

Both *Lymantria Dispar* Nucleopolyhedrovirus Enhancin Genes Contribute to Viral Potency

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Abstract

Enhancins are a group of proteins first identified in granuloviruses (GV) that have the ability to enhance nuclear polyhedrosis virus potency. We had previously identified an enhancin gene (E1) in the *Lymantria dispar* multinucleocapsid nucleopolyhedrovirus (LdMNPV) (Bischoff and Slavicek, J. Virol. 71:8133-814, 1997). Inactivation of the E1 gene product within the viral genome lowered viral potency by an average of 2.9 fold. A second enhancin gene (E2) was identified when the entire genome of LdMNPV was sequenced (Kuzio et al., Virol. 253: 17-34, 1999). The E2 protein exhibits approximately a 30% amino acid identity to the LdMNPV E1 protein as well as the enhancins from *Trichoplusia ni* GV, *Pseudaletia unipuncta* GV, *Helicoverpa armigera* GV, and *Xestia c-nigrum* GV. Northern analysis of viral RNA indicated the E2 gene transcripts are expressed at late times post-infection from a consensus baculovirus late promoter. The effect of the enhancin proteins on viral potency was investigated through bioassay using two recombinant viruses, one with a deletion in the E2 gene (E2del) and a second with deletion mutations in both enhancin genes (E1delE2del). The enhancin gene viral constructs were verified by Southern analysis and were shown not to produce enhancin gene transcripts by northern analysis. The E2del virus exhibited an average decrease in viral potency of 1.8 fold compared to wild-type virus. In the same bioassays the recombinant virus E1cat, which does not produce an E1 gene transcript, exhibited an average decrease in viral potency of 2.3 fold compared to control virus. The E1delE2del virus exhibited an average decrease in viral potency of 12 fold compared to wild-type virus. Collectively, these results suggest that both LdMNPV enhancin genes contribute to viral potency, that each enhancin protein can partially compensate for the lack of the other protein, and that both enhancin genes are necessary for wild-type viral potency.