

Diversity of the expression profiles of late embryogenesis abundant (LEA) protein encoding genes in the anhydrobiotic midge *Polypedilum vanderplanki*

Hatanaka R., Gusev O., Cornette R., Shimura S., Kikuta S., Okada J., Okuda T., Kikawada T.
Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

Abstract

© 2015, Springer-Verlag Berlin Heidelberg. Main conclusion: In the anhydrobiotic midge *Polypedilum vanderplanki*, LEA family proteins are likely to play distinct temporal and spatial roles in the larvae throughout the process of desiccation and rehydration. The larvae of the anhydrobiotic midge, *P. vanderplanki*, which can tolerate almost complete desiccation, accumulate late embryogenesis abundant (LEA) proteins in response to drying. Using complete genome data of the midge, we have identified 27 PvLea1-like genes based on the similarity to previously characterized PvLea1 gene belonging to group 3 LEA proteins. Generally, group 3 LEA proteins are characterized by several repetitions of an 11-mer motif. However, some PvLea genes lack the canonical motif in their sequences. We performed the detailed characterization of all 27 PvLea genes in terms of biochemical and biophysical properties and conserved motifs. The motif analysis among their amino acid sequences revealed that all 27 PvLEA proteins have at least one of two types of motifs (motif 1: G AKDTTKEKLGE AKDATAEKLG or motif 2: KD ILExAKDKLxD AKDAVKEKL), indicating the presence of at least two repeated 11-mer LEA motifs. Most of PvLEA proteins were localized to the cytosol. We also performed quantitative real-time PCR of all 27 PvLea genes in detail during the process of desiccation and rehydration. The expression of these genes was upregulated at the beginning of dehydration, the latter phase of the desiccation process and on rehydration process. These data suggested that each LEA protein is likely to play distinct temporal and spatial roles in the larvae throughout the process of desiccation and rehydration.

<http://dx.doi.org/10.1007/s00425-015-2284-6>

Keywords

Anhydrobiosis, Desiccation tolerance, Gene expression, Late embryogenesis abundant (LEA) protein, *Polypedilum vanderplanki*, Subcellular localization