Spring 2018
Mathematical Sciences/RTG Seminar

Modeling the coupling between molecules that occurs during muscle contraction

At the molecular level, muscle contracts when the molecular motor myosin binds to the filamentous protein actin. Single molecule techniques have allowed researchers to characterize, in exquisite detail, how a single myosin interacts with actin. But it is the combined effect of trillions of myosin motors that causes muscular contraction. As motors work together, they apply forces on each other and also activate the actin filament locally. These effects introduce coupling between the motors, so an isolated myosin molecule is not the same as a myosin molecule working in a group.

We have developed partial differential equation models for: 1) global coupling, where the attachment of one myosin affects all molecules equally; and 2) local coupling, where the attachment of one myosin only affects nearby molecules. These models allow us to understand experimental results, including i) why groups of myosin move actin more rapidly than an isolated myosin, and ii) how both calcium and myosin binding contribute to muscle activation. This work gives insight into how the molecular scale affects macroscale muscle function, an important problem given the prevalence of genetic heart disease.

Speaker: Sam Walcott

University of California at Davis

Thursday, March 22, 2018

Time: 4:00 – 5:00 PM

Where: Ricketts 211

Refreshments 3:30-4:00pm in the
Coonley Lounge (1st floor Rickets)