# The plus and minus of microtubules

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The September issue of the *Journal of Cell Biology* featured the research of

Marija Zanic and colleagues on the cover. The image is a montage of dynamic microtubule extensions (teal) grown in vitro from stabilized microtubule seeds (red). Credit: Vanderbilt University

Microtubules are protein polymers that assemble into dynamic structures, essential for cell division, shape, motility, and transport of intracellular cargos.

Proteins that regulate microtubule function and activity have been implicated in disorders ranging from Alzheimer's disease to cancer. By learning how microtubules work, scientists hope to find new ways to treat these diseases.

The "plus" and "minus" ends of microtubules switch between growing and shrinking, a phenomenon known as "dynamic instability." Now Marija Zanic, Ph.D., and colleagues have discovered that the distinct rate at which tubulin protein subunits dissociate (the tubulin "off-rate") underlies key dynamic differences between the two ends.

The researchers also found that a minus-end directed motor protein, the human kinesin-14 HSET, promotes minus-end stability by suppressing the minus-end tubulin "off-rate," even when challenged by the destabilizing kinesin-13 MCAK motor.

Their report, published in the September issue of the *Journal of Cell Biology* and featured on the cover, suggests that regulation of both the plus and minus microtubule ends is integrated to form the basis for the dynamic architecture of cellular microtubules.

**More information:** Claire Strothman et al. Microtubule minus-end stability is dictated by the tubulin off-rate, *The Journal of Cell Biology*

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