

burn

# skin

- Largest human organ
- Profound regional variation
- Protective barrier
- Interface with our surrounding
- As an environmental buffer
- Protection against a vast array of destructive forces

# Structural integrity of epidermis

- Semipermeable barrier to chemical absorption
- Prevent fluid loss
- Protect against penetration of solar radiation
- Rebuff infection agent
- Dermal durability resist physical forces
- To regulate body heat

- Epidermis
- Basement membrane
- dermis

# Epidremis

- very little extracellular matrix (ECM)
- composed of specialized cell with vital functions

# Basement membrane

- Many biologic functions
- Tissue organization
- Growth factor reservoir
- Support of cell monolayers during tissue development
- Semipermeable selective barrier

# dermis

- Providing soft tissue durability
- Composed of a dense ECM that provides support for a complex network of nerves , vasculature & adnexal structures

# ECM

- A collection of fibrous proteins & associated glycoproteins embedded in a hydrated ground substance of glycosaminoglycans & proteoglycans
- Mechanical support
- Viscoelasticity
- Regulate the neighboring cells ( their ability to migrate , proliferate & survive injury )



# epidermis

- Composed of keratinocytes
- A dynamic multilayered composite of maturing cells
- Layers from internal to external :
- Stratum germinatum , stratum spinosum , stratum granulosum , stratum lucidum , stratum corneum

- **In spinous layer** : Keratinocytes are linked together by tonofibrils & produce keratin
- **In granular layer** : cells accumulate keratohyalin granules
- **In horny layer** : keratinocytes age , lose their intercellular connections & shed
- From basal layer exit to shedding : 40 – 56 days

# Melanocytes

- Absorption of harmful radiation
- Derived from precursor cells of neural crest
- Produce melanin from tyrosine & cysteine
- Despite differences in skin tone , density of melanocytes is constant among individuals
- Rate of melanin production , transfer to keratinocytes & melanosome degradation that determine the degree of skin pigmentation

- Cutaneous melanocytes play a critical role in neutralizing the sun , s harmful rays
- As a durable barrier against external forces , skin relies on a complex network of filaments to maintain cellular integrity
- Intermediate filaments called Keratins ( found within the spindle layer) , provide flexible scaffolding that enables keratinocyte to resist external stress

# Skin is a immunoreactive barrier

- Langerhans , cell : migrate from bone marrow , skin, macrophages
- Express class II major histocompatibility antigens
- Has antigen – presenting capabilities
- Initiating rejection of foreign bodies , immunosurveillance against viral infections & neoplasms of skin

# dermis

- Comprised of structural proteins , cellular components
- Collagen : main functional protein within the dermis, 70% of dermal dry weight , tensile strength
- Skin : collagen type I
- Fetal dermis : collagen type III

- **Elastic fibers:** highly branched proteins capable of stretching to twice their resting length
- **Ground substance :** consisting of various polysaccharide-polypeptid ( glycosaminoglycans) complexes , an amorphous material , secreted by fibroblasts

- **Blood supply to dermis** : based on an intricate network of blood vessels which provide vascular inflow to superficial structures , as well as regulate body temperature
- **Glomus body** : tortuous arteriovenous shunts that allow a substantial increase in superficial blood flow when stimulated to open



- **Cutaneous sensation** is achieved via activation of a complicated plexus of dermal autonomic fibers synapsed to sweat glands , erector pili & vasculature control points
- **Corpuscular receptors** : Meissner ( local pressure ) , Ruffini ( vibration ) , Pacini ( touch ) , unspecialized free nerve ending ( temperature , touch , pain , itch )

# Cutaneous adnexal structure

1) eccrine glands

2) pilosebaceous units

3) apocrine glands

# Ecrine glands

- Sweat producing
- Located over the entire body
- Concentrated on the palms , soles , axillae & forehead

# Apocrine glands

- Human axillae & anogenital region
- Suppurative hydroadenitis

# Pilosebaceous unit

- Hair follicles are mitotically active germinal centers that produce hair. Together with oil – secreting sebaceous glands , these two structures form a pilosebaceous unit

# Type of burn

- Thermal burn (Flash & flame , Scalds, Contact , , Tar )
- chemical burn
- Electrical burn
- Nonaccidental burn

# Burn depths

- Epidermal
- Superficial partial thickness
- Deep partial thickness
- Full thickness

# Management of the burn wound

- Topical ointment
- Wound dressing
- Biologic wound dressing
- surgery



- Deep partial thickness or full thickness burn , time for healing can be extensive & risks for infection greater
- For these , it is better to treat by surgical debridement & coverage with skin grafts or cultured epidermis

Ideally , all wounds should have epithelial cover within 3 weeks to minimize scarring

# surgery

## Early excision & graft :

- ✓ To reduce pain
- ✓ Shorten hospital stay
- ✓ Accelerate return to normal function in moderate injuries

- Dead tissue continues to incite an inflammatory response , serves as a growth medium for pathogens & delays wound healing
- Even after removal of the dead tissue , pathogens colonize the wound & enter the patient, s blood stream to seed distant sites
- Open wounds leak proteins & fluids & continue to be painfull

- Burn eschar is shaved tangentially or excised to deep fascia
- Best time to graft burns is within 5 days of injuries of injury to minimize blood loss , and injuries that are obviously deep at presentation must be referred early

- Main limitation to removal of dead skin in large burns is severe physiologic disturbance caused by rapid & copious blood loss
- Every 1% TBSA of skin debrided : 100 ml blood loss
- Only 10-20% TBSA debridement in one procedure

# Tangential debridement

cutting the skin tissue at the  
depth of dermal &  
subcutaneous capillary network

- Tourniquet use on extremities
- pressure dressing
- electrocautery
- hemostatic agents
- avoidance of agents that interfere with the coagulation & subcutaneous injection of the burn with dilute epinephrine



Autologous split thickness skin graft from unburnt areas are the “gold standard” for definitive coverage of burn wounds

# Donor sites

- Extremities minus hands & feet are the best areas for harvesting of skin graft
- Trunk
- scalp

- If donor sites are sparse , or wound bed is likely to bleed profusely : graft is perforated with a mesher to allow expansion
- **Un meshed graft** : on hand, face , over any future site for intravenous central line & tracheostomy

# limitation of donor sites

- 1) rotation of donor sites and cover the unexcised burn with antimicrobial creams
- 2) excised wound is resurfaced with a temporary covering until donor sites have regenerated & can be re-harvested

# Types of Skin graft

- Split thickness
- Full thickness
- Composite graft

# Graft take

- Imbibition
- Inosculation
- revascularization