Body Tissue Types

組織名稱	結構	主要功能	舉例
上皮組織(epithelial tissue)	單層或多層緊密結合的細胞	保護、吸收、分泌	皮膚、腦下垂體前葉、腺體
結締組織(connective tissue)	細胞分散於基質中	支撐、分隔、保護	軟骨、脂肪、血球
肌肉組織(muscular tissue)	長形細胞含大量收縮纖維	運動、支持、血流	骨骼肌、心臟
神經組織(nervous tissue)	不規則形狀的神經元及周邊細胞	訊息傳遞、意識	脊髓、腦

1

General Features of Epithelial Tissues

- Closely packed cells forming continuous sheets
- Cells sit on basement membrane
- Apical (upper) free surface
- Avascular---without blood vessels
  --nutrients diffuse in from underlying connective tissue
- Good nerve supply
- Rapid cell division
- Covering / lining versus glandular types

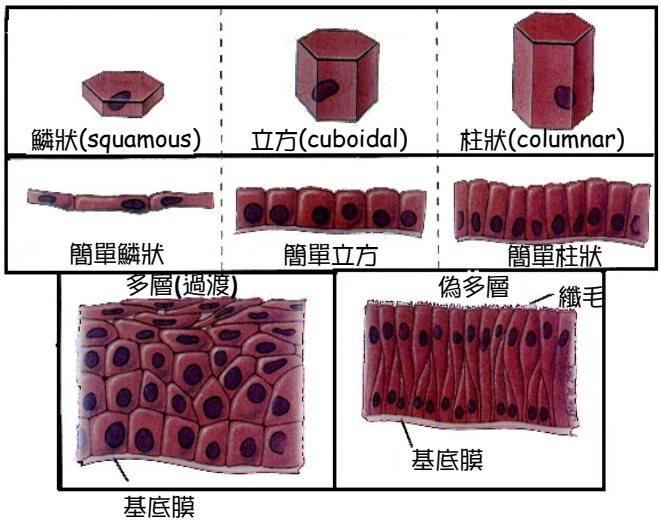
2

Epithelial Tissues

■*Covering / lining types*

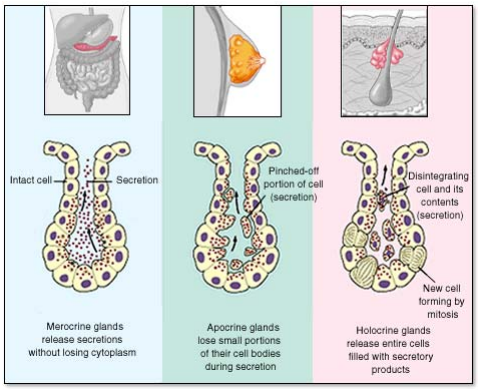
❖ 依形狀:
1. 鱗狀上皮
2. 立方上皮
3. 柱狀上皮

❖ 依排列:
1. 簡單上皮
2. 多層上皮
3. 移形上皮
(過渡上皮)



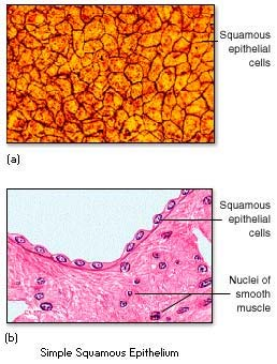
Epithelial Glands

■*Glandular types*



4

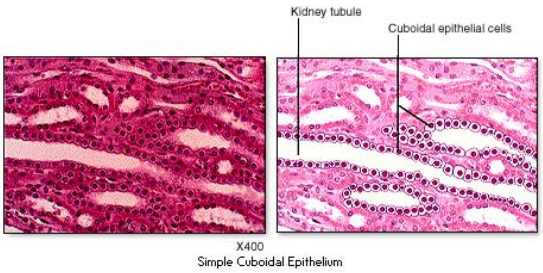
Simple Squamous Epithelium



Locations: alveoli of the lungs; walls of blood capillaries; mesothelium
Function: diffusion; some secretion
Key Features: single layer of flat cells with flat nucleus; little matrix, free surface

5

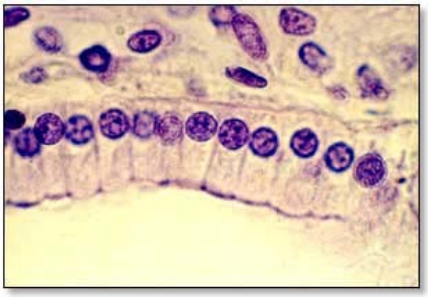
Simple Cuboidal Epithelium



Locations: bronchioles; kidney tubules; thyroid and other glands

6

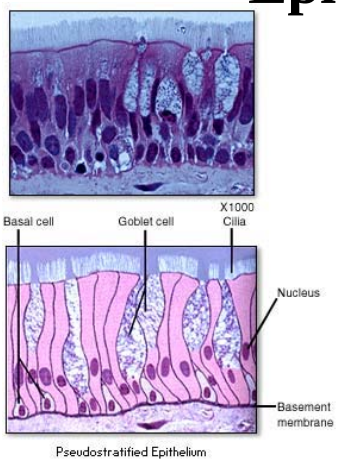
Simple Columnar Epithelium



Locations: the stomach, intestines, and the uterus
Functions: secretion and absorption
Key Features: single layer of columnar cells; nuclei in a somewhat linear arrangement; may have goblet cells; little matrix

7

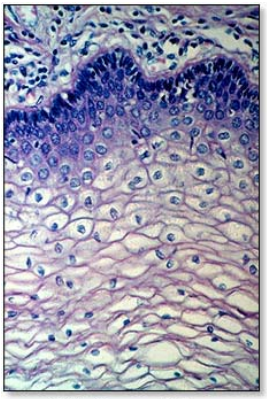
Pseudostratified Columnar Epithelium



Location: the lining of the respiratory passages
Function: secretion
Key Features: staggered nuclei; may have goblet cells and cilia; little matrix

8

Stratified Squamous Epithelium

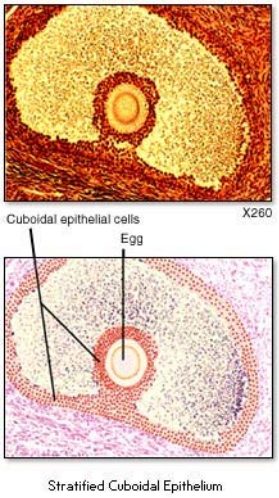


Stratified Squamous Epithelium

Locations: the epidermis, the oral cavity, and the anal canal
Function: protection against abrasion
Key Features: flattened, anucleated cells near free surface; little matrix

9

Stratified Cuboidal Epithelium

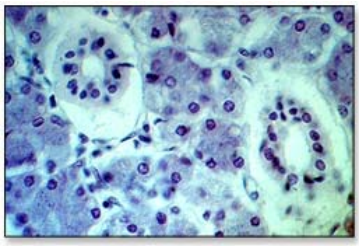


Stratified Cuboidal Epithelium

Locations: limited, but can be found lining ovarian follicles and the lining of some ducts and glands
Functions: lining of ducts
Key Features: cuboidal cells near free surface; usually two layers of cells

10

Stratified Columnar Epithelium

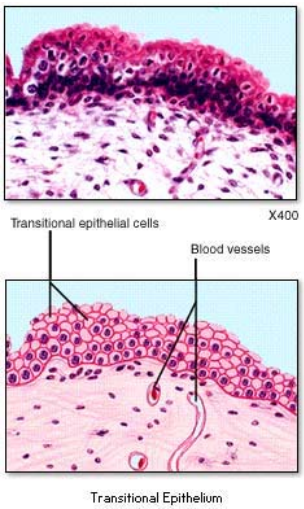


Photomicrograph of stratified columnar epithelium

Location: limited, and includes small portions of the pharynx and larynx
Functions: a transitional zone between stratified squamous epithelium and simple columnar epithelium or pseudostratified epithelium

11

Transitional Epithelium



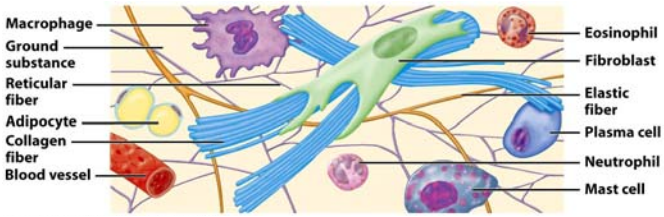
Transitional Epithelium

Locations: limited to structures of the urinary system - ureters, urinary bladder and the urethra
Functions: allows for distension as an organ fills with fluid
Key Features: domed cells near free surface, binucleated cells

12

General Features of Connective Tissues

- Most abundant tissue type
- small **cells** far apart
- large amount of extracellular **matrix**
- Matrix (fibers & ground substance secreted by cells
- Often good nerve & blood supply except cartilage & tendons



13

Connective Tissue Cell Types

- **Fibroblasts**- present in several tissues
  - secrete fibers & ground substance
- **Macrophages**- from monocytes
  - Engulf bacteria & cell debris by phagocytosis
- **Plasma cells**- develop from B lymphocytes
  - Make antibodies
- **Mast cells**- near blood cells
  - part of reaction to injury- histamine
- **Adipocytes**- fat cells or adipose cells
  - Store triglycerides (fat)

14

Connective Tissue Ground Substance

- Supports the cells and fibers
- Helps determine the consistency of the matrix
  - fluid, gel or solid
- Contains many large molecules
  - **hyaluronic acid** is thick, viscous and slippery
  - **condroitin sulfate** is jellylike substance providing support
  - **adhesion proteins (fibronectin)** binds collagen fibers to ground substance

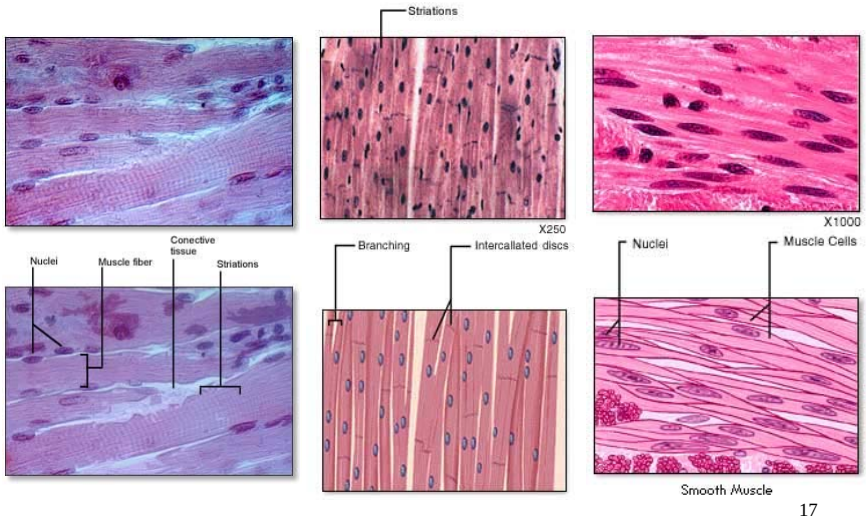
15

Types of Connective Tissue Fibers

- **Collagen (25% of protein in your body)**
  - tough, resistant to pull, yet pliable
  - formed from the protein collagen
- **Elastin (lungs, blood vessels, ear cartilage)**
  - smaller diameter fibers formed from protein elastin surrounded by glycoprotein (fibrillin)
  - can stretch up to 150% of relaxed length and return to original shape
- **Reticular (spleen and lymph nodes)**
  - thin, branched fibers that form framework of organs
  - formed from protein collagen

16

Muscle Tissue



17

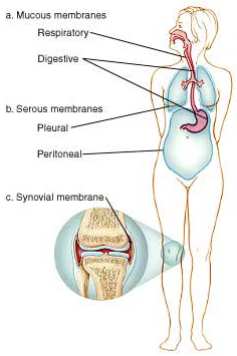
Muscle Tissue

Comparison of Skeletal, Smooth, and Cardiac Muscle

	Skeletal	Smooth	Cardiac
Major location	Skeletal muscles	Walls of hollow viscera	Wall of the heart
Major function	Movement of bones at joints, maintenance of posture	Movement of viscera, peristalsis	Pumping action of the heart
Cellular characteristics			
Striations	Present	Absent	Present
Nucleus	Many nuclei	Single nucleus	Single nucleus
Special features	Well-developed transverse tubule system	Lacks transverse tubules	Well-developed transverse tubule system; intercalated discs separating adjacent cells
Mode of control	Voluntary	Involuntary	Involuntary
Contraction characteristics	Contracts and relaxes rapidly	Contracts and relaxes slowly; self-exciting; rhythmic	Network of fibers contracts as a unit; self-exciting; rhythmic

18

Body Membrane



A. Epithelial membranes

表層膜(skin)

黏膜

漿膜

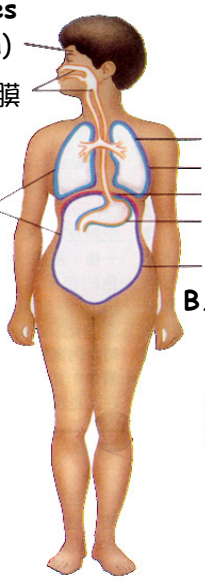
肋膜之臟層

肋膜之壁層

橫膈膜

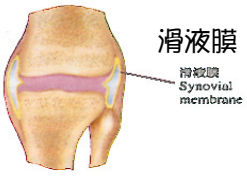
腹膜之臟層

腹膜之壁層



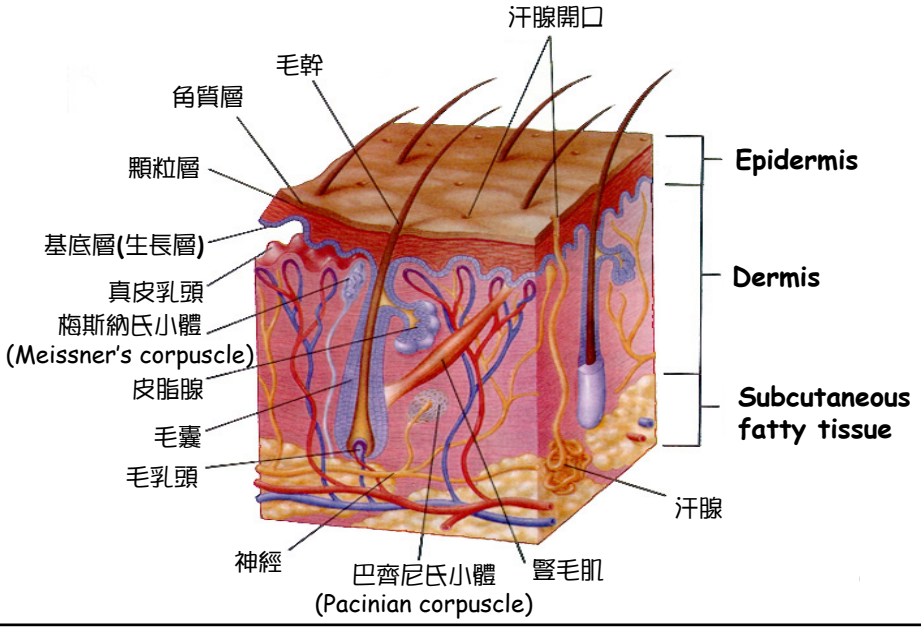
B. Connective tissue membranes

滑液膜

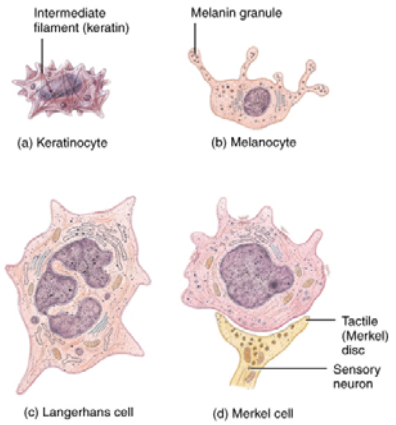


19

Structure of the Skin



Cell types of the Epidermis



- **Keratinocytes--90%**
  - produce keratin
- **Melanocytes-----8 %**
  - produces melanin pigment
  - melanin transferred to other cells with long cell processes
- **Langerhan cells**
  - from bone marrow
  - provide immunity
- **Merkel cells**
  - in deepest layer
  - form touch receptor with sensory neuron

21

Epidermis

角質層→顆粒層→棘狀層→基底層

Stratum Corneum (SC)
角質層

Stratum Granulosum (SGR)
顆粒層

Stratum Spinosum (SS)
棘狀層

Stratum Germinativum (SG)
基底層

22

Skin Color Pigments

- **Melanin produced in epidermis by melanocytes**
  - same number of melanocytes in everyone, but differing amounts of pigment produced
  - results vary from yellow to tan to black color
  - melanocytes convert tyrosine to melanin
    - UV in sunlight increases melanin production
- **Clinical observations**
  - freckles or liver spots = melanocytes in a patch
  - albinism = inherited lack of tyrosinase; no pigment
  - vitiligo = autoimmune loss of melanocytes in areas of the skin produces white patches

23

Skin Color Pigments

- **Carotene in dermis**
  - yellow-orange pigment (precursor of vitamin A)
  - found in stratum corneum & dermis
- **Hemoglobin**
  - red, oxygen-carrying pigment in blood cells
  - if other pigments are not present, epidermis is translucent so pinkness will be evident

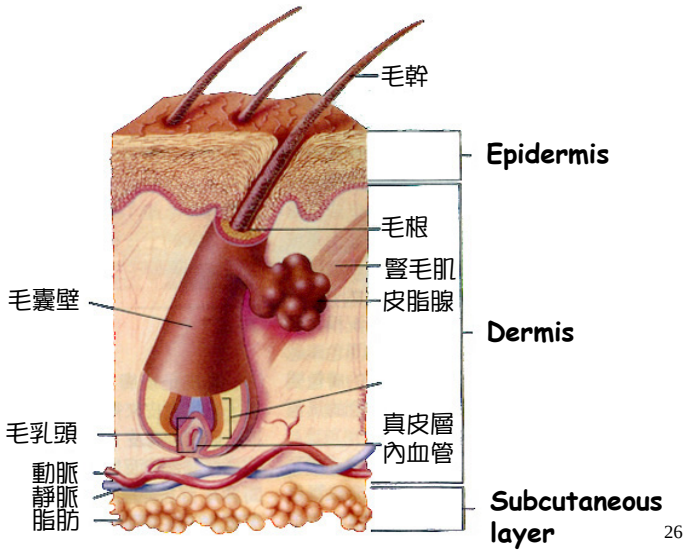
24

Skin Color as Diagnostic Clue

- **Jaundice**
  - yellowish color to skin and whites of eyes
  - buildup of yellow bilirubin in blood from liver disease
- **Cyanotic**
  - bluish color to nail beds and skin
  - hemoglobin depleted of oxygen looks purple-blue
- **Erythema**
  - redness of skin due to enlargement of capillaries in dermis
  - during inflammation, infection, allergy or burns

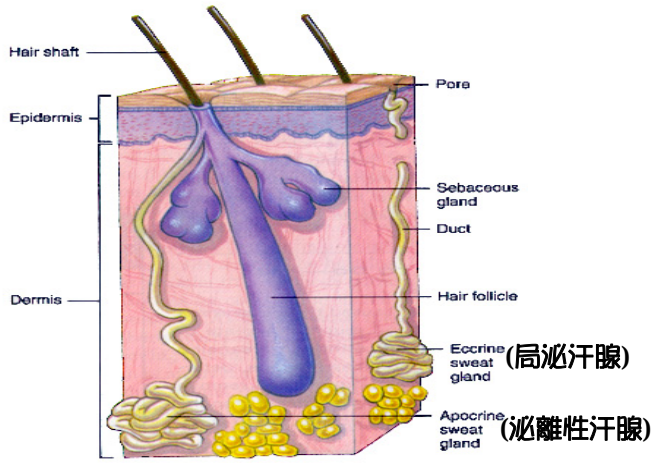
25

Hair Follicle



26

Sweat Gland



27

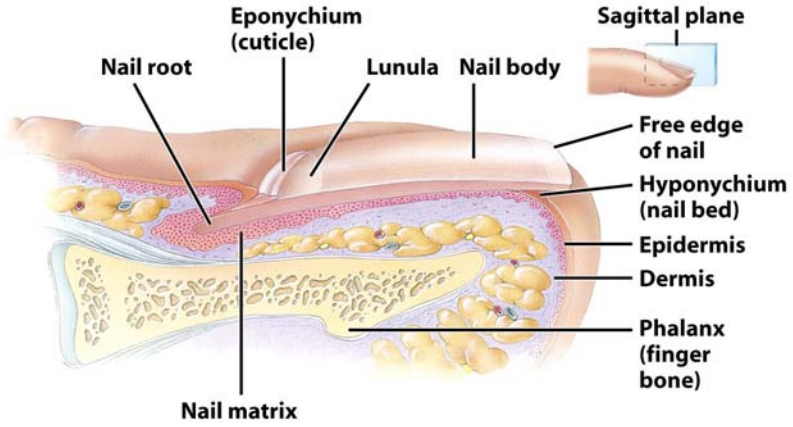
TABLE 5.3 Comparison of Eccrine and Apocrine Sweat Glands

Feature	Eccrine Sweat Glands	Apocrine Sweat Glands
Distribution	Throughout skin of most regions of the body, especially in skin of forehead, palms, and soles.	Skin of the axilla, groin, areolae, bearded regions of the face, clitoris, and labia minora.
Location of secretory portion	Mostly in deep dermis.	Mostly in subcutaneous layer.
Termination of excretory duct	Surface of epidermis.	Hair follicle.
Secretion	Less viscous; consists of water, ions (Na^+, Cl^-), urea, uric acid, ammonia, amino acids, glucose, and lactic acid.	More viscous; consists of the same components as eccrine sweat glands plus lipids and proteins.
Functions	Regulation of body temperature and waste removal.	Stimulated during emotional stress and sexual excitement.
Onset of function	Soon after birth.	Puberty.

Table 5-3 Principles of Anatomy and Physiology, 11/e

28

Nails



Sagittal section showing internal detail

Figure 5-5b Principles of Anatomy and Physiology, 11/e
© 2006 John Wiley & Sons

29

TABLE 5.4 Comparison of Thin and Thick Skin

Feature	Thin Skin	Thick Skin
Distribution	All parts of the body except palms and palmar surface of digits, and soles.	Palms, palmar surface of digits, and soles.
Epidermal thickness	0.10–0.15 mm (0.004–0.006 in.).	0.6–4.5 mm (0.024–0.18 in.).
Epidermal strata	Stratum lucidum essentially lacking; thinner strata spinosum and corneum.	Thick strata lucidum, spinosum, and corneum.
Epidermal ridges	Lacking due to poorly developed and fewer dermal papillae.	Present due to well-developed and more numerous dermal papillae.
Hair follicles and arrector pili muscles	Present.	Absent.
Sebaceous glands	Present.	Absent.
Sudoriferous glands	Fewer.	More numerous.
Sensory receptors	Sparser.	Denser.

Table 5-4 Principles of Anatomy and Physiology, 11/e
© 2006 John Wiley & Sons

30

Rule of Nines

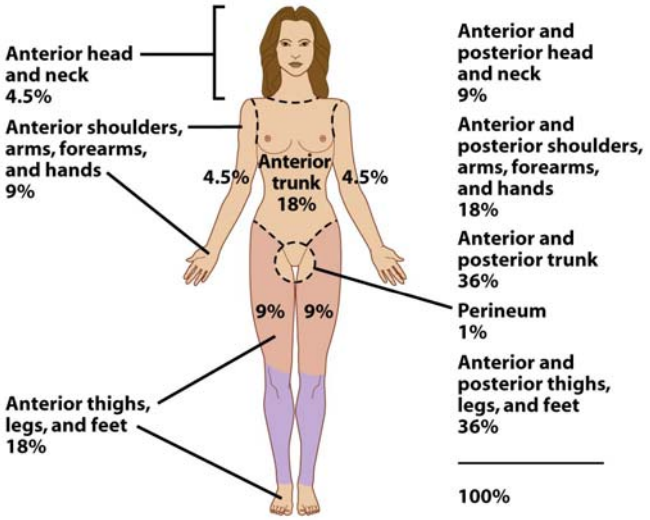


Figure 5-10 Principles of Anatomy and Physiology, 11/e
© 2006 John Wiley & Sons

31

Burns

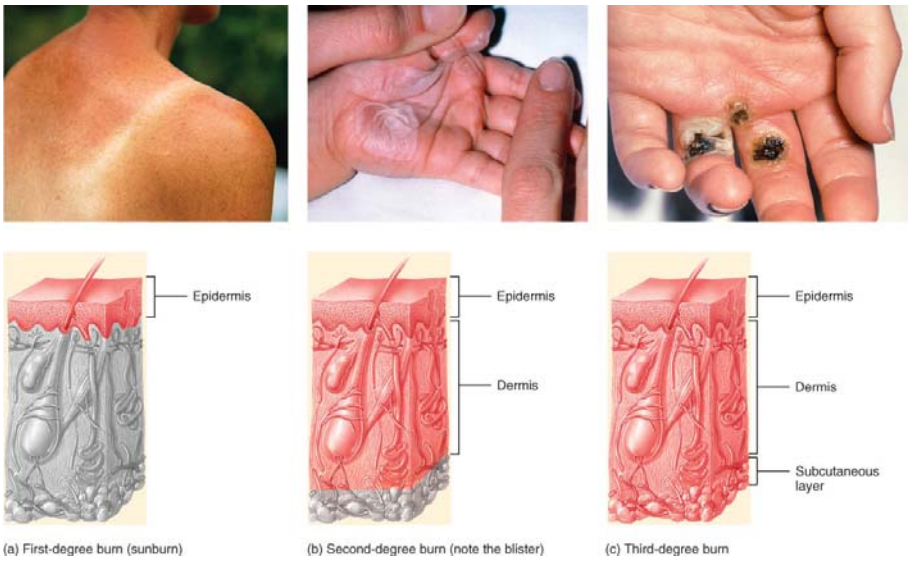


Table 4.1 Functions of the Skin

Functions	How accomplished
Protects deeper tissues from	
• Mechanical damage (bumps)	Physical barrier contains keratin, which toughens cells, and pressure receptors, which alert the nervous system to possible damage.
• Chemical damage (acids and bases)	Has relatively impermeable keratinized cells; contains pain receptors, which alert the nervous system to possible damage.
• Bacterial damage	Has an unbroken surface and "acid mantle" (skin secretions are acidic, and thus inhibit bacteria). Phagocytes ingest foreign substances and pathogens, preventing them from penetrating into deeper body tissues.
• Ultraviolet radiation (damaging effects of sunlight)	Melanin produced by melanocytes offers protection.
• Thermal (heat or cold) damage	Contains heat/cold/pain receptors.
• Desiccation (drying out)	Contains waterproofing substances including keratin.
Aids in body heat loss or heat retention (controlled by the nervous system)	Heat loss: By activating sweat glands and allowing blood to flush into skin capillary beds. Heat retention: By not allowing blood to flush into skin capillary beds.
Aids in excretion of urea and uric acid	Contained in perspiration produced by sweat glands.
Synthesizes vitamin D	Modified cholesterol molecules in skin converted to vitamin D by sunlight.

Transdermal Drug Administration

- Method by which drugs in a patch enter the body
- Drug absorption most rapid in areas where skin is thin (scrotum, face and scalp)
- Examples
  - nitroglycerin (prevention of chest pain from coronary artery disease)
  - scopolamine (motion sickness)
  - estradiol (estrogen replacement therapy)
  - nicotine (stop smoking alternative)

34