The Integumentary System

Basic Structure of the Skin

1. Complete the following statements by writing the appropriate word or phrase on the correspondingly numbered blank:

   The two basic tissues of which the skin is composed are dense irregular connective tissue, which makes up the dermis, and ___, which forms the epidermis. The tough water-repellent protein found in the epidermal cells is called ___. The pigments melanin and ___ contribute to skin color. A localized concentration of melanin is referred to as a ___.

2. Four protective functions of the skin are ___.

3. Using the key choices, choose all responses that apply to the following descriptions.

   Key: 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 in thick skin containing keratin fibrils
   2. dead cells
   3. dermis layer responsible for fingerprints
   4. vascular region
   5. major skin area that produces derivatives (nails and hair)
   6. epidermal region exhibiting the most rapid cell division
   7. scalelike dead cells, full of keratin, that constantly slough off
   8. mitotic cells filled with intermediate filaments
   9. has abundant elastic and collagenic fibers
   10. location of melanocytes and Merkel cells
   11. area where weblike prekeratin filaments first appear
   12. region of areolar connective tissue

Prevents dessication, protects against thermal damage, prevents bacterial invasion, and protects against UV radiation.
4. Label the skin structures and areas indicated in the accompanying diagram of thin skin. Then, complete the statements that follow.

- Laminated (or lamellated) granules extruded from the keratinocytes prevent water loss by diffusion through the epidermis.
- Fibers in the dermis are produced by fibroblasts.
- Glands that respond to rising androgen levels are the sebaceous (and apocrine sweat) glands.
- Phagocytic cells that occupy the epidermis are called Langerhans' cells.
- A unique touch receptor formed from a stratum basale cell and a nerve fiber is a Merkel disc.
- What layer is present in thick skin but not in thin skin? Stratum lucidum.
- What cell-to-cell structures hold the cells of the stratum spinosum tightly together? Desmosomes.

5. What substance is manufactured in the skin (but is not a secretion) to play a role elsewhere in the body?

Vitamin D
6. List the sensory receptors found in the dermis of the skin.  

   Pain, pressure, touch, heat, and cold.

7. A nurse tells a doctor that a patient is cyanotic. Define cyanosis.  

   A blue cast to the skin.

   What does its presence imply?  

   Inadequate oxygenation of the blood.

8. What is the mechanism of a suntan?  

   When exposed to UV radiation, the melanocytes produce more protective melanin and the skin becomes more brown in color.

9. What is a bedsore (decubitus ulcer)?  

   Localized area of tissue necrosis and death.

   Why does it occur?  

   Pressure areas (points of increased pressure over bony areas) restrict the blood supply to the area.

10. Some injections hurt more than others. On the basis of what you have learned about skin structure, can you determine why this is so?  

    It depends on the relative number of pain receptors stimulated.

Appendages of the Skin

11. Using key choices, respond to the following descriptions.

   Key:  
   a. arrector pili  
   b. cutaneous receptors  
   c. hair  
   d. hair follicle  
   e. nail  
   f. sebaceous glands  
   g. sweat gland—apocrine  
   h. sweat gland—eccrine

   f: sebaceous glands  
   a: arrector pili  
   h: sweat gland—eccrine  
   d: hair follicle  
   g: sweat gland—apocrine  
   f: sebaceous glands  
   c, e: hair, nail  
   b: cutaneous receptors  
   f: sebaceous glands  
   e: nail

   1. produces an accumulation of oily material that is known as a blackhead
   2. tiny muscles, attached to hair follicles, that pull the hair upright during fright or cold
   3. perspiration glands with a role in temperature control
   4. sheath formed of both epithelial and connective tissues
   5. less numerous type of perspiration-producing gland; found mainly in the pubic and axillary regions
   6. found everywhere on body except palms of hands and soles of feet
   7. primarily dead/keratinized cells
   8. specialized nerve endings that respond to temperature, touch, etc
   9. its secretion is a lubricant for hair and skin
   10. "sports" a lunula and a cuticle
12. Describe two integumentary system mechanisms that help in regulating body temperature. (1) *When capillary blood flow to the skin is enhanced (by nervous system controls), heat radiates from the skin surface; restriction of blood flow conserves body heat.* (2) *Activity of sweat glands, i.e., when perspiration evaporates from the skin surface, heat is lost.*

13. Several structures or skin regions are listed below. Identify each by matching its letter with the appropriate area on the figure.

- Adipose cells
- Dermis
- Epidermis
- Hair follicle
- Hair shaft
- Sloughing stratum corneum cells

![Diagram of skin structures](image)

**Plotting the Distribution of Sweat Glands**

14. With what substance in the bond paper does the iodine painted on the skin react? *The starch*

15. Based on class data, which skin area—the forearm or palm of hand—has more sweat glands? *Palm*

   *Was this an expected result? Yes* Explain. *For most people, hands sweat more than the forearm.*

   *Which other body areas would, if tested, prove to have a high density of sweat glands? Face, axillae*

16. What organ system controls the activity of the eccrine sweat glands? *Nervous system (sympathetic division)*

**Dermography: Fingerprinting**

17. Why can fingerprints be used to identify individuals?

   *Everyone’s fingerprints are genetically distinct.*

18. Name the three common fingerprint patterns.

   - loops
   - arches
   - whorls