

Neuroglial cells that do not transmit impulses but support the activities of the neurons .

3- Lubricate body surfaces

Body membranes could be classified into:

A- **Epithelial membranes** which can be sub classified into:

1- **Cutaneous membrane (skin)**

2- **Mucous membrane (line open body cavities)**

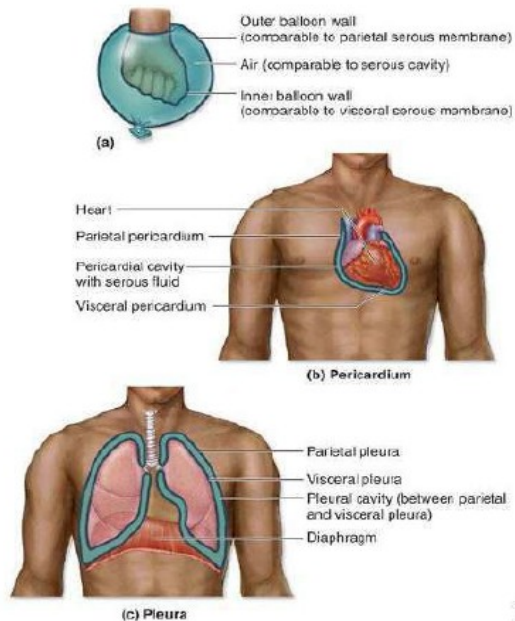
3- **Serous membrane (line closed body cavities)**

B- **Connective tissue membranes**

1- **The Cutaneous membrane ( skin) has two main characteristics:**

1- A dry membrane

2- Outermost protective boundary



### 1- Superficial epidermis

which is a Keratinized stratified squamous epithelium manufactures a tough, waterproof protein called keratin

2- Underlying dermis Mostly of dense connective tissue

2- **Mucous membrane** (line open body cavities) It consists of two layers

1- **anepithelium** (a layer, or layers of epithelial cells) and

2- an underlying **lamina propria** of **loose connective tissue**.

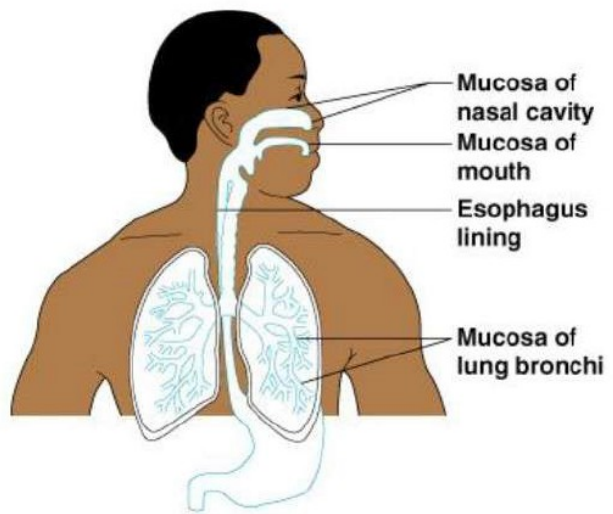
Mucosae line various cavities of the body that are either

1-externally exposed to the environment (nasal cavity) or are

2- internal **organs** (intestine) .

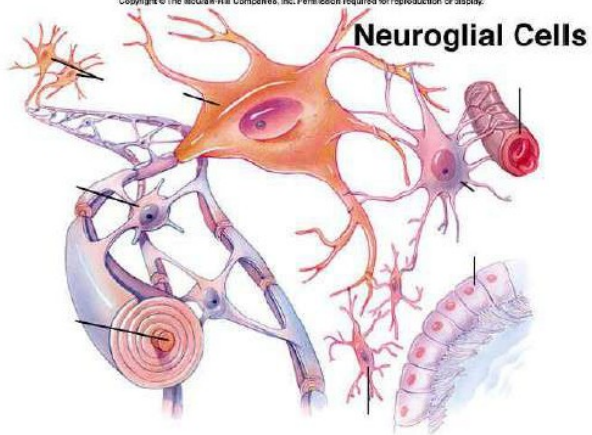
The mucous membranes ensure that the underlying of connective tissue remains moist.

They are at several places contiguous with **skin**: at the **nostrils**, the **lips** of the **mouth**, the **eyelids**, the **ears**, the **stomach**,



**(b) Mucous membranes**

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## **Integumentary System**

### **Skin and Body Membranes**

The functions of body membranes are:

- 1- Line or cover body surfaces
- 3- Protect body surfaces

#### **Melanin**

- Pigment (melanin) produced by melanocytes

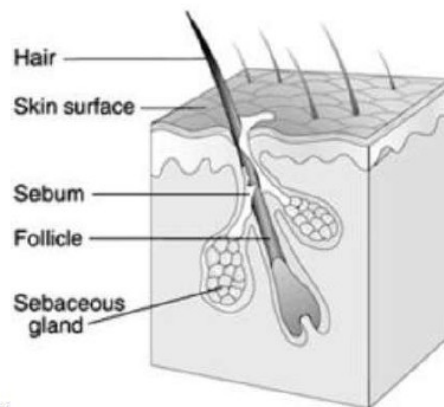
- Color is yellow to brown to black
- Melanocytes are mostly in the stratum basale
- Amount of melanin produced depends upon genetics and exposure to sunlight

### Appendages of the Skin

- **Sebaceous glands**
  - Produce oil (sebum)
    - Lubricant for skin
    - Kills bacteria
  - Most with ducts that empty into hair follicles
  - Glands are activated at puberty age (adult)

*Problems:* whitheads, black heads, acne

4-



3- Lubricate body surfaces

### The Skin (Integument = Covering)

It consists of 3 major regions

1. Epidermis – outermost superficial region
2. Dermis – middle region
3. Hypodermis (superficial fascia) – deepest region

### Skin Functions

- 1- Protects deeper tissues from:
  - Mechanical damage
  - Chemical damage
  - Bacterial damage

- Thermal damage
- Ultraviolet radiation
- Desiccation (dryness)
- Cutaneous sensation – sense touch and pain

2- Aids in body heat regulation

3- Aids in excretion of urea and uric acid

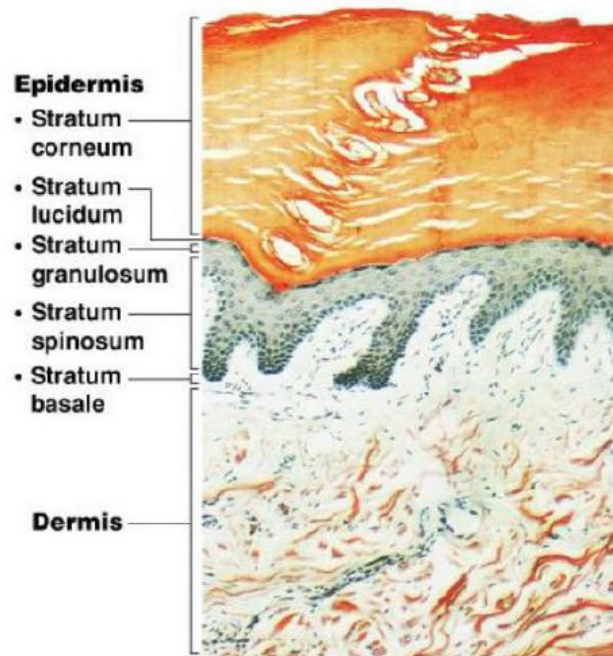
4- Synthesizes vitamin D

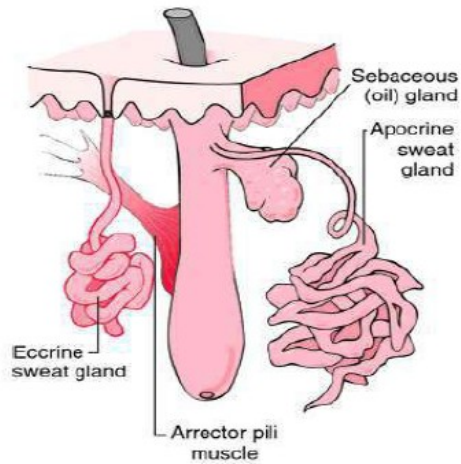
- **Skin derivatives**

- Sweat glands
- Oil glands
- Hairs
- Nails

**Skin Structure**

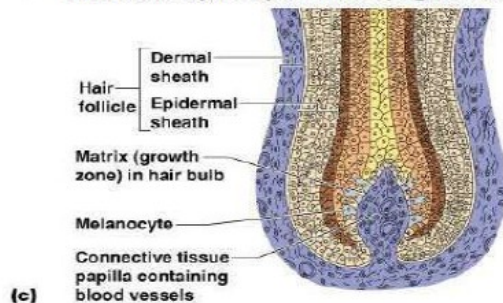
- Epidermis – outer layer
  - Stratified squamous epithelium
  - Often keratinized (hardened by keratin)
- Dermis
  - Dense connective tissue





### Sweat and Its Function

- **Composition**
  - Mostly water
  - Some metabolic waste
  - Fatty acids and proteins
- **Function**
  - Helps dissipate excess heat
- **Excretes waste products**
  - Helps dissipate excess heat
  - Excretes waste products
  - Acidic nature inhibits bacteria growth
- **Odor is from associated bacteria**
- **Hair**
  - Produced by hair bulb
  - Consists of hard keratinized epithelial cells
  - Melanocytes provide pigment for hair color

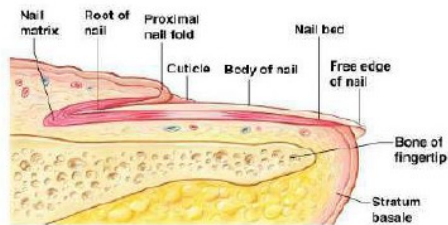


(c)



### Nail Structures

- Free edge
- Body
- Root of nail
- proximal nail fold that projects onto the nail body



(b)

### The appendages of the skin of fishes(Scales)

#### 1- Placoid scales:

Found in sharks and rays, and can vary greatly in external appearance. They do not increase in size as the fish grows, instead new scales are added. Placoid scales are often referred to as denticles.

Placoid scales consist of a flattened rectangular base plate which is embedded in the fish, and variously developed structures, such as spines, which project posteriorly on the surface. The spines give many species a rough texture.

