in the trailing head is accelerated by strain from the leading head and that of the leading head is slowed by the strain exerted by the trailing head. This pathway ensures that ADP is typically released from the trailing head, while the leading head still has bound nucleotide. To understand how myosin-V coordinates ATP binding and ADP release in ATPase cycle, we visualized the ATP binding and dissociation events during a stepping of the myosin-V molecule simultaneously. We have shown that myosin-V coordinate one ATP hydrolysis energy to having one step of the molecule.

All students, faculty, and public are welcome.