

Integumentary System

Skin

Membranes

- Epithelial – covering and lining membranes
 - Mucous
 - Lines all body cavities (opening to exterior of body)
 - Adapted for absorption or secretion
 - moist
 - Cutaneous
 - Skin
 - Epidermis
 - Dry

Membranes

- Serous (serose) – occurs in pairs
 - Parietal layer – lines wall
 - Visceral layer – covers outside of organs
 - Peritoneum – abdominal cavity
 - Pleura – lungs
 - Pericardium - heart
- Synovial
 - Joint cavities

Integument: covering

- Function:
 - Protection –
 - keeps water, etc. inside
 - Waterproof
 - Prevents invasion
 - Homeostasis (temperature)
 - Insulates and cushions
 - Manufactures several proteins important to immunity and synthesizes vitamin D from sunlight

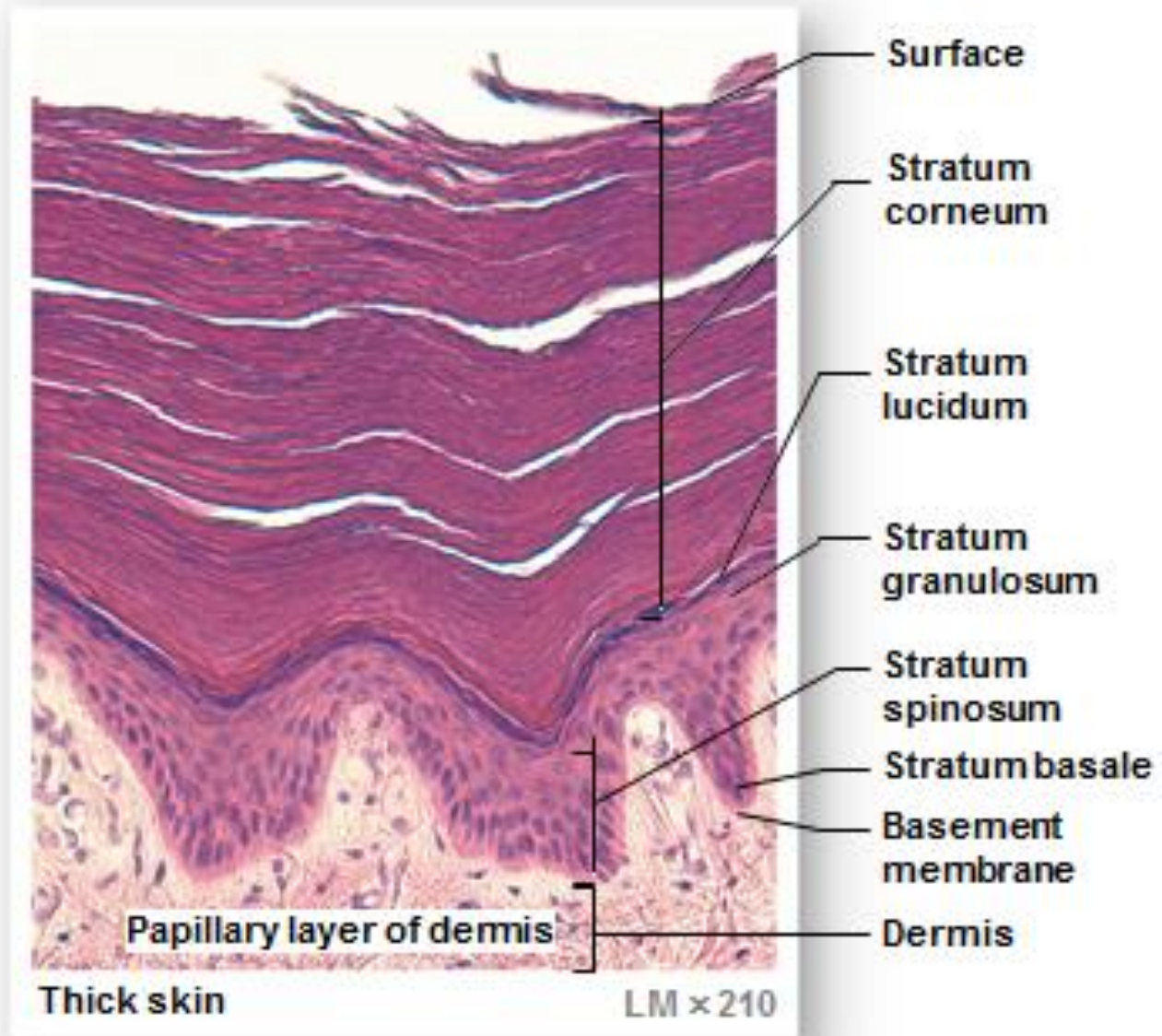
Keratin

- Uppermost layer of protein
- Very tough

Structure

- Only as thick as a paper towel
- Epidermis
 - Composed of 5 zones/layers called strata
 - Stratum corneum – outer $\frac{3}{4}$ of epidermis
 - Dead cells completely filled with keratin
 - Contains keratinocytes (produce keratin)
 - No blood supply
 - Production of melanin (pigment from yellow to black)
 - Exposure to sun make more melanin
 - Freckles/moles – more concentrated in one place

Figure 5-3 The Structure of the Epidermis



Structure

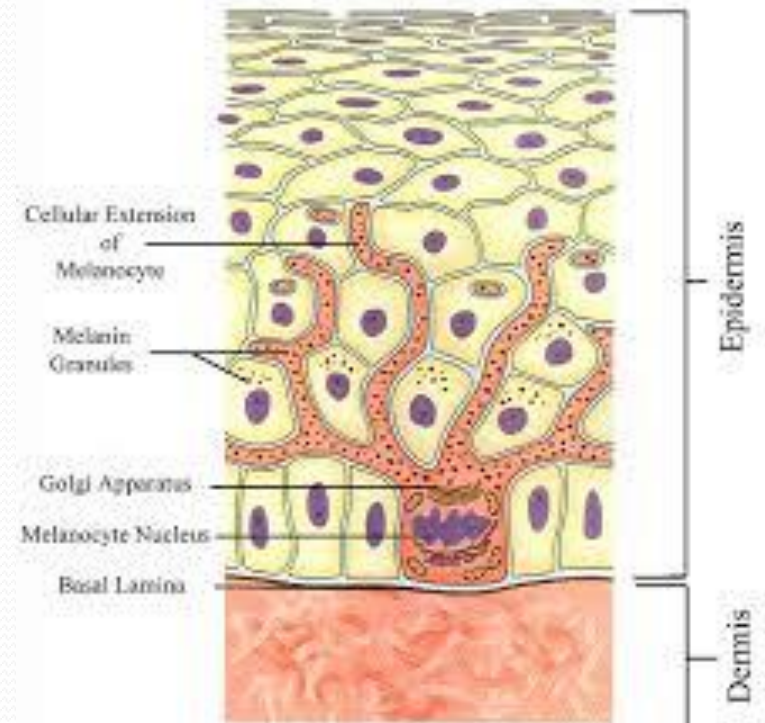
- Dermis
 - Hide – strong and stretchy
 - Has collagen (toughness) and elastic fibers
 - Has an abundant supply of blood and nerve fibers
 - Role in maintaining body temperature

Structure

- Subcutaneous tissue (hypodermis)
 - Essentially adipose tissue
 - not considered part of the skin, but does anchor the skin to underlying organs
 - Shock absorber
 - Insulates the deeper tissue from temperature changes

Skin Color

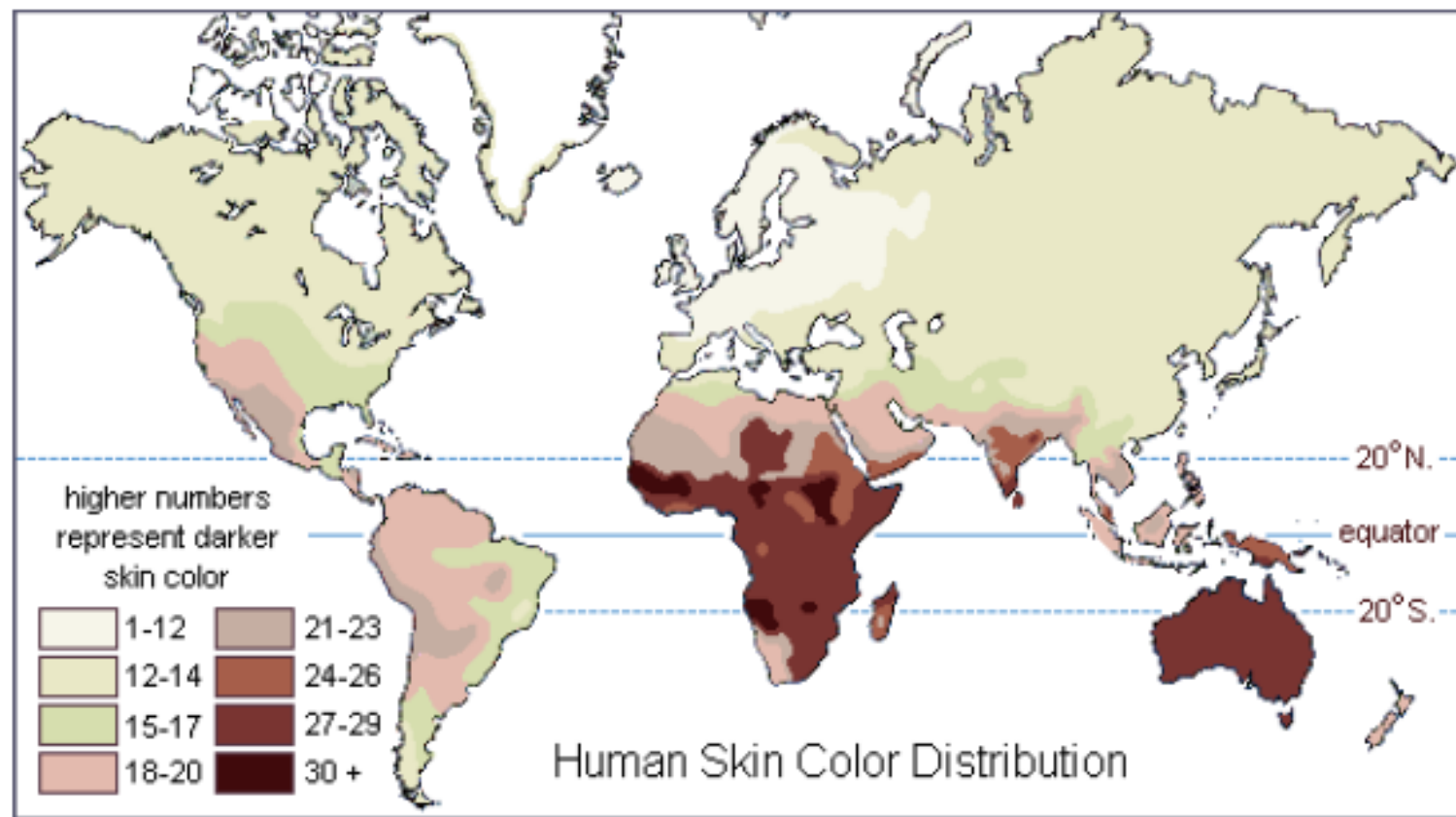
- Melanin
 - Yellow, reddish brown, black
 - Made by melanocytes (more pigment = darker tone)
- Carotene
 - Orange/yellow
- Oxygen-rich hemoglobin
 - Pink undertone
 - Change due to blood flow
 - Warmer = pink to red
 - cold/lack of blood = white



Skin tones



Map of Skin Color Distribution



Color Influences

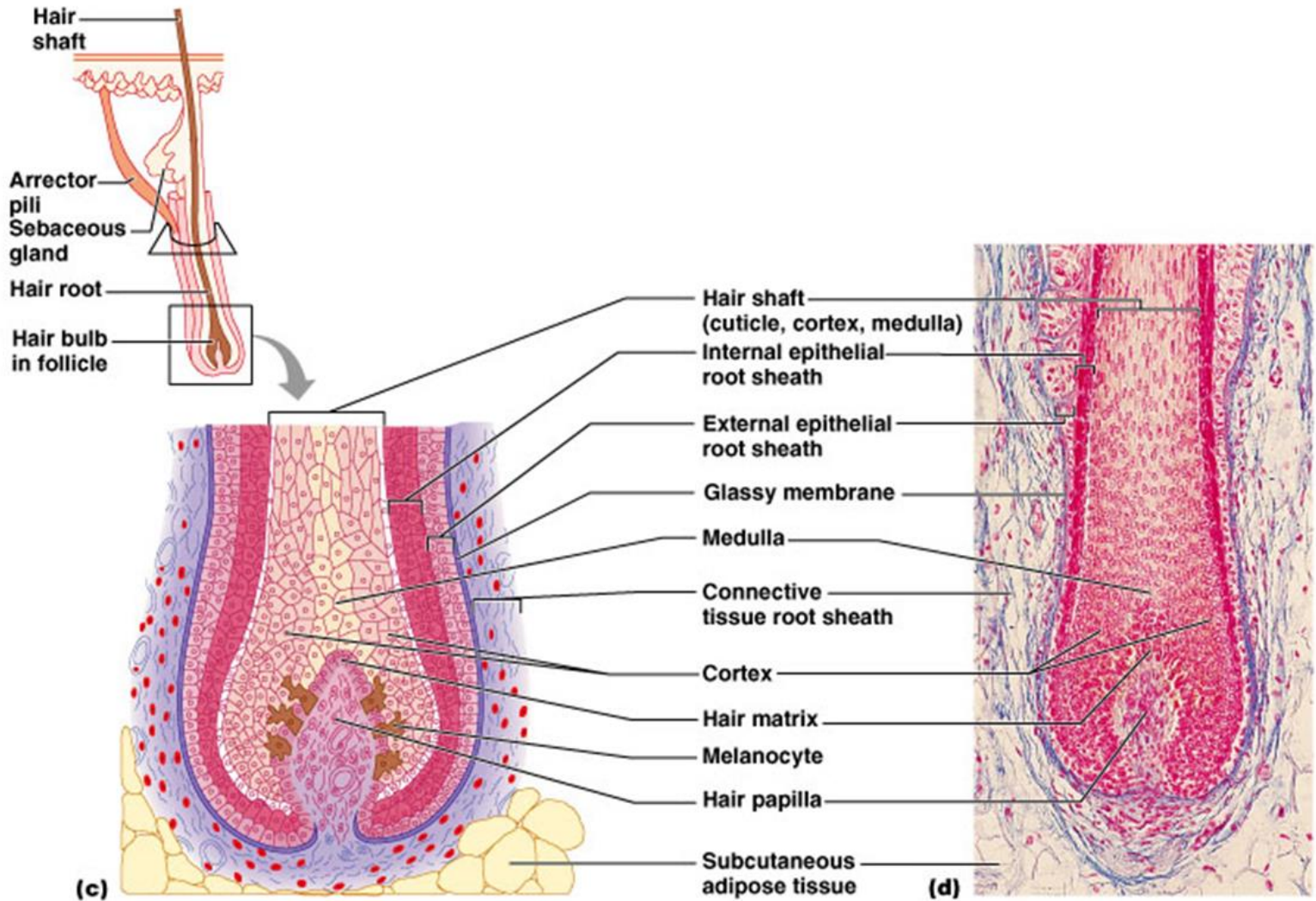
- Redness (erythema)
 - Embarrassment (blushing), fever, allergy, inflammation
- Blanching or pallor
 - Emotional stress, fear, anger
- Jaundice
 - Yellow
 - May signal liver disorder
- Bruises
 - Blood escapes vessels
 - Tendency to bruise: vitamin C deficiency, hemophilia (genetic)

Appendages of the skin

- Cutaneous glands: Exocrine glands – release secretions to the skin surface via ducts
 - Sebaceous (oil) glands: sebum = oily mixture
 - All over skin except palms of hands and bottom of feet
 - Keeps skin soft, prevents hair from getting brittle
 - Contains chemicals for killing bacteria
 - Blocked gland (acne): whitehead -> oxidizes/dries -> blackhead
 - Sweat glands (sudoriferous glands)
 - Primarily water and salt, also vitamin C and traces of metabolic waste
 - Help regulate heat

Appendages of the skin

- Hair and hair follicles (produce hair)
 - Our body hair has lost most of its usefulness
 - Eyelashes guard eyes
 - Hair follicle – surround hair root, form hair
 - Each hair:
 - Central core: medulla
 - cortex
 - Outer cuticle – keratinized (provides strength)
 - Oval = smooth and wavy
 - Flat = curly and kinky
 - Round = strait and coarse



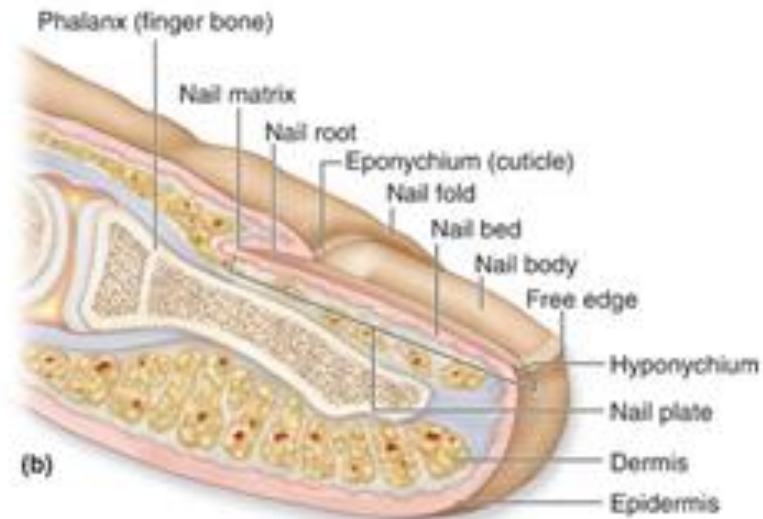
Appendages of the skin

- Nails- modification of epidermis
 - Hooves and claws
 - Mostly non-living material (keratin)
 - Transparent/nearly colorless

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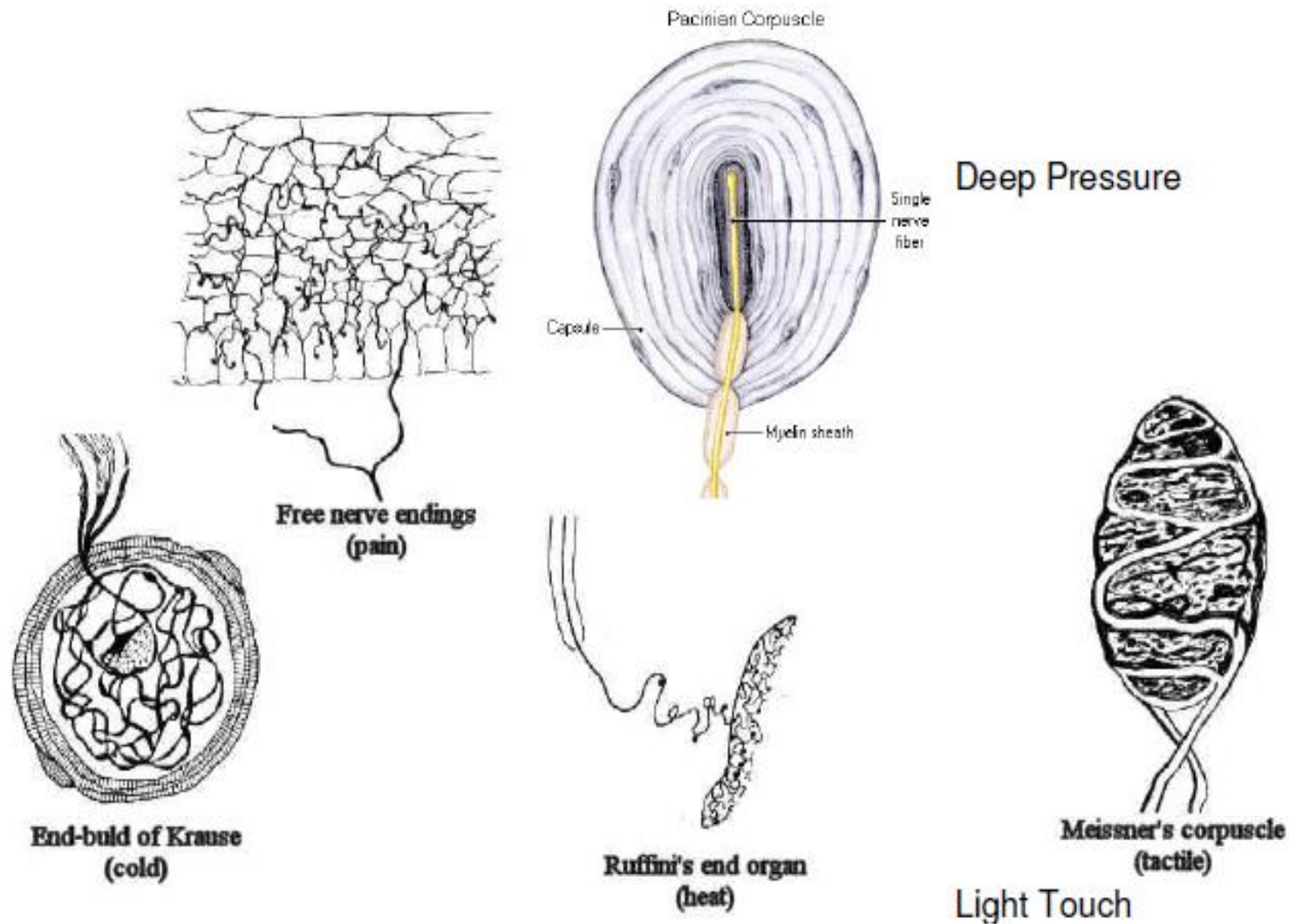


(a)



(b)

Skin Sensory Neurons



Skin Aging

- skin changes as you age.
- wrinkles, age spots and dryness
- becomes thinner and loses fat, making it less plump and smooth
- take longer to heal
- Major contributors to increased aging/wrinkles
 - Sun
 - smoking

Disorders of the skin

- Athlete's foot
 - Fungal infection



Athlete's Foot

Athlete's foot is marked by red, itchy patches and white flaking skin.



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Disorders of the skin

- Boils and carbuncles
 - Common on neck
- painful, pus-filled bumps that form under your skin when **bacteria infect and inflame one or more of your hair follicles**
- Boils
 - red, tender lumps that fill with pus, growing larger and more painful until they rupture and drain
- Carbuncle
 - a cluster of boils that form a connected area of infection under the skin.



Disorders of the skin

- Cold sores
 - Fluid-filled blisters
 - Herpes simplex (virus)



Disorders of the skin

- Contact dermatitis
 - Itching, redness
 - Exposure of skin to chemicals (poison ivy)



Disorders of the skin

- Impetigo
 - Lesions around mouth and nose
 - Caused by staphylococcus infection
 - Common in elementary children



Disorders of the skin

- Psoriasis
 - Chronic condition
 - Overproduction of skin cells
 - Can be disfiguring
 - Autoimmune disorder – attacks own tissues
 - Triggers: trauma, infection, stress



Burns

- First-degree
 - Only epidermal damage
 - Red & swollen
 - Not usually serious
 - Ex: sunburn



Burns

- Second-degree
 - Epidermis and upper region of the dermis
 - Blisters
 - Can regenerate
 - No scarring



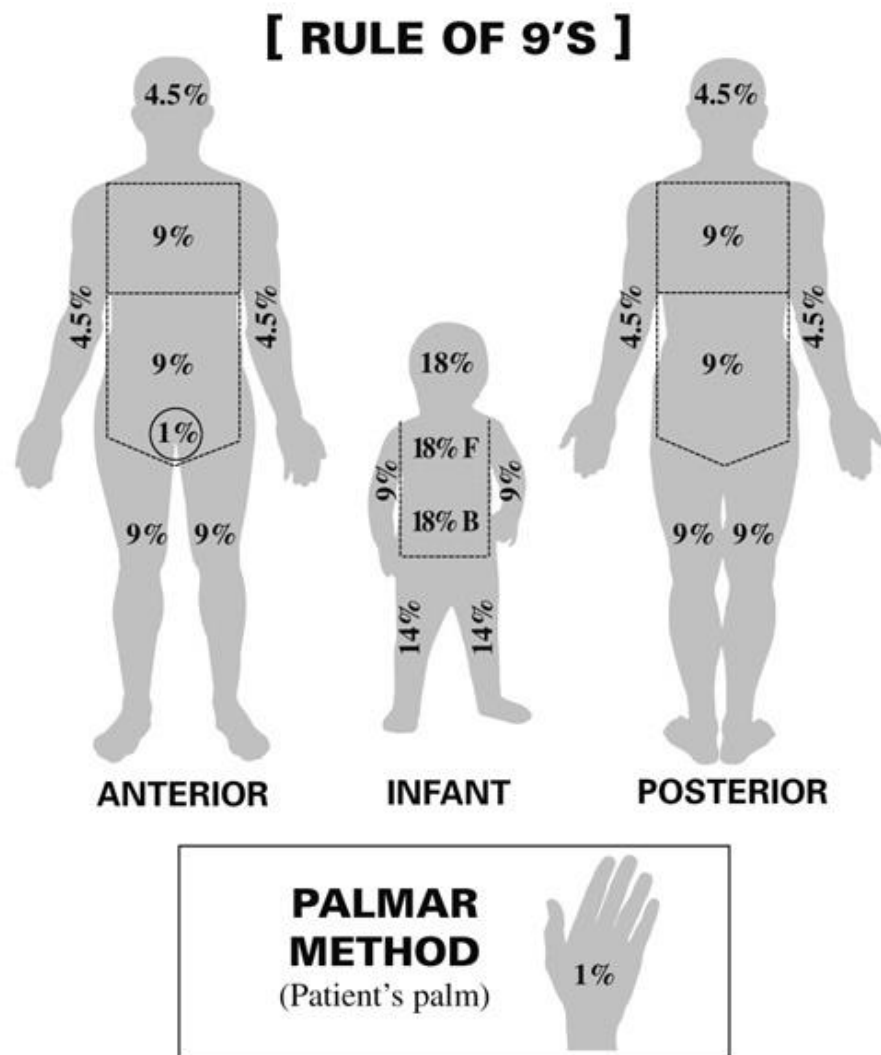
Burns

- Third-degree burns
 - Destroys entire thickness of skin
 - Nerve endings destroyed
 - Regeneration is not possible
 - Skin grafts necessary
 - dehydration



RULE OF NINES

- Measures percent of body burned.
- Body divided into 11 area, each is 9% of body surface.



Skin Cancer

- Benign – does not spread
- Malignant – metastasizes (moves)

- Basal Cell Carcinoma (least malignant, most common)
 - Cannot tell boundary between epidermis and dermis
- Squamous cell carcinoma
 - Red, scaly
 - Can go to lymph nodes if not removed
 - Thought to be sun induced
- Malignant Melanoma
 - Only 5% of cancers, can be deadly

Skin Cancer



(a) Basal cell carcinoma



(b) Squamous cell carcinoma



(c) Melanoma

Skin Cancer

- ABCD rule
 - **A**symetry, **B**order irregularity, **C**olor, **D**iameter larger than 6cm (size of a pencil eraser)

