Microtubule search-and-capture mechanism orchestrates MTOC clustering and nuclear division via proper spindle positioning in yeast

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In budding yeast *C. neoformans*, the spindle pole body (SPB) formation requires timely clustering of MTOCs, embedded on the outer nuclear envelope. Our *in silico* model for search and capture via cytoplasmic microtubules (cMT), for the first time, identifies redundant mechanisms of MTOC clustering mediated by inter cMT coupling at the nuclear envelope and cMT-cell cortex interactions within the experimentally observed timescale [1, 2]. During early stages of spindle formation, nuclear microtubules (nMTs) form many low tension syntelic and stable high tension amphitelic attachments. Syntelic attachments are degraded and amphitelic attachments are stabilized in presence of Ipl1-mediated phosphorylation gradient, preventing aneuploidy and promoting equal division. Our experimental results suggest that greater amount of nuclear mass is retained by the mother bud in Ipl1-depleted cells [1]. Computer simulations explain that the asymmetric division might stem from the differential functionality of the two SPBs. Delayed/impaired MT nucleation from the SPB settling into the daughter bud accounts for the unequal division.

[1] Varshney et al. PLoS Genet 15(2): e1007959 (2019)

[2] Sutradhar et al. Molecular Biology of the Cell 26(22) 3954-3965 (2015)