



# Regulation and Control of Directionality of Mitotic Kinesin-5

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Abstract:

Complex cellular functions, such as mitosis, need a high degree of control of motors, and it is largely unclear still how this control is established in the cell. Kinesin-5 motors fulfill essential roles in mitotic spindle morphogenesis and dynamics and were thought to be slow, processive microtubule (MT)-plus-end directed motors. We have examined *in vitro* and *in vivo* functions of the *Saccharomyces cerevisiae* kinesin-5 Cin8 using single-molecule motility assays and single-molecule fluorescence microscopy. We observed that individual Cin8 motors could be switched by ionic conditions from rapid (up to 400 nm/s) and processive minus-end, to bidirectional, to slow plus-end motion. We also could detect plus- and minus-end directed motility in yeast cells. Evidence suggests that directionality is switched by binding between two microtubules.

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