



アドバンス生命理学特論
Advanced Biological Science



GTR Seminar

How chromosomes become prepared for mitosis



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NEOREX PLACE (理学南館) Seminar Room

To maintain genetic integrity, a whole set of chromosomes must be inherited by daughter cells when cell division occurs. This process relies on chromosome segregation in mitosis. Errors in chromosome segregation would cause cell death and various human diseases such as congenital disorders and cancers. My talk will focus on two major events of chromosome preparation for segregation in human cells, which occur in early mitosis (prophase and prometaphase) – first, chromosome re-organization involving resolution and compaction of sister chromatids; second, interactions between chromosomes and the mitotic spindle, which provide forces for chromosome segregation later in mitosis.

To analyze sister chromatid resolution and chromosome compaction, we recently developed a novel real-time live-cell assay (Eykelboom et al 2019; PMID 30858191). This study and our subsequent work suggest that the two processes should be coordinated to ensure correct chromosome segregation. I will discuss how these two processes are coordinated by the protein complexes condensin I and II, and what is the outcome if this coordination is impaired. Furthermore, we also found that, for efficient and correct interaction with the mitotic spindle, chromosomes must be properly positioned by the actomyosin network, which is formed around the nucleus during prophase and shows contraction during early prometaphase (Booth et al 2019; PMID 31264963). I will discuss how the contraction of the actomyosin network facilitates chromosome interactions with the mitotic spindle.

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