

The Conformational Analysis of Brevetoxin A, Brevetoxin B, and Ciguatoxin

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Brevetoxin A, Brevetoxin B, and Ciguatoxin are polycyclic marine neurotoxins produced by the dinoflagellates *Kerenia brevis* (Brevetoxin) and *Gambierdiscus toxicus* (Ciguatoxin). These neurotoxins are biological agents that have been identified as the cause of shellfish poisoning and large-scale food poisoning of non-microbial organisms. These molecules function by binding to voltage-gated sodium ion channels in the fish, creating an extended ion channel opening time at lower membrane potentials. The conformation of these toxins is thought to greatly influence their binding behavior and corresponding toxicity, therefore it is important to understand their conformational flexibility. The medium sized rings that make up the structures allow for relative flexibility of the molecule. The conformational searches of these molecules were performed using the Low Mode and Monte Carlo search methods in a one to one ratio in both water and chloroform. The potential energy surfaces were exhaustively searched to find the lowest energy structures. Ensembles were then clustered using XCluster to find geometric similarities. Quantum calculations provided further analysis of low energy structures.