

\* The integumentary system is the organ system that protects the body from various kinds of damage, such as loss of water or abrasion from outside. The system comprises the skin and its appendages (including hair, scales, feathers, hooves, and nails).

Integumentary system consist of skin, hair, nails, and exocrine glands.

\* **EPIDERMIS:** It is the most superficial layer of skin that covers almost the entire body surface.

Structurally, epidermis is <sup>only</sup> about tenth of a millimeter thick but is made of 40 to 50 rows of stacked squamous epithelial cells.

Epidermis is an avascular region of the body, meaning that it doesn't contain any blood or blood vessels. The cells of epidermis receive all of their nutrients via diffusion of fluids from the dermis.

The epidermis is made up of several specialized types of cells:

1. Keratinocytes
2. Melanocytes
3. Langerhan Cells
4. Merkel Cells

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1. **Keratinocytes:** Almost 90% of the epidermis is made of cells known as keratinocytes. They produce and store the protein keratin. Keratin makes the keratinocyte very tough, scaly and water-resistant.
2. **Melanocytes:** 8% of epidermal cells  
They produce the pigment melanin to protect the skin from ultraviolet radiation and sunburn.
3. **Langerhan Cells:** 1% of epidermal cells  
They detect and fight pathogens that attempt to enter the body through the skin.
4. **Merkel Cells:** Less than 1%.  
Important function of sensing touch.

## DERMIS

- \* The Dermis is made of dense irregular connective tissue along with nervous tissue, blood and blood vessels.
- \* Gives the skin its strength and elasticity.
- \* Within the dermis, there are two distinct regions:
  1. The papillary layer
  2. The Reticular layer

### 1. The Papillary Layer:

- \* The papillary layer is the superficial layer of the dermis that borders on the epidermis
- \* The papillary layer contains many finger-like

1) extensions called dermal papillae that protrude superficially towards the epidermis. The dermal papillae increase the surface area of the dermis and contain many nerves and blood vessels that are projected toward the surface of the skin.

- \* Blood flowing through the dermal papillae provide nutrients and oxygen for the cells of the epidermis. ~~The~~

- \* The nerves of the dermal papillae are used to feel touch, pain, and temperature through the cells of the epidermis

2. The Reticular Layer: It is made of dense irregular connective tissue that contains many tough collagen and stretchy elastin fibers running in all directions to provide strength and elasticity to the skin. The reticular layer also contains ~~the~~ blood vessels to support the skin cells and nerve tissue to sense pressure and pain in the skin.

3. HYPODERMIS: Deep to the dermis is a layer of loose connective tissues known as hypodermis.

- \* It serves as the flexible connection between the skin and the underlying muscles and bones as well as a fat storage area.

- \* Areolar connective tissue in the hypodermis contains elastin and collagen fibers loosely arranged to allow the skin to stretch and move independently of its underlying structures.

- \* Fatty adipose tissue in the hypodermis stores energy in the form of triglycerides. Adipose also helps to insulate the body by trapping body heat produced by the underlying muscles.

## HAIR

Hair is an accessory organ of the skin made of columns of tightly packed dead keratinocytes found in most regions of the body.

- \* Hair helps to protect the body from UV radiation by preventing sunlight from striking the skin.
- \* Hair also insulates the body by trapping warm air around the skin.

## SWEAT GLANDS

Sudoriferous glands are exocrine glands found in the dermis of the skin and commonly known as sweat glands.

2 Major Types:

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1. Eccrine Sweat Glands
2. Apocrine Sweat Glands

**1. ECCRINE SWEAT GLANDS:** are found in almost every region of the skin and produce a secretion of water and NaCl. Eccrine sweat is delivered via a duct to the surface of the skin and is used to lower the body's temperature through evaporative cooling.

**2. APOCRINE SWEAT GLANDS:** found in mainly the axillary and pubic regions of the body. These glands are inactive until puberty, at which point they produce a thick, oily liquid that is consumed by bacteria living on the skin. The digestion of apocrine sweat by bacteria produces body odour.

# SUBACEOUS GLANDS

Subaceous Glands are exocrine glands found in the dermis of the skin that produce an oily secretion known as sebum.

Sebaceous glands are found in every part of the skin except for the thick skin of the palms of the hands and soles of the feet.

Sebum is produced in the sebaceous glands and carried through ducts to the surface of the skin or to hair follicles. Sebum acts to waterproof and increase the elasticity of the skin.

# CERUMINOUS GLANDS

These are special exocrine glands found only in the dermis of the ear canals.

Ceruminous glands produce a waxy secretion known as cerumen to protect the ear canals and lubricate the eardrum. Cerumen protects the ears by trapping foreign material such as dust and airborne pathogens that enter the ear canal.

Cerumen is made continuously and pushes older cerumen outward toward the exterior of the ear canal where it falls out of the ear or is manually removed.

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## IMPORTANCE OF SKIN

The skin provides protection to its underlying tissues from pathogens, mechanical damage, and UV light.

- \* Pathogens, such as viruses and bacteria, are unable to enter the body through unbroken skin due to the outermost layers of the epidermis containing an unending supply of tough, dead keratinocytes. This protection explains the necessity of cleaning and covering cuts and scrapes with bandages to prevent infection.
- \* Minor mechanical damage from rough or sharp objects is mostly absorbed by the skin before it can damage the underlying tissues.
- \* Melanocytes in the epidermis produce the pigment melanin, which absorbs UV light before it can pass through the skin. UV light can cause cells to become cancerous if not blocked from entering the body.

## SNEEZING

A sneeze is a sudden and forceful expiration of air through the nose or sometimes partly through the mouth. Its function is to clear the nasal passages of any irritants.

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Subject: \_\_\_\_\_

Date: \_\_\_\_\_

**MUCUS:** Mucus is a normal, slippery and stringy fluid substance produced by many lining tissues in the body. It is essential for body function and acts as a protective and moisturizing layer to keep critical organs from drying out.

\* Mucus also acts as a trap for irritants like dust, smoke, or bacteria.

\* It contains antibodies and bacteria-killing enzymes to help fight off infections.