

# FORENSIC & TOXICOLOGY SUMMARY

Done by Shahed Atiyat

## Electrocution

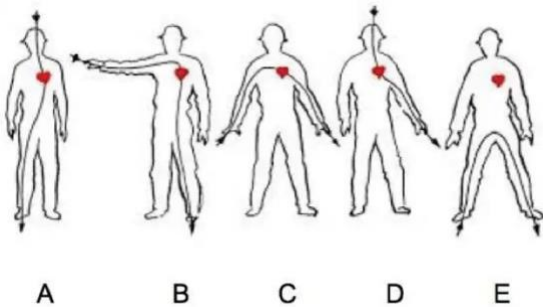
Death or severe injury happens due to the passage of electric current through the body.

### Source of electricity:

1. Domestic, 240 volts (most common source).
2. Industrial, up to 40000 volts.
3. Lightning, up to 300 million volts.

### Factors affecting electrocution:

- ❖ Current strength and voltage.
- ❖ Resistance (more resistance = less conduction but severe injury).  
Dry skin has higher resistance than wet skin.
- ❖ Duration of contact.
- ❖ Type of current (AC/DC).
- ❖ Pathway through the body.
- ❖ Surface area.
- ❖ Environmental conditions (humidity, metal ...).
- ❖ Personal factors (age, diseases like heart disease).



### Pathways of electrocution

More vital organs/tissues passing through = more dangerous the electrocution is.

“A” considered the **most** dangerous (the current pass through the **heart, brain & diaphragm**).

### Cause of death in electrocutions:

1. Cardiac arrest (V. fibrillation).
2. Respiratory arrest: due to respiratory muscles paralysis or damage of brain stem.
3. Thermal injury: in case of high voltage exposure.
4. CNS damage.
5. Multi organ failure.
6. Secondary trauma: like falls.
7. Asphyxia.

## Mechanism of injury:

1. **Contact injuries:** The person becomes a part of electrical circuit and has an entrance and exit site.
  - \* Points of enters: Necklace, belt, ring.
  - \* Points of exit: Knee, Toes.
2. **Flash injuries:** Cause superficial burn, no electrical energy travels through the skin. Cause by high voltage electric burn.
3. **Spark injuries:** typically minor and involves localized areas, no transfer through body.
4. **Flame injuries:** Secondary burn result when electrical spark or arc cause explosion of clothing or surroundings so the flam caused the injury rather than current.
5. **Lightning injuries:** Natural phenomenon, electric spark discharge from atmosphere. Mechanism of injury: Blast injury or thermal burns.



### Spark injury

Caused by small electrical spark that jumps between a low-voltage electrical source and the body.



### Flash injury



### Flam injury

Occurs due to high voltage electrical arc.

## Electrocution marks



### Blisters

Caused by thermal effect resulting from electrical current.



### Collapsed blisters

Raised edge and pale areola.



### Crater lesion (enters site lesions)

3 areas (from in to out):

1. The center may be pale or charred black.
2. Gray, coagulated necrosis area.
3. Partial tissue damage area (redness).



### Exit wound

Larger and more irregular. May have a charred edges with extensive tissue necrosis. The electrical current exits the body with greater force than it enters >> extensive damage

## Autopsy findings

### External:

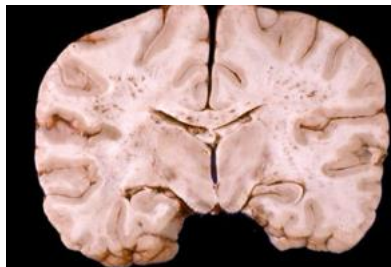
1. Electrocution marks.
2. Burned clothes and body hair.
3. Fractured ribs (due to severe convulsions).
4. Extensive ecchymosis.

### Internal:

1. Ocular congestion with dilated pupils.
2. Pulmonary edema.
3. Petechial hemorrhage (brain, pleura, pericardium).



Ecchymosis



Petechial hemorrhage in the brain and heart

## Clinical features of lightning injury:

1. Clothing: torn/ singed.
2. Skin: superficial burn, **Lichtenberg** (pathognomonic), metallization.
3. Cardiac: arrhythmia (V. Fib).
4. Neurological:  
Immediate: pupil dilation/anisocoria (asymmetric pupil size), LOC, amnesia, seizures.  
Delayed: myelopathy, complex regional pain syndrome.
5. Vascular: spasm.
6. ENT: tympanic membrane rupture (blast injury).
7. Ocular: cataract, retinal detachment.



**Lichtenberg**



**Anisocoria**



**Metallization**

## Notes:

- ❖ The **mode** of death in electrocution is syncope.
- ❖ The most common **cause** of death is arrhythmias.
- ❖ The **manner** of death is accidental.

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