Skin, Serous Membranes Fasciae, Muscles

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Skin

The skin is the exterior covering of the body.
It is the largest organ of the body.

Functions of skin

1. provides protection.
- against invasion by bacteria and other harmful agents.
- It inhibits excessive loss of water and electrolytes.
- It produces a protective pigmentation to protect the body against excessive exposure from the sun.
- It helps produce the body's supply of Vitamin D.

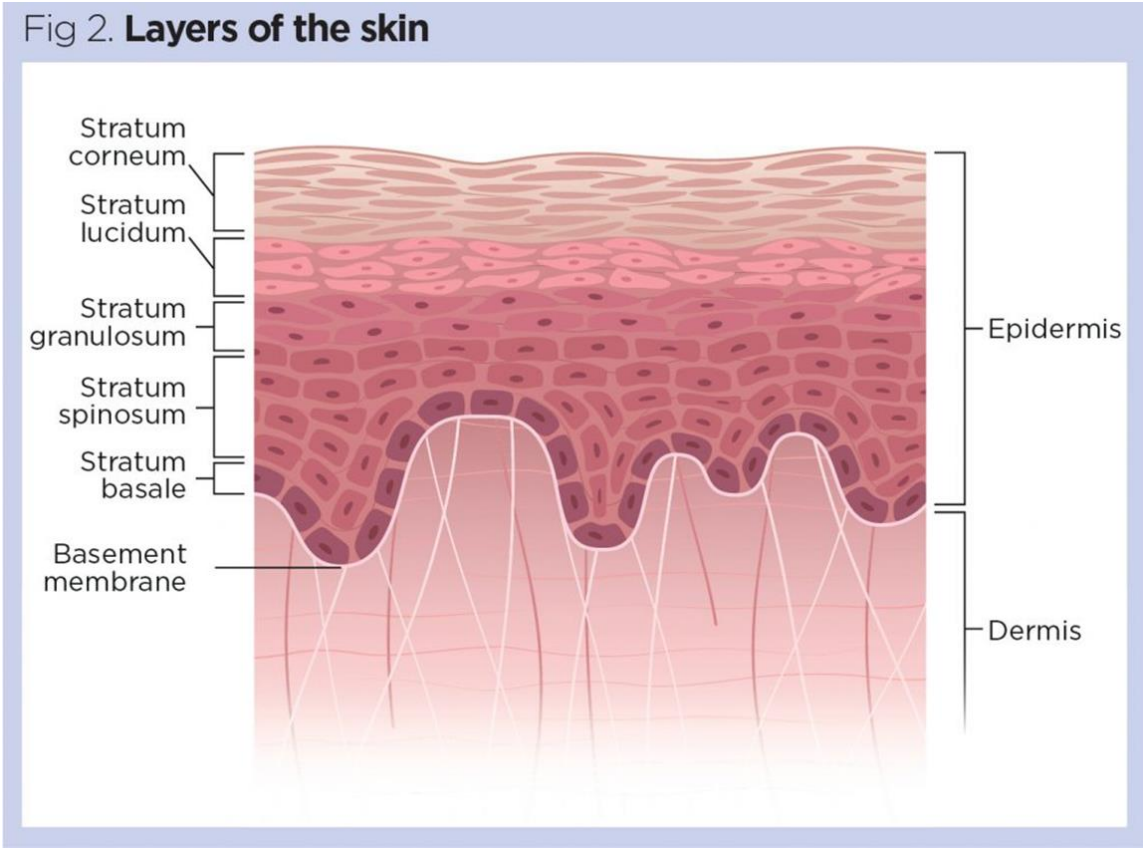
2. regulates body temperature.
- when the body is too cold, the skin's blood vessels constrict, this allows more heat-carrying blood to circulate to the muscles and organs. When the body is too hot, the blood vessels in the skin dilate, that brings more blood to the surface for cooling by radiation.
- At the same time, sweat glands secrete more sweat that cools the body when it evaporates.

3. provides sensations.
- It contains millions of nerve endings that act as sensory receptors for pain, heat, cold, and pressure.

Structure of the skin

Two layers ;

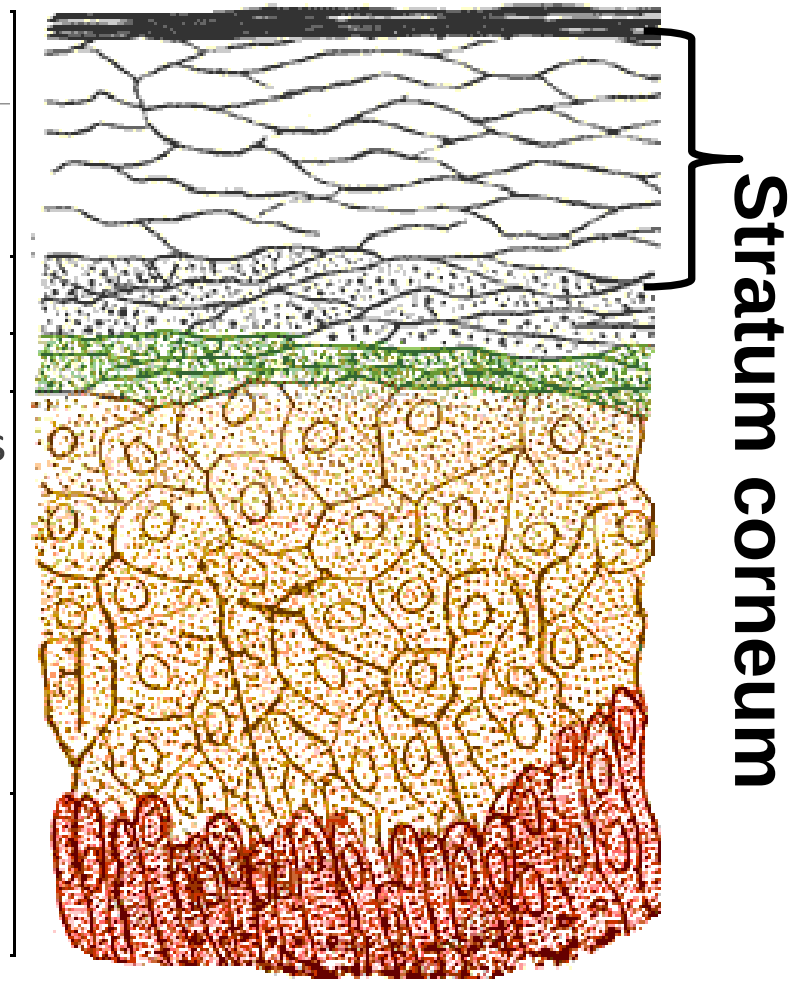
Epidermis and Dermis.



Epidermis ,has 4 layers :

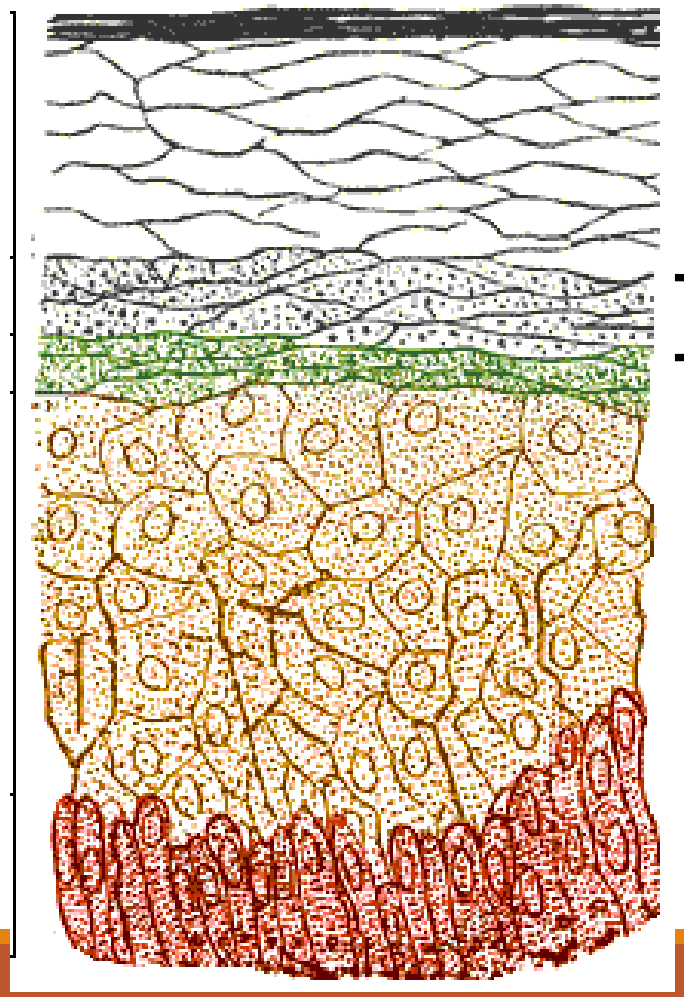
1. Stratum corneum ;

- is the outermost strata of the epidermis.
- It is mostly dead cells, filled with a protein substance called keratin.
- It is thicker on the soles of the feet than on the eyelids, where there is less pressure.



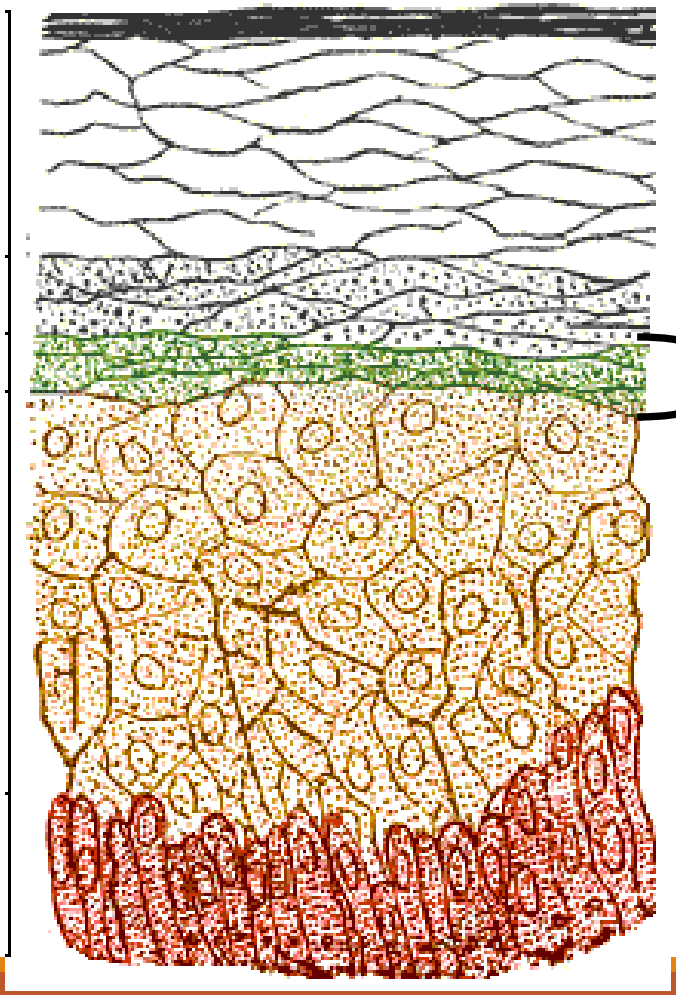
2. Stratum lucidum

- is a translucent layer lying directly beneath the corneum.
- It may not even exist in thinner skin.
- cells in this layer are dead or are in the process of dying.



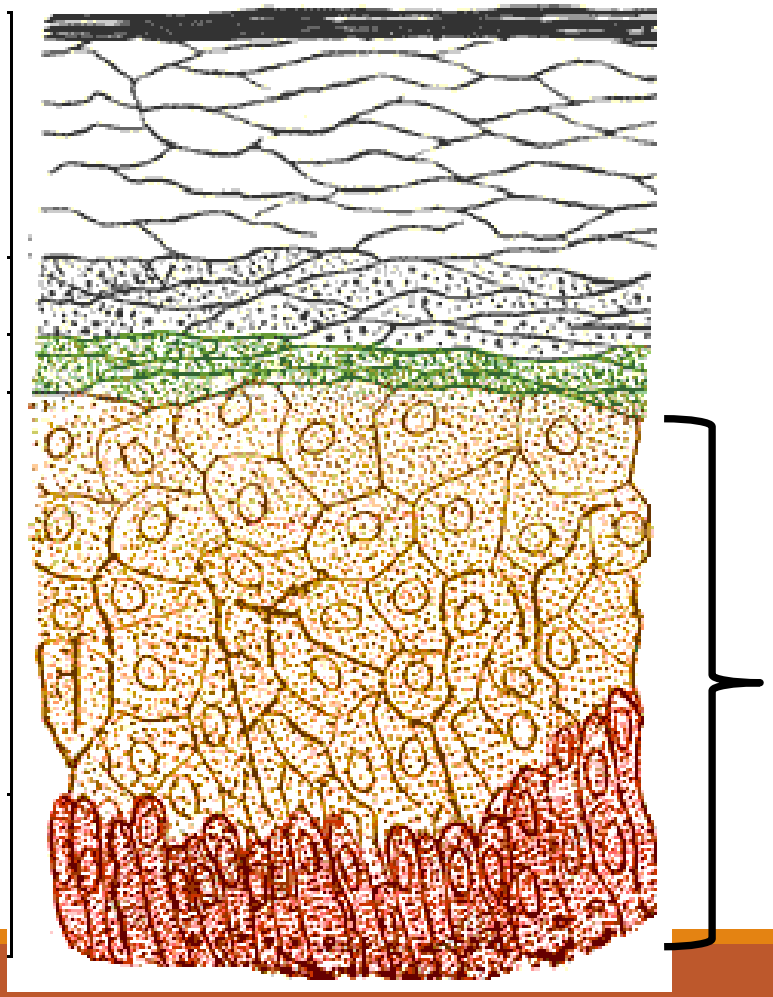
3. Stratum granulosum

- is one or more layers of cells starting to die and become hard.
- they are in the process of keratinization.
- becoming fibrous protein similar to that in hair and nails.



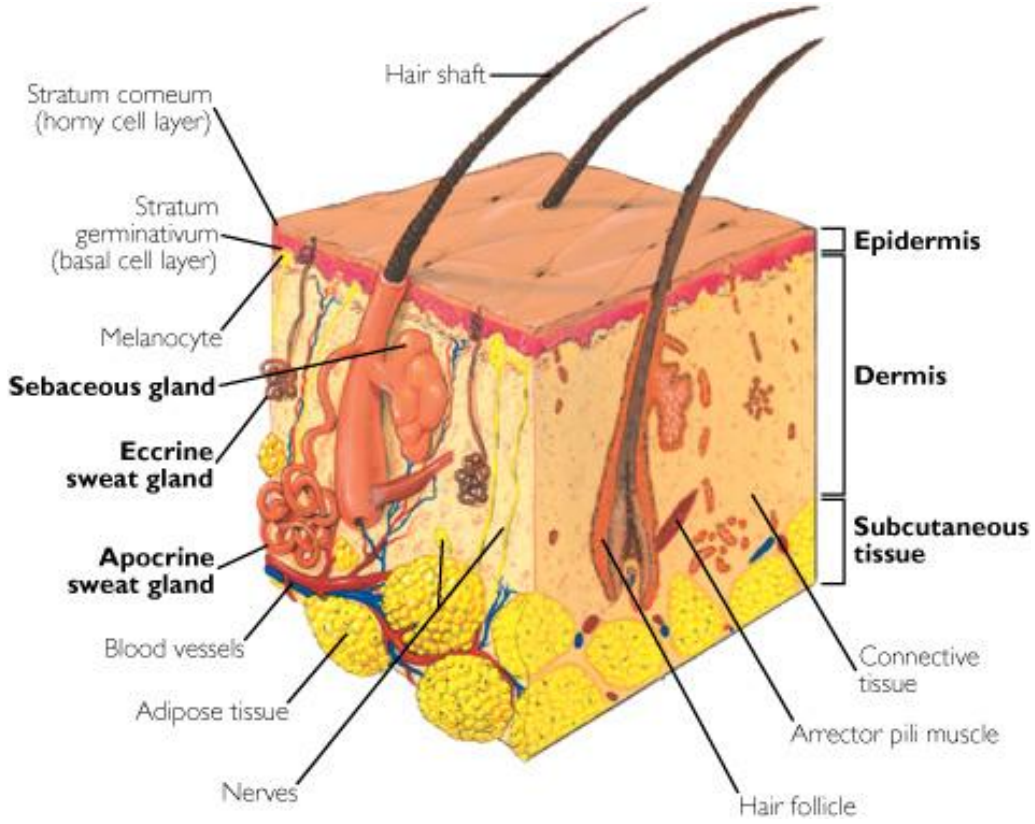
4. stratum germinativum

- is composed of several layers of living cells capable of cell division.
- contains melanin, the pigment that gives color to the skin.
- Damage to this layer, such as in severe burns, requires skin grafts.



Dermis

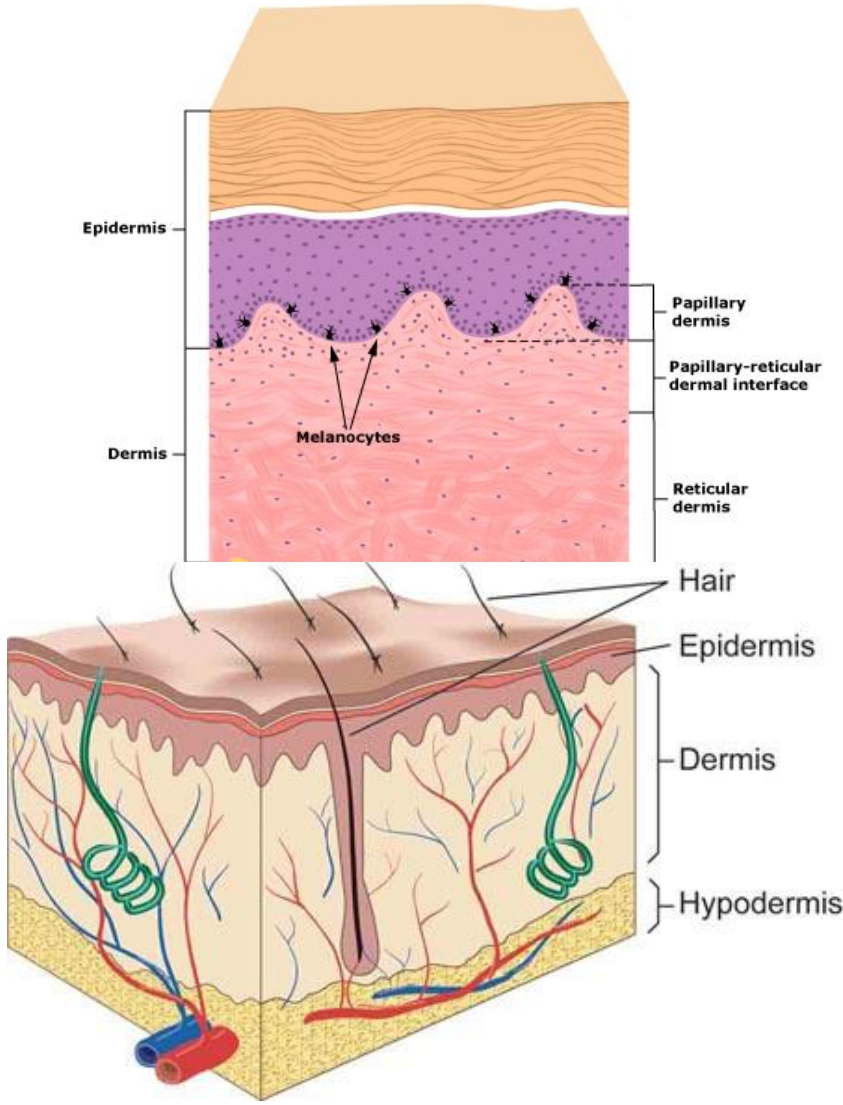
- beneath the epidermis
- composed of connective tissue.
- contains the lymphatics, nerves, nerve endings, blood vessels, sebaceous and sweat glands, elastic fibers, and hair follicles.
- connected to underlying tissue by the subcutaneous tissue.
- The subcutaneous tissue is composed of adipose and connective tissue. It supports, nourishes, insulates, and cushions the skin.



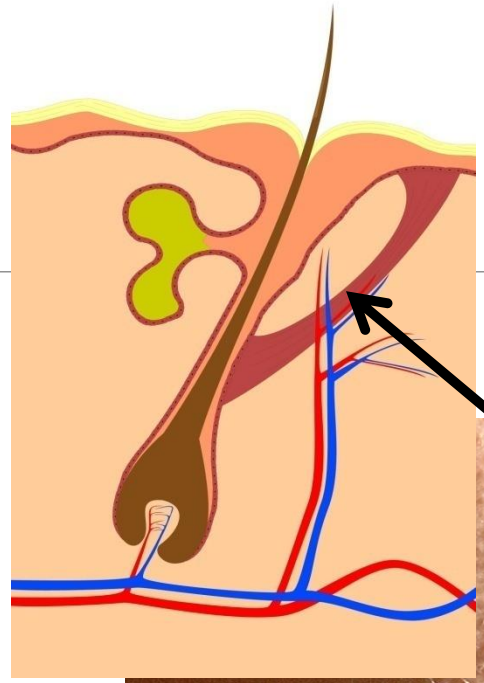
Divided into two layers;

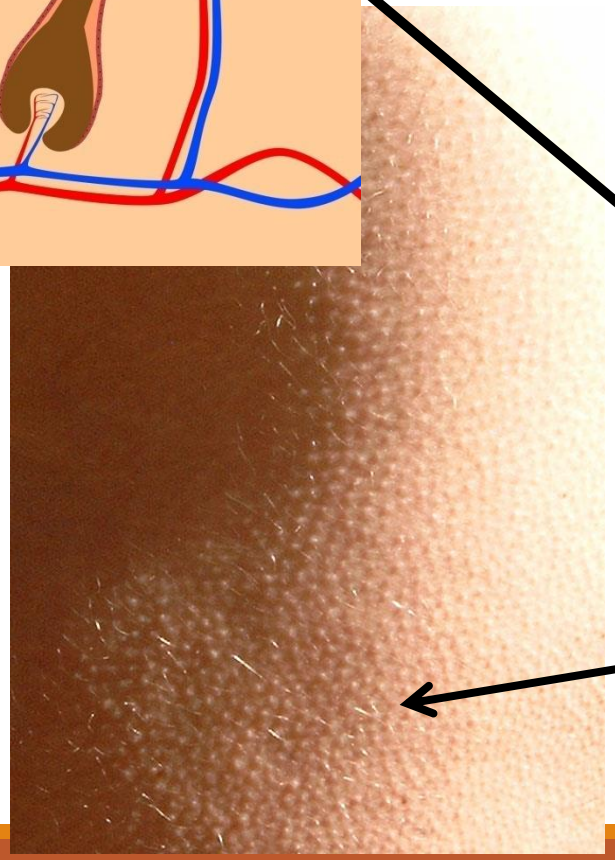
1. the papillary layer
 form ridges, these are the finger- and footprints
2. the reticular layer

- ❑ is beneath the papillary layer
- ❑ it is a white fibrous tissue that supports the blood vessels



The hair





The hair is a thread like structure formed by a group of cells that develop within a hair follicle or socket.

Each hair has a shaft that is visible and a root that is embedded in the follicle.

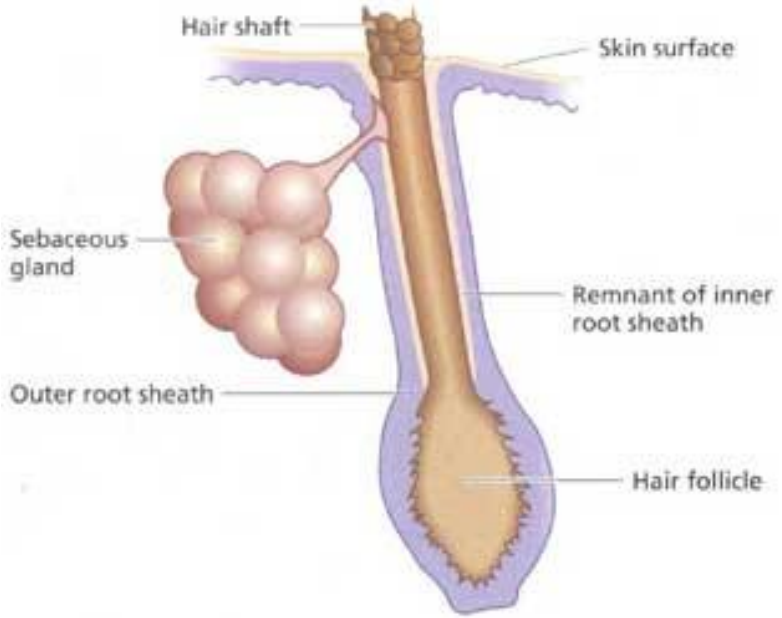
A pilomotor muscle is attached to the side of each follicle. It is stimulated by skin irritants, emotional arousal, or cold temperatures, and reacts by contracting. This causes goose flesh or goose pimples.

At the base of each hair follicle is a bulb enclosing a loop of capillaries. It is called the hair papilla, and provides nourishment to the hair

Sebaceous glands

Sebaceous glands are oil glands. They have tiny ducts that open into each hair follicle.

Each sebaceous gland secretes sebum, which lubricates the hair and skin.

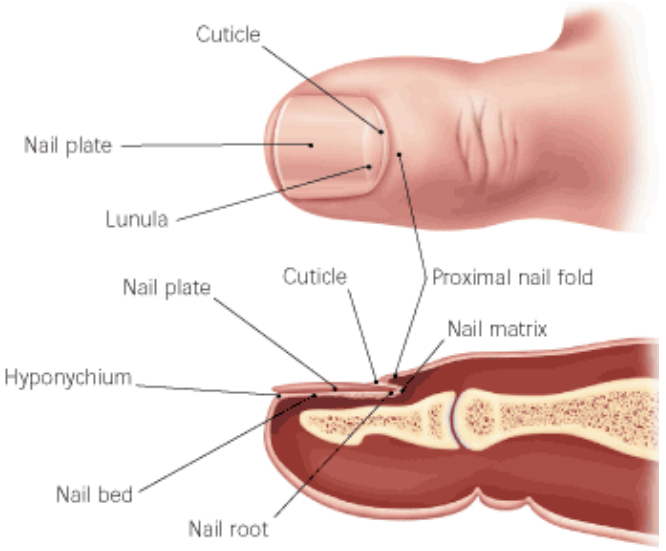


Nails

Fingernails and toenails are hard keratin structures that protect the ends of the fingers and toes.

The nail root, also called the germinal matrix or nail bed, begins several millimeters into the finger and extends to the edge of the white, crescent-shaped lunula. This is where the growth occurs… approximately 1 mm per week.

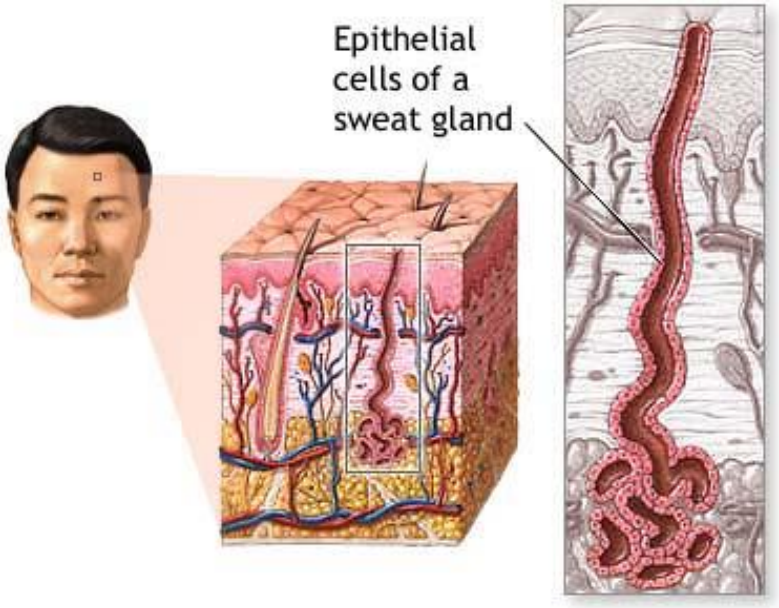
The under-surface of the nail plate or body of the nail has grooves that help anchor it.



Sudoriferous Glands

- are sweat glands. About 2 million are distributed over the surface of the body, more numerous on the palms of the hands, soles of the feet, forehead, and axillae or underarms.
- produce sweat or perspiration. As sweat collects on the skin surface, it evaporates and creates a cooling effect. Sweat also rids the body of waste through the pores of the skin.
- As it accumulates, sweat may become odorous by the action of bacteria.

The average person loses approximately ½ liter of fluid through sweating each day.



Serous Membranes

Membrane - a soft, thin pliable layer of tissue that either ;

- covers a vital (visceral organ) visceral membrane.
- or lines a body cavity parietal membrane.

There is a space between a visceral and parietal membrane into which serous fluid is secreted for lubrication.

Serous Membranes of the Heart pericardium)(

The membrane on the surface of the heart is called visceral pericardium.

The membrane that lines the cavity in which the heart is located is called the parietal pericardium.

The space between these two membranes is called the pericardial cavity, and it is filled with serous fluid.

Serous membranes of the Lungs (pleura)

The membrane on the surface of the lung is called visceral pleura.

The membrane that lines the cavity in which the lungs are located is called parietal pleura.

The space between these two membranes is called the pleural cavity, and it is filled with serous fluid.

Serous membranes of the Abdominal organs (peritoneum)

The membrane on the surface of the liver, stomach, etc. is called visceral peritoneum.

The membrane that lines the abdominal cavity is called parietal peritoneum.

The space between these two membranes is called the peritoneal cavity, and it is filled with serous fluid.

Fasciae

Collection of connective tissue

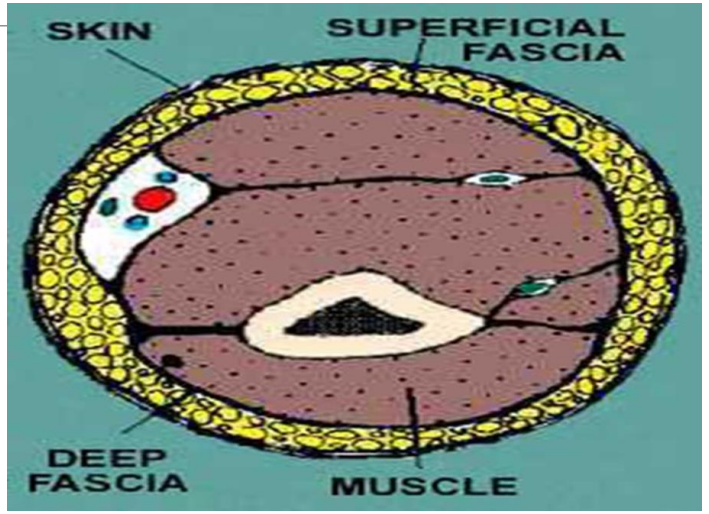
Two types :

Superficial

Deep

Superficial fascia

- Loose, mixture of adipose and loose areolar tissues.
- It unites the skin to the underlying structures.
- It is dense in some places as scalp, palm of hand and sole of foot .
- It is thin in the eyelids, auricle, scrotum, penis and clitoris(devoid of adipose tissue).



Functions:

- Facilitates movement of skin over underying structures.
- Passage for cutaneous vessels, nerves.
- Protects the body against heat loss.

Deep fasciae

More dense than superficial fasciae .

Fascia tough, sheet-like membrane that covers and protects tissue

Collagenous bundles are more compact and more regularly arranged

It is usually present in the form of membranes

Absence of deep fasciae ;

(face , breast, penis , anterior abdominal wall)

Examples of deep fasciae

a. investing fascia

Covers the surfaces of muscles

In the neck ; bounds fascial spaces so limits spread of infection or determine o the path of infection

In the abdomen it is thin

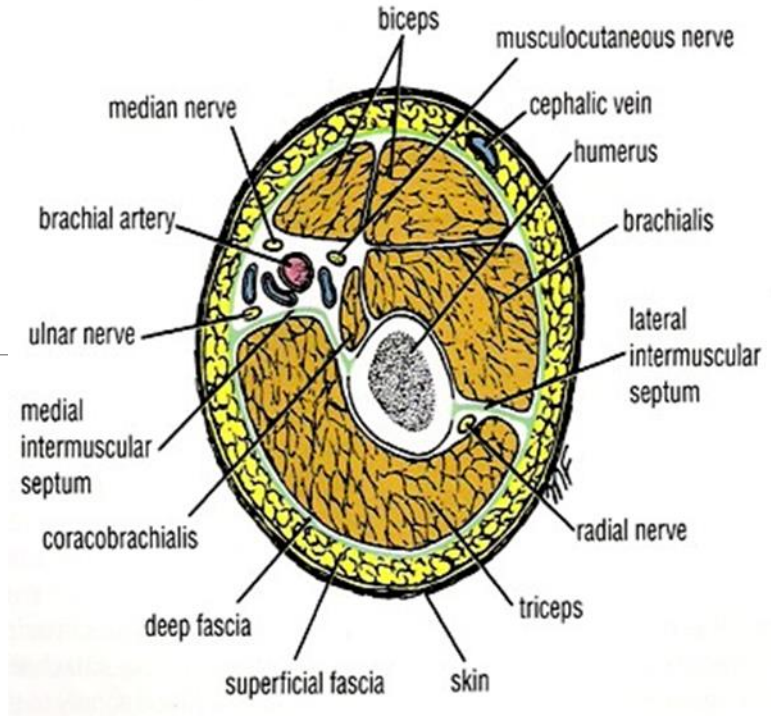
b. intramuscular septa ; lie between muscles dividing the limb into compartment.

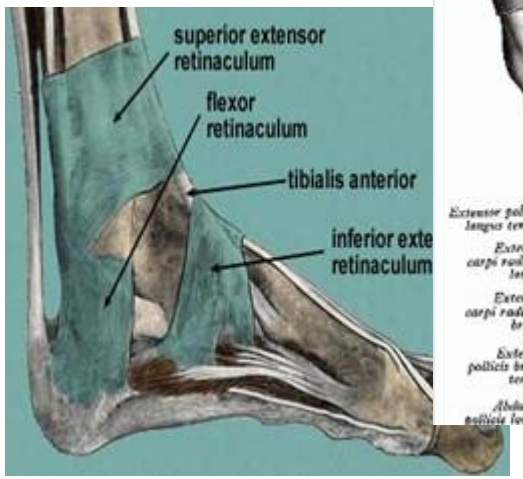
c. Retinacula ; joints prevent bowstringing

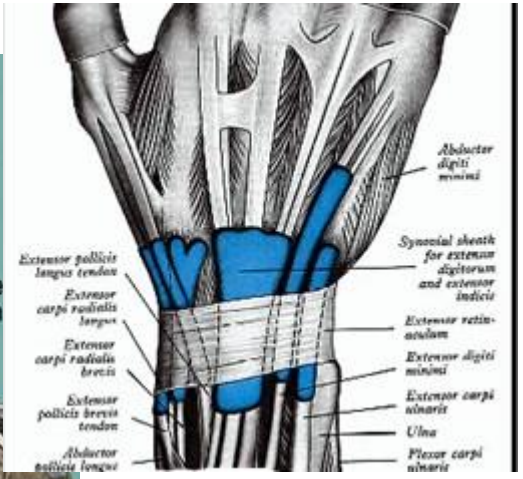
d. fibrous sheath, e.g carotid sheath

e. fibrous capsule , e.g parotid capsule

f. ligaments

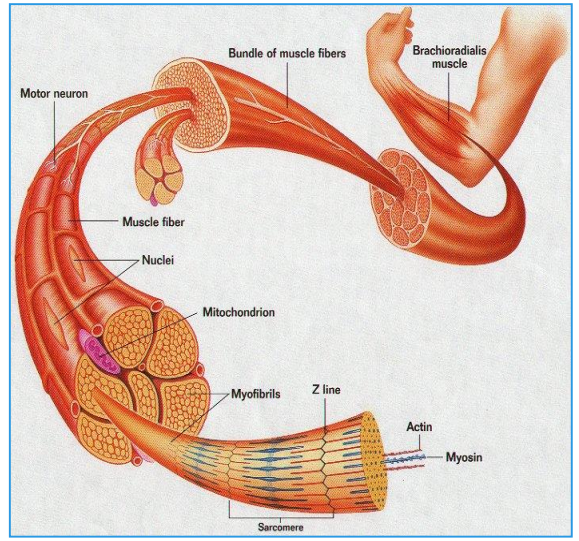






MUSCLES

Muscle cells contain protein filaments of actin and myosin that slide past one another, producing a contraction that changes both the length and the shape of the cell.

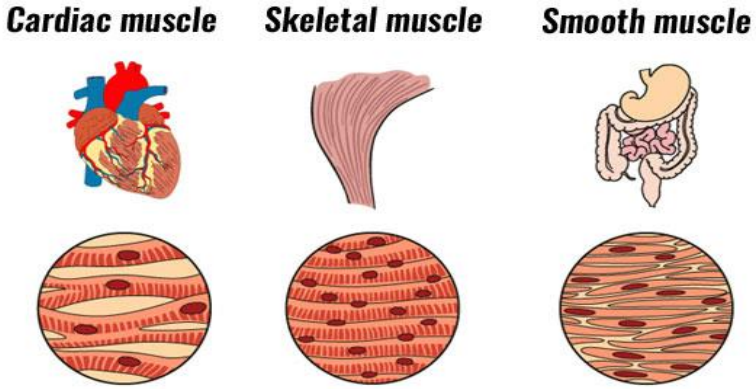


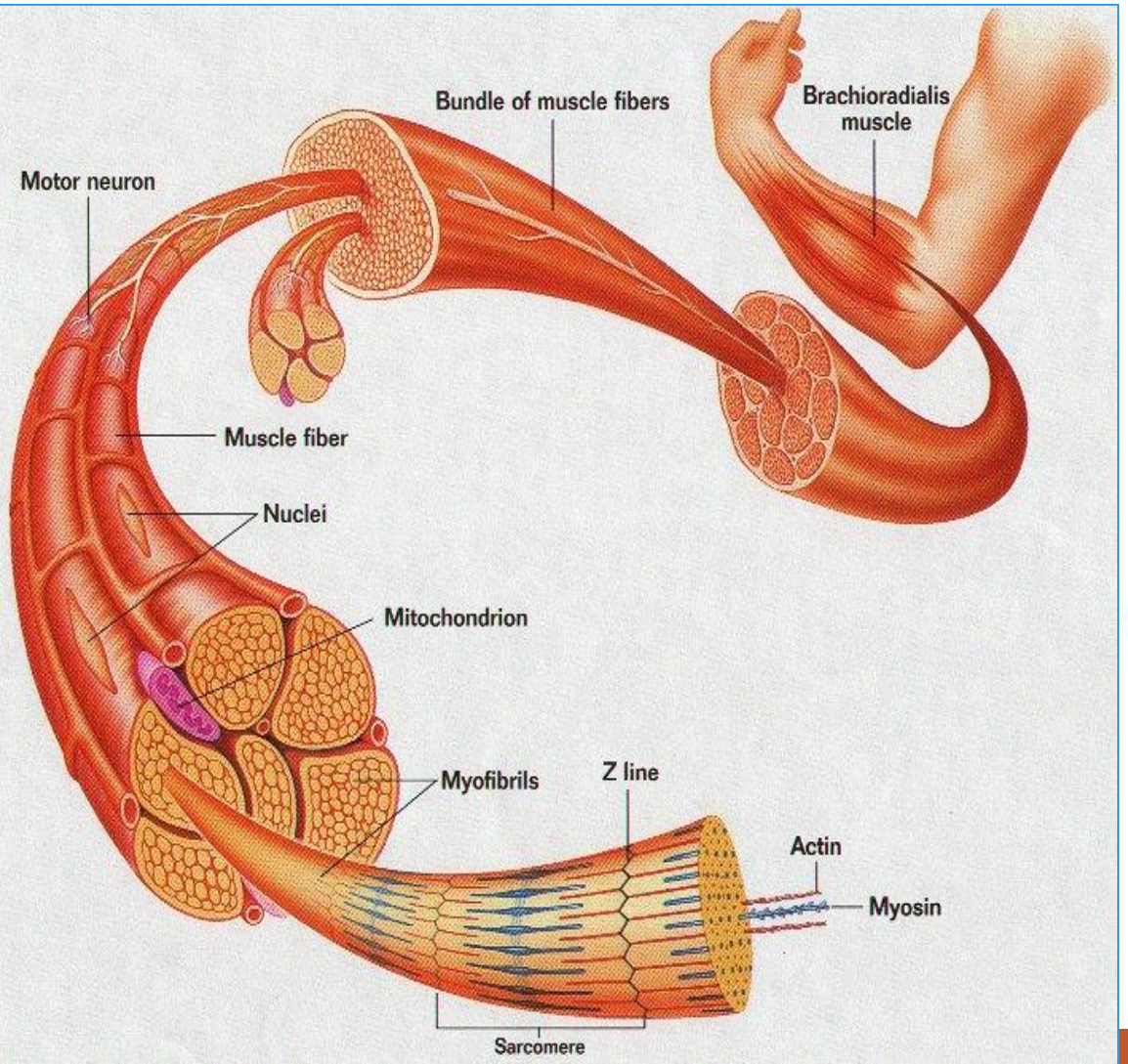
FUNCTION OF THE MUSCLE TISSUE

- generation of movements
- stabilization of the position of the body
- control of the volume of the organs LIKE smooth muscle - sphincters
- motion of the substances in the body, LIKE blood, lymph, urine, air, food and fluids, sperm
- generation of body heat

Three basic muscle types are found in the body

- Skeletal muscle
- Cardiac muscle
- Smooth muscle



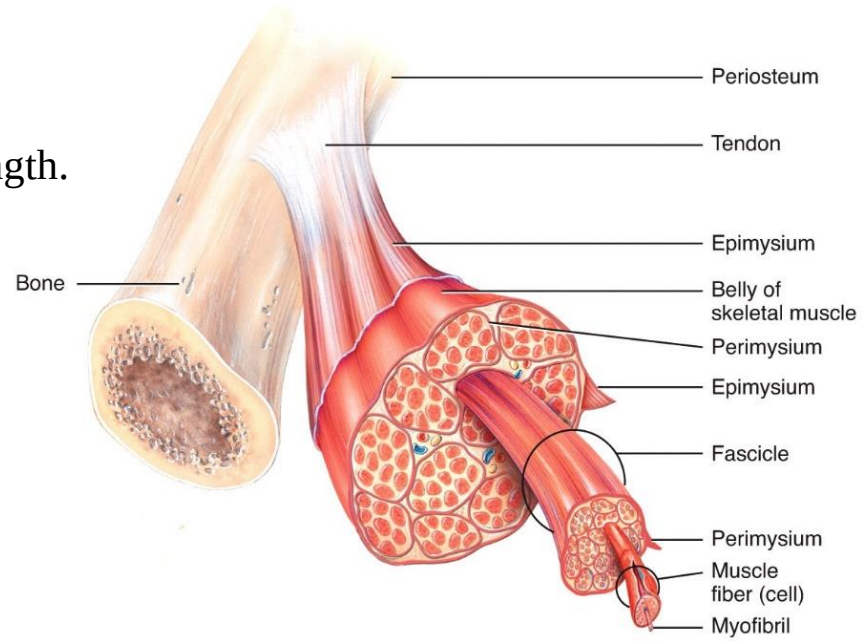


Side Back Anatomy

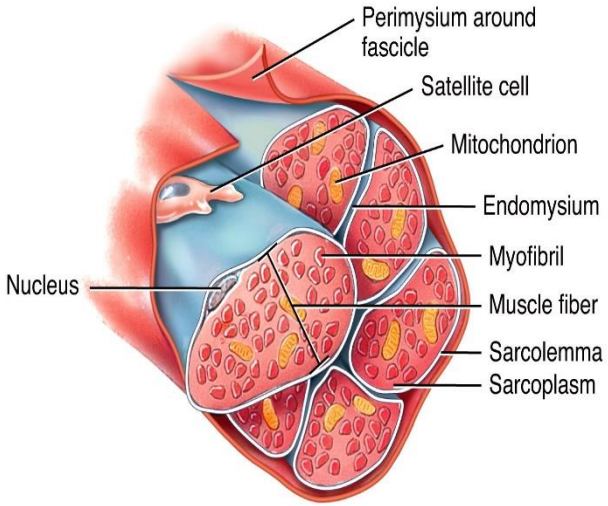
Organization of muscle, a fasciculus, and a fiber all visualized

Skeletal muscle fibers (cells) are arranged into bundles called fascicles
Fascicles are bound by connective tissue.
Four different connective tissue coverings

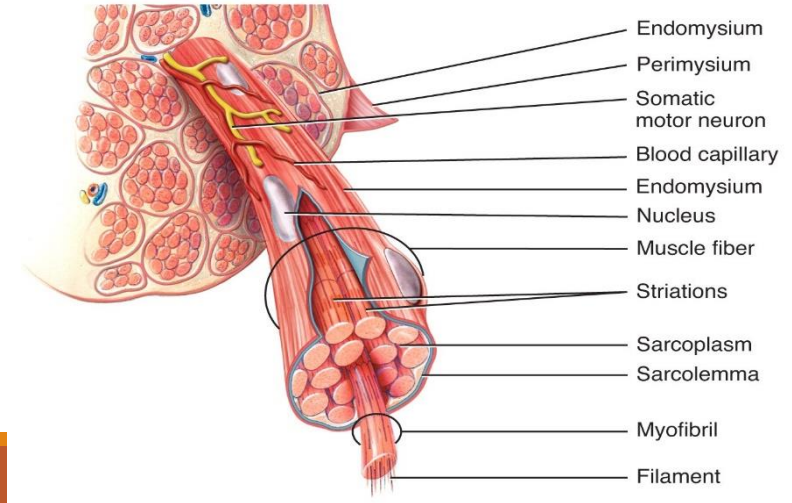
- Deep fascia ; surrounds entire skeletal muscle and extends beyond its length.
- Epimysium ; closely surrounds skeletal muscle, binds fascicles together
- Perimysium ; surrounds each fascicle.
- Endomysium ; surrounds each muscle fiber (cell).



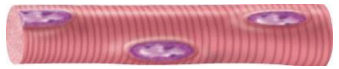
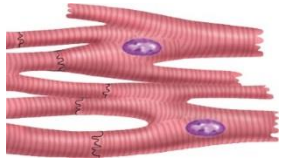
Organization of a fasciculus



Organization of a muscle fiber



THREE TYPES OF MUSCULAR TISSUE

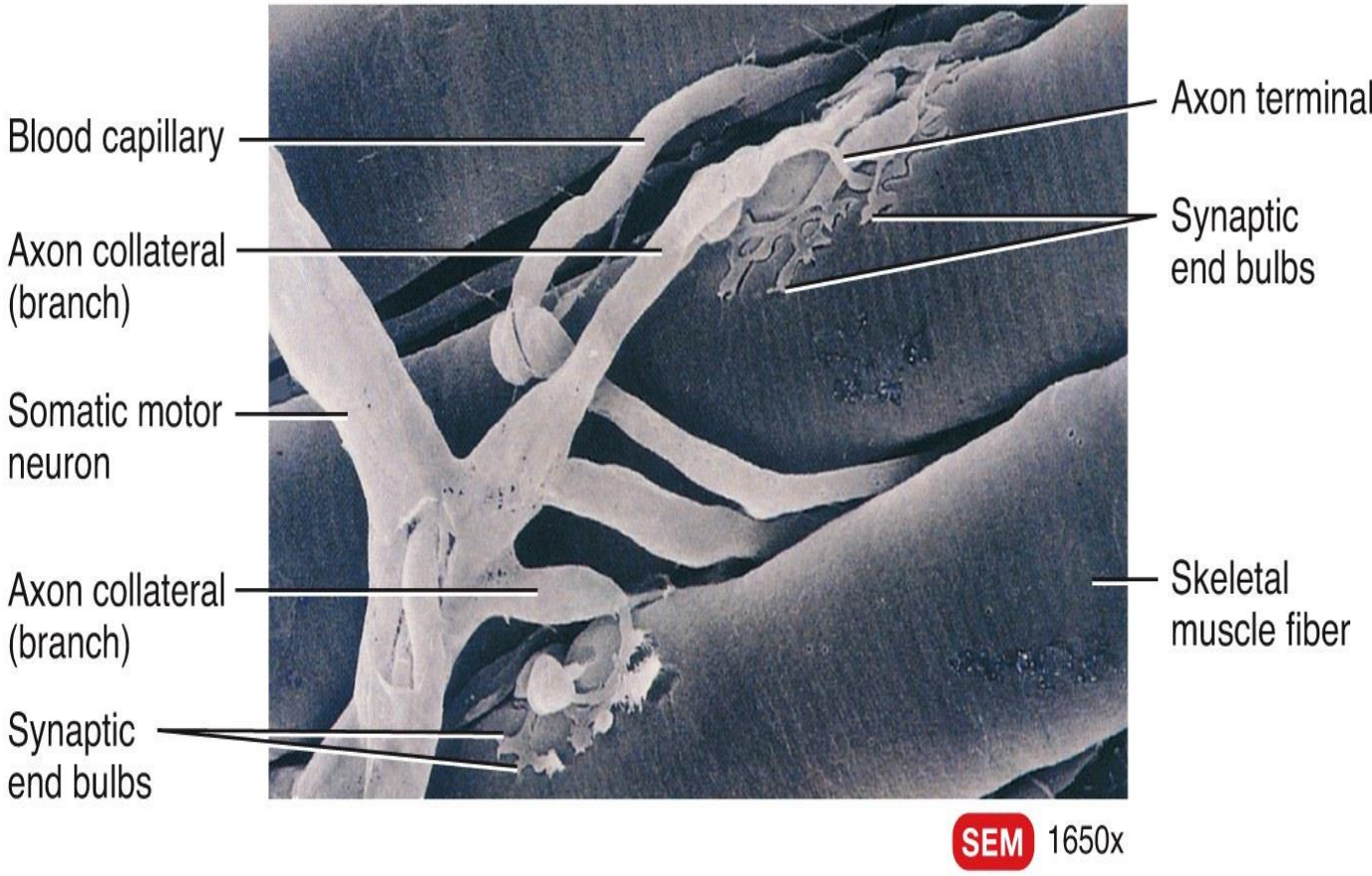
	Location	Function	Appearance	Control
Skeletal 	skeleton	movement, heat, posture	**striated**, multi-nucleated (eccentric), fibers parallel	**voluntary**
Cardiac 	heart	pump blood continuously	**striated**, one central nucleus	**involuntary**
Visceral (smooth muscle) 	G.I. tract, uterus, eye, blood vessels	Peristalsis, blood pressure, pupil size, erects hairs	**no striations**, one central nucleus	**involuntary**

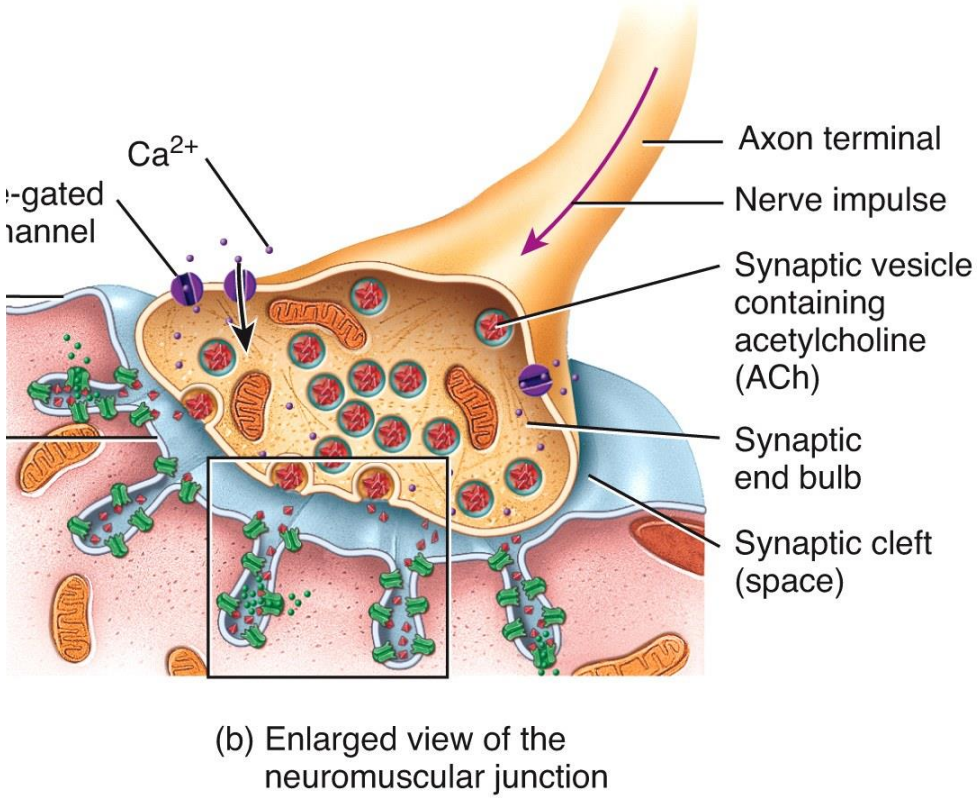
NEURO-MUSCULAR JUNCTION(NMJ)

Motor end-plate

Sarcolemma of muscle fiber directly beneath motor nerve ending

Contains an abundance of mitochondria and nuclei



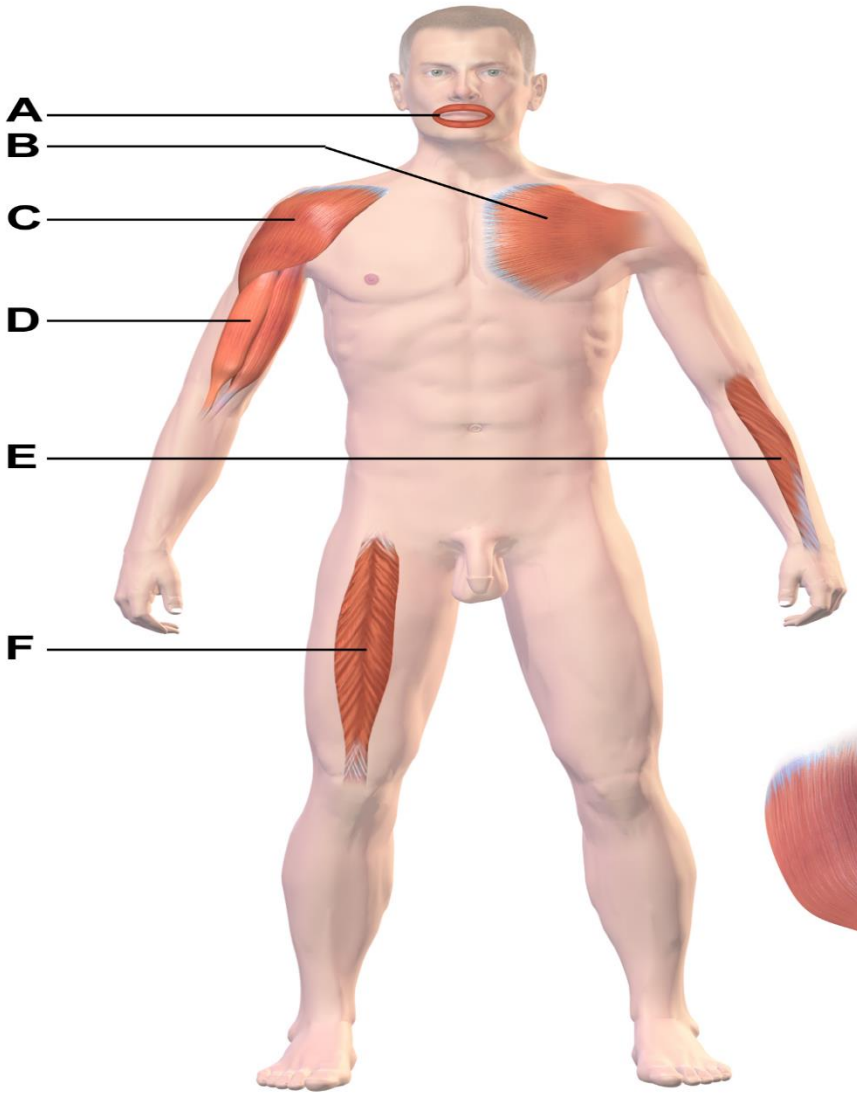


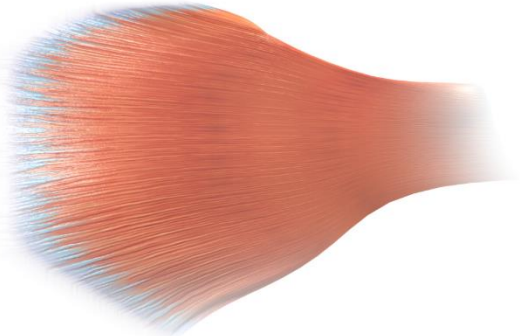
(b) Enlarged view of the neuromuscular junction

CHARACTERISTICS OF THE MUSCLE TISSUE

- **Electrical irritability (excitability)** ability of the skeletal muscle to respond to stimuli , skeletal muscle contracts as a result of nerve irritation
- **Contractility** ability of contraction
- **Extensibility** ability to extend without tissue damage
- **Elasticity** ability to return to the original shape after being extended

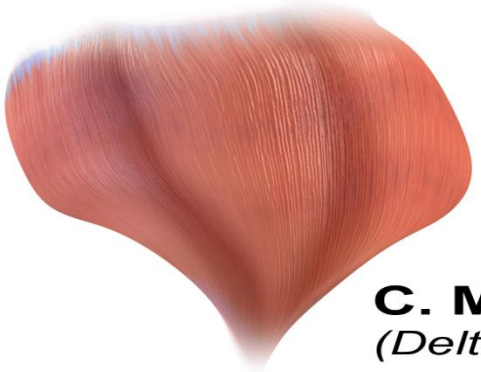
Muscle Types



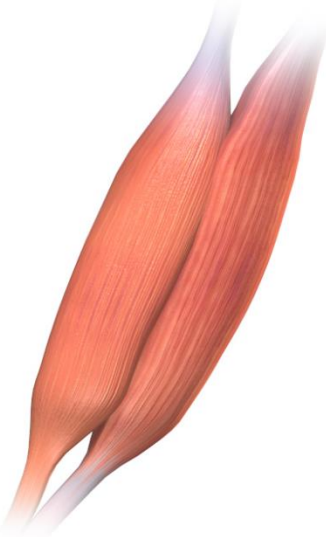


B. Convergent
(Pectoralis muscle)

A. Circular
(Orbicularis oris muscle)



C. Multipennate
(Deltoid muscle)



D. Parallel
(Biceps brachii muscle)

F. Bipennate
(Rectus femoris muscle)

E. Unipennate
(Extensor digitorum muscle)

MUSCULAR SYSTEM

Half of the body's weight is muscle tissue

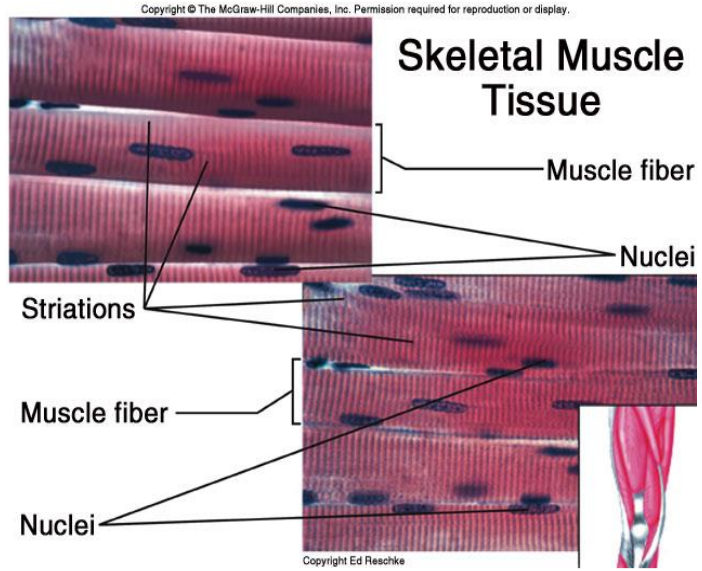
Skeletal muscle = 40% in males, 32% in females , Cardiac muscle = 10%

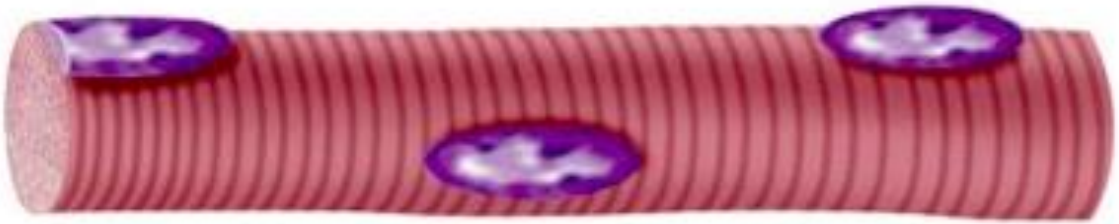
Skeletal Muscle Characteristics

- Most are attached by tendons to bones .
- Allow for movement, facial expressions, breathing, swallowing, writing, talking and singing, posture, heat production, joint stability
- Skeletal muscle is the only organ of the muscular system.
- Skeletal muscle is composed of skeletal muscle tissue and also contains nervous tissue, blood vessels and connective tissue

The muscle fibers (cell) are ;

- multinucleate
- surrounded and bundled by connective tissue
- elongated (muscle cell = muscle fiber)
- striated – have visible banding (due to arrangement of thick and thin filaments)
- voluntary – subject to conscious control
- contraction of muscles is due to the movement of microfilaments

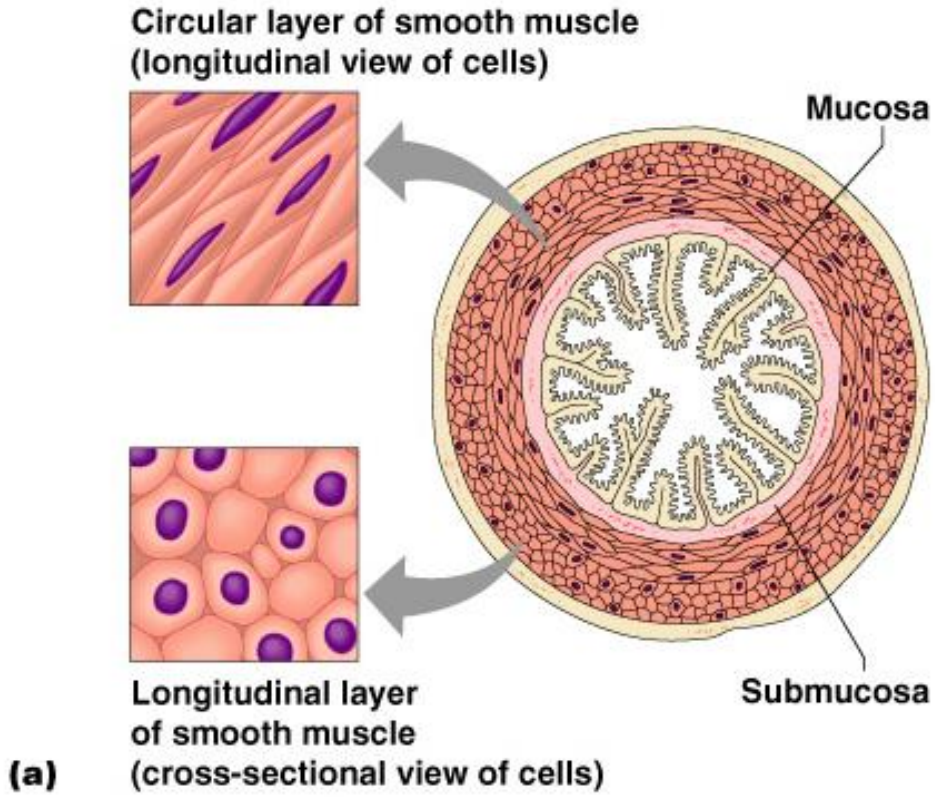




SMOOTH MUSCLE TISSUE

Smooth muscle cell ;

- single nucleus is in the centre of the cell
- inervated by automonic system
- has no striations
- spindle-shaped
- involuntary – no conscious control
- found in walls of hollow organs



CARDIAC MUSCLE

- it is involuntary: a person cannot control it consciously.
- found only in the heart , called the myocardium (cardiac muscle (heart muscle) .
- has striations.
- usually has a single nucleus.
- joined to another muscle cell at an intercalated disc.