P1

Characterization of a Silkworm Thioredoxin Peroxidase That Is Induced by External Temperature Stimulus and Viral Infection

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A thioredoxin peroxidase (TPx) that reduces H_2O_2 was firstly characterized in the lepidopteran insect, silkworm *Bombyx mori*. The *B. mori* TPx (BmTPx) cDNA contains an open reading frame of 585 bp encoding 195 amino acid residues and possesses two cysteine residues that are characteristic of 2-Cys subgroup of peroxiredoxin family. The deduced amino acid sequence of the BmTPx cDNA showed 78% identity to *Drosophila melanogaster* (DmTPx-1), 73% to *Aedes aegypti* (AaTPx), and 54% - 48% to other insect 2-Cys TPx. The cDNAencoding BmTPx was expressed as a 25-kDa polypeptide in baculovirus-infected insect Sf9 cells. The purified recombinant BmTPx was shown to reduce H_2O_2 in the presence of electrons donated by dithiothreitol and shown to be active in the presence of thioredoxin as electron donor. Northern blot analysis revealed the presence of BmTPx transcripts in all tissues examined. Western blot analysis showed the presence of the BmTPx in the fat body and midgut, but not in the hemolymph, suggesting the BmTPx is not secretable. When H_2O_2 was injected into body cavity of *B. mori* larva, BmTPx mRNA expression was up-regulated in the fat body tissues. Interestingly, the expression levels of BmTPx enzyme in the fat body were particularly high when *B. mori* larva was exposed at low (4 °C) and high (37 °C) temperatures or baculovirus infection, suggesting that the BmTPx seems to play a protective role against oxidative stress caused by temperature stimuli and viral infection.