Body membranes, which cover body surfaces, line its cavities, and form protective sheets around organs, fall into two major categories. These are epithelial membranes (skin epidermis, mucosae, and serosae) and the connective tissue synovial membranes.

Topics for review in this chapter include a comparison of structure and function of various membranes, anatomical characteristics of the skin (composed of the connective tissue dermis and the epidermis) and its derivatives, and the manner in which the skin responds to both internal and external stimuli to protect the body.

CLASSIFICATION OF BODY MEMBRANES

1. Complete the following table relating to body membranes. Enter your responses in the areas left blank.

<table>
<thead>
<tr>
<th>Membrane</th>
<th>Tissue type (epithelial/connective)</th>
<th>Common locations</th>
<th>Functions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mucous</td>
<td>Non-Keratinized Stratified Squamous E.T.</td>
<td>Cavities that open to exterior</td>
<td>Protection in areas of ab</td>
</tr>
<tr>
<td>Serous</td>
<td>Simple Squamous E.T.</td>
<td>Ventral Body Cavity</td>
<td>Reduce friction</td>
</tr>
<tr>
<td>Cutaneous</td>
<td>Keratinized Stratified Squamous E.T.</td>
<td>Epidermis</td>
<td>Protection/ Waterproof Skin</td>
</tr>
<tr>
<td>Synovial</td>
<td>Areolar C.T.</td>
<td>Synovial Joints</td>
<td>Reduce friction</td>
</tr>
</tbody>
</table>
2. Four simplified diagrams are shown in Figure 4–1. Select different colors for the membranes listed below, and use them to color the coding circles and the corresponding structures.

- Cutaneous membrane
- Mucosae
- Visceral pleura (serosa)
- Parietal pleura (serosa)
- Visceral pericardium (serosa)
- Parietal pericardium (serosa)

Figure 4–1
INTEGUMENTARY SYSTEM (SKIN)

Basic Functions of the Skin

3. The skin protects the body by providing three types of barriers. Classify each of the protective factors listed below as an example of a chemical barrier (C), a biological barrier (B), or a mechanical (physical) barrier (M).

   B 1. **Dendritic** cells and macrophages
   M 2. Intact epidermis
   C 3. Bactericidal secretions
   M 4. Keratin
   C 5. Melanin
   C 6. Acid mantle (low pH secretions)

4. In what way does a sunburn impair the body’s ability to defend itself?

   (Assume the sunburn is mild.) **Sunburns damage the protective epidermis making the organism more susceptible to mechanical or chemical damage**

5. Explain the role of sweat glands in maintaining body temperature homeostasis.

   In your explanation, indicate how their activity is regulated. **Sweat glands produce 99.7% H₂O (which carries heat w/ it) So when the body warms up, the Sympathetic N.S. stimulates sweat gland activity**

6. Complete the following statements. Insert your responses in the answer blanks.

   1. The cutaneous sensory receptors that reside in the skin are actually part of the **(1)** system. Four types of stimuli that can be detected by certain of the cutaneous receptors are **(2)**, **(3)**, **(4)**, and **(5)**.

   2. **(6)** Vitamin D is synthesized when modified **(6)** molecules in the skin are irradiated by **(7)** light. Vitamin D is important in the absorption and metabolism of **(8)** ions.
Basic Structure of the Skin

7. Figure 4–2 depicts a longitudinal section of the skin. Label the skin structures and areas indicated by leader lines and brackets on the figure. Select different colors for the structures below and color the coding circles and the corresponding structures on the figure.

- Arrector pili muscle
- Adipose tissue
- Hair follicle
- Nerve fibers
- Sweat (sudoriferous) gland
- Sebaceous gland

8. The more superficial cells of the epidermis become less viable and ultimately die. What two factors account for this natural demise of the epidermal cells?

1. They move farther away from their blood supply
2. They naturally extrude organelles and become increasingly filled with the protective protein keratin
9. Using the key choices, choose all responses that apply to the following
descriptions. Enter the appropriate letter(s) or term(s) in the answer blanks.

**Key Choices**

A. Stratum basale
B. Stratum corneum
C. Stratum granulosum
D. Stratum lucidum
E. Stratum spinosum
F. Papillary layer
G. Reticular layer
H. Epidermis as a whole
I. Dermis as a whole

1. Translucent cells, containing keratin
2. Strata containing all or mostly dead cells
3. 
4. Vascular region
5. Epidermal region involved in rapid cell division; most inferior epidermal layer
6. Scalelike cells full of keratin that constantly flake off
7. Site of elastic and collagen fibers
8. Site of melanin formation
9. Major skin area from which the derivatives (hair, nails) arise
10. Epidermal layer containing the oldest cells

Don't Do

Circle the term that does not belong in each of the following groupings.

1. Reticular layer  Keratin  Dermal papillae  Meissner's corpuscles
2. Melanin  Freckle  Wart  Malignant melanoma
3. Prickle cells  Stratum basale  Stratum spinosum  Cell shrinkage
4. Langerhans' cells  Epidermal dendritic cells  Keratinocytes  Immune cells
5. Meissner's corpuscles  Pacinian corpuscles  Merkel cells  Arrector pili
6. Waterproof substance  Elastin  Lamellated granules  Produced by keratinocytes
7. Intermediate filaments  Keratin fibrils  Keratohyaline  Lamellated granules
11. This exercise examines the relative importance of three pigments in determining skin color. Indicate which pigment is identified by the following descriptions by inserting the appropriate answer from the key choices in the answer blanks.

*Key Choices*

A. Carotene  
B. Hemoglobin  
C. Melanin

1. Most responsible for the skin color of dark-skinned people  
A  
2. Provides an orange cast to the skin  
C  
3. Provides a natural sunscreen  
B  
4. Most responsible for the skin color of Caucasians  
C  
5. Phagocytized by keratinocytes  

B  
6. Found predominantly in the stratum corneum  
C  
7. Found within red blood cells in the blood vessels  
B

12. Complete the following statements in the blanks provided.

*heat*  
1. Radiation from the skin surface and evaporation of sweat are two ways in which the skin helps to get rid of body *(1)*.

*hypodermis*  
2. Fat in the *(2)* tissue layer beneath the dermis helps to insulate the body.

*Vitamin D*  
3. A vitamin that is manufactured in the skin is *(3)*.

*Collagen*  
4. Wrinkling of the skin is caused by loss of the *(4)* of the skin.

5. 

6. 

**Appendages of the Skin**

13. For each true statement, write *T*. For each false statement, correct the underlined word(s) and insert your correction in the answer blank.

1. A saltwater solution is secreted by sebaceous glands. 

2. The most abundant protein in dead epidermal structures such as hair and nails is melanin. 

3. Apocrine and sebaceous glands secrete their products into a *pore*. 

4. The externally observable part of a hair is called the *root* *(not on test)*

5. The *epidermis* provides mechanical strength to the skin.
14. Figure 4–3 is a diagram of a cross-sectional view of a hair in its follicle. Complete this figure by following the directions in steps 1–3.

1. Identify the two portions of the follicle wall by placing the correct name of the sheath at the end of the appropriate leader line.

2. Use different colors to color these regions.

3. Label, color-code, and color the three following regions of the hair.

- Cortex
- Cuticle
- Medulla

Figure 4–3

15. Circle the term that does not belong in each of the following groupings.

1. Luxuriant hair growth  Testosterone  Poor nutrition  Good blood supply

2. Vitamin D  Cholesterol  UV radiation  Keratin

3. Stratum corneum  Nail matrix  Hair bulb  Stratum basale

4. Scent glands  Ecorine glands  Apocrine glands  Axilla

5. Terminal hair  Vellus hair  Dark, coarse hair  Eyebrow hair

16. What is the scientific term for baldness? 

17. Using the key choices, complete the following statements. Insert the appropriate letter(s) or term(s) in the answer blanks.

**Key Choices**

A. Arrector pili  
B. Cutaneous receptors  
C. Hair  
D. Hair follicle(s)  
E. Sebaceous glands  
F. Sweat gland (apocrine)  
G. Sweat gland (eccrine)

1. A blackhead is an accumulation of oily material produced by ___________.

2. Tiny muscles attached to hair follicles that pull the hair upright during fright or cold are called __________.

3. The most numerous variety of perspiration gland is the ___________.

4. A sheath formed of both epithelial and connective tissues is the ___________.

5. A less numerous variety of perspiration gland is the ___________. Its secretion (often milky in appearance) contains proteins and other substances that favor bacterial growth.

6. ___________ is found everywhere on the body except the palms of the hands, soles of the feet, and lips, and it primarily consists of dead keratinized cells.

7. ___________ are specialized nerve endings that respond to temperature and touch, for example.

8. ___________ become more active at puberty.

9. Part of the heat-liberating apparatus of the body is the ___________.

10. Secretin contains bacteria-killing substances.

18. Circle the term that does not belong in each of the following groupings.

1. Sebaceous gland  
2. Radiation  
3. Stratum corneum  
4. Scent glands  
5. Cyanosis

   Hair  
   Arrector pili  
   Absorption  
   Conduction  
   Nails  
   Eccrine glands  
   Apocrine glands  
   Erythema  
   Wrinkles  
   Epidermis  
   Evaporation  
   Stratum basale  
   Axilla  
   Pallor