

Supplementary movie1 Motility assay of cytoplasmic dynein

Purified dynein translocated MTs in an *in vitro* motility assay where MTs glide on a dynein-coated surface, demonstrating that LIS1 and NDEL1 are not essential components for the motility of dynein.

Supplementary movie2 Motility assay of cytoplasmic dynein with LIS1

When dynein was mixed with different amounts of LIS1 and then introduced into the observation chamber, increasing amounts of LIS1 gradually decreased the MT gliding speed and eventually stopped MT gliding altogether, indicating that LIS1 negatively regulates the motility of dynein in a dose dependent fashion.

Supplementary movie3 Confocal imaging of GFP-LIS1 in dorsal root ganglia neuron

Supplementary movie4 Confocal imaging of mCherry-dynein intermediate chain1 in dorsal root ganglia neuron