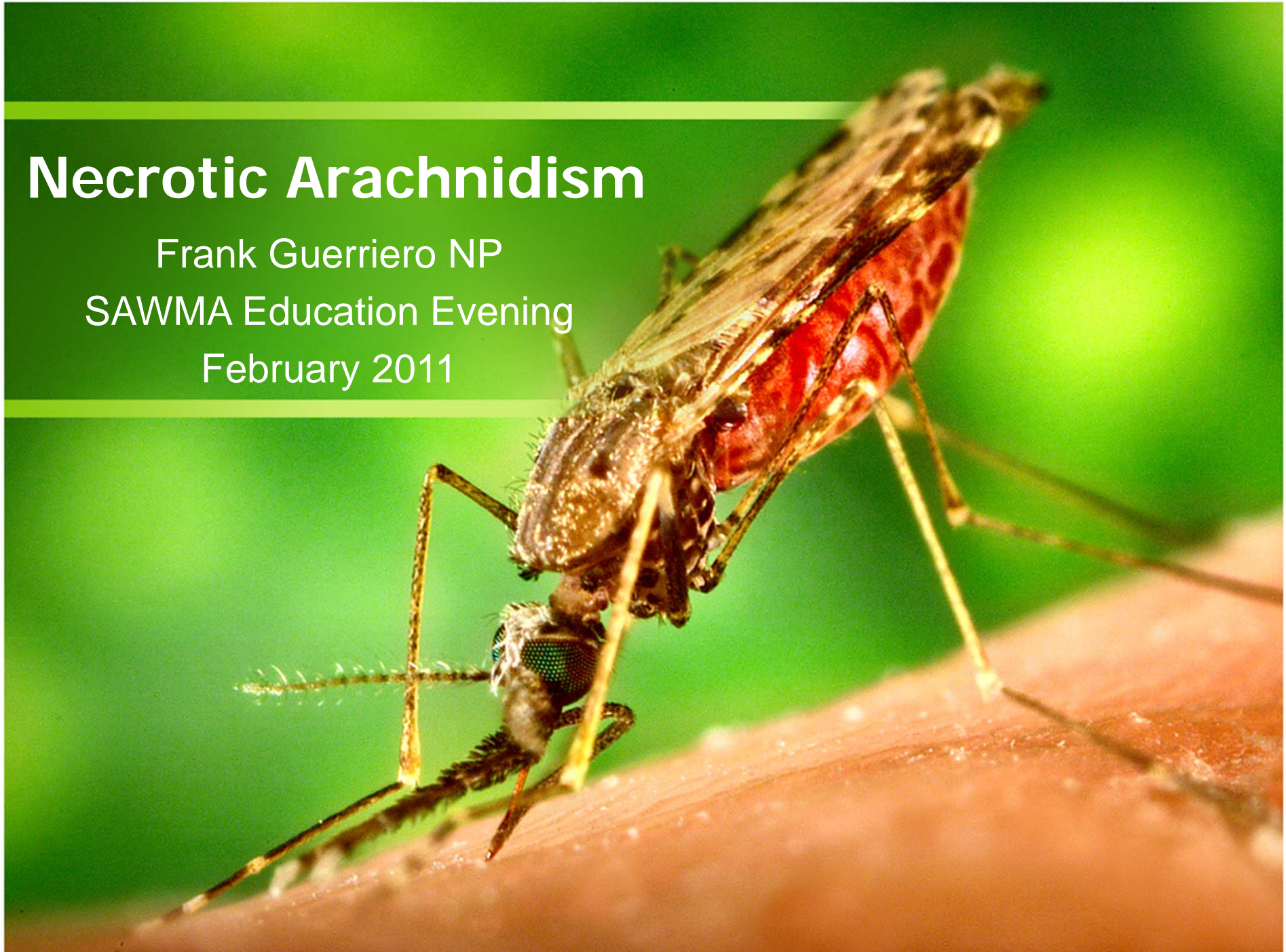


Necrotic Arachnidism

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SAWMA Education Evening
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Necrotic Arachnidism



- Outline
 - Reality Check - Incidence of spider bites in Australia
 - Terminology
 - The Usual Suspects - Species of spiders implicated
 - Pathophysiology
 - Controversy
 - Case example

Reality Check

- Spider Bite Incidence
 - Statistics taken from the BEACH program state:
(Bettering the Evaluation And Care of Health)
 - 2 in 1000 patient encounters (insect bites)
 - Extrapolates out to approx 240,000 insect bite episodes
 - Of these 240,000 episodes Spider Bites account for only 7.3%
 - This equates to 17,500 reported spider bites each year (nationally)

Reality Check

- A species of extreme biodiversity
 - Approximately 40,000 identified species of spiders¹
 - Of these 40,000 only 60 species are capable of biting humans
 - In Australia only 6 spider species have been implicated in causing significant harm to humans
 - Only 3 have been associated with causing significant tissue damage

¹ Charles (2008) *Australian Family Physician*

Terminology

- **Dermonecrosis** – damage or destruction of skin and immediate underlying structures (may involve dermis, epidermis and subcutaneous tissue)
- **Necrotising Arachnidism** – skin ulceration due to spider bite
- **Protease** – an enzyme associated with the breakdown of proteins
- **Hyaluronic Acid** – a complex glyco-protein which serves as a base constituent of connective tissue (extracellular matrix)

The Usual Suspects



- *Loxosceles rufescens*
 - Australian native recluse spider
- *Badumna insignis*
 - Black widow or ‘black house spider’
- *Lampona cylindrata*
 - White tailed spider

The Usual Suspects

- *Loxosceles rufescens*
 - Australian native recluse spider



- Relative of the more infamous *L. reclusa* from the US
- Active hunter
- Likes to hide in dry sheltered spaces
 - Behind picture frames
 - Cardboard boxes
 - Dry wood piles
- Grow up to 20mm long

The Usual Suspects

- *Badumna insignis*
 - Black widow or 'black house spider'



- Grow up to 18mm long
- Commonly found in
 - Window frames
 - Wall crevices
 - Tree trunks
 - Logs
- Passive hunter

The Usual Suspects

- *Lampona cylindrata*
 - White tailed spider



- Active hunter
- Habitats in houses and bush detritus
 - Leaf litter
 - Under bark and rocks
 - Anything inside your house
- Grow up to 18mm long
- Natural predator of *Badumna insignis*

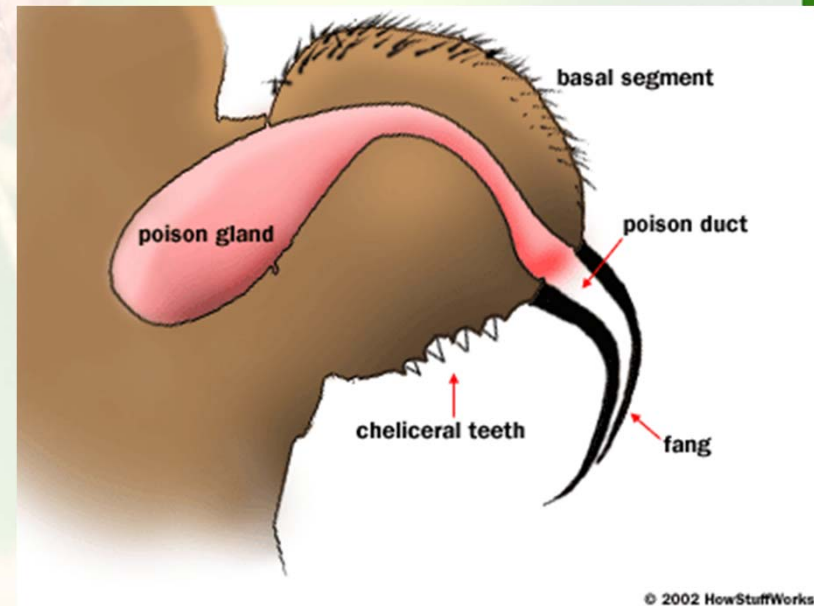
Spider Bite Pathophysiology

- Spider fangs are housed in anatomical equipment known as **chelicerae** (pronounced keh-lis-ser-ree)
- The chelicerae are hinged and muscular, allowing the spider to swing and manoeuvre it's fangs
- The chelicerae allow for the fangs to be stored (retracted) when not in use



Spider Bite Pathophysiology

- Envenomation of prey is achieved through injection via hollowed ducts within the fang
- Poison glands are then contracted and a dose of venom is administered to intended prey
- Spider venom is designed to paralyze or kill insect size prey



Source: <http://animals.howstuffworks.com/arachnids/spider.htm/printable>

Spider Bite Pathophysiology

- In the case of Necrotising Arachnidism
 - The injected venom is believed to facilitate tissue necrosis
 - Necrosis occurs as a result of a cocktail of enzymes²
 - Hyaluronidase – mucolytic enzyme
 - Proteases – protein destroying enzymes
 - Lipases – fat destroying enzymes
 - **Sphingomyelinase D – highly toxic enzyme**

²Young & Pincus (2000) *Toxicon*

Spider Bite Pathophysiology

- **Sphingomyelinase D** ^{2,3}
 - Implicated as the primary toxic component due to affects on:
 - Endothelial cells (oedema and destruction)
 - Red blood cells (destruction)
 - Platelets (aggregation)
- This results in gross localised inflammation, capillary plugging, ischemia and necrosis.

³Wilson, Hagood & Prather (2008) *Ostomy Wound Management*

Spider Bite Pathophysiology

- Wound Manifestation
 - Inflammation and ischemia in hours post bite
 - May develop Bleb or Blister (colours vary)
 - Erythema / discolouration may spread



Spider Bite Pathophysiology



- Wound Manifestation
 - The blister will ‘harden’ and eschar will form
 - At this stage healing may take weeks – months
 - Extent of wound dependant on
 - tissues involved
 - Co morbidities
 - Personal susceptibility

Spider Bite Pathophysiology

- Wound Manifestation
 - Satellite lesions may also develop as the venom spreads



Controversy

- Obtaining a true diagnosis
 - Dependant on correct identification of the spider
 - Exclude/consider other causes
- Elegant and sophisticated study by Young and Pincus (2000)²
 - Study of the 3 spiders implicated in dermonecrosis
 - Sphingomyelinase D only found in venom of *L. rufescens*
 - Sphingomyelinase D was however found in abdomen of black widow and white tail
 - Is this enough to explain the phenomena of dermonecrosis?

Controversy

- More Mud (other evidence)
 - Isbister & Grey (2003) *MJA* – *White Tail Spider*
 - Australian study – prospective data on 130 confirmed bites
 - Results = Pain (100%), redness (83%), itchiness (44%) and systemic (9%)
 - **NO necrotic ulcers**
 - Bias



Controversy

- More Mud (other evidence)
 - Vetter (2008) American experience – Brown recluse ⁴
 - Dissertation on *Loxosceles reclusa*
 - Most bites do **NOT** result in skin lesions
 - Of those that do, only 1/3 suffer complications with healing
 - Higher risk in obese victims

⁴Vetter (2008) *The Journal of Arachnology*



Treatment

- Wound Management will be based on how wound unfolds
- Limited evidence / literature on management
- ALL state **NO SURGERY** or **DEBRIDEMENT** in early stages
- Early stages:
 - Rest
 - Ice
 - Elevation
(cooling wound limits action of Sphingomyelinase D)
 - Oral NSAID for pain / inflammation



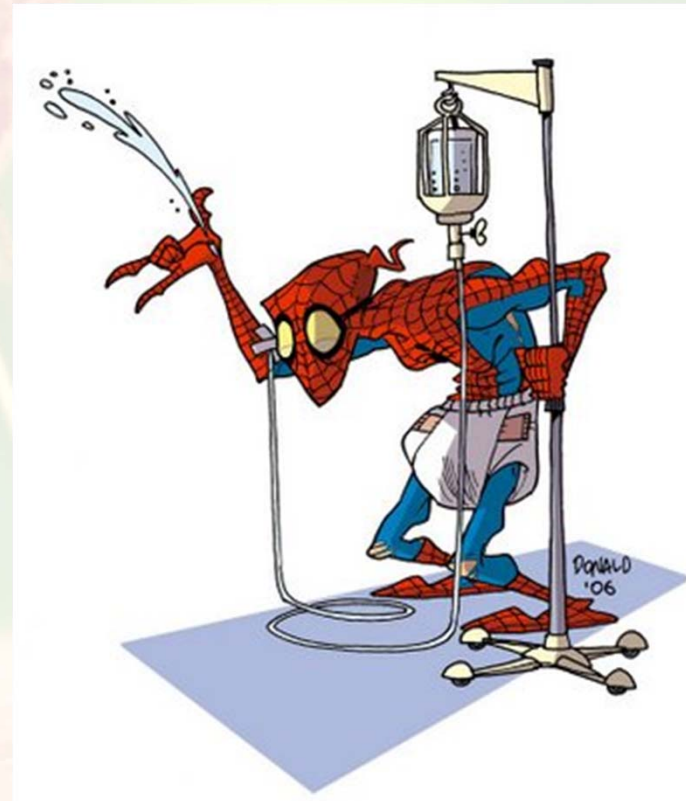
Treatment

- Wound Management
- Ongoing:
 - Antibiotics for cellulitis
 - Tetanus prophylaxis is appropriate
 - Topical antiseptics (Iodosorb, Iodine based products)



Other Therapies

- Dapsone
 - Neutrophil inhibitor
 - Traditionally used to treat leprosy
 - Side effects
 - Limited evidence
- Hyperbaric Oxygen Therapy
- Corticosteroids
- Skin grafts in latter stages





Summary

- Necrotising Arachnidism (NA) is a rare complication of spider bite
- Of the 3 species of spider implicated in NA, causal evidence exists for only one – the local *Loxosceles*
- Diagnosis is often muddled by a lack of correct identification of spider and a lack of consideration of other factors (think wound healing problems)
- Management should follow modern wound management principles – surgery should **NOT** be considered until later stages of healing