Skin

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Anatomy
NAIHS

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At the end of this class you should be able to …

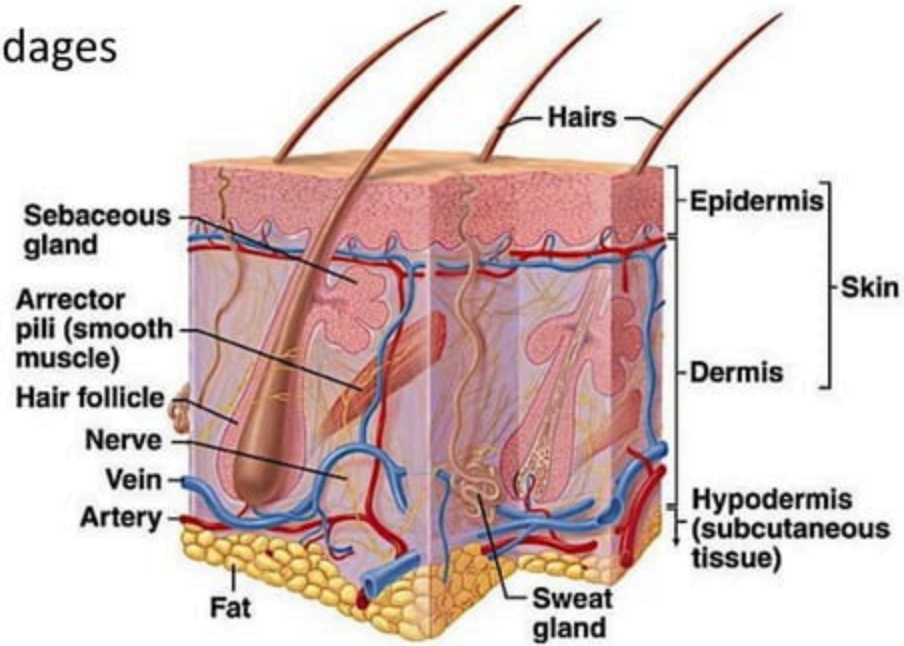
- Describe gross & microscopic structure of skin
- Enumerate functions of skin
- Appreciate importance of anatomy of skin in clinical practice

Integumentary system

Integumentary - covering; covers outside of the body

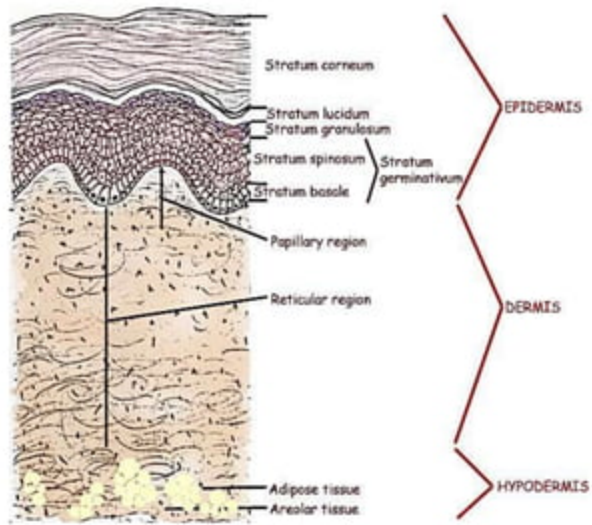
Consists of:

- Skin & appendages
  - Hair
  - Nails
  - Glands



Introduction

- Largest organ
- Continues m/m at orifices
- 7 % of body weight
- Surface area: 1.5 to 2 Sq. meters
- Thickness: 0.5 to 3mm
- Consists of:
  - Epidermis
  - Dermis

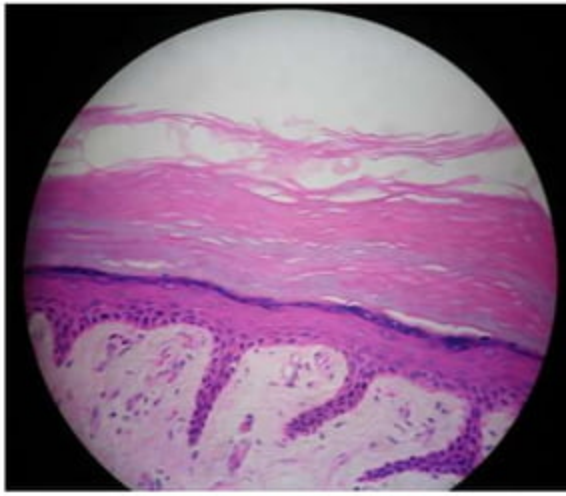


Layers

- Dermis
  - Deep layer, connected to hypodermis
  - 2 layers
    - Superficial papillary layer
    - Deep reticular layer

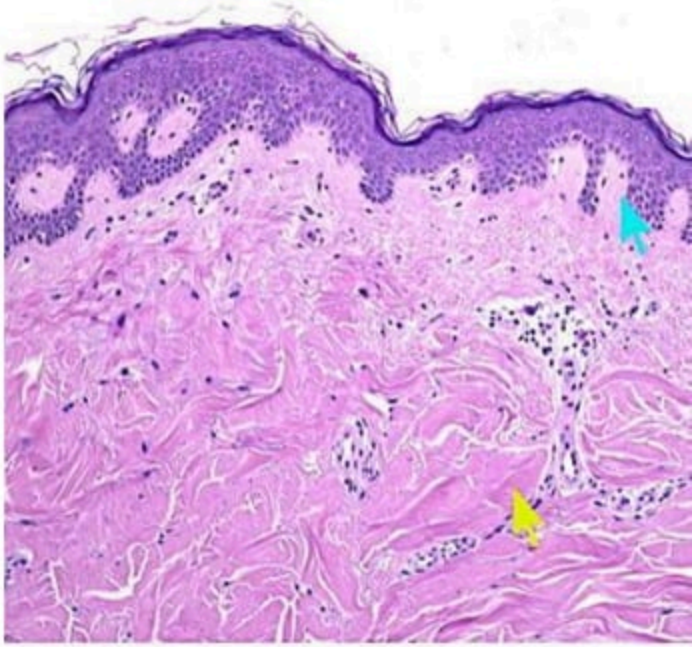
Dermis: papillary layer

- Loose CT with collagen & elastic fibers
- Peg-like projections -**dermal papillae** - fit into reciprocal depressions on undersurface of epidermis
- Dermal papillae contain capillary loops & free nerve endings



Dermis: Reticular Layer

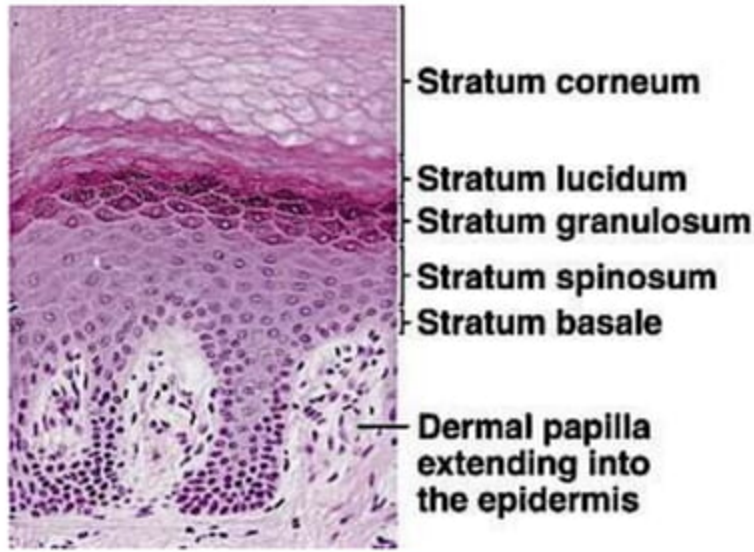
- Main layer
- Elastin & collagen produce:
  - Structural strength
  - Cleavage lines
  - Stretch marks- striae

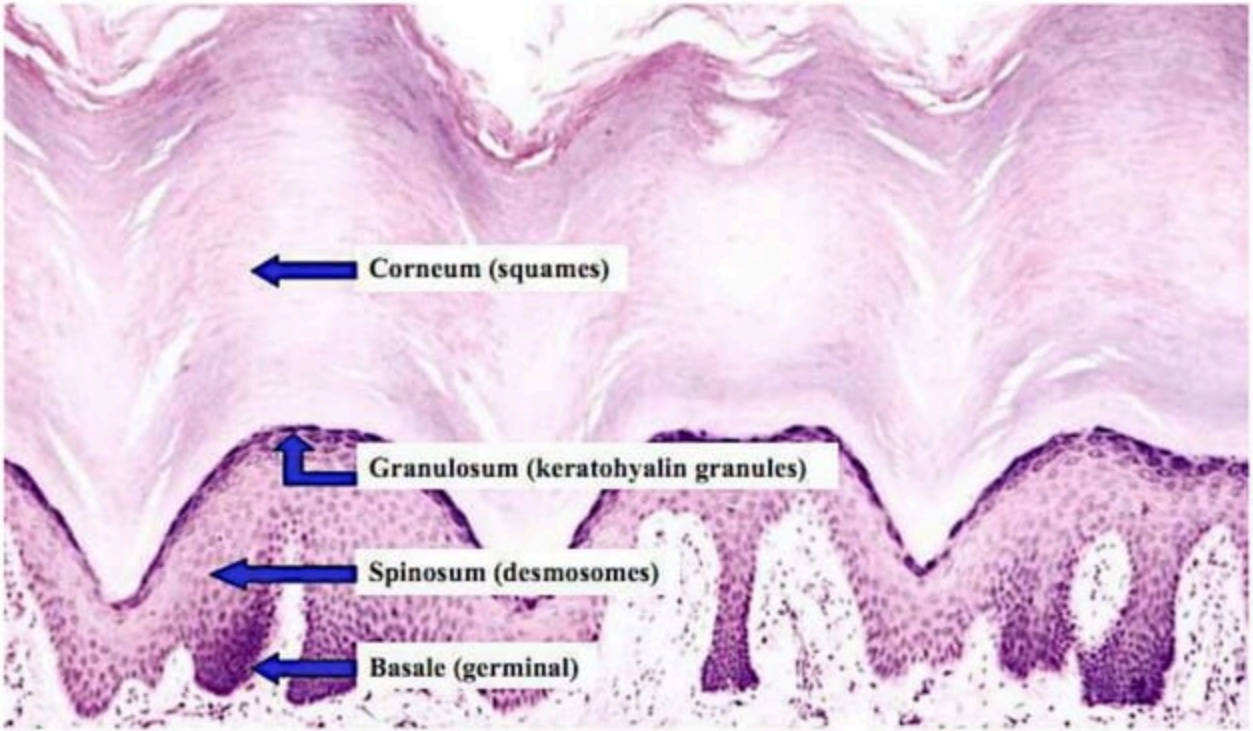


Papillary dermis

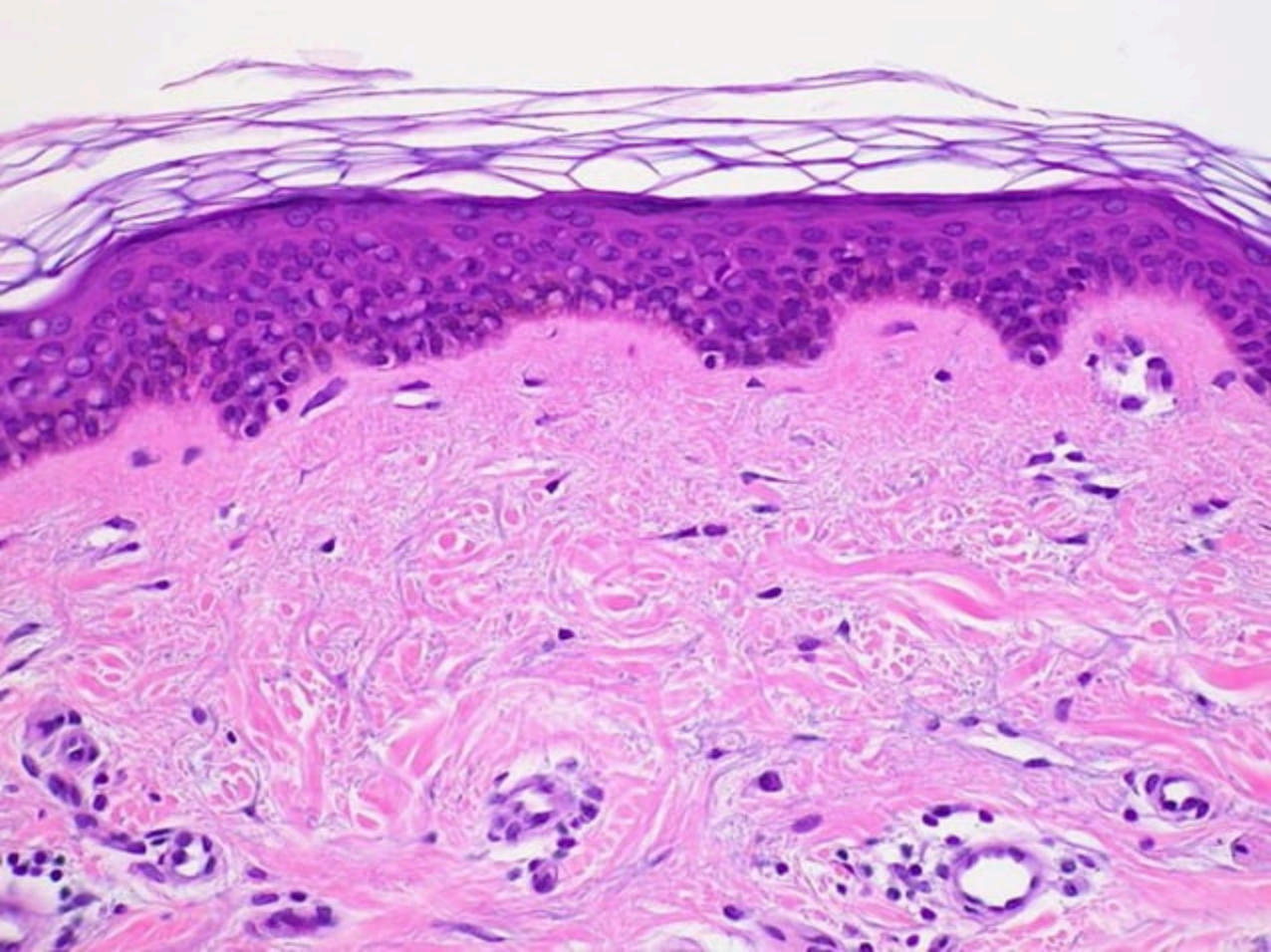
Reticular dermis

- Epidermis
  - –Avascular
  - –5 Layers
  - –Str sq ker ep



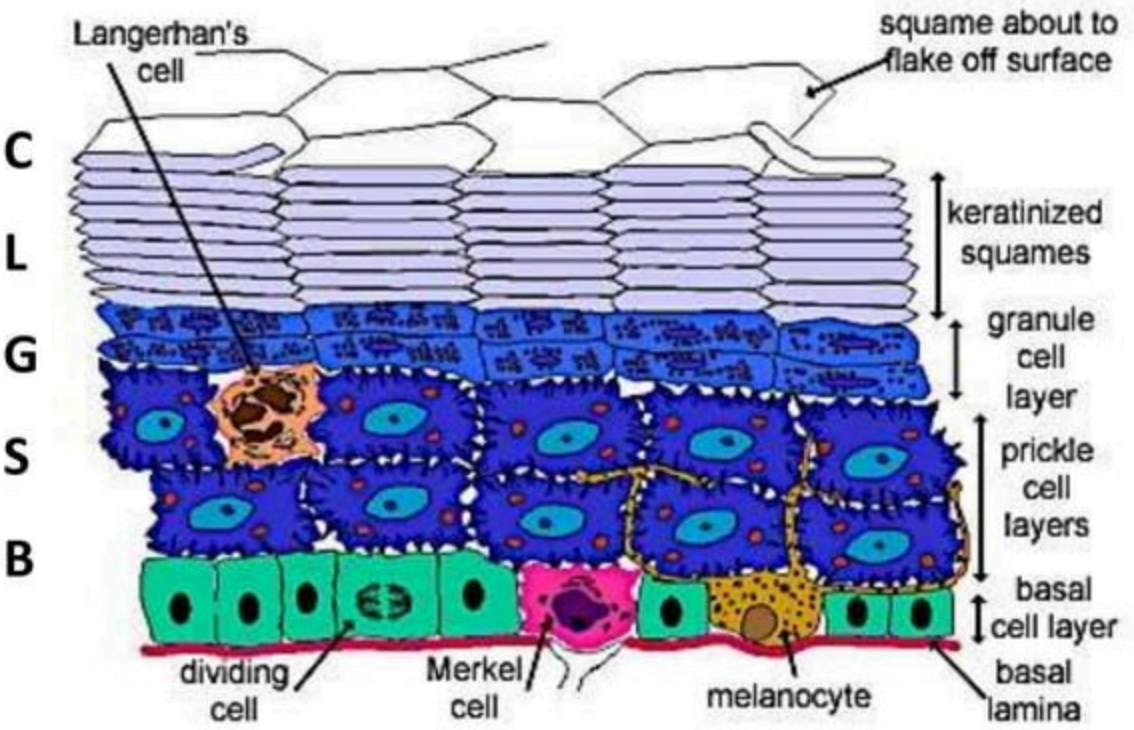


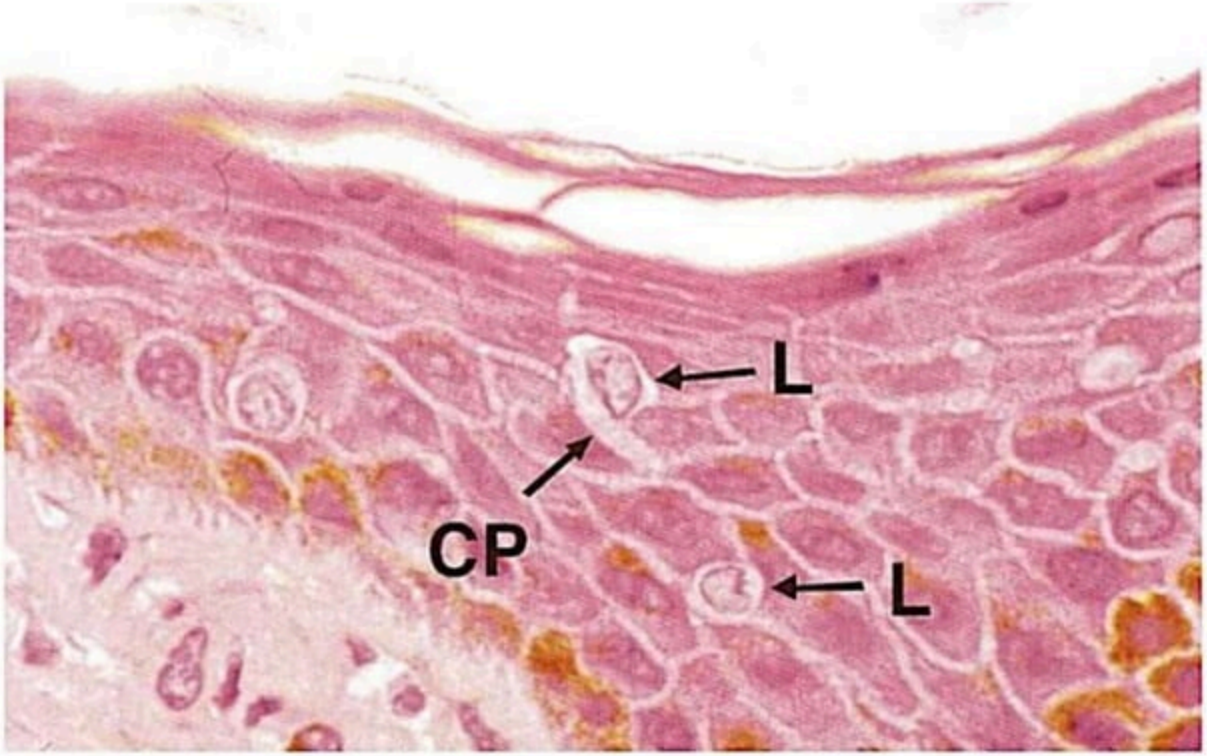
4 distinct cell types: 1) Keratinocyte, 2) Melanocyte, 3) Langerhans cell, 4) Merkel cell



Epidermis: cells

- **Keratinocytes:** Produce keratin for strength
- **Melanocytes:** Contribute to skin color
- **Langerhans' cells:** Part of immune system
- **Merkel's cells:** Detect light touch & pressure


C
L
G
S
B
Langerhan's cell
squame about to flake off surface
keratinized squames
granule cell layer
prickle cell layers
basal cell layer
dividing cell
Merkel cell
melanocyte
basal lamina



Langerhans cell: dendritic processes; antigen presentation

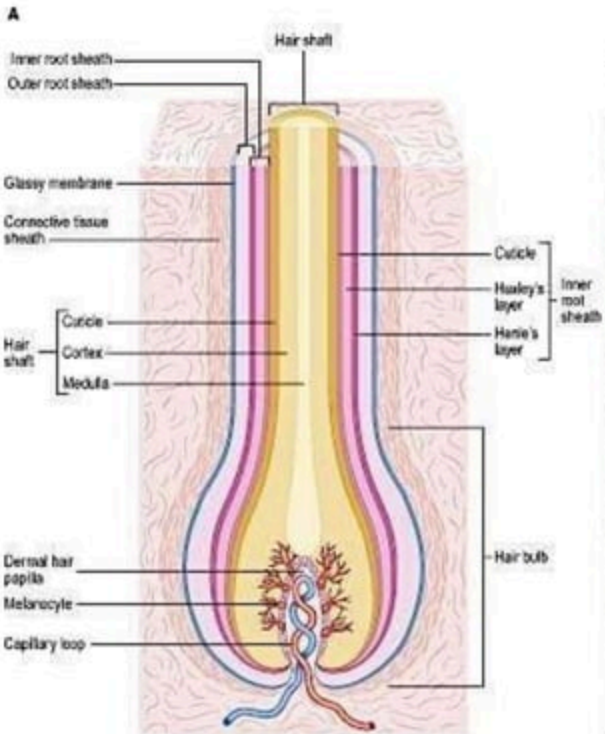
Melanocyte: neural crest origin; no desomosomal attachments

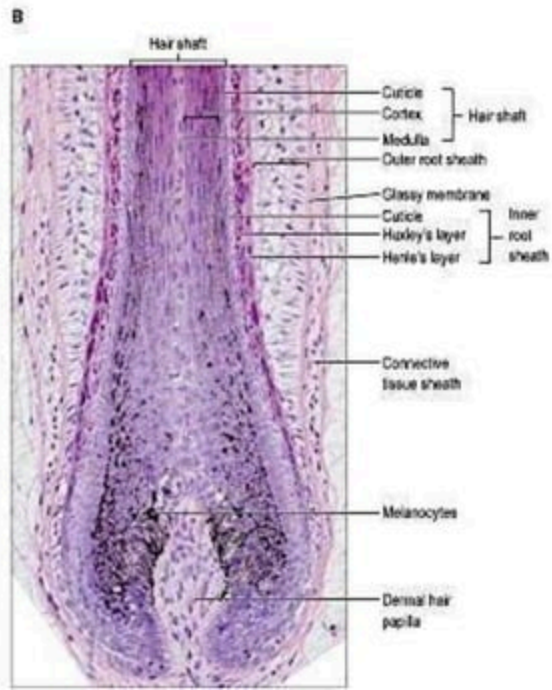
Desmosomes: false intercellular bridges

Appendages

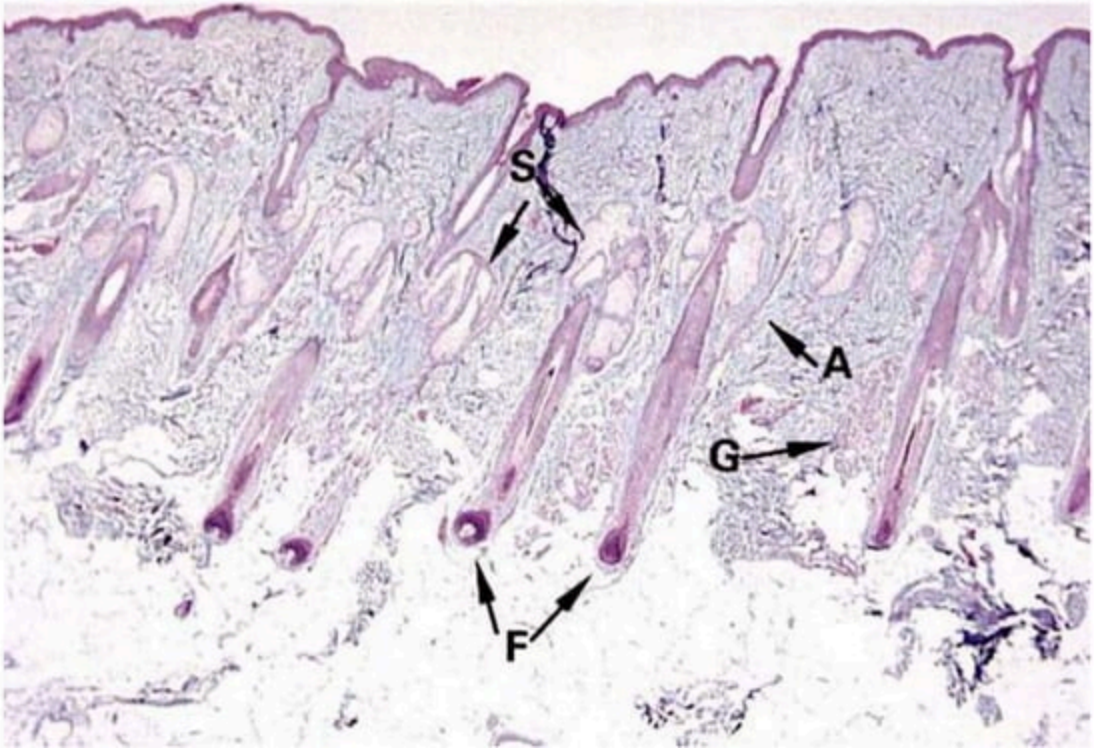
- **Hair**
  - Except palms, soles, lips, nipples, parts of external genitalia & distal segments of fingers & toes
- **Glands**
  - Sebaceous
  - Sudoriferous (sweat)
  - Ceruminous
  - Mammary
- **Nail**

Hair


A
Hair shaft
Inner root sheath
Outer root sheath
Glassy membrane
Connective tissue sheath
Cuticle
Huxley's layer
Henle's layer
Inner root sheath
Hair shaft
Cuticle
Cortex
Medulla
Dermal hair papilla
Melanocyte
Capillary loop
Hair bulb


B
Hair shaft
Cuticle
Cortex
Medulla
Hair shaft
Outer root sheath
Glassy membrane
Cuticle
Huxley's layer
Henle's layer
Inner root sheath
Connective tissue sheath
Melanocytes
Dermal hair papilla

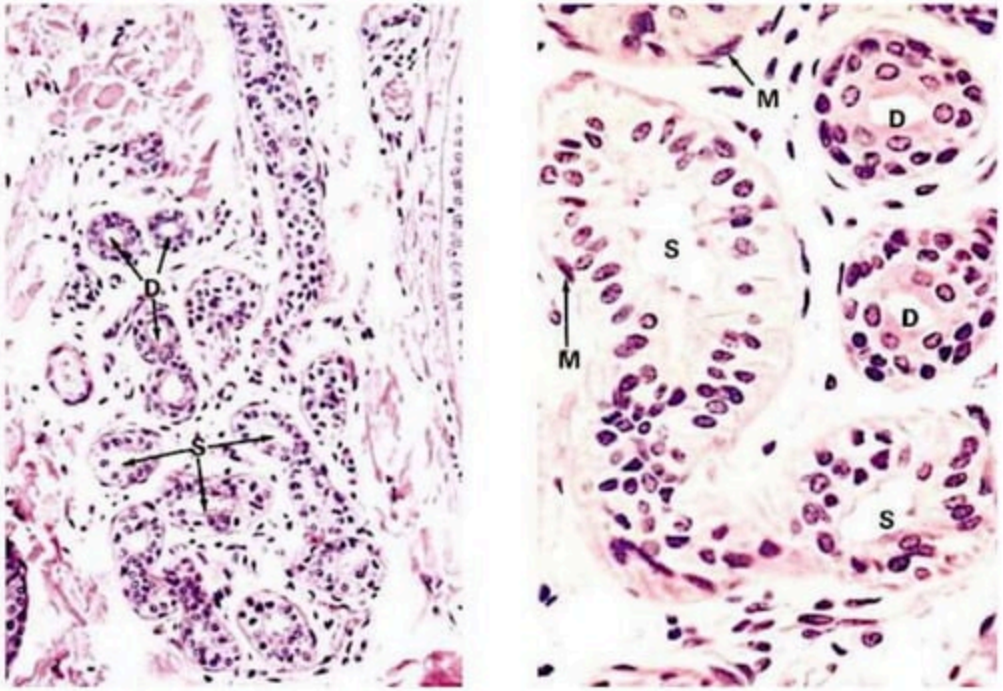
Hair



M
G
F

Sweat glands

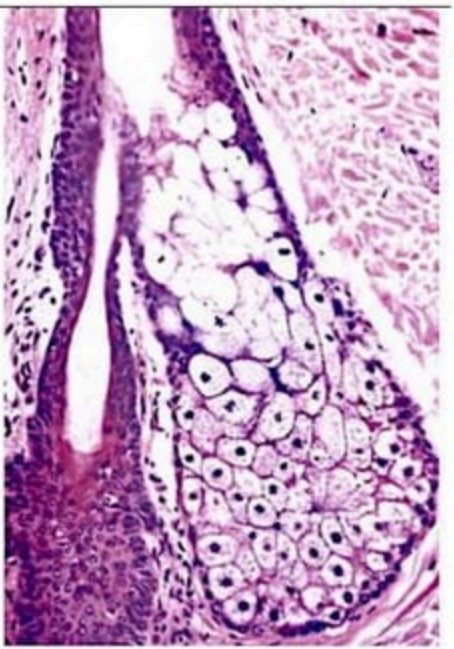
- **Sweat** - blood filtrate
  - 99% water with some salts
  - Contains traces of metabolic wastes
- **Types:**
  - **Eccrine gland**
    - Most numerous – produce true sweat
  - **Apocrine gland**
    - Confined to axillary, anal & genital areas
    - Produce special kind of sweat



Merocrine (eccrine) Sweat Glands

Sebaceous glands

- Over entire body except palms & soles
- Simple alveolar glands
- Secrete sebum- oily substance
- Holocrine secretion – entire cell breaks up to form secretion
- Functions - Softens & lubricates hair & skin

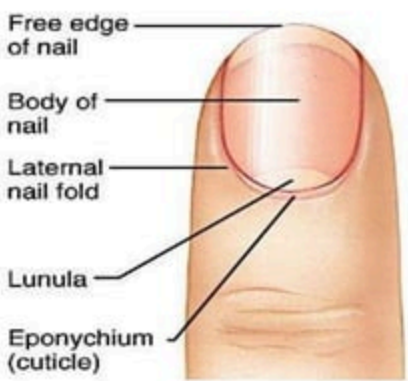


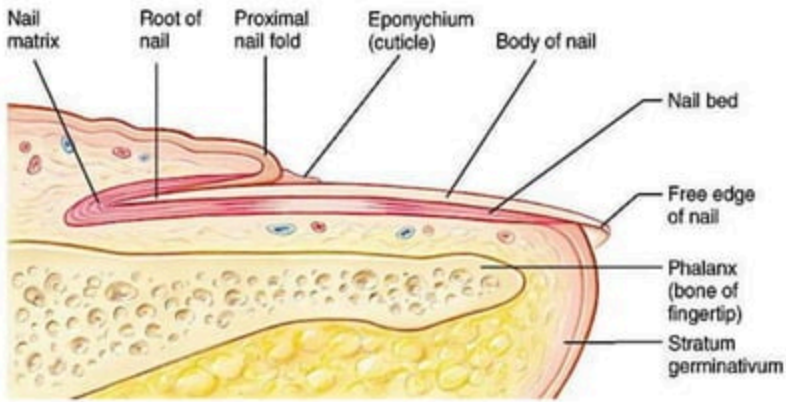
Sebaceous Glands

Wheater's Functional Histology

Nail

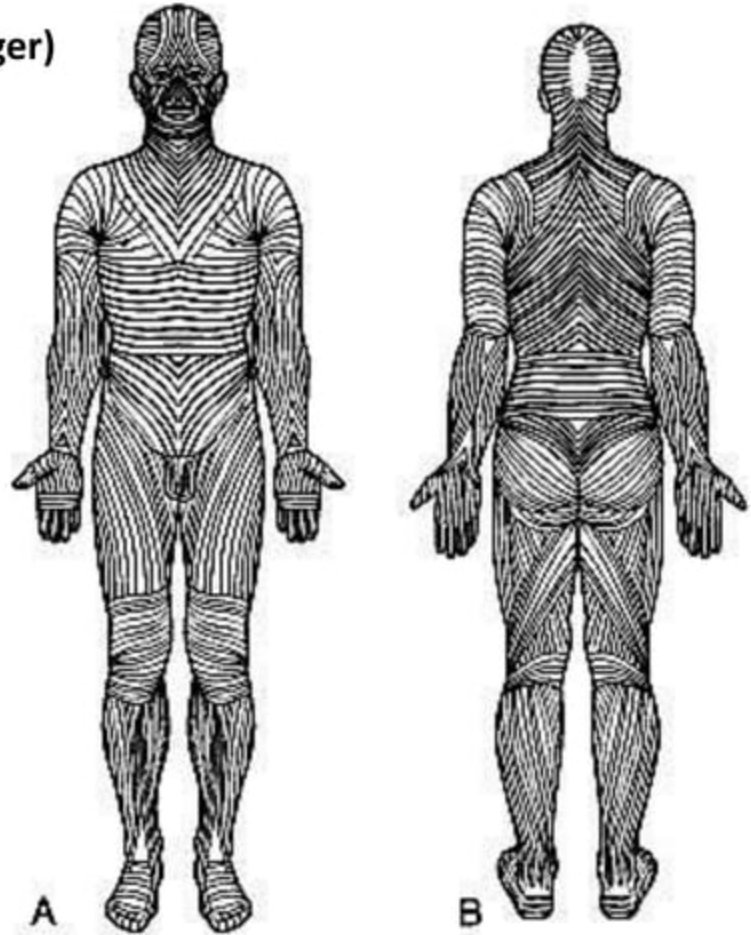
- Scale-like modification of epidermis on the distal, dorsal surface of fingers & toes
- Parts: Free edge, Body, Root, Nail folds, Eponychium, Lunula

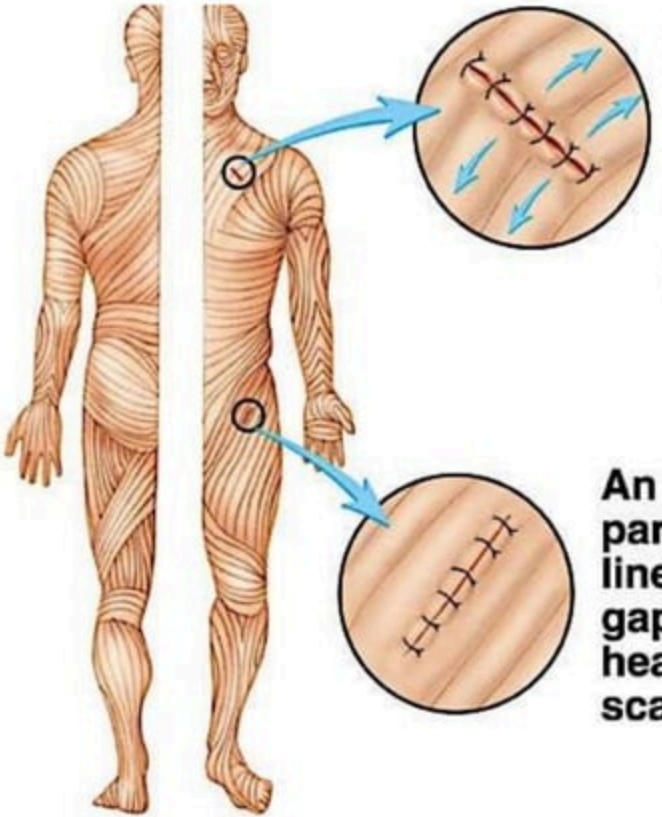




Cleavage lines (Lines of Langer)

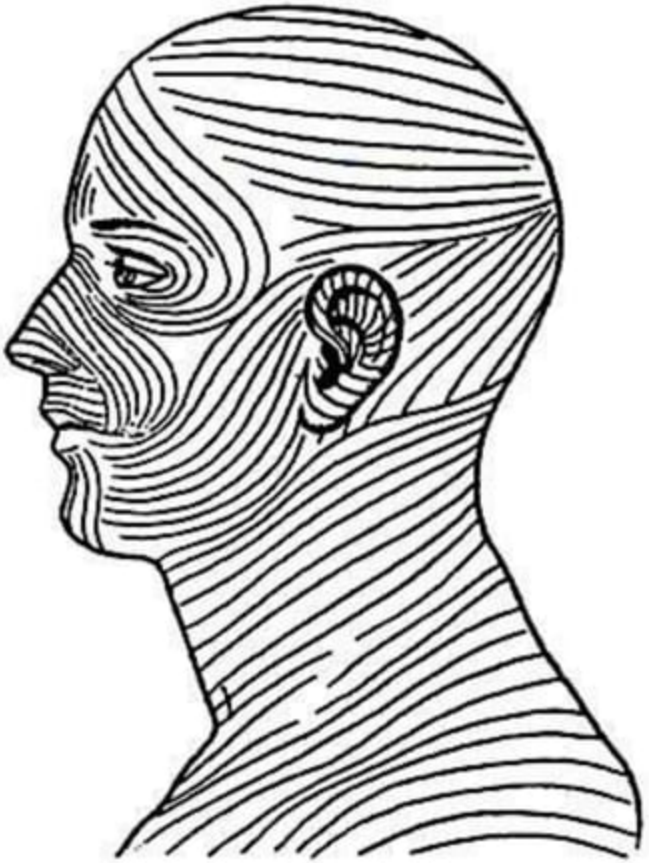
- Elastin & collagen fibers oriented in directions
- Important in surgery
- When incision parallel to lines
  - Less gaping
  - Faster healing
  - Less scar tissue



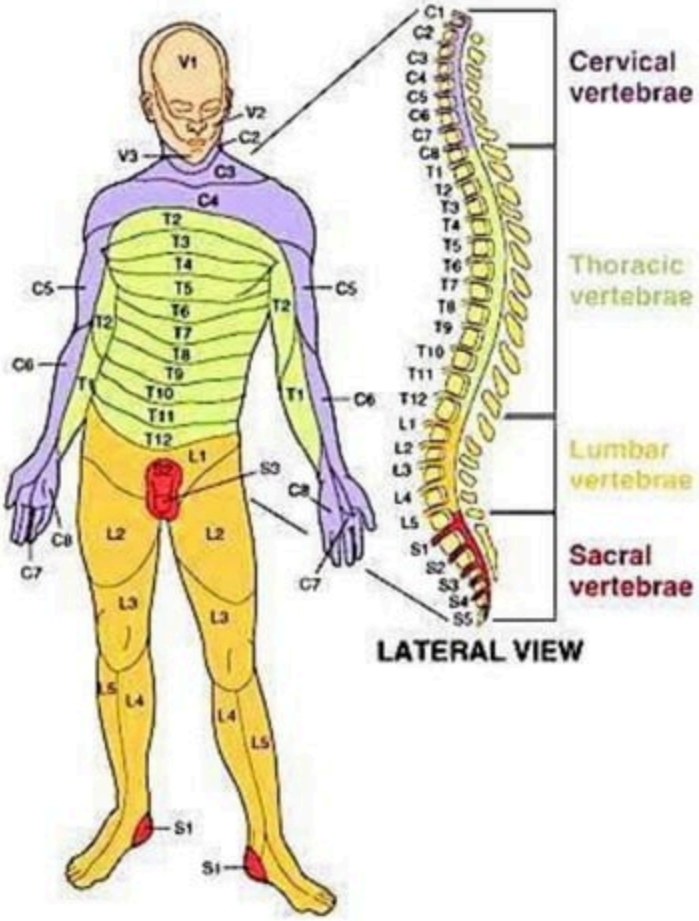


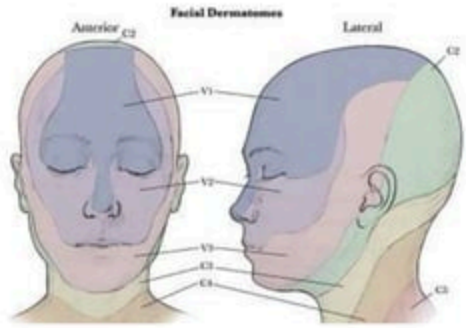
An incision made across cleavage lines can gap, increasing the time needed for healing, and result in increased scar tissue formation.

An incision made parallel to cleavage lines results in less gapping, faster healing, and less scar tissue.



Dermatome


V1
V2
V3
C2
C3
C4
C5
C6
C7
C8
T1
T2
T3
T4
T5
T6
T7
T8
T9
T10
T11
T12
L1
L2
L3
L4
L5
S1
S2
S3
S4
S5
Cervical vertebrae
Thoracic vertebrae
Lumbar vertebrae
Sacral vertebrae
LATERAL VIEW


Facial Dermatomes
Anterior
Lateral

Skin color

Determined by 3 factors

1. Pigments
   - Melanin
   - Carotene
   - **Albinism**: Deficiency or absence of pigment
2. Blood circulating through skin
   - Imparts reddish hue- Hb & Oxy Hb
   - **Cyanosis**: Blue color caused by decrease in blood oxygen
3. Thickness of stratum corneum

Functions of skin

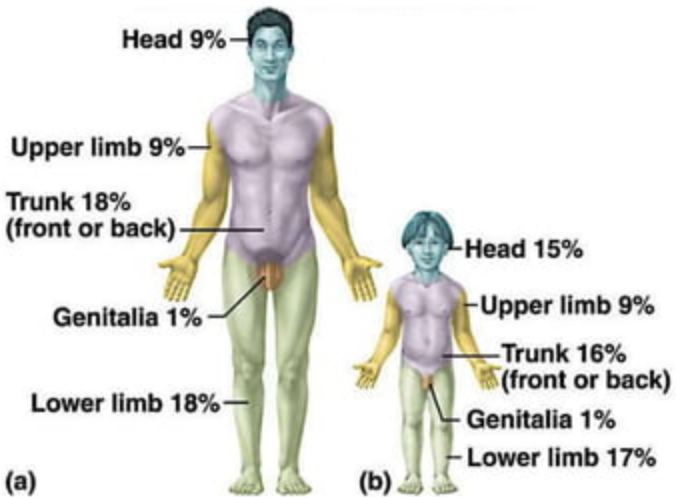
- Protection
- Sensation
- Metabolism
  - Temperature regulation
  - Vitamin D production
  - Excretion
  - Regulation of pH
  - Absorption
  - Secretion
  - Storage

Applied anatomy

- Skin color in clinical conditions
  - Pale - Anemia
  - Yellow - jaundice
  - Blue – cyanosis
- Skin grafts
  - Split thickness grafts - Epidermis & tips of dermal papillae is used
  - Full thickness graft - Both epidermis & dermis is used

Rule of nines

- Estimates severity of burns
- Burns are critical if:
  - Over 25% second degree burns
  - Over 10% third degree burns
  - Third degree burns on face, hands, or feet



Du BOIS FORMULA

To calculate surface area of a person

A = W x H x 71.84

- **A:** Surface area in square cm
- **W**: Weight in kilogram
- **H:** Height in cm