Delays in anaphase initiation occur in individual nuclei of the syncytial Drosophila embryo

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The syncytial divisions of the *Drosophila melanogaster* embryo lack some of the well established cell-cycle checkpoints. It has been suggested that without these checkpoints the divisions would display a reduced fidelity. To test this idea, we examined division error frequencies in individuals bearing an abnormally long and rearranged second chromosome, designated C(2)EN. Relative to a normal chromosome, this chromosome imposes additional structural demands on the mitotic apparatus in both the early syncytial embryonic divisions and the later somatic divisions. We demonstrate that the C(2)EN chromosome does not increase the error frequency of the late larva neuroblast divisions. However, in the syncytial embryonic nuclear divisions, the C(2)EN chromosome produces a 10-fold increase in division errors relative to embryos with a normal karyotype. During late anaphase of the neuroblast divisions, the sister C(2)EN chromosomes cleanly separate from one another. In contrast, during late anaphase of the syncytial divisions in C(2)EN-bearing nuclei, large amounts of chromatin often lag on the metaphase plate. Live analysis of C(2)EN-bearing embryos demonstrates that individual nuclei in the syncytial population of dividing nuclei often delay in their initiation of anaphase. These delays frequently lead to division errors. Eventually the products of the nuclei delayed in anaphase sink inward and are removed from the dividing population of syncytial nuclei. These results suggest that the *Drosophila* embryo may be equipped with mechanisms that monitor the fidelity of the syncytial nuclear divisions. Unlike checkpoints that rely on cell cycle delays to identify and correct division errors, these embryonic mechanisms rely on cell cycle delays to identify and discard the products of division errors.

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