

THERMAL INJURIES

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THERMAL INJURY:

Tissue injury result from the effects of systemic (general) or /and localized exposure to heat or cold to the external or internal body surfaces.

CLASSIFICATION:

- 1. COLD (Hypothermia)
- 2. HEAT (Hyperthermia)
 - 2.1 Heat Cramps 2.2 Heat Stroke 2.3 Heat Exhaustion
- 3. BURNS
- 4. ELECTRICAL INJURY
- 5. LIGHTNING
- 6. SCALD

CLASSIFICATION Thermal injuries Due to cold Due to heat General effects General effects Local effects Local effects CHILBLAIN BURN HEAT CRAMPS HYPOTHERMIA FROSTBITE SCALD **HEAT EXHAUSTION** TRENCH FOOT HEAT STROKE

COLD (Hypothermia)

- Body temperature : < 35° C
- Hypothalamus not able to regulate temperature < 30°C

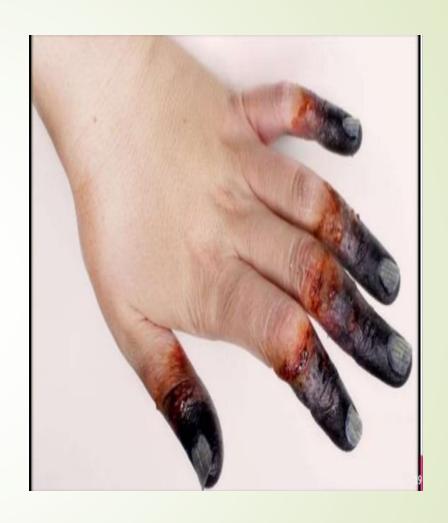
LOCAL EFFECTS:

- Blanching and paleness of skin (due to vascular spasm)
- Erythema , Oedema and swelling
- Blister formation (advanced stage) localised dry gangrene

FROSTBITE TRENCH FOOT / IMMERSION FOOT Exposure to 5-8° C • Exposure to -2.5° C Seen in soldiers during Infarction of peripheral digits with edema and winter warfare necrosis later Skin become hard black (2 weeks)



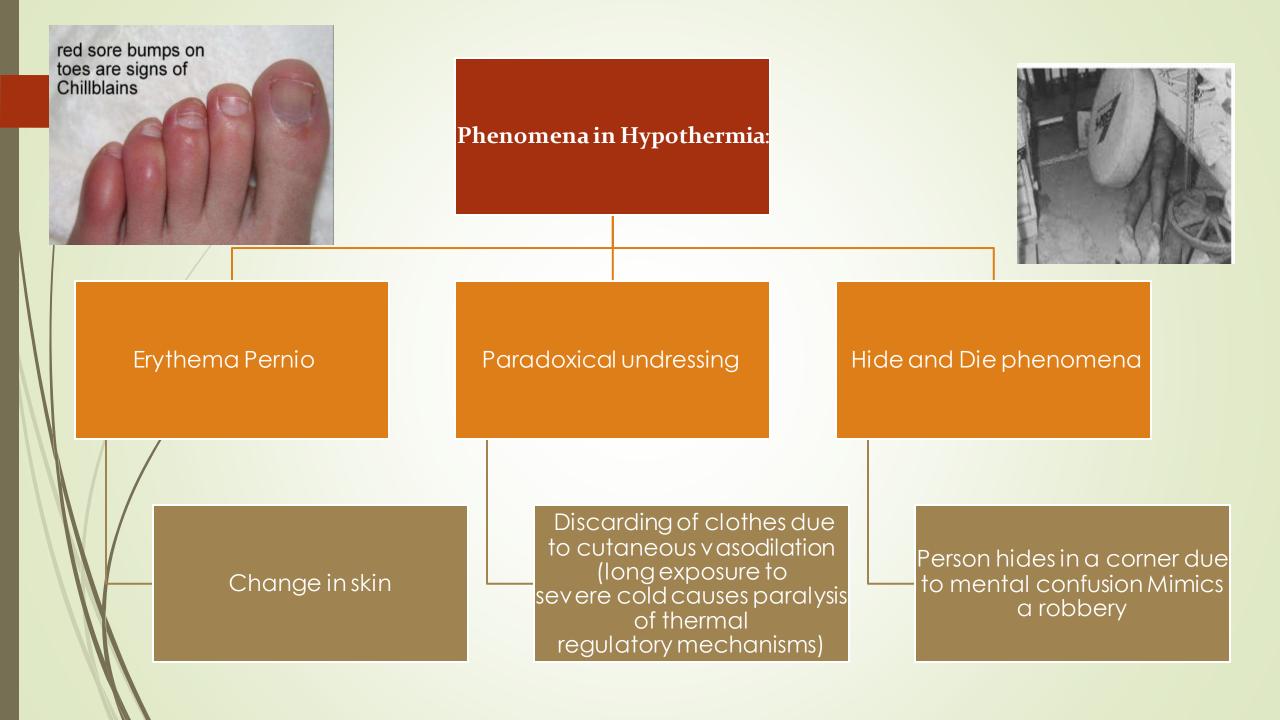




Frost Bite

General effects

First stage	Second stage	Third stage
□ Cold	□ Shivering stops when temp. is at or below 32° C	• Temp. Lowered to 27° C or even less
□ Shivers	Victim become □ Depressed □ Lethargic □ Drowsy □ Gradually passes to stupor and coma □ Muscle stiffness	 Which if maintained for 24 hours or longer is fatal.
□ Body temp. falls		Results into death



PM CHANGES

EXTERNAL	INTERNAL
• Pink patches with indistinct blurred margins on skin	□ Internal organ congested
Exterimites may be cyanosed	Pulmonary oedema
Oedema may be seen	 Fat necrosis of pancreas
• PM LIVIDITY: Bright Pink	 Wischnewski spot in stomach : due to necrosis of mucosa
	Subcutaneous tissue : Avascular
	Perivascular hemorrhages in brain

HEAT (Hyperthermia)

Clinical condition result from exposure to high environmental temperature.

- HEAT CRAMPS

■ HEAT STROKE

- HEAT EXHAUSATION

HEAT CRAMPS

- aka Miner's cramp, Fireman's cramp
- Severe and painful paraoxymal muscle cramps: affecting arms, legs and abdomen
- Increase temprature –vasodilation and sweating: water and sodium loss
- Clinical features:
- Face: Flushed
- Pupils: Dilated
- Dizziness
- Tinnitus
- Headache
- Vomiting
- **TREATMENT**: Intravenous injection of saline give rapid relief.

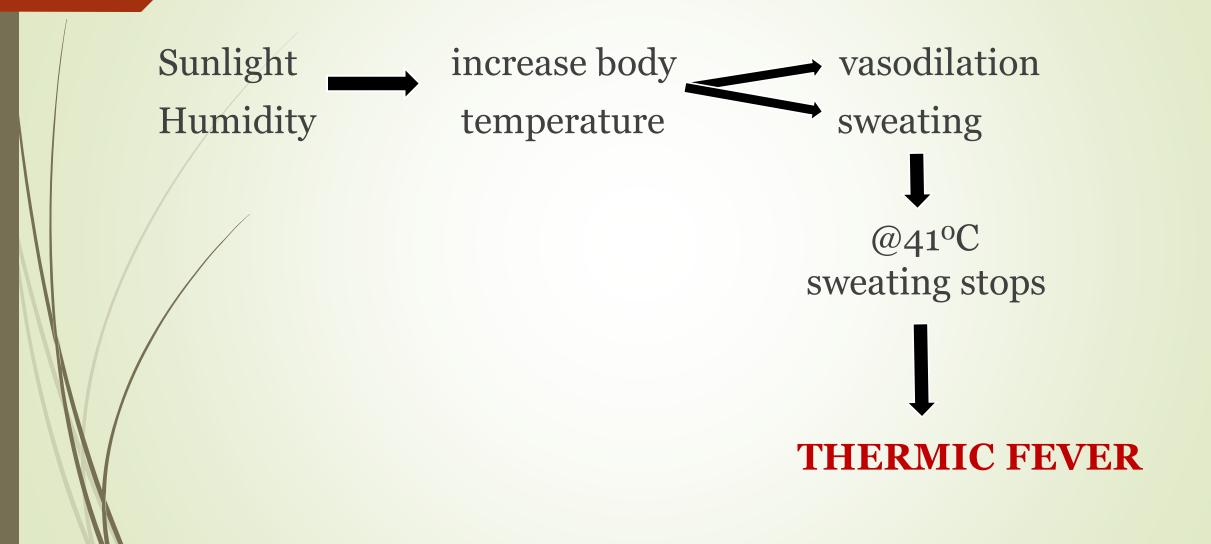


HEAT STROKE

- also known as
- Sun stroke {direct exposure to sun}
- Thermic fever
- Heat Hyperpyrexia(a fever above 41.5°C)
- Most common type of hyperthermia
- Fatal period: 5minutes to 3 days

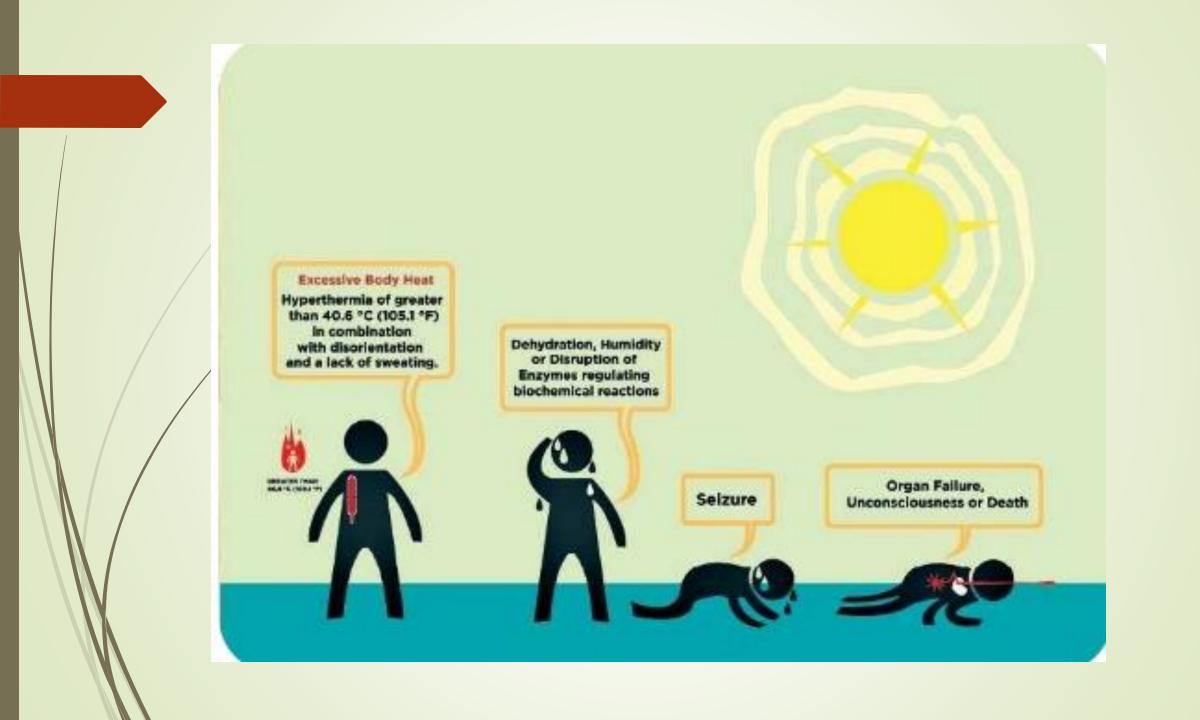
Clinical presentation:

- Sudden onset with sudden collapse
- and loss of consciousness
- ► Skin: hot, flushed
- Pupils: constricted
- Delirium
- Confusion
- Pulse: rapid
- Breathing : deep and rapid
- Headache, dizziness
- Staggering gait
- Muscle cramps



PM CHANGES:

- CNS: Reduction in purkinjie fibres of cerebellum Hypothalamus shows oedema of nuclei
- Lungs: Oedema, congestion, hemorrhage
- **Heart:** degenration of myocardium, subendocardial and subpericardial hemorrhage
- Liver: congested
- **Kidney:** congested and oedema Increase in weight



HEAT EXHAUSATION

Also known as

Heat prostration Heat syncope

Excessive high temperature(~100°C)

vascular collapse

no increase in body temperature

- Clinical features:
- Weakness
- Giddiness
- Face:Pale
- Pupils:dilated
- Skin: cold
- Pulse: small and thready
- Respiratory sighing

	HEAT EXHAUSATION	HEAT STROKE
	Heavy sweating	No sweating
•	Heavy thirst	• Red or flushed , hot dry skin
•	Panting/ heavy breathing	Any symptom of heat exhaustion but m ore severe
•	Rapid pulse	• Difficult breathing
•	Headache	• Pinpoint pupils
-	Blurred vision	Bizarre behavior
•	Exhaustion, weakness	• Convulsions
•	Confusion	• Confusion
•	Dizziness	• Collapse
	Cramps	

Lightning Injury



Electrical discharge from the clouds.

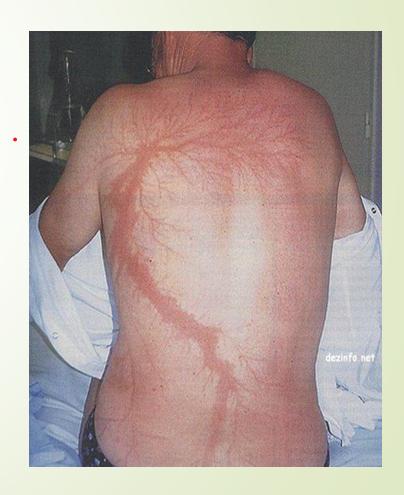
- Most common site: **Shoulder flank.**
- Branching tree pattern of burns:
- Fligree burn
- Arborescent burn
- Lichtenberg flower petal burn
- Keranographic
- Pathognomic of lightening strike
- Superficial thin irregular tortuous marking on skin resembling marbling of skin.
- Not associated with burning

Causes: static electric discharge, Hb staining the tissues, inflammatory response by tissues etc.

■ Mechanism: denaturation of RBC

Hb staining of blood vessels

Branching tree pattern burn



MCQ's

Q1:A person considered to be hypothermic when their temperature falls below:

- a) 30 degree celsius
- b) 32 degree celsius
- c)34 degree celsius
- d)35 degree celsius

Q2:Temprature regulation by the hypothalamus completely fails below which body temperature?

- a) 37 degree celsius
- b)35 degree celsius
- c)32 degree celsius
- d)30 degree celsius

Q3:Which of the following statement regarding paradoxical undressing is true?

a)Sen in mild to moderate hypothermia

b)If associated with bruises /abrasions of knees and elbows , indicates homicidal death.

c) Always associated with hide and die syndrome

d) The mechanism is that of peripheral vasodilation

Q4:Heat stroke occurs at a core body temperature above?

- a) 40.5 degree Celsius
- b) 40 degree Celsius
- c)41 degree Celsius
- d)41.5degree Celsius

Q5: The following is the image of patient struck by lightning. The pattern is:



- a) Tolstoy figures
- b) Litchtenberg figures
- c) Henderson figures
- d) Alexander figures

Q6: Which among the following is not a common finding in a patient of hypothermia:

- a) Pink discoloration of skin
- b) Gastric erosions
- c) Acute pancreatitis
- d) Extradural haemorrhage

Answers:

- 1.D: 35 degree Celsius
- 2.D: 30 degree Celsius
- 3. D: mechanism is of peripheral vasodilation
- 4. A: 40.5 degree Celsius
- 5. B: Lichtenberg figures
- 6.D: extradural haemorrhage