Importance of ME53 C4 Zinc Fingers on the Activities of Baculovirus AcMNPV Protein ME53

The Autographa californica multiple nucleopolyhedrovirus (AcMNPV) encodes me53, an immediate/early gene that is highly conserved among baculoviruses that infect lepidopterans. The me53 polypeptide is 449 amino acids in length and contains one identified functional domain and two putative C4 zinc finger domains. The identified functional domain is a nuclear translocation sequence from amino acids 109-137 that facilitates the nuclear localization of ME53. One putative C4 zinc-finger motif is located at the C-terminus of ME53, from amino acids 379-399. I identified a second C4 zinc-finger located at the N-terminus of ME53, from amino acids 170 – 209. ME53 is expressed during early and late times of infection, is required for optimal budded virus production, and associates with the nucleocapsid of budded virus. In addition, ME53 colocalizes with GP64, the major envelope protein of AcMNPV, to form distinct foci at the cellular membrane during late times of infection. Thus the protein appears to be multifunctional and its activities could be influenced by one, or both, of the C4 zinc finger domains. Specifically, the N-terminus zinc finger is adjacent to the nuclear translocation sequence of ME53 and may thus regulate transcription, while the C-terminus zinc finger may interact with viral structural proteins important for nucleocapsid assembly and egress. To delineate these putative functions, I will determine the following: the affect that zinc finger deletions (independently and both) have on virus growth, if the zinc fingers influence transcription by binding to viral/host DNA, and how the C4 zinc fingers may influence binding to protein partners.