

**CAFFEINE-INDUCED PREMATURE CHROMOSOME
CONDENSATION (PCC) IN THE ROOT MERISTEM CELLS
OF *VICIA FABA***

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The conserved system of cell-cycle checkpoints provides an efficient control mechanism to ensure that DNA synthesis and the segregation of chromosomes in mitosis proceed with an accuracy high enough to preserve genomic integrity. During interphase, the checkpoint-mediated inhibitory pathways give a cell both the time and the means for repair processes to occur before genetic alterations are rendered irreversible and heritable. Our current experiments on the root meristem cells of *Vicia faba* clearly show that caffeine-induced signals which invoke mechanisms allowing the cells to override the intra-S-phase checkpoint control may induce premature condensation of incompletely replicated chromosomes (PCC). Using Feulgen cytophotometry and ³H-thymidine autoradiography, we showed that their appearance varies significantly depending on the stage at which hydroxyurea-blocked S-phase cells were stimulated to enter mitosis. The frequency of cells with PCC and the relative number of cells showing distinct types of PCC may become considerably altered in root meristems treated with protein kinase activators (phorbol 12-myristate, 13-acetate or 1,2-dioctanoylglycerol). Furthermore, we found that despite their highly condensed state, pulverized chromosomes still preserve the ability to incorporate ³H-thymidine, demonstrating the validity of acquired licence for DNA replication.