

## Snakebites: Don't Be So Hisssterical!

Got any plans this summer? Longing for that crisp-warm air, the lingering craving for a “Cold one”, after a long day, the late sunsets, BBQs and your right to wear flip flops day to night. Ever thought about accounting for the Australian Brown Snake, responsible for 23 of the 35 deaths recorded from 2000 to 2016 amongst those plans? No?

Welcome to Australia, renowned for its chemically equipped fauna. A “Mecca of toxic biodiversity,” Australia is home to 3 of the top 10 most lethal snakes in the world.











Meet the family				
				
<b>Eastern (Common) Brown snake-</b> <i>Pseudonaja textilis</i>	<b>Western Brown snake-</b> <i>Pseudonaja nochalis</i>	<b>Taipan-</b> <i>oxyuranus scutatus</i>	<b>Tiger snake-</b> <i>Notechis scutatus</i>	<b>Death Adder-</b> <i>Acanthopis antarcitus</i>
				
<b>Copperhead-</b> <i>Austrelaps superbus</i>	<b>Rough Scaled snake-</b> <i>Tropidechis carinatus</i>	<b>Mulga snake-</b> <i>Pseudechis australis</i>	<b>Redbellied Black Snake-</b> <i>Pseudechis porphyriacus</i>	<b>Small Scaled Snake-</b> <i>Oxyuranus microlepidotus</i>

Figure 1: Venomous Australian snakes

The majority of snake bites occur due to provocation, and have proven to be a seasonal injury. Increases in the duration of snake activity could perhaps be attributed to the expansion of farmlands and climate change.

Snake venoms are a cocktail of proteins and other small molecules that are able to cause pain and target specific systems or enzymes necessary for metabolic function. The specificity of targets depends on the type of snake, therefore, identification is important in treatment. Australian Elapids are amongst the most potent in causing neurotoxicity and haemotoxicity, by acting on the nervous system and affecting the coagulation (fluidity) of blood, respectively.

### NEUROTOXICITY

A particular enzyme, phospholipase A2, has been found to be present in the venom of poisonous snakes across all families. It is responsible for the damage to many red blood cells, leukocytes that are associated with immunity, skeletal muscle and vascular cells, as well as destroying the junction existing between motor neurons (nerve cells) and muscle fiber, impacting muscular contractions (Hodgson and Wickramaratna, 2002). The smaller molecules existing in the venom could be easily transported across the synapses involved in neural communication. *Are you nervous yet?*

### HAEMOTOXICITY

Snake venom protein components are able to alter physiological mechanisms which govern blood coagulation, causing venom-induced consumption coagulopathy (VICC). In Australia, VICC related intracranial hemorrhage is the 2<sup>nd</sup> most common reason for snake bite deaths, following early cardiac arrest. Victims may experience excessive bleeding or clotting (Yamazaki and Morita, 2007).

## SYMPTOMS

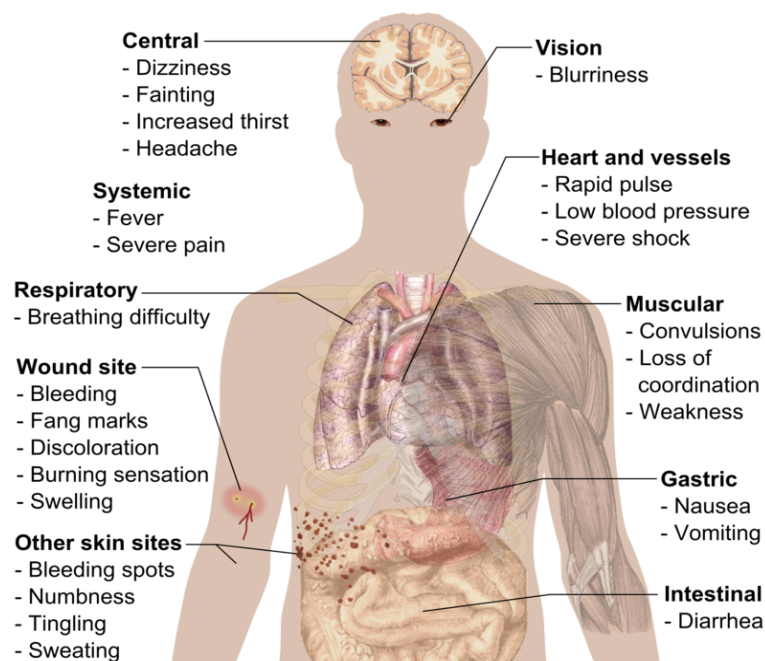


Figure 2: Diagram of the general symptoms of snake bites

## TREATMENT

From traditional healers and “Black Stones” to freezing, burning and shocking, we have now come to treatment using modern medicine. Anti-snake venom (ASV), is an expensive product with an expensive shelf life, often needed most by those who can afford it least (Fry, 2018).

Made by obtaining antibodies, certain proteins that aid in the immune defense, ASV’s are purified, stored and injected into the victim usually upon admission to a hospital. ASVs can be classified by which antigens (venoms) are used in production. Unfortunately, in this case, the more is not necessarily the merrier. Monovalent antivenoms may reduce hypersensitivity reactions, but are limited in effectiveness based on accurate snake identification.

Polyvalent antivenoms are lower in specificity, with a larger volume of specific antibodies that put the victim at a greater risk of unfavourable autoimmune reactions. Benefits of antivenoms may include discontinuation of systemic bleeding after 15-30 minutes of administration and restoration of the coagulability of blood after approximately 6 hours. For severe neurotoxicity, a repeated dosage may be required. It should be noted that this lack of specificity requires larger doses, and is therefore a much less cost-effective option (Slagboom, Kool, Harrison and Casewell, 2017)

Another advocated (Peterson, 2006) form of first-aid treatment in Australia is the use of Pressure Immobilization Method (PIM) which works by restricting the flow of venom through the lymphatic system, preventing absorption (figure 3). Developed in Australia, this technique has proven to be effective, yet is rarely applied correctly (Ahmed et al., 2008). The same study concluded that the effectiveness of the compression bandage is nullified after 10 minutes but should remain as a first aid technique until hospitalization.

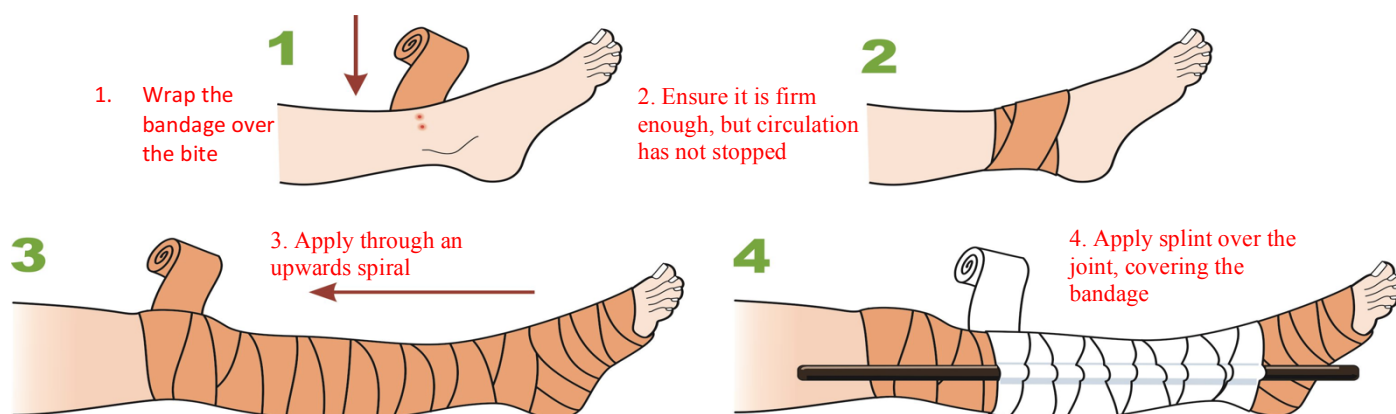


Figure 3: Appropriate application of PIM

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