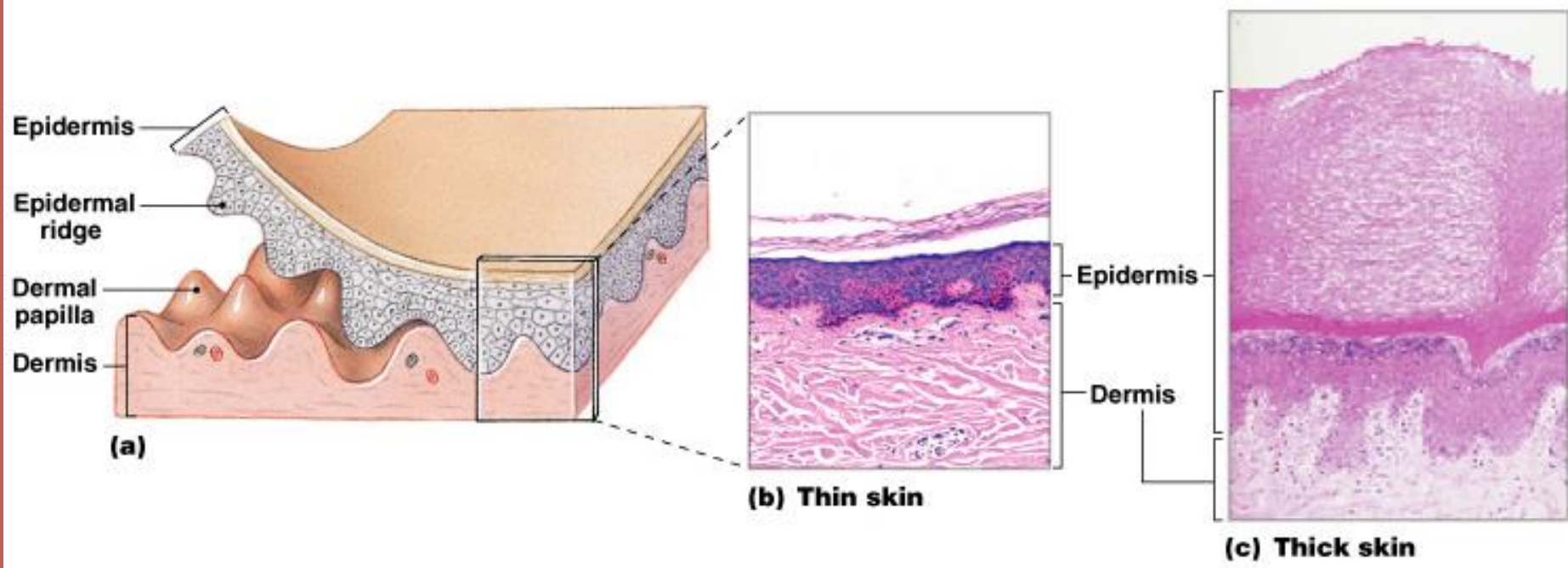


Epidermis

- Avascular stratified squamous epithelium
- Nutrients and oxygen diffuse from capillaries in the dermis





Organization of the Epidermis



Cells of the Epidermis

Keratinocytes:

-  contain large amounts of keratin
-  the most abundant cells in the epidermis



Thin Skin

- Covers most of the body
- Has 4 layers of keratinocytes



Thick Skin

- Covers the palms of the hands and soles of the feet
- Has 5 layers of keratinocytes



Structures of the Epidermis

The 5 strata of keratinocytes in thick skin

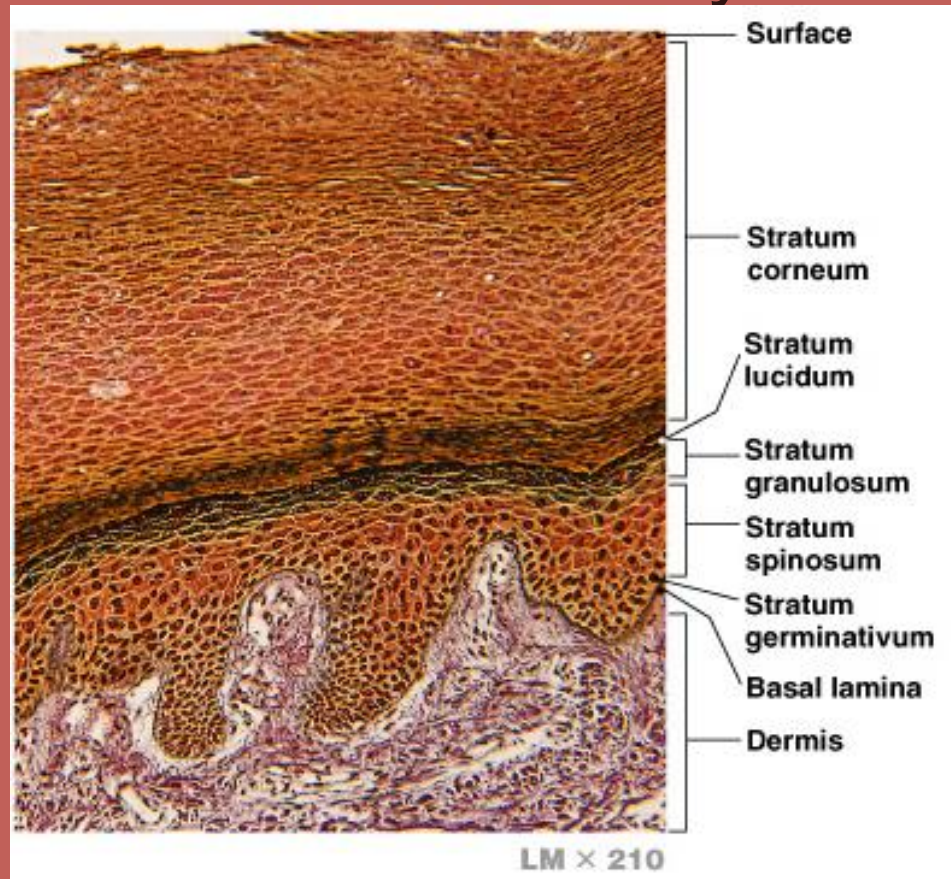


Figure 5-3

Structures of Stratum Germinativum

- Epidermal ridges (e.g., fingerprints)
- Dermal papillae (tiny mounds):
 - increase the area of basal lamina
 - strengthen attachment between epidermis and dermis



Ridges and Ducts

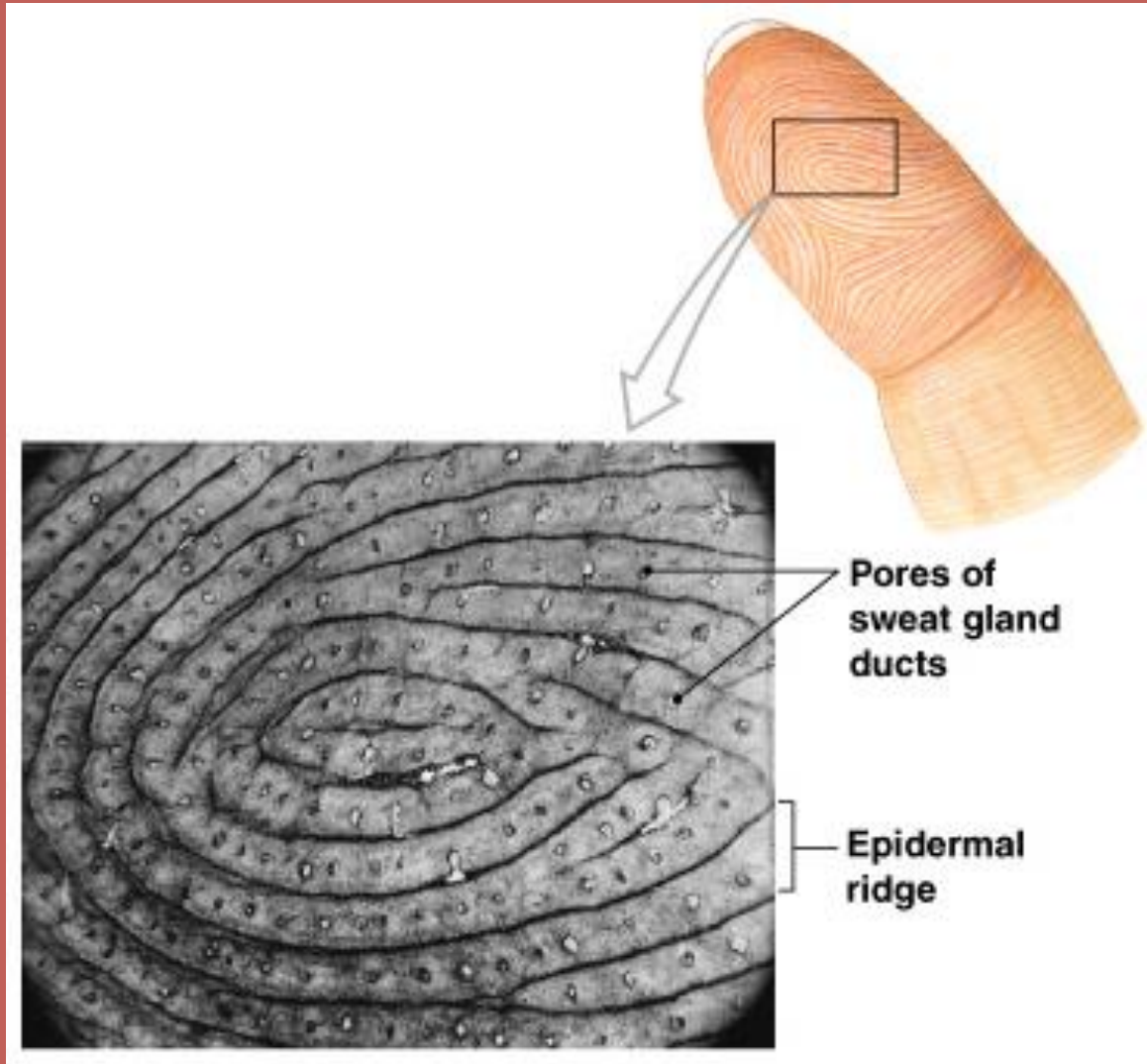






Figure 5-4

Cells of Stratum Germinativum

Merkel cells:

-  found in hairless skin
-  respond to touch (trigger nervous system)

Melanocytes:

-  contain the pigment melanin
-  scattered throughout stratum germinativum



Stratum Granulosum

- The “grainy layer”

- Stops dividing, starts producing:

 - keratin:

 - a tough, fibrous protein, makes up hair and nails





- Dehydrate and die

- Create tightly interlocked layer of keratin



Stratum Corneum

The “horn layer”:

-  exposed surface of skin
-  15 to 30 layers of keratinized cells
-  water resistant
-  shed and replaced every 2 weeks



Keratinization

- The formation of a layer of dead, protective cells filled with keratin
- Occurs on all exposed skin surfaces except eyes




Skin Life Cycle

- It takes 15–30 days for a cell to move from stratum germinosum to stratum corneum



Perspiration

Insensible perspiration:

-  interstitial fluid lost by evaporation through the stratum corneum

Sensible perspiration:

-  water excreted by sweat glands



Water Loss Through Skin



Dehydration results:

- from damage to stratum corneum, *e.g.*, burns and blisters (insensible perspiration)
- from immersion in hypertonic solution, *e.g.*, seawater (osmosis)



Water Gain Through Skin

Hydration:

-  results from immersion in hypotonic solution, *e.g.*, freshwater (osmosis)
-  causes stretching and wrinkling skin



What causes different skin colors?



Skin Color

- Skin color depends on:
 - the pigments **carotene** and **melanin**
 - blood circulation (red cells)



Carotene

- Orange-yellow pigment
- Found in orange vegetables
- Accumulates in epidermal cells and fatty tissues of the dermis
- Can be converted to vitamin A



Melanin

- Yellow-brown or black pigment
- Produced by **melanocytes** in stratum germinativum
- Stored in transport vesicles (**melanosomes**)
- Transferred to keratinocytes

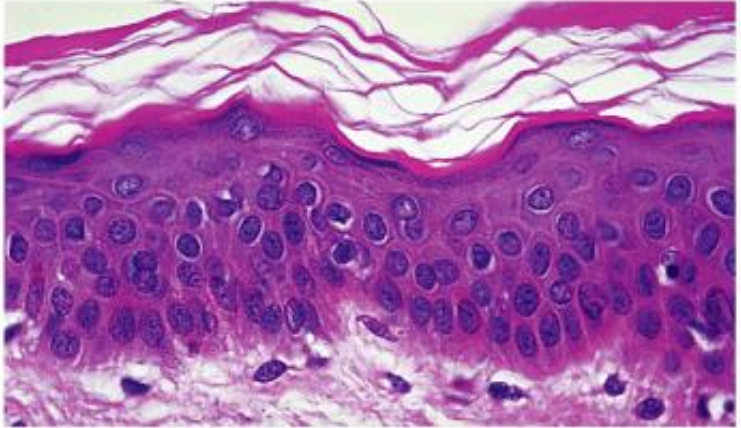
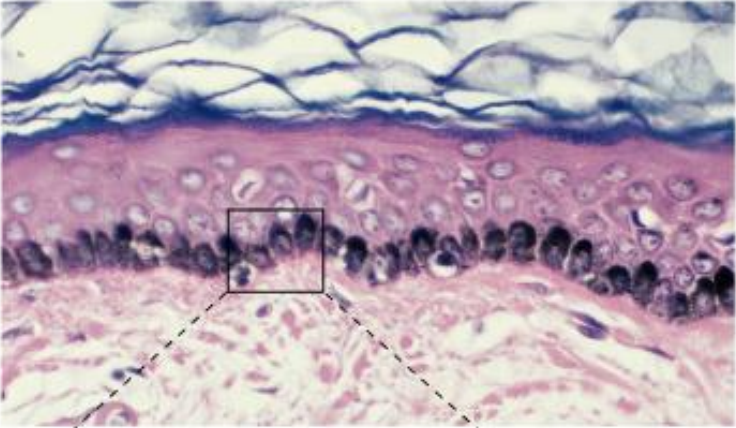


Function of Melanocytes

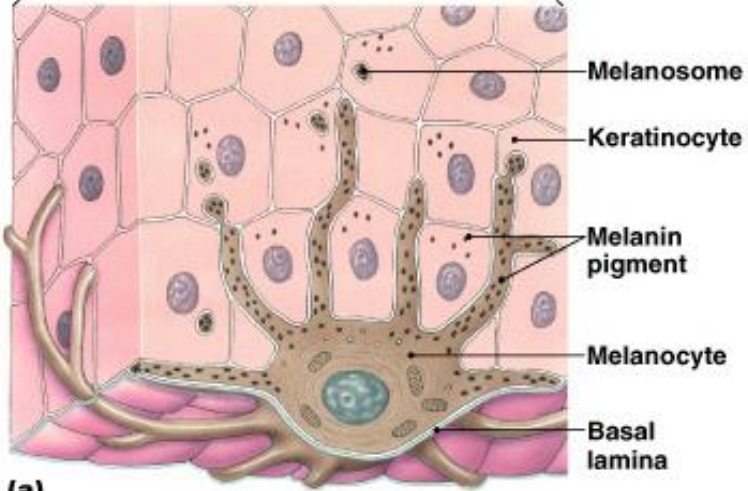
- Melanin protects skin from sun damage
- Ultraviolet (UV) radiation:
 - causes DNA mutations and burns which lead to cancer and wrinkles



Melanocytes



(b)



(a)

Figure 5-5

Melanocytes

- Skin color depends on melanin production, not number of melanocytes



Capillaries and Skin Color

- Oxygenated red blood contributes to skin color:
 - blood vessels dilate from heat, skin reddens
 - blood flow decreases, skin pales



Cyanosis

- Bluish skin tint

- Caused by severe reduction in blood flow or oxygenation



Illness and Skin Color

Jaundice:

-  buildup of bile produced by liver
-  yellow color

Addison's disease:

-  and other diseases of pituitary gland
-  skin darkening



Illness and Skin Color

Vitiglio:

-  loss of melanocytes
-  loss of color



Vitamin D

- Epidermal cells produce cholecalciferol (vitamin D₃):
 - in the presence of UV radiation
- Liver and kidneys convert vitamin D into calcitriol:
 - to aid absorption of calcium and phosphorus



Vitamin D

 Insufficient vitamin D:

 can cause *rickets*

