CDB SEMINAR

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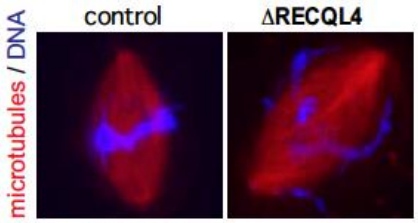
16:00~17:00 Auditorium C1F

Comprehensive understanding of how chromosomes regulate mitosis

Summary

In mitosis, chromosomes are accurately segregated into daughter cells. The failure of this process results in aneuploidy, which is a main cause of cancer development in humans. However, the molecular mechanisms that drive mitosis are highly complex and are incompletely understood. Although chromosomes were once considered as passengers segregated by spindle microtubules, it is now clear that they play a major role in spindle assembly. From this point of view, I have developed a new affinity purification method and, using the method, identified ~200 proteins potentially involved in spindle assembly. By characterizing the several proteins using frog egg extract and human cells, I have discovered new spindle assembly factors and their specific functions. Beyond spindle assembly in early mitosis, I have found that chromosomes independently stabilize and maintain the spindle during chromosome segregation in anaphase.

In this talk I introduce the affinity purification method that allowed me to identify the proteins and to uniquely discover new mitotic mechanisms. I finally show our new finding on the mitotic function of RECQL4, mutated in Rothmund-Thomson syndrome.



Without RECQL4, chromosomes cannot align to the metaphase plate

References

- The nucleoporin MEL-28 promotes RanGTP-dependent γ-tubulin recruitment and microtubule nucleation in mitotic spindle formation. Yokoyama H, et. al., Nat Commun. 2014; 5:3270.
- CHD4 is a RanGTP-dependent MAP that stabilizes microtubules and regulates bipolar spindle formation. Yokoyama H, et. al., Curr Biol. 2013; 23(24):2443-51.
- ISWI is a RanGTP-dependent MAP required for chromosome segregation. YokoyamaH,et. al., J Cell Biol. 2009; 187(6):813-29.

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