AL MUSTAQBAL UNIVERSITY

College of Medicine / First Year

ANATOMY

(L3) Skin, Fascia & Muscles with Pectoral Region

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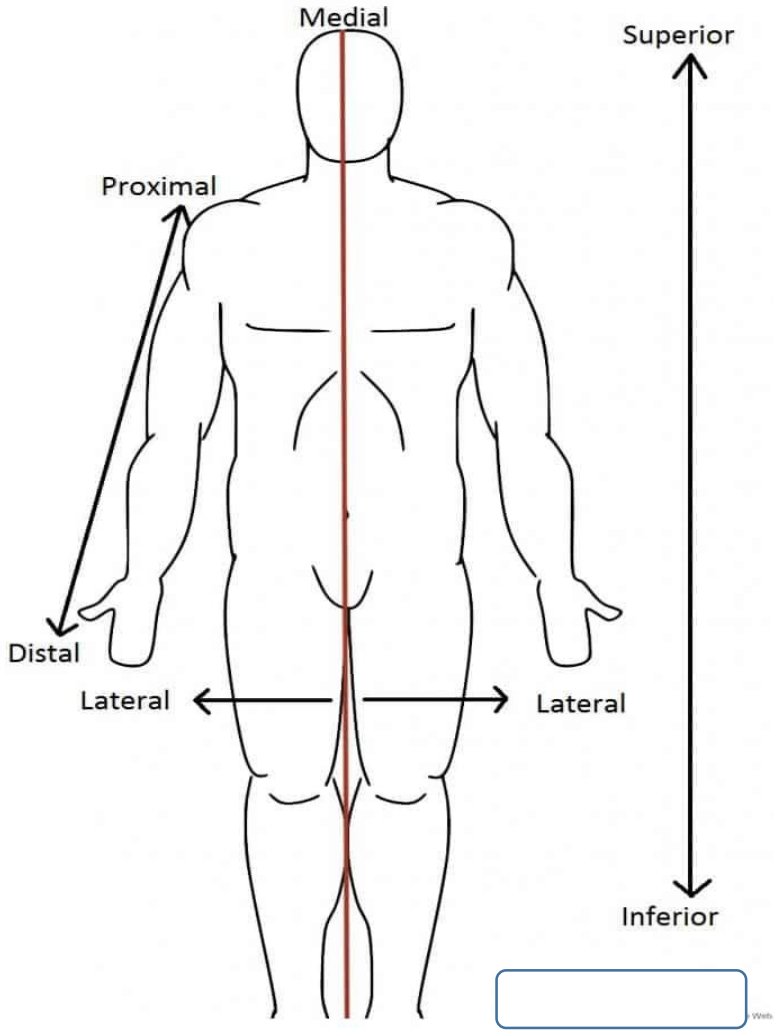


Learning Objectives

Skin & Appendages: Distinguish between the **epidermis** and **dermis** , and identify key appendages including hair follicles, nails, and glands.
Clinical Correlates: Understand the surgical significance of Langer’s Lines.

Fascia: Differentiate between superficial and deep fascia , and recognize specialized modifications like retinacula and septa.

Myology: Master muscle characteristics (excitability, contractility) and functional architecture (origin vs. insertion).

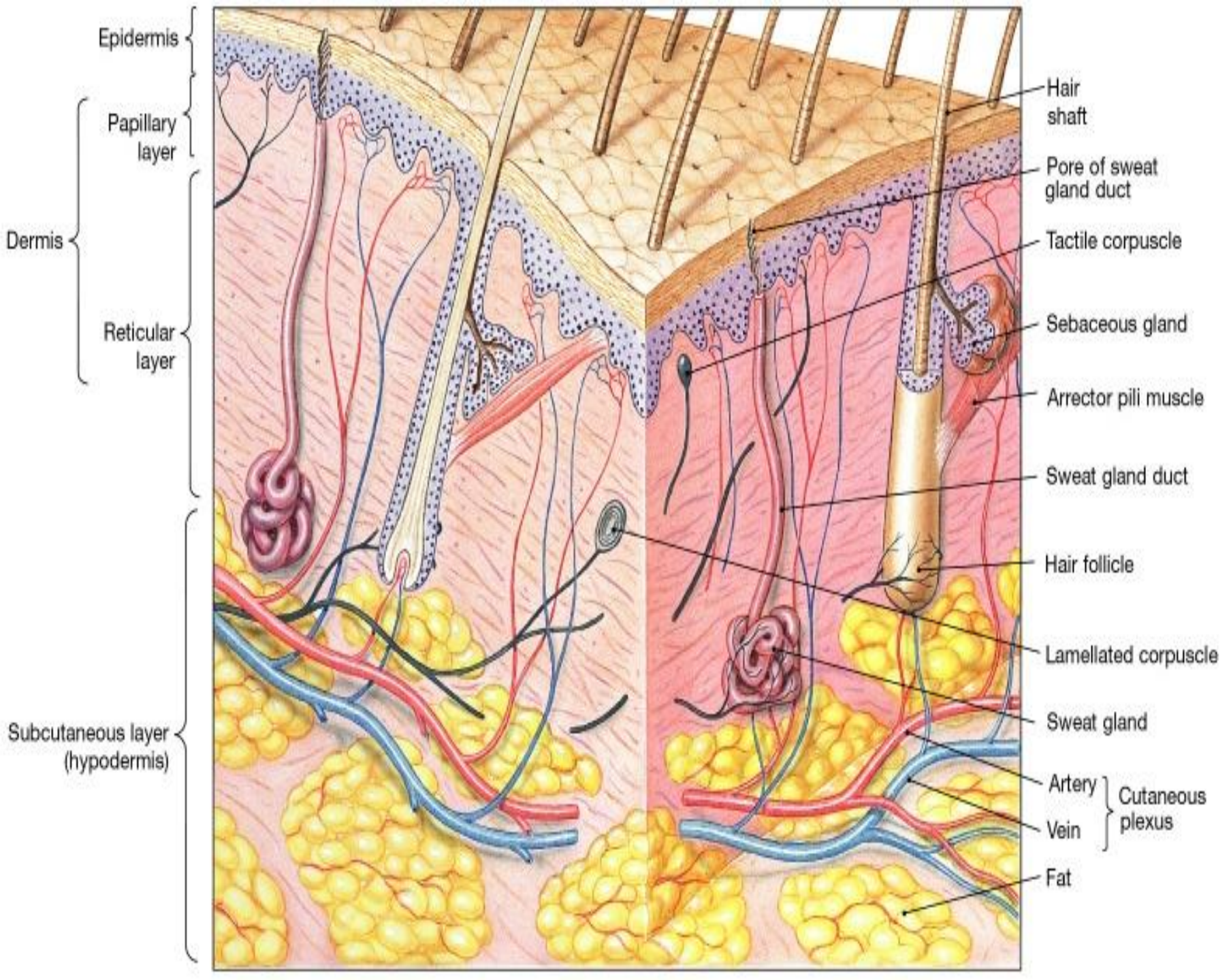
Pectoral Region: Describe the anatomy and quadrants of the breast , its lymphatic drainage , and the muscles of the anterior chest wall (e.g., Pectoralis Major, Serratus Anterior).
Applied Anatomy: Identify clinical conditions such as "Winged Scapula" related to nerve injury.

Skin (Integument)

The skin is the body's largest organ. It is generally classified into two main layers:

Epidermis: The superficial, avascular layer of stratified squamous epithelium. It serves as the primary barrier. In **"thick skin"** (palms/soles), there are five layers; in **"thin skin"** (everywhere else), there are four.

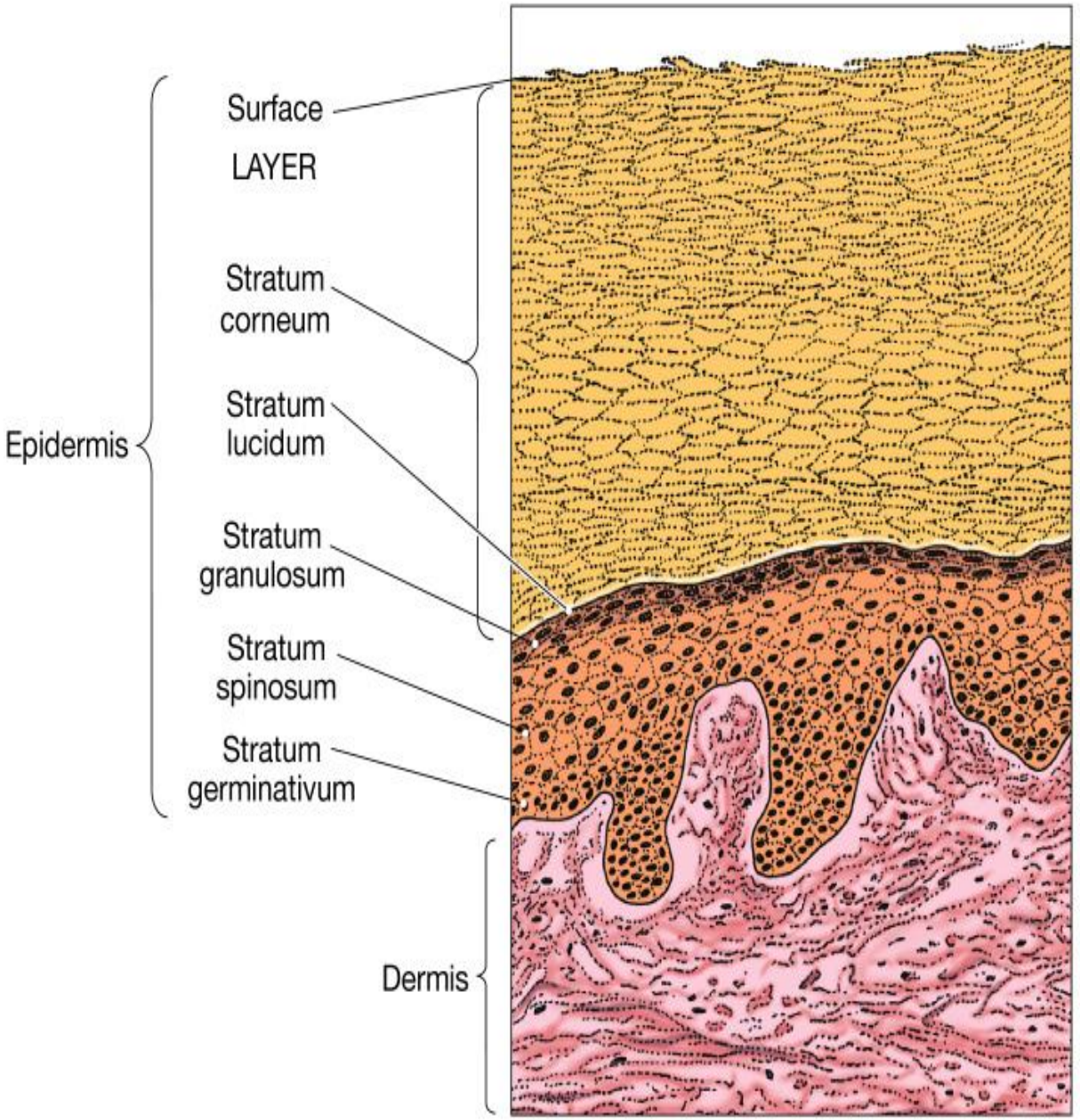
Dermis: The deep, vascular layer of dense irregular connective tissue. It contains collagen (strength) and elastin (elasticity).



On the palms of the hands and the soles of the feet, the epidermis is extremely thick to withstand the wear and tear that occurs in these regions. In other areas of the body, such as on the anterior surface of the arm and forearm, it is thin.

The dermis is composed of dense connective tissue containing many blood vessels, lymphatic vessels, and nerves. It shows considerable variation in thickness in different parts of the body, tending to be thinner on the anterior than on the posterior surface. It is thinner in women than in men.

The dermis of the skin is connected to the underlying deep fascia or bones by the superficial fascia, otherwise known as subcutaneous tissue.



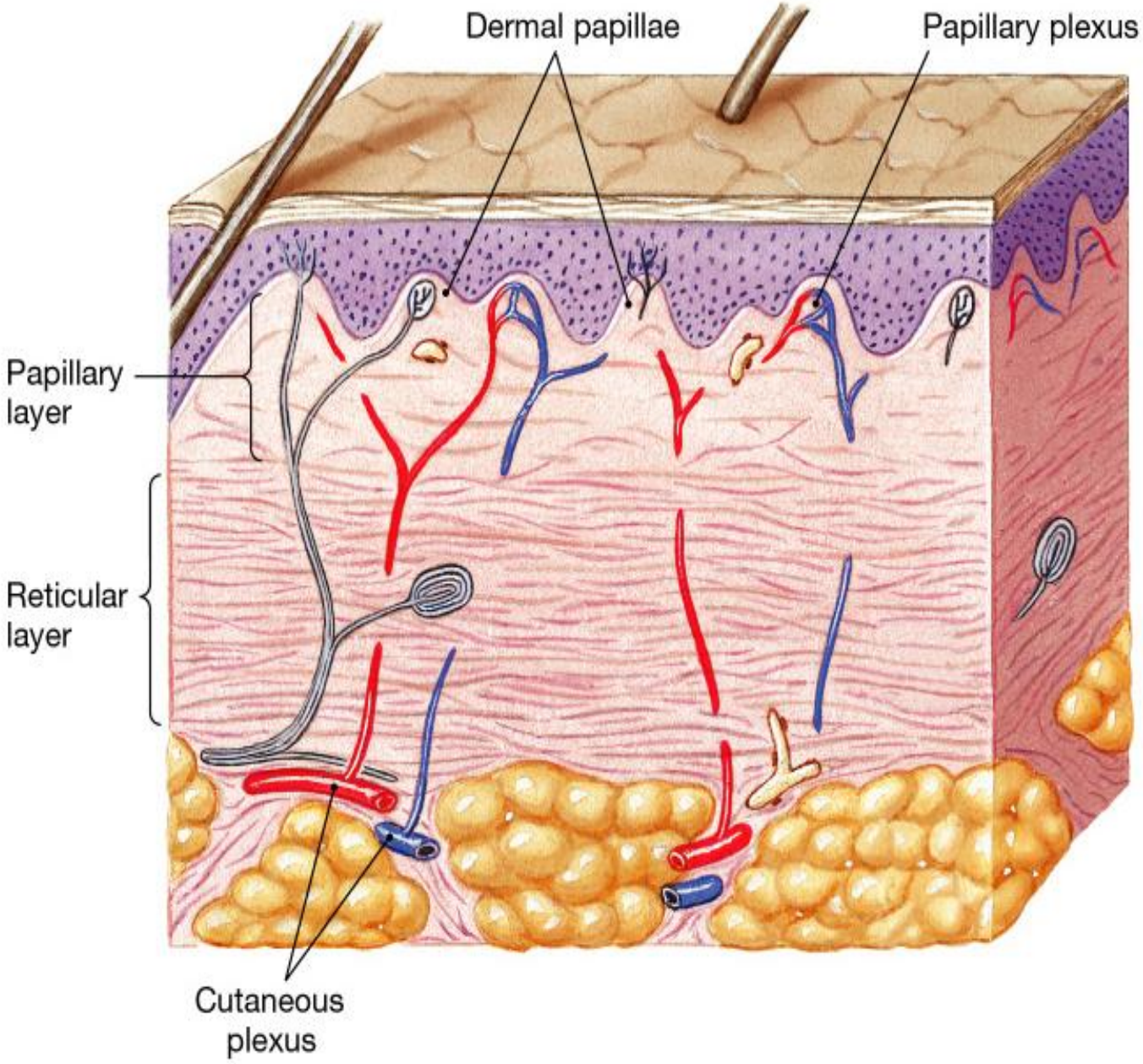
The Dermis

Papillary Layer (areolar C.T.)
nourishes and supports the epidermis.

Reticular Layer (Dense Irreg C.T.)
attaches skin to deeper tissues.
restrict spread of pathogens (defense).

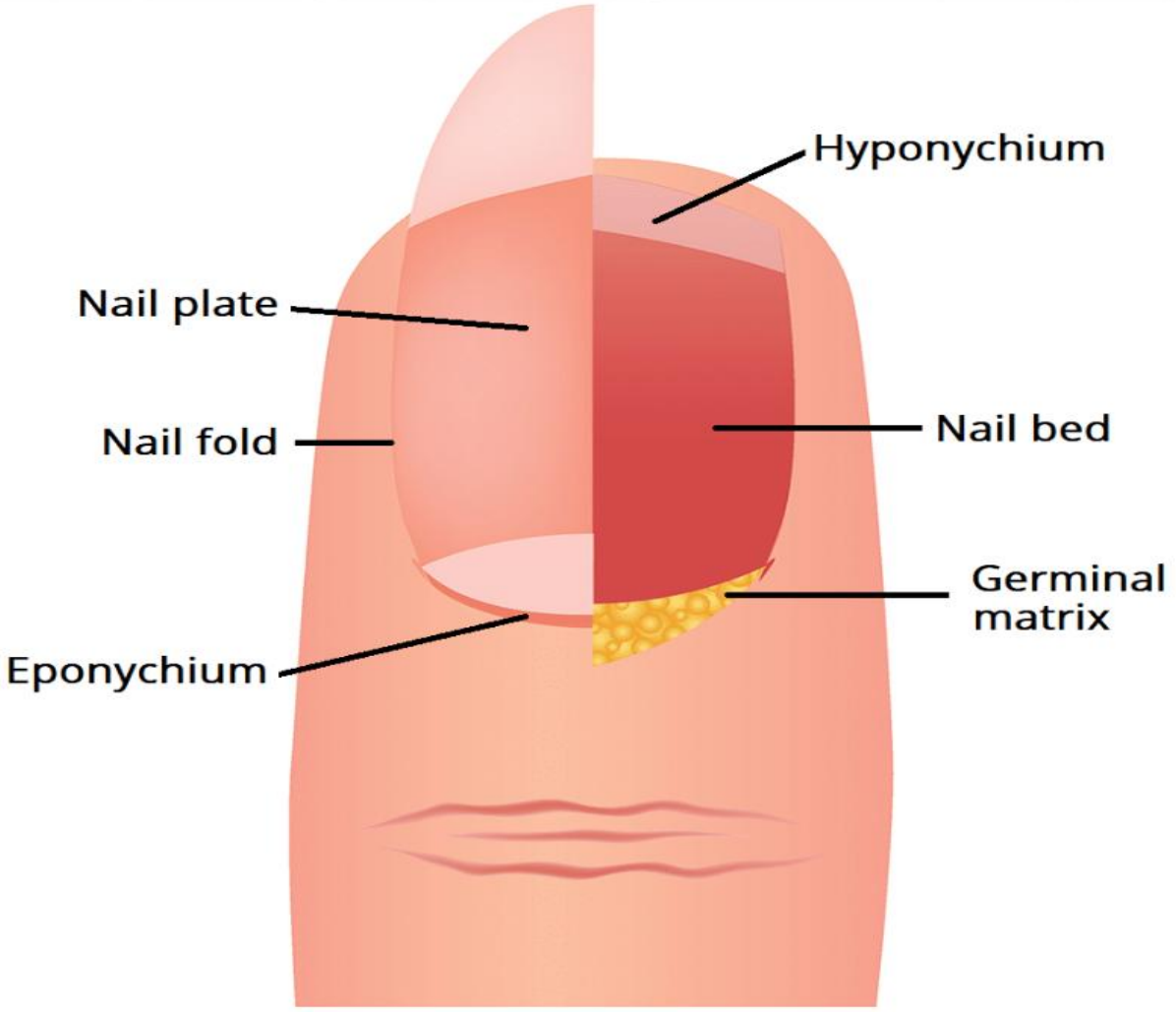
sensory perception (touch, pressure, pain).
thermoregulation via blood vessels.

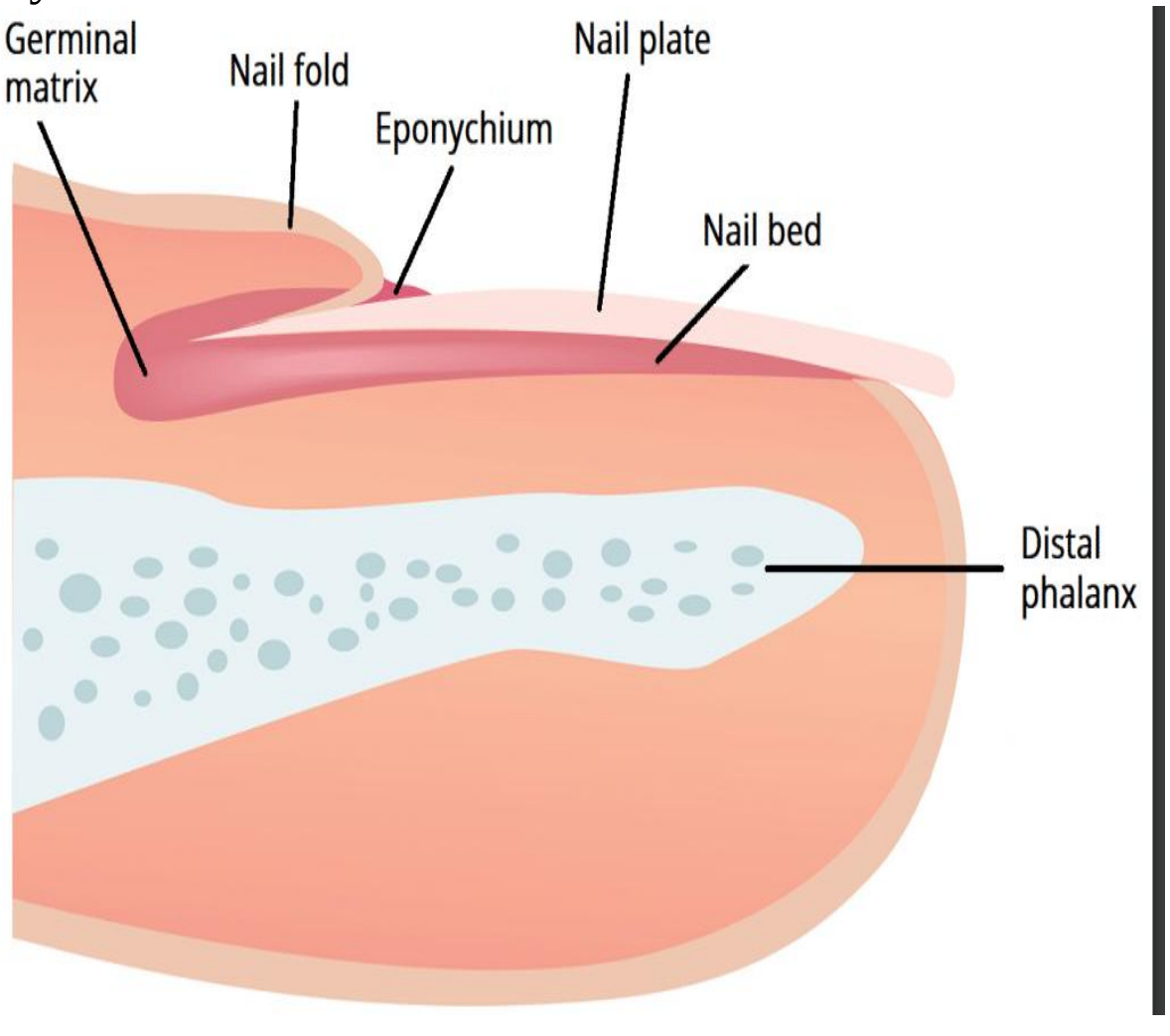
many accessory structures located here.



The appendages of the skin are **the nails, hair follicles, sebaceous glands, and sweat glands.**

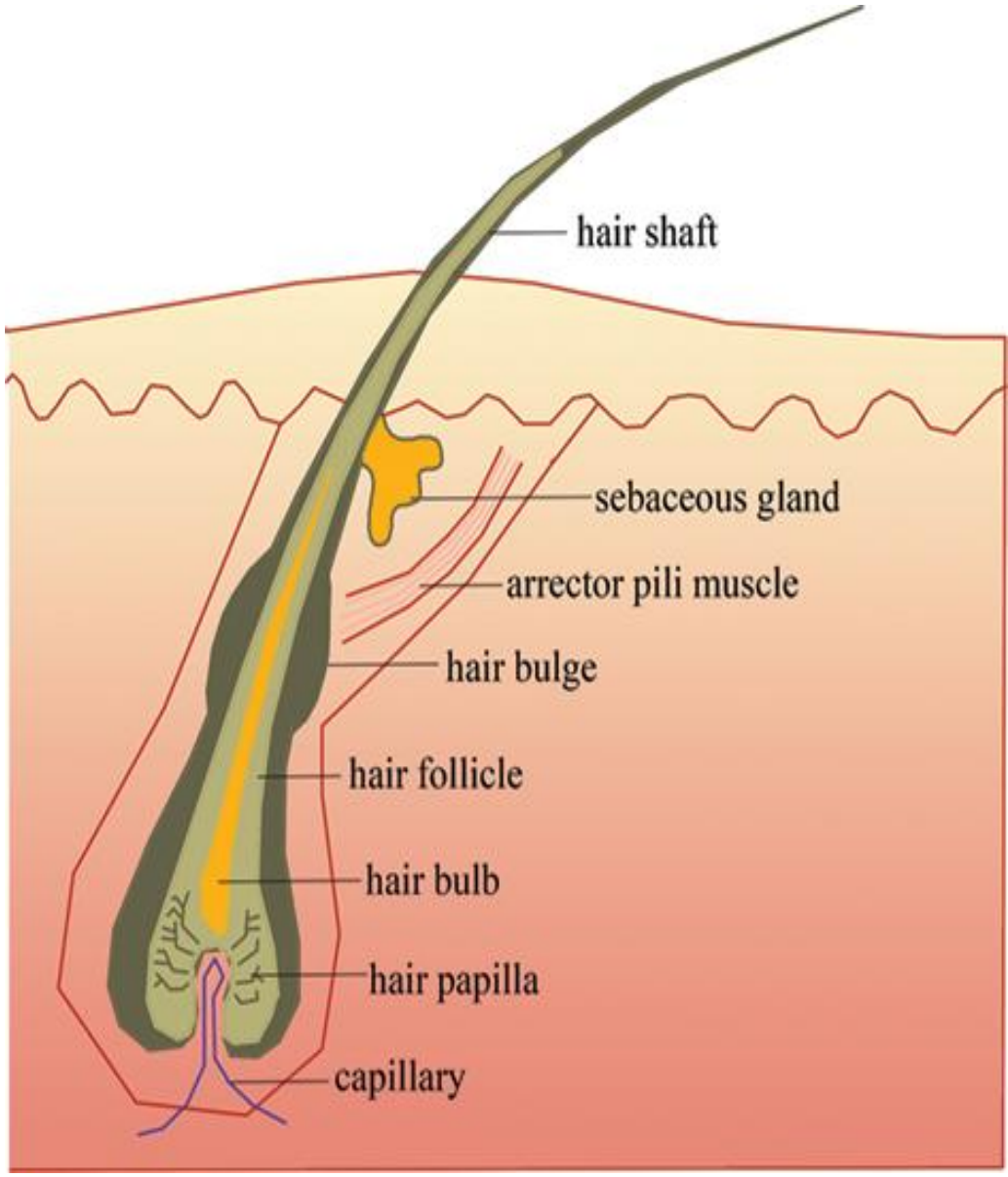
The nails are keratinized plates on the dorsal surfaces of the tips of the fingers and toes. The proximal edge of the plate is the root of the nail. With the exception of the distal edge of the plate, the nail is surrounded and overlapped by folds of skin known as nail folds. The surface of skin covered by the nail is the nail bed.





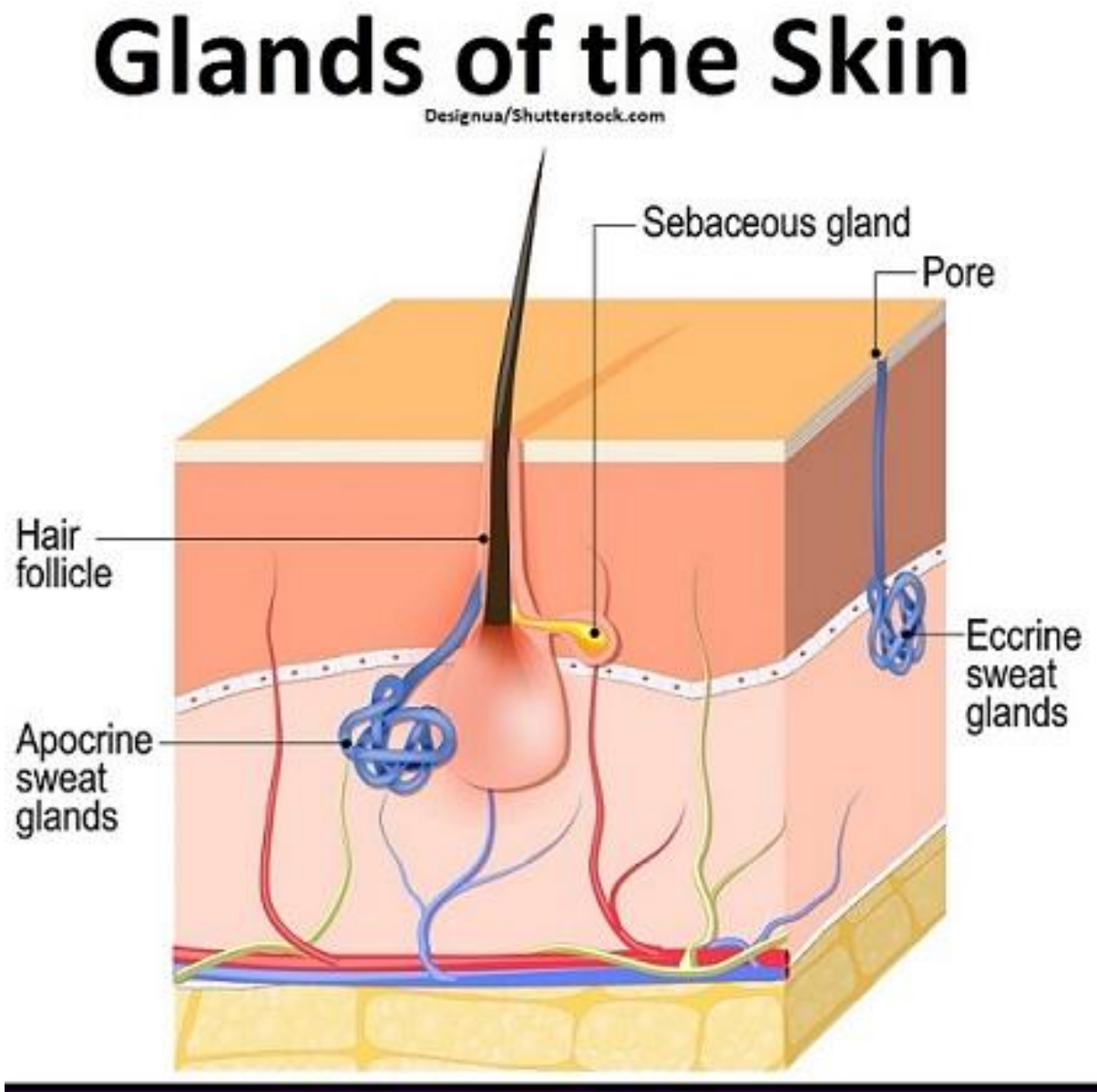
Hairs grow out of **follicles**, which are invaginations of the epidermis into the dermis.
Their expanded extremities, called **hair bulbs**, penetrate to the deeper part of the dermis. Each hair bulb is concave at its end, and the concavity is occupied by vascular connective tissue called the **hair papilla**.

A band of smooth muscle, the **arrector pili**, connects the undersurface of the follicle to the superficial part of the dermis. The muscle is innervated by **sympathetic nerve fibers**, and its contraction causes the hair to move into a more vertical position; it also compresses the sebaceous gland and causes it to extrude some of its secretion.



Sebaceous glands secrete sebum onto the shafts of the hairs as theypass up through the necks of the follicles. They are situated on the sloping undersurface of the follicles and lie within the dermis. Sebum is an oily material that helps preserve the flexibility of the emerging hair. It also oils the surface epidermis around the mouth of the follicle.

Sweat glands are long, spiral, tubular glands distributed over the surface of the body, except on the red margins of the lips, the nail beds, and the glans penis and clitoris. These glands extend through the full thickness of the dermis, and their extremities may lie in the superficial fascia. The sweat glands are therefore the most deeply penetrating structures of all the epidermal appendages.



Sweat gland vs Sebaceous gland in the skin

Clinical Pearl: **Langer’s Lines (Cleavage lines, tension lines)** are the direction of collagen fibers in the dermis. Surgical incisions made parallel to these lines heal with less scarring.

Wounds against Langer's Lines have been described to have a poorer final cosmetic appearance compared to those along Langer's Lines.

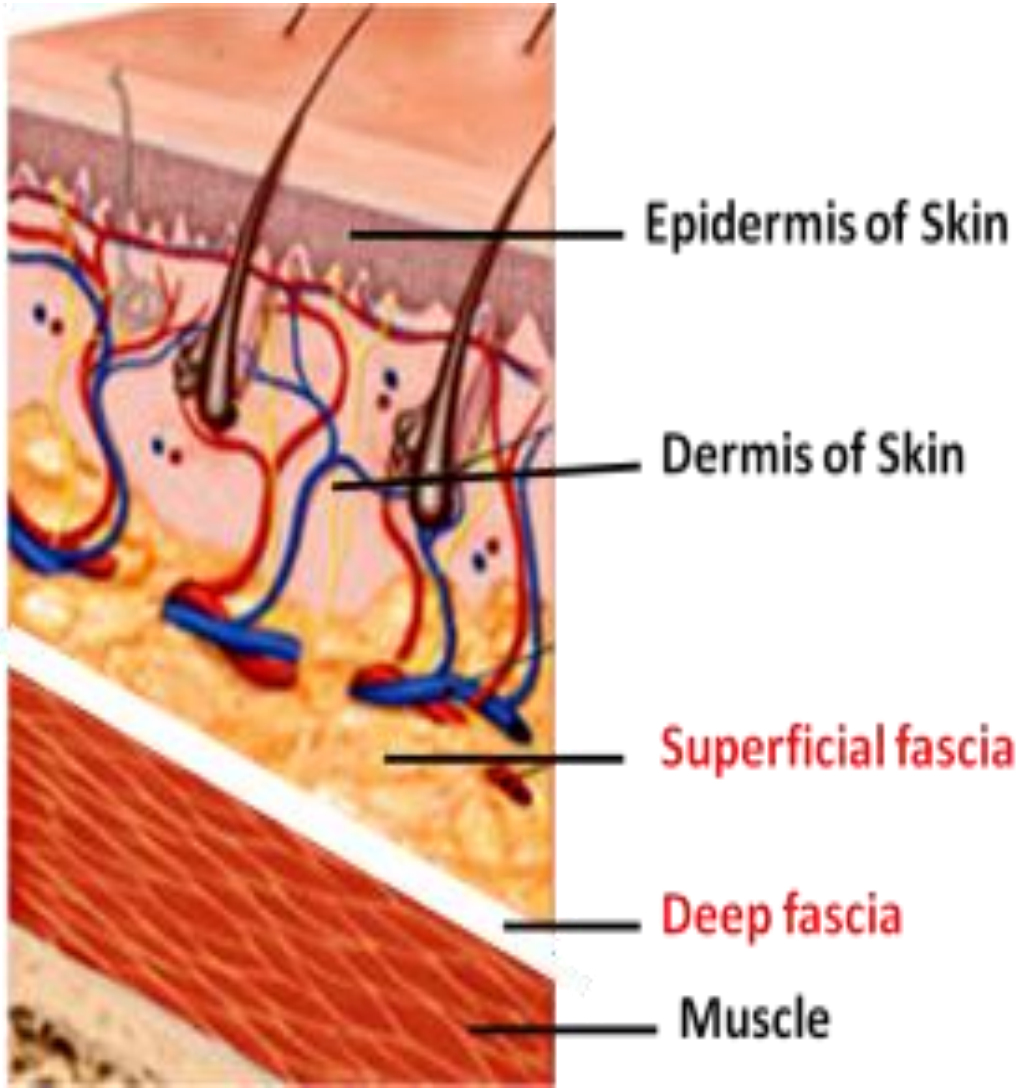
Fascia

Fascia is the connective tissue that encloses the body deep to the skin and also envelops and separates individual muscles and groups of muscles as well as deeper organs.

Think of fascia as the connective tissue sheaths that hold the structures of the body together in organized arrangements. The fasciae of the body can be divided into two types, superficial and deep.

Superficial fascia is the subcutaneous layer of loose connective tissue that connects the skin to the underlying deep fascia. It contains:

Fat
Superficial blood vessels
Cutaneous nerves
Superficial lymphatics
Mammary gland in females
Muscle in superficial fascia e.g. platysma in neck, muscles of scalp and muscles of facial expression.



Deep fascia (muscular fascia; visceral fascia)is a dense, inelastic fibrous layer that lies deep to superficial fascia and covers the deeper structures such as muscles bone and nerves and blood vessels.
It becomes continuous with the outermost covering layer of underlying structures i.e. periosteum, perimysium, perineurium, and adventitial layer of blood vessels.

Some Modifications of deep fascia are:

Intermuscular septa: In limbs the deep fascia sends septa from its deep surface to the bone which separate the muscles into different compartments. They form partition between the groups of muscles.

Retinaculum: A retinaculum (plural retinacula) is a band of thickened deep fascia that holds tendons in place. They are present where tendons cross the joint. The term retinaculum is derived from the Latin verb retinere (to retain). e.g. Flexor and extensor retinacula are present around the wrist and ankle joint.

Fibrous flexor sheath: They are thickened deep fascia on the flexor surface of digits in hand and foot. They retain the flexor tendons close to the joints and prevent their bow stringing.

Ligament: They are the thickening of deep fascia which connect bones at joints. They hold ends of the bones close to each other during movements and thus provide stability to the joints.

Interosseous membrane: An interosseous membrane is a thick dense fibrous sheet of connective tissue that occupies the space between two bones and connects them. They are present between the radius and ulna bones of forearm and tibia and fibula in the leg.

MUSCLES

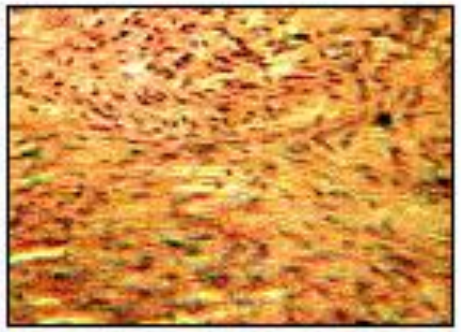
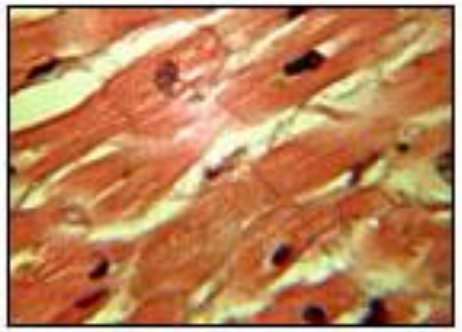
Muscle Function:

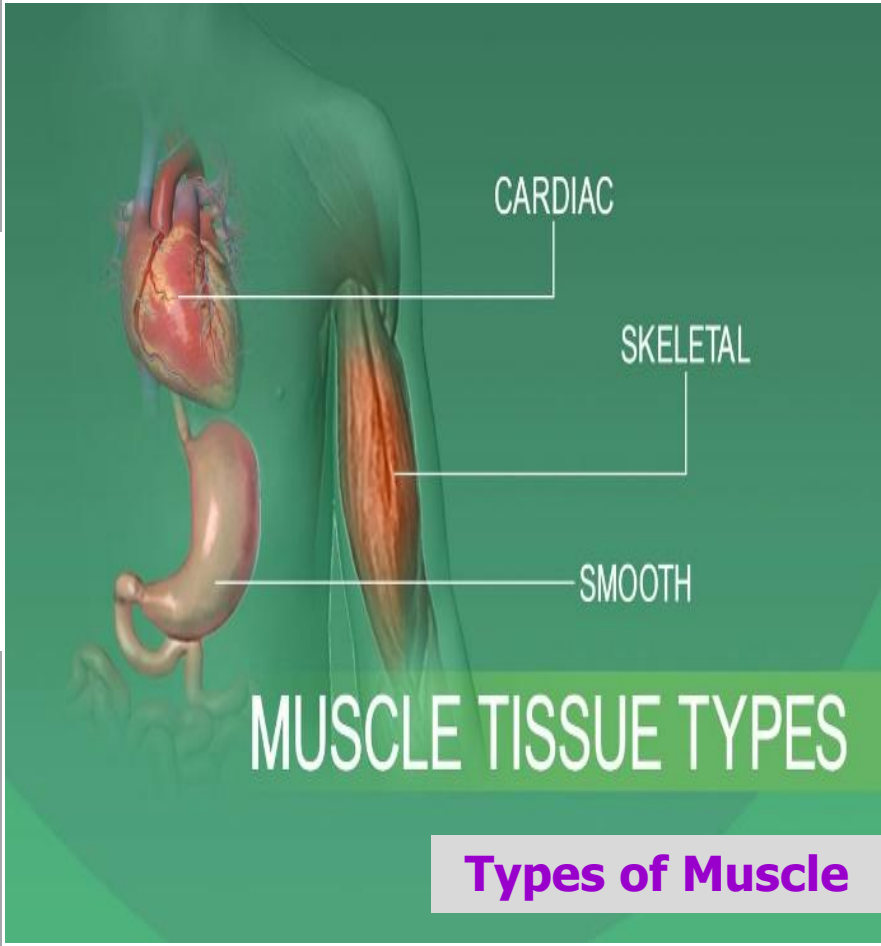
- Stabilizing joints
- Maintaining posture
- Producing movement
- Moving substances within the body
- Stabilizing body position and regulating organ volume
- Producing heat– muscle contraction generates 85% of the body's heat

Characteristics of Muscle Tissue

- Excitability- receive and respond to stimuli
- Contractility- ability to shorten and thicken
- Extensibility- ability to stretch
- Elasticity- ability to return to its original shape after contraction or extension

Types of Muscle

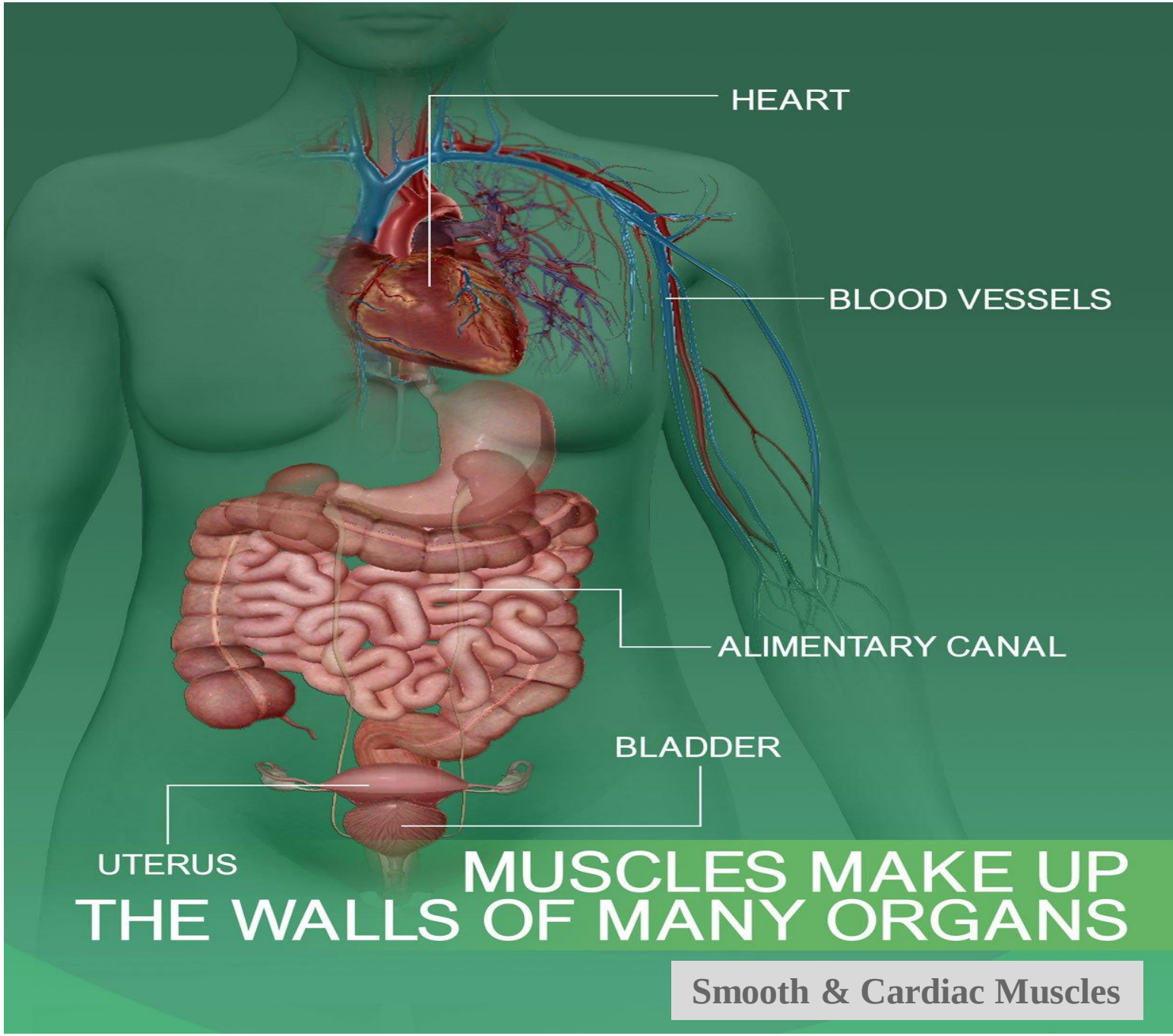
	Skeletal Muscle	Smooth Muscle	Cardiac Muscle
Location	Attached to bone	On hollow organs, glands and blood vessels	Heart
	 Skeletal muscle	 Smooth muscle	 Cardiac muscle
Control	voluntary	involuntary	involuntary
Striations	yes	no	yes
Cell Shape	Cylindrical	Spindle-shaped	Branched



Not all muscle tissue is **skeletal muscle.**

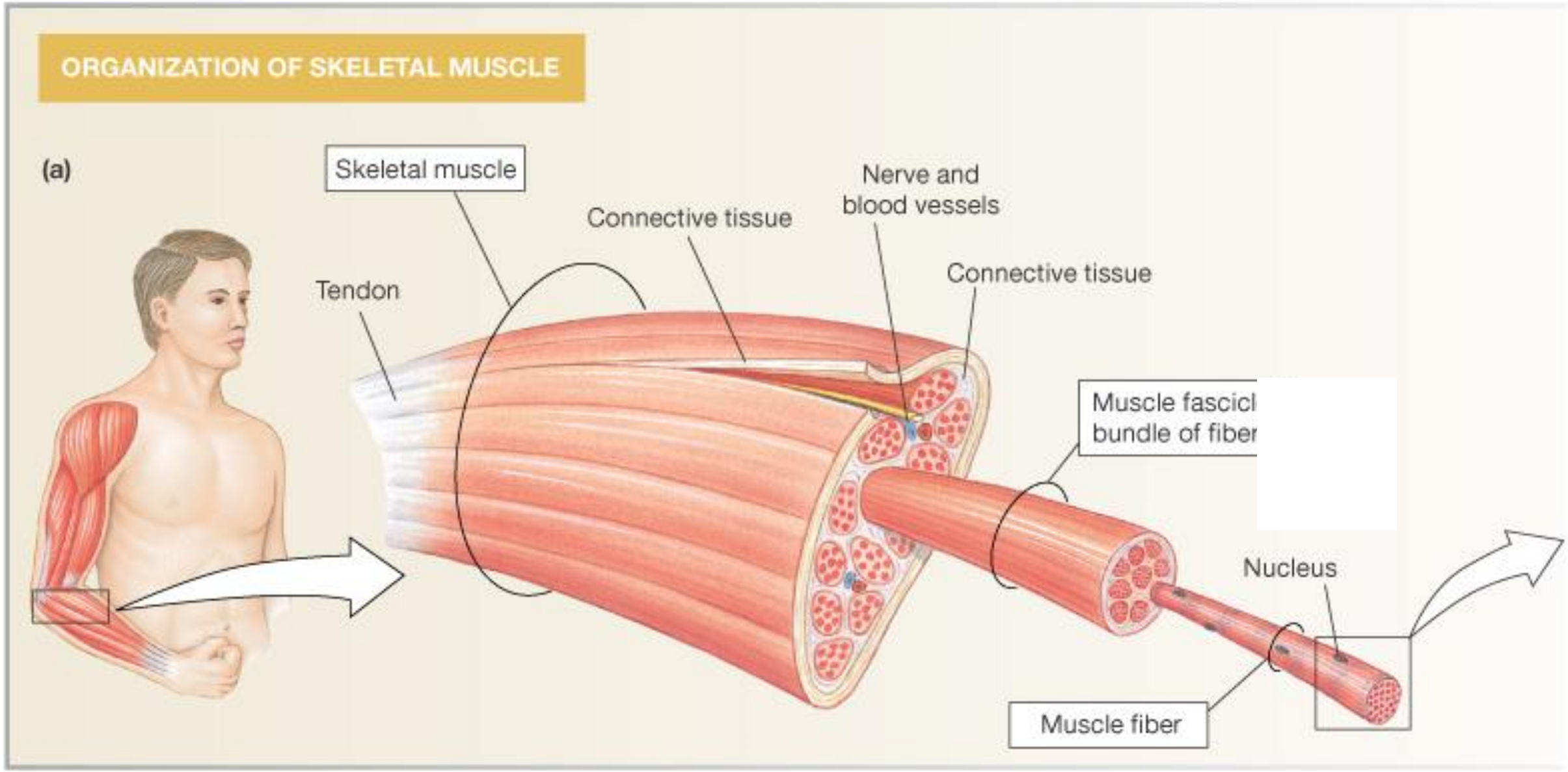
Smooth muscle tissue is in the walls of many human body organs and helps those organs move to facilitate body functions. The alimentary canal (esophagus, stomach, and intestines) includes muscle tissue that contracts and relaxes to move nutrients through the digestion process. The urinary bladder also includes muscle tissue that contracts and relaxes to hold and release urine. Smooth muscles in the walls of arteries help move blood through the body.

Heartbeats are the result of the contraction and relaxation of **cardiac muscle**.



Smooth & Cardiac Muscles

Anatomy of Skeletal Muscle

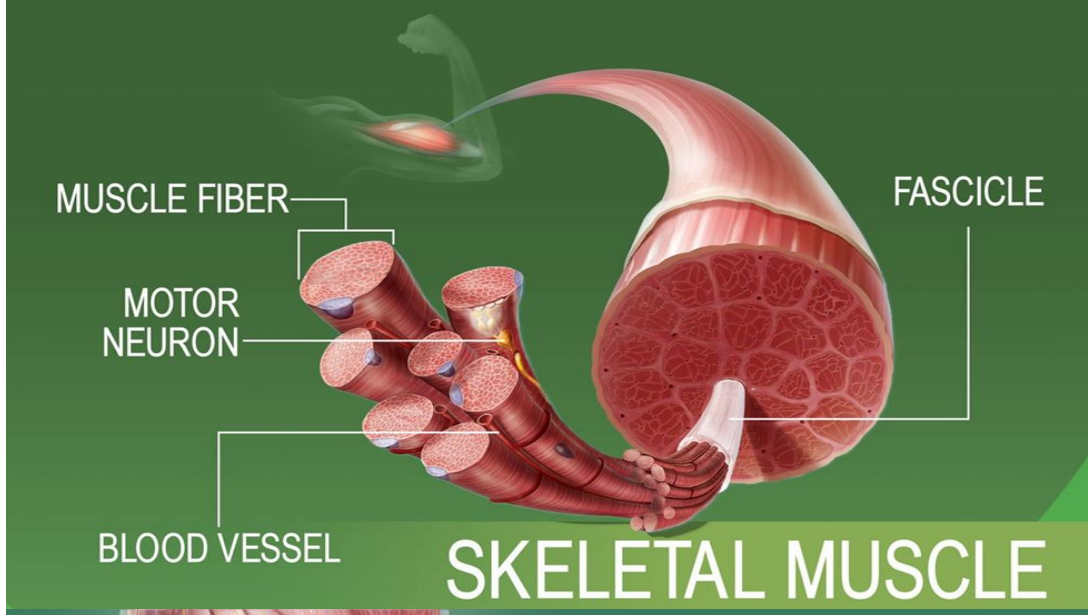


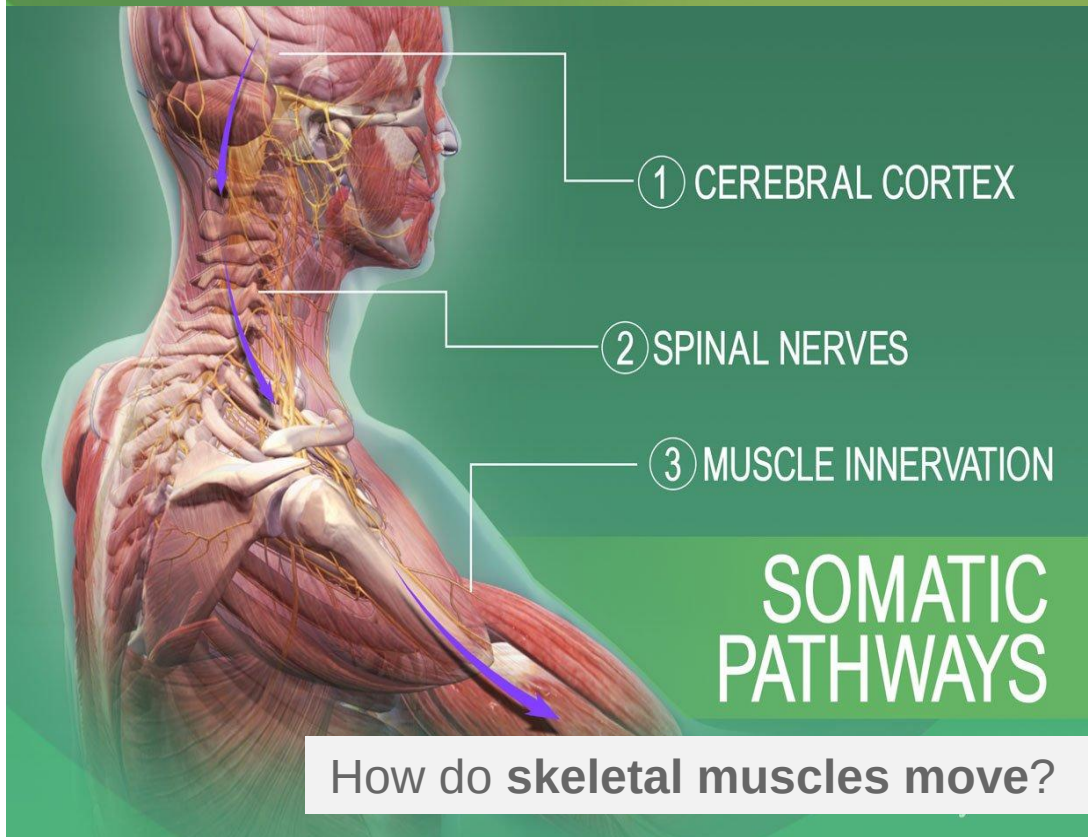
- The muscular system
  - Consists only of skeletal muscles
  - Muscle organization dramatically affects power, range, and speed of movement.
- Skeletal muscle fibers form bundles called *fascicles*
- How do **skeletal muscles move**?

It happens when the **muscular system** and the **nervous system** work together:

Somatic signals are sent from the cerebral cortex to nerves associated with specific skeletal muscles.

Most signals travel through spinal nerves that connect with nerves that innervate skeletal muscles throughout the body.





How do **skeletal muscles move**?

Nearly **650 muscles** are attached to the skeleton.

Skeletal muscles- work **in pairs**: one muscle moves the bone in one direction and the other moves it back again.

Most muscles- extend from one bone across a joint to another bone with one bone being more stationary than another in a given movement.

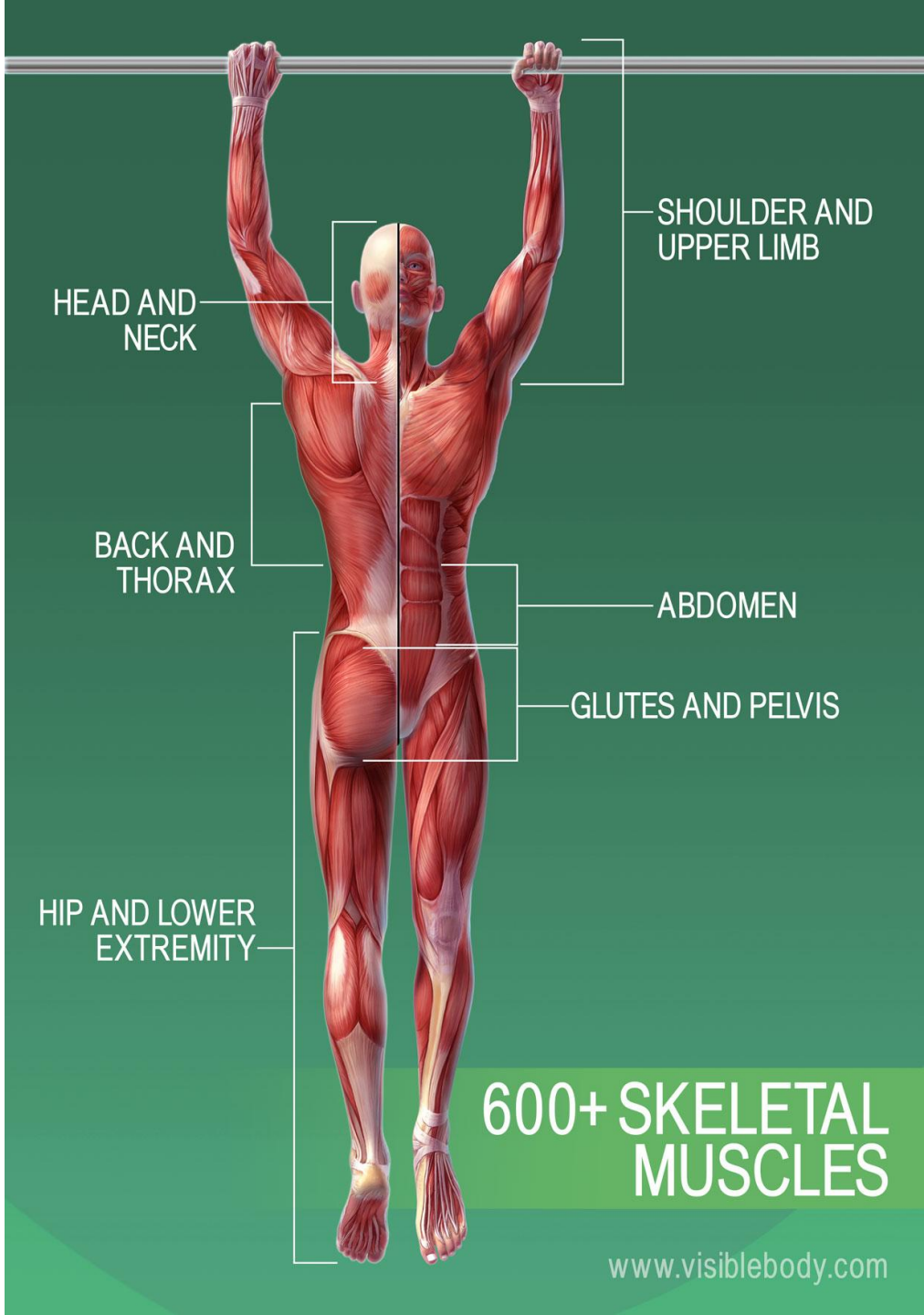
Muscle movement- bends the skeleton at moveable joints.

Tendons: made of dense fibrous connective tissue shaped like heavy cords anchor muscles firmly to bone.

Origin: attachment to the more stationary bone by tendon closest to the body (proximal).

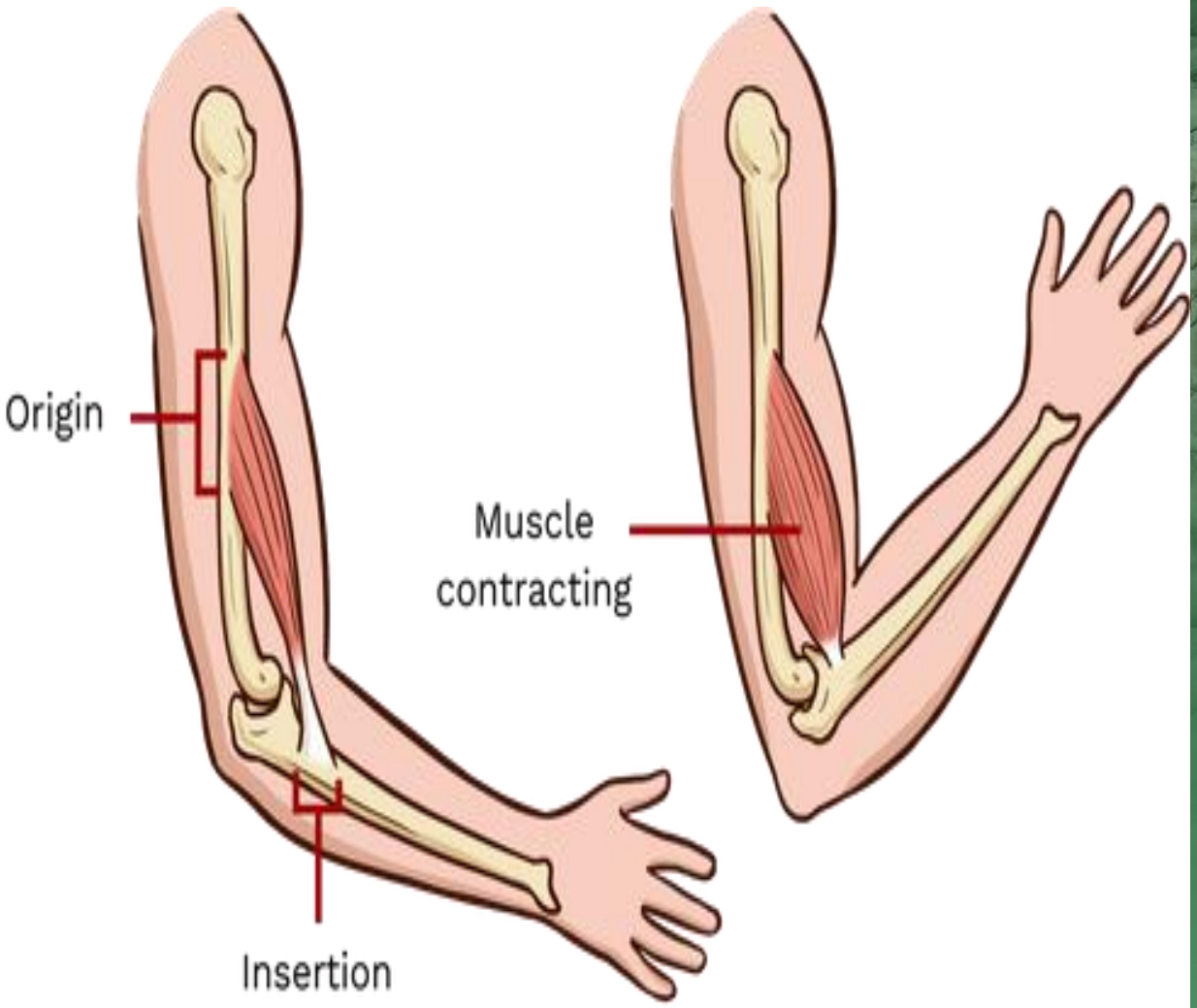
Insertion: attachment to the more moveable bone by tendon at the distal end.

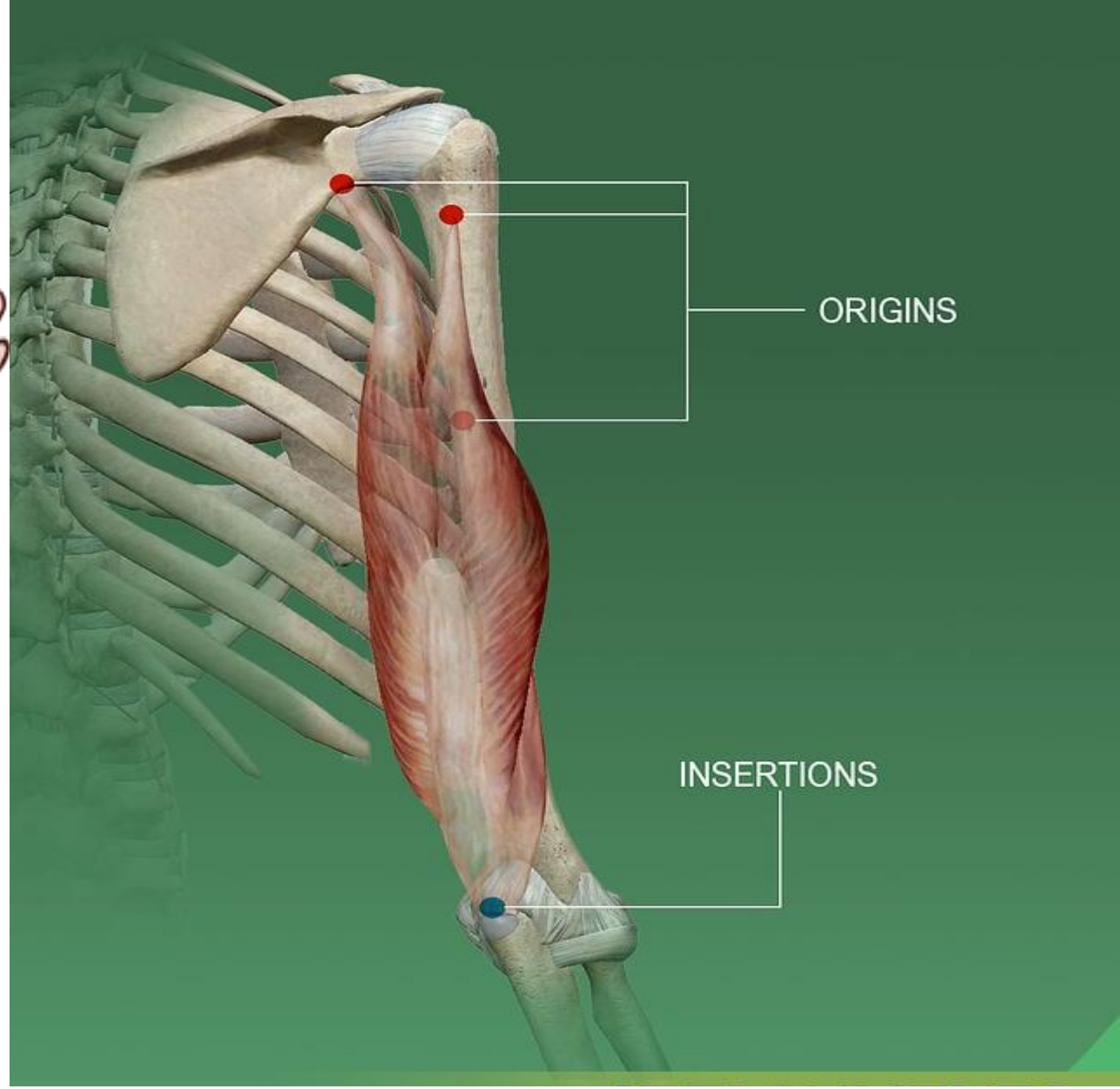
The force producing the bending is always a pull of contraction. Reversing the direction is produced by the contraction of a different set of muscles.



Naming of Skeletal Muscle

- Size
  - Maximus
  - Minimus
  - Major
  - Minor
  - Longus
  - Brevis
- Shape
  - Deltoid (triangle)
  - Teres (round, cylindrical)
  - Trapezius (trapezoidal)
  - Rhomboideus (rhomboidal)
- Location
  - Abdominis
  - Femoris
  - Brachii
  - Capitis
  - Pectoralis
  - Intercostal
  - Digitorum
- Action
  - Abductor
  - Adductor
  - Flexor
  - Extensor
  - Pronator
  - Supinator
  - Levetor
  - Depressor
- Relative Position
  - Lateral
  - Medial
  - Internal
  - External
  - Superficialis
  - Profundis
- Number of Heads
  - Biceps
  - Triceps
  - Quadriceps





The **origin** is a point of attachment of the muscle to the immovable or less movable bone - a point where the muscle is anchored to the bone.
The **insertion** is a point of attachment of the muscle to the movable bone. When the muscle contracts, the insertion is usually pulled towards the origin, creating the movement.

Pectoral Region

The pectoral region is the anterior aspect of the shoulder. Although this area may be considered part of the anterior thoracic wall, several structures here (e.g., pectoral muscles) connect with and function as part of the upper limb, thus uniting these areas. The pectoral region also houses the breasts.

Breasts

Strictly speaking, the breasts are not anatomically part of the upper limb. However, they are situated in the pectoral region, and their blood supply and lymphatic drainage are largely related to the armpit. The clinical importance of the breasts cannot be overemphasized.

The breasts are paired structures, present in both males and females, yet are more prominent in females following puberty.

In females, the breasts contain the mammary glands, an accessory gland of the female reproductive system. The mammary glands are the key structures involved in lactation.

The breasts are specialized accessory glands of the skin that secrete milk.They are present in both sexes and share similar structure in males and immature females. **The nipples** are small and surrounded by a colored area of skin called the **areola**. The breast tissue consists of a system of ducts embedded in connective tissue that does not extend beyond the margin of the areola.

Surface Anatomy

The breast is located on the anterior thoracic wall. It extends horizontally from the **lateral border of the sternum** to the **mid-axillary line**. Vertically, it spans between the 2nd and 6th **costal cartilages**. It lies superficially to the pectoralis major and serratus anterior muscles.

The breast can be considered to be composed of two regions:

Circular body – largest and most prominent part of the breast.

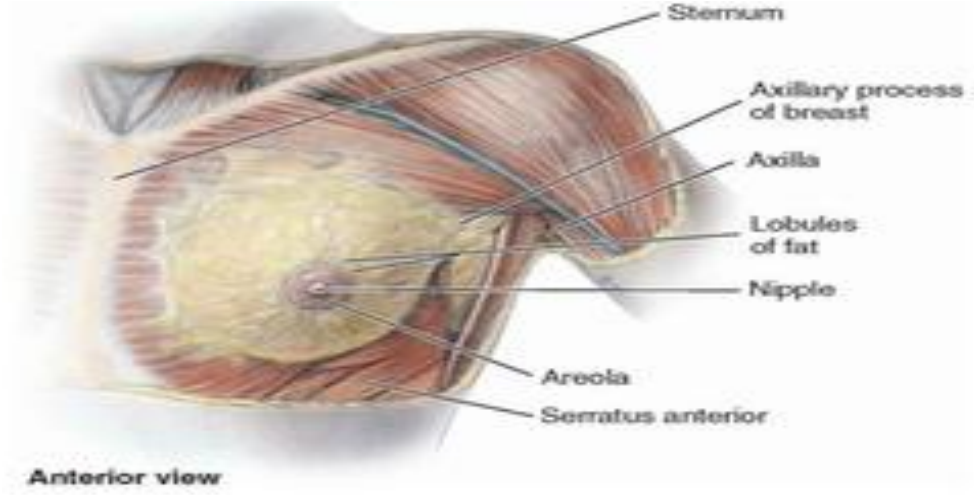
Axillary tail – smaller part, runs along the inferior lateral edge of the pectoralis major towards the axillary fossa.

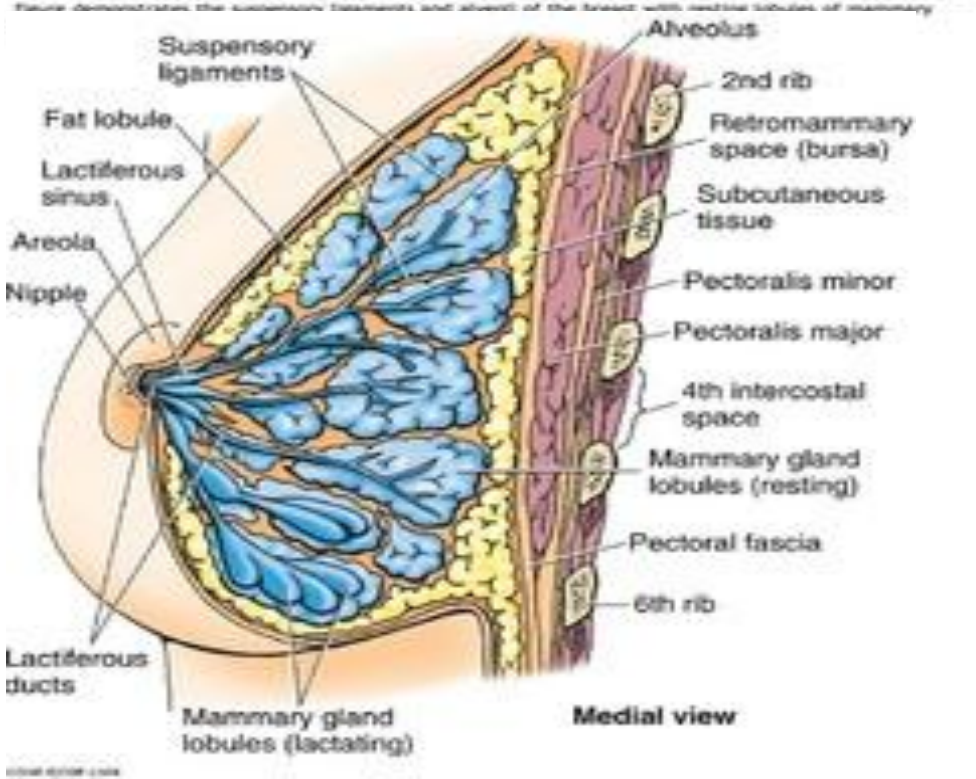
VERTICALLY

From second to sixth rib in midclavicular line.

HORIZONTALLY

From lateral border of sternum to midaxillary line along the fourth rib.





Deep relations

The Base of the Mammary gland called Mammary Bed rests upon the following structures (from Superficial to deep)

(a) Retromammary Space
(b) Deep Fascia (Pectoral Fascia)
(c) Muscles- Pectoralis Major, Serratus Anterior, External Oblique.

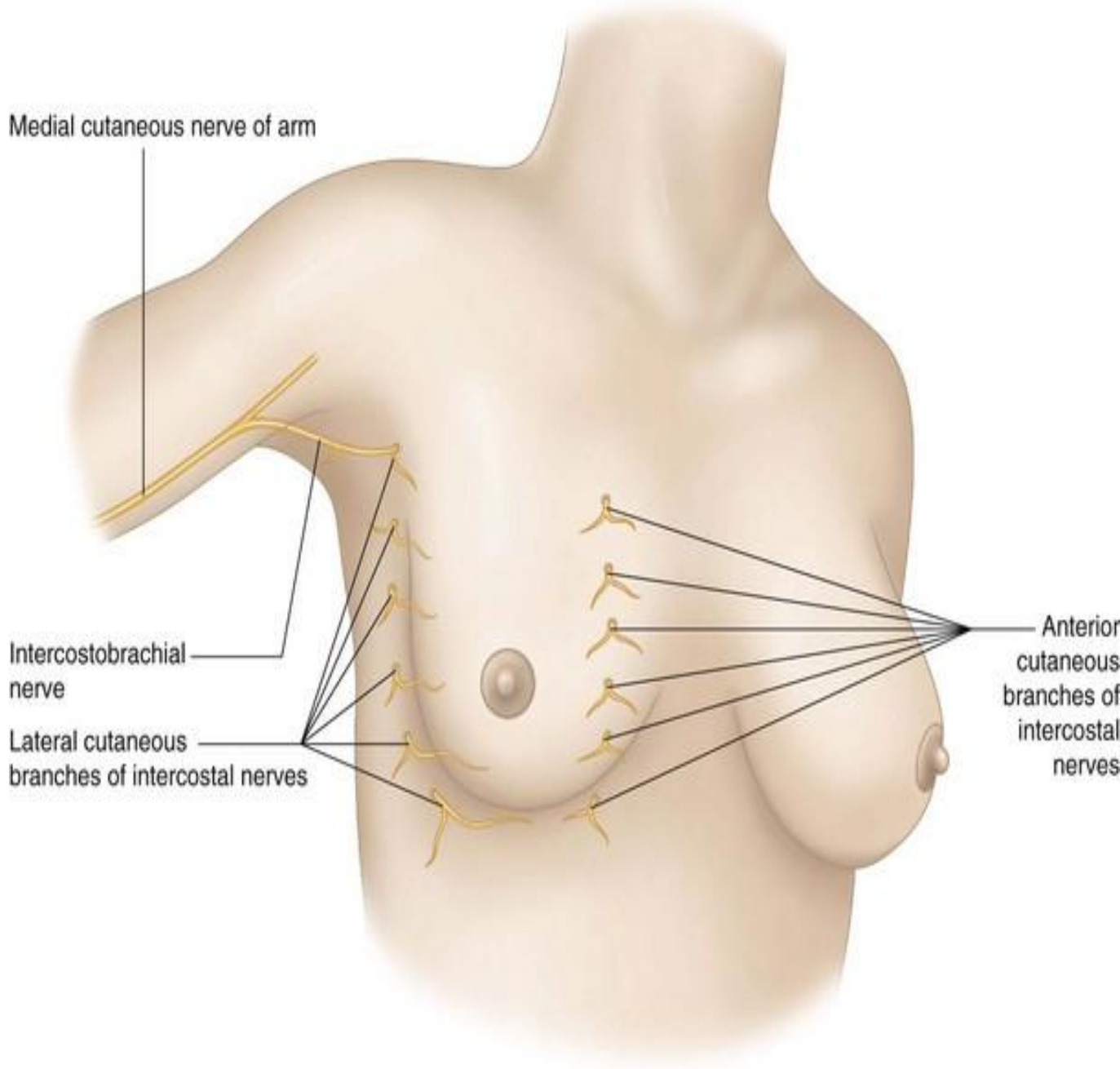
RETROMAMMARY SPACE

A Space deep to the base of the gland, lies superficial to deep fascia, contains loose areolar tissue, makes the gland freely movable.

Nerve Supply

The breast is innervated by the **anterior** and **lateral cutaneous branches** of the 4th to 6th intercostal nerves.
These nerves contain both sensory and autonomic nerve fibres (the autonomic fibres regulate smooth muscle and blood vessel tone).

It should be noted that these nerves do not control the production and secretion of milk. This is regulated by the hormones prolactin and oxytocin, which are secreted from the **pituitary gland**



Vasculature

Arterial supply to the **medial aspect** of the breast is via the **internal thoracic artery** (also known as internal mammary artery) – a branch of the **subclavian artery**.

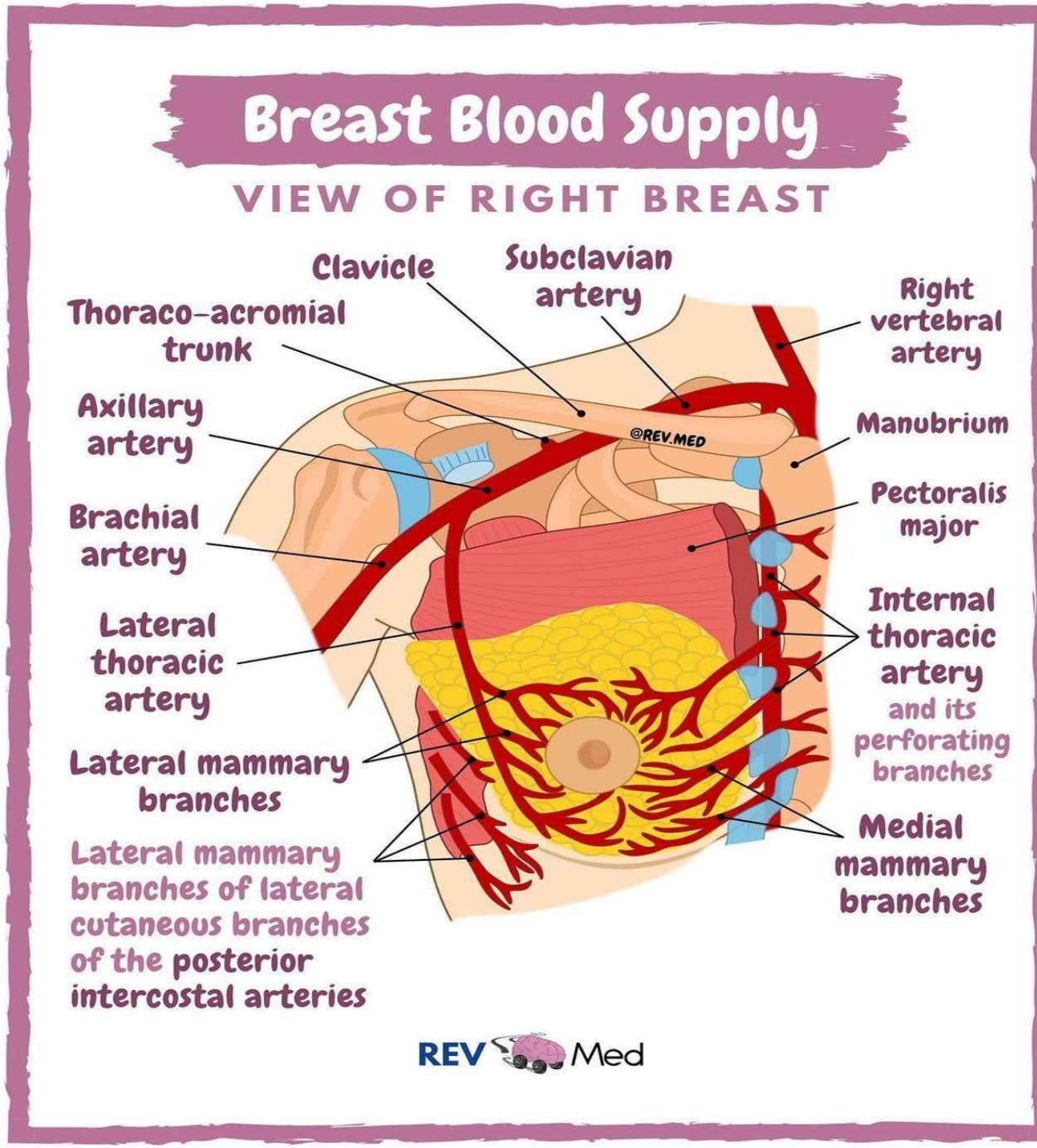
The lateral part of the breast receives blood from four
vessels:

Lateral thoracic and thoracoacromial branches – originate from the axillary artery.

Lateral mammary branches – originate from the posterior intercostal arteries (derived from the aorta). They supply the lateral aspect of the breast in the 2nd 3rd and 4th intercostal spaces.

Mammary branch – originates from the anterior intercostal artery.

The veins of the breast correspond with the arteries, draining into the **axillary** and **internal thoracic veins**

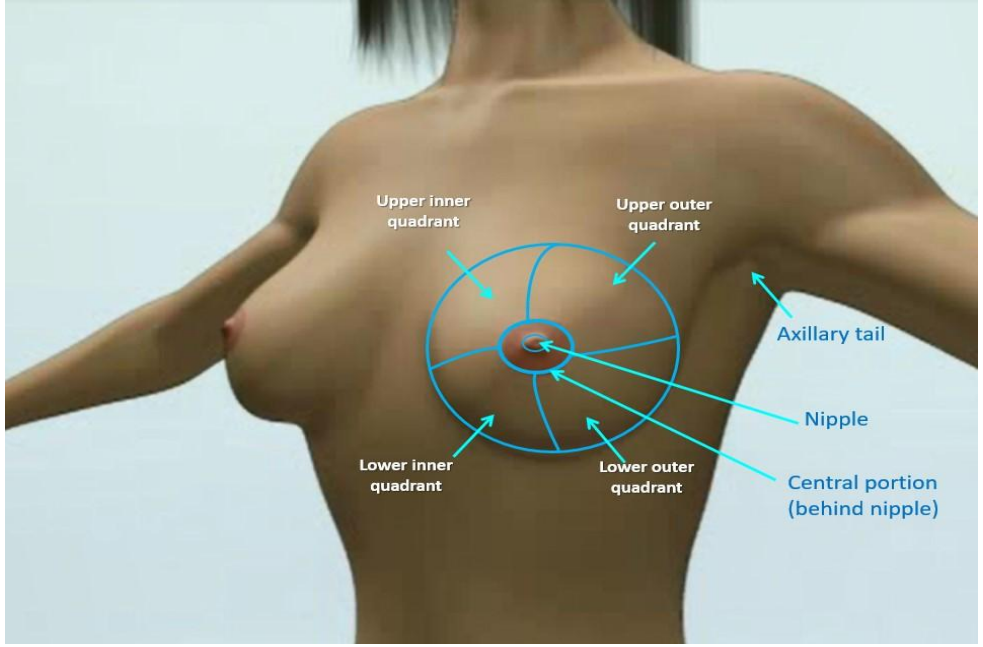


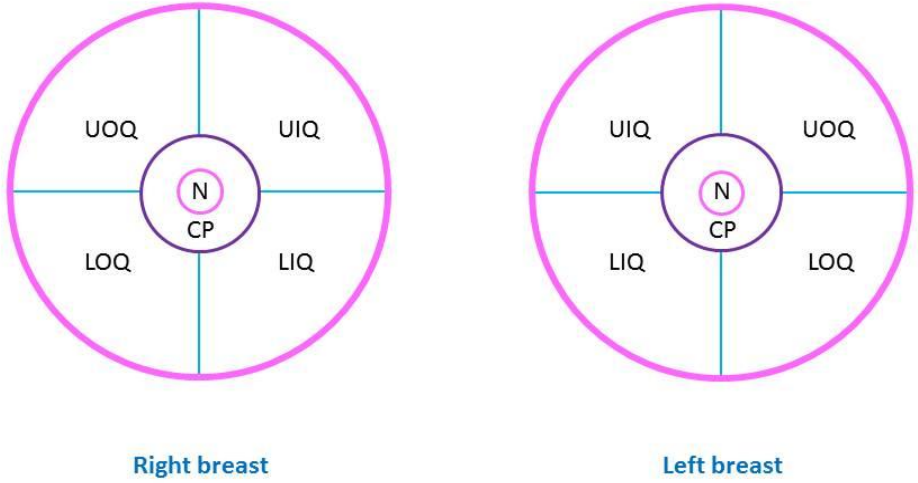
Dividing the breast into four quadrants is a standard clinical method used to localize and describe findings (like masses, cysts, or pain) clearly and consistently.

Each breast is divided into **four quadrants**, with the **nipple and areola** at the centre:
UOQ: Upper outer quadrant (superior and lateral)
LOQ: Lower outer quadrant (inferior and lateral)
LIQ: Lower inner quadrant (inferior and medial)
UIQ: Upper inner quadrant (superior and medial)

Note: There is a fifth clinical area called the Axillary Tail (Tail of Spence), which is an extension of the UOQ that reaches toward the axilla (armpit).

The quadrants help predict where cancer might spread (lymphatic metastasis).





Lymphatics

The lymphatic drainage of the breast is of great clinical importance due to its role in the **metastasis** of breast cancer cells.

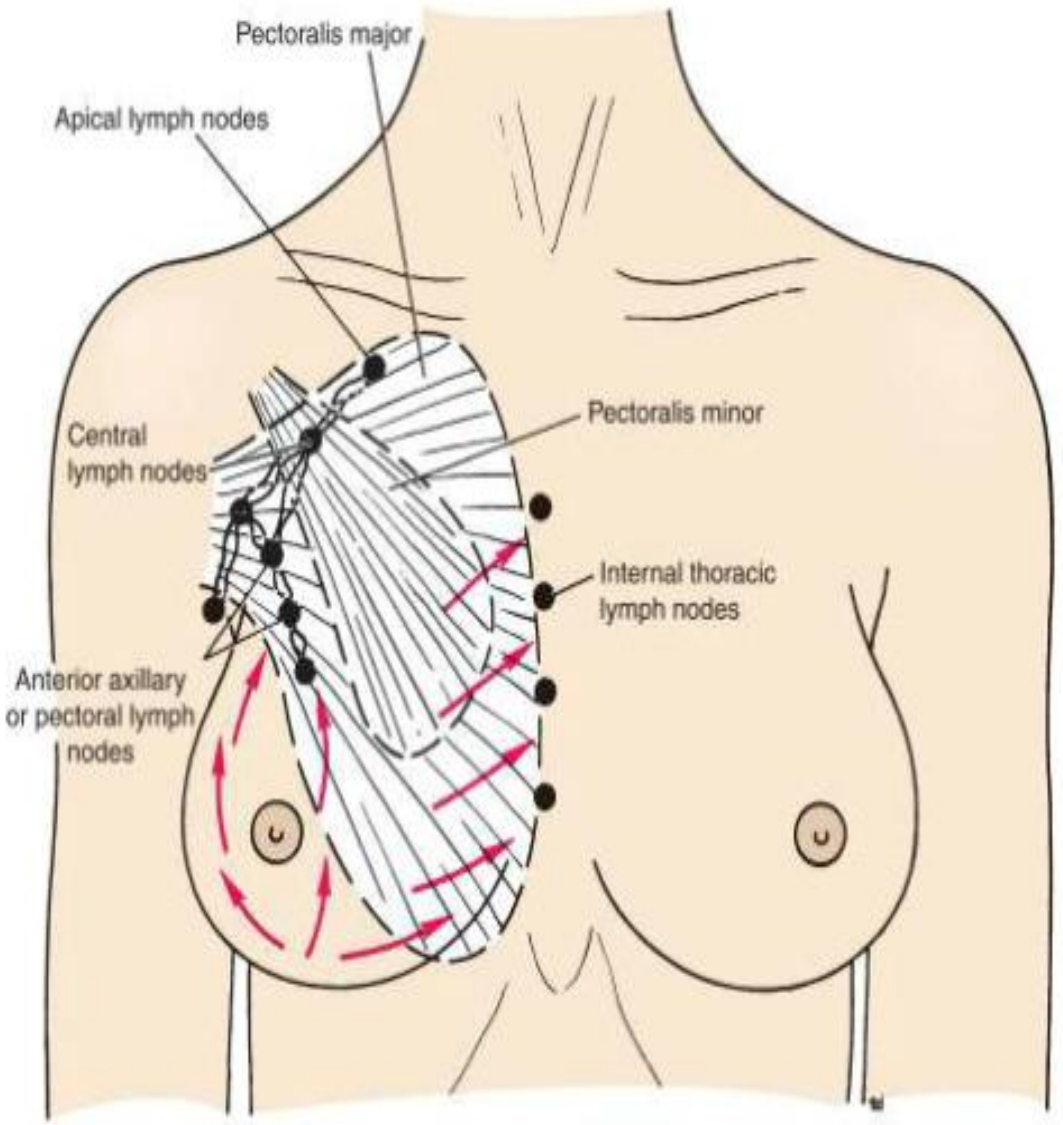
There are three groups of lymph nodes that receive lymph from breast tissue:

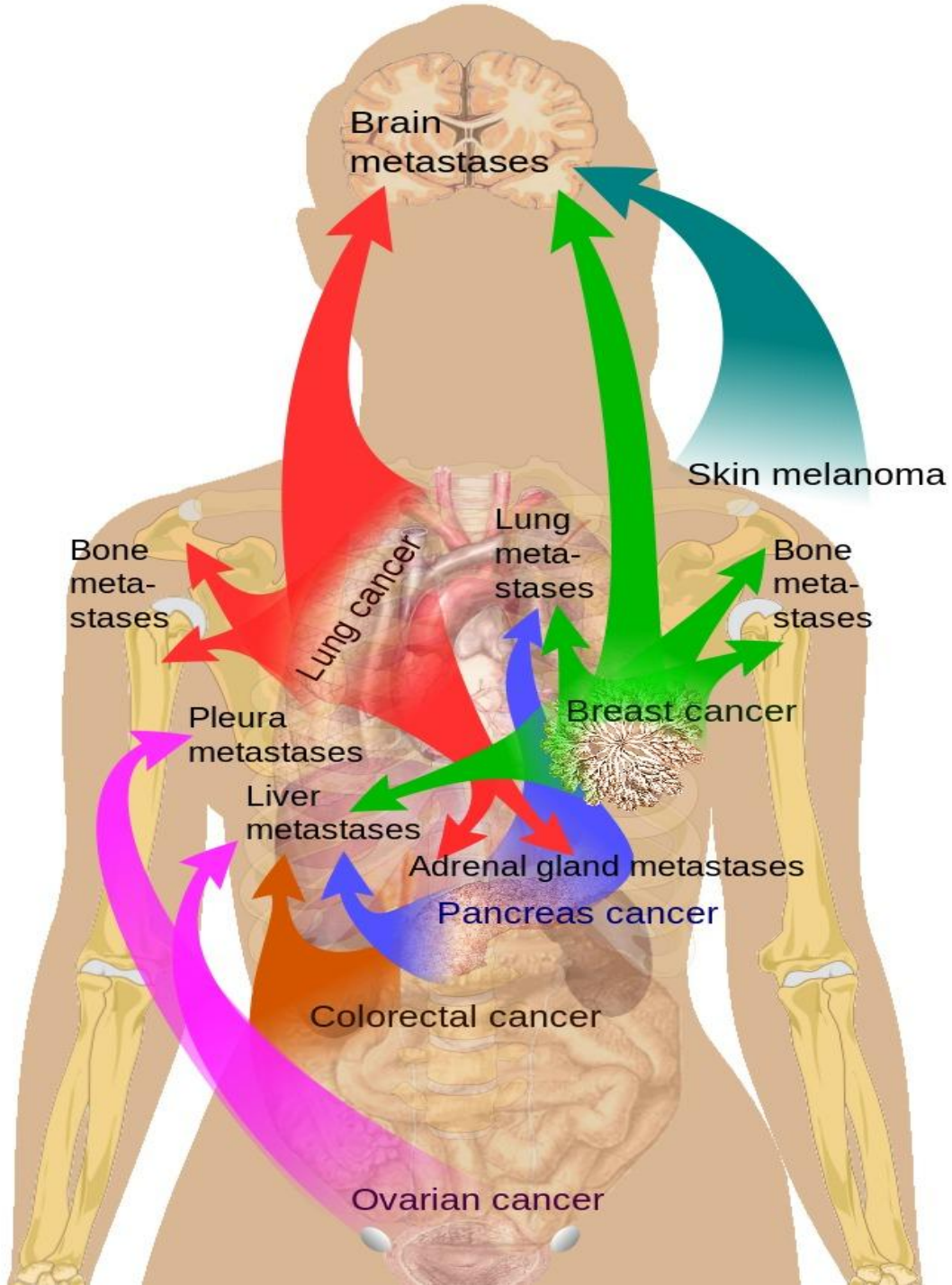
The lateral quadrants of the breast drain into: **anterior axillary nodes** (pectoral group of nodes): **(75%),**

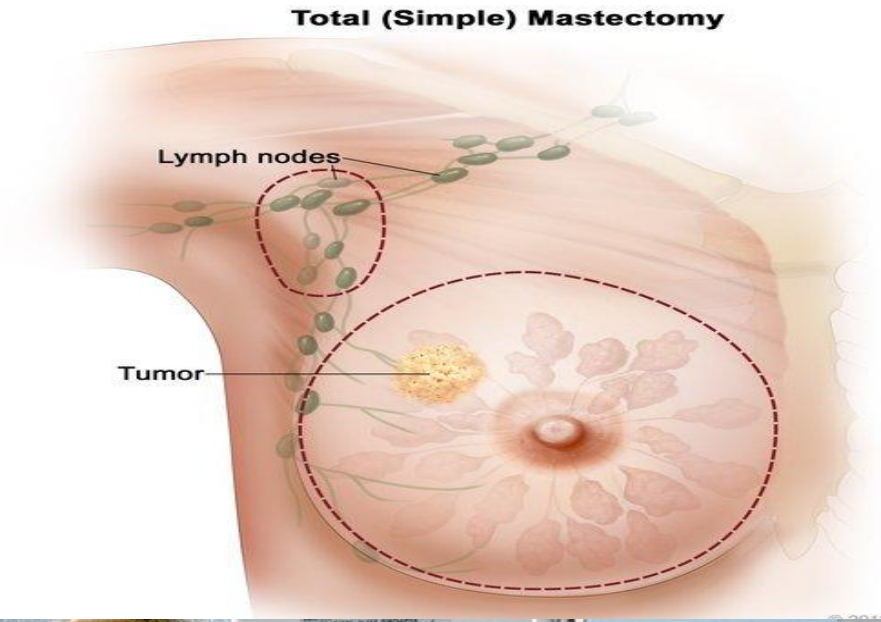
The medial quadrants drain by **parasternal nodes** (along the course of the internal thoracic artery) **(20%)**

posterior intercostal nodes (situated along the course of the posterior intercostal arteries) **(5%).**

some vessels communicate with the lymph vessels of the opposite breast and with those of the anterior abdominal wall.

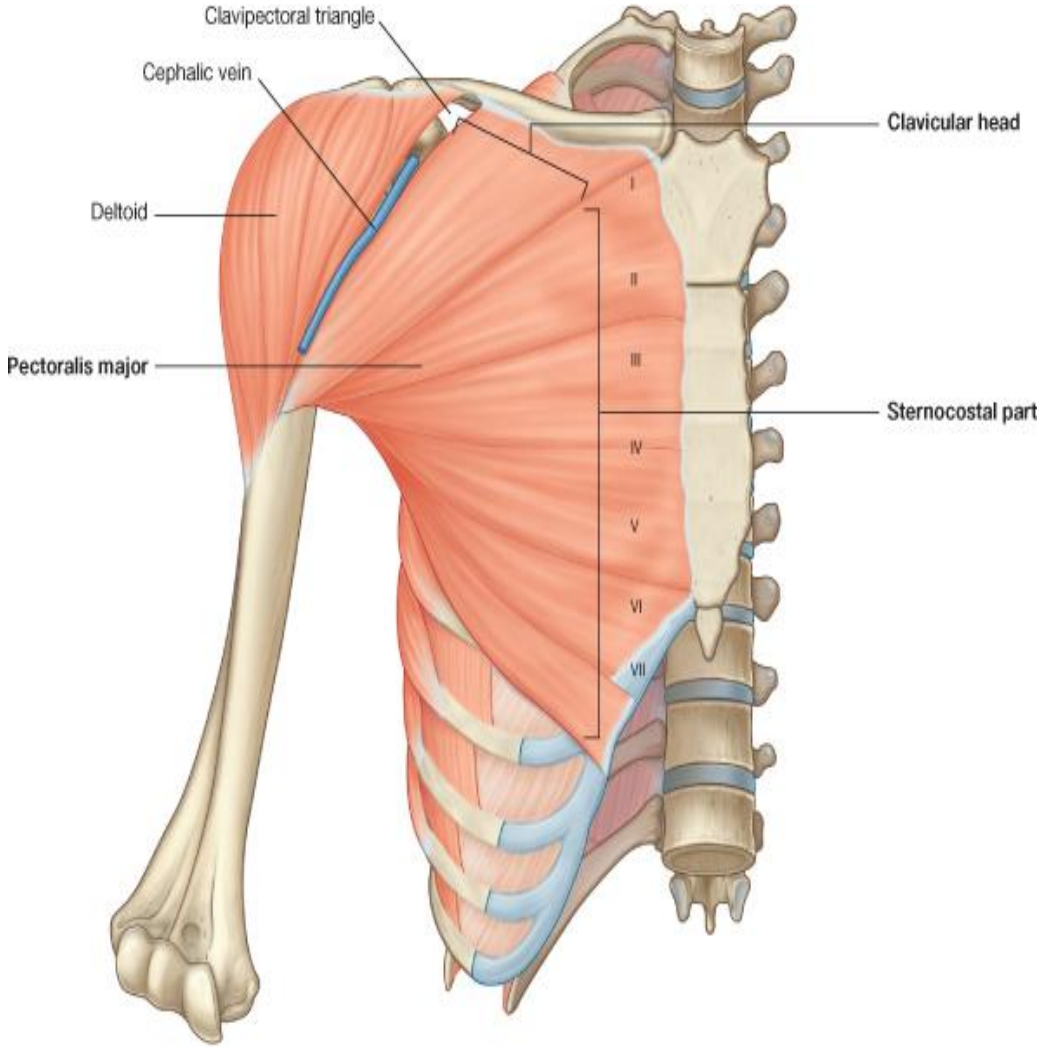






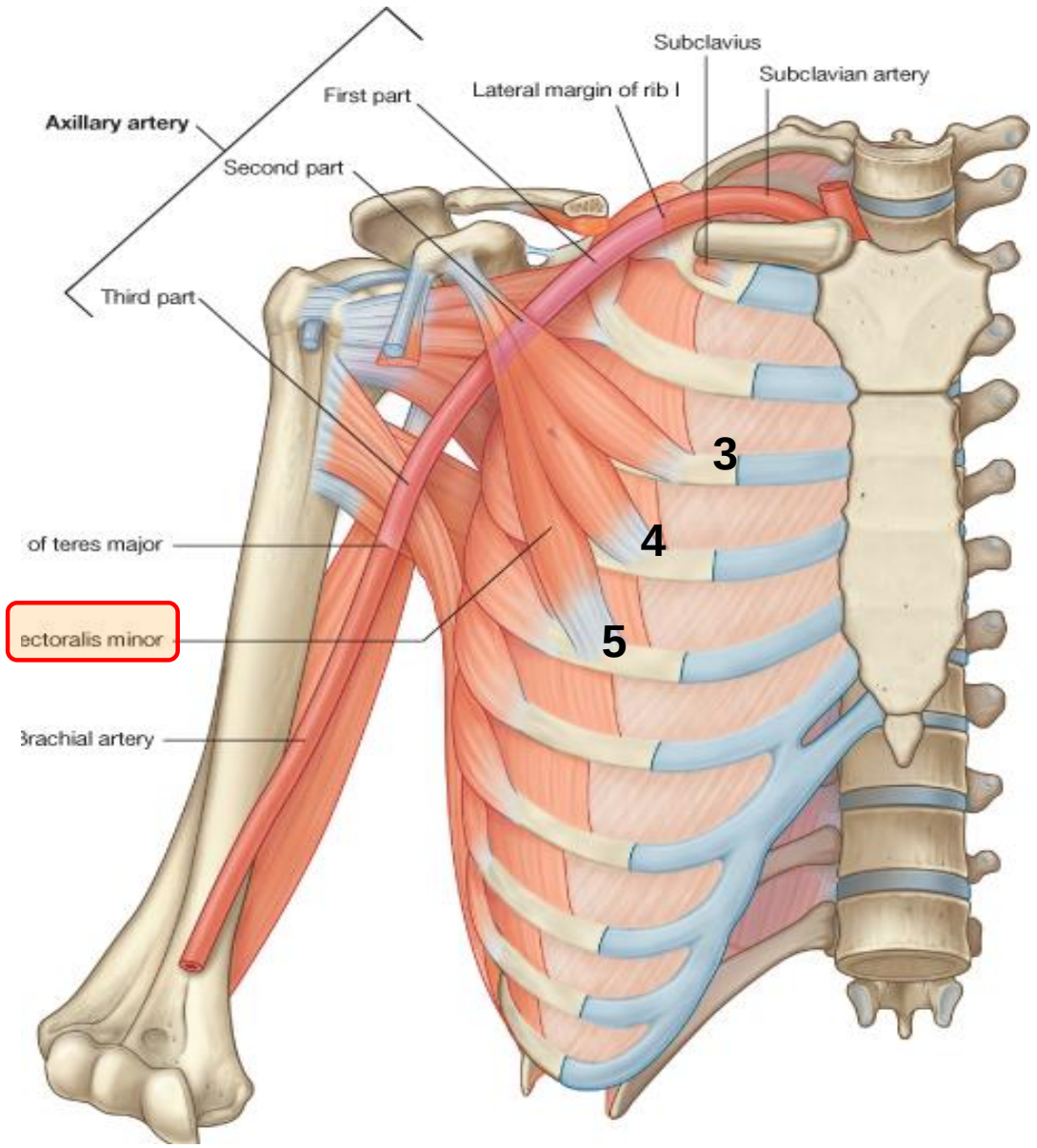
Mammogram. Woman undergoing a mammogram of the right breast.

Pectoral Muscles, Pectoralis Major



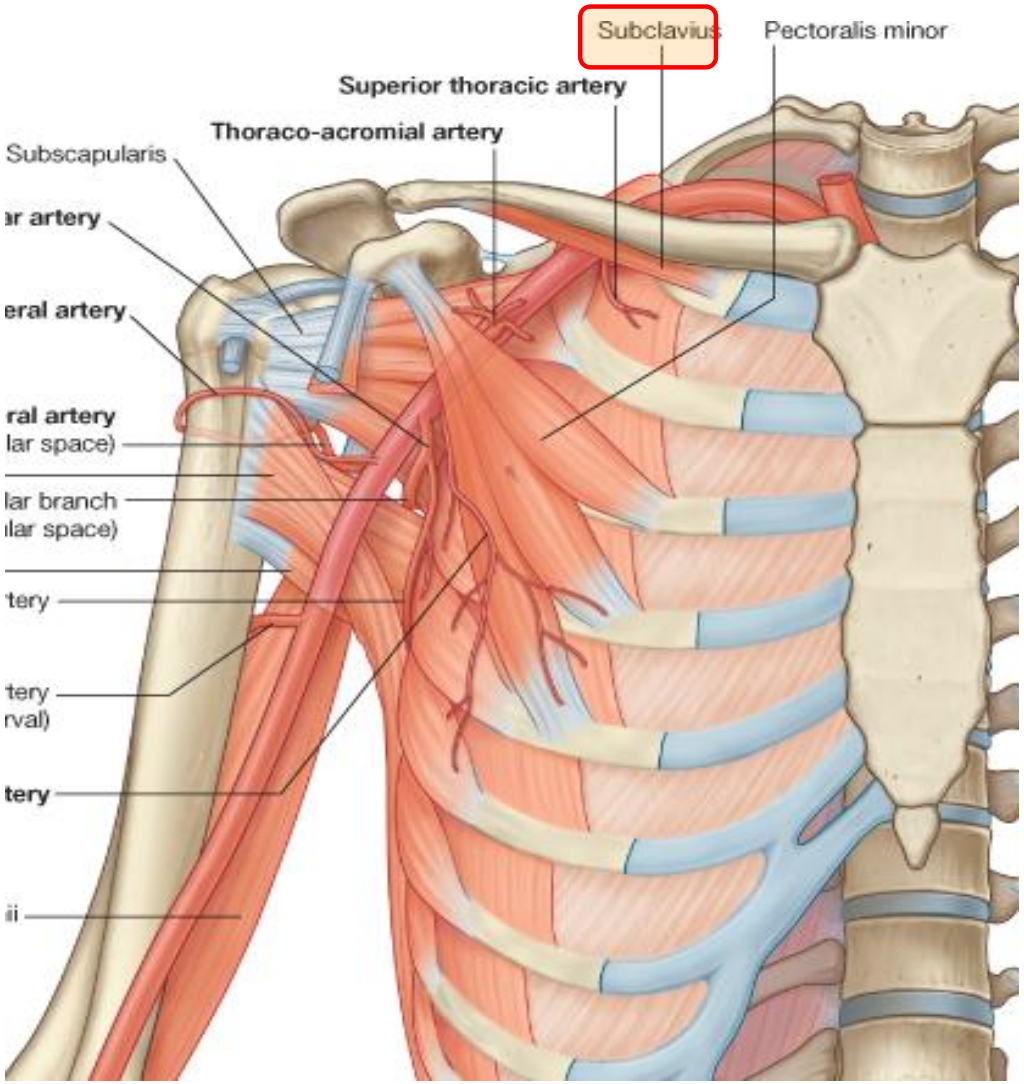
- **Origin :** 2 heads;
- **Clavicular head: From;**
- Medial ½ of the front of the clavicle.
- **Sternocostal head: From;**
- Sternum.
- Upper 6 costal cartilages.
- Aponeurosis of the external oblique muscle.
- **Insertion :**
- **Lateral lip of bicipital groove.**
- **Nerve supply :**
- **Medial & lateral pectoral nerves.**
- **Action :**
- **Adduction and medial rotation of the arm.**
- **Clavicular head helps in flexion of arm (shoulder).**

Pectoralis Minor



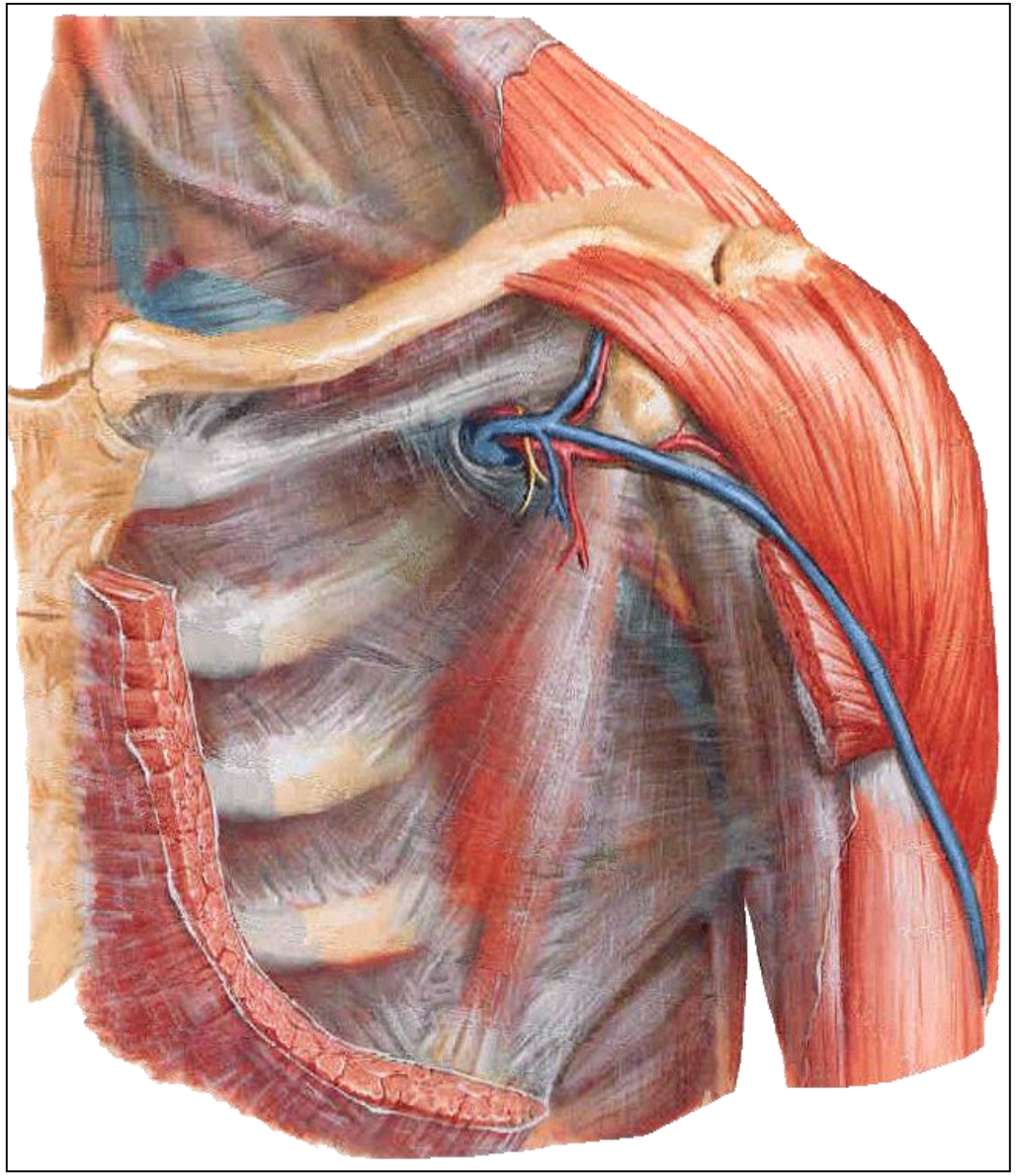
- **Origin:**
- From 3rd ,4th, & 5th ribs close to their costal cartilages.
- **Insertion:**
- Coracoid process.
- **Nerve supply:**
- Medial pectoral nerve.
- **Action:**
- Depression of the **shoulder.**
- Draw the **ribs** upward and outwards during deep inspiration.

Subclavius

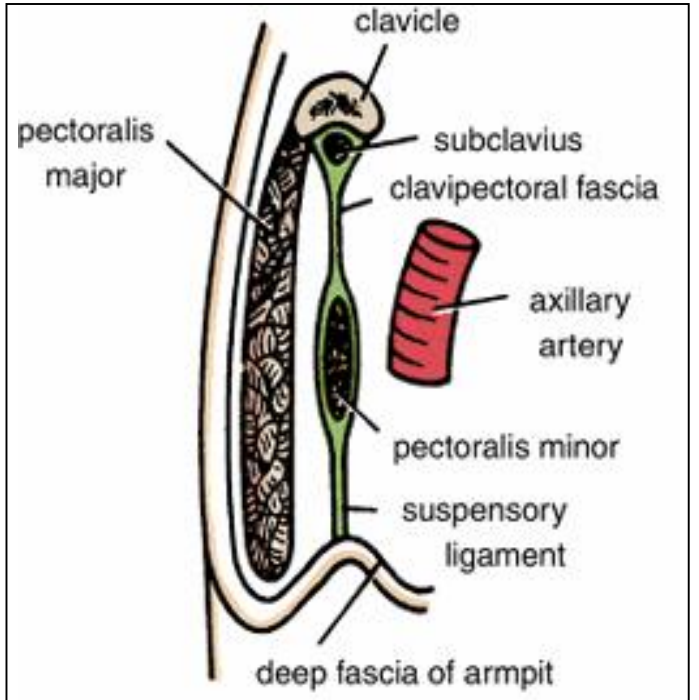


- **Origin:**
- From 1st rib at its costal cartilage.
- **Insertion:**
- Subclavian groove in the **middle 1/3** of the inferior surface of **clavicle.**
- **Nerve supply:**
- Nerve to subclavius from upper trunk of brachial plexus.
- **Action:**
- **Fixes** the **clavicle** during movement of shoulder joint.

Clavipectoral Fascia



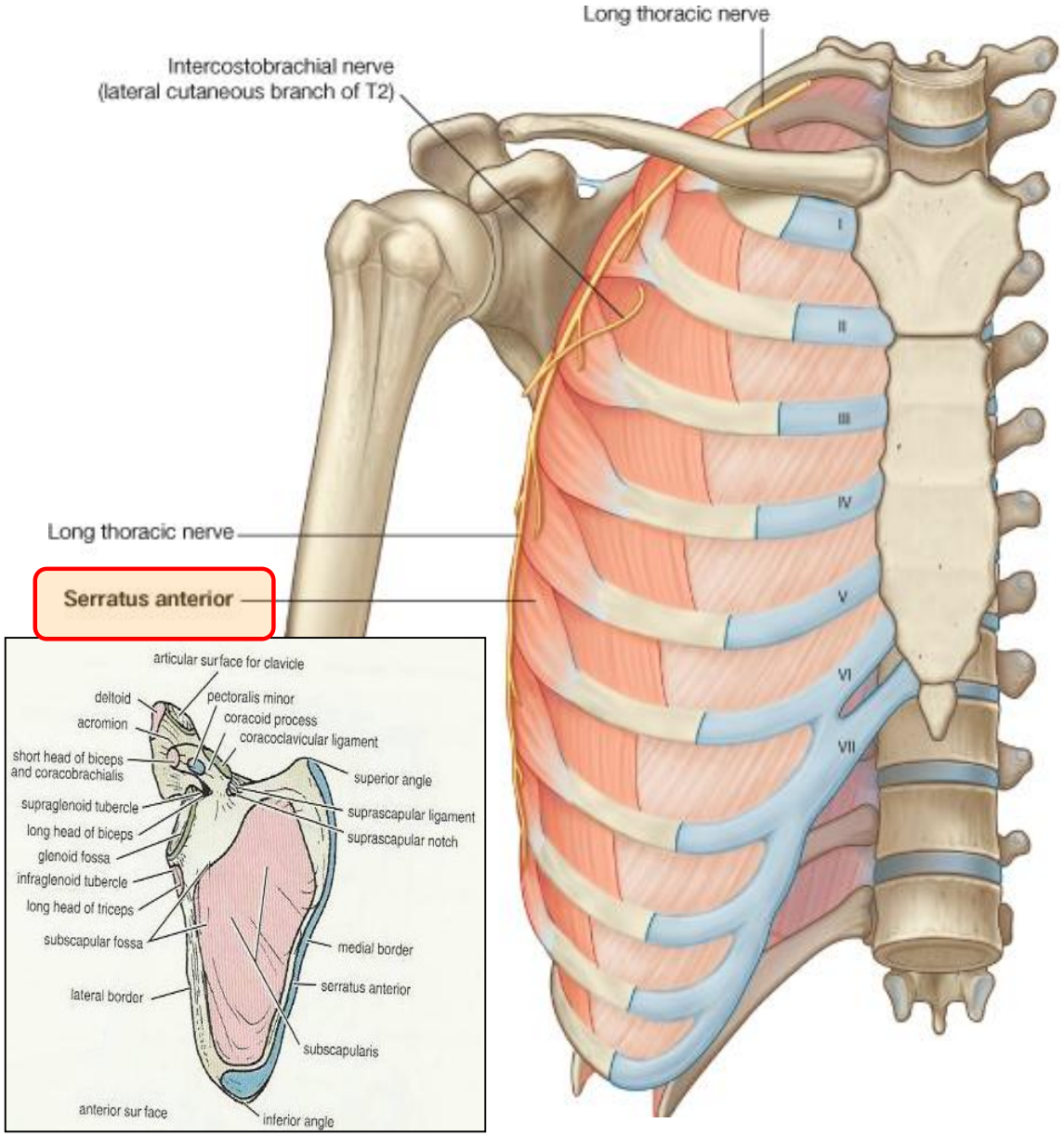
- It is a **thickened** membrane of **deep fascia** between the subclavius and pectoralis minor.
- It is pierced by :
  - Lateral pectoral nerve.
  - Thoraco- acromial artery
  - Cephalic vein.
  - Few lymph vessels.



Serratus anterior

Origin:

- Upper eight ribs.
- **Insertion:**
- anterior aspect of the medial border and inferior angle of scapula.
- **Nerve supply:**
- Long thoracic nerve (from roots of brachial plexus,C5,6,7).
- **Action:**
- Draws the scapula forward in boxing, (protrusion).
- Rotates scapula outwards in raising the arm above 90 degree.



Applied aspect

- Serratus anterior is called the **Boxer’s muscle** since it is responsible for pushing and punching movements.

- Paralysis of this muscle results in a **"winged scapula"** ,results in protrusion of the scapula on the affected side when the patient is asked to push against the wall with both arms extended.

- **Winged scapula** occurs in **lateral thoracic nerve paralysis**

THANK YOU!