**Objective**

- Due to the questionable efficacy of the currently available antivenom, a study was undertaken to identify the scorpion species responsible for cases of severe scorpionism in order to:

  facilitate and/or motivate for the development of a more effective and rapid-acting antivenom.

**Methods**

- A study of all cases of scorpionism (scorpion sting associated with systemic toxicity) dealt with by the Tygerberg Poison Information Centre over a period of 20 years (1990 to 2010) was undertaken.

  - The geographical locations of all cases were recorded.
  - Where available, scorpions were identified.

**Results**

- Of the 148 cases studied, 90% occurred in the Western & Northern Cape provinces.

- In 38 of the 148 cases, the scorpion was available for identification.

- All of the 38 specimens were identified as *Parabuthus granulatus*.
Geographical distribution of 148 cases of severe scorpionism.

Red dots indicate incidence which scorpion specimens were obtained and identified as *P. granulatus*.

Geographical distribution of the 38 identified scorpions.

Discussion

• The syndrome of serious scorpion envenomation is characterized by copious oral and pharyngeal secretions and symptoms and signs of bulbar paralysis.

• The result is loss of protective laryngeal / upper airway reflexes, difficulty in swallowing, upper airway obstruction, aspiration and respiratory failure.

• Children are particularly vulnerable, with a mortality rate of 12 – 15%.

• Death may occur within 1 – 2 hours post envenoming – often while the patient is on route to a medical facility.

• To reduce morbidity and mortality, prompt respiratory support and administration of an effective antivenom is crucial.

• If antivenom is not administered, the toxic syndrome may last days to a week before clearing up.

Scorpions

• South Africa has a rich scorpion fauna with 127 species.

• Most scorpions stings are relatively harmless and cause mild to moderate local pain only.
Four scorpion families occur in South Africa:

- Buthidae (34%)
- Scorpionidae (42%)
- Liochelidae (21%)
- Bothriuridae (2%)

The potentially dangerous and medically important species belong to the family **Buthidae**.

Seven Buthid genera occur in South Africa:

- *Parabuthus*
- *Uroplectes*
- *Hottentotta*
- *Pseudolychas*
- *Lychas*
- *Karasbergia*
- *Afroisometrus*

*Parabuthus* is medically the most important.

- Of the *Parabuthus* species, 22 are endemic to southern Africa.
- Some of the larger species in this genus include:
  - *P. granulatus*
  - *P. transvaalicus*
  - *P. capensis*
  - *P. raudus*
  - *P. villosus*
  - *P. kalaharicus*
  - *P. schlechteri*
  - *P. mossambicensis*

- It was assumed until recently that all of the above larger *Parabuthus* species are equally venomous.
- However, we now know that only two spp, namely *P. granulatus* and *P. transvaalicus*, can cause serious envenoming.
- We now also know that, although *P. transvaalicus* may cause significant systemic envenomation, *P. granulatus* is the no 1 culprit, causing life-threatening scorpionism.
- This finding has also recently been supported by LD50 experiments in mice. (Current PhD study)

**LD50 values of the venom of 5 *Parabuthus* scorpion species.**

Experiments performed on adult Balb C mice. (Meier and Theakston, 1986)

<table>
<thead>
<tr>
<th>Scorpion Species</th>
<th>LD50 Values (mg/kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Parabuthus granulatus</em></td>
<td>1,56</td>
</tr>
<tr>
<td><em>P. transvaalicus</em></td>
<td>4,25</td>
</tr>
<tr>
<td><em>P. schlechteri</em></td>
<td>&gt; 20</td>
</tr>
<tr>
<td><em>P. capensis</em></td>
<td>&gt; 20</td>
</tr>
<tr>
<td><em>P. mossambicensis</em></td>
<td>&gt; 20</td>
</tr>
<tr>
<td>Centruroides noxius (control venom)</td>
<td>1,19</td>
</tr>
</tbody>
</table>

**Geographical distribution of Parabuthus granulatus and P. transvaalicus**
Parabuthus granulatus

(6 – 15 cm)

**Parabuthus granulatus**

**P. granulatus**

**P. transvaalicus**

**P. schlechteri**

**P. granulatus**

**Parabuthus granulatus**

**Habitat and Behaviour of**

**P. granulatus**
In Conclusion

- *P. granulatus* has now for the first time been positively identified as the most venomous scorpion species in southern Africa.
- It is important to note that *P. transvaalicus* (the venom of which is used in the production of the current antivenom) does not occur in the Western and Northern Cape, regions known for a high incidence of scorpionism.

- The most probable reason for the sub-optimal efficacy of the antivenom is that the venom of the wrong scorpion is used in its production.
- In light of this, a strong case exists for the development of a specific *P. granulatus* antivenom, or the inclusion of both *P. granulatus* and *P. transvaalicus* venom in the production of a more effective polyvalent antivenom.

Thank you