SNAKES

**INTRODUCTION**

Although we have a great variety of snakes in Southern Africa, approximately 160 species and sub-species, there are only a few which have venom deadly to man.

Although 37 species have fangs and venoms, only 16 different species are regarded as being potentially fatal to man. The other species have venoms less toxic than those of bees, and are regarded as not being dangerous. Antivenom is made for 10 of these snakes.

One non-venomous snake (has no fangs or venom) the African Rock python has also been noted to be responsible for the death of a human.

There are documented deaths from the following species:

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| COMMON NAME | SCIENTIFIC NAME | TREATMENT |

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| Puff Adder | *Bitis arietans* | Polyvalent |
| Gaboon Adder | *Bitis gabonica* | Polyvalent |
| Mozambique Spitting Cobra | *Naja mossambica* | Polyvalent |
| Black Mamba | *Dendroaspis polylepis* | Polyvalent |
| Green Mamba | *Dendroaspis angusticeps* | Polyvalent |
| Snouted Cobra | *Naja annulifera* | Polyvalent |
| Cape Cobra | *Naja nivea* | Polyvalent |
| Forest Cobra | *Naja melanoleuca* | Polyvalent |
| Black Spitting Cobra | *Naja nigricincta woodi* | Polyvalent??? |
| Rinkhals | *Hemachatus haemachatus* | Polyvalent |
| Yellow bellied Sea snake | *Pelamis platurus* | Symptomatic |
| Boomslang | *Dispholidus typhus* | Monovalent |
| Twig snake | *Thelotornis capensis* | Symptomatic |
| Berg adder | *Bitis atropos* | Symptomatic |
| Angolan Coral snake | *Aspidelaps lubricus infuscatus* | Symptomatic |
| Shieldnose snake | *Aspidelaps scutatus* | Symptomatic |
| Rock Python | *Python sebae* | Wounds only. In the event of constriction give CPR. |

*DEFINITIONS:*

*1.* ***Major Bites:***Medical treatment required or death may occur.

*2.* ***Minor bites:***Bites which are often serious, but normally not life threatening. There may have been fatal bites in exceptional circumstances.

*3.* ***Dry bite:*** *Although* the snake has bitten the person - no envenomation has taken place.

*4.* ***Venom****:* A substance secreted by specialized glands of certain animals, such as snakes. These animals have evolved with venom apparatus as means of capturing prey or for defence or for both.

*5.* ***Poison:***A toxic secretion discharged by a living organism, e.g. frogs or plants. These animals or plants do not have apparatus to inject toxins into an attacker, but store it in various parts of their body.

6. ***Front fanged snake:*** Mamba's, Cobra's and Sea snakes

7. ***Hinged front fanged snakes:*** Adders

8. ***Neurotoxins:*** Venoms that affect the nervous system.

9. ***Cytotoxins:*** Venoms that destroy tissue.

10. ***Haemotoxins:*** Venoms that affect the blood especially the coagulation.

11 **Myotoxins:** Venoms that destroy muscle.

*12.* ***Polyvalent Anti-snakebite serum:*** Effective against venoms of all cobras, mambas and the big adders to be found in Southern Africa.

13. ***Monovalent Anti-snakebite serum:*** Can only be used for Boomslang – (Dispholidus typus). This is not effective against the venom of the vine snake (*Thelotornis)*, also called bird or twig-snake.

14: ***Serum Sickness:*** Reaction to serum - normally occurring 10 days after being injected. It is characterised by itching rashes and sometimes a rise in temperature and joint pains. Proper treatment (antihistamines and steroids) should alleviate the symptoms.

15.  ***Anaphylactic Shock:***  A rare but far more serious complication is an acute serum reaction (anaphylaxis) with a sudden drop in blood pressure and collapse. The risk of this type of reaction in a healthy person is very slight but those with an allergic disposition, in particular a history of asthma or infantile eczema, should not receive serum unless it is absolutely necessary and then only with the greatest caution.

16.  ***General care:*** Keep the patient quiet and comfortably warm and avoid unnecessary movement Water, tea or coffee may be given if the patient requests it but only in small quantities due to the possibility of vomiting. Artificial respiration may become necessary. All patients should be taken to a hospital or doctor as quickly as possible whether they have shown signs of envenomation and/or have received serum or not.

SNAKE BITE - TWO MAJOR FACTORS TO CONSIDER ARE THE FOLLOWING:

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| --- | --- |
| **ENVIRONMENTAL FACTORS** | **DOMESTIC FACTORS** |
| **1. TIME OF BITE**  Speed of venom absorption will be indicated by the rapid onset of symptoms, which will indicate the severity of the bite. | **1. VICTIM – AGE and WEIGHT**  Will assist in determining the potential for a serious reaction. |
| **2. TEMPERATURE**  The warmer the temperature the more active the snake might be and the more venom it might inject. | **2 PREVIOUS ENVENOMATION**  Determine if patient had been bitten before and if so was antivenom given and for which species? |
| **3. SPECIES AND SIZE OF THE SNAKE.**  If snake can be identified the correct treatment can be administered. The size may assist in estimating the amount of venom that may have been injected. Even though younger snakes might not give off vast amounts of venom it is usually still enough to possibly cause a death. | **3. TREATMENT PRIOR TO ARRIVAL AT HOSPITAL OR RECEIVING MEDICAL HELP.**  1.Did the patient run or walk after being bitten?  2. Was any medication taken - this could retard symptoms? |
| **4. CIRCUMSTANCES THAT LED TO THE BITE**  Was the snake restrained - could envenomate more than an unexpected encounter? | **4. GENERAL CONDITION OF THE PATIENT.**  Has the victim some underlying medical condition or does he/she suffer from allergies? |
| **5. NUMBER OF BITES.**  If the snake bit more than once then more venom would have entered the victim. | **5. STATE OF THE PATIENT.**  Is the victim sober or using any other substances that would make the symptoms worse? |

Anyone bitten by a snake should be referred to hospital or a doctor whether he was treated in the field or not. Treatment with serum should preferably take place under controlled conditions and under medical supervision where possible.

A patient bitten by an identified adder can be dismissed from hospital if signs of poisoning have not appeared after a few hours. Patients bitten by an elapid snake (cobra, rinkhals, mamba) or an unidentified snake should be observed for 12 to 24 hours. A patient suffering from a suspected or known boomslang or vine snake bite should be kept under observation for at least two days.

Snakebite Allergic Effects

Snake venoms contain a variety of proteins, all of which are potentially able to stimulate an immune response in the snakebite victim. This is advantageous when raising antibodies in an animal, as part of the antivenom production process, but is not always useful in the human snakebite victim. After a first exposure, either through a bite, or possibly through breathing in venom particles (in the case of people working with venoms or "milking" snake venom), antibodies may develop against some or all venom components. If IgE antibodies develop, then the person is at risk of a major allergic reaction (anaphylaxis) on subsequent exposure to this or similar venoms. This is the same as a person with major bee sting allergy and the result can be just as lethal.

Not all cases of allergic reaction to snakebite are due to an IgE response, however. Some snakes can sometimes cause a severe "allergic" type response on first exposure. Typically, this is in the form of angioneurotic oedema, characterised by massive swelling of the lips, face and pharynx. The airway can be occluded, a potentially fatal complication. The precise reason for this response to a bite is not fully understood.

**SNAKES ARE DIVIDED INTO THREE GROUPS DUE TO THE EFFECT THAT THE VENOM HAS ON THE VICTIM:**

**CYTOTOXIC eg Puff adders**

**NEUROTOXIC eg Black Mamba**

**HAEMOTOXIC eg Boomslang**

## GROUP A

**TISSUE AFFECTING TOXINS (CYTOTOXIC)**

Major cytotoxic snakes include - PUFF ADDERS,

GABOON ADDERS

MOZAMBIQUE SPITTING COBRA

WESTERN BARRED SPITTING COBRA (Namibia)

WOOD’S BLACK SPITTING COBRA

RINKHALS

Spitting Cobras and Rinkhals have a Cytotoxic and to a lesser extent Neurotoxic venom

Minor cytotoxic snakes include - Stiletto snake (also known as the burrowing asp)

Natal Black snake, (back-fanged)

Horned Adder and Many-horned Adder

Night Adder and Snouted Night Adder

Desert Mountain Adder and Plain Mountain Adder

Berg Adder has both Neurotoxic and Cytotoxic venom.

**The venom and fangs:** In the adder family, venom is injected most often just under the skin into subcutaneous tissue via hollow, movable fangs located in the anterior mouth although because of the size of the fangs intramuscular or intravenous injection also occurs. The cobras do not have movable fangs and these are much shorter so most bites are subcutaneous.

Cytotoxic venom is generally composed of several digestive enzymes and spreading factors, which result in local and systemic injury. Clinically, local effects progressing from pain and edema to ecchymosis (bleeds under the skin) and bullae (watery blisters) most commonly predominate. Hematological abnormalities including benign defibrination with or without thrombocytopenia (increased bleeding and decreased clotting) may result, but severe generalized bleeding is not common.

Coagulopathy and Haemorrhagin Effects. The severity and clinical presentation of coagulopathy will be determined, in part, by the species of snake. In general, first clinical evidence of coagulopathy is often persistent ooze of blood from the bite site, any other areas of recent trauma, venepuncture sites and often from the gums. The area around the bite site may show mild to gross and extensive ecchymosis. Coagulopathy may be severe, yet the victim may be virtually symptom free and thus the severity of envenoming masked. It is particularly because of this danger that at least baseline clotting tests should be routine for most adder bites.

Local or diffuse myotoxicity may result in complications such as compartment syndrome or rhabdomyolysis (destruction of skeletal muscle cells). Other general effects include shock, fasciculations (small local contraction of muscles, visible through the skin), taste changes and vomiting. Rarely, direct cardiotoxicity may occur although Gaboon viper has shown that the heart can be affected in a few recorded cases.

Nephrotoxicity. Renal damage is a common sequelae of bites by many species of snakes and may be primary or secondary and vary from mild transient rises in creatinine and urea levels, detectable only by laboratory tests, through oliguric or anuric renal failure, to rare cases of permanent renal damage (renal cortical necrosis). Careful measurement of urine output is important to detect early evidence of functional renal problems, which are otherwise asymptomatic, at least in the critical early hours after a bite.

Necrosis or tissue death is typical of bites by the Southern African spitting cobras (Naja nigricollis and N mossambica) as well as the Rinkhals. Although the venoms of these snakes contain neurotoxins, necrosis often is the chief or only manifestation of envenoming in man. Occasionally, a combination of neurological dysfunction and tissue necrosis is seen.

In addition to biting, the above mentioned species have a unique defense in which jets of venom are ejected toward an enemy. This unique form of toxicity with these species of cobra and the rinkhals is acute ophthalmia occurring when venom is spat into the eyes. The fangs of these species are specially modified with the discharge orifice on the anterior face rather than at the tip. The effective discharge range of a large snake is at least 2m. Spitting cobras possess great accuracy at placing venom into a victim's eyes, resulting in immediate and intense pain with blepharospasm (twitching of the eyelid), tearing, and blurring of vision. Systemic toxicity does not occur with eye exposure, but corneal ulcerations, uveitis (an inflammation of the middle tunic of the eye), and permanent blindness have been reported in untreated cases. About one-half of the cases ascribed to the spitting cobras showed corneal ulceration, and some victims suffered permanent visual impairment or blindness. Cases ascribed to the Rinkhals are usually less severe.

Pain and swelling occurs almost immediately after the bite from a cytotoxic snake and gradually becomes worse, in the next few hours. (Within 4 to 6 hours it will be more pronounced) It is often described as "cold fire” Later shock develops and this may cause death.

**Immediate symptoms:**

 Immediate pain at the bite site

 Swelling

 Taste changes (such as a metallic taste)

 Eye pain, tearing, blurred vision (with eye exposure to venom from spitting cobras)

 Panic-associated symptoms:

 Nausea and vomiting

 Near loss of consciousness, fainting

**Physical:**

 Fang marks

 Local edema

 Mark and time the border of advancing edema with a pen every 15 minutes.

 Rapid swelling is usually indicative of a severe envenomation.

 Erythema (redness of the skin)

 Ecchymosis (haemorrhagic spots)

 Bullae (watery blisters)

 Bleeding

 Hypotension/Hypertension

 Myokymia (fasciculations)

 Neurological effects

* Acute inflammation of the eye follows venom-spitting exposure and is characterized by ocular congestion, edema of the conjunctiva and cornea, and a whitish discharge.
* Findings of necrosis usually are evident by 48 hours following the bite. Necrosis begins with darkening of the area around the fang punctures. Blistering may follow. Necrosis usually is confined to the skin and subcutaneous tissue, but may be quite extensive. A putrid smell is characteristic.

**First aid:** Do nothing that injures the patient or impedes travel to the ER.

Give general support of airway, breathing and circulation. In addition, minimize activity (if possible), remove jewelry or tight-fitting clothes in anticipation of swelling and transport as quickly and as safely as possible to the ER. Mark and time the border of advancing edema with a pen every 15 minutes. No benefit was demonstrated when a negative pressure venom extraction device (The Extractor - Sawyer Products) was evaluated and additional injury could result. Incision across fang marks is dangerous. Mouth suction is contraindicated.

Lymphatic constriction bands and pressure immobilization techniques may inhibit the spread of venom, but it is not clear whether this improves outcome. Limiting venom spread may actually be harmful for cytotoxic envenomation if it increases local necrosis. Maintain the extremity in a neutral position.

**Tourniquets are not to be used at all for any cytotoxic envenomation.**

If venom is spat into the eyes, they should be immediately and copiously irrigated with any bland fluid, including water or saline solution. When applicable in a hospital setup, initiate and continue irrigation of the eyes with saline. Applying several drops of a topical, ophthalmic, anesthetic agent may be helpful to reduce pain and aid in irrigation. The topical use of 1:1000 epinephrine solution is reported to relieve pain promptly. A fluorescein-aided slit lamp examination helps to find evidence of corneal damage. A brief course of topical ophthalmic antibiotics may be prescribed.

First aid techniques lacking therapeutic value or potentially more harmful than the snakebite includes electric shock, alcohol, stimulants, aspirin, placing ice on the wound and various folk and herbal remedies. Cooling measures and ice have been associated with increased necrotic complications and should be avoided.

Antivenom should not be given in the field because of the risk of severe allergic reactions.

Attempts to secure or kill the snake cannot be recommended because of the risk of additional injury.

**Procedures:**

Fasciotomy may be indicated if measured compartment pressures remain persistently and severely elevated despite judicious use of antivenom.

Compartment syndrome may manifest with subjective complaints of increasing pain and objectively with tenderness on passive muscle stretch, a rock hard feel to the compartment or a diminished capillary refill. However, true compartment syndrome is rare following snakebites, even in patients with severe edema, as most envenomations are subcutaneous.

Myonecrosis has been shown to occur from direct myotoxicity, even in fasciotomized compartments.

It may be difficult to distinguish compartment syndrome from the effects of envenomation. Similar to compartment syndrome, cytotoxic envenomation may cause a bluish discoloration of the skin or pallor (due to subcutaneous bruising), severe swelling and pain.

If effects are only due to envenomation without compartment syndrome, capillary refill will be normal and compartmental pressures will not be elevated.

**SNAKES, WHICH HAVE PREDOMINATELY CYTOTOXIC VENOMS**

**PUFF ADDER *Bitis arietans arietans***

DISTRIBUTION:

Whole of South Africa

DESCRIPTION:

Head flattened and broad - (diamond shaped). Body short and stocky. Adults average less than a metre.

COLOUR:

Shades of yellow-brown, and brown with darker brown to black chevron markings pointing towards the tail.

REPRODUCTION:

Ovoviviparous – (live bearing) Brood size: average 15-40. Length of young: 10-20cm

GENERAL NOTES:

These snakes rely on camouflage and immobility to escape detection. They emit a loud hissing sound as warning and will strike from a coiled position. Fang Length: 10-18mm. Venom yield 100-350mg. 100mg is considered fatal. They are probably the fastest striking snake we have in South Africa.

**GABOON ADDER *Bitis gabonica***

DISTRIBUTION:

Northern Kwazulu-Natal.

DESCRIPTION:

Head flattened and broad – (Triangular in shape). Body short and stocky. Adult’s length: fairly large up to 1.5 meters

COLOUR:

The back has a geometric pattern in brown and purple, interspersed with pastel colours. The underside is light in colour with darker blotches. The head is a pale buff colour.

REPRODUCTION:

Ovoviviparous - Brood size: 15-40 young. Length of young: 235-350mm

GENERAL NOTES:

These snakes also rely on camouflage and immobility to escape detection. They emit a loud hissing sound as warning and will strike from any position. Fang Length: 40mm. Large amounts of venom are produced - 450-600mg although 90-100mg are fatal in humans. Bites are a rare occurrence due to the limited distribution in SA and the fact that these snakes are slow to anger.

**MOZAMBIQUE SPITTING COBRA M'fezi  *Naja mossambica***

DISTRIBUTION:

Kwazulu-Natal, Gauteng, Mpumalanga, Northwest and Limpopo province.

DESCRIPTION:

Sturdy, slender snake. Adults average 1 to 1,5 m in length.

COLOUR:

Above: Slate grey or brownish. Scales have darker edges. Below: Salmon pink with broken black bands or blotches on the throat area.

REPRODUCTION:

Egg clutches: 10-20 eggs. Hatchling: 20-25cm long

GENERAL NOTES:

If cornered it may spread a hood. Fangs are modified for spitting. It can spit its venom to a distance of 2m. This snake does not have to lift its body and make a hood to be able to spit. Spits repeatedly. It is a very active and alert snake and the eyesight seems to be better than most other cobras. The juveniles have been recorded feigning death when molested. Adults usually move around at night whereas the juveniles can be found foraging during the day. Both adults and juveniles can be found in trees as they are good climbers. They swim well and often swim across open water in search of food. Spitting cobras are often found near dwellings where they raid chicken coops. Rats and mice which come to feed on the chicken food are also another source of food and as such lure these snakes to a specific area.

**WOODS BLACK SPITTING COBRA  *Naja nigricincta woodi***

DISTRIBUTION:

Western Cape, Namaqualand, Southwestern Namibia

DESCRIPTION:

Long, sturdy snake with a broad head. Average 1,5m but may reach 2m in length.

COLOUR:

Uniform olive-brown to jet-black above. Grey to black underside. Broad dark throat band.

REPRODUCTION:

Egg Clutches: 7- 20 eggs. Hatchlings: 20-30cm in length.

GENERAL NOTES:

When threatened these snakes will lift a possible third of its body length off the ground and spread a hood. It will spit at the first possible opportunity and will readily bite. It can also spit without spreading a hood. The venom supply seems to be endless and they will spit venom for continuous periods without a noticeable drop in supply.

**RINKHALS** *Hemachatus haemachatus*

DISTRIBUTION:

Southern Cape, Free State, Kwazulu Natal, Gauteng and Mpumalanga.

DESCRIPTION:

Sturdy snake with keeled scales. Length 1-1,5m

COLOUR:

Above: Dark brown or slate grey or dark black. Below: Same as above with two or three white bands on the throat. A yellow/orange and black banded form occurs in the Eastern Cape and southern Natal. Juveniles from the other areas are often banded grey and black.

REPRODUCTION:

Ovoviviparous - live-bearing 20-30 young. Length at birth: 14 -18cm

GENERAL NOTES:

If cornered it will lift half of its body from the ground and spread a hood. It also spits venom but always from a reared position. This snake is also known to “sham “ death and will turn on its back with the mouth slightly open and the tongue may even hang out of its mouth. When turned over it will however roll back onto it’s back. It can still strike from this position and will chew to envenomate the assailant.

### GROUP B

#### NERVE AFFECTING TOXINS (NEUROTOXIC)

Major neurotoxic snakes include - BLACK MAMBA

GREEN MAMBA

CAPE COBRA

FOREST COBRA

SNOUTED COBRA (Egyptian Cobra)

SEA SNAKES

Minor neurotoxic snakes include - Coral Snakes

Shield Nose Snakes

Garter Snakes

The Elapid group: To many people, the cobras and mambas are the quintessential venomous snake. Most of these snakes elevate the head and spread the neck as a threat gesture. However, a number of other snakes, venomous and non-venomous, employ this defense as well. However when encountered, cobras and mambas usually try to escape, but occasionally defend themselves boldly and may appear aggressive.

**The venom: Non spitting c**obra and mamba envenomation is an extremely variable process. Some species cause profound neurological abnormalities (eg, cranial nerve dysfunction, abnormal mental status, muscle weakness, paralysis, and respiratory arrest).

**Mortality/Morbidity:**

It is difficult to determine the exact cobra and mamba contribution to overall snakebite morbidity and mortality. In most cases, bitten individuals do not see the snake well enough to identify it.

Mamba bites are considered more serious than bites from other elapid species. This is due to greater volumes of injected venom and more rapid onset of neurotoxic symptoms. Mortality is also higher.

CLINICAL

**History:**

Cobra and mamba bites occur in 2 scenarios. By far, rural, agricultural workers and other indigenous people in Africa receive most bites while working barefoot in the fields. In many cases, captive snakes usually cause bites, with zookeepers and amateur collectors at greatest risk.

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Not all snakebites result in envenomation. In the case of cobras, the percentage of dry bites may be quite high, 45% in one series of 47 cases from Malaysia. (In another series, 1 of 3 snake charmers bitten by large king cobras showed no signs of envenoming.) Mambas are not inclined to give dry bites and any encounter should be taken as a possible emergency.

Most snakebites are inflicted on body extremities. Since these snakes usually only bite when molested, bites on the hands and feet are common.

The onset of symptoms and signs following a neurotoxic snake bite can be extremely variable.

 Immediate, local pain (almost always present)

 Soft tissue swelling (may be progressive)

 Neurological findings, which may begin early and be rapidly progressive (in anecdotal cases, victims have suffered respiratory arrest in a matter of minutes), or they may be delayed in onset as long as 24 hours

 Alteration of mental status (e.g., drowsiness, occasionally with euphoria)

 Complaints related to cranial nerve dysfunction, such as ptosis (often one of the earliest neurotoxic findings), ophthalmoplegia, dysphagia (swallowing difficult, and dysphasia (inability to speak words which one has in mind or to think of correct words, coupled with the inability to understand written or spoken words)

 Profuse salivation, nausea, vomiting, and abdominal pain

 Paresis (slight or incomplete paralysis) of neck and jaw muscles and generalized muscular weakness, followed by flaccid paralysis

 Shortness of breathe, respiratory failure (muscular paresis and accumulated secretions)

 Chest pain or tightness

**Physical:**

 Impending respiratory failure

 Respiratory distress or weakness

 Cyanosis

 Neurological dysfunction

 Altered mental status

 Ptosis (may be the earliest sign of systemic toxicity)

 Generalized weakness or paralysis

 Cardiovascular collapse

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Tachycardia or bradycardia (below 60 bpm or over 100 bpm)

Soft tissue edema

Paralysis

Flaccid paralysis caused by neurotoxins affects skeletal muscles and respiration, not cardiac or smooth muscle. For species with potent postsynaptic neurotoxins, paralytic symptoms can develop within 3-15 minutes of the bite and major paralysis within 15-30 minutes, but such cases are the exception. In most cases, clinically detectable paralysis will not be apparent until at least one hour post-bite and may be delayed up to 24 hours. The cranial nerves are usually affected first, with ptosis often the first sign. Other common presenting signs are dysphonia, dysphagia, drooling and diplopia, the latter due to partial ophthalmoplegia. As paralysis progresses drooling may increase, ophthalmoplegia may become total, with fixed forward gaze, often associated with fixed dilated pupils. Limb weakness becomes apparent, the victim usually first noticing ataxic gait, then inability to walk, then stand or even sit up. The neck may become floppy (“broken neck” sign). Deep tendon reflexes will become reduced, then disappear.

Respiratory distress develops and breathing may become shallow, rapid and cyanosis may be apparent. Complete respiratory failure will ensue, unless respiratory support is offered. Time from bite to respiratory failure is highly variable, from as little as 30 minutes (rare) to more than 24 hours, but commonly within 6-12 hours. Without antivenom therapy or anticholinesterases, the period of respiratory failure may vary from less than 24 hours, to several days, or even several weeks.

For those species with potent presynaptic neurotoxins, but low concentrations of postsynaptic neurotoxins, while symptoms and signs are the same, the rapidity of onset is usually slower, with first signs essentially never evident in less than one hour post-bite. Unless paralysis is diagnosed and halted at an early stage, using antivenom therapy, this type of paralysis is not reversible and days, weeks or months may elapse before axonal repair is sufficient for return of neuromuscular function.

In addition to the major features noted above, several other neurotoxic effects may occur. Of particular note are transient or permanent alteration to taste or smell, sometimes leaving the victim with permanent complete anosmia.

Excitatory Neurotoxins - Clinical Effects

Classic neurotoxins are generally considered to be paralysing toxins. These are the typical snake neurotoxins, causing progressive muscle weakness. Most achieve this effect by blocking nerve signal transmission at the neuromuscular junction. However, a few snake neurotoxins effectively cause weakness by overstimulating the neuromuscular junction; an example is the class of mamba toxins known as dendrotoxins.

This effective paralysis by neurotoxins that excite the nervous system is not the only possible effect such toxins may have. Some excitatory neurotoxins cause much more widespread excitation of the nervous system. In doing so they stimulate many types of nerves, resulting in a diversity of effects, which can include pain, sweating, salivation, tearing, piloerection (body hair standing on end), muscle fasciculation, high blood pressure, tingling sensation, particularly around the lips, and flooding of the lungs with fluid (pulmonary oedema). For most excitatory venoms, only some of these clinical effects will be present. For some species, while the venom effects are distressing, they are unlikely to prove lethal, but for a few species these excitatory effects can prove rapidly lethal, especially in young children.

In the case of a suspected bite from a neurotoxic snake prompt movement of the victim to a medical facility capable of rendering advanced care, including airway support and antivenom administration, is critical.

An alternative first aid technique is the Australian pressure immobilization technique. This technique uses an elastic compress (e.g., Ace wrap, clothing, or crepe bandage), wrapped rapidly around a bitten extremity, beginning at the bite site and progressing proximally to encompass the entire limb. The compress should be wrapped as tightly as that of a ligamentous sprain immobilization. The extremity is then splinted and kept at heart level. This technique has been shown to be helpful in delaying systemic absorption of elapid venoms, but its use in other bites remains controversial. Certain literature suggests that attempts to limit spread of venom using ligature or bandage may be life saving.

Prolonged use of arterial tourniquets is unwise, and has caused loss of limb function. A completely occlusive tourniquet is reasonable when a victim has been bitten by a highly toxic snake, such as a mamba or Cape cobra, and is a short distance from medical care. \* A mamba bite is more dangerous than a tourniquet, when used correctly.(Prof. C.J. Reitz - January 1992) The tourniquet (belt, strap, or better a broad rubber bandage as supplied with the snakebite kit) should be placed on the upper limb, depending on the site of the bite. It should be occlusive, but should not be left on for more than one and a half hours, and should be released for 30 seconds every 30 minutes. It must be discarded altogether as soon as an adequate dose of antivenom has been injected intravenously.

The safest method used in South Africa on mamba bites is to apply a pressure bandage and also a tourniquet at once above the already applied pressure bandage. If the tourniquet has to be removed (after 1 and a half hours) the pressure bandage must stay in place. Keep patient calm and monitor breathing. Mouth-to-mouth resuscitation could be used if respiratory failure occurs prior to arrival at the hospital.

**BLACK MAMBA**  *Dendroaspis polylepis*

DISTRIBUTION:

Eastern Cape, Kwazulu-Natal, Gauteng, Mpumalanga, Limpopo and Northwest.

DESCRIPTION:

Long and slender with a narrow head also described as coffin shaped. Adults vary between 2,5m and 3m but they may reach a length of 4m.

COLOUR:

Juveniles are light grey to olive and darkening to gunmetal grey with age. The inside of the mouth is pitch black.

REPRODUCTION:

Egg clutches - 5-12 eggs. Hatchlings: 40-50cm in length

GENERAL NOTES:

This snake is very unpredictable and will not hesitate to strike. They are known to return to a permanent lair. When confronted they will gape and spread a slight hood. Any movement will result in a series of rapid strikes.

An average snake of 2,5m to 3m in length may yield an average of 100-200 milligrams (dry weight) and 50 milligrams is estimated to be a lethal dose for an adult human. The venom of this snake seems to be absorbed quicker than the Green Mamba and to also be more severe. This snake will often bask in the same spot every day. Generally only active during the day. Often huge doses of antivenom are required to neutralize the venom.

**GREEN MAMBA** *Dendroaspis angusticeps*

DISTRIBUTION:

Eastern Coastal area from Pondoland north to Mozambique.

DESCRIPTION:

Long and slender with a narrow head also described as coffin-shaped. Adults vary between 1,5 m and 2,5m

COLOUR:

Bright green above and yellowish green below. Mouth lining usually white but can be black too.

REPRODUCTION:

Egg clutches - 5-15 eggs. Hatchlings: 30-40cm in length

GENERAL NOTES:

This snake is normally arboreal and will seldom move onto the ground. Green mambas are diurnal and will seldom if ever move at night. They are not as aggressive as the Black mamba but will strike if feel threatened. They usually do not spread the small narrow hood like the Black mamba. Being very alert snakes they try to flee, often by moving high into the trees. Green mambas are often found in very high concentrations. The venom is milder than the Black mamba but must still be regarded as a serious bite. Mild necrosis has been recorded for this species but seems to be isolated in specific locations.

**SNOUTED COBRA**  *Naja annulifera [Previously known as the Egyptian Cobra]*

DISTRIBUTION:

Kwazulu-Natal, Gauteng, Mpumalanga, Northwest, Limpopo province and Northern Cape.

DESCRIPTION:

Fairly long and thick bodied snakes. Average 1,2m but may reach 2,5 - 3m in length

COLOUR:

Above: Yellowish brown with darker areas across the ridge of the back. Banded specimens are known with broad brown bands on a yellow background. Below: Yellow mottled with black markings or even broken bands and usually a broad black band on the throat.

REPRODUCTION:

Egg Clutches: 7- 20 eggs Hatchlings: 20-30cm in length.

GENERAL NOTES:

When threatened these snakes will lift a possible third of its body length off the ground and spread a hood. It will however at the first possible opportunity leave the area and seek safety. Juveniles and on occasion adults are known to also “sham” death. Although the venom is similar to the other elapids the bite is often not as severe although it is a potent neurotoxin. Generally it is not an aggressive snake but if cornered it can hiss loudly and rush the assailant.

**FOREST COBRA**  *Naja melanoleuca*

DISTRIBUTION: Eastern Kwazulu-Natal.

DESCRIPTION:

Long but not so slender snakes. It is probably the largest African cobra. Average 1,5 -2m but may reach 2,5 - 3m in length

COLOUR:

Above: Brownish or blackish-brown - very shiny. Below: Yellow or cream mottled with black and brown markings. Tails are bluish-black.

REPRODUCTION: Egg Clutches: 15 - 25 eggs Hatchlings: 35cm in length.

GENERAL NOTES:

When threatened these snakes will lift a possible third of its body length off the ground and spread a narrow hood. They are fast and will climb trees to great heights. Often found near water it is a very good swimmer. It is a bit more aggressive than most other cobras. It is active both at night and during the day.

**CAPE COBRA**  *Naja nivea*

DISTRIBUTION:

Cape Provinces, Free State, Kwazulu-Natal and Northwest province.

DESCRIPTION:

This is a slender cobra and smaller than the Snouted cobra. It averages 1,2m in length but can grow up to 1.7 meters.

COLOUR:

Coloration is varied. May be either butter yellow or mottled yellow and brown or even uniform brown to black. The colours are usually location specific and varies colours will blend in with the surrounding environment. Juveniles have a broad black throat band which fades with age.

REPRODUCTION:

Egg Clutches: 7- 20 eggs Hatchlings: 25-30cm in length.

GENERAL NOTES

When threatened these snakes will lift a possible third of its body length off the ground and spread a hood. It is known that this snake is more aggressive than other cobras and when cornered will rush the assailant. It generally moves around during the day. During mating season it is said to be more irritable. NOTE: The paralysing effect of this venom is more potent than that of other cobras and the effects are not always reversible with antivenom.

**YELLOW-BELLIED SEA SNAKE** *Pelamis platurus*

DISTRIBUTION:

Indian Ocean and African Coast - East Africa to Cape Peninsula

DESCRIPTION:

Adults average 60cm in length. This snake is specially adapted to its aquatic life, with its laterally compressed body and paddle shaped tail.

COLOUR:

Black above and yellow below. The paddle like tail has clear reticulated patterns in yellow and black.

REPRODUCTION:

Ovoviviparous - 4-8 young Length of juveniles - 24cm

GENERAL NOTES:

Normally very placid but will bite if molested. The venom is also said to be myotoxic (muscle destroying) and symptoms will appear within hours after being bitten. Few bites are recorded and to date no serious bites have occurred on our shores. The teeth are very short and often break off when biting humans.

SYMPTOMS:

Numbness. Myalgia [muscular rheumatism - joint pain] Severe pain when moving limbs or head. Urine will turn brown or red. Respiratory failure and death can follow.

TREATMENT

Patient to be admitted to hospital and treated symptomatically as no serum is available.

**GROUP C**

**BLOOD TOXINS (HAEMOTOXIC)**

Major haemotoxic snakes include - **BOOMSLANG**

**BIRD or TWIG SNAKE**

SYMPTOMS.

This type of venom is slow in comparison with the other two types mentioned. Effects can be seen after as little as 1 hour but can take a few days to manifest. The venom causes irregularities in the victim's blood, preventing it from clotting. A bleeding tendency occurs starting with all the mucous membranes and progress to nose bleeds, bruises, blood is found in the urine and vomiting of blood. Anaemia and shock may develop and eventually kidney failure may set in. Slight pain and discomfort and haemorrhage at sight of bite, dizziness and headaches are known to occur.

Fibrin degradation products are cleared through the kidney and secondary renal failure is a potential complication of coagulopathy.

Death usually follows after 2 to 5 days. Antivenom can be administered after a few days and still work effectively however the kidneys would have been damaged by then. In the event that the antivenom is not obtained in time, whole blood and fresh freeze-dried plasma should be administered

TREATMENT:

1. No tourniquet should be applied.

2. No polyvalent serum to be given.

3. If bite has been confirmed as Boomslang the hospital should order the specific monovalent serum from S.A.I.M.R and it would then be injected intravenously. Polyvalent has no effect on these venoms!

**BOOMSLANG**  *Dispholidus typus typus*

DISTRIBUTION:

Throughout Southern Africa, except the Karoo, Namaqualand and Western Cape.

DESCRIPTION:

Adults average between 1,2m and 1,5m in length. It is a slender snake. Very large eyes.

COLOUR:

Juveniles: Light grey to brown above with fine blue spots anteriorly. The throat is yellow to orange in colour. The eyes are a brilliant green.

Adult female: Light brown or olive above and cream to dirty white on the belly.

Adult male: Green to olive green above and light green below OR bright green, with the scales having a black edge, OR dark brown with bright yellow belly. Females can sometimes have typical male colouring.

REPRODUCTION:

Oviparous - 8-12 eggs Hatchling - 25-30cm

GENERAL NOTES:

Normally placid but if provoked the snake will inflate the neck region to twice the normal size, displaying the interstitial skin and the snake will then strike forward with a jerky movement. This snake also has binocular vision and can see very well.

NOTE: If a Boomslang bite is suspected the patient must be observed in a hospital for a period of at least two days. If bite has been confirmed as Boomslang the hospital should order the specific serum from S.A.I.M.R. Blood transfusions and other therapy can be continued while the serum is on its way.

**VINE, TWIG or BIRD SNAKE** *Thelotornis capensis*

DISTRIBUTION:

Limpopo Mpumalanga, and Kwazulu-Natal

SIZE:

These snakes are long and very slender. Adults average 70 cm to 1m in length.

COLOUR:

Grey with grey-black or grey-brown blotches. The head above is blue-green and is heavily marked. These markings differ clearly when looking at different sub-species. The tongue is yellow to red with the tip being black. The pupil is keyhole shaped and it is the only snake with these keyhole shaped eyes.

REPRODUCTION:

Oviparous - 5-15 eggs. Hatchling - 22-30cm

GENERAL NOTES:

This snake is normally found in trees and due to the colouring and the ability to lie motionless this snake camouflages well with its surroundings. As the name implies it looks like a twig or a piece of vine. These snakes do not easily bite humans and will try to “freeze” first, then move away, swell up the throat and then only as a last resort will they bite.

SYMPTOMS.

This type of venom is slow in comparison with the other two types mentioned. The venom causes irregularities in the victim's blood, preventing it from clotting, a bleeding tendency occurs, nose bleeds, bruises, blood in urine and vomiting of blood. Anaemia and shock may develop and even kidney failure may set in. Slight pain and discomfort and haemorrhage at sight of bite, dizziness and headaches are known to occur. Death occurs due to the loss of the blood’s capability to coagulate.

TREATMENT:

1. If a Twigsnake bite is suspected the patient must be observed in a hospital for a period of at least two days. The treatment that should be administered is the same as for the boomslang except that the antivenom does not neutralize this venom and blood and plasma transfusions should save the patient.

2. No tourniquet should be applied.

3. No polyvalent serum is to be given as this is ineffective and potentially more harmful.

# IN A NUTSHELL

PREVENTION:

Leave snakes, spiders and scorpions alone. Never molest them or try to harm them.

Do not walk barefoot at night and use a torch to light your path at night.

Shake your shoes out before putting them on and wear long trousers and boots when in the bush.

Keep your eyes open and look where you put your feet. Do not step over logs and large stones unless you have a clear view of the other side. Snakes love to bask near a retreat and may bite when you step on or near them.

Do not pick up "dead" snakes, as they may only be feigning death and could bite when further molested.

Never put your hands into places you cannot clearly see in. When climbing beware of basking Berg adders

If you do come across a snake stand still - give the snake a chance to retreat - or you may slowly start retreating carefully. Never chase after a snake up a tree because it will feel cornered and may encounter you on the way down if it decides to find another safer place.

More people get bitten while killing or catching snakes than in chance encounters.

Most snakes can only see clearly to about twice the length of their bodies so if you are further away from the snake than this you can safely move around it and leave it alone.

Be careful when picking up dead wood or rocks as these may house snakes, spiders or scorpions. Turn rocks or logs over before picking them up.

IDENTIFICATION :

Snakes with bands either above or below the body could be venomous. There are no lethal snakes which have lines running down its body.

If a snake makes a hood or rears up the chances are good that it is venomous.

Most large snakes (over 2 meters in length) could be lethally venomous with the exception of the Rock Python which needs to be twice that length to be considered dangerous.

A greenish or grayish snake which is over 1.2 meters in length and seen in a tree is probably a dangerous species and if it swells up its neck it is a boomslang or birdsnake.

Even very small snakes could be venomous and should not be underestimated just because of the size.

TREATMENT:

In the event that somebody has been bitten by a snake get to a hospital first and worry about species and toxicity while getting there.

Pressure bandages can be used for most snake bites especially if the hospital is close by.

SAIMR Polyvalent antivenom is effective for nine South African snake species.

SAIMR monovalent is only effective for boomslang envenomation.

Venom in the eyes is not lethal and venom on the skin can be washed off with no ill effects.

Anaphylactic shock can occur during the injection of antivenom.

Shock can produce symptoms which are often confused with envenomation.

Many venomous snakes will not inject venom when they bite and today few people die from snake bites.