Electrical injuries

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Objectives

- Students should be able to
- identify injuries due to electrocution
- identify circumstances of death
- describe post mortem features of electrocution

Effects of electric current

Effects on the body d/o

1) factors related to the current
2) factors related to the victim

Factors related to the current

- Voltage
- Amperage
- Duration of contact
- Type of current
  - Alternative or Direct

Voltage

- Low voltage as 50 v
- Domestic voltage - 230 v
- High tension voltage - > 1000 v

Amperage

<10 mA	-	unpleasant sensation
10 mA	-	lose of muscular control
15 mA	-	muscular contraction
60 mA	-	ventricular fibrillation
100 mA	-	fatal
4 amps	-	danger decreases

Duration of contact

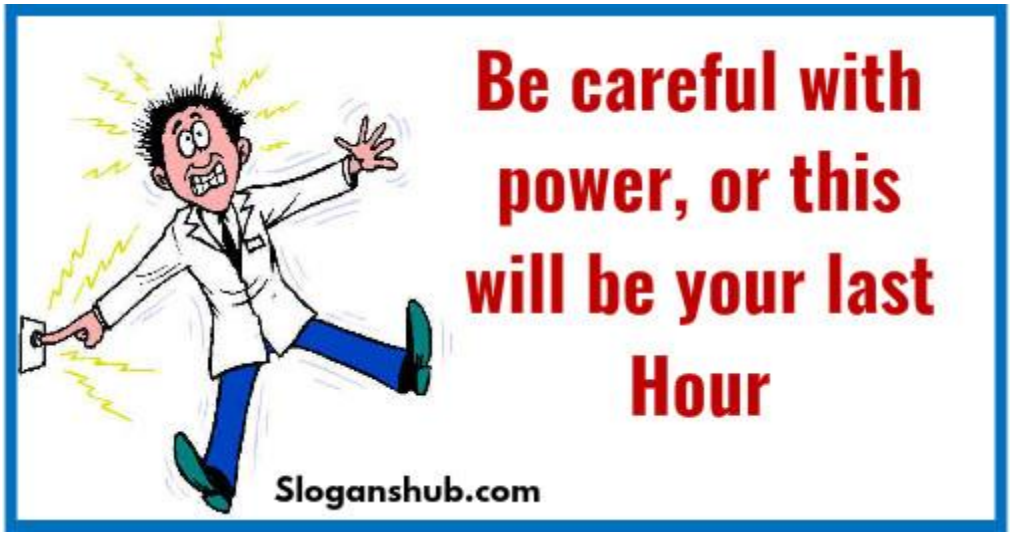
- Greater the contact , more serious effects

Type of current

- AC current is more dangerous than the DC current.

Factors related to the victim

- Resistance of the body
- Earthing
- Point of entry & path taken by the current



Factors related to the victim

- Disease conditions

  Ischemic heart disease

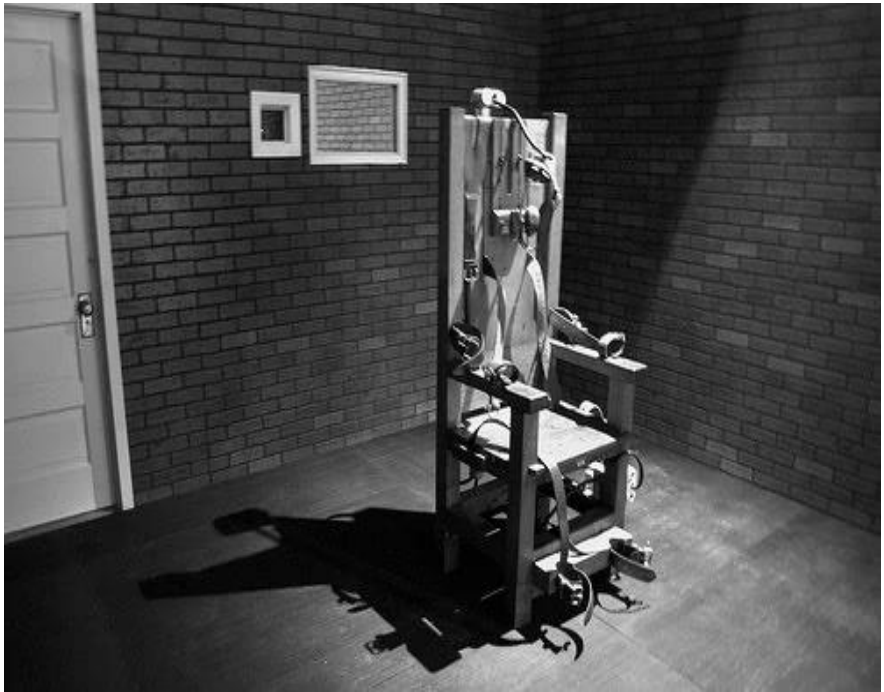
Circumstances

Accidental

- Domestic
- Industrial/ occupational
- Live wires in the environment
- Therapeutic accidents

Circumstances cont’.

- Suicide
- Homicides
- Judicial electrocution

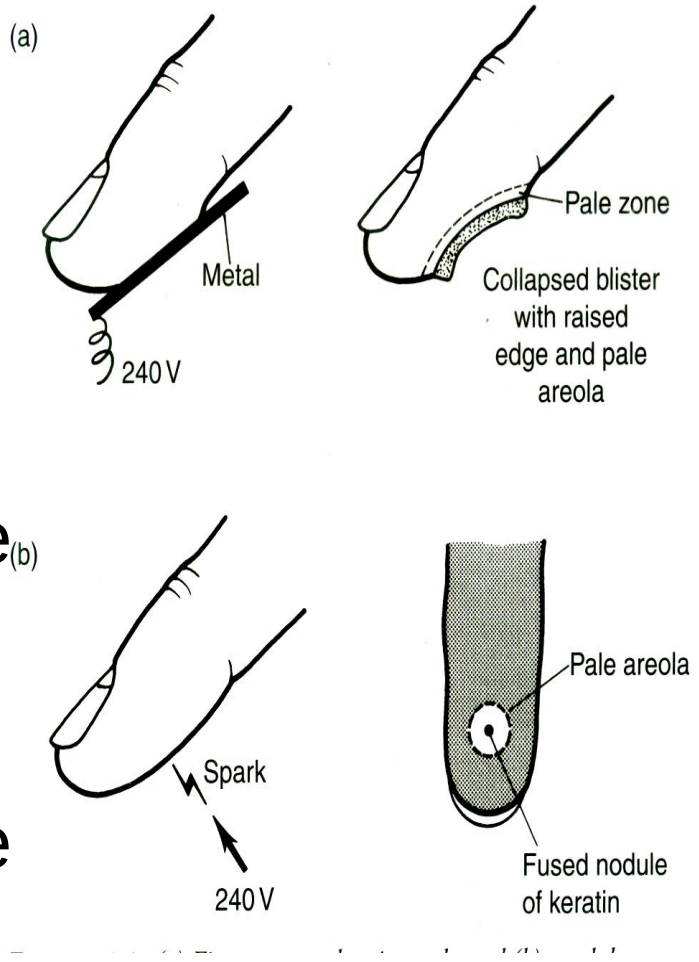


Signs of electrocution

- Electrocution produces burns
  - No marks to charring

1. Joule burn

- Found at the point of entry
- How does it produce?
- Electric energy converted to heat, boiled tissue fluids & the vapour produced blisters.
- Blister ruptures & form a crate



Joule burn con’t.

- Features of a Joule burn
  - Round or oval shallow crater or shape of conductor
  - Margins are raised
  - Floor of the crater- pale

Joule burn con’t.

- Features of a Joule burn con’t.
  - puckering of the surrounded skin
  - Fluid filled blister
  - Small pin point burns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2. Flash burns

- Produced in high voltage
- multiple burns close to each other

  resemble crocodile skin

3. High voltage burns

- Features of high voltage electrocution
  - clothing can ignite
  - extensive burns
  - charring of the body
  - thrown away causing injuries

4. Exit marks

- Usually on the soles of the feet

  often seen as linear splits

5. Arc eye

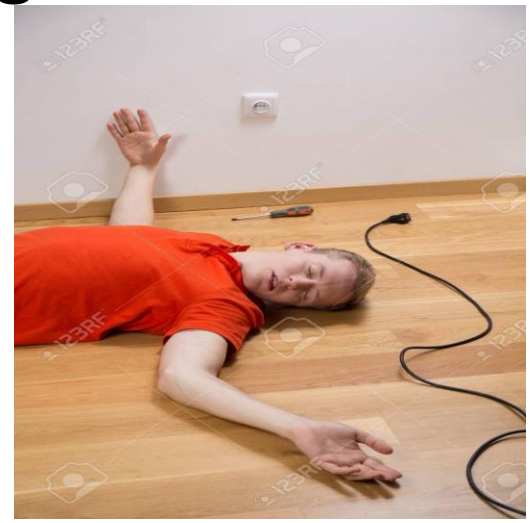
- There is singeing of the eye lashes, red eye & burns on the face.

6. Metallization

The face of the victim becomes darkened due to the metallization of the metal particles which are driven into the skin.

Medico-legal examination of death due to electrocution

- History
- Visit to the scene
- Identification
- Examination of clothes



Post mortem appearances

External

- Entry & exit burns
- crocodile skin burns
- extensive burns with charring

Post mortem appearances

External

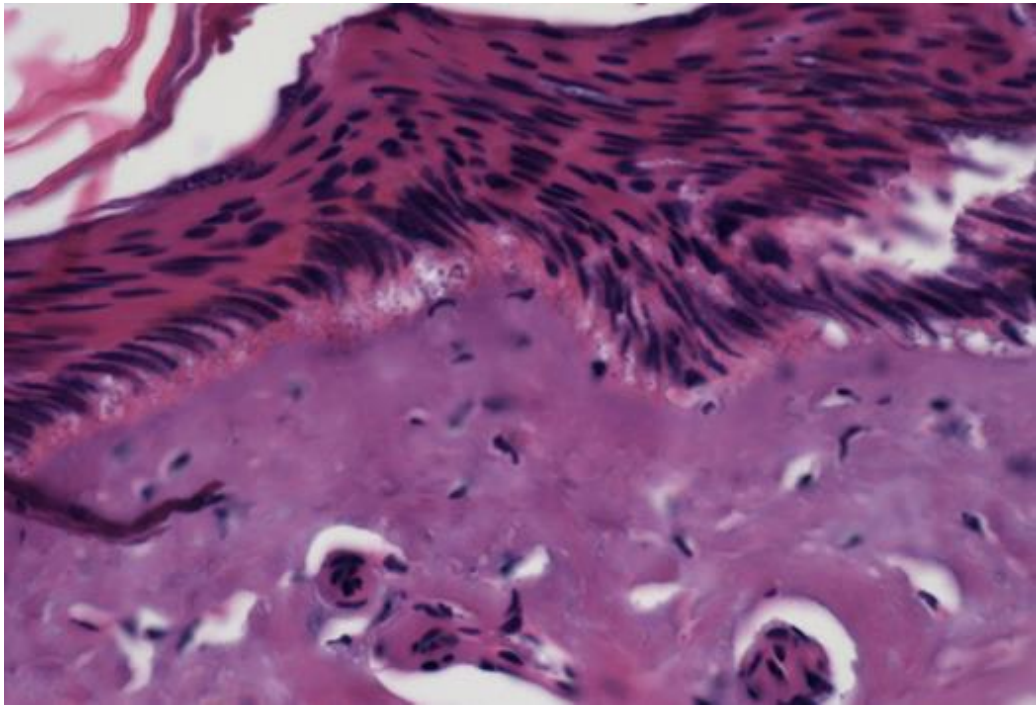
- Arc eye, metallic hue over the face
- Injuries due to falls
- External sings of asphyxia

Post mortem appearances

- Internal
  - Non specific
  - Sings of asphyxia
  - Negative autopsy

Investigation

- Histological appearance
- Cells of the epidermis elongated & arranged in parallel rows at right angle to the dermis.
- Vacuole formation
- Small haemorrhages

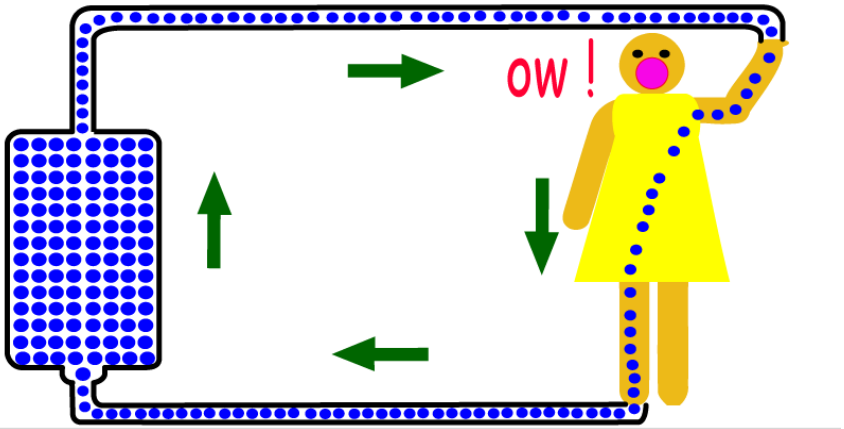


Death due to electrocution

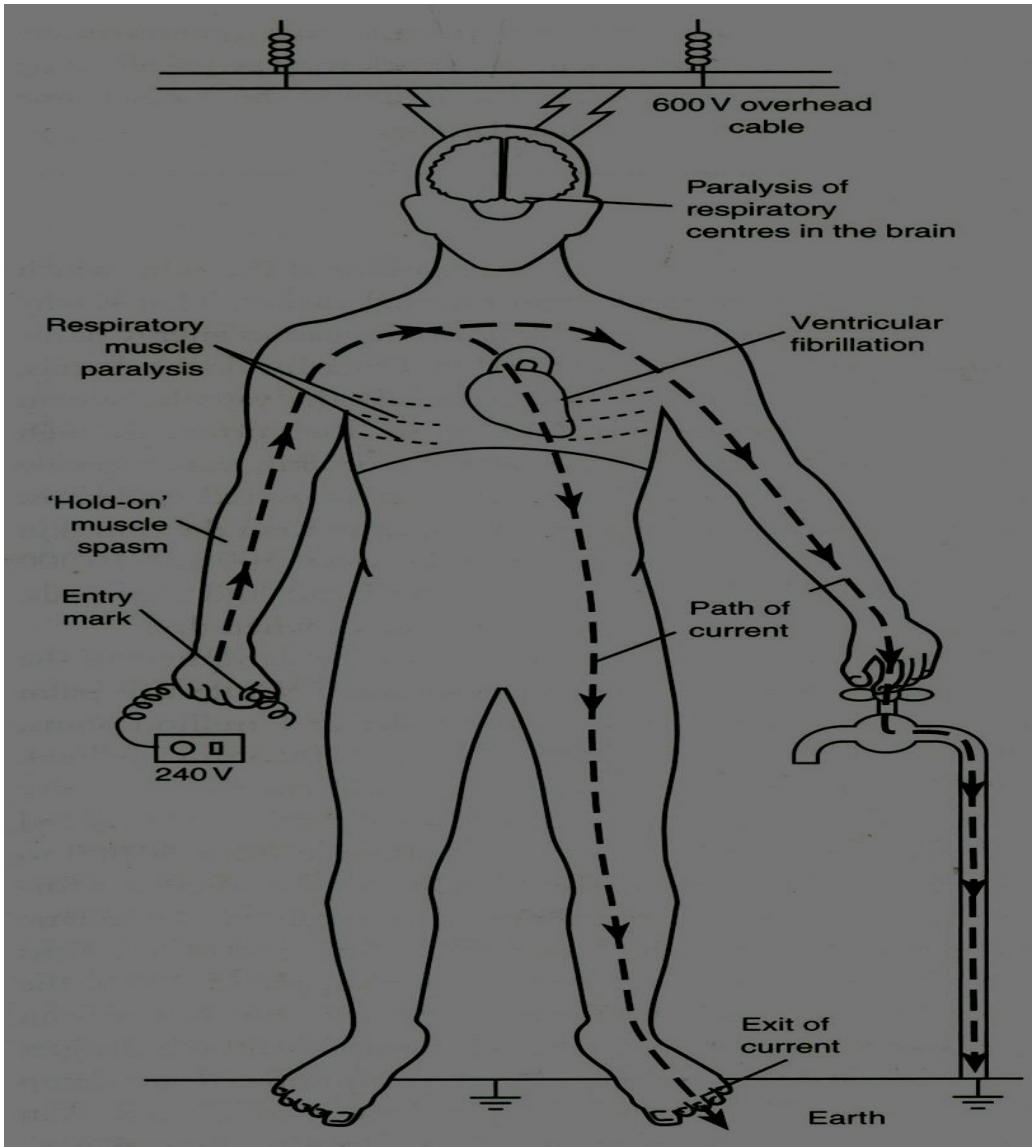
- Electricity must travel through a vital organ to cause death.
- Current enters at one point and then leaves the body at an exit point.
- Pathway depends relative resistance
- Take the shortest route between entry and best exit.

The death is caused by 3 major ways

- Passage of current across heart -
- Passage of current across the chest and abdomen
- Passage of current across head and neck



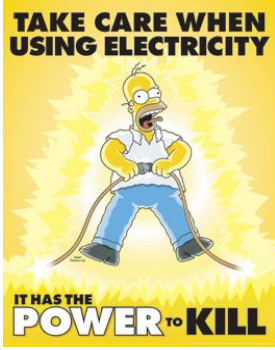
Death due to electrocution



Causes of death

- Ventricular fibrillation
- Respiratory failure
- Mechanical asphyxia
- Current passes through the head, paralysis of the conducting pathway

Causes of death



- Burns - high voltage burns
- Injuries - fallen from height
- Delayed death due to burns & septicemia

Summary

- Signs of electrocution
  - Joule burn
  - Arc eye
  - Exit mark
  - Metallization
- Investigation of death due to electrocution

Reference

- Pathology of trauma ,3rd ed.– Bernard Knight
- Lecture notes on injuries – Dr L.B.L.de Alwis
- Simpson's Forensic Medicine,12th ed. – Richard Shephered

- Acknowledgement - Sources of images
- Reference books
- Google images
- Doctor's who provide photographs to the Departmental collection of photographs