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Regulation of kinesin-transport by microtubule age and polymerization conditions JING XU, WINNIE LIANG, Physics, UC Merced, STEPHEN KING, U Central Florida, K. FAYSAL, Physics, UC Merced — Microtubules are fundamental biopolymers in cells, formed via self-assembly ("polymerization") of tubulin dimers. Microtubule polymerization conditions have been shown to alter the presence of defects in microtubule lattices, including point defects (missing tubulin dimers) and line defects (protofilament disruption). Potential impact of these lattice defects on molecular motor-based transport is not yet understood. Here we investigate the impact of microtubule polymerization conditions on multiple-kinesin transport, using single-molecule-type optical trapping experiments. We find that kinesin-based cargoes pause preferentially at specific locations along individual microtubules, and that the pause frequency and duration is strongly dependent on microtubule age and polymerization condition. Within each polymerization condition and for fresh microtubules, we also observe significant variations in multiple-kinesin travel distances, depending on which microtubules the motors travel along. Taken together, our study suggests an important role of microtubule lattice defect in regulating intracellular transport.

Jing Xu
Physics, UC Merced

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