Injury due to Heat and Cold

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Injury due to heat

- Systemic injuries

- mammalian tissues can survive t 20-44°C

  - heatstroke - high external temperatures or physical exertion
  - drug induced hyperthermia (SSRI, IMAO..)

- Localised injuries – burns and scalds

Burns x scalds

- Burns – dry heat
- the lowest temperature that caused damage was 44°C – 5h x 66°C – 3 s

- Scalds – hot liquids – water, steam and gases (evaporation), oil

- sharply demarked edge
- doesn´t cause charring, carbonization

- Extent depends on
  - the applied temperature
  - the ability of the body surface to conduct away the excess heat
  - the time for which the heat is applied

- Classification both by severity and extent

Severity

- First degree – erythema
  - damaged epidermis, redness due to capillary dilatation, swelling and exudation

- Second degree - blistering

  IIa – superficial – split of epidermis, painful due to exposure of nerves, capillary bed is not damaged

  IIb – deep – destruction of the full thickness of skin, nerves are destroyed, capillary bed is disturbed → scaring

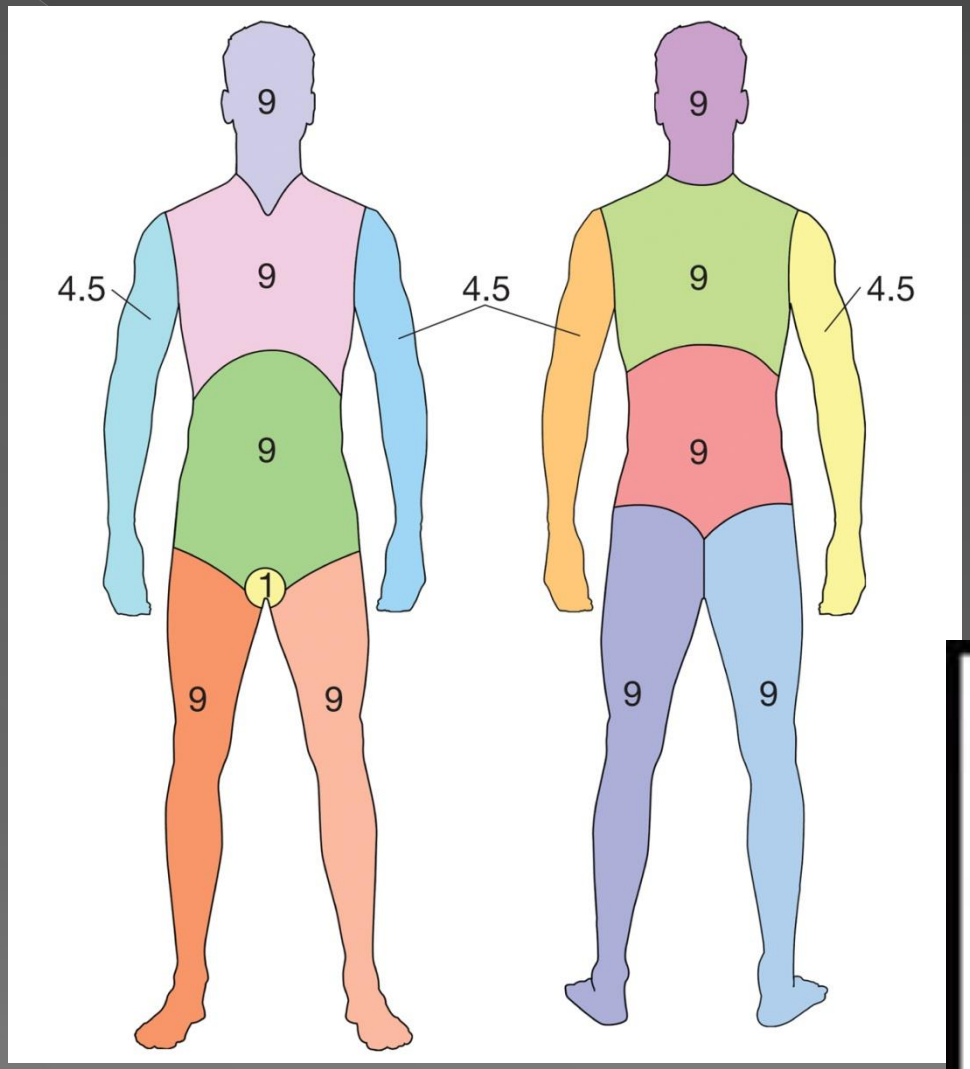
- Third degree – charring
  - destruction of underlying subdermal tissue

- Forth degree – carbonisation
  - destruction of muscles, bones, loss of peripheral parts – torso

Extent

- Rule of Nines - 9%
  - Head 9%
  - Upper extremity 9%
  - Anterior parts of the trunk 18%
  - Back 18%
  - Lower extremity 18%
  - Genitals and perineum 1%

- 30-50 per cent incompatible with survival
- Children - Palm about 1%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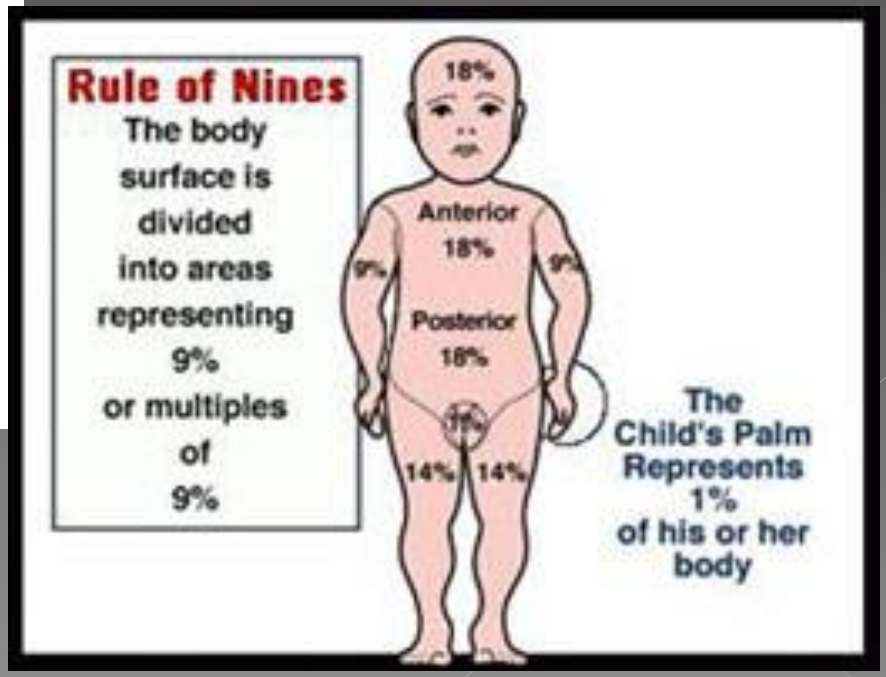

Rule of Nines
The body surface is divided into areas representing 9% or multiples of 9%
18%
Anterior 18%
9%
9%
Posterior 18%
1%
14%
14%
The Child's Palm Represents 1% of his or her body

Causes of death

- Survivors – shock, sepsis
- Dead on the spot – CO intoxication (40 % at least), thermal damage to the air passages and lungs, gunshot wounds…

Forensic examination

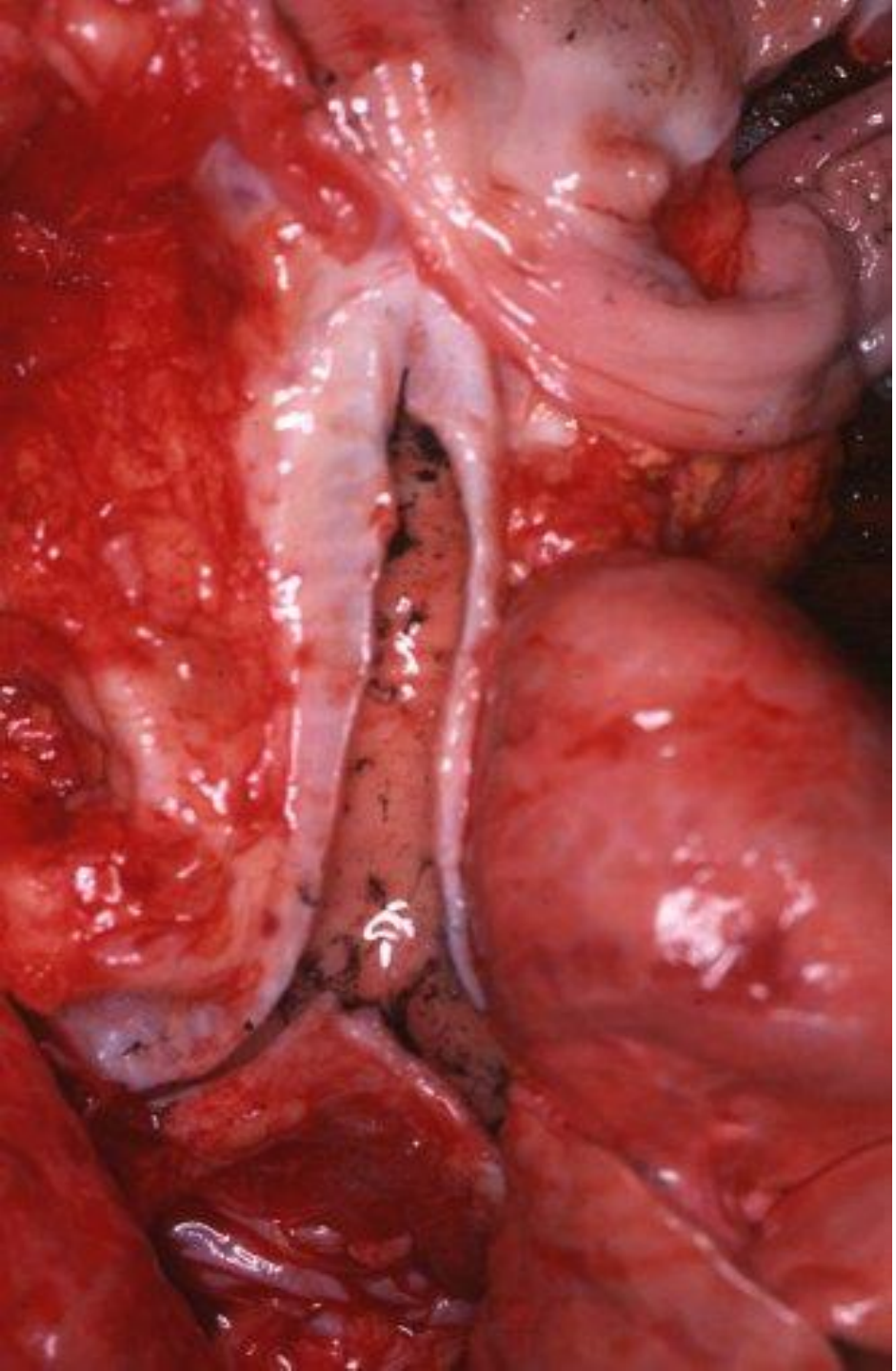
- carbonylhaemoglobin
- X-ray
- injuries (x splits, heat haematoma, heat cracking of the bones)

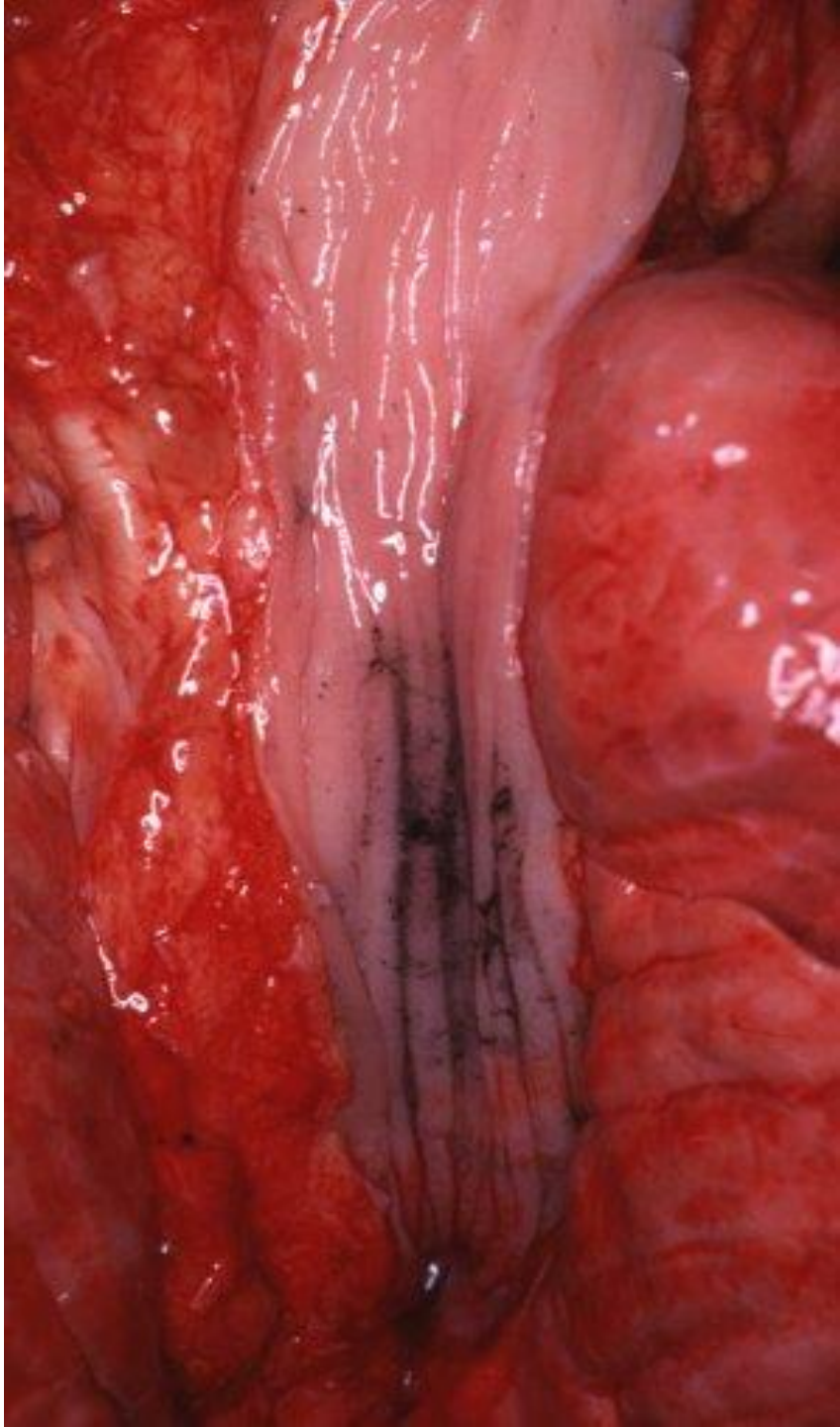
Spurious „wounds“ in burns

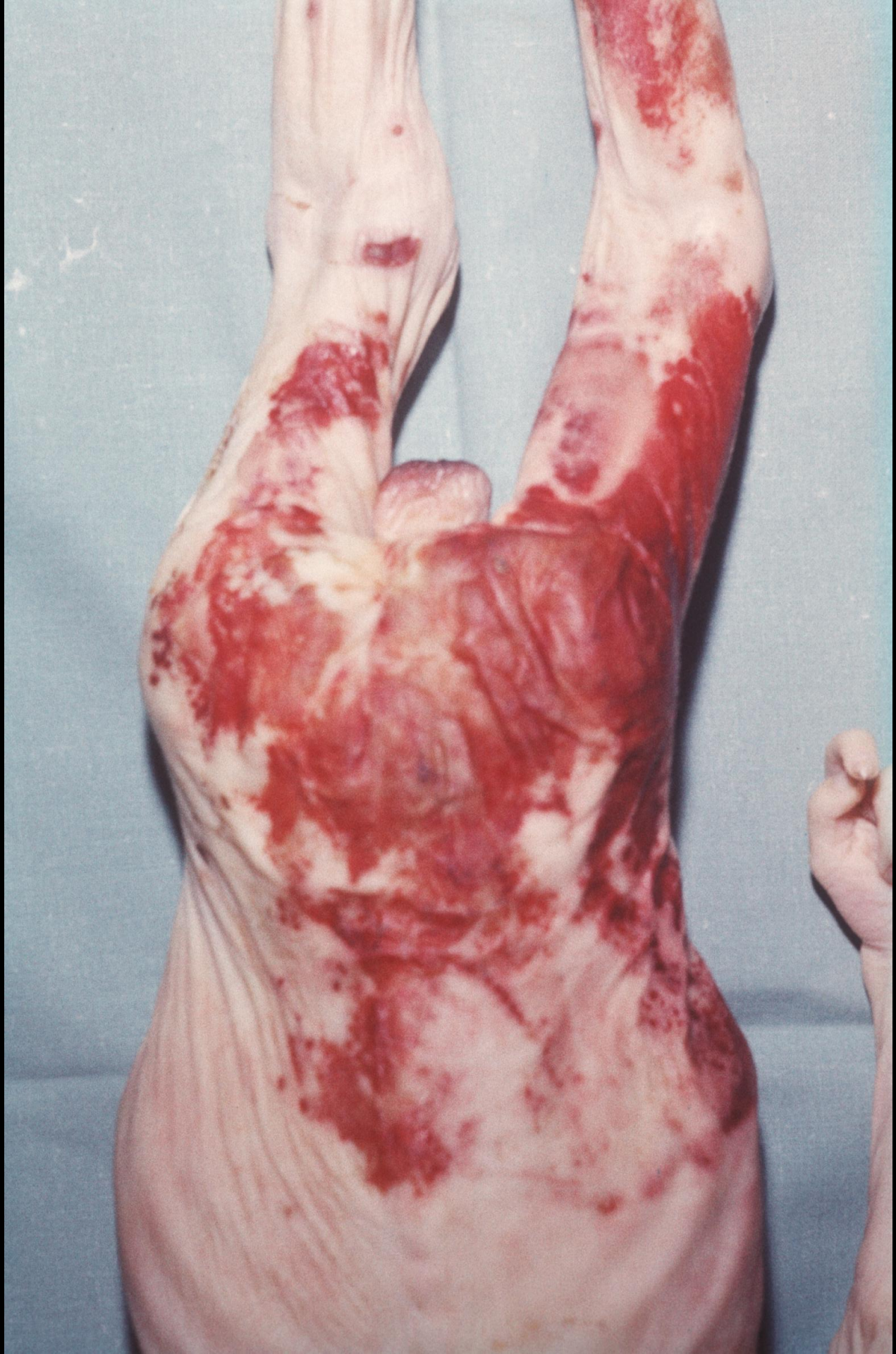
- Splits – over extensor surfaces and joints, on the head, no bleeding in the deeper tissues
- Heat haematoma – in the extradural space, blood spongy, tawny or chocolate brown

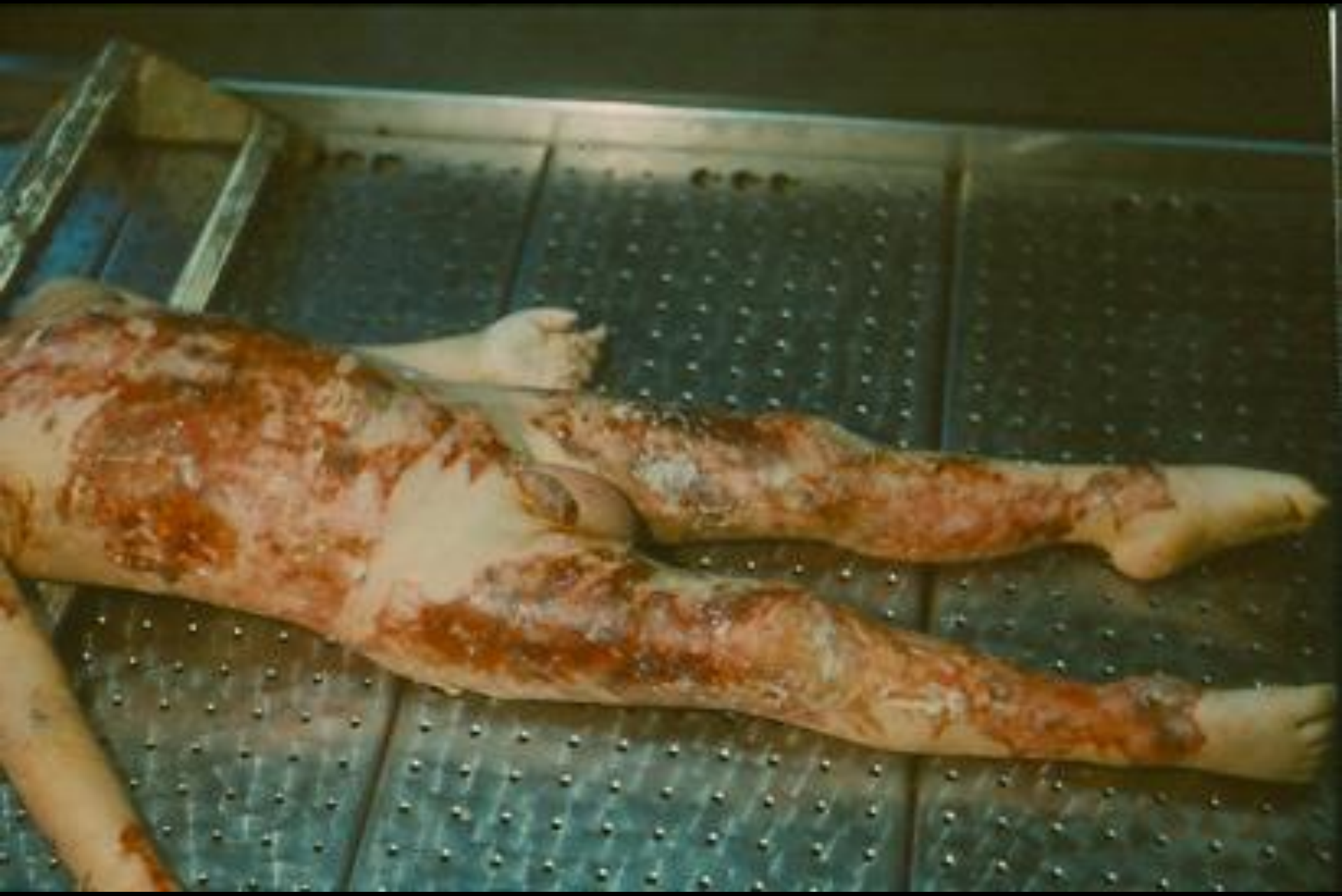
Ante-mortem x Post- mortem

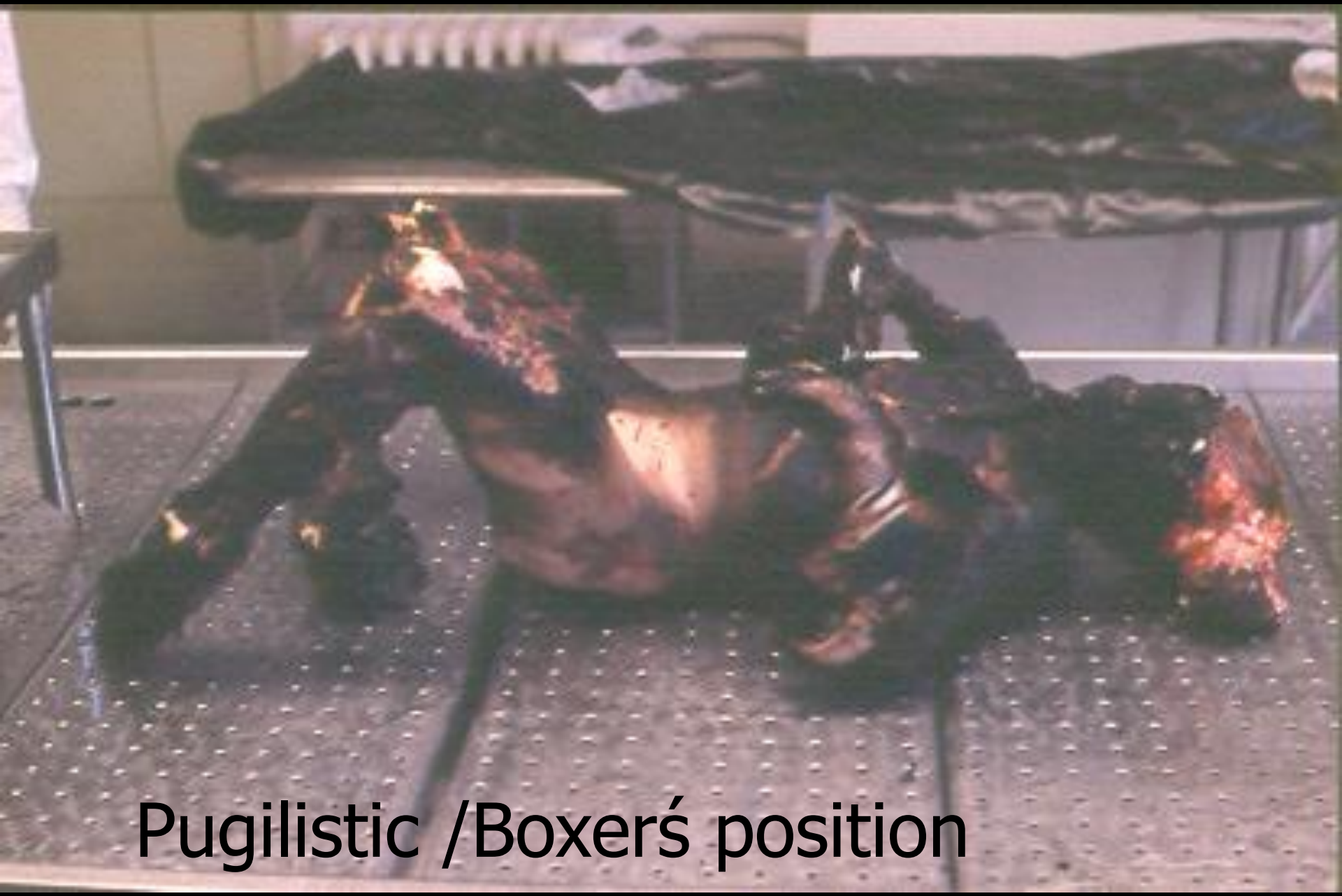
- carbon monoxide in circulating blood
- inhalation of soot → carbon particles in the air passages and lungs
- crowś feet











Pugilistic /Boxerś position

Cold injury

- Systemic effects – hypothermia

  - even if environmental temperature > 0 °C –

  children, the elderly, abuse of alcohol, drugs,

  hypothyroidism, cerebrovascular disease….

  10°C low enough, wind, damp conditions…

- Localised effects – frostbites

  - peripheral parts – nose, ears, cheek, chin, fingers

  - moist surroundings – trench foot, immersion foot

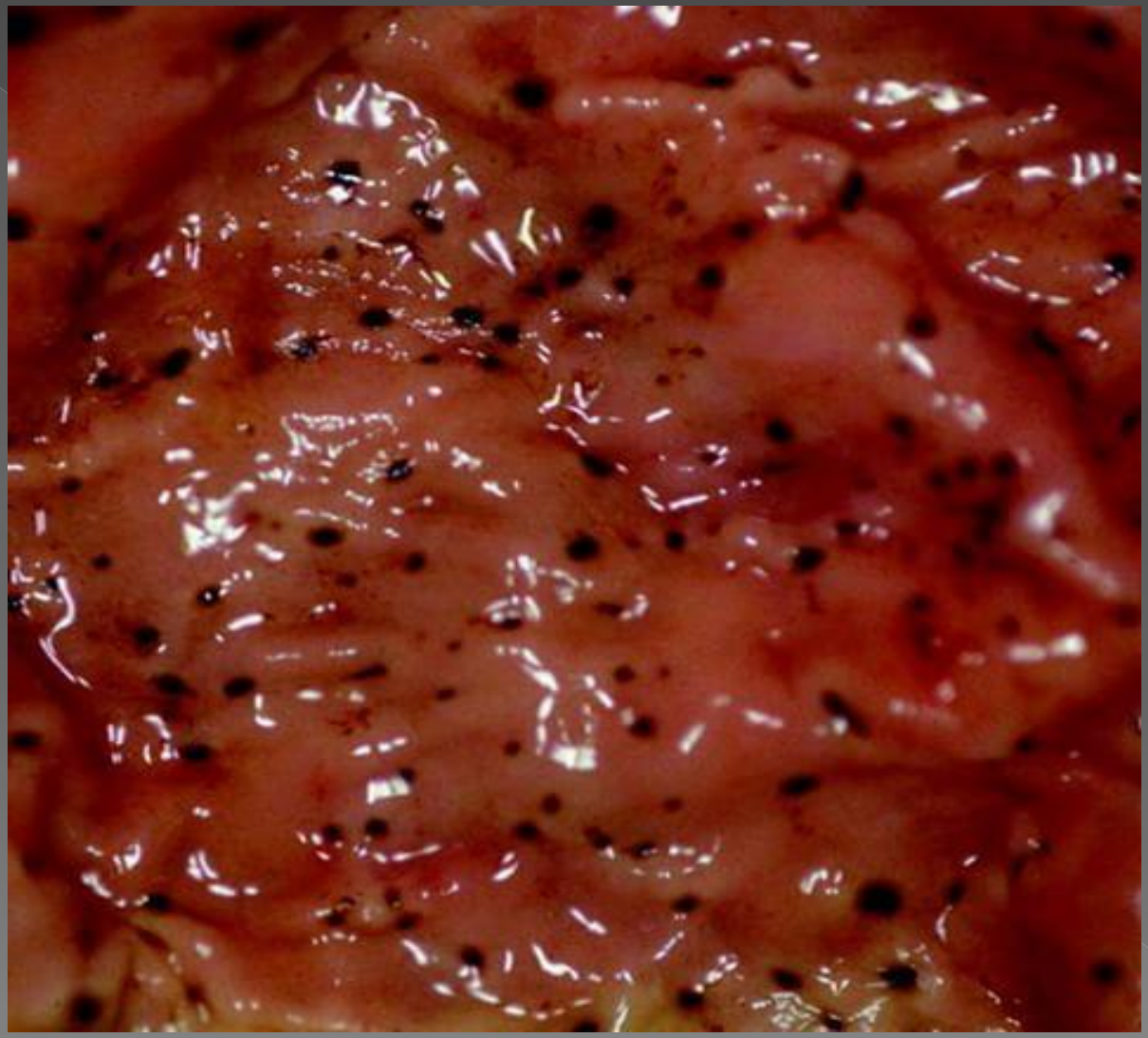
Systemic hypothermia

- Exposure to low temperature – mountaineers, swimmers, senile people, drunken people, children (high body surface-to-weight ratio)

- Body core temperature < 28 °C – certain death even with treatment
- Effects on CNS – analgesia, anaesthesia
- Bradycardia, arrhythmia, cardiac arrest
- Hide-and-die syndrome (undressing and hiding..)

Autopsy findings

- hypostasis light red
- patches of pink to brownish pink discoloration with blurred edges over the joints (elbows, knees)
- internal signs of suffocation
- multiple erosions in ventricle (called Wishniewsky spots)



Frostbites

- Tight vasoconstriction and spasms of small vessels – clustering of erythrocytes → redness, oedema and later necrosis

- Determination by severity and extent same as burns
- Treatment same as burns