

# Burns



Burns are damage to tissues caused by their exposure to thermal, chemical, electrical, or radiation energy

# Classification

- **Due to causes:**
  1. **Thermal**
  2. **Chemical**
  3. **Electrical**
  4. **Radiation**

# Class

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# Burn. Degree 4



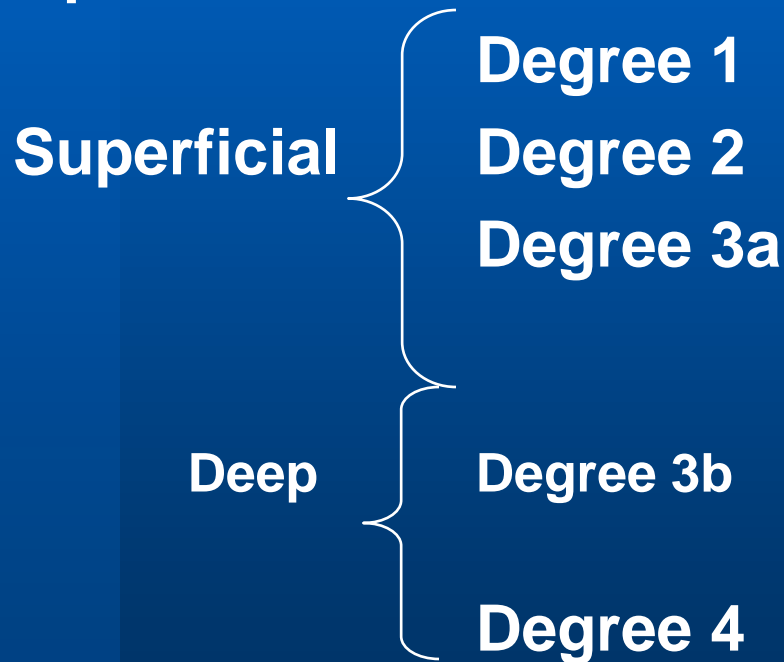
# Burn. Degree 4





# Classification

Due to skin's capability of regenerating through epithelization



# The severity of burns

**depend on**

– The area

**And**

– Depth of damage

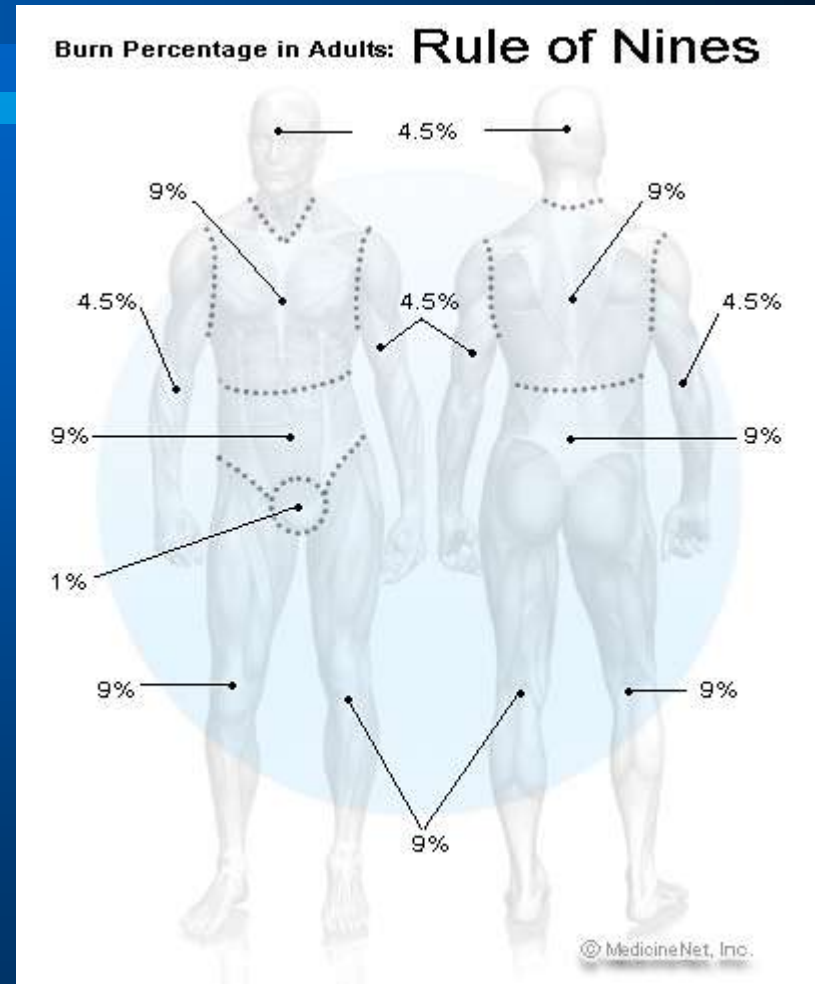
# Assessment of the area of burns

- **Facilitates adequacy of the therapy**
  - **are measured as a percentage of total body area affected**
  - **rule of nines**
  - **rule of palm**
- } are used



# rule of nines

- Head = 9%
- Chest (front) = 9%
- Abdomen (front) = 9%
- Upper/mid/low back and buttocks = 18%
- Each arm = 9%
- Each palm = 1%
- Groin = 1%
- Each leg = 18% total (front = 9%, back = 9%)



## rule of palm

- **If the areas damaged are not so extensive and localized on different parts of the body**
- **The size of an adult palm is about 1% of the body surface area.**

# Assessment of the depth of burns

- **It is difficult within the first few hours or even days following injury**
- **Evaluation of skin sensation is used**
- **Pain sensation at the affected areas are intact or somewhat reduced in superficial burns, while in deep burns are lost**

# Factors Determining Severity of Burns:

- Size of area of burns
- Age (*age < 2 years old or > 60 years old, the mortality rates increases*)
- Body part effected
  - *If the burn involves the face, nose, mouth or neck, there is a risk that there will be enough inflammation and swelling to obstruct the airway and cause breathing problems.*
  - *If there are circumferential burns to the chest, as the burn progresses, the tissue involved may not allow enough motion of the chest wall to allow adequate breathing to occur. If circumferential burns occur to arms, legs, fingers, or toes, the same constriction may not allow blood flow and put the survival of the extremity at risk .*

# Factors Determining Severity of Burns:

- **Mechanism of Injury (*Flame, contact, scalds, chemical, electrical*)**
- **History of cardiac, pulmonary, renal or hepatic diseases**
- **Duration of contact with burning agent.**

# Burn disease

## Result from

- Superficial burns with a burn area of above 15% body surface
- Deep burns of more than 10% body surface

# Periods of the burn disease

- **Burn shock (2-72 hours)**
- **Acute burn toxemia (3-9 day)**
- **Septicemia (on 10 day)**
- **Recovery**



# Burn shock

- **Rapid fluid shifts - from the blood into the interstitial space**
- **Capillary permeability with burns increases with vasodilation**
- **Protein loss - hypoproteinemia**
- **Hemoconcentration - Ht increases**
- **Hyponatremia - loss of sodium with fluid**
- **Hyperkalemia - damaged cells release  $K^+$ , oliguria**
- **Metabolic acidosis**

# The tasks of first aid in burns treatment

- 1. To stop the action of the traumatizing agent**
- 2. Prophylaxis of shock**
- 3. Prevention of the burn surface infection**
- 4. Transportation**

# Principles of treatment and resuscitation

- **maintain a patient airway - watch for laryngeal edema**
- **Oxygen therapy**
- **maintain circulation - fluid resuscitation - crystalloids and colloids**
- **analgesia**

# The Parkland formula

- The Parkland formula (named for the trauma hospital in Dallas) estimates the amount of fluid required in the first few hours of care following a burn:
- $4\text{ml of Lactated Ringers} \times \text{weight (Kg)} \times \% \text{BSA (Body surface area) burned} = \text{ml of Lactated Ringers to be given during the first 24 hour period following the burn}$
- first 8 hours following the burn are the most critical - need to give half of the total
- the second 8 hrs give one-quarter, the last 8 hrs give the remaining one-quarter

**NOT EXCEED**

**10% OF PATIENT'S BODY WEIGHT!**

# SIGNS OF ADEQUATE FLUID RESUSCITATION

- **Pulse < 120 beats per minute**
- **Urine output for adults 30 - 50 ml/hour**
- **Systolic blood pressure > 100 mm Hg**
- **Blood pH within normal range 7.35 - 7.45**

# Acute burn toxemia

- **Capillary membrane integrity returns**
- **Edema fluid shifts back into vessels - blood volume increases**
- **Increase in renal blood flow - result in diuresis (unless renal damage)**
- **Hemodilution - low Ht, decreased potassium as it moves back into the cell or is excreted in urine with the diuresis**
- **Fluid overload can occur due to increased intravascular volume**
- **Metabolic acidosis –  $H^+CO_3$  loss in urine, increase in fat metabolism**

# Septicemia

## Signs of sepsis:

- Fever
- Tachypnea
- Paralytic ileus
- Abdominal distention
- Oliguria



# Wound care - dressing the burn

## 1. Open technique - more often used with burns effecting the:

- face,
  - neck
  - perineum and
  - broad areas of the trunk
- **Superficial burns- exudate dries in 48 to 72 hours forming a hard crust that protects the wound.**
    - Epithelialization occurs beneath the crust and may take 14 to 21 days to heal.
    - Crust then falls off spontaneously - leaving healed unscared surface

# Wound care - dressing the burn

- **Deep burns - dead skin is dehydrated and converted to black leathery eschar in 48 to 72 hours. Loose eschar is gradually removed with debridement**
- ## **2. Closed technique**
- **Wound is washed and sterile dressings changed**
  - **Dressing consists of gauze with topical antimicrobial agents and ointments.**

# WOUND CARE - GRAFTING

## Indications for grafting

- Deep burns
- priority areas
- wound bed pink, firm, free of exudate
- bacterial count  $< 10^5$ /gram of tissue

# GRAFTING



# GRAFTING



# GRAFTING



# GRAFTING





# Frostbite

- **Pre-reactive period: the skin temperature begins to drop, and blood flow to the surface of the skin dramatically decreases due to the vascular spasm**
- **Reactive period: starts from warming the affected organ and restorations of blood circulation. It is divided into early and late reactive periods.**

# Reactive period

- **Early**
  - lasts for 12 hours from the beginning of warming
  - is characterised by the disorders in blood circulation, changes in the vascular walls, hypercoagulation and clotting.
- **Late**
  - Follows the early
  - the skin becomes necrotic and gangrenous



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es muscle, tendons  
al swelling. Pain at the  
joints is a possible symptom.

# frostbite



# frostbite



# First aid

- **Rapid warming is the most important**
- **Limbs are put in warm baths with the temperature of water at 18-20<sup>0</sup> C**
- **Within a period of 20-30 min the temperature is rased to 39-40<sup>0</sup> C**

# treatment

- **Pre-reactive, early reactive period**
  - Rheopolyglucin, spasmolytics, heparin
- **Late reactive period: detoxication, immune stimulators, antibiotics**