

Intracellular Transport: Molecular Motors, Drag, and Binding

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Abstract

Within certain cells, small molecules such as sugars and amino acids move to where they are needed by the passive process of diffusion. Diffusion is inadequate for the transport of larger cargos such as mitochondria. Molecular motor proteins bind to cytoskeletal tracks and hydrolyze ATP to haul large cargo through the crowded cytoplasm. In this talk, we will examine a new model describing the dynamics of cargo weakly bound to a cytoskeletal track. Through parameterization, we estimate the effects of electrostatic microtubule drag on the cargo for the first time. We then make the hypothesis that binding of cargo to the cytoskeletal track is a function of distance. Analysis of this assumption leads to the surprising conclusion that there is an optimum nonzero distance for binding.