

HEAT INJURY 热创伤

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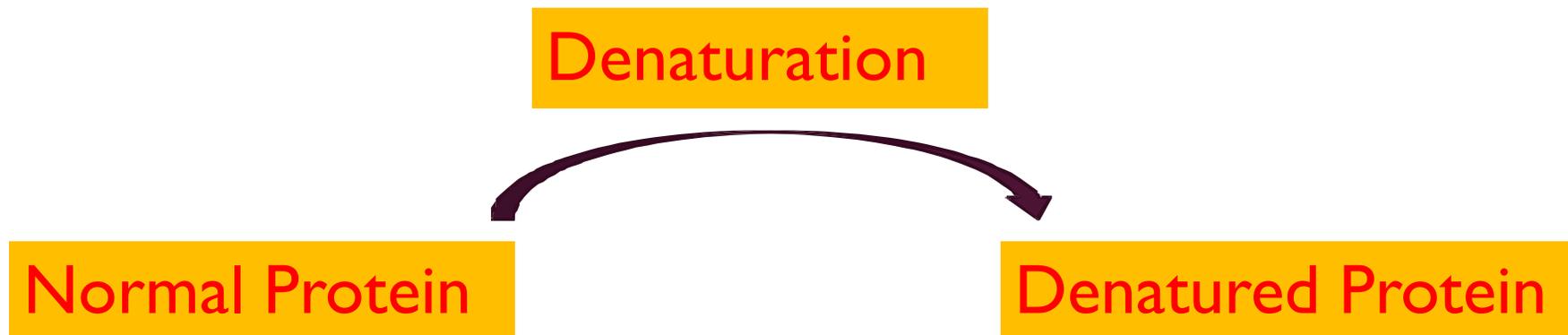


**CUHK SPORTS
MEDICINE**
中大運動醫學



HEAT INJURY / HEAT ILLNESS

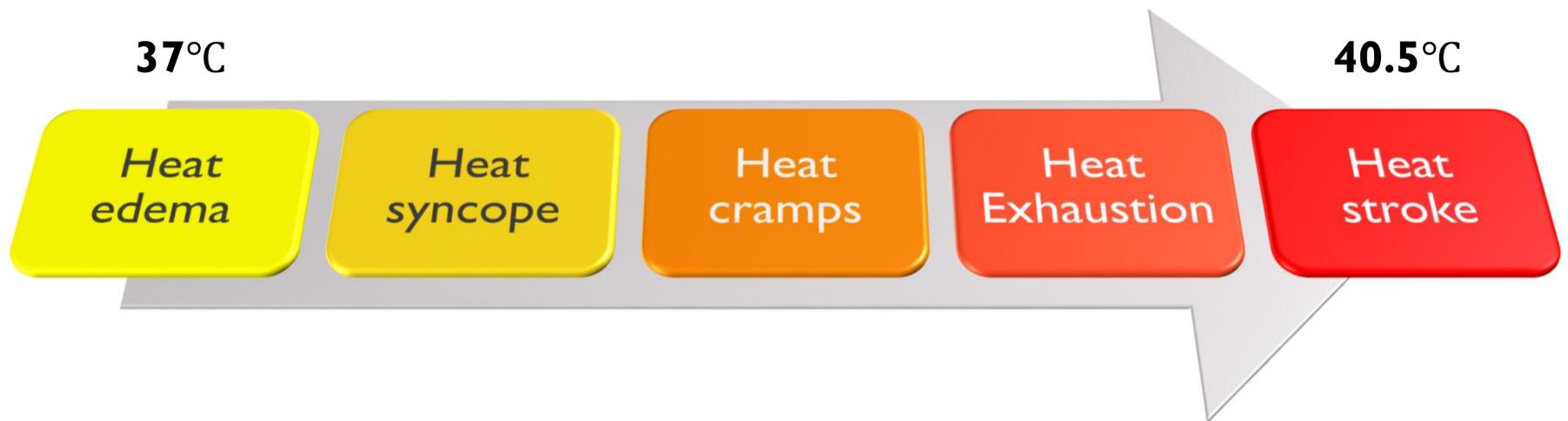
- Hyperthermia
- Caused by failure of thermoregulatory mechanisms (evaporation, radiation, conduction, convection), resulting in impaired heat production and heat loss.



RISK FACTOR

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

SPECTRUM OF HEAT INJURY



HEAT RASH

- Prickly Heat
- 热痱
- 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

- 热水肿
- 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

- 热痉挛
- 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

- 热晕厥
- Transient loss of consciousness
- 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

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

Classical

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 $> 40.5^{\circ}$ 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

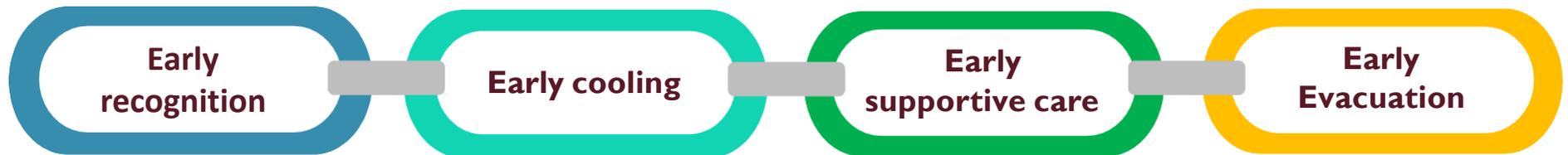
- Acute renal failure
- Haematological
 - Leukocytosis
 - Disseminated intravascular coagulation
- GI and hepatic
 - Liver damage
 - Peak on the 3rd day
 - Avoid paracetamol

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

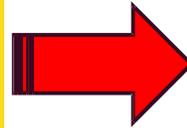
Sources: <https://www.safetyandhealthmagazine.com/articles/21320-keep-workers-safe-from-heat-osa-releases-poster>

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