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LS-13-P-3296 Spindle aparatus during transition from meiosis into mitosis

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Aneuploidy has critical consequences such as miscarriages, stillbirths and severe mental and physical defects. An improper number of chromosomes mainly results from errors in chromosomal segregation during the meiosis and the first mitotic divisions after fertilization. During early development mammalian embryo divides mitotically several times and it seems that those few first divisions are different than mitosis in somatic cells. This developmental period is also associated with the increase of chromosome segregation errors. The mechanisms behind the rise in aneuploidy level during embryonic early stages are still unclear. Employing live cell confocal microscopy we focused on the regulation of the spindle length, duration of the different cell cycle phases and the fidelity of the chromosome segregation during the first four embryonic divisions. We have combined the advantages of live cell imaging with chromosomal spreads and other methods. It gave us the unique opportunity to obtain complete picture of the cell cycle events and results of chromosome segregation in living embryos. According to our data the regulation of spindle length changes between first and second mitosis in developing embryo. Besides regulation of the spindle length we have also discovered that distribution of cohesin, the protein complex, which holds sister chromatids together, is also changing dramatically in the first embryonic mitoses. We believe that our results will help to understanding of basic developmental processes in mammalian embryos.

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