FASSBERG SEMINAR SERIES

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special date & time

Cell division: learning from reconstitution

During mitotic cell division, each daughter cell receives from its mother cell an exact, full copy of the genome. For this to happen, the sister chromatids in the mother cell must bi-orient on the mitotic spindle. Sister chromatid separation at the metaphase-to-anaphase transition then leads to equal segregation of the genome to the two daughters.

Chromosome attachment to spindle microtubules takes place at complex protein structures named kinetochores, which contain multiple copies of as many as ~30 individual core subunits. This stable protein core emerges from a specialized region of the chromosome known as the centromere. Microtubule binding by kinetochores is subject to a feedback control mechanism known as error correction (ER), and whose purpose is to detect improper configurations of the attachments and allow their regression. This mechanism is believed to require a force sensor capable of monitoring differences in the action of forces acting on kinetochores when they are bi-oriented (correct attachments) or not (incorrect attachment). The molecular nature of this force sensor remains unclear.

In addition, kinetochores determine the timing of mitotic exit by exercising control over the cell cycle machinery through the spindle assembly checkpoint (SAC). The SAC coordinates completion of bi-orientation with the transition to anaphase, preventing premature mitotic exit in the presence of incompletely attached sister chromatid pairs. All SAC components are recruited to kinetochores and regulated there in a way that reflects attachment status but that remains poorly understood.

In the last several years, our laboratory engaged in the *in vitro* reconstitution and in the structural and functional characterization of several kinetochore sub-complexes that operate at the interface between chromatin and microtubules. We also reconstituted crucial aspects of SAC signaling, identifying a rate-limiting step in the pathway, as well as a set of catalysts that accelerate the accumulation of the checkpoint effector, the mitotic checkpoint complex (MCC).

Host: Melina Schuh

Wednesday / 27.02.2019 / 14:00

Max Planck Institute for Biophysical Chemistry
Large Seminar Room / Administration Building