**MEMBRANES**

**EPITHELIAL membranes**
1. **Cutaneous membranes** (SKIN) – a dry membrane; the main function is protection.
2. **Mucous membranes** (mucosa) – lines body cavities open to the exterior and organs of the respiratory, digestive, urinary and reproductive tracts; membrane secretes mucus for lubrication, trap debris and protect lining of tissue.
3. **Serous Membranes** (serosa) – moist membrane found in ventral body cavities.
   - Serous membranes occur in pairs. The parietal layer lines a specific portion of the wall of the ventral body cavity. The visceral layer covers the outside of the organs in the cavity.
   - The serous space between the layers is filled with lubricating fluid called serous fluid. The fluid is secreted by both layers and allows organs to slide without friction.
   - The membranes lining the abdominal cavity and organs are called peritoneum. The membranes lining the thoracic cavity and the lungs are called pleura. The membranes lining pericardial cavity and covers the heart is called pericardium.

**CONNECTIVE membranes**
1. **Synovial membranes** – found at joints; secretes synovial fluid to provide lubrication and cushioning for smooth movement.

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**INTEGUMENTARY SYSTEM**

**Functions**
1. Protection from ….
   a. Mechanical damage – epidermis contains keratin which toughens cells
   b. Infection by microbes – the low pH skin secretions (sweat & oil) creates an acid mantle which deters bacterial growth; sweat contains lysozymes (enzyme) and antibodies that destroy bacteria
   c. Ultraviolet light – UV light stimulates cells to produce melanin which blocks much of the harmful UV light
   d. Excessive water loss or dehydration – contains a waterproofing glycolipids and keratin to block diffusion of water
2. Excretion – nitrogen containing waste are eliminated from body in sweat
3. Cutaneous sensation – sensory receptors for heat, pain and pressure
4. Body temperature regulation…..
   a. Cold temperatures – blood vessels constrict to reduce blood flow to the skin and sweat production decreases to retain heat in the trunk of the body…shivering occurs to generate heat due to muscle activity
   b. Hot temperatures – blood vessels dilate to increase blood flow to the skin to dissipate to the extremities and sweat production increases to cool body
5. Blood reservoir – when other body organs need blood supply, the nervous system constricts dermal blood flow
6. Production of Vitamin D – UV light converts circulating cholesterol into Vitamin D precursor which is needed for calcium metabolism
**Skin Layers –**

**EPIDERMIS**

1. **Stratum Basale**
   - Deepest layer; cells undergo rapid cell division; millions of cells are produced daily – daughter cells are pushed upward.

2. **Stratum Spinosum**

3. **Stratum Granulosum**

4. **Stratum Lucidum**
   - Thin, translucent layer -- only visible in thick skin of the palms, fingers, toes and soles.

5. **Stratum Corneum**
   - Outermost layer of flattened, dead, keratin-filled cells that constantly flake off.

**Cells of the epidermis –**

- **Melanocytes** – produce melanin that protects the skin cells from the damaging effects of ultraviolet (UV) radiation in sunlight.
- **Keratinocytes** – produces keratin that gives the epidermis its protective properties – makes epidermis tough, durable and water resistant.
- **Merkel cells** – detect touch.
- **Langerhans’ cells** – white blood cells ingest foreign substances.

**DERMIS –**

- Contains nerve fibers, blood vessels, lymphatic vessels, hair follicle, oil glands, sweat glands, sensory receptors, white blood cells. Filled with collagen and elastin fibers.
  1. **Papillary layer** – thin, superficial layer. Contains a rich supply of blood capillaries and nerve endings for touch and pain.
     - Superior surface forms projections called dermal papillae that indent into the epidermis.
     - On the palms of the hand and soles of the feet, these papillae form epidermal ridges. These ridge patterns are genetically determined and form your fingerprint.
  2. **Reticular layer** – lower layer that contains bundles of collagen, elastic and reticular fibers.
     - **Pacinian corpuscles** – sensory receptor that are sensitive to deep pressure

- **Collagen fibers** provide strength; prevent scrapes from penetrating the dermis, and bind water to keep skin hydrated. Elastic fibers provide the stretch-recoil properties of the skin.
- **Flexure lines** are dermal folds that occur at or near joints to accommodate joint movement.

**SUBCUTANEOUS LAYER (hypodermis)**

- Contains adipose; anchor the skin to underlying organs. Serves as a shock absorber and insulates the deeper tissues.

**Damage to the Skin:**

- Blisters occur when the epidermal and dermal layers are separated by fluid-filled pockets.
- Extreme stretching of the skin can tear the dermis resulting in stretchmarks.
- As a result of aging, elastic and collagen production decreases and subcutaneous fat decreases, resulting in saggy, wrinkled skin.
**Skin Pigments –**

**Melanin** – ranges in color from yellow to brown to black. Freckles and moles are local accumulations of melanin.

**Carotene** – yellow to orange pigment that accumulates in the stratum corneum and the hypodermis.

**Hemoglobin** – pinkish hue is due to color of oxygenated hemoglobin in red blood cells circulating

**Skin Color Changes -----**

- Erythema - reddening of skin due to embarrassment, hypertension, fever, inflammation or allergy.
- Pallor (blanching) - pale skin due to emotions, anemia or hypotension.
- Jaundice - yellow skin tone usually indicates liver disorder
- Bruises – reveal where blood escaped from circulation and clotted beneath the skin.
- Cyanosis – poorly oxygenated skin turns bluish due to heart failure and respiratory failure.

**APPENDAGES of the SKIN**

**Hair** – strand of dead, keratinized cells produced by hair follicles. Melanocytes are found in the bulb. Arrector pili is smooth muscle attached to the hair follicle that contracts to make hair erect.

**Nails** – composed of dead cells filled with keratin.

**Sebaceous (oil) Glands** – releases sebum (oil & fragmented cells) through a pore or on the hair follicle…..sebum lubricates skin and prevents bacterial growth

**Sudoriferous Glands** – release sweat to the skin surface via ducts.
1. Eccrine (Merocrine) glands – excrete body waste, assist in temp regulation, deter bacterial growth
   a. sweat composition: 99% water, salt, metabolic waste (urea, uric acid & ammonia)
2. Apocrine glands – begin to function at puberty…located in the axillary and genital regions
   a. same secretions as eccrine, but contains fatty substances & proteins --- bacteria on skin decompose this sweat and release byproducts that form our body odor
**Infections & Allergies**

**Athlete’s Foot** – fungal infection resulting in itchy, red, peeling condition of the skin

**Boils and Carbuncles** – inflammation of hair follicles and sebaceous glands caused by bacterial infection

**Cold Sores** – fluid-filled blisters caused by herpes simplex infection; virus stays dormant in a cutaneous nerve

**Contact dermatitis** – redness and swelling of skin, progressing to blister caused by exposure to chemicals

**Psoriasis** – overproduction of skin cells that results in reddened epidermal lesions covered with dry scales

**CANCER** – abnormal growth of cells that form tumors...tumors may be benign or malignant (cancerous) and metastasize to invade other body areas. Use the ABCDE rule to examine skin for possible lesions.....Asymmetry, Border irregularity, Color, Diameter, Elevation.

- Basal Cell Carcinoma – most common; cancer is slow growing, does not metastasize, and often occurs on the face.
- Squamous Cell Carcinoma – tends to grow rapidly and metastasize. If caught early, change of complete cure is good after being surgically removed and radiation therapy.
- Melanoma – cancer of melanocytes is the most dangerous because it is highly metastatic and resistant to chemotherapy.

**BURNS** –

- The immediate threat to life resulting from severe burns is a loss of body fluids resulting in dehydration and electrolyte imbalance. This leads to renal shutdown and circulatory shock. Lost fluids must be replaced immediately.
- After initial dehydration crisis, the leading cause of death is infection. Burned skin is sterile for about 24 hours, after this time pathogens are free to invade broken skin.
- Rule of 9’s is used to estimate the extent and severity of burns.

**Types of Burns**

1. Partial Thickness burns
   - First-degree burns - only the epidermis is damaged; the area becomes red and swollen
   - Second-degree burns - injury to the epidermis, upper region of dermis resulting in a blister

2. Full Thickness burns
   - Third-degree burns – destroys entire thickness of skin and area becomes blackened, nerve endings are destroyed and burn area is not painful. Skin graft is necessary because regeneration isn’t possible.

**CRITICAL** burns –

1. over 25% of body has 2nd degree burns
2. over 10% of body has 3rd degree burns
3. 3rd degree burns present on face, hands, feet