Supplemental Materials

Molecular Biology of the Cell

Sutradhar et al.

A comprehensive model to predict mitotic division in budding yeasts

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Supplementary information

Supplementary Table S1.

List of yeast strains used in this study

Organism	Strain name	Genotype	Reference
C. neoformans	CNVY109	MATα *GFP-TUB1:NAT + H4-mCherry:NEO*	This study
C. neoformans	CNVY197	MATα *SPC98-GFP:NAT + H4-mCherry:NEO*	This study
C. albicans	YJB12856	BWP17 *TUB1/TUB1::GFP-URA3 NOP1/NOP1::RFP-NAT*	J. Berman (Harrison *et al.*, 2014)
C. albicans	LSK111	SN148 *TUB4/TUB4-GFP:URA3*	This study

Supplementary figures

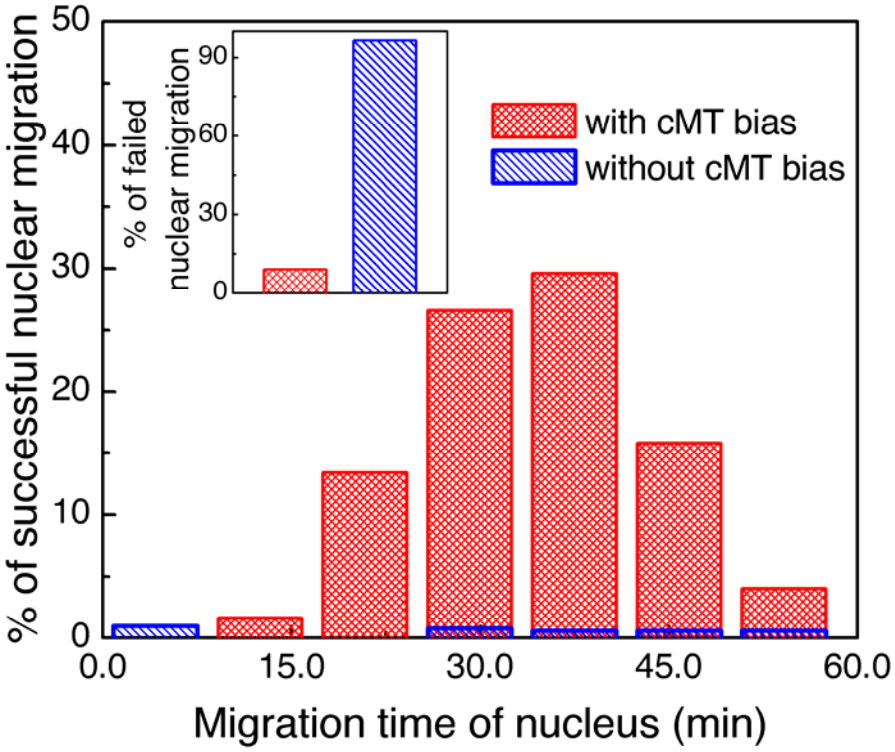

Figure S1. Biased nucleation of cMT is necessary for proper nuclear migration. Distribution of nuclear migration time with and without cMT bias is plotted here. Successful migration is achieved after nucleus moves within 1 μm of the mother-daughter junction (neck). We observe the nucleus moves close to the neck if cMTs are nucleated toward the bud. In this case, the mean migration time is ~40 min which is in agreement with our experiment. Directional migration of the nucleus is severely perturbed for uniform/unbiased nucleation of cMTs and the nucleus often fails to migrate close to the neck as shown in the inset.

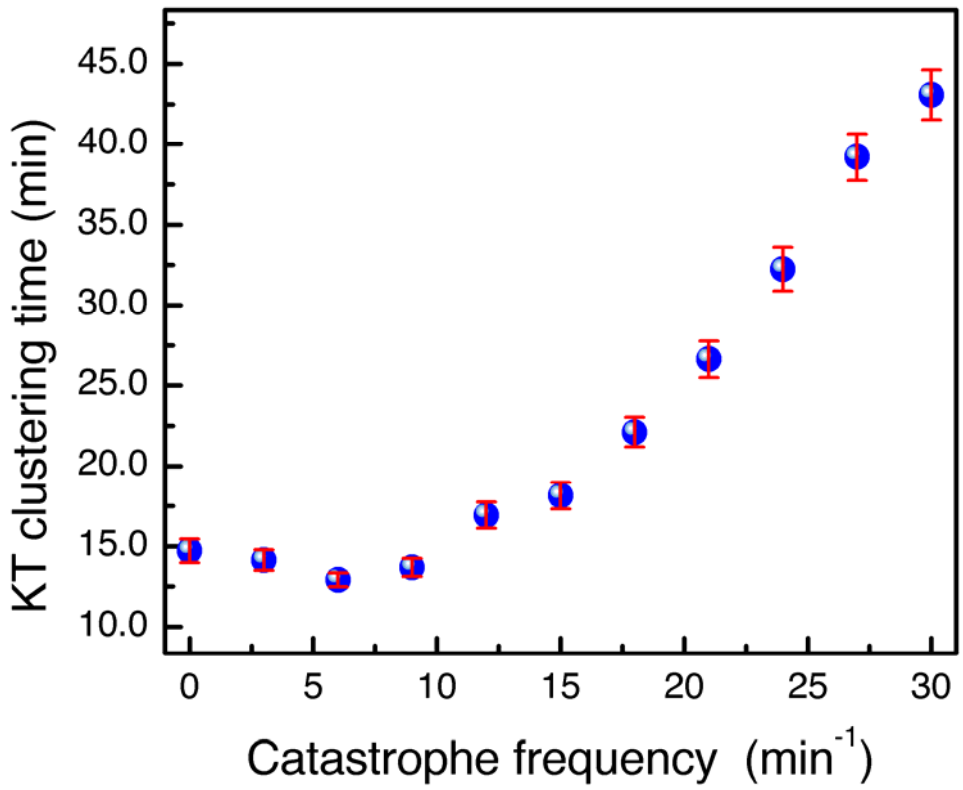

Figure S2. Optimized catastrophe of MT is required for an efficient kinetochore clustering in *C. neoformans*. We observed that the kinetochore clustering time in *C. neoformans* prior to the metaphase strongly depends on the catastrophe frequency of the microtubules. The KTs as well as the MTOCs assemble together via a 'search and capture' mechanism by the MTs. For small catastrophe, longer MTs inefficiently search for the MTOCs in the wrong directions leading to large clustering time. At high catastrophe frequency, MTs are short and often fail to reach the target MTOC and hence clustering time is large. We observed that catastrophe frequency ~7-8/min leads to an optimized 'search' and minimum KT clustering time.

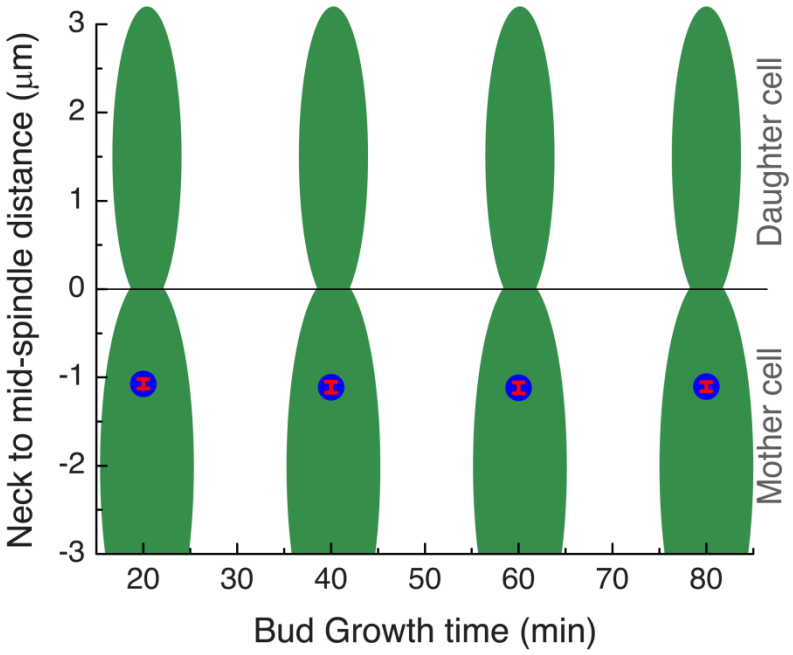

Figure S3. Bud growth rate does not alter the spindle positioning. Keeping the final volume of the bud ~80-90% of the cell volume, we grow the bud at various rates and record the final spindle position. Simulation data clearly suggests that bud growth rate does not have any significant effect on the spindle positioning.

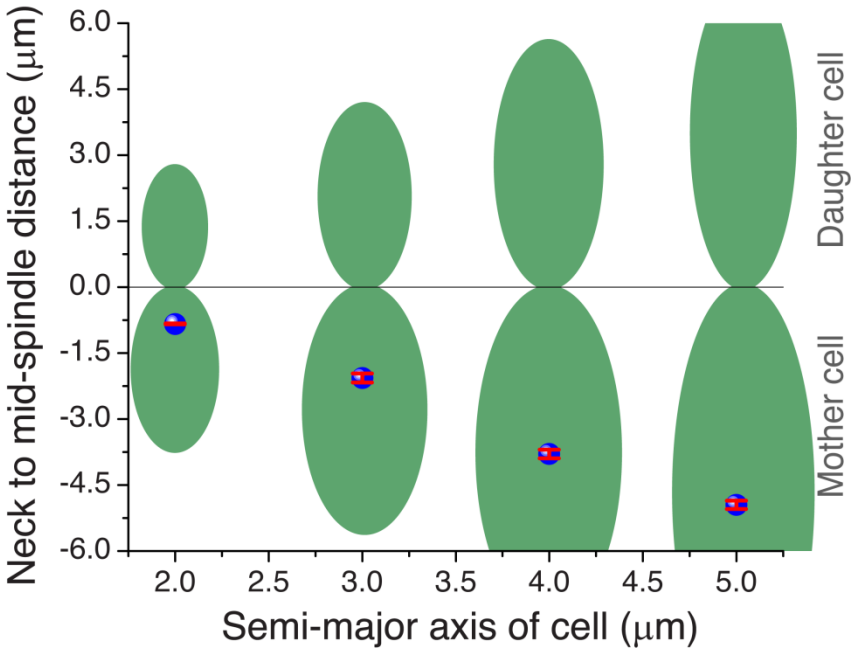

Figure S4. Cell size affects spindle positioning. Mid-spindle distances from the neck within experimental time frame (1 hr) are shown in this figure as a function of the cell size. As the cell size increases, the nucleus remains further away from the mother-bud neck region, leading to improper spindle positioning and alignment. However, if the nucleus is allowed to migrate longer than the observed experimental time (~1 hr), it can achieve the required positioning.

Supplementary videos

Video1. Dynamics of centromere, MTOCs and microtubules during the process of chromosome segregation in Ascomycetes.

Video2. Dynamics of centromere, MTOCs and microtubules during the process of chromosome segregation in Basidiomycetes.

Video3. Chromosome segregation in Ascomycetes in the absence of cMT nucleation bias.

Video4. Chromosome segregation in basidiomycetes in the absence of cMT nucleation bias.

Video5. Effect of Nocodazole treatment in Ascomycetes.

Video6. Effect of Nocodazole treatment in Basidiomycetes.

Video7. Effect of MBC treatment in Basidiomycetes.

Color code: SPB in cyan, MTs in yellow, KTs in red

Supplementary References

Harrison, B.D., Hashemi, J., Bibi, M., Pulver, R., Bavli, D., Nahmias, Y., Wellington, M., Sapiro, G., and Berman, J. (2014). A tetraploid intermediate precedes aneuploid formation in yeasts exposed to fluconazole. PLoS Biol *12*, e1001815.