

4

Skin and Body Membranes

PowerPoint® Lecture Slide Presentation by Jerry L. Cook, Sam Houston University



ESSENTIALS OF HUMAN ANATOMY & PHYSIOLOGY

EIGHTH EDITION

ELAINE N. MARIEB

Components of Integumentary System

- Skin (cutaneous membrane)
- Skin derivatives
 - Sweat glands
 - Oil glands
 - Hairs
 - Nails

Skin Functions

- Protects deeper tissues from:
 - Mechanical damage
 - Chemical damage
 - Bacterial damage
 - Thermal damage
 - Ultraviolet radiation
 - Desiccation (drying out)

Skin Functions

- Aids in heat regulation
- Aids in excretion of urea and uric acid (wastes)
- Synthesizes vitamin D

Skin Structure

- Epidermis – outer layer
 - Stratified squamous epithelium
 - Often keratinized (hardened by keratin)
- Dermis
 - Dense connective tissue

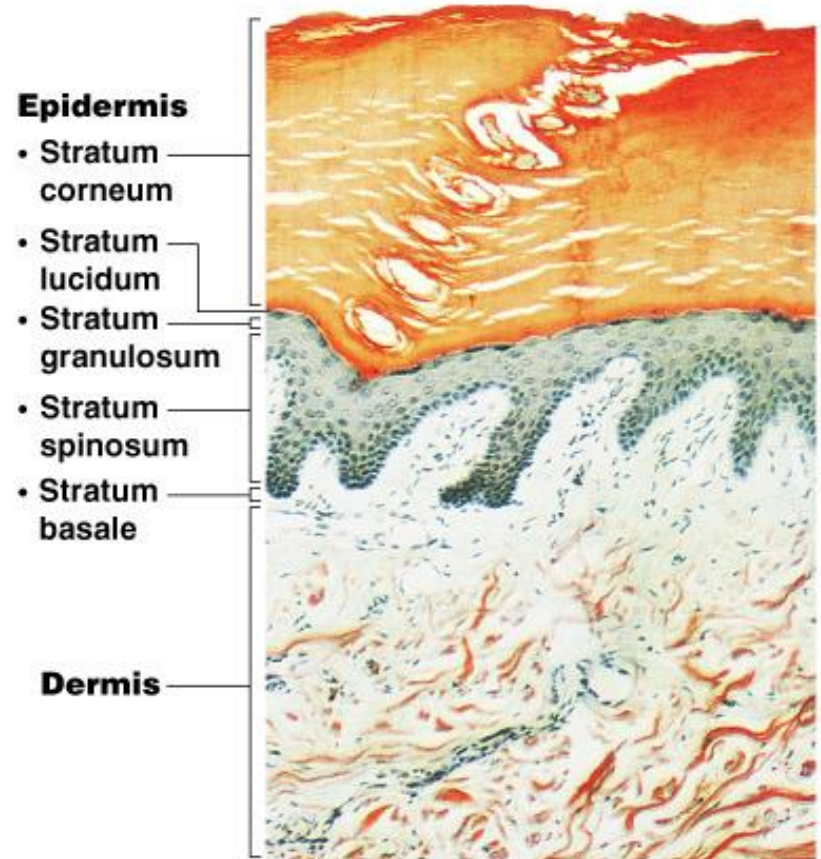


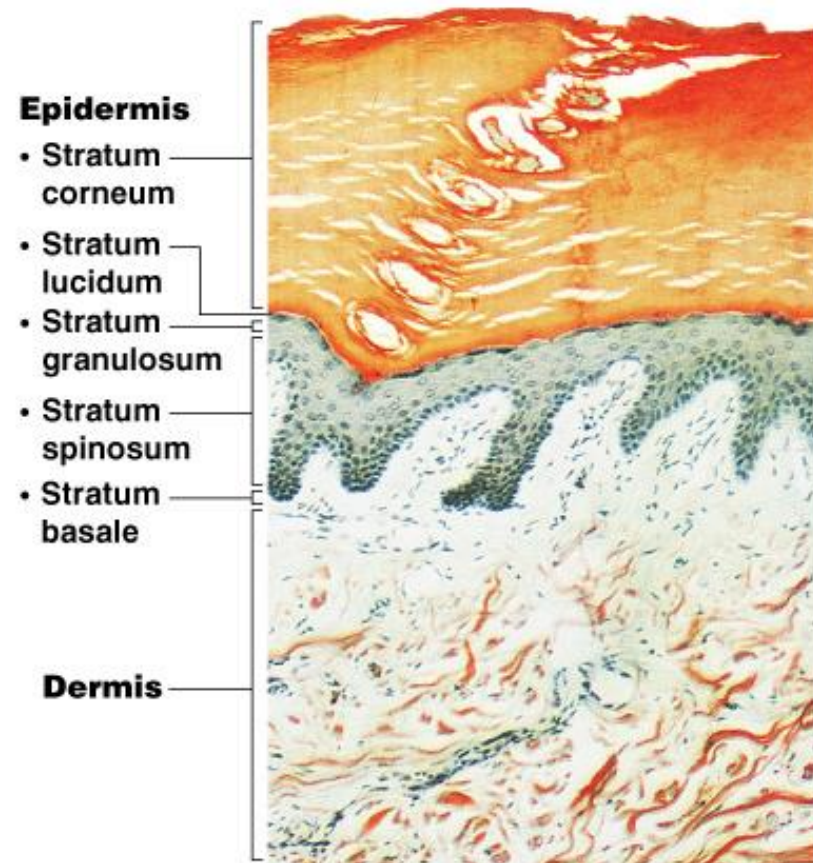
Figure 4.3

Skin Structure continued

- Hypodermis/Subcutaneous Layer (deep to the dermis)
 - Not part of the skin
 - Anchors skin to underlying organs
 - Composed mostly of adipose tissue

Layers of Epidermis (epithelial tissue)

- Stratum basale (bottom)
 - Cells undergoing mitosis
 - Lies next to dermis
 - Stratum spinosum
 - Stratum granulosum
 - Stratum lucidum
- Occurs only in thick skin
- Stratum corneum (top)
 - Shingle-like dead cells
 - $\frac{3}{4}$ of epidermal thickness



Melanin

- Pigment (melanin) produced by melanocytes
- Color is yellow to brown to black
- Melanocytes are mostly in the stratum basale
- Amount of melanin produced depends upon genetics and exposure to sunlight

Dermis (connective tissue)

- Collagen & Elastic fibers found throughout dermis
- Two layers
 - Papillary layer
 - Projections called dermal papillae (form fingerprints)
 - Pain & touch receptors
 - Capillary loops
 - Reticular layer
 - Blood vessels (supply oxygen/nutrients & regulate body temp)
 - Sweat & oil glands
 - Nerve receptors (deep pressure)

Skin Structure

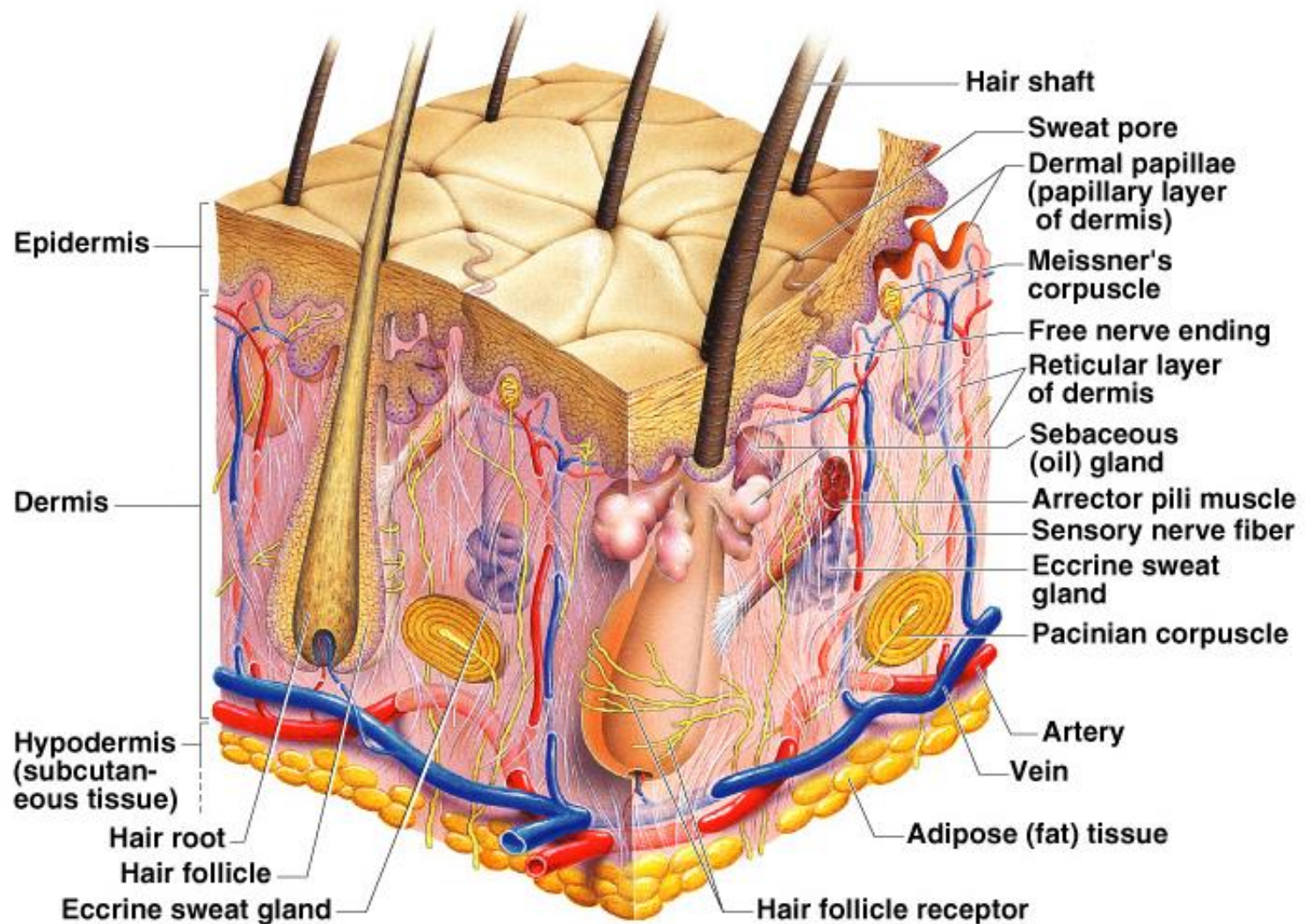


Figure 4.4

Normal Skin Color Determinants

- Melanin
 - Yellow, brown or black pigments
- Carotene
 - Orange-yellow pigment from some vegetables
- Hemoglobin
 - Red coloring from blood cells in dermis capillaries
 - Oxygen content determines the extent of red coloring



Appendages of the Skin

- Sebaceous glands
 - Produce sebum (oil & fragmented cells)
 - Lubricant for skin
 - Kills bacteria
 - Most with ducts that empty into hair follicles
 - Glands are activated at puberty

Appendages of the Skin

- Sweat glands
 - Widely distributed in skin
 - Two types
 - Eccrine
 - Open via duct to pore on skin surface
 - Apocrine
 - Ducts empty into hair follicles

Sweat and Its Function

- Composition
 - Mostly water
 - Some metabolic waste
 - Fatty acids and proteins (apocrine only)
- Function
 - Helps dissipate excess heat
 - Excretes waste products
 - Acidic nature inhibits bacteria growth
- Odor is from associated bacteria

Appendages of the Skin

- Hair
 - Produced by hair bulb
 - Consists of hard keratinized epithelial cells
 - Melanocytes provide pigment for hair color

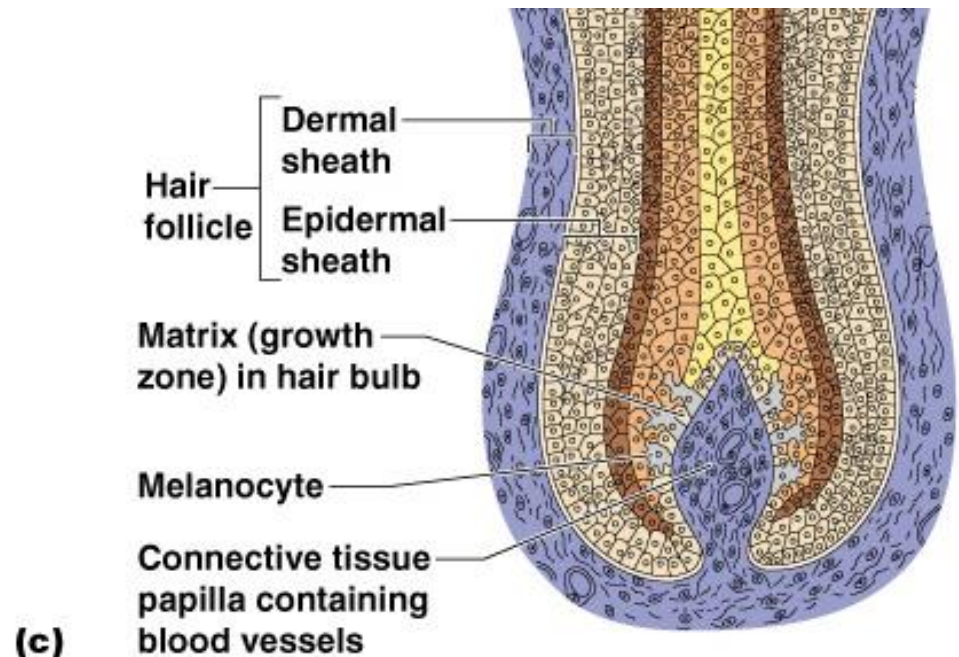
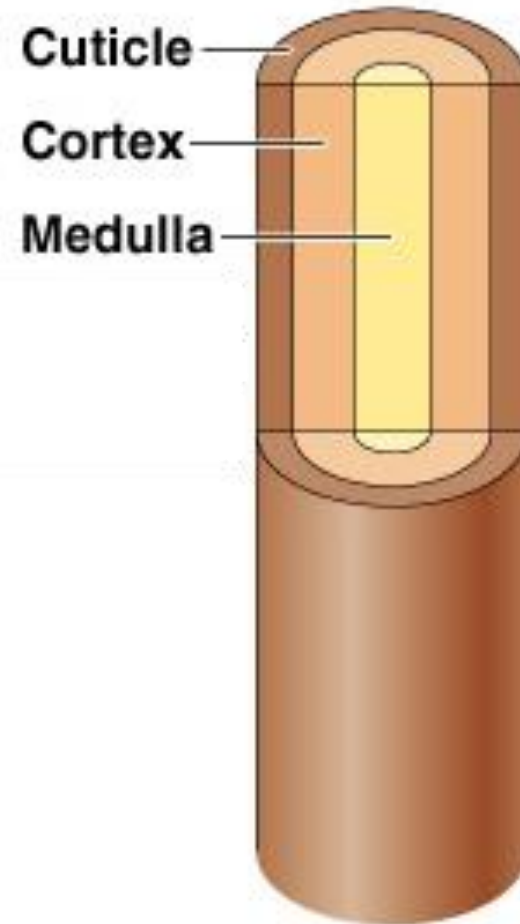


Figure 4.7c

Hair Anatomy

- Central medulla
- Cortex surrounds medulla
- Cuticle on outside of cortex
 - Most heavily keratinized

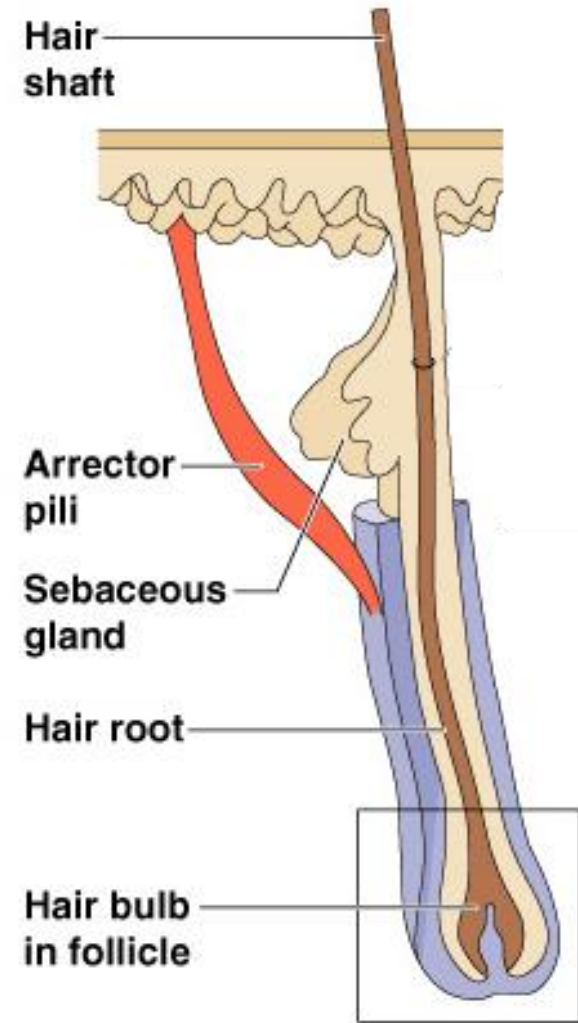


(b) Hair

Figure 4.7b

Associated Hair Structures

- Hair follicle
 - Dermal and epidermal sheath surround hair root
- Arrector pili
 - Smooth muscle
- Sebaceous gland
- Sweat gland



(a)

Figure 4.7a

Appendages of the Skin

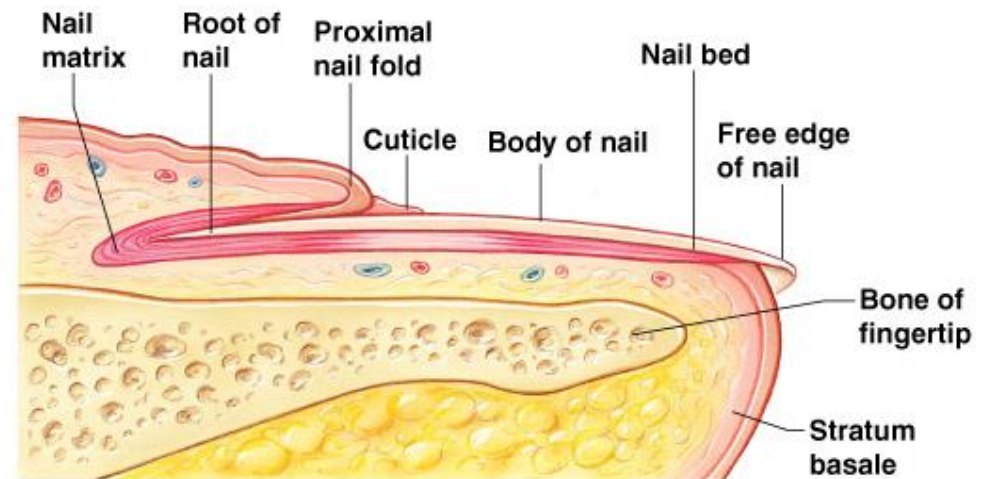
- Nails
 - Scale-like modifications of the epidermis
 - Heavily keratinized
 - Stratum basale extends beneath the nail bed
 - Responsible for growth
 - Lack of pigment makes them colorless

Nail Structures

- Free edge
- Body
- Root of nail
- Eponychium – proximal nail fold that projects onto the nail body



(a)



(b)

Figure 4.9

Skin Homeostatic Imbalances

- Infections
 - Athletes foot
 - Caused by fungal infection
 - Boils and carbuncles
 - Caused by bacterial infection
 - Cold sores
 - Caused by virus

Skin Homeostatic Imbalances

- Infections and allergies
 - Contact dermatitis
 - Exposures cause allergic reaction
 - Impetigo
 - Caused by bacterial infection
 - Psoriasis
 - Cause is unknown
 - Triggered by trauma, infection, stress

Skin Homeostatic Imbalances

- Burns
 - Tissue damage and cell death caused by heat, electricity, UV radiation, or chemicals
 - Associated dangers
 - Dehydration
 - Electrolyte imbalance
 - Circulatory shock

Rule of Nines

- Way to determine the extent of burns
- Body is divided into 11 areas for quick estimation
 - Each area represents about 9%

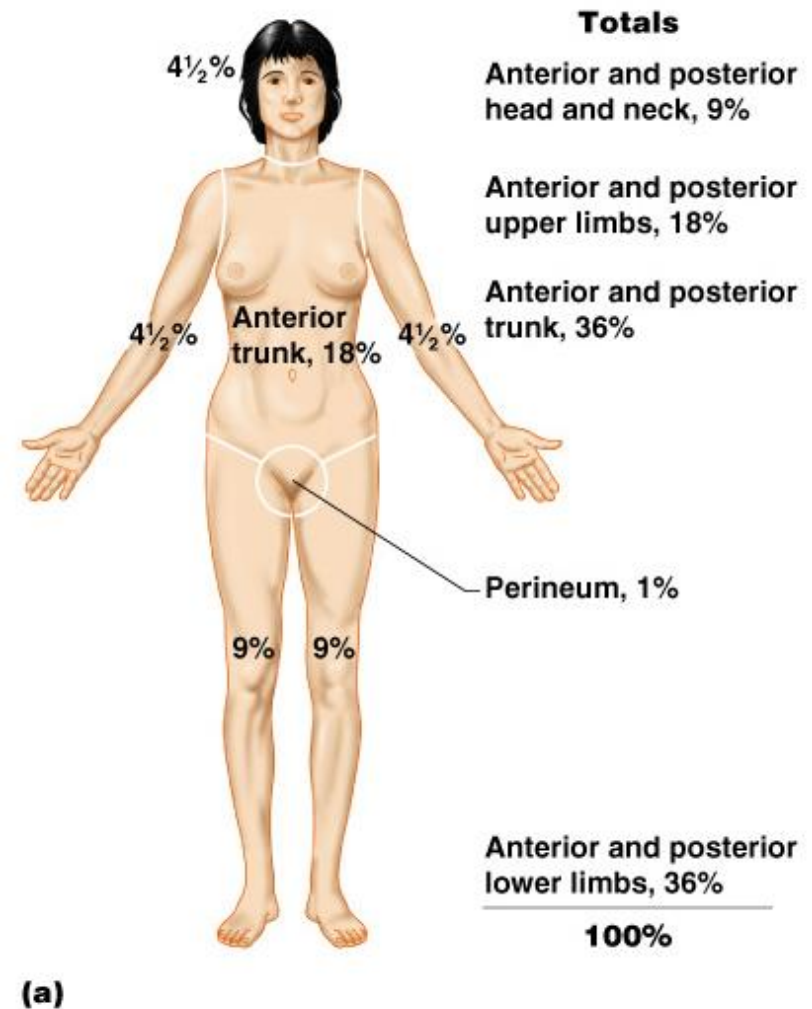


Figure 4.11a

Severity of Burns

- First-degree burns
 - Only epidermis is damaged
 - Skin is red and swollen
- Second degree burns
 - Epidermis and upper dermis are damaged
 - Skin is red with blisters
- Third-degree burns
 - Destroys entire skin layer
 - Burn is gray-white or black

Critical Burns

- Burns are considered critical if:
 - Over 25% of body has second degree burns
 - Over 10% of the body has third degree burns
 - There are third degree burns of the face, hands, or feet

Skin Cancer

- Cancer – abnormal cell mass
- Two types
 - Benign
 - Does not spread (encapsulated)
 - Malignant
 - Metastasized (moves) to other parts of the body
- Skin cancer is the most common type of cancer

Skin Cancer Types

- Basal cell carcinoma
 - Least malignant
 - Most common type
 - Arises from stratum basale
- Squamous cell carcinoma
 - Arises from stratum spinosum
 - Metastasizes to lymph nodes
 - Early removal allows a good chance of cure

Skin Cancer Types

- Malignant melanoma
 - Most deadly of skin cancers
 - Cancer of melanocytes
 - Metastasizes rapidly to lymph and blood vessels
 - Detection uses ABCD rule

ABCDE Rule

- A = Asymmetry
 - Two sides of pigmented mole do not match
- B = Border irregularity
 - Borders of mole are not smooth
- C = Color
 - Different colors in pigmented area
- D = Diameter
 - Spot is larger than 6 mm in diameter
- E = Evolving— changing size, shape, or color