|  |  |  |  |
| --- | --- | --- | --- |
|  | **Components** | **Mechanism of toxicity** | **Pathophysiological effect** |
| Inorganic cations | Zinc  | Enhance anti-cholinesterase activity [3] |  |
| Calcium  | Activates Phospholipase A2 [3] |  |
| Enzymatic components | Phospholipase A2 | Bind to target protein only (due to reciprocity in hydrophilicity, charge and van der Waal’s forces) 🡪 Calcium dependent hydrolysis of membrane phospholipids and glycerophospholipids producing fatty acid + lysophospholipids [2,3,9]   | * Neurotoxicity

-Presynaptic (block the release of Acetylcholine from axon terminus) -Postsynaptic * Myotoxicity
* Cardiotoxicity
* Hemolysis: Anticoagulant and antiplatelet activity
* Hypotension
* Edema
 |
| Hyaluronidase | Decrease connective tissue’s viscosity by hydrolyzing hyaluronan into oligosaccharides + N-acetylglucosamine [3,4]  | * Facilitate the spread of the venom in victim’s tissue [4]
 |
| Proteolytic enzymes (Serine protease and metalloproteases)  | * Breakdown structural proteins/peptides [3]
* Activate prothrombin, clotting factors and protein C [2]
* Thrombin like activities
* Release bradykinin [1]
 | * Hypotension
* Bleeding

[1,10] |
| Cholinesterase  | Hydrolyze Acetylcholine producing choline + acetate at the neuromuscular junction [3] | * Myotoxicity
 |
| L-Amino acid oxidase (LAAO) | Oxidative deamidation of L- amino acids and hydroxy acids [3,11] | * Platelet dysfunction (by blocking the ADP-dependent platelet aggregation)
* Hemorrhage
* Edema
* Induce apoptosis
* Cytotoxicity

[11] |
| 5′-nucleotidases  | Hydrolysis of phosphate at position 5′ of the sugar of DNA or RNA [12] | * Platelet dysfunction
 |
| Non-enzymatic components  | Disintegrins (DIS)  | Block platelet fibrinogen receptorInhibit integrin aIIbb3 [13] | * Platelet dysfunction
* Antiangiogenic activity
 |
| Cysteine-rich secretory proteins (CRISP)  | Block CNG and Calcium channels [14] | * Cytotoxicity
 |
| C-type lectins | Bind to GPIb, GPVI or integrin a2b1 [15] | * Platelet dysfunction
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