Integumentary System

- The skin is easily observed. It is the one organ that can be inspected in its entirety without requiring surgery or special equipment
- The skin not only gives clues to its own health but also reflects the health of other body systems.
- The skin is associated with structures known as appendages(glands, hair, and nails)
- Blood vessels, nerves, sensory organs, the skin and its appendages form the integumentary system.

Structure of the Skin

The skin consists of two layer.

The epidermis the outermost portion. It is subdivided into thin layers called strata. It is composed entirely of epithelial cells and contains no blood vessels.

The dermis has a framework of connective tissue and contains many blood vessels, nerve endings and glands.

Epidermis

Its deepest level is the **stratum germinativum**

The cells in this layer constantly divide and new cells are pushed to the surface. As the surface cells die they develop large amounts of protein called **Keratin**.

The upper most layer the **stratum corneum**

Cells in the deepest level of the epidermis produce **melanin** a dark pigment that colors the skin

Irregular patched of melanin are called **freckles**

Papillae form a distinct pattern of ridges on the surface of thick skin (fingerprints)

Dermis

The dermis has elasticity the skin can stretch with little damage (pregnancy)

Most appendages of the skin, including the sweat glands, the oil glands, and the hair are located in the dermis

Subcutaneous Layer

The dermis rests on the subcutaneous layer (hypodermis or the superficial fascia)

This layer connects the skin to the surface muscles.

It consists of loose connective tissue and large amounts of adipose tissue (fat)

The fat serves as insulation and as a reserve supply for energy.

Appendages of the Skin

- Sweat Glands (sudoriferous glands) are coiled tubelike structures located in the dermis and the subcutaneous tissue
- These glands function the regulate body temperature through the evaporation of sweat from the body surface
- Sweat consists of water with a small amount of mineral salts and other wastes
- Modified sweat glands are ceruminous glands in the ear produce ear wax ciliary glands at the edges of the eyelids and mammary glands

Appendages of the Skin

- Sebaceous glands are sac like in structure and their oily secretion sebum lubricates the skin and hair and prevents drying
- The ducts of the sebaceous glands open into the hair follicles
- Babies are born with a cream cheese like coating which is produced by these glands called vernix caseosa
- Blackheads consist of a mixture of dried sebum and keratin
- If these glands become infected pimples result
- Sebaceous cysts are sacs that form and increase in size when the gland becomes blocked with accumulated sebum

Appendages of the Skin

Hair is composed of keratin and is not living

Each hair develops within a sheath called a **follicle**

Nails are protective structures made of hard keratin produced by cells that originate in the outer layer of the epidermis

Changes in nails including abnormal color, thickness, shape or texture(grooves or splitting) occur in chronic diseases such as heart disease, peripheral vascular disease, malnutrition, and anemia

Functions of the Skin

Protection against infection

Protection against dehydration

Regulation of body temperature

Collection of sensory information

Protection Against Infection

Skin forms a barrier against invasion of pathogens.

Rupture of this barrier as in cases of wounds or burns invites infection of deep tissues

The skin also protects against bacterial toxins and other harmful chemicals in the environment

Burns

- First degree burns involve the outermost layer of the skin the epidermis which becomes red and painful (sunburn)
- Second degree burns penetrate into deeper layers and often cause the formation of blisters
- Third degree burns are the most serious and involve the full thickness of the skin and often the underlying tissue (muscle and connective)
- The % of the body's total skin area damaged by a burn is used as a measure of seriousness and chances of survival
- Skin grafts are used in treatments of serious burns

Protection Against Dehydration

The function of the epidermis in preventing water loss is vital to maintenance of the wet environment required by all cells

Regulation of Body Temperature

Both the loss of excess heat and protection from cold are important functions of the skin

Because of the many nerve endings and other special receptors for pain, touch, pressure, and temperature, which are located mostly in the dermis the skin is regarded as one of the chief sensory organs of the body

Skin

- Substances can be absorbed through the skin in limited amounts. Some drugs can be absorbed from patches placed on the skin (estrogen)
- Injection of medication into the subcutaneous tissues (insulin)
- Vitamin D needed for the development and maintenance of bone tissue is manufactured in the skin under the effects of ultraviolet radiation in sunlight

Color

The color of skin depends on a number of factors including

Amount of pigment in the epidermis

Quantity of blood circulation in the surface blood vessels

Composition of the blood (quantity of oxygen, concentration of hemoglobin, presence of bile, silver compounds or other chemicals

Pigment

The main pigment of the skin is called **melanin**

The melanin in the skin helps to protect against damaging ultraviolet radiation from the sun

Skin exposed to the sun shows an increase in this pigment (tanning)

Abnormal increases in the quantity of melanin are characteristic of some endocrine disorders

Discoloration

Pallor paleness of the skin often caused by reduced blood flow it is most easily seen in the lips, nail beds, or mucous membranes

Flushing is redness of the skin often related to fever. It is most noticeable in the face and neck

Cyanosis a bluish discoloration when there is not enough oxygen in circulation blood (heart failure, asthma)

Jaundice a yellowish discoloration of the skin due to excessive quantities of bile pigment (bilirubin) in the blood (tumor pressing on common bile duct, inflammation of the liver, hepatitis, certain diseases in blood in which red blood cells are rapidly distroyed

Lesions

Lesion any wound or local damage to tissues

Two types of lesions

Surface lesions

Deeper lesions

Surface Lesions

Rash surface lesions

Eruption raised surface lesion

Skin rashes maybe localized (diaper rash) or generalized (measles)

Erythema redness of the skin often accompanies surface lesions

Surface Lesions

Macules neither raised nor depressed (measles, freckles)

Papules firm raised areas (chickenpox, pimples)

Nodule a large firm papule

Vesicles blisters or small sacs full of fluid (shingles)

Pustules these are vesicles filled with pus

Deeper Lesions

These may develop from a surface lesion or may be caused by trauma

Excoriation is a scratch of the skin surface

Laceration is a rough jagged wound made by tearing of the skin

Fissure is a crack in the skin as seen in athlete's foot

Effects of Aging on the Integumentary System

- Wrinkles develop around the eyes and mouth owing to the loss of fat and collagen in the underlying tissue
- The dermis becomes thinner
- The skin becomes transparent and loses its elasticity
- The formation of pigment decreases with age
- The hair becomes thinner
- Lack of pigment causes hair to become grey

Effects of Aging on the Integumentary System

- Sweat glands decrease in number less output of perspiration (lower ability to withstand heat)
- Less fat in the skin and poor circulation
- Lack of sebum causes dryness of the hair and skin
- Fingernails flake, become brittle, or develop ridges
- Toenails become discolored and abnormally thickened

Care of the Skin

Regular cleansing with soap and water

Application of sunscreens before and during time spent in the sun

Skin Disorders

Dermatosis refers to any skin disease

Dermatitis inflammation of the skin

Atopic dermatitis (eczema) is characterized by intense itching and skin inflammation. The affected areas show erythema (redness), blisters (vesicles), pimplelike lesions (papules) and scaling and crusting of the skin surface

Skin Disorders

Sunburn

sunlight may cause chemical and biologic changes in the skin. The skin first becomes reddened (erythematous) and then may become swollen and blistered

Excessive exposure to the sun is a risk factor in skin cancer

Skin Disorders

Skin cancer is the most common form of cancer in the US

Basal cell and **squamous cell** carcinomas arise in the epidermis and generally appear on the face and neck

Melanoma a malignant tumor of melanin forming cells. The cancer originates in a mole or birth mark. It is fastest growing cancer in the US

Skin Disorders

Acne is a disease of the sebaceous glands connected with the hair follicles. It is found most often between the ages of 14-25. The infection of the oil glands takes the form of pimples which generally surround blackheads

Impetigo acute contagious staph or strep disease. It takes the form of blisterlike lesions that are filled with pus and virulent bacteria

Skin Disorders

Alopecia baldness

Athlete's foot caused by fungi

Furuncle or boil which is o localized collection of pus in a cavity formed by disintegration of tissue

Carbuncle a pus producing lesion that results from the extension of an infectious process such as a boil

Psoriasis characterized by sharply outlined, red flat plaques covered with silvery scales

Skin Disorders

Herpes simplex virus the formation of watery vesicles on skin (cold sores fever blisters)

Shingles seen in adults caused by virus which causes chicken pox. Infection follows nerve pathways producing small lesions on the skin. Vesicular lesions appear along the course of a nerve

Urticaria (hives) allergic reaction elevated red patches (wheals) appear accompanied by itching

Skin Disorders

Pruritus itching

Scleroderma causing thickening of the dermis (lupus)

Decubitus ulcer (bedsore or pressure ulcer) seen in bedridden poorly nourished patients with decreased circulation