# A single-molecule view on intracellular transport in living C. elegans


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Abstract:

Intraflagellar transport (IFT) is an intracellular-transport mechanism in the cilia of eukaryotic cells. In C. elegans chemosensory cilia, IFT is driven by the cooperative action of IFT-dynein (driving transport from cilium tip to base) and two kinesin motor proteins, Kinesin-II and OSM-3 (driving transport in the opposite direction). Our goal is to understand what the specific roles of the motors are and how they cooperate. To achieve this, we image mutant nematodes expressing fluorescent motors using in vivo single-molecule fluorescence microscopy. Images obtained are analyzed using automated kymograph and single-particle tracking analysis. In the past, we focused on the functional differentiation of the two kinesin motors, and found that Kinesin-II is mostly active at the ciliary base to initiate transport, after which OSM-3 takes over for long-distance transport. Here I will present our latest results, focussing on the in vivo motility properties of IFT dynein and on turnarounds of IFT particles, including motors at the ciliary tip. Our results provide unprecedented insight in how cells use a combination of motor proteins to drive complex intracellular transport processes.


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