CDB SEMINAR

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16:00~17:00 Auditorium C1F

Mouse embryo keeps paternal chromosomes away from maternal spindle to maintain the ploidy during fertilization

Summary

The maintenance of ploidy in early embryo is important because the failure leads to miscarriage or birth defect. It is well known that embryo inherits two copies of each chromosome, one each from mother and father. However, at the moment of sperm-egg fusion, although sperm contains only one copy, egg is arrested at metaphase of meiosis II and still contains two copies in mammals. Therefore, after the fusion, half of maternal chromosomes have to be discarded into polar body, but not paternal ones. Even though it is important to understand how embryo manages these chromosome behaviors, the mechanism is completely unclear. Here we found that embryo actively keeps paternal chromosomes away from the maternal spindle during fertilization. This mechanism is essential to maintain the ploidy because the mislocalization of paternal chromosomes leads to their discarding into polar body. We demonstrated that maternal chromosomes block sperm-egg fusion around the spindle by eliminating the localization of sperm receptor Juno. After the fusion, there is an actin-dependent cytoplasmic streaming from maternal chromosomes and it flows paternal chromosomes away from the spindle. These findings reveal how early embryo manages to synchronize paternal and maternal genome, and be ready for development.

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