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Characterization of a Foldase, Protein Disulfide Isomerase in the Protein Secretory Pathway of *Bombyx mori*

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We have isolated a complementary deoxyribonucleic acid clone that encodes the protein disulfide isomerase of *Bombyx mori* (bPDI). This protein has a putative open reading frame of 494 amino acids and a predicted size of 55.6 kDa. In addition, 2 thioredoxin active sites, each with a CGHC sequence, and an endoplasmic reticulum (ER) retention signal site with a KDEL motif were found at the C-terminal. Both sites are typically found in members of the PDI family of proteins. The expression of bPDI messenger ribonucleic acid (mRNA) was markedly increased during ER stress induced by stimulation with calcium ionophore A23187, tunicamycin, and dithiothreitol, all of which are known to cause an accumulation of unfolded proteins in the ER. We also examined the tissue distribution of bPDI mRNA and found pronounced expression in the fat body of insects. Hormonal regulation studies showed that juvenile hormone, insulin, and a combination of juvenile hormone and transferrin (although not transferrin alone) affected bPDI mRNA expression. A challenge with exogenous bacteria also affected expression, and the effect peaked 16 hours after infection. These results suggest that bPDI is a member of the ER-stress protein group, that it may play an important role in exogenous bacterial infection of the fat body, and that its expression is hormone regulated.