The black mamba's kiss of death

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Populärvetenskaplig sammanfattning av Självständigt arbete i biologi 2017
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The black mamba (Dendroaspis Polylepis) is among the largest, fastest and most venomous snakes in the world. Capable of reaching speeds up to 20 km/h, the mamba strikes repeatedly, injecting its deadly neurotoxin, leaving its victim paralyzed and convulsing. By analyzing the different toxins that constitutes the venom, researchers have achieved a better understanding of our biological systems as well as discovered new potential pharmaceuticals.

Neurotoxins and their effects

Neurotoxins are toxic compounds that affect our nervous system in different ways. The reason why the black mamba is so dangerous is because its venom is extremely potent, meaning that only a very small amount is needed to kill you. Being bitten by a black mamba almost always means certain death if an antivenom is not administered. Some of the symptoms that the victim might experience are convulsions, paralysis and diarrhea.

Dendrotoxins, a toxin unique to mambas

Most of the black mamba's venom is made up of dendrotoxins which fascinatingly enough, is unique to the genus *Dendroaspis.* When dendrotoxins enters your blood system, they block the voltage-gated potassium ion channels in your nerves. This ultimately leads to muscle spasms since your muscles end up in a hyper-sensitive state.

MIT-1

Mamba intestinal toxin 1 (MIT-1) was actually the first toxin in its own specific family of proteins to be discovered. It has been shown to induce relaxation and contraction in different parts of your intestines, which might explain why victims can get stomach aches and diarrhea.

Calciseptine

The way calciseptine acts is similar to dendrotoxins since they also block ion channels. However, calciseptine blocks calcium channels in smooth muscles as opposed to the blockage of potassium channels done by dendrotoxins. Basically, what the toxin does is inhibit contractions in different places, the heart being one of them. As one might imagine, too much of this toxin would be detrimental to your health, however scientist believe that the toxin can have medical implications as it decreases arterial pressure.

Mambalgin's analgesic effect

Mambalgins stand out because they have no actual toxic effect. In fact, they have been shown to have analgesic effects as strong as morphine. The peptide induces analgesia by binding to acid-sensing ion channels (ASIC) which are associated with sensing pain. By studying this substance, our understanding of the way we sense pain has been deepened which is necessary if we are to produce better analgesics.

What has researching the black mamba venom taught us?

By studying these fascinating snakes' venom, we have further increased our knowledge of the

nervous system. This includes the study of dendrotoxins and calciseptine which has given us information on the structure of the respective ion channel that they block. Furthermore, taking a deeper look at how mambalgins work, we have been able to learn more about the ASICs which are so very important if we are to produce better analgesics.

More information

For further in-depth understanding and knowledge read: Uppbyggnaden av svarta mambans (*Dendroaspis Polylepis*) gift av Yannick Kamali