

Dr Stephan Sanders

Cold injury and hypothermia

# Case Study 1

- Medical Research Expedition in Himalaya
- Week spent at 5,050m (16,500ft)
- Temperatures below  $-20^{\circ}\text{C}$  ( $-5^{\circ}\text{F}$ )
- On descent TG complains of foot pain
- Worsens with descent
  - Prickly, tingling sensation
  - Extreme pain with minor skin contact
- Feet look slightly swollen; otherwise normal





# Case Study 1

- “Were your feet numb at basecamp?”
- “I don’t know; I couldn’t feel them.”
- **Diagnosis:** 1<sup>st</sup>/2<sup>nd</sup> degree frostbite
- **Management:**
  - Analgesia
  - Early return as unable to walk secondary to pain

# Learning points

- **Do not tolerate numbness**
  - if you cannot feel the end of your boot it is numb
- Tell people you are with if you are numb
- Take adequate equipment for the situation

# Cold injury

- **Freezing**
  - Frostnip and frostbite
- **Non-freezing**
  - Chilblains
  - Immersion foot (Trench foot)

# Frostbite

- Freezing of tissues leading to tissue destruction
- **Medical emergency**
- Affects peripheral areas:
  - Hands
  - Feet
  - Nose/cheeks
  - Ears
- Blood flow varies from 3 to 180ml/min

# Frostbite

- **1<sup>st</sup> Degree** – Partial skin freezing (Frostnip)
  - Pale/blue, waxy, numb, feels stiff
- **2<sup>nd</sup> Degree** – Full thickness skin freezing
  - Pale/blue, waxy, numb, feels stiff
- **3<sup>rd</sup> Degree** – Freezing of subcutaneous tissues
  - Grey/blue/mottled, numb, feels rigid
- **4<sup>th</sup> Degree** – Freezing of muscle/bone/tendon
  - Grey/blue/mottled, numb, feels rigid

# Case Study 2

- JY was climbing a trekking peak in Nepal
- Bad weather resulted in an unplanned bivi
- He returned to basecamp after a cold night complaining of a cold left foot
- His foot looked pale and was completely numb
- Re-warmed using warm water



# Case Study 2

- What degree of frostbite is this?
- What will happen?



# Frostbite for real

- Numb foot/hand
  - Take it seriously
  - Get to a safe, ideally sheltered, location
  - Remove shoe/glove
  - Rewarm in friend's armpit
- After **10min** if no longer numb
  - Eat, drink, wrap up warm, re-evaluate
- After **10min** if **still numb** = Frostbite
  - Do not try to rewarm any further, descend immediately

# Further management

- Rewarming frostbite is intensely painful
  - They will not be able to walk
- Do not rewarm until:
  - There is minimal risk of refreezing
  - Further evacuation can be assisted (ie car, helicopter)
- Rewarm: water 40-44°C (105-110°F)
- Ibuprofen
- No walking, no smoking, get to hospital asap
- Antibiotics if hospital is not practical
- Future risk is increased











# Everyone is unique

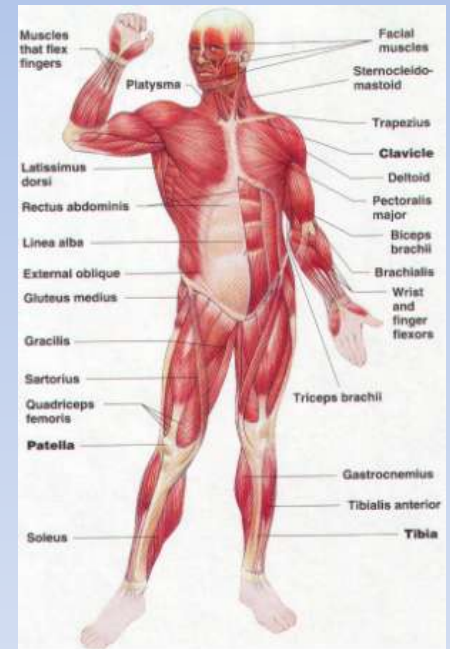
- Different people need different equipment
- After every trip think what worked and what did not
  - Consider hand warmers, foot warmers
  - Mittens and plastic boots
  - Down and Primaloft insulation
  - Energy drinks
- Raynauds...

# Hypothermia

- Reduction of core body temperature
- Very rare when things are going well
- Very common when things go badly
  - Hypothermia makes simple accidents into fatal disasters

# Hypothermia

- What keeps us warm on mountains?



- Energy expenditure when walking uphill is 8 times that at rest



# Case Study 3

- One of three left behind (HS) complains of feeling cold and starts shivering
- After two hours HS has stopped shivering and states he feels better, but is very thirsty
- HS starts to eat snow and remove his jacket; he gets very angry when the others protest
- A helicopter rescue party arrives an hour later by which time HS has slurred speech and staggers when walking

# Case Study 3

- **Diagnosis:** Moderate hypothermia
- **Management:**
  - Flown to nearest hospital for active rewarming
  - Discharged next day with no long term injury

# Learning points

- Mistakes and accidents rapidly escalate in winter conditions
- Plan for the worst and take appropriate equipment, as a minimum:
  - Survival shelter/bag
  - Down jacket



# Hypothermia Symptoms

- Mild/Moderate
  - Shivering, confusion, dizziness, poor coordination, tiredness, irritability, slurred speech
- Severe
  - Unable to stand, reduced consciousness



# Important points

- Preparation
  - Cover every bit of skin
  - Carry back-ups (eg spare gloves)
  - Carry extra warm layers and survival shelters
- Do not tolerate numbness
- Become an equipment geek and find the combination that suits you



**Questions**

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