

**I. INTRODUCTION**

- A. Comprised of the **skin** and its accessory components, including hair, nails, and associated glands
- B. Functions
  - 1. Protects from **pathogens**
  - 2. Balances fluid levels
  - 3. Stores fatty tissue for energy supply
  - 4. Produces vitamin D (with help from the sun)
  - 5. Provides sensory input
  - 6. Helps to regulate body **temperature**

**II. THE SKIN**

- A. The skin is the largest organ, weighing approximately **20** pounds and covering an area about 20 square feet on an adult
- B. A cross-section of skin reveals three layers:

1	<b>Epidermis</b>	<ul style="list-style-type: none"> <li>a. The <b>outside</b> layer of skin; five sublayers</li> <li>b. No <b>blood</b> vessels</li> <li>c. Deepest layer: new cells born every 2 to 4 weeks</li> <li>d. Surface layer:                             <ul style="list-style-type: none"> <li>i. Dead cells—flat, scaly, keratinized epithelial cells</li> <li>ii. Sloughed off</li> <li>iii. Replaced by cells from deeper layers</li> </ul> </li> <li>e. Melanocytes, make pigment <b>melanin</b> _____</li> </ul>
2	<b>Dermis</b>	<ul style="list-style-type: none"> <li>a. Inferior to epidermis</li> <li>b. Connective tissue</li> <li>c. Contains accessory structures                             <ul style="list-style-type: none"> <li>i. Capillaries</li> <li>ii. Involuntary muscles</li> <li>iii. <b>Lymph</b> vessels</li> <li>iv. <b>Hair</b> follicles</li> <li>v. Sudoriferous (<b>sweat</b>) glands                                     <ul style="list-style-type: none"> <li>a. Body has 3 million sweat glands</li> <li>b. Sweat has no odor, but bacteria degrade the substances in the sweat over time into chemicals that give off strong smells commonly known as body odor</li> </ul> </li> <li>vi. Sebaceous (<b>oil</b>) glands                                     <ul style="list-style-type: none"> <li>a. Secrete sebum (oil)</li> <li>b. Sebum keeps skin from drying out and (because of its acid nature) helps destroy some pathogens on skin’s surface</li> </ul> </li> </ul> </li> </ul>
3	<b>Subcutaneous Fascia</b>	<ul style="list-style-type: none"> <li>a. Deepest layer of skin</li> <li>b. Elastic and fibrous connective tissue and fatty tissue</li> <li>c. Insulation and attachment</li> </ul>

### C. Skin color

1. Melanocytes
  - a. Located deep in the epidermis
  - b. Produce **melanin** skin pigment
  - c. Skin color determined by distribution and abundance of melanin
2. Carotene, another form of pigment, gives a **yellowish** hue to skin.
3. A pinkish hue derives from the hemoglobin in the **blood**
4. Effect of disease on skin color
  - a. When liver disease occurs, the skin turns a **yellow** color.
  - b. Malfunctioning adrenal gland can cause the skin to turn bronze because of excessive melanin.
  - c. Excessive bruising could indicate skin, blood, or **circulatory** problems.
  - d. Cyanosis, or a blue coloring, results from a drop in **oxygenation**.

### III. SKIN HEALING

- A. Blood clots, on skin surface, exposed to air—becomes a **scab**
- B. Repair progresses in same way as generalized tissue repair
- C. The wound ideally starts to heal from the **inside** out.

### IV. BURNS

- A. Heat, chemicals, electricity, and radiation can cause burns.
- B. Classification

#### 1. Depth

	Degree Burns	Description
a	<b>First</b> -degree burns damage only the outer layer, or epidermis.	i. Only epidermis ii. Redness, pain, no blister iii. No scarring
b	<b>Second</b> -degree burn	i. Entire epidermis, portion of dermis ii. Blistering iii. Scarring iv. Often need medical attention
c	<b>Third</b> -degree burn	i. All three layers ii. Black, brown, tan, or white iii. Little pain initially iv. Destroys accessory structures v. Must have medical attention
d	<b>Fourth</b> -degree burn	i. Most severe ii. Penetrates to bone

#### 2. Amount of area damaged: the rule of nines

- a. Head and neck: **9** %
- b. Each upper limb: 9% (X 2 = **18** %)
- c. Front of trunk: 18%
- d. Back of trunk and buttocks: 18%
- e. Perineum (including anus and urogenital region): 1%
- f. Each lower limb 18% (X 2 = **36** %)

- C. Clinical concerns of burns
  1. Bacterial **infections**
  2. Fluid loss
  3. Heat loss
- D. Treatment for severe burns
  1. Damaged skin must be removed.
  2. **Skin** grafting

## V. NAILS

- A. Specialized epithelial cells originating from the nail root
- B. Keratinized
- C. The cuticle: fold of tissue that covers the nail root
- D. Nail **body**; visible portion of nail
- E. Nails can be used to assess peripheral perfusion.
  1. If you pinch one of your fingers, the pink color should return within **FIVE** seconds (usually within 3 seconds) if you have good perfusion, after you release the pressure.
  2. If the normal color takes longer to return, it may indicate a problem.
  3. Blood clots or vascular spasm can decrease blood flow, as can hypothermia, making peripheral refill slower.
  4. Reduced levels of **oxygen** can cause a blue color to nail beds.

## VI. HAIR

A	Purpose of Hair	<ol style="list-style-type: none"> <li>1. Body <b>temperature</b> regulation</li> <li>2. Sensor</li> <li>3. Protect eyes and nose from foreign objects</li> </ol>
B	Anatomy of a Hair	<ol style="list-style-type: none"> <li>1. Hair made of <b>keratin</b></li> <li>2. Shaft: visible portion of hair; dead cells</li> <li>3. Root extends down into the dermis to the follicle</li> <li>4. <b>Follicle</b>: cells grow and divide there</li> <li>5. A sebaceous gland is associated with each hair follicle.</li> <li>6. Sebum production decreases with age.</li> </ol>
C	Hair Color and Texture	<ol style="list-style-type: none"> <li>1. Dependent on the amount of melanin you produce</li> <li>2. The more melanin, the <b>darker</b> the hair</li> <li>3. White hair occurs in the absence of melanin.</li> <li>4. Red hair is the result of hair that has melanin with <b>iron</b> in it.</li> <li>5. Flat hair shafts produce <b>curly</b> hair, whereas round hair shafts produce <b>straight</b> hair.</li> <li>6. The life span of hair is dependent on location: Eyelashes last 3 to 4 months; hair on the head lasts 3 to 4 years.</li> </ol>
D	Forensics and Hair	<ol style="list-style-type: none"> <li>1. Hair can reveal to a pathologist if an individual ingested certain <b>drugs</b> or other substances, such as lead or arsenic.</li> <li>2. Trace amounts of ingested substances can become part of the hair's composition.</li> <li>3. Analysis of a hair sample can reveal what and how long ago toxins or drugs were ingested.</li> </ol>

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|  |  | 4. The longer the length of hair, the longer the record of what was consumed by that individual. |
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## VII. TEMPERATURE REGULATION

- A. Change in size of **blood** vessels
  - 1. Vasodilation exposes heated blood to external cooling air.
  - 2. **Vasoconstriction** keeps cooling of blood to a minimum in cold temperatures.
- B. Sweat glands excrete water onto the skin's surface, allowing cooling through **evaporation**.
- C. **Shivering**: muscle contractions produce heat.
- D. Hairs on your skin stand erect, causing goose **bumps**; these hairs insulate you from cooler surroundings.

## VIII. DISEASES OF THE SKIN

- A. Melanoma: deadliest form of **skin cancer**
- B. Lesion: any pathological change in skin

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Complete the Following:

### 1. Main Layers

- a. Epidermis
- b. Dermis
- c. Subcutaneous Fascia (Hypodermis)

### 2. Functions of the Integumentary

- a. Prevention of Fluid Loss
- b. Prevention of Infection
- c. Vitamin D Production
- d. Temperature Regulation
- e. Sensory Input
- f. Fat Storage

Multiple Choice:

3. D    4. C    5. C

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Multiple Choice:

1. B    2. C    3. B    4. D

## Review Questions:

### Multiple Choice:

1. A    2. B    3. C    4. D    5. B

### Fill in the Blanks

1. Epidermis; Dermis; Hypodermis
2. Eccrine; Apocrine
3. Sebum
4. Freckles
5. Bilirubin

### Short Answer

1. The skin has several functions. It functions as a barrier against bacteria entering the body. The skin, when exposed to sun, produces vitamin D. Because the skin is keratinized, it is waterproof and helps prevent fluid loss. Body fluids can only pass through the skin as sweat. The skin also helps control body temperature. Blood vessels in the skin dilate, sending more blood to the skin if your temperature rises. You also sweat to increase evaporative cooling. Blood vessels in the skin constrict, decreasing blood flow to the skin, if your body temperature falls. Fat storage as well as sensory input are also skin functions.
2. Melanin is a pigment that shields the nuclei of skin cells from UV radiation. The source of most UV radiation is sunlight. So, as sunlight exposure increases, so does your body's attempt to protect against UV damage.
3. Burns are classified by depth and extent. Burn depth is divided into four classes. First-degree burns are superficial damaging only the epidermis. Second-degree burns are more serious, damaging the epidermis and part of the dermis. First- and second-degree burns are partial thickness burns. Third-degree burns burn through the epidermis and the dermis, completely destroying the skin. Fourth-degree burns destroy muscle and bone. Third- and fourth-degree burns are full thickness burns. Extent of a burn is expressed as percentage of body burned. The rule of nines is used to estimate the percentage of the body that is burned.
4. There are several skin accessory structures. Sweat glands secrete water either to regulate body temperature or as a sexual attractant. Hair follicles produce hair, which create goose bumps when the air is cold. Sebaceous glands, which secrete sebum (oil) to lubricate the skin, are also associated with hair follicles.

