

Venoms and their Effects

In past years snake venoms have been characterized as being either hemotoxic or neurotoxic in their nature. This characterization has now fallen into disuse and venoms have more recently been classified as being either “mainly hemotoxic” or “mainly neurotoxic”. It is now known, however, that venoms have multiple sites of action and can no longer be classified in either of the previous mentioned fashions.

Hemotoxins

Thrombin-like Enzymes – True vipers and pit vipers possess venoms that contain thrombin-like enzymes affecting the blood and can function as defibrinogenating anticoagulants and/or as procoagulants or clotting agents. Glycoproteins serve as the thrombin-like enzymes.

Neurotoxins

- Pre-synaptic – Some neurotoxic components affect the nervous system by inhibiting the release of the neurotransmitter acetylcholine (Ach) at the neuromuscular junction (synapse). Other pre-synaptic affects cause the neurotransmitter to slowly and constantly leak out thus resulting in only erratic signals to be transmitted from one neuron to the next.
- Post-synaptic – These toxins bind to the acetylcholine (Ach) receptor sites competitively and produce a non-depolarizing neuromuscular block similar to the affect seen in curare.

Digestive Enzymes

Venoms of different snakes have varying types of digestive components. These enzymes begin the digestive process upon injection into the prey item even before the food item is ingested.

Nephrotoxins

The mechanisms that comprise the destructive power of these types of components are not fully understood. Nephrotoxic components may include both direct toxic affects on the kidney, as well as, secondary damage as a result of hypotension (symptoms of dizziness such as wooziness, feeling about to black out, and tunnel vision can be due to insufficient blood flow to the brain), myolysis (Dissolution or liquefaction of muscular tissue), or coagulopathy (A defect in the blood clotting mechanism).

Myolysins

These are most often structurally related with the neurotoxins. These components bind to the muscle fibers and result in a progressive destruction of muscle cells with a release of breakdown products. Myoglobinuria (Excretion of myoglobin in the urine; results from muscle degeneration, which releases myoglobin into the blood). Also secondary renal failure and hyperkalaemia (Abnormal elevation of serum potassium level) can result. Plenty of I.V. fluids are crucial to help the body deal with all the resulting products from cell destruction.

Cytotoxins

The Spreading Factor: Hyaluronidase or Hyaluronic Acid destroys the hyaluronic barrier of cells and breaks down the viscosity of connective tissue. The breakdown of the hyaluronic barrier allows venom components to penetrate any tissues adjacent to the bite site. Much of the swelling and edema of the limbs after an envenomation is due to this destructive process.

Allergic Reaction & Venomous Snakebite

Anaphylactic or allergic reactions to snakebite and envenomation can occur in varying degrees. These types of reactions are not well documented in the scientific literature, however, many hospitals can cite unpublished cases of allergic reaction as related to incident of snakebite. It is very likely that during cases of envenomation many anaphylactic symptoms are masked by the fact that they are similar or the same to many of the same symptoms that result from other components in the venoms. Some of the most common symptoms that would indicate clear cases of allergic reaction are: urticaria (A transient condition of the skin, usually caused by an allergic reaction, characterised by pale or reddened irregular, elevated patches and severe itching, hives), bronchospasm (Spasmodic contraction of the smooth muscle of the bronchi, as occurs in asthma), and hypotension (Abnormally low blood pressure, seen in shock but not necessarily indicative of it).