

Mechanical symmetry breaking in *C. elegans* dorsal-ventral axis establishment

In *Caenorhabditis elegans*, the initial event of spontaneous symmetry breaking that gives rise to embryonic polarity is the midbody remnant in the two-cell embryo being off-centered, which sets the dorsal-ventral axis. This results from the asymmetric ingression of contractile ring in first cleavage, but their underlying mechanisms remain largely unexplored. Here I demonstrate that a hydrodynamic coupling between the cell cortex and cytoplasm facilitates asymmetric ingression of the cytokinetic furrow. I identified two prerequisites for this symmetry breaking: cortical contractility to drive cytoplasmic flow, and the link between the cortex and the mitotic spindle to set long-ranged cytoplasmic flow, suggesting that cytoplasmic flow influences the contractile furrow ingression.

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