Promoter Activities of *Cotesia plutellae* Polydnavirus and Application for Improved Baculoviral Insecticides

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Cotesia plutellae polydnavirus (CpBV) is obligate mutualistic insect virus found in parasitic wasp, *Cotesia plutellae*. Genomes of CpBV consist of several double-stranded, circular DNA molecules with variable size. In this study, we cloned CpBV genomic segments using plasmid capture system (PCS), and 27 different segments ranging from 0.1 to 25.5kb were cloned. Among these, the complete nucleotide sequence of CpBV-S30 segment was determined and seven putative ORFs, which showed similarities with known proteins were predicted. The promoter activities of these seven ORFs were investigated using baculovirus expression system and EGFP as reporter. While the ORF3002 promoter showed highest activity in transient expression, ORF3004 and ORF3006 promoter showed the highest activity in insect cells and larvae, respectively in expression assay using recombinant baculoviruses. To improve the insecticidal activities of *Autographa californica* nucleopolyhedrovirus (AcNPV) by expressing AaIT under the control of these early promoters of CpBV-S30, recombinant AcNPVs, Ac3003ProAaIT, Ac3004ProAaIT, Ac3005ProAaIT and Ac3006ProAaIT expressing AaIT under the control of ORF3003, ORF3004, ORF3005 and ORF3006 promoter, respectively were constructed. Among these recombinant viruses, Ac3006ProAaIT showed highest insecticidal activity against 3rd instar larvae of *Spodoptera exigua*. These results suggested that early promoters from CpBV could be successfully applied to improve pathogenicity of baculoviruses.