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## Review Article

### A REVIEW ON SPIDER TOXIN: CHANGING POISON INTO MEDICINE

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#### ABSTRACT

Perfectly said by Paracelsus that “Solely the dose determines that a thing is not a poison”. Previously considered poisons are now considered as the medicines in right dose. As the famous Botulinum toxin which was proved to be neurotoxin, now used as to relief chronic pain, depression, cosmetic etc. Many snake venoms are now used to treat deadly diseases such as cancer etc. This article solely focuses on the spider venoms and its medicinal use.

**Key words:** Paracelsus, dose, poison, spider, venom, medicinal

#### INTRODUCTION

From the beginning of the time, human and spiders have shared common habitats. Since people don't like spiders around them, they tend to kill as many as possible because of various reasons. One of such reasons is the poison in them. But it is discovered that they have this venom to kill their prey and for self defense. They also use this venom for the liquefaction of the solid food since they cannot eat the solid food.

Recently scientists have found that spiders share some of the gene sequence with humans which other arthropods do not share. Quest for knowledge of human beings led them to discover various types of medicinal peptides present in spiders and use them against various diseases.

This article is solely dedicated to list out some of the spider venoms, peptides found in them, mechanism of the peptides and their use in various diseases.

#### TAXONOMY

Spiders are eight legged air breathing arthropods that contain chelicerae with fang for injecting venom.<sup>1</sup>

Kingdom: Animalia

Phylum: Arthropoda

Subphylum: Chelicerata

Class: Arachnida

Order: Araneae

Sub orders: *Mesothelae*, *Opisthothelae*

*Mesothelae* contains the family *Liphistiidae* and genus is *Liphistius*

#### GEOGRAPHICAL DISTRIBUTION

They are found in all the continents of the world except Antarctica. They have established in all types of habitat without sea and air colonization.

#### VENOMS OF SPIDER

Spider venoms consist of various peptide toxins that attracted attention of scientists as promising drug leads in pharmacology and neurobiology. Spider toxins are mostly consisting of 30–50 amino acid peptides having disulfide bonds and function as neurotoxins that modulate ion channels.<sup>2-4</sup>

#### ANTIMICROBIAL ACTIVITY

Current studies have found specific spider toxins that lack cysteine residue and with secondary helical structure. These intriguing peptides are amphipathic in nature and are positively charged exhibiting antimicrobial activity with pore-forming mechanism.<sup>5-12</sup> These spider toxin peptides are of family antimicrobial peptide (AMP). Lycosin-II that is derived from spider *L. singorensis* is a potent, broad spectrum antibiotic which also shows the rapid antibacterial activity against multi drug resistant bacterial strains.

The antibacterial activity of lycosin can be attributed through its membrane binding activity.<sup>13</sup>

#### ANTICARCINOGENIC ACTIVITY

Spider peptides have been proved to have anticancer activity, antifungal activity, antimicrobial, hemolytic activity in various models.<sup>14</sup> Latarcin 2a, a cytolytic peptide, induced the pore formation in bilayers.<sup>15</sup> Study showed that Ltc2a exhibits *in vitro* cytotoxicity against human erythroleukemia cells.<sup>16</sup> In another study it was found that Lycosin-1 suppressed the growth of tumor cells in in-vitro and in in-vivo studies.<sup>17</sup>

#### ANTIARRHYTHMIC DRUG

Stretching of the atrial chambers resulting atrial fibrillation is blocked by the venom isolated from tarantula (*Grammostola rosea*).<sup>18</sup>

#### TREATING ERECTILE DYSFUNCTION

The armed-spider (*Phoneutria nigriventer*) secretes a venom ( $\delta$ -CNTX-Pn2a) that is responsible for the erection in mice as studied by Andrade et al.<sup>19</sup> The study states that the potency and specificity shown by this venom makes it a lead molecule for developing into a medication for the erectile dysfunction.

#### ANTIMALARIAL TOXINS

U1-TRTX-Pc1a (Psalmopeotoxin I) and U2-TRTX-Pc1a (Psalmopeotoxin II) are the peptides obtained from the venom of the tarantula *Psalmopoeus cambridgei* that are effective against the *Plasmodium falciparum*.<sup>20</sup>

#### CONCLUSION

As interesting is the spider toxin, it can be used in curing various diseases. There are many undiscovered peptides and many undiscovered magical powers. Study of structure activity relationship of peptides of the spider venom can make them lead molecule against various diseases. The discovery of the mechanism of action also can solve the mysteries of difference between its poisonous action and medicinal action.

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