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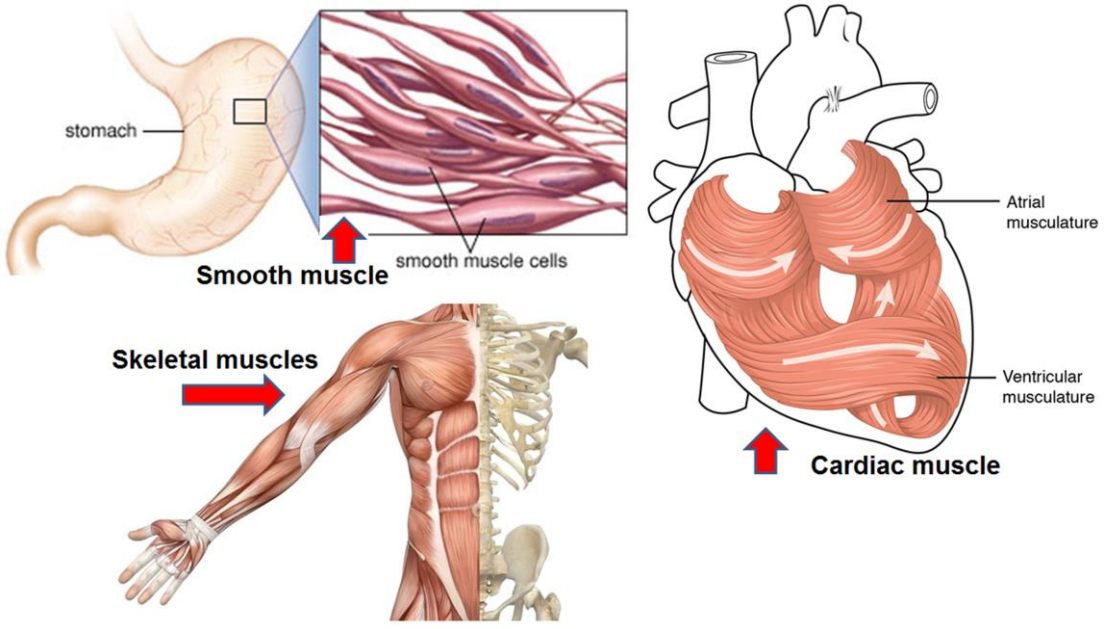
Lecture (5)

MUSCLES

Learning objectives:
After this lecture, student should be able to:
1-know the different types of muscles.
2-know the different types of muscle origins and insertions.
3- Describe the shape and arrangement of muscle fibers.
4-Describe the major muscles of the body.
5- Understand the mechanism of muscle action.
6-Understand the role of muscles in muscle tone.

DEFINITION: Muscles are the red flesh of the body they are tissues specialized to produce motion by contraction.



Types of muscles

TYPES:

a. Smooth muscle tissue makes up the muscular portion of the various visceral organs. They are not under the control of will. They are non stripped muscle. Examples of this type are muscles of stomach, blood vessels intestine, uterus and urinary bladder.

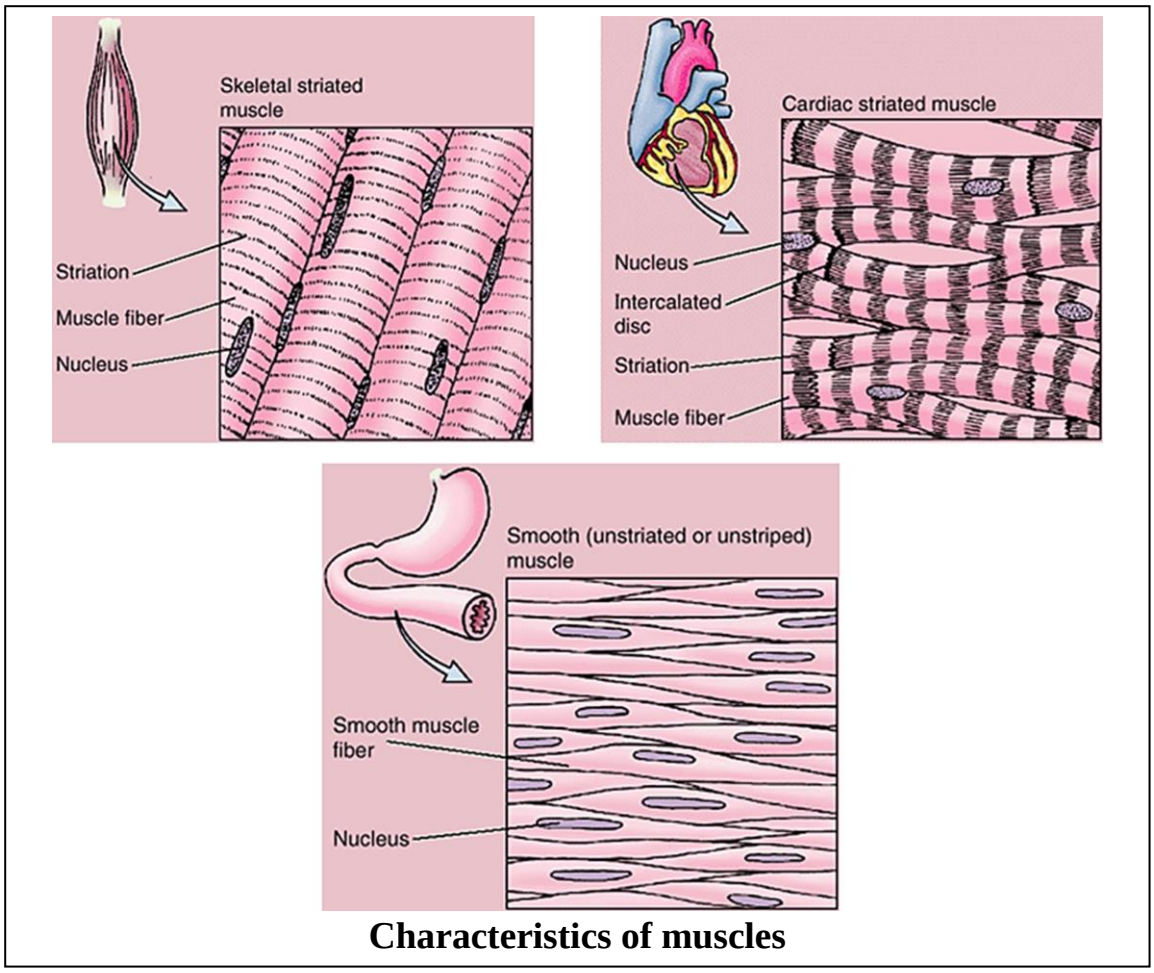
b. Cardiac muscle tissue makes up the muscular wall of the heart- the myocardium. They are involuntary and partially stripped.

c. Skeletal (voluntary) muscles are attached to and moves bones. They are stripped (striated) and under the control of will. Examples of skeletal muscles are muscles of limbs.

…….. is an interdigitation of the tendinous ends of fibers of flat muscles.

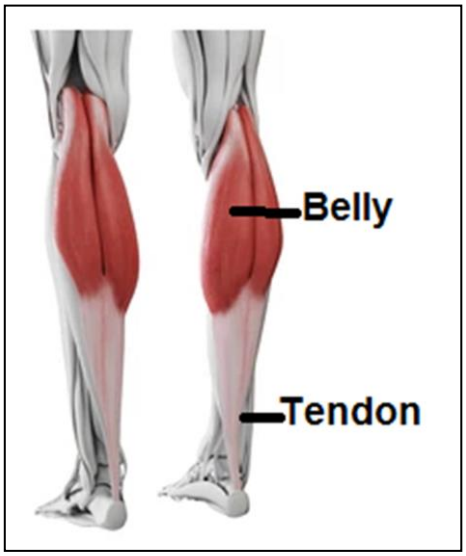
a) Aponeurosis. b)Tendon

c) Raphe d)origin



Characteristics of muscles

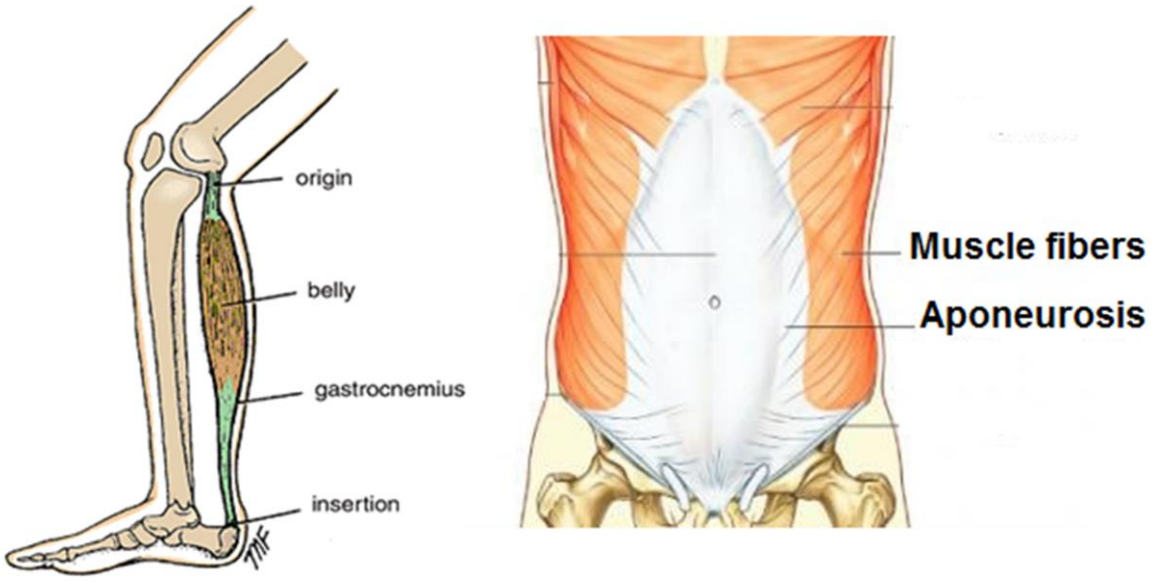
General Construction of a Skeletal Muscle



♦The large portion of a muscle is known as its belly or fleshy belly. This muscle is attached to bones by tendons or aponeuroses.

♦Tendons and aponeuroses are similar to each other. However, tendons are cord-like and aponeuroses are broad and flat.

♦The fleshy portion may be directly connected to the bone. Each muscle is usually attached to the skeleton by two points, a fixed proximal point **(origin)** and a movable distal one **(insertion).**



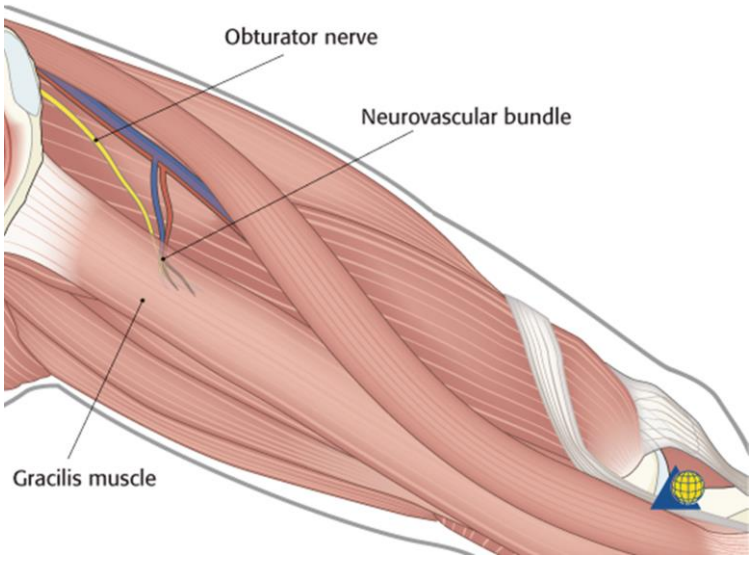
Tendon versus aponeurosis

Muscular Nerves, Arteries, Veins, Lymphatics

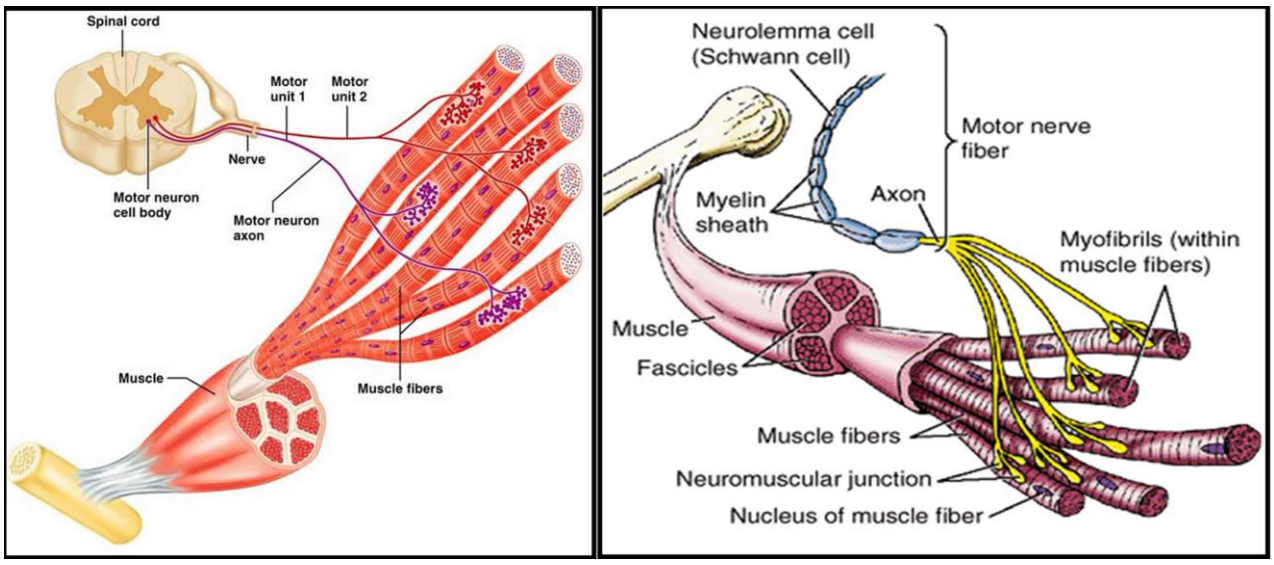
(1) From the main nerve, artery, vein, lymphatic, there are branches going to each muscle. These muscular branches are bound together by a fibrous connective tissue sheath to form ***a neurovascular bundle.***

(2) The motor point is that specific location on the surface of the muscle where the neurovascular bundle enters.

(3) A motor unit is the single motor neuron and the number of striated muscle fibers activated by it (innervation).



A neurovascular bundle



Nerve supply of muscles

♦ MUSCLE FORMS

This refers to the arrangement of the fibers of the muscles with reference to the tendons to which they are attached.

(1)Parallel

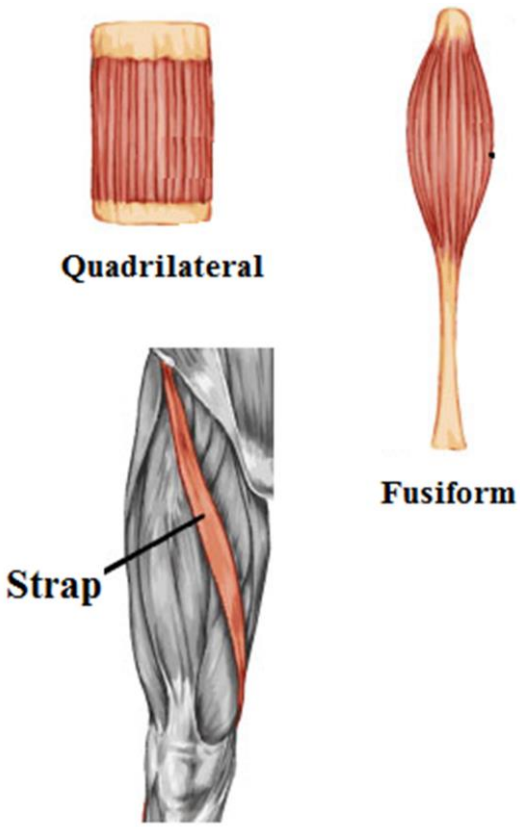
(a) Quadrilateral muscles: the fibers run directly from their origin to their insertion such as the Thyrohyoid.

(b) Fusiform muscles: the fibers are not quite parallel, but slightly curved, so that the muscle tapers at either end; such as biceps brachii.

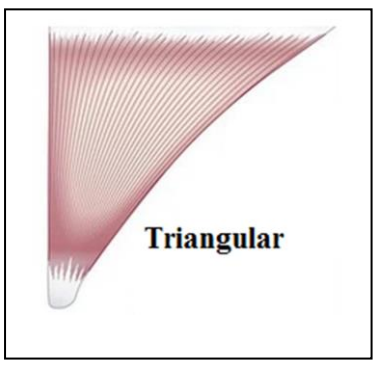
(c) Strap: fibers are parallel forming a thin sheet such as Sartorius.

(2) Triangular

The fibers are convergent; arising by a broad origin, they converge to a narrow or pointed insertion. e.g., the temporalis



Parallel muscle form



(3) Pennate

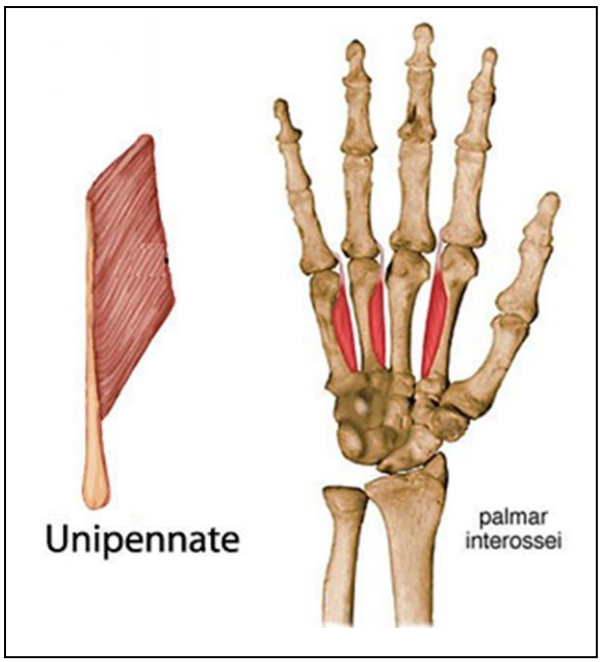
They resemble a feather in which the fibers are oblique to the long axis of the muscle.

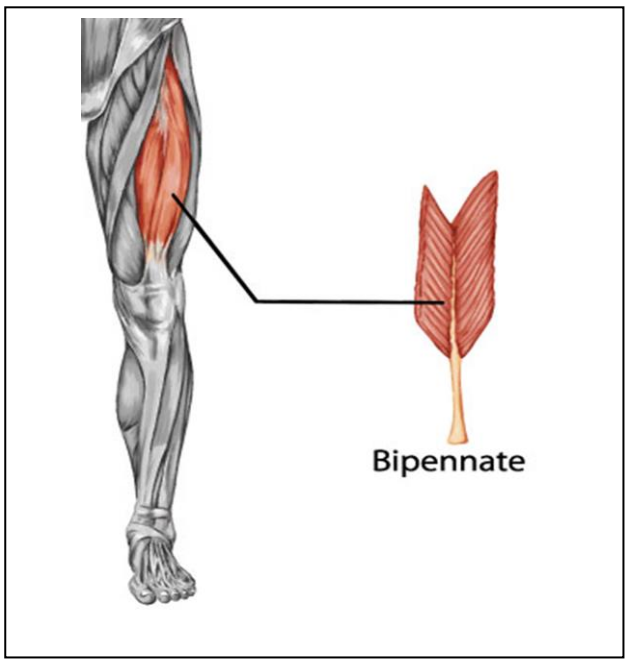
(a) Unipennate :the fibers are located to one side of a tendon which runs the entire length of the muscle such as palmar interossei.

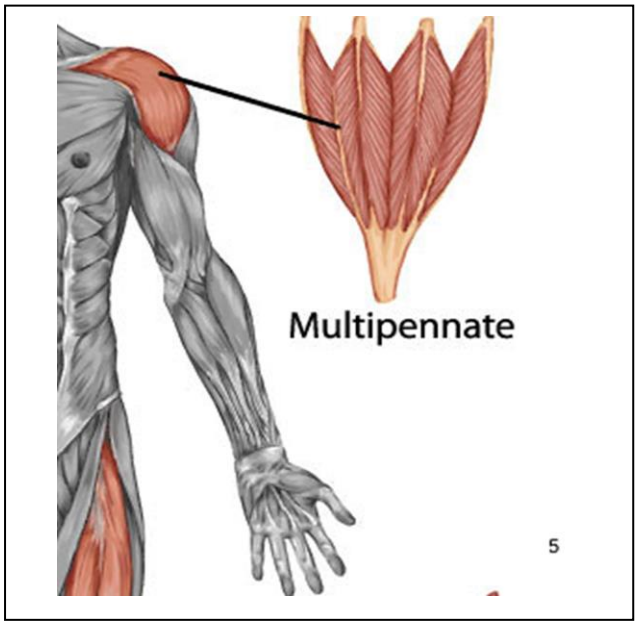
(b) Bipennate : where oblique fibers converge to both sides of a central tendon; an example is the Rectus femoris.

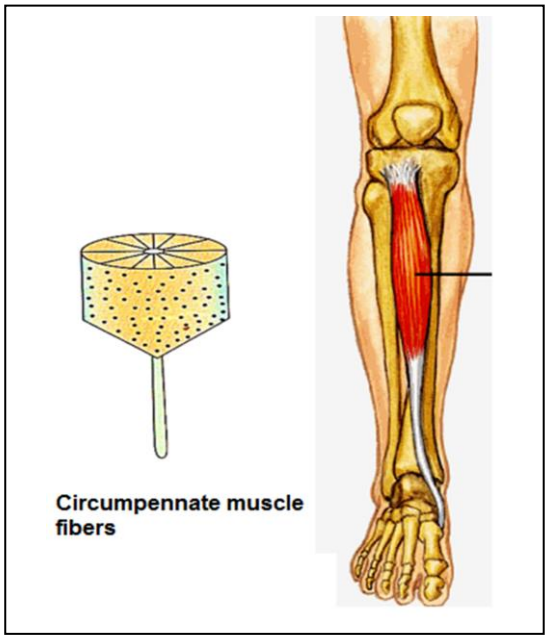
(c) Multipennate where oblique fibers converge to both sides of Multiple central tendons ; such as deltoid muscle.

(d) Circumpennate fibers are arranged in a circumradial manner around the central tendon an example is tibialis anterior muscle.









MUSCLE NAMES

The names applied to the various muscles have been derived:

(1) From their situation, as the Tibialis, Radialis, Ulnaris.

(2) From their direction, as the Rectus abdominis, Obliqus abdominis,Transversus abdominis.

(3) From their uses, as Flexors, Extensors, Abductors.

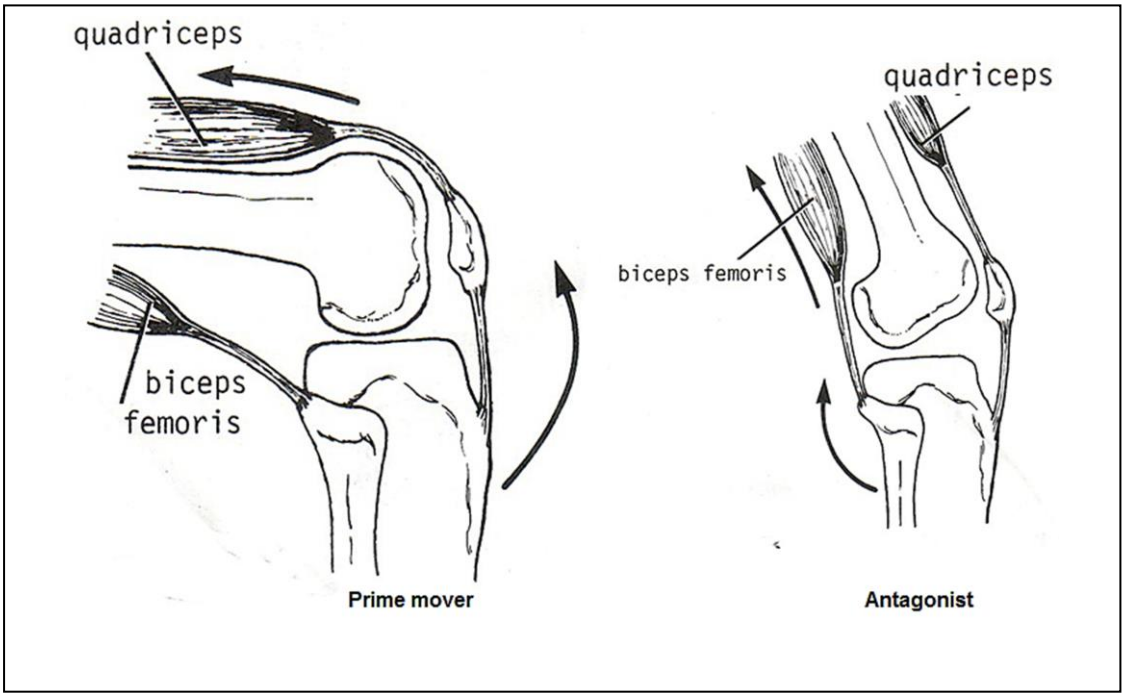
(4) From their shape, as the Deltoideus, Rhomboideus.

(5) From the number oftheir divisions, as the Biceps and Triceps.

(6)From their points of attachment, as the sternocleidomastoideus, Sternohyoideus

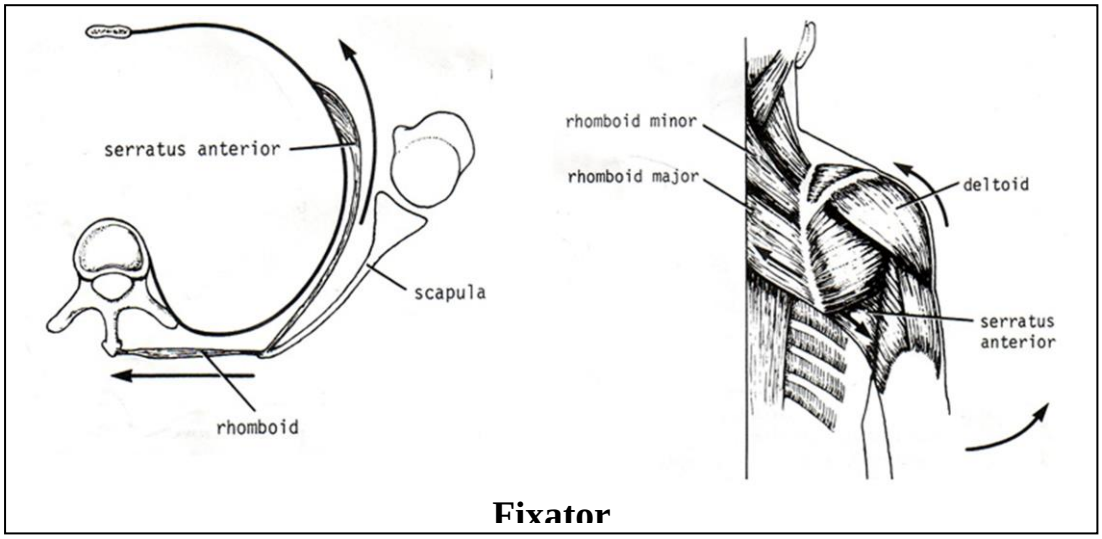
Skeletal Muscle Action:

- **Prime mover:** A muscle is a prime mover when it is the chief muscle or member of a chief group of muscles responsible for a particular movement. For example, the quadriceps femoris is a prime mover in the movement of extending the knee joint.
- **Antagonist:** Any muscle that opposes the action of the prime mover is an antagonist. For example, the biceps femoris opposes the action of the quadriceps femoris when the knee joint is extended. Before a prime mover can contract, the antagonist muscle must be equally relaxed; this is brought about by nervous reflex inhibition.

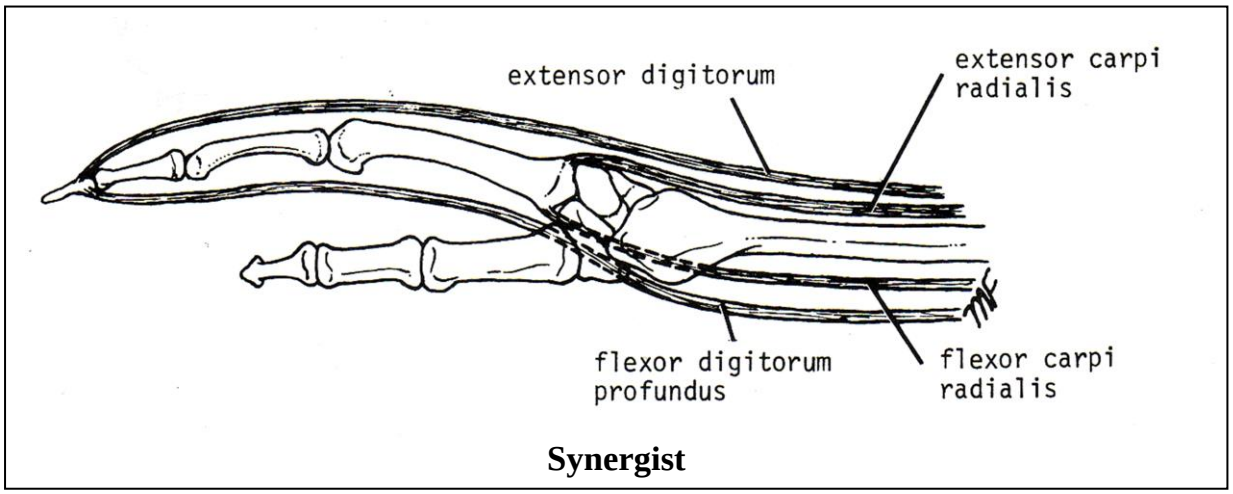


• **Fixator:** A fixator contracts isometrically (i.e., contraction increases the tone but does not in itself produce movement) to stabilize the origin of the prime mover so that it can act efficiently. For example, the muscles attaching the shoulder girdle to the trunk contract as fixators to allow the deltoid to act on the shoulder joint.

• **Synergist:** In many locations in the body the prime mover muscle crosses several joints before it reaches the joint at which its main action takes place. To prevent unwanted movements in an intermediate joint, groups of muscles called synergists contract and stabilize the intermediate joints. For example, the flexor and extensor.



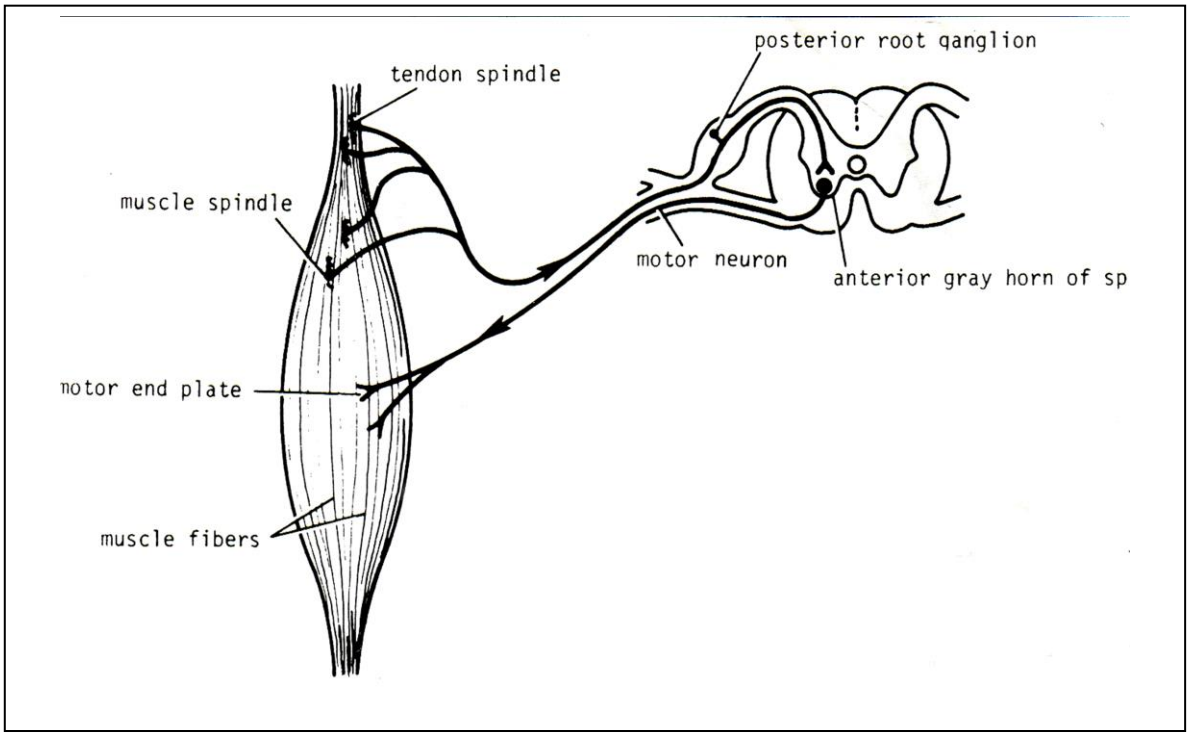
Fixator



Synergist

• **<u>Nerve Supply of Skeletal Muscle:</u>**

The nerve trunk to a muscle is a mixed nerve, about 60% is motor and 40% is sensory, and it also contains some sympathetic autonomic fibers. The nerve enters the muscle at about the midpoint on its deep surface, often near the margin; the place of entrance is known as the motor point. This arrangement allows the muscle to move with minimum interference with the nerve trunk.



Choose the correct answer:

-…….. complements the action of prime movers .

A) Fixator B) Agonist

C) Synergist. D) Antagonist

-…… is a muscle that opposes the action of a prime mover.

A) Fixator B) Agonist

C) Synergist D) Antagonist

-……have two rows of muscle fibers, facing in opposite diagonal directions, with a central tendon, like a feather.

A) Bipennate. B) Fusiform.

C) Unipennate D) Parallel

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