
HEAT INJURY 熱創傷

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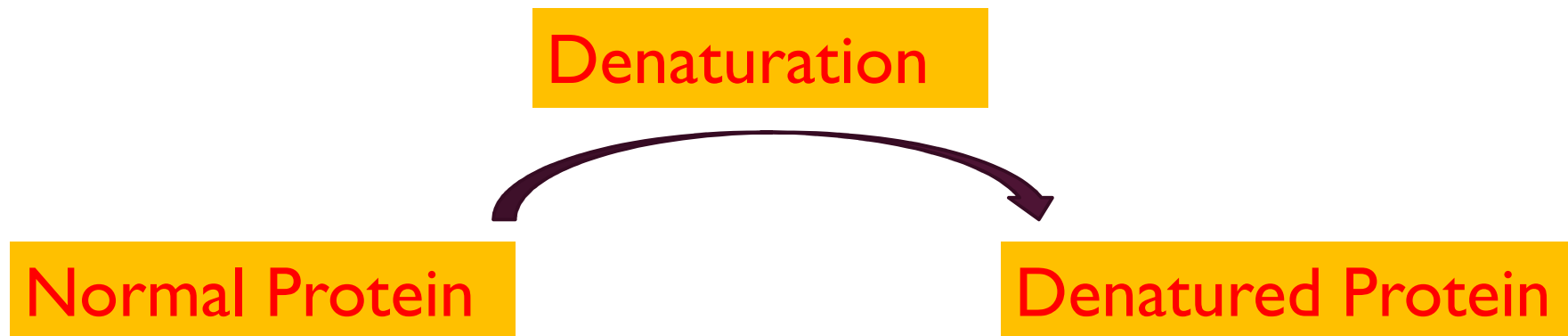


**CUHK SPORTS
MEDICINE**
中大運動醫學



HEAT INJURY / HEAT ILLNESS

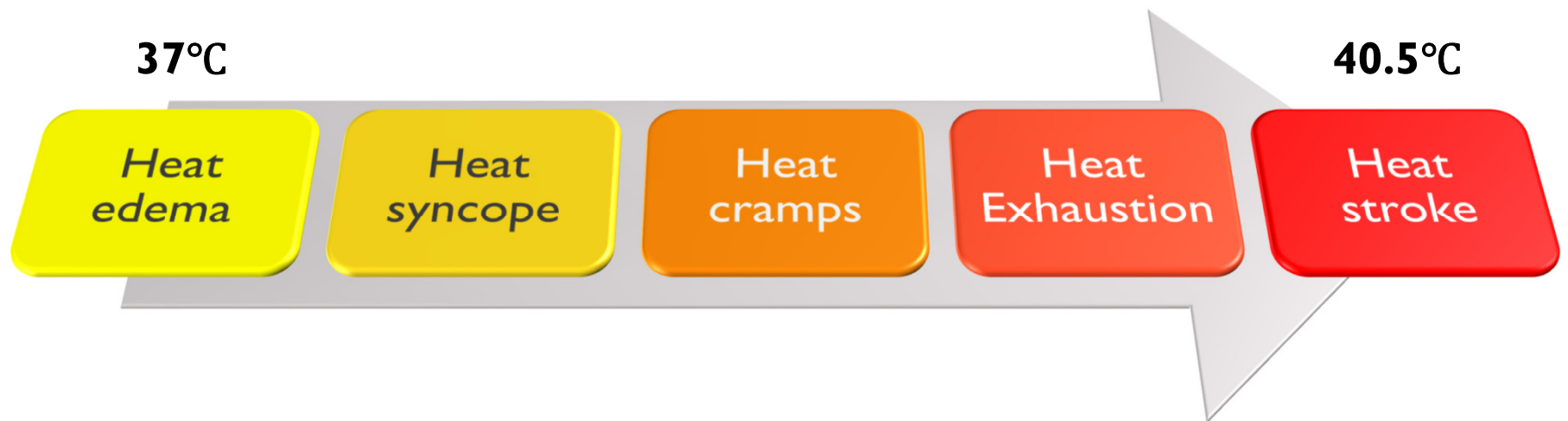
- Hyperthermia
- Caused by failure of thermoregulatory mechanisms (evaporation, radiation, conduction, convection), resulting in impaired heat production and heat loss.



RISK FACTOR

- Environment
- Clothing
- Fitness level/acclimatization
- Age
- Dehydration
- Body fat
- Fever
- Medication

SPECTRUM OF HEAT INJURY



HEAT RASH

- Prickly Heat
- 熱疹
- Red or pink small raised rash after exposed to hot and humid environment
- Irritation due to sweating and excessive heat
- Skin becomes irritable and itchy

- No treatment is required usually
- Usually vanish in 3-4 days
- Prevent secondary infection
- Irritable skin may be treated with calamine or hydrocortisone cream

HEAT EDEMA

- 熱水腫
- Mildest form of heat injury
- Swelling of the feet and hands due to cutaneous vasodilatation and pooling of interstitial fluid in the dependent extremities
- Treatment: elevation of extremities

HEAT CRAMP

- 熱痙攣
- Painful muscle spasms in legs, arms or torso
- Several hours after vigorous exertion
- Occurs alone or associated with heat exhaustion

- Lack acclimatization
- Salt loss, fluid loss and muscle fatigue
- Dehydration
- Prior use of diuretics

HEAT CRAMP

- Rest
- stretch affected muscle
- drinks to replace fluids & electrolytes

HEAT SYNCOPE

- 熱暈厥
- Transient loss of conscious
- Occurs in the standing position due to pooling of blood in the lower limbs, typically in elderly and unacclimatized persons
- Treatment: move to shaded area, resting supine, leg elevation and rehydration

HEAT EXHAUSTION

- 熱衰竭
- Unusual fatigue, headache, dizziness, nausea, vomiting
- Sweating and cutaneous flushing
- Associated with heat cramps, heat syncope and may progress to heat stroke
- Rapid heartbeat and breathing, profuse sweating and hypotension
- No central nervous system dysfunction
- Body temp: $< 40^{\circ}\text{C}$

HEAT EXHAUSTION

- Rest in a cool, shaded area with legs elevated
- Remove excessive clothing & equipment
- Rehydrate! frequent small drink
- Replenish 1-2L over 2-4 hours
- Not resume exercise until enough resting

HEAT STROKE

- 中暑

Classical

- Core temp $> 40^{\circ}\text{C}$ with central nervous system dysfunction

Exertional

HEAT STROKE

- Debilitated persons during high environmental temp and humidity
- Usually occurs in the poor, elderly, alcoholics ..
- Gradually develops over several days, commonly during heat waves
- Anhydrosis is a feature
- Higher mortality

Classical

HEAT STROKE

- Commonly occur in poorly acclimatized persons involved in strenuous exercise in a hot environment
- Develops over minutes to hours
- Typical: military recruits, athletes and miners
- Mortality from 10% to 70%

Exertional

HEAT STROKE

- Core Temp $> 40.5^{\circ}\text{C}$
- It should be excluded when a person collapsed during exercise in hot and humid environment
- Check rectal temp
- Look for other CNS dysfunction e.g. confusion, convulsion, coma, ataxia, dysarthria, bizarre behaviour etc.
- Anhydrosis is a late feature

Exertional

COMPLICATIONS

- Cardiovascular
 - Hyperdynamic then hypodynamic
 - Thermal myocardial dysfunction leads to arrhythmias, myocardial ischaemia
 - Hypotension in fatal cases
- Pulmonary
 - Hyperventilation
 - Respiratory alkalosis and tetany
 - Acute respiratory distress syndrome (ARDS)

COMPLICATIONS

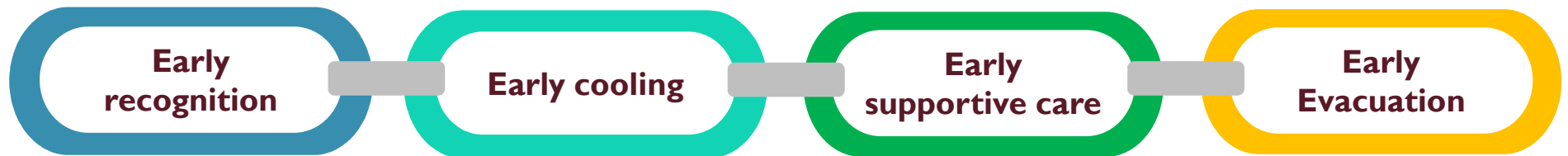
- Acute renal failure
- Haematological
 - Leukocytosis
 - Disseminated intravascular coagulation
- GI and hepatic
 - Liver damage
 - Peak on the 3rd day
 - Avoid paracetamol

COMPLICATIONS

- Skeletal Muscle
 - Rhabdomyolysis
 - Myoglobinuria

HEAT STROKE

CHAIN OF SURVIVAL!!!



HEAT STROKE

- Extreme hyperthermia ($>40^{\circ}\text{C}$) at the time of collapse + CNS dysfunction
- hot and dry skin
- dizziness, light-headedness
- incoordination, irritability
- confusion
- seizures
- coma

**Early
recognition**

HEAT STROKE

- Reduce the temp to $< 40^{\circ}\text{C}$ in 30 min
- (Golden half hour)
- Mortality rate 0% if meet

- Cold water immersion (CWI)
- Immerse as much of body as possible except the head, in cold/ice water ($1.7 - 14^{\circ}\text{C}$)
- Stirring the water and bring cold water to skin surface
- Rotation of wet/ice towels
- Water spray
- Blow wind for evaporation

Early cooling

HEAT STROKE

- Basic life support
- Continue cooling
- IV fluids replacement
- Monitor vital signs and urine output
- Correct electrolytes and blood sugar
- Control seizure

**Early
supportive care**

HEAT STROKE

Hospital:
Accident and Emergency Depart.

**Early
Evacuation**

First Aid for Heat Illness

The following are signs of Medical Emergency:

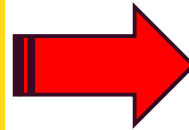
- Abnormal thinking or behavior
 - Slurred speech
 - Seizures
 - Loss of Consciousness
1. Call 999 immediately
 2. Cool the patient right away with water or ice
 3. Stay with the patient until help arrives

First Aid for Heat Illness

Watch for any other signs of heat illness and act quickly

If a patient experiences:

- Headache or nausea
- Weakness or dizziness
- Heavy sweating or hot, dry skin
- Elevated body temperature
- Thirst
- Decreased urine output



Take these actions:

- Give water to drink
- Remove unnecessary clothing
- Move to a cooler area
- Cool with water, ice or a fan
- Do not leave alone
- Seek medical care if needed



End