THE INTEGUMENTARY SYSTEM

The integumentary system consists of the skin and its derivatives—glands, hairs, and nails. Although the skin is very thin, it provides a remarkably effective external shield that acts to protect our internal organs from what is outside the body.

This chapter reviews the anatomical characteristics of the skin (composed of the dermis and the epidermis) and its derivatives. It also reviews the manner in which the skin responds to both internal and external stimuli to protect the body.

The Skin

1. 1. Name the tissue type composing the epidermis. ______________________

2. Name the tissue type composing the dermis. ______________________

2. 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. ______________________

2. ______________________

3. Several types of skin markings may reveal structural characteristics of the dermis. Complete the following statements by inserting your responses in the answer blanks.

1. The presence of less dense regions between bundles of collagen fibers is revealed by .(1). .

2. Dermal tears show up as .(2). on the skin.

3. Skin markings that occur where the dermis is secured to deeper structures are called .(3). .

4. .(4). appear when dermis elasticity declines from age or excessive sun exposure.
4. Figure 5.1 depicts a longitudinal section of the skin. Label the skin structures and areas indicated by leader lines 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
- Nerve fibers
- Adipose tissue
- Sudoriferous gland
- Hair follicle
- Sebaceous gland

Figure 5.1
5. Using the key choices, choose all responses that apply to the following descriptions. Enter the appropriate letters 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  
J. Hypodermis

--- 1. Translucent cells containing keratin
--- 2. Dead cells
--- 3. Dermis layer responsible for fingerprints
--- 4. Vascular region
--- 5. Epidermal region involved in rapid cell division; the 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 where derivatives (hair, nails) arise
--- 10. Largely adipose tissue; anchors the skin to underlying tissues
--- 11. Collectively form the stratum germinativum
--- 12. Epidermal layer missing in thin skin
--- 13. Cells of this layer contain granules of keratohyalin
--- 14. Accounts for the bulk of epidermal thickness
--- 15. When tanned, becomes leather; provides mechanical strength to the skin
--- 16. Epidermal layer containing the “oldest” cells

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

1. Reticular layer  
2. Melanin  
3. Prickle cells  
4. Langerhans' cells  
Keratin  
Freckle  
Stratum basale  
Phagocytes  
Dermal papillae  
Wart  
Stratum spinosum  
Keratinocytes  
Meissner's corpuscles  
Malignant melanoma  
Cellular extensions  
Macrophages
Chapter 5  The Integumentary System

5. Meissner's corpuscles  Pacinian corpuscles  Bare nerve endings
Arrector pili
6. Waterproof substance  Elastin  Keratin  Produced by keratinocytes
7. Mast cells  Macrophages  Fibroblasts  Keratinocytes

7. 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 letter of the key choices in the answer blanks.

KEY CHOICES

A. Carotene  B. Hemoglobin  C. Melanin

___  1. Most responsible for the skin color of black people
___  2. Produces an orange cast to the skin
___  3. Provides a natural sunscreen
___  4. Most responsible for the skin color of Caucasians
___  5. Phagocytized by keratinocytes
___  6. Found predominantly in the stratum corneum
___  7. Found within red blood cells in the blood vessels
___  8. Greatest accumulation is in the stratum germinativum

8. Abnormalities of skin color can be helpful in alerting a physician to certain pathologies. Match the clinical terms in Column B with the possible-cause descriptions in Column A. Place the correct letter in each answer blank.

Column A

___  1. A bluish cast of the skin resulting from inadequate oxygenation of the blood
___  2. Observation of this condition might lead to tests for anemia or low blood pressure
___  3. Accumulation of bile pigments in the blood; may indicate liver disease
___  4. Clotted mass of blood that may signify bleeder's disease
___  5. A common result of inflammation, allergy, and fever

Column B

A. Cyanosis  B. Erythema  C. Hematoma  D. Jaundice  E. Pallor
Derivatives of the Skin

9. 1. What is the scientific term for baldness? ______________________

2. Name four factors that can cause hair loss and hair thinning other than nutritional or circulatory factors. ____________________________________________

10. Draw a simple diagram of a fingertip bearing a fingernail in the space at the right. Identify and label the following nail regions on your sketch: free edge, body, lunula, lateral nail folds, proximal nail fold (eponychium).

1. What is the common name for the eponychium? ____________________________________________

2. Why does the lunula appear whiter than the rest of the nail? ____________________________________________

11. Using the key choices, complete the following statements. Insert the appropriate letters in the answer blanks.

KEY CHOICES
A. Sebaceous glands  B. Sudoriferous gland (apocrine)  C. Sudoriferous gland (eccrine)

_____ 1. Its product is an oily mixture of lipids, cholesterol, and cell fragments.

_____ 2. Are merocrine glands, functionally.

_____ 3. The less numerous variety of perspiration gland. Its secretion (often milky in appearance) contains proteins and other substances that favor bacterial growth.

_____ 4. Duct opens to the external environment via a pore.

_____ 5. Is found everywhere on the body except the palms of the hands and soles of the feet.


_____ 7. Become more active at puberty under the influence of androgens.

_____ 8. Its secretion, when oxidized, is seen on the skin surface as a blackhead.

_____ 9. The ceruminous glands that produce ear wax are a modification of this gland variety.

_____ 10. Involved in thermoregulation.
12. Figure 5.2 shows longitudinal and cross-sectional views of a hair follicle.

Part A

1. Identify and label all structures provided with leader lines.

2. Select different colors to identify the structures described below, and color both the coding circle and the corresponding structure on the diagram.

- Contains blood vessels that nourish the growth zone of the hair
- Secretes sebum into the hair follicle.
- Pulls the hair follicle into an upright position during fright or exposure to cold
- The follicle sheath that consists of dermal tissue
- The follicle sheath that consists of epidermal tissue
- The actively growing region of the hair
5. Label, color code, and color the three following regions of the hair.

- Cortex
- Cuticle
- Medulla

13. 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 germinativum
4. Scent glands  Eccrine glands  Apocrine glands  Axilla
5. Terminal hair  Vellus hair  Dark, coarse hair  Eyebrow hair
Derivatives of the Skin

Part B

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

4. Color these regions using the same colors used for the identical structures in Part A.

5. Label, color code, and color the three following regions of the hair.
   
   - Cortex
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Functions of the Skin

14. 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).

____ 1. Langerhans' cells and macrophages  ____ 4. Keratin
____ 2. Intact epidermis  ____ 5. Melanin
____ 3. Bactericidal secretions  ____ 6. Acid mantle

15. Substances that can penetrate the skin in limited amounts include (circle all that apply):

Fat-soluble vitamins  Steroid hormones  Water-soluble substances
Organic solvents  Oxygen  Mercury, lead, and nickel

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

(Assume the sunburn is mild.)

__________________________________________

__________________________________________

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

In your explanation, note how their activity is regulated.

__________________________________________

__________________________________________

__________________________________________

18. 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.

_______________ 3.

_______________ 4. Vitamin D is synthesized when modified (6) molecules in the (7) of the skin are irradiated by (8) light. Vitamin D is important in the absorption and metabolism of (9) ions.
4. Figure 5.1 depicts a longitudinal section of the skin. Label the skin structures and areas indicated by leader lines on the figure. Select different colors for the structures below, and color the coding circles and the corresponding structures on the figure.

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Figure 5.1