Snake venom charms science world

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The King Cobra continues to weave its charm with researchers identifying a protein in its venom with the potential for new drug discovery and to advance understanding of disease mechanisms.

The novel protein named haditoxin has been described in the prestigious Journal of Biological Chemistry (March 12, 2010).

The editorial board of the journal has selected this work as the "Paper of the Week" recognising it as being in the top one per cent of their published articles in terms of significance and overall importance.

Haditoxin was discovered in Professor Manjunatha Kini's laboratory at the National University of Singapore. Co-author of the paper Dr S. Niru Nirthanan, now at Griffith University on the Gold Coast, has characterised the pharmacological actions of haditoxin.

Dr Nirthanan said that haditoxin was structurally unique and therefore expected to have unique pharmacological properties.

"This toxin is like a conjoined twin. It is a relatively large complex made up of two identical protein molecules known as three-finger toxins linked together."

"We know that the family of three-finger toxins display diverse biological actions on the human nervous system, cardiovascular system and blood clotting. Some have directly led to the development of compounds with potent analgesic and blood pressure reducing properties

- so it is likely that haditoxin in its 'conjoined twin' state or as individual components will offer us more novel insights," he said.

Dr Nirthanan, a former clinician who has research interests in pharmacology and neurobiology, said many common drugs such as the widely prescribed blood pressure medication Captopril and anti-clotting drug Eptifibatide have been developed from snake and other animal venoms.

"Researchers have been studying King Cobra venom for over 50 years and yet we are still identifying new compounds. It is a complex cocktail of biological molecules that can change composition depending on the environment, the season or even the snake's diet."

The venom primarily acts on neurotransmitter receptors which regulate communication between nerve cells or between nerves and muscles, resulting in symptoms such as paralysis and respiratory failure.
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He said that from a clinical perspective, the worldwide burden of snakebite is high with up to 125,000 preventable deaths each year and significant public health costs associated with snakebite treatment.

"We may be able to improve management of snakebite as we better understand the mechanism of action of these venoms. However, my research interest is in the therapeutic and pharmacological potential of venom toxins."

While not every new toxin will convert directly into a clinically useful drug, he said there was potential for haditoxin to be a lead compound or template from which to design other drugs.
"Because of the high specificity of these toxins, haditoxin may also be useful as a 'molecular probe' which will help us study neurotransmitter

receptors and their role in disease."

These receptors are important in neurodegenerative conditions such as Alzheimer's and Parkinson's diseases as well as in schizophrenia, anxiety and depressive disorders and nicotine addiction.

Provided by Research Australia

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