

## **Pre-Mitotic Clustering of Centromeres May Help Efficient Microtubule Search-and-Capture in Mitosis in *Drosophila* S2 cells**

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Centromeres are specialized chromosome regions that build scaffolds (kinetochores) which capture dynamic centrosomal microtubules during prometaphase (search-and-capture model). However, a recent theoretical study reveals that the mechanism of search-and-capture alone is insufficient to account for the quick capture of all centromeres that is observed *in vivo*<sup>1</sup>. Here, we present experimental and computational data suggesting that centromere clustering in the prophase nucleus may enhance search-and-capture efficiency. Observing Mis12-GFP and DAPI as centromere and nuclear markers, respectively, we found that centromeres are not uniformly distributed but are preferentially clustered near the center of the nucleus in interphase and prophase *Drosophila* S2 cells. For our experimentally measured centromere distributions, computer simulations of the microtubule search-and-capture model showed significantly reduced capture times compared to the theoretically predicted, randomly distributed case. Preliminary observations suggest that centromeres are clustered around nuclear RNAs, particularly the nucleolus. Our results suggest that centromeres are preferentially clustered near the center of *Drosophila* nuclei, and that this distribution may enhance the rate of achieving metaphase alignment.

1. Wollman R, Cytrynbaum EN, Jones JT, Meyer T, Scholey JM, Mogilner A; Efficient chromosome capture requires a bias in the "Search-and-Capture" process during mitotic spindle assembly. *Curr Biol.* (2005) May 10;15(9):828-32.