

# Burning of Body: Causes, Stages, Effects, Preventions

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## Abstract

*Burn is one of the most destructive form of trauma. A burned body show many changes in the physical and chemical properties of the body parts. Burn can be caused in different ways: Thermal, Chemical, Electrical, Radiation, Sunburns, Cold burn and Friction burn. There are three stages of Burn which include: First degree, Second degree and Third degree. The burning cause the effects on the physiological as well as psychological factors. We need to take various precautions in order to prevent the injury cause due to the burning.*

**Keywords :** Burn , Body , Skin , Injury

Burn is one of the most destructive form of trauma. This is a significant cause of injuries which may result in death of the person. This may also cause permanent functional impairment which not only effect the life of the victims but also their families and locality.[2] Most of the deaths are realted to the sepsis from burn wound because it further provide site for many infections. In case of serious injury, there is a need of special resources that minimize morbidity and mortality.[1] The special resources include specialized medical equipment, well educated staff and a well-organized systems for proper maintenance.[2] A burned body show many changes in the physical and chemical properties of the body parts. Depending upon the temperature of exposure heat, the manner of identification matters. In forensics, to examine burned body various techniques are used i.e. Anthropological tests, DNA profiling, Polymerase chain reaction.[3]



Figure 1: Burned Victim

## Causes of Burns

The burns can be classified on the basis of manner used: [5] [6]

- Thermal Burns: These Burns are caused due to the excess amount of heat which may occur due to steam, flames, hot water, hot area etc. (Figure 2). Depending upon the temperature and duration of the time, the skin damage varies.



Figure 2: Thermal Burn

- Chemical Burns: These burns occur due to the contact with strong acids or strong bases. Hydrochloric acid, phosphorus, bleach, phenol, mercury are some of the chemicals that cause the damage to the skin.(Figure3)



Figure 3: Chemical Burn

- Electrical Burns: These burns occur due to the electric shock or lightning strike. The electrical burns varies from low-voltage electrical burns(1000 volts) to high-voltage electrical burns(more than 1000 volts). It may cause damage to the skin, deeper tissues and may cause unconsciousness, cardiac arrhythmia and many other disorders.(Figure 4)



Figure 4: Electrical Burn

- Radiation Burns: These burns are caused due to radioactive substance. High radiation doses (8-10Gy) causes cell death. (Figure 5) Lymphocytes and hematopoietic cells are at great risk with these radiations. Ulceration and cell necrosis may also occur.



Figure 5: Radiation Burn

- Sunburns: These burns occur due to long exposure of skin to the sun or light sources containing ultraviolet B rays (295-315nm) which causes the damage to the superficial layer. (Figure 6)



Figure 6: Sunburn

- Cold Burn (Frostbite): These occur due to the frozen of the skin at  $-2$  to  $-10^{\circ}\text{C}$ . Due to the development of the ice crystals, the concentration of the electrolyte increases which cause the destruction of the tissues. (Figure 7)



Figure 7: Cold Burn (Frostbite)

- Friction Burns: These burns occur due to the scraping of skin by contact with any hard object like the floor, the road, etc. (Figure 8) These are rarely included in burn category.



Figure 8: Friction Burn

### Stages of Burns

On the basis of range of damage to the skin, there are three stages of the burns: first degree, second degree and third degree. (Figure 9) There is also the fourth degree that involves the damage of the skin beyond third degree which involves the harm to the tendons and bones.

- First degree burn: These are the 'superficial burns'. They cause minimum skin damage because it affects only the outermost layer of skin. The first degree burn involve redness on the skin, swelling, pain, peeling skin, etc. This injury usually lasts for 7-10 days. Consult with your doctor if the injury occurs on the face or any major joint like spine, elbow, shoulder, etc.
- Second degree burn: These are more dangerous than the first degree because the damage occurs beyond the superficial layer. This may cause blister and the skin become red. These burns may take 2-3 weeks to heal. You should seek medical treatment if the burn affects your face, hands, buttocks, etc.
- Third degree burn: These are the most severe condition. These cause damage to the deep layers of the skin. This cause more pain and this may also include dark brown colour, raised texture, waxy and white colour, etc. There is no certain duration for healing of third degree.[7]

### Effects of Burning on the Body

The largest organ of the body is skin which separate the outer surroundings with internal body. It resists the entry of various harmful environmental microorganisms to enter the body. It synthesis Vitamin D. The regulation of the body temperature, composition of body fluids occur due to the packaging of the internal body with the skin. When the skin is damaged by burning, all these functions are unable to occur.[8]

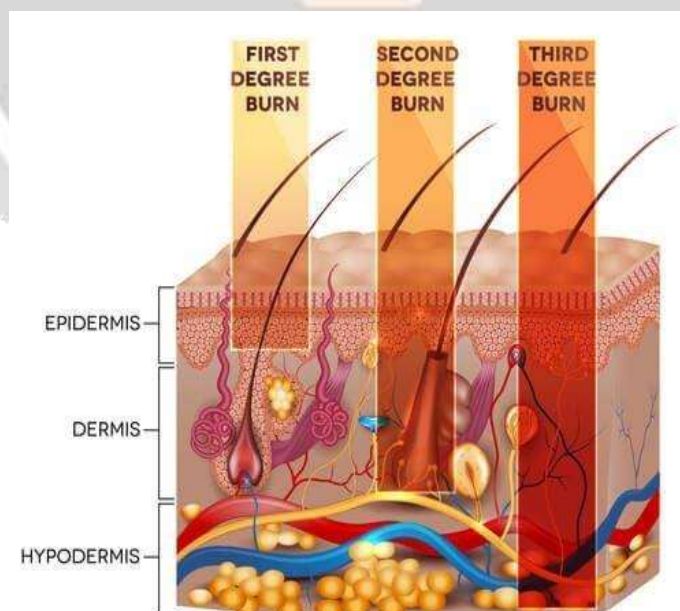


Figure 9: Stages of Burns

Severe burns may cause physiological and psychological effects on the body. It may cause instant shock to the nervous system. Also, the victim may also get afraid and anxiety due to pain and may get unconscious. Due to

disruption of the skin the fluid and salts in the body may leak out.[9] After burning of the body, only bones and teeth may be left for the extraction of DNA but due to extreme fire, DNA fragments get highly degraded and is difficult for amplification. The ash component of the body contains calcium carbonate (25-45%), Potash (<10%), Phosphate (<1%) with iron, manganese, zinc, copper and heavy metals. The smell of the burning body may cling to nostrils as it smells like gasoline, burning trash or gunpowder.

There is an increase in the permeability of capillary due to the extreme burn and it may result into the loss of the plasma. The life span of Red blood cells also decreases due to the effect of heat on them. Extreme burn may also cause damage to bone marrow and causes anemia.[10] It may also cause thrombosis in the vessels due to the denaturation of the cell proteins. There is a release of histamine, kinin and serotonin from the burning site. Burning causes systemic as well as local changes. There are pathological changes in various systems like cardiovascular, renal, gastrointestinal, metabolic, etc.[5] The pathological changes occur may cause difficulty in respiration, acute respiratory distress syndrome (ARDS), paralytic ileus, sepsis and renal failure. Due to the burning, the skeletal muscles get weakened and the victim suffers from hypoventilation and dependence on respirators.[11]

### Preventions

- The chemical burns can be avoided by wearing gloves and mask during handling of any chemical agent.
- The electrical boxes must be covered for proper safety.
- The Smoke detectors should be placed in the house and workplace so that in case of fire, you will be aware of it.
- Switch off all the electrical equipments when not in the use.
- Avoid wearing loose clothes and open hair while cooking.
- During lightning, never go outside and maintain distance from electrical appliances.

### Conclusion

Burns are preventable. There is a great risk of burning at the home and at the workplace. The preventions must be taken in order to avoid any skin damage due to fire. In case of serious injury, you must consult with the doctor immediately. Stay Safe.

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