Chapter 10

CYTOTOXICITY OF SNAKE VENOMS AND TOXINS: MECHANISMS AND APPLICATIONS

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ABSTRACT

Virtually all snake venoms are capable of inducing cytotoxicity, causing cell necrosis and/or apoptosis at varying degrees. Snake venom cytotoxicity manifests clinically as local necrosis, hemolysis, cardiotoxicity, myonecrosis, kidney injury and so on, either through direct mechanism or in combination with other pathogenic activities of the venom. Cytotoxins (CTXs), first discovered in cobra (genus: Naja) venoms, are the most established cytotoxic component of venom. They are single-chain polypeptides of 59-61 amino acids arranged in a three-finger fold made of anti-parallel β-strands, fortified by 4 disulfide bonds and numerous hydrogen bonds. CTXs are basic proteins with hydrophobic three-finger loops, which extremities are flanked by cationic residues (mainly lysine and arginine). The hydrophobic termini impart the amphipathicity of CTXs, mediating their binding and insertion into anionic phospholipid membranes that leads to deleterious cellular events such as pore formation and lysis, increased intracellular Ca²⁺ ion influx and

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