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Cell cycle arrest as a hallmark of insect diapause: Changes in gene transcription during diapause induction in the drosophilid fly, *Chymomyza costata*

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Kostal V., Simunkova P., Kobelkova A., Shimada K. (2009). Insect Biochemistry and Molecular Biology 39, 875-883

Annotation:

The changes of relative mRNA levels of seven different genes, coding for key cell cycle regulatory factors (Cyclins D and E, kinases Wee1 and Myt1, Phosphatase Cdc25 (String), Dacapo (p27), and Pcna) were performed using qRT-PCR method. Two reference genes (Rp49 and β-tubulin) served as a background. Significant transcriptional response to photoperiodic transfer were observed for two genes. While the relative levels of Dacapo mRNA increased during the rapid entry into G2 arrest, the Pcna expression was significantly downregulated during the beginning of G0/G1 arrest. Moderate transcriptional upregulations of the genes coding for two cell cycle inhibitory kinases, Wee1 and Myt1 accompanied the entry into diapause. The other genes were expressed equally in all photoperiodic conditions.

Declaration [in Czech]

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Cell cycle arrest as a hallmark of insect diapause: Changes in gene transcription during diapause induction in the drosophilid fly, *Chymomyza costata*

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ABSTRACT

The division cycle of CNS cells was arrested in G0/G1 (86.6%) and G2 (12.8%) phases in diapausing larvae of *Chymomyza costata*. A two-step response was observed when the diapause was induced by transferring the 3rd instar larvae from long-day to short-day conditions: first, the proportion of G2-arrested cells increased rapidly within a single day after transfer; and second, the increase of G0/G1-arrested cells started with a delay of 5 days after transfer. The changes of relative mRNA levels of seven different genes, which code for important cell cycle regulatory factors [Cyclins D and E, kinases Wee1 and Myt1, phosphatase Cdc25 (String), Dacapo (p27), and PCNA] were followed using qRT-PCR technique. Two reference genes (*Rp49* and ß-*tubulin*) served as a background. Significant transcriptional responses to photoperiodic transfer were observed for two genes: while the relative levels of *dacapo* mRNA increased during the rapid entry into the G2 arrest, the *pcna* expression was significantly downregulated during the delayed onset of G0/G1 arrest. In addition, moderate transcriptional upregulations of the genes coding for two inhibitory kinases, *wee1* and *myt1* accompanied the entry into diapause. The other genes were expressed equally in all photoperiodic conditions.

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