

**Chapter 5: The Integumentary System**  
**Read pages 144 - 167**

NAME \_\_\_\_\_

**TOPIC OUTLINE AND OBJECTIVES:**

**A. Structure of the skin**

1. Describe the layers of the epidermis and their cell types
2. Explain the basis for skin color.

**B. Accessory structures of the skin**

3. Compare the structure, distribution, and function of hair, sebaceous, sudoriferous, and ceruminous glands.

**C. Functions of the skin**

4. Describe how the skin contributes to regulation of body temp, sensation, and protection.

**D. Maintaining homeostasis and skin wound healing**

5. Outline the steps involved in epidermal wound healing.
6. Explain the role of the skin in helping to maintain the homeostasis of body temperature.

**E. Aging of the integumentary system**

7. Explain the effects of aging on the integumentary system.

**F. Disorders**

8. Describe the causes and effects for various skin disorders.
9. Define a burn, classify burns into 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> degree burns.

**G. Clinical Applications**

**A. Skin (pages 145 – 151)**

**A1.** Name the structures included in the integumentary system.

**A2.** Skin may be one of the most underestimated organs in the body. What functions does your skin perform while it is “just lying there” covering your body? List the six functions provided.


**A3.** Answer these questions of the skin. Label the 2 bracketed regions on the **Figure 5-1**.

a. The outer layer is named the \_\_\_\_\_. It is composed of (*connective tissue? epithelium?*). **What is the specific name of this said tissue?**

b. The inner portion of skin, called the \_\_\_\_\_, is made of (*connective tissue? epithelium?*). The dermis is (*thicker? thinner?*) than the epidermis.

**A4.** Most sensory receptors, nerves, blood vessels, and glands, are embedded in the ( *epidermis?* *dermis?* ). Fill in all label lines on the right side of Figure 5-1. Then color those structures and their related color code ovals.

**A5.** The tissue underlying skin is called *subcutaneous*, meaning \_\_\_\_\_.

This layer is also called \_\_\_\_\_. It consists of two types of tissue, \_\_\_\_\_ and \_\_\_\_\_.

a. Give two functions of the subcutaneous tissue.

**A6.** Epidermis contains **four distinct cell types**. Fill in the name of three of the four cell types that fit each description below.

a. Most numerous cell type, this cell produces keratin which helps to waterproof skin:

\_\_\_\_\_.

b. This type of cell produces the pigments which give skin its color and helps protect against UV light \_\_\_\_\_.

c. Cell in epidermis that function in immunity: \_\_\_\_\_; are damaged by UV.

**A7.** Describe the dermis in this exercise.

a. The outer one-fifth of the dermis is known as the ( *papillary?* *reticular?* ) region. It consists of ( *loose?* *dense?* ) connective tissue. Present in finger- like projections known as

dermal \_\_\_\_\_ are Meissner's corpuscles, that are sense receptors sensitive to ( *touch?* *pressure?* ).

b. The remainder of the dermis is known as the \_\_\_\_\_ region,

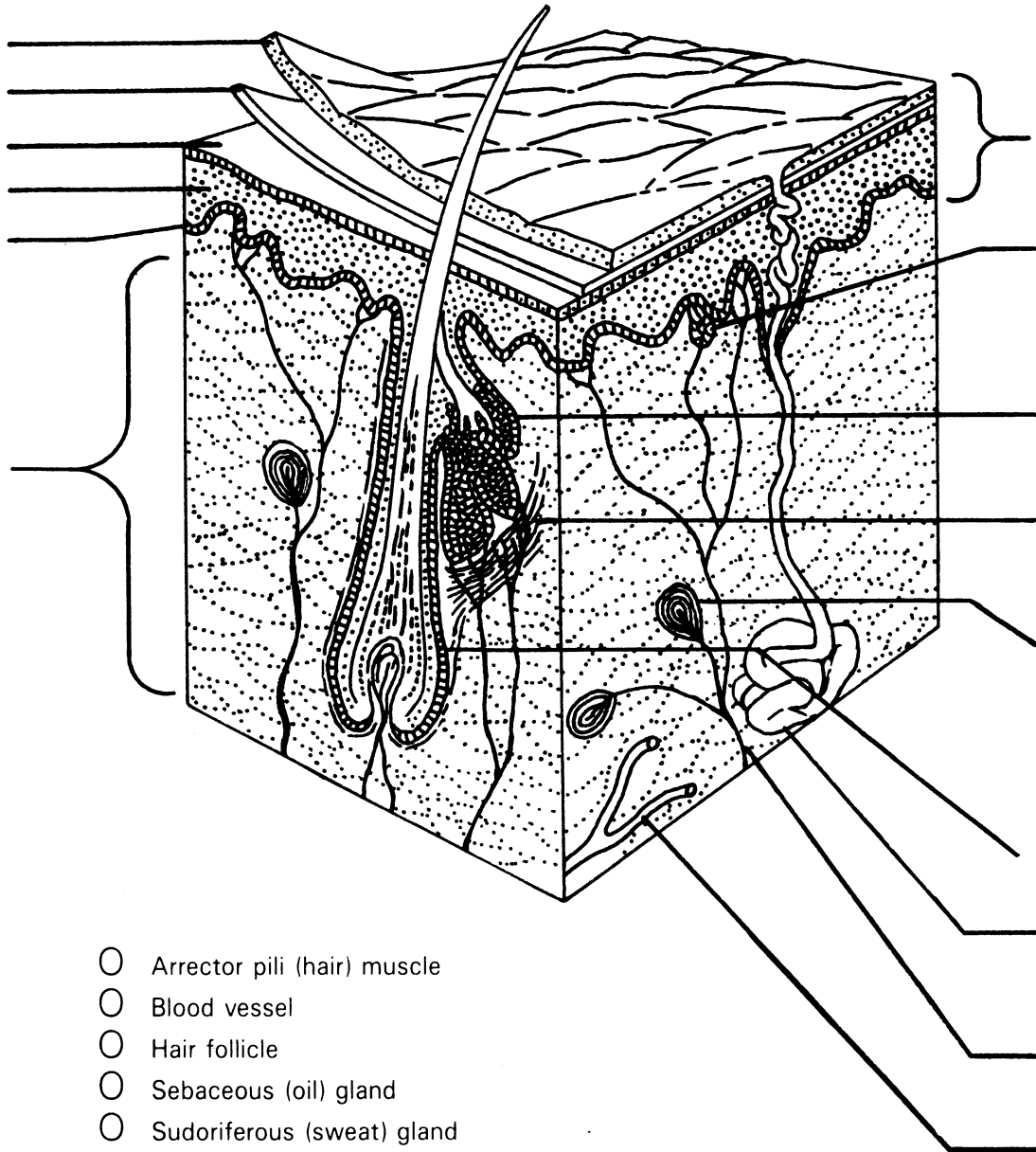
composed of ( *loose?* *dense?* ) connective tissue? Skin is strengthened by ( *elastic?* *collagenous?* ) fibers in the **reticular layer**. Skin is extensible and elastic due to

\_\_\_\_\_ fibers in the reticular layer.

c. Describe the relationship between the pair of terms: **Stretch marks/ pregnancy and weight gain.**

d. Explain why do tattoos remain permanent? Respond to Jessica's statement, "I can always get it taken off if I don't like it!"

A8. Label each of the five layers on the left side of **Figure 5-1**.



- Arrector pili (hair) muscle
- Blood vessel
- Hair follicle
- Sebaceous (oil) gland
- Sudoriferous (sweat) gland
- Touch (Meissner's) receptor
- Pressure (lamellated or Pacinian) corpuscle
- Nerve

A9. Explain what accounts for skin color by doing this exercise.

a. Dark skin is due primarily to ( *a larger number of melanocytes? greater melanin*

*production per melanocyte?* ). Melanocytes are abundant in the stratum\_\_\_\_\_.

continued →

b. Melanin is derived from the amino acid \_\_\_\_\_. The enzyme which converts tyrosine to melanin is \_\_\_\_\_. The enzyme is activated by \_\_\_\_\_ light.

The hormone \_\_\_\_\_, plays a role in color production in skin of mammals.

c. The yellowish color of skin of persons of Asian origin is due to variations of the pigment \_\_\_\_\_.

d. What accounts for the pink color of Caucasian skin, especially during blushing and as a cooling mechanism during exercise? Be sure to mention the action of blood vessels!

## **B. Accessory structures of the skin (pages 151 – 157)**

**B1.** List three types of accessory structures of the skin.

**B2.** What is the main function of hair?

**B3.** Complete this exercise about the structure of a hair and its follicle.

a. Arrange the parts of a hair from *superficial to deep*: \_\_\_\_\_

**A. Shaft**

**B. Bulb**

**C. Root**

b. A **hair shaft** is composed of ( *nucleated cells? anucleated cells?* ).

c. What accounts for the fact that hairs are waterproofed?

d. Which treatment destroys the bulb of a hair so that the hair cannot grow back?  
( *use of depilatory/waxing? laser treatment?* )

**B4.** Describe the relationship between the terms in each pair of terms.

a. Arrector pili muscles/ "goose bumps"

b. Sebaceous glands/ "blackheads"

c. Growth stage/ resting stage (in growth cycle of a hair)

**B5.** In which areas of the body are sebaceous glands most commonly found?

a. List two main functions of sebaceous glands.

**B6.** Describe the *composition* of perspiration (sweat) and state its function.

**C. Functions of the skin (pages 157 – 158)**

**C1.** Humans are homeotherms. What is the meaning of the term *homeotherms*?

a. Describe how human body temperature is maintained close to 37° C (98.6°F) with the help of sweat glands. Explain why this temperature-control mechanism can be called a *negative feedback mechanism*.

**C2.** List six ways in which the skin **protects** the human body. (see page 157 in your text).

**D. Maintaining homeostasis: skin wound healing (pages 158 – 159)**

**D1.** Describe the process of superficial epidermal wound healing in this exercise.

a. State two examples of a *superficial wound*.

b. Usually the deepest part of the wound is the ( *central? peripheral?* ) region.

c. In the process of repair, epidermal cells of the stratum ( *corneum? basale?* ) break contact from the basement membrane. These are cells at the ( *center? periphery?* ) of the wound.

d. These basal cells migrate toward the center of the wound, stopping when they meet other similar advancing cells. This cessation of migration is an example of the phenomenon known as \_\_\_\_\_ . Cancer cells ( *do? do not?* ) exhibit this characteristic.

e. Both the migrated cells and the remaining epithelium cells at the periphery undergo ( *meiosis? mitosis?* ) to fill in the epithelium up to a normal (or close to normal) level.

**D2.** Deep wound healing review: Match the phrases with the descriptions below.

**I. Inflammation**  
**Mat. Maturation**

**Mig. Migration**  
**P. Proliferation**

\_\_\_\_\_ a. Blood clot temporarily unites edges of wound; blood vessels dilate so neutrophils (WBC's) enter to clean up the area.

\_\_\_\_\_ b. Clot forms a scab; epithelial cells migrate into scab; fibroblasts also migrate to start scar tissue; damaged blood vessels start to re-grow.

\_\_\_\_\_ c. Epithelium and blood vessels grow; fibroblasts lay down many fibers.

\_\_\_\_\_ d. Scab sloughs off; epidermis grows to normal thickness; collagenous fibers give added strength to healing tissue; blood vessels are more normal.

**D3.** Contrast these two terms: *hypertrophied scar* and *keloid scar*

**E. Effects of Aging (pages 160 – 162)**

**E1.** Complete the table relating observable changes in aging of the integument to their causes.

Changes	Causes
a. Wrinkles; skin springs back less when gently pinched.	
b.	Macrophages become less efficient.
c.	Loss of subcutaneous fat.
d. Dry, easily broken skin	
e.	Decrease in number and size of melanocytes

**E2.** How is aging of skin related to over-exposure to sunlight (photo-damage). Include collagen fibers in your discussion.



**F4. Identify characteristics of the three different classes of burns.**

a. In a **1<sup>st</sup> degree** burn, only the superficial layers of the ( *dermis? epidermis?* ) are involved. The tissue appears \_\_\_\_\_ in color. Blisters ( *do? do not?* ) form.

b. Give one example of a 1<sup>st</sup> degree burn.

c. Which parts of the skin are injured in a 2<sup>nd</sup> degree burn?

d. Blisters usually ( *do? do not?* ) form. Epidermal derivatives, such as hair follicles and glands ( *are? are not?* ) injured. Healing usually occurs in about three to four ( *days? weeks?* ). For most **2<sup>nd</sup> degree** burns, grafting ( *is? is not?* ) required.

e. **3<sup>rd</sup> degree** burns are called ( *partial? full?* ) –thickness burns. Such skin appears ( *red and blistered? white, brown, or black and dry?* ). Such burned areas are usually ( *painful? not painful?* ) since nerve endings are destroyed. Grafting ( *is? is not?* ) required, and scarring ( *does? does not?* ) result from 3<sup>rd</sup> degree burns.

**G. Clinical Applications: Please respond in complete sentences and thoughts!**

1. We are told that every surface we touch is teeming with bacteria, and are found in the pools we swim in, the water we wash with, and on the hands of friends. Why are we not inundated with bacterial infections on our skin?

2. Mary noticed a large, brown spot on her skin. She has been playing tennis in the sun for several years without sun protection. She reported the discovery to a friend, who told her to apply to the **ABCDE Rule** to determine whether or not she had malignant melanoma. Her friend told her that if her answer was “no” to the questions that were asked by the ABCDE rule, she had nothing to worry about. What is the ABCDE rule and should she ignore the spot if her answers are negative?

3. John, a young teenager, notices that he is experiencing a lot of blackheads and pimples, which frequently become infected. What is causing this problem?

4. Albinos commonly contract skin cancer. What seems to be their problem and what is a solution?

5. A new mother brings her infant to the clinic, worried about a yellowish, scummy deposit that has built up on her baby’s scalp. What is this condition called, and is it serious?

6. During a diaper change, an alert day care worker notices a dark, bruised-looking area at the base of a baby’s spine. Worried about possible child abuse, she reports the spot to her supervisor, who tells her not to worry because it is a Mongolian spot. What is a Mongolian spot?



7. A worker in a refinishing establishment fell into a vat of paint stripper, but quickly removed his clothes and rinsed off in the safety shower. Were his safety measures adequate? What vital organs might suffer early damage from poisoning through skin by organic solvents?
8. Mr. Fish, a fisherman in his late 60s, comes to the clinic to complain of small ulcers on both forearms as well as on his face and ears. Although he has had them for several years, he has not had any other problems. What is the likely diagnosis, and what is the likely cause?
9. Diane, the mother of a thirteen-month old infant, brings her child to the clinic because his skin has turned orange. Why does the pediatrician inquire about the child's diet?
10. Mrs. Ullum volunteered to help at a hospital for children with cancer. When she first entered the cancer ward, she was upset by the fact that most of the children had no hair. What is the explanation for their baldness?
11. Kaya is having plastic surgery "to make my body gorgeous." Dr. Columbus states that he will make incisions that follow lines of cleavage on Kaya's arms and abdomen. Explain what Dr. Columbus means. i.e, what are lines of cleavage and why are they important to a surgeon?

**Chapter 5 Essay Questions:**

1. Describe in detail what causes hair to turn gray? Briefly, how is gray hair related to an albino's snow-white hair?
2. Compare and contrast epidermal wounds and Epidermal Wound Healing to deep wounds and Deep Wound Healing, ie. how are they alike and how are they different!
3. Blistering rashes are sites of local inflammation and necrosis; they are often signs of an allergic response. One such example is the encounter with the poison oak allergen *urushiol*. Why are some individuals not sensitive to the allergen *urushiol*? i.e. why do they not develop an allergic response? Give two possible explanations. [ You need to focus your discussion on the *effector T-cell's* role during the inflammatory response to *urushiol* ]
4. The skin is a major organ of the body and assumes a role in regulating a constant body temperature. Describe four homeostatic activities involved in regulating a constant body temperature when the environment is sub-zero degree Fahrenheit. Why are these activities considered to be part of a negative feedback system?