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Title: The Drosophila microtubule associated protein Mini Spindles is required for RNA localization.

The Drosophila mini-spindles gene (msps) encodes a member of a conserved family of microtubule-associated proteins (MAPs), the XMAP215/TOG family. While requirements for Msps in mitosis and meiosis have been well-established, its functions, if any, for functions carried out by interphase cytoplasmic microtubules, have not been previously reported. Given its role in regulating the integrity of microtubules during mitosis and meiosis and its maternal expression, we asked whether msps is also required for a process regulated by interphase microtubules, subcellular mRNA localization during oogenesis. We found that bcd mRNA localization is completely lost in embryos from msps mutant mothers, whereas osk mRNA remains localized in msps embryos. In msps mutant ovaries, bcd mRNA localization and GFP-Exu particle defects start to be visible during stages 8-10 of oogenesis. Intriguingly, we found that the microtubule density at the ring canals and within the nurse cells and the anterior oocyte cortex decreases in msps mutants. Taken together, these results suggest that Msps plays crucial roles in Exu particle transport from the nurse cells to the oocyte, and a bcd anterior localization step in the oocyte that is initiated in mid-oogenesis.

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