Protein Engineering of *Bacillus thuringiensis* δ-Endotoxins

Abstract

Protein engineering of insecticidal Bt δ-endotoxins is a powerful tool for designing novel Cry toxins with altered properties, including changing the toxin’s specificity. By following some elementary rules governing the structure/function relationship, it has been possible to create new toxins with modified properties including increased toxicity and binding affinity, enhanced ion-transport activity, and changes in insect specificity. These methods have also produced valuable information and have led to an improved understanding of the mode of action of these important biopesticides. The results discussed in this chapter derive from rational molecular design where protein structure is modified by incorporating single or multiple amino acid substitutions aimed at modifying specific protein functions. In this review, we analyze several protein modifications that have been successfully used for creating stable, functional proteins with minimal structural alterations. The understanding and proper use of protein engineering approaches may help in implementing appropriate pest management strategies by improving the efficacy of these toxins against insect pests.

Keywords

Protein engineering  δ-endotoxins  Protein domains  Protein structure  Designing novel toxins