

SKELETAL MUSCLES

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OBJECTIVES

At the end of the lecture, students should be able to:

- Describe the main criteria of skeletal muscles.
- Describe the attachments of skeletal muscles.
- Describe the different directions of skeletal muscle fibers.
- Describe the mode of action of skeletal muscles.
- Describe briefly the naming of skeletal muscles.
- Describe briefly the nerve supply of skeletal muscles.

MUSCULAR SYSTEM

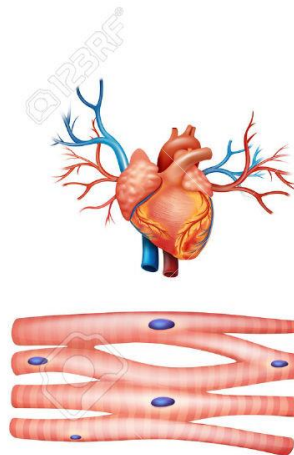
Composed of two main types :

❑ Involuntary

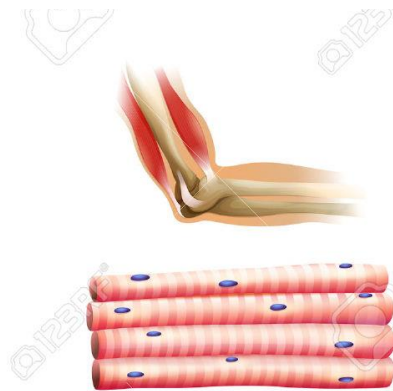
- Smooth muscles: Found in the walls of viscera.
 - *located in walls of hollow visceral organs*
 - *appear smooth*
- Cardiac muscles: Found only in the heart.
 - *located in the walls of the heart*
 - *appear striated*

❑ Voluntary

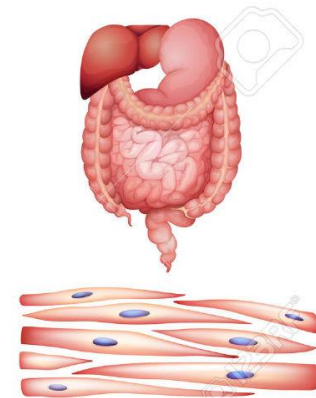
- ✓ Skeletal muscles
 - *attached to the skeleton*
 - *appear striated*



Cardiac muscle



Skeletal muscle



Smooth muscle

MAIN CRITERIA OF SKELETAL MUSCLES

- Voluntary
- Striated
- Attached to skeleton
- Produce movement of skeleton
- Supplied by somatic nerves



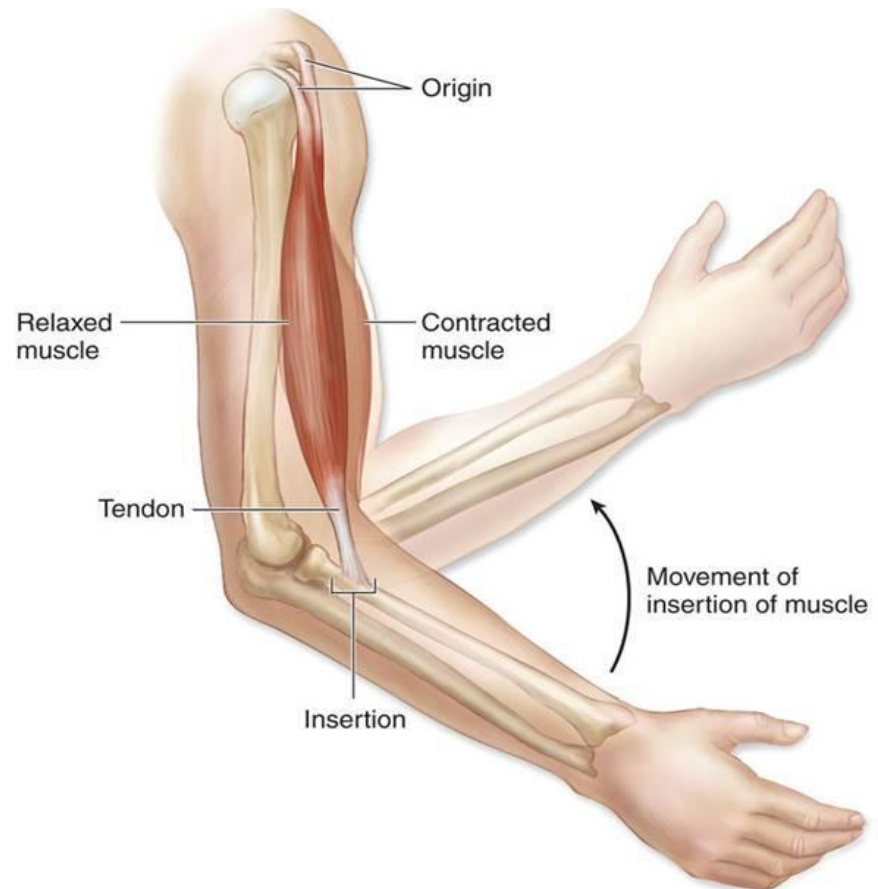
ATTACHMENTS

ORIGIN:

- Least movable
- Mostly fleshy
- Proximal end

INSERTION:

- Most movable
- Mostly fibrous
- Distal end



TYPES OF ATTACHMENTS

Muscles are attached to bones, cartilage or ligaments by:

Tendons

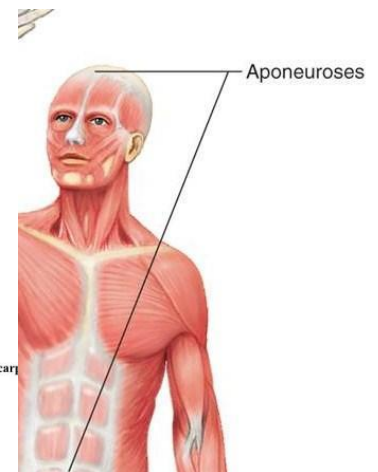
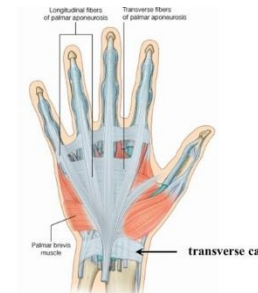
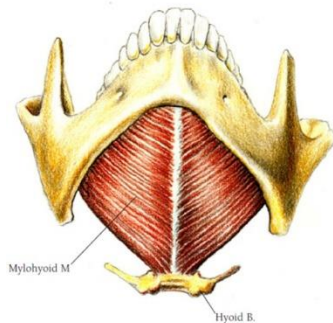
- A tough cord of fibrous connective tissue that usually connects muscle to bone and is capable of withstanding tension.

Aponeurosis

- A thin broad and strong sheet of fibrous tissue.

Raphe

- An interdigitation of the tendinous ends of the flat muscles.
- Example: mylohyoid raphe



DIRECTIONS OF MUSCLE FIBERS

Parallel to line

- More range of movement, less powerful.

Pennate (oblique to line)

- More powerful, less range of movement.
 - *Unipennate*
 - *Bipennate*
 - *Multipennate*

Fusiform

- Spindle-shaped (round, thickbelly, & tapered ends).

Circular

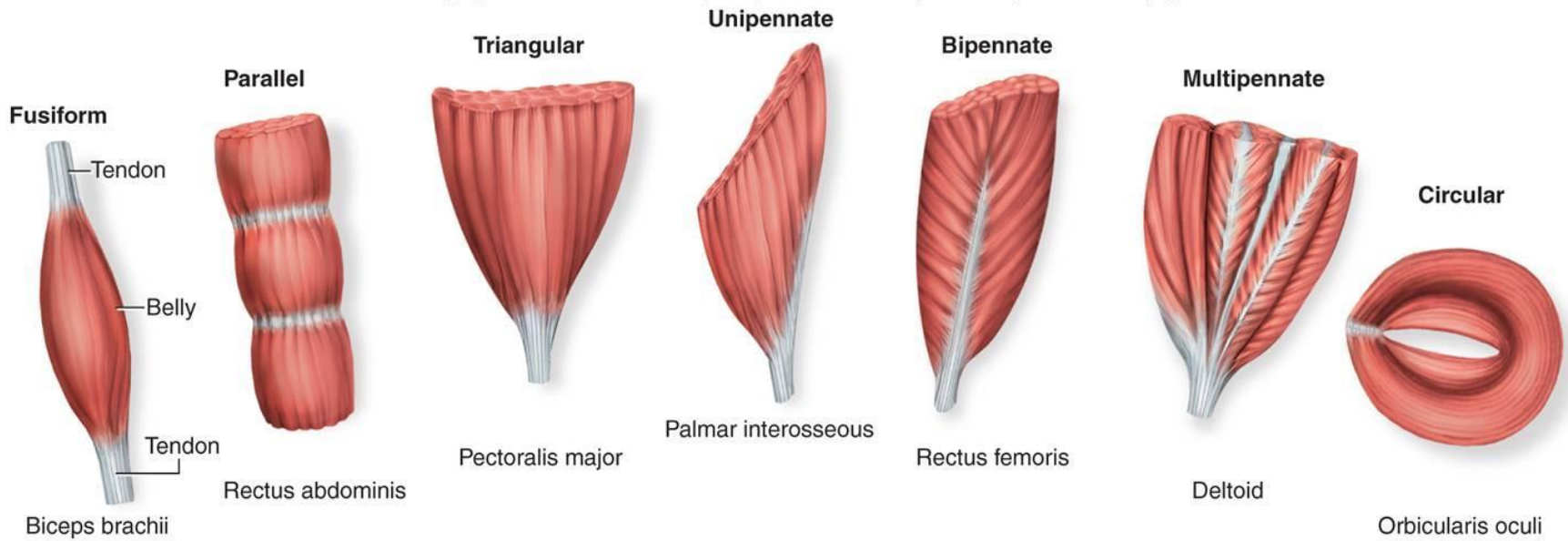
- Surround a body opening or orifice, constricting it when contracted.

Triangular

- Have a broad attachment from which the fascicles converge to a single tendon.

DIRECTIONS OF MUSCLE FIBERS

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MODE OF ACTIONS

Prime mover (Agonist):

- It is the chief muscle responsible for a particular movement.

Example: Biceps Brachii is the prime mover for flexion of the elbow joint and forearm.



MODE OF ACTIONS

Antagonist :

- It opposes the action of the prime mover.
- Before contraction of prime mover, antagonist must be relaxed.

Example: Triceps Brachii is the antagonist for prime mover for extension of the elbow joint and forearm

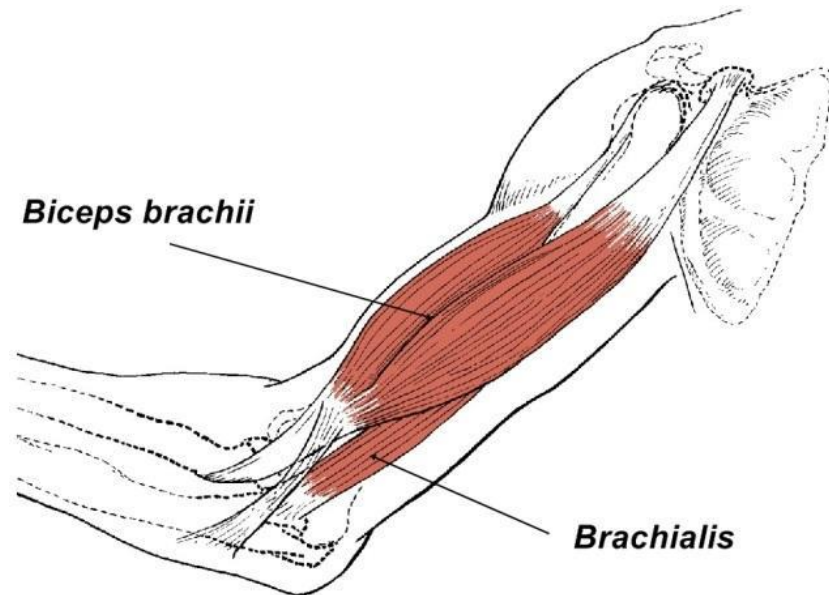


MODE OF ACTIONS

Synergist :

- Muscles that assist the prime mover in a particular movement.

Example: Brachialis muscle for Biceps prime mover muscle.



MODE OF ACTIONS

Fixator :

- Its contraction does not produce movement by itself but it stabilizes the origin of the prime mover so that it can act efficiently.

Example: Deltoid muscle for Biceps prime mover muscle.



NAMING OF MUSCLES

Size:

- Major or Maximus (large)
- Minor or Minimus (small)
- Latissimus (broad)
- Longus (long)
- Brevis (short)

Position:

- Pectoralis (pectoral region)

Depth:

- Superficialis (superficial)
- Profundus (deep)
- Externus (external)



NAMING OF MUSCLES

Shape:

- Deltoid (triangular)
- Teres (rounded)
- Rectus (straight)

Number of Heads:

- Biceps (2 heads)
- Triceps (3 heads)
- Quadriceps (4 heads)

Attachments:

- Coracobrachialis
 - *from coracoid process to arm*

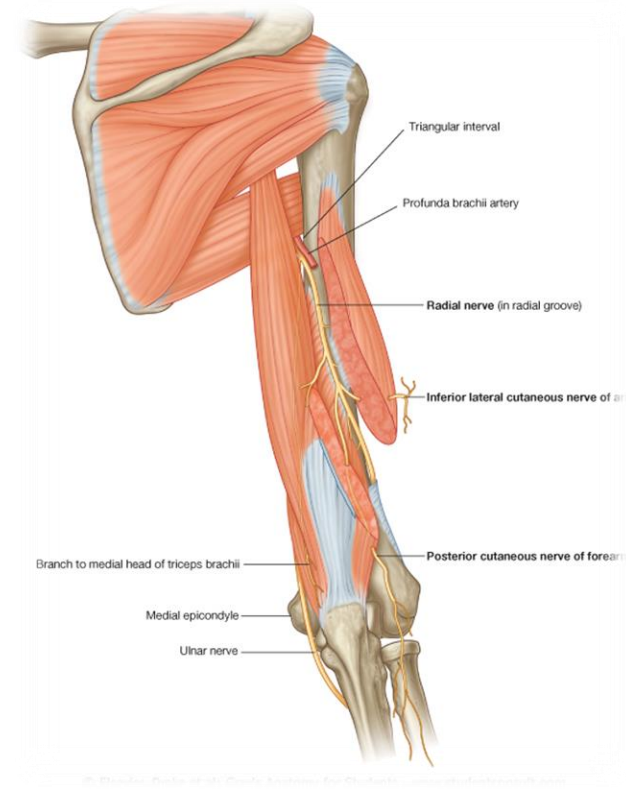
Action:

- Flexor digitorum: flexion of digits



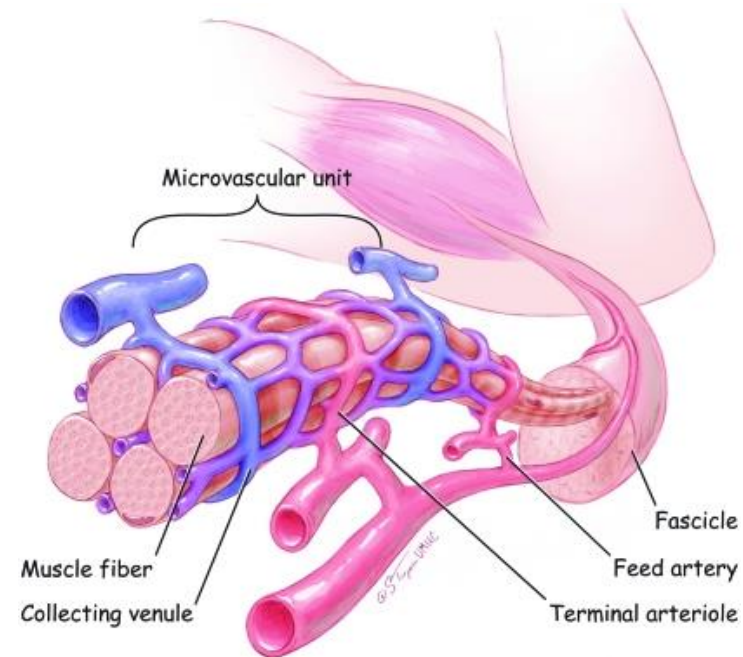
INNERVATION

- ❑ The somatic nervous system (is the part of the peripheral nervous system associated with skeletal muscle voluntary control of body movements.
- ❑ The nerves supplying the skeletal muscles are **Mixed**.
 - **60%** are Motor
 - **40%** are Sensory
- ❑ It contains some Autonomic fibers
 - **Sympathetic**
- ❑ The nerve enters the muscle at about the middle point of its deep surface.



BLOOD SUPPLY

- During extreme physical exertion, more than 80% of cardiac output can be directed to contracting muscles.
- The vascular inflow to skeletal muscles is provided by primary arteries, which represent the last branches of the arterial supply that arise before entry into the tissue.
- The primary arteries are appropriately distributed along the long axis of the muscle and give rise to feed arteries that course toward the epimysium of the muscle at right or oblique angles to the primary arteries.



MUSCLE DISEASES & INJURIES

- Muscle diseases and injuries are common, especially in sports activities. A severe muscle injury can keep you from participating in the activities that you love and enjoy for living.
- Muscle diseases and injuries could be one of the major factors that threaten someone's professional career(s).
- **Muscular Dystrophy:** A genetic disease that causes damage to muscle fibers.
- **Muscle Cramps:** can occur suddenly and involuntarily in one or more muscles.
- **Sprains and Strains:** Twist or pull in the muscles or tendons which can either be sudden or over a period of time, with or without tearing of the muscle.
- **Contusions:** often caused by a direct trauma or repeated blow to the muscle. In some cases, the condition can be caused by falling on a hard surface.



MUSCLE TREATMENTS

- **Minor muscle injuries may be treated with simple home remedies, such as rest, applying ice, using compression bandage, and elevating your injured limb.**
- **Anti-inflammatory medication.**
- **Physiotherapy**
- **Severe muscle injuries need to be checked by a qualified health care provider.**
- **A torn muscle or tendon may need to be surgically repaired.**



SUMMARY

- **Skeletal muscles are striated, voluntary muscles attached to & move the skeleton.**
- **They have 2 attachments: origin & insertion.**
- **Their fibers may be parallel or oblique (pennate) to the line of pull.**
- **According to mode of action, they are classified as: prime mover, antagonist, synergist or fixator.**
- **They may be named according to: size, shape, number of heads, position, attachment, depth or action.**
- **They are supplied by a mixed nerve.**

QUESTIONS!