

Amerman Active-Learning Workbook: Chapter 5 Answers

Key Concept: What are the different ways that the integument offers protection? How does it perform these functions?

The integument protects us from mechanical trauma, pathogens, and environmental hazards. The keratinized stratified squamous epithelium of the skin provides a continuous, durable, yet flexible surface that protects the body from mechanical trauma and pathogen penetration. Its lipid-based chemicals also repel most harmful water-soluble materials.

Key Concept: How does altering blood flow to the skin help with thermoregulation?

When body temperature rises, blood vessels dilate, causing much more blood to fill the dermis. This allows heat to radiate from the blood into the environment, cooling the body. The reverse occurs when body temperature falls, and vessels constrict to keep blood and its heat deeper where it is conserved.

Key Concept: Why are the cells of the superficial epidermis dead?

The growing distance from their source of nutrition combined with with lipid based molecules coating the cells as they mature in the upper layers prevents the cells from gaining access to water and nutrients needed to survive.

Key Concept: How does a keratinocyte that starts in the stratum basale eventually end up in the stratum corneum?

The cells are pushed outward by the continuous mitosis and production of new cells in the deep layers.

Key Concept: What do you think would happen if thin skin were present on the palms of the hands and the soles of the feet instead of thick skin?

Since those are higher friction areas, damage such as abrasion of the skin might occur. Also, calluses would develop as a response to the excess friction occurring there.

Key Concept: What do you think would happen to the epidermis if the dermal papillae were damaged in some way? Why?

Damage to the dermal papillae and its connection to the epidermis can result in blisters. Some loss of tactile sensation may occur if the (Meissner) corpuscles found in the dermal papillae were damaged.

Key Concept: How do epidermal ridges form, and why do we leave behind fingerprints when we touch certain surfaces? Why don't epidermal ridges form in thin skin?

Dermal collagen fibers arrange the dermal papillae into dermal ridges which produce visible epidermal ridges at the surface; the residue from sweat glands helps to leave a pattern matching the ridges as fingerprints. The ridges form from dermal papillae, which are far more prominent in thick skin.

Key Concept: What are melanin's protective functions?

Melanin protects the DNA of keratinocytes from mutations induced by UV radiation, and decreases the synthesis of vitamin D in response to UV radiation.

Key Concept: How can the skin pigment hemoglobin give clues to different pathologies? Hemoglobin is bright red when oxidized, so reddening of the skin (erythema) or a more white color (pallor) is suggestive of how much blood flow is being directed to the surface. Conversely, low amounts of oxygen bound to hemoglobin turns it dark reddish-purple, and the skin takes on a faint bluish color (cyanosis).

Key Concept: What determines hair color, and how does it accomplish this?

Hair color is determined by the pigment melanin, which is incorporated into keratinocytes just as it is in skin. Small amounts of melanin produce blond hair, and more melanin produces darker pigmented hair.

Key Concept: From which region does a nail grow? How is this similar to hair growth?

Nails grow from the epidermal region. Just as the hair follicle is a *cylinder* of epidermis with cells growing inward, the nail/nail bed is produced by a *fold* of epidermal tissue.

Complete It: Exocrine Glands of the Skin

Fill in the blanks to complete the following paragraph that describes the types exocrine glands found in the skin.

The most prevalent type of sweat gland is the eccrine sweat gland, which produces sweat that is released through sweat pores. Apocrine glands are located in the axillae, areola, and anal area, and they release a protein-rich sweat into a hair follicle. Sebaceous glands release sebum into a hair follicle through holocrine secretion. In contrast, sweat glands release sweat via merocrine secretion.

Key Concept: How do sweat and sebum differ in their protective functions of the skin?

The primary function of sweat from eccrine sweat glands is thermoregulation – evaporation of sweat helping to cool the skin. Sebum, a mixture of lipids, coats the skin and hair, and helps keep skin moist by providing a barrier that prevents water loss.

Key Concept: What disruptions to homeostasis can result from damage to the skin?

Disruptions to homeostasis such as burns and wounds create a breach in the skin's barrier qualities, allowing pathogens (and infections) in, and allowing excessive fluid loss to the outside (dehydration).