Teacher Notes *Cold Shock and Hypothermia*

Sitting in water at

- 35°Centigrade (C) does not produce a cooling of the body.
- 25°C produces a shivering effect (the natural way for the body to work to warm itself up) Onehunga indoor pool is 28-29°C

People usually rate their swimming ability when swimming in a warm pool or in a warm summer sea.

Falling into water

- Falling into water of 27°C produces no incapacity
- Falling into water at 15-18°C - could take 4-5 hours before hypothermia leads to unconsciousness and drowning
- Falling into water at 10°C could mean death from hypothermia in about 1 hour

What is hypothermia?

(Hypothermia - way to remember (as opposed to hyperthermia) zero heat)

Hypothermia occurs when core body temperature drops below that required for normal body function. Normally the body functions at a core temperature of 37°C. The temperature of the skin and muscles can vary but these changes stimulate the body's internal systems to maintain equilibrium that is homeostasis. If the body is exposed to cold conditions it may be unable to replenish the heat loss. This is when the body could show signs of hypothermia.

- Decrease of body core temperature begins after about 15 mins in icy cold water
- Unconsciousness occurs when the body temperature falls from the normal of 37°C to 32°C. When in water this increases the chances of drowning
- Wearing a life jacket and keeping still will decrease the rate of body cooling

Falling into very cold water less than 10° C

(56% of people die before hypothermia[1] sets in, 20% die within the first 2 minutes[2])

When people fall into very cold water the body can respond with a series of reactions. The severity of the reaction varies with individuals. The order of reactions is

- Cold shock
- Cold incapacitation
- Hypothermia
- Post rescue collapse

COLD SHOCK – lasts 3-5 mins

- Gasp reflex - uncontrolled gasping - reduces ability for breath holding 5-6 secs,
- Breathing rate increases e.g. 12 – 66 breaths per minute (16L of air /minute -114L after 1 min)
- Heart rate increase e.g. from 90 – 156 beats/ minute in the first minute. It falls to 108 b/m after 5 minutes

[1] Golden F and Tipton M Essentials of Sea Survival Champaign, IL Human Kinetics
[2] Vittone Mario The truth about cold water http://gcaptain.com retrieved 7/7/2010

- Blood pressure increases – vaso constriction (skin blood flow when very hot is 3-4L/min; very cold reduced by 99% to 0.02L/min – exception is scalp) blood pooling and heart having to work against water pressure - leads to increased urination
- Breathing against the increase of water pressure means it is harder work
- Aspiration of water more likely as mouth is more open during hyperventilation
- Cools skin – receptors are above the fat cells at 0.18mm below the skin so fat does not provide protection
- **Enter cold water slowly.** Falling into cold water - rescue and rewarm quickly as not hypothermic

COLD INCAPACITATION

- Uncoordinated movement (cannot unwrap a flare for example) loss of fine motor skills - anaerobic activity and a swimming failure 5 – 30 mins later (depending on the many factors that affect the rate of body cooling)

HYPOTHERMIA

- Core body temperature cools – death in 60 mins in icy water, may be 4-5 hours in water around NZ in the summer and not applicable in warm tropical waters around some Pacific Islands
- If hypothermic rewarm slowly

POST RESCUE COLLAPSE

- Death post immersion once rescued - 17% of those rescued will die – patient thinks 'I am OK' and relaxes. Tell patient to keep fighting to get body warm. Keep patient horizontal

SO WHAT SHOULD WE DO when we fall into cold water?

- **FLOAT AND KEEP STILL** in the water - the lack of breath holding ability, the increase in heart rate, breathing rate and the increase of risk of swallowing water could all lead to muscle spasms.
- Wait 2-3 minutes – do not try to swim
- Get breathing back under control
- Complete essential tasks e.g. unwrap flare
- Swim short distances to get onto top of the boat do not use arms – legs only (>heat loss keep folded by chest) lose strength easily so it may be hard to climb up onto boat

- **H.E.L.P., HUDDLE** If we stand with legs and arms out we expose 85% of possible body surface area to heat loss. Heat loss decreases to 50% in H.E.L.P. position
  H.E.L.P. - keep head out of water – back to waves, keep clothes on, hat if possible, crotch strap done up, balance problems – open out knees - Rob Hewitt wore a wetsuit and survived for over 70 hours in this position.
  HUDDLE - chests touching, no open water between people, arm pits closed, small person in middle, legs intertwined, reassurance
- RESCUE - keep horizontal – reduce the risk of heart failure, rewarm slowly


HELP position


Huddle position

Swimming in this period will increase the chance of

- Water aspiration
- Accelerate core body cooling. When a person is moving, the movement will reverse the vaso constriction and encourage the warm blood to travel to cold extremities of the limbs. This blood cools so when it returns to the heart it cools the heart down.

Enter cold water very slowly to reduce the effect of cold shock

Other teacher guides from WaterSafe Auckland

What cold water will do to you
How to survive in cold water
Dry Rescues
Lifejackets
Hypothermia First Aid Water Safety New Zealand