

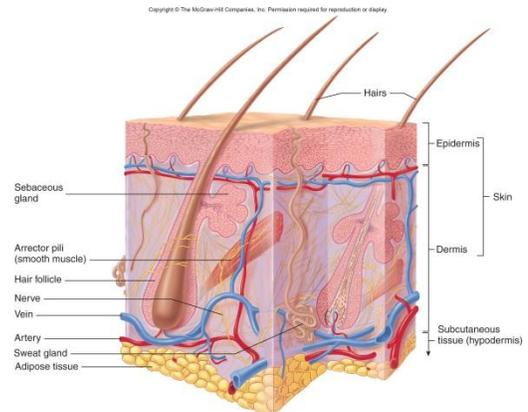
Unit 1 Lecture 4

INTEGUMENTARY SYSTEM

SKIN

Skin is an organ because it consists of different tissues that are joined to perform specific activities. It covers about 2 sq. meters and weighs 10-11 lb. The range in thickness is from 0.5 to 4.0 mm depending on its location.

The anatomy of skin includes three layers; the epidermis is the most outer layer, a thinner portion that is composed of epithelium. Next is the dermis, the inner, thicker portion that is composed of connective tissue. Beneath the dermis is a subcutaneous layer which is composed of superficial fascia (hypodermis).



Functions of Skin

Regulation of body temperature;	Evaporation of sweat lowers elevated body temperature, however most heat is lost by radiation.
Protection	From abrasions, disease, dehydration
Sensation:	Touch, pressure, temperature, and pain.
Excretion:	removal of wastes (Carbon dioxide)
Immunity	
Blood reservoir	
Synthesis of vitamin D	
Social functions	

The epidermis is composed of stratified squamous epithelium. [Cell types](#) found in the epidermis and their function are: the keratinocytes that produce keratin which toughens and waterproofs the skin, the melanocytes that produce the pigment melanin which absorbs UV light, the Langerhans cell that arise in the bone marrow and migrate to the epidermis and help with immunity, and Merkel cells that are thought to function in the sensation of touch.

The [layers of the epidermis](#) from deepest to most superficial are:

- stratum basale: single layer of cuboidal to columnar cells which are stem cells (that produce the keratinocytes), melanocytes, and tactile cells.
- stratum spinosum: layer contains 8 -10 rows of many-sided keratinocytes
- stratum granulosum: 2-5 layers of keratinocytes that develop keratohyalin (precursor of keratin) which functions in waterproofing the skin
- stratum lucidum: normally seen only in thick skin of the hands and feet

- stratum corneum: uppermost 25-30 layers of cells completely filled with keratin; keratinization occurs in cellular development as the cells are pushed towards the surface.

The dermis is composed of connective tissue containing collagen and elastic fibers. The papillary region, the outer 1/5, has a surface area that is increased by projections called dermal papillae (ridges, that when formed cause the epidermal layer to develop finger prints) which are filled with capillaries and tactile receptors. The reticular region or inner portion consists of dense irregular connective tissue containing collagen, adipose tissue, hair follicles, sebaceous (oil) glands, nerves and sudoriferous (sweat) glands. Beneath the dermis is the subcutaneous layer (hypodermis). This layer binds the skin to underlying tissue, pads the body, and serves as an energy reserve.

Skin color is due to melanin, carotene (yellow), and hemoglobin (red). All races have about the same number of melanocytes, it's the amount of melanin produced that determines the skin color. UV light stimulates melanin production.

ACCESSORY ORGANS OF THE SKIN

Hair

The primary function of hair is protection. It decreases heat loss and protects us from large foreign particles being inhaled and getting into our eyes and ears. The anatomy consists of a shaft above the surface, a root that penetrates the dermis and subcutaneous layer, and a hair follicle. Sebaceous (oil) glands, arrector pili muscles, hair root plexus are also associated with hair. Hair color is primarily due to melanin.

Nails

Nails are hard, keratinized epidermal cells over the dorsal surface of the terminal portions of fingers and toes. Parts of a nail are the body free edge, root, lunula, eponychium (cuticle) and the nail matrix. The function is protection and to help us grasp small objects.

Glands

Sebaceous (oil) glands are usually connected to hair follicles, produce sebum which moistens hair and waterproofs skin. An infection of sebaceous glands leads to boils or pimples. Sudoriferous (sweat) glands are basically of two types:

- a) apocrine, which are found in the skin of the axilla, the pubic region and areola and are stimulated during emotional stress or sexual excitement, and
- b) merocrine (eccrine) sweat glands which cover most of the body. The ducts terminate at a pore on the surface of the epidermis. The function is to produce perspiration and remove small amounts of waste.

Ceruminous glands are modified sudoriferous glands that secrete cerumen (ear wax) which helps prevent foreign particles from entering the ear.

Mammary glands produce milk in lactating females after childbirth.

SKIN AND HOMEOSTASIS

The major function of the skin is the maintenance of normal body temperature (thermoregulation). Heat is lost or given off by radiation, conduction, convection, and evaporation. If body temperature is high, stimuli are sent to the brain which responds by sending stimuli back to the skin to produce sweat (secretions from the eccrine sudoriferous glands) and for the blood vessels to vasodilate. As sweat evaporates, large amounts of heat energy leave the body.

Skin Wound Healing

Epidermal wounds are repaired by enlargement and migration of basal cells, contact inhibition, and division of migrating and stationary basal cells. In deep wound healing there is an inflammatory phase where blood clot unites the wound edges, epithelial cells migrate across the wound, and vasodilatation delivers phagocytes. In the migratory phase, epithelial cells beneath the scab bridge the wound, fibroblasts develop scar tissue and damaged blood vessels repair themselves. The proliferative phase continues more of the above. In the maturation phase, the scab sloughs off, blood vessels are repaired. Finally in fibrosis there is the process of scar tissue formation.

DISORDERS

Skin Cancer is usually a result of excessive sun exposure. Basal cell carcinoma is the most common and rarely metastasizes. Squamous cell carcinoma has a variable tendency to metastasize and develops from preexisting lesions on sun exposed skins. Malignant melanomas arise from melanocytes, readily metastasize, and can cause death within months especially if not treated. It is mostly seen in young women. Predisposing factors include skin type (fair skin more susceptible), amount of skin exposure, family history, age and immunologic status.

Why is this chapter important?

The integumentary system is the first organ system that we observed. The three layers are the epidermis, dermis and subcutaneous layers. The epidermal strata were described. The most important functions of the integumentary system are temperature management and protection. The accessory structures and their functions we discussed.