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### Detachment Kinetics of Single Kinesin and Dynein

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Intra-cellular transport via the microtubule motors kinesin and dynein plays an important role in maintaining cell structure and function. Often, multiple kinesin or dynein motors move the same cargo. Their collective function depends critically on the single motors' detachment kinetics under load. Single Kinesin's and Dynein's super-force off rates have been measured using an optical-trap based method. We rapidly increased the force on a moving bead and measured the time to detachment. From such events, detachment time distributions for specific super-force values have been measured. In contrast to a possible constant off-rate kinesin has an off-rate increasing with force. At low loads, dynein is sensitive to load; detaching easily but at higher load it exhibited a catch-bond type behavior, with off rate decreasing with load. The super-force experiments also allowed us to determine the probability of backward stepping for the motors. Kinesin and dynein can back-step under load, but this was relatively rare in both directions (<20%), and the typical backward travel distance was short.