Skin = Integument = Cutaneous Membrane

The Integumentary System
STRUCTURE OF THE SKIN

- 2 basic layers
- **Epidermis**
  - Outermost covering
  - Epithelial cells
  - Avascular
- **Dermis**
  - True skin
  - Connective tissue
  - Vascular
EPIDERMIS

- 2 (of 3) epidermal layers are:
  - Stratum corneum
  - Stratum germinativum

- Superficial layer of skin
STRATUM CORNEUM

- Outermost layer
- In cells, cytoplasm replaced by KERATIN – making them waterproof.
- Flat and scale-like cells that flake off
- First line of defense against surface bacteria
- Thickest on palms of hands, soles of feet
STRATUM GERMINATIVUM

- Innermost epidermal layer
- Reproductive layer – cells form and push their way up, become keratinized, and replace the top layer
- Contains MELANOCYTES – cells that contain a pigment = MELANIN
Melanin

- ★ Black, brown, or has a yellow tint – depending on racial origin
- ★ The more melanin, the darker the skin
- ★ Caucasians don’t have much melanin in their melanocytes.
- ★ Freckles = patches of melanin
- ★ Albinism = no melanin
Tanning

• Sunlight stimulates melanocytes to make more melanin
• Tanning produced by UV rays.
• Prolonged exposure may lead to skin cancer!
Welcome to FDA’s Tanning Website
This site is intended to provide a source of general information on skin tanning, Ultraviolet (UV) exposure, UV emitting products, and skin protection. While this site provides general information on UV safety, it is not intended to provide medical advice. If you have questions about your health, the best source of information is your doctor. The FDA wants consumers to know that UV radiation in tanning devices poses serious health risks. A recent report by the International Agency for Research on Cancer, (IARC), part of the World Health Organization, concludes that tanning devices are more dangerous than previously thought. Exposure to UV radiation, whether from the sun or indoor tanning beds, can cause:
- Skin cancer
- Skin burns
- Premature skin aging
- Eye damage (both short- and long-term)
PAPILLAE

- Ridges in stratum germinativum that arise from dermis
- Create permanent ridges in fingers, palms and soles of feet
- These “friction ridges” help with grip
- Cause “fingerprints”
DERMIS

- Thicker inner layer that contains:
  - Connective tissue
  - Blood vessels
  - Nerve endings
  - Muscles
  - Hair follicles
  - Oil and sweat glands
  - Fat cells
Nerve Receptors in Dermis

- Sensory nerves – heat, cold, touch, pain and pressure
- Touch receptors close to the surface
- Pressure receptors are deeper
Subcutaneous Layer

- Lies under the dermis (not really part of integumentary system)
- Made up of loose connective tissue
- Contains half of the body’s stored fat
Appendages of the Skin

- HAIR
- Almost everywhere on the body
- Length, thickness, type and color varies
Hair

- Outer layer = CORTEX
- Inner layer = MEDULLA
- Part under the skin = ROOT
- Part outside the skin = SHAFT
- FOLLICLE = pocket in epidermis, hair inside
- PAPILLA = tuft of tissue in root, contains capillaries
- ARRECTOR PILI MUSCLE = smooth muscle attached to follicle. How does this muscle cause goose bumps?
NAILS

- Nail is formed in the nail bed or MATRIX
- Epidermal cells fused together and fill with keratin
SWEAT GLANDS

- Perspiration is 99% water
- SUDORIFEROUS GLANDS
- Distributed over the entire skin surface
- Large numbers under the arms, palms of hands, soles of feet and forehead
- Duct extends to form a pore in the skin, perspiration excreted through the pores
- May be activated by heat, pain, fever and nervousness
- Average fluid loss is 500 ml per day
SEBACEOUS GLANDS

• Secret oil (SEBUM) that protects and lubricates the skin
Skin and Microorganisms

- Intact skin = best protection against pathogens, toxins and water loss
- Skin generally too dry for microbial growth – they do grow in moist areas
- Most skin bacteria associated with hair follicles or sweat glands
- Underarm perspiration odor caused by bacteria and perspiration
• The best way to prevent the spread of disease is by hand washing.
7 Functions:

- Protective covering
- Regulates body temperature
- Manufactures Vitamin D
- Sensory function
- Temporary storage of fat, glucose, water and salts
- Screens out harmful ultraviolet radiation
- Absorbs certain drugs
DISORDERS

Disorders of the Skin
ACNE

• Common and chronic disorder of sebaceous glands

• Sebum plugs pores → area fills with leukocytes

• Also – blackheads, cysts, pimples and scarring
ATHLETE’S FOOT

• Contagious fungal infection
• Usually contracted in public baths and showers
• Rx – antifungal agents
DERMATITIS

- Non-specific inflammation of skin
- Can be rash – reaction to soap, plants, etc.
- Can be emotional – stress can cause skin blotches
GENITAL HERPES

- Viral
- Blister in genital area
- Spread through sexual contact
- Periods of remission and exacerbation
- Rx – Acyclovir
- Can be passed to newborn during vaginal delivery
SKIN CANCER

- Associated with exposure to sun (UV rays)
- Most common type of cancer in people

Small, smooth, shiny, pale, or waxy lump

Firm, red lump

A lump that bleeds or develops a crust

Photos courtesy of NCI's Dermatology Branch
MALIGNANT MELANOMA

- Occurs in melanocytes
- Metastasizes to other areas quickly
- Appears as brown or black irregular patch that occurs suddenly
- A change in an existing wart or mole may indicate melanoma
- Rx – surgical removal of melanoma and surrounding area and chemotherapy
Terms

- **ALBINISM** – absence of melanin
- **ALOPECIA** – baldness
BURNS

- Caused by radiation, sun, boiling water, chemicals, fire or electricity
- RULE OF NINES – Measures percent of body burned. Body divided into 11 area, each is 9% of body surface.
Rules of Nine

- Adult: 9% head + 18% back + 18% each leg + 9% each arm + 9% each shoulder + 9% chest
- Child: 9% head + 18% back + 18% each leg + 9% each arm + 9% each shoulder + 9% chest
- Infant: 9% head + 18% back + 18% each leg + 9% each arm + 9% each shoulder + 9% chest

Add 1/2% to each leg for each year over age 1.
Subtract 1% from the head area for each year over age 1.
FIRST DEGREE

- Superficial
- Skin red and dry
- Involves only epidermis
- Rx – cold water
- Healing within one week
Burns

<table>
<thead>
<tr>
<th>Depth of Tissue</th>
<th>Depth of Burn</th>
<th>Wound Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Epidermis</td>
<td>First</td>
<td>Red, pink in color, blanches, painful, no blisters</td>
</tr>
<tr>
<td></td>
<td>Superficial</td>
<td></td>
</tr>
<tr>
<td>Dermis</td>
<td>Second</td>
<td>Deep red in color, blanches or slow blanching, very painful, blisters present, moist in appearance</td>
</tr>
<tr>
<td></td>
<td>Partial</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Deep partial</td>
<td></td>
</tr>
<tr>
<td>Sub Q</td>
<td>Third</td>
<td>White, black, brown, grey, or charred in color, no blanching, decreased or absent sensation, no blisters, dry, or leathery in appearance</td>
</tr>
<tr>
<td></td>
<td>Full thickness</td>
<td></td>
</tr>
</tbody>
</table>

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SECOND DEGREE

- Epidermis and dermis
- Pain, swelling, redness and blistering
- Skin may be exposed to infection
- Rx – pain medication, dry sterile dressing
- Healing within 2 weeks
THIRD DEGREE

- Epidermis, dermis and subcutaneous layers
- Symptoms – loss of skin, blackened skin
- May be life-threatening
- Obtain medical treatment immediately
First degree burn
Second degree burn
Third degree burn