I. Overview → KNOW Fig. 5.1 (Should be labeled “Structure of Integumentary system”)
- sketch –

A. A true system, not synonymous with “skin”
B. Skin = dermis + epidermis = cutaneous membrane
   - largest organ in the body → ~2m², 5kg (15% of body weight)
   - thickness varies: 0.5mm – 6mm

C. Subcutaneous tissue or hypodermis is not considered skin by anatomists
D. Functions
   ♦ protection → 1st line of defense against pathogens
   ♦ water retention
   ♦ sensation
   ♦ thermoregulation (3)
   ♦ synthesis of Vitamin D

II. Epidermis → KNOW Fig. 5.3 (with some exceptions)
A. stratified squamous epithelium
   - 4 or 5 layers → Know by name & sequence
   - reflect life cycle of individual cells

B. folded into friction ridges (= fingerprints)
   - irregular surface area for better grip
   - sweat ducts open here: moisture further enhances grip

C. two main cell types (NRF others)
   1. keratinocytes ~ 90%, produce keratin = a tough, fibrous protein
   "horny"
      - intermediate filament (part of cytoskeleton)
   -- so, epidermis is a keratinized epithelium
   -- keratinocytes also produce a lipid substance extruded to create the epidermal water barrier
2. melanocytes ~ 8%, only in stratum basale
   "black"
   -- produce melanin \(\rightarrow\) a dark pigment that absorbs UV, protecting underlying
   nuclear DNA from mutation
   -- How many of you are paying to get skin cancer?

D. Skin types (remember Rule #2?) \(\rightarrow\) note in lab, cf. Fig. 5.3, 5.4, 5.5
   • "thick" skin = thick epidermis
   • "thin" skin = thin epidermis
   • dermis is thickest layer of skin and thickest on dorsal trunk (Why?)
   • Complete chart for details (text p. 109 for reference)

<table>
<thead>
<tr>
<th>Feature</th>
<th>Thin skin</th>
<th>Thick skin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Layers (how many?)</td>
<td></td>
<td></td>
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<tr>
<td>Location on body</td>
<td></td>
<td></td>
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<tr>
<td>Hair</td>
<td></td>
<td></td>
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<tr>
<td>Sebaceous glands</td>
<td></td>
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<tr>
<td>Sweat glands: relative abundance</td>
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</tbody>
</table>

III. Dermis
   A. deeper, vascular layer of c.t.
      1. papillary region – just deep to stratum basale
         "little nipple" \(\leftarrow\) -- areolar c.t.

      2. reticular region – deep to papillary region
         "net" \(\leftarrow\) -- dense irregular c.t. = leather!
         -- thickest skin layer

      3. abundant nerve endings, glands, blood vessels, hairs

IV. Subcutaneous tissue (hypodermis)
   - not part of skin
   - superficial fascia to anatomists
   - loose c.t. + lots of adipose c.t. (8% thicker in women = soft)
   - easily accommodates injections

V. Accessory organs
   A. hair (= pilus) \(\rightarrow\) Fig. 5.6 & Chapter intro Fig. (p. 108)
      - develop from invaginations of epidermis, the follicle
      - raised by bands of smooth muscle, the piloerector muscle (arrector pili) =
        goosebumps
B. nails
- also develop from epidermal ingrowths
- “hard” keratin

C. Cutaneous glands \(\rightarrow\) Fig. 5.3, **Know Table 5.3**

1. **sudoriferous** glands: see text for details & complete chart

<table>
<thead>
<tr>
<th>Feature</th>
<th>Merocrine sweat gland</th>
<th>Apocrine sweat gland</th>
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<tbody>
<tr>
<td>Function</td>
<td></td>
<td></td>
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<tr>
<td>Body-wide Distribution &amp; relative number</td>
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<td></td>
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<tr>
<td>Structure: lumen size &amp; location of duct</td>
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</tbody>
</table>

2. modified sweat glands
   a. **ceruminous** glands – wax in ear
   b. mammary glands

3. **sebaceous** (oil) glands
   - secrete sebum (keeps hairs flexible), complex mix of fats, proteins, salt
   - connected to hair follicles
   - don’t confuse with adipose tissue

VI. Blood supply
A. epidermis avascular
B. dermis has 2 capillary networks (better developed in women = warmer)
   1. cutaneous plexus – deep
   2. papillary plexus – superficial; important in temperature control

VII. Color
A. produced by 3 major pigments
   1. melanin – from melanocytes
   2. hemoglobin – from erythrocytes
   3. carotene (yellow-orange) – from diet
B. significant diagnostic value \(\rightarrow\) see text p. 115
   1. cyanosis
   2. erythema
   3. pallor
   4. albinism
   5. jaundice
   6. hematoma