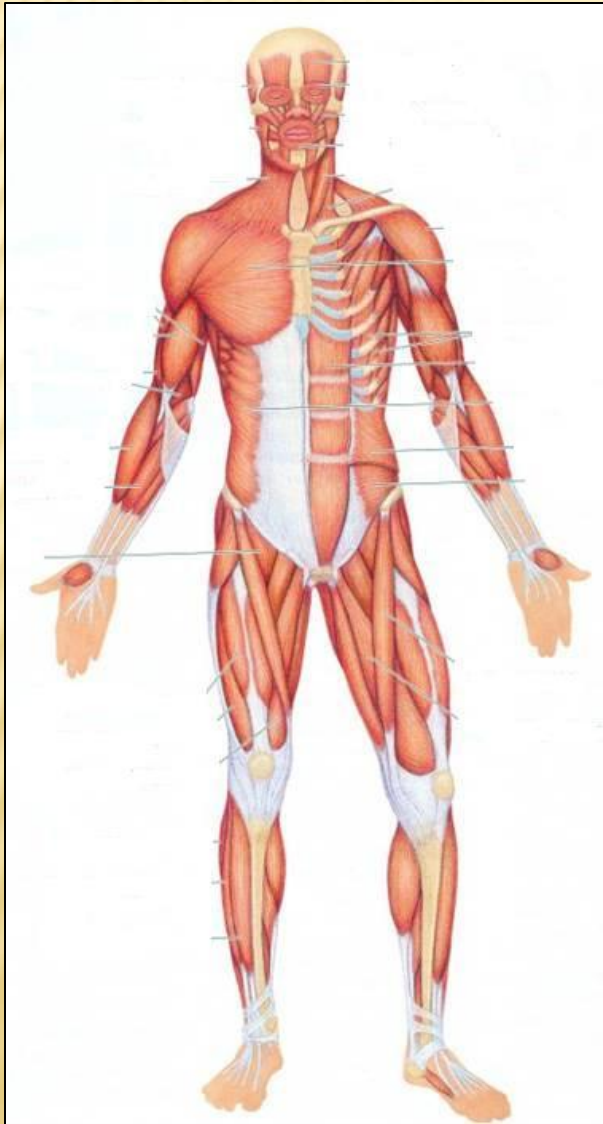


سَلَامٌ عَلَى الْمُرْسَلِينَ

SKELETAL MUSCLES



***DR. JAMILA EL
MEDANY***

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.*

FUNCTIONS OF MUSCLES

- × **Movement** of body and its parts
- × Maintain **posture**
- × **Generate heat**
- × **Stabilize joints**



CLASSIFICATION OF MUSCLES

- ✘ Muscles are classified on the base of their:
 - **Location**
 - **Action**
 - **Microscopic structure**

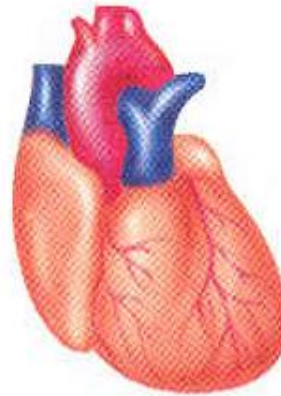
LOCATION

SKELETAL



Attached to bones or, for some facial muscles, to skin

CARDIAC



Walls of the heart

VISCERAL



Mostly in walls of hollow visceral organs (other than the heart)

ACTION

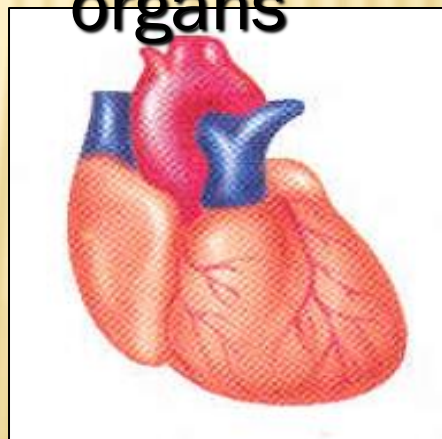
- × **VOLUNTARY:**
MUSCLE

- × Subject to **conscious control**: e.g. Muscles attached to skeleton



- **INVOLUNTARY:**
MUSCLES

- **Not under conscious control**: e.g. muscles of the heart and other organs



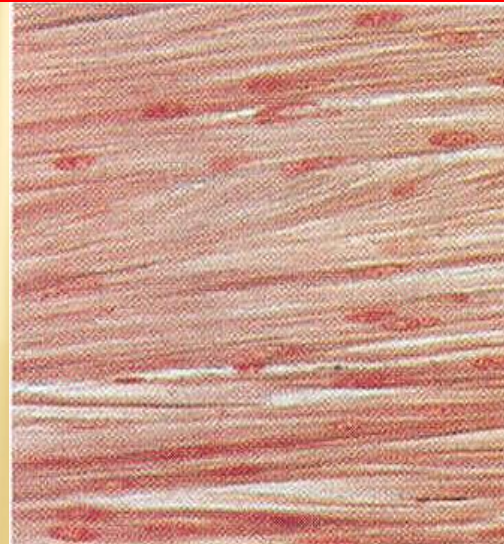
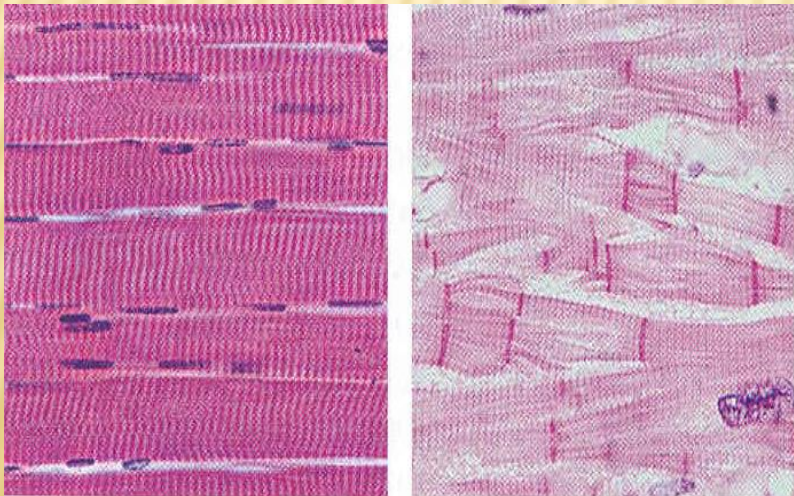
MICROSCOPIC STRUCTURE

× **STRIATED:**

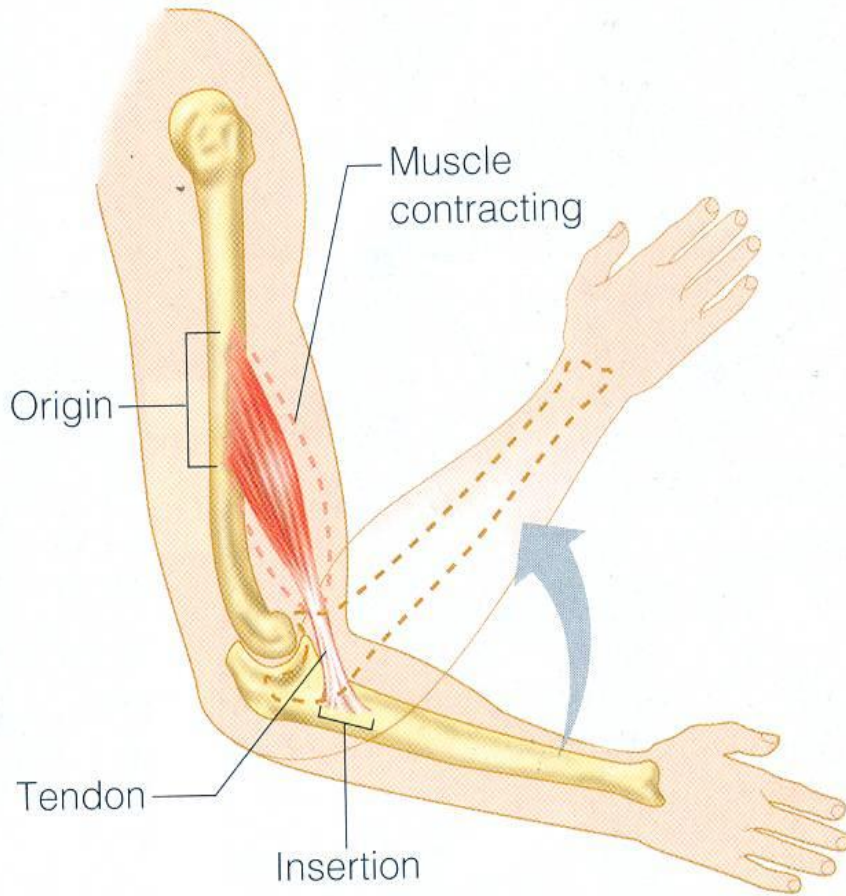
- × The muscle fibers show **transverse striations** e.g. skeletal & cardiac muscles

■ **NON STRIATED (SMOOTH):**

- No striations e.g. visceral muscles



MAIN CRITERIA OF SKELTAL MUSCLES



- ❑ **Striated.**
- ❑ **Attached to skeleton.**
- ❑ **Produce movement of skeleton.**
- ❑ **Voluntary**
- ❑ **Supplied by Somatic Nerves.**

ATTACHMENTS OF SKELETAL MUSCLES

Number: (MOSTLY TWO)

ORIGIN

INSERTION

The **Proximal** end

Mostly

Fleshy,

Least

Movable,

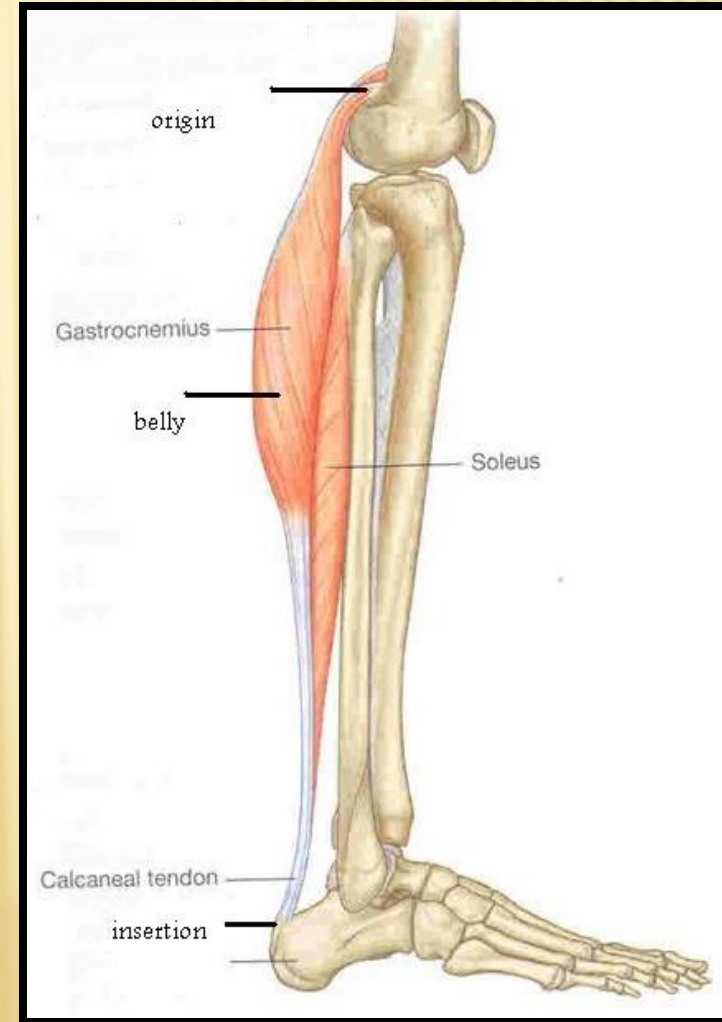
The **Distal** end

Mostly

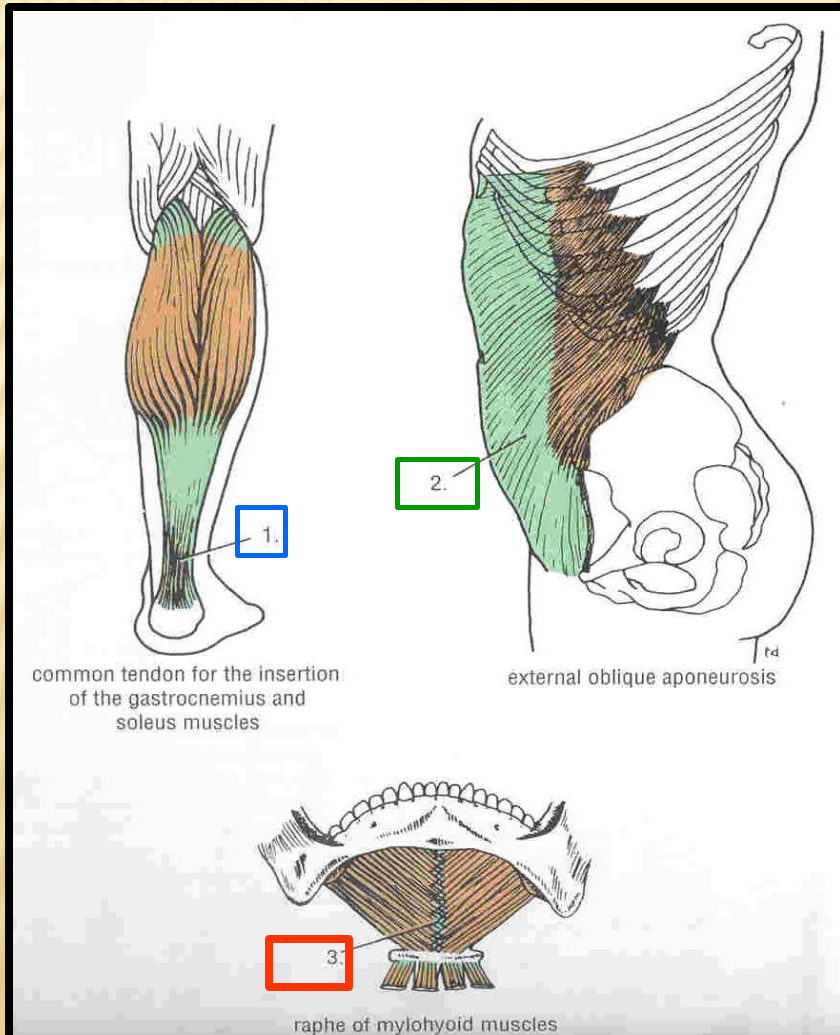
Fibrous,

Most

Movable,



TYPES OF ATTACHMENT

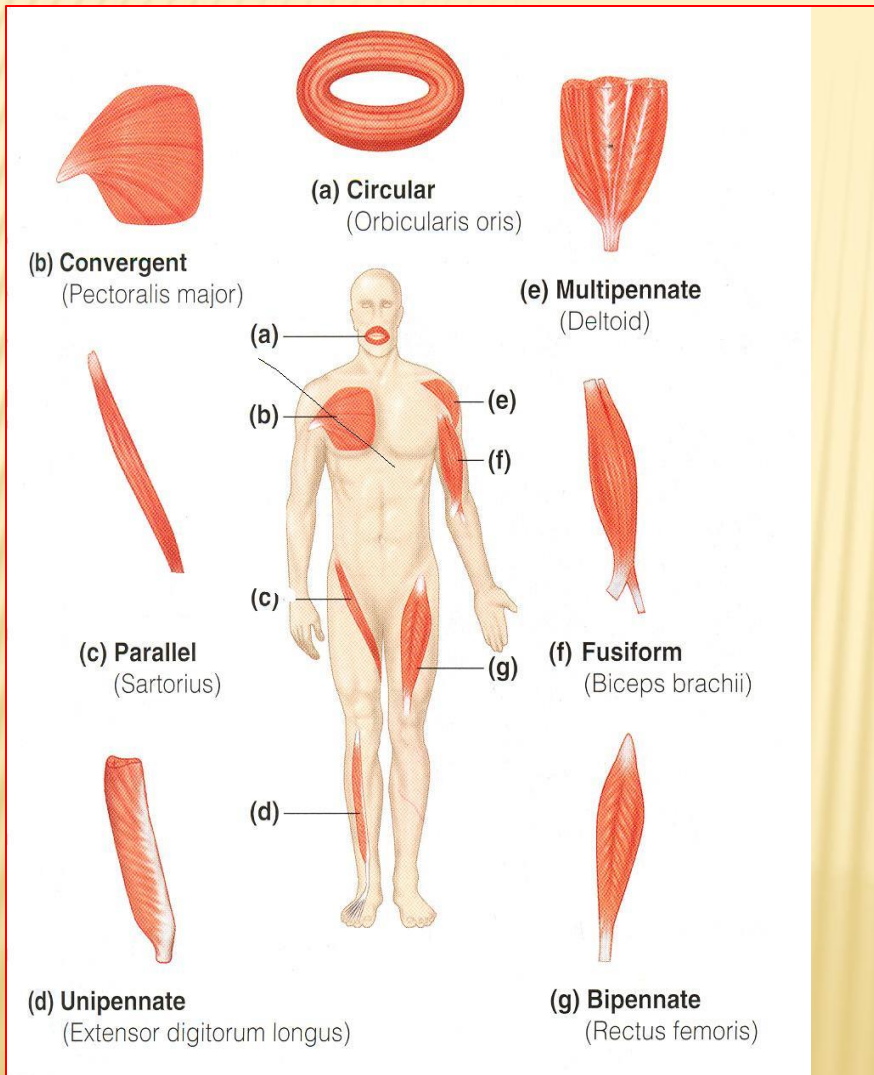


- ✗ Muscles are attached to bones, cartilage or ligaments through:
- ✗ **(1) TENDONS** :
- ✗ Cords of fibrous tissue.
- ✗ **(2) APONEUROSIS**:
- ✗ A thin and strong sheet of fibrous tissue.
- ✗ **(3) RAPHE** :
- ✗ An interdigitation of the tendinous ends of

THE DIRECTION OF MUSCLE FIBERS

✗ The range of motion and the power of a muscle depends on the arrangement of its fascicles. It can be:

- **CIRCULAR**
- **CONVERGENT**
- **FUSIFORM**

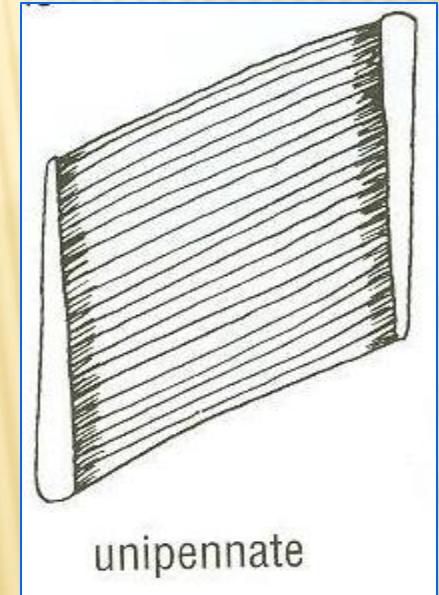


DIRECTION OF MUSCLE FIBERS

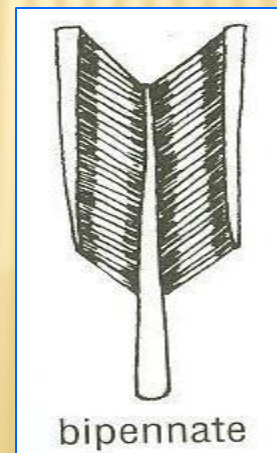
- ❑ **PARALLEL TO LINE OF PULL:** More range of movement, (less powerful).
- ❑ **PENNATE (OBLIQUE TO LINE OF PULL):**
- ❑ **More powerful, (less range of movement.)**
 1. ***Unipennate.***
 2. ***Bipennate.***
 3. ***Multipennate.***



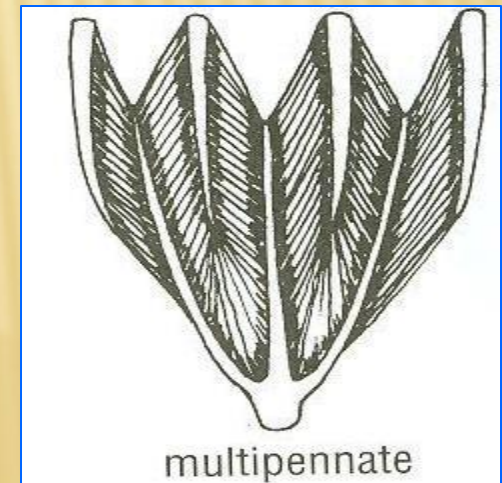
parallel



unipennate



bipennate



multipennate

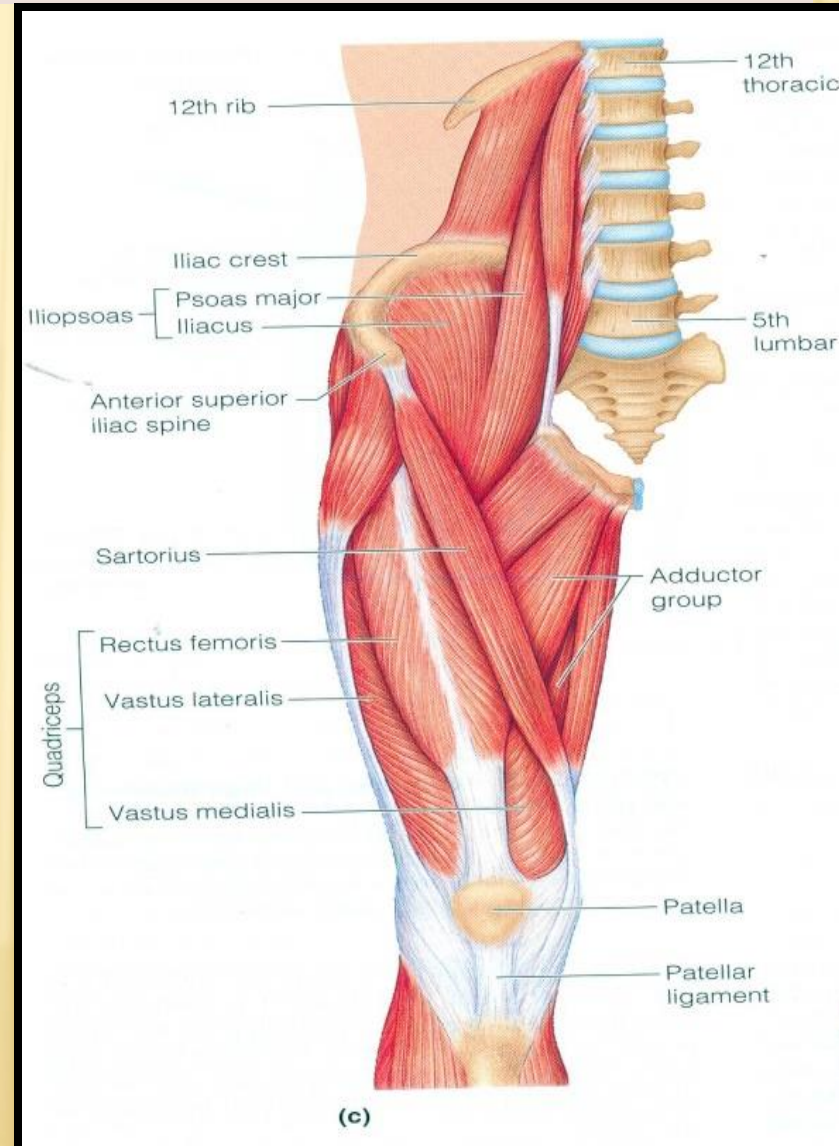
MECHANISM OF ACTION

□ (1) PRIME MOVER (AGONIST):

× It is the chief muscle responsible for a particular movement

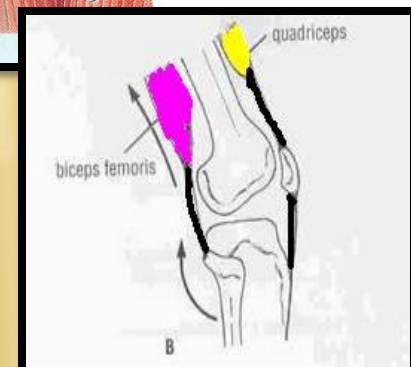
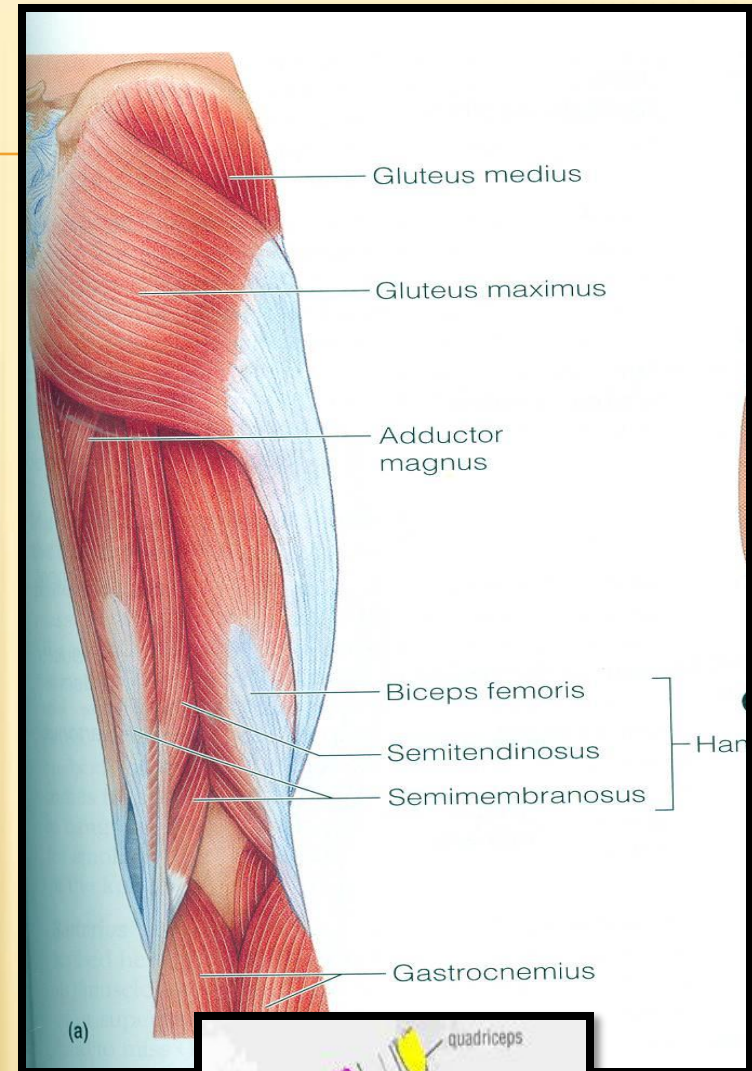
× Example:

× **Quadriceps Femoris** is the prime mover for extension of the knee joint.



❑ **(2) ANTAGONIST :**

- ✗ It opposes the action of the prime mover.
- ✗ Before contraction of prime mover, the antagonist must be relaxed.
- ✗ **Example: Biceps Femoris** (Flexor of knee)
- ✗ It opposes the action of quadriceps when the knee joint is extended.



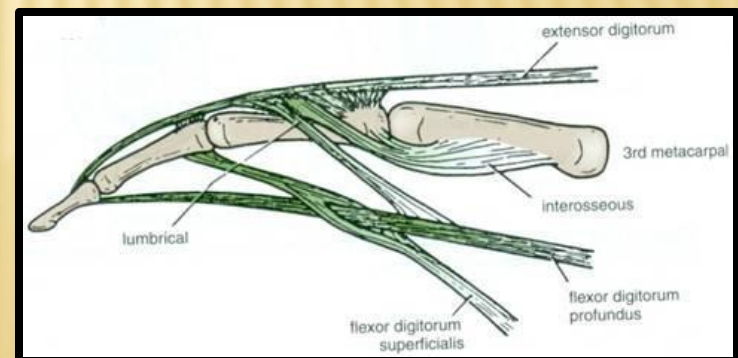
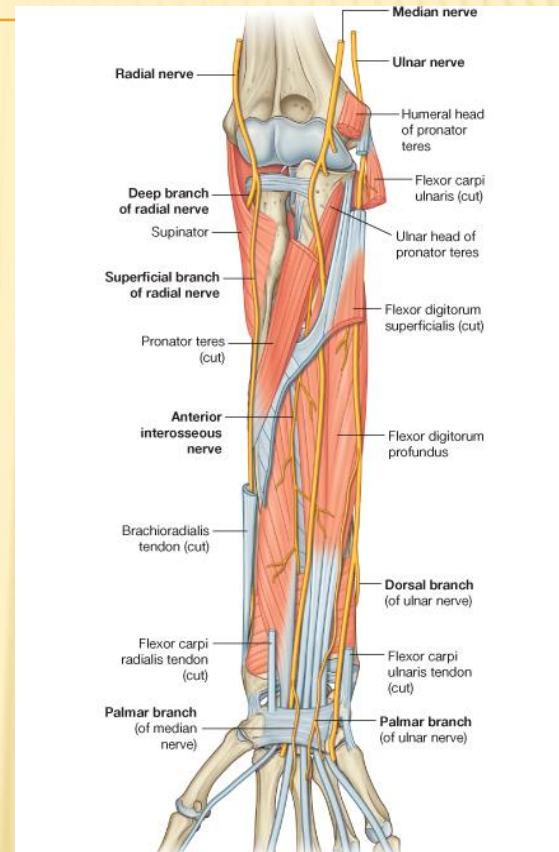
❑ **(3) SYNERGIST :**

✗ Prevents unwanted movement in an intermediate joint crossed by the Prime Mover.

✗ **Example:**

✗ **Flexors and Extensors of wrist joint**

✗ They contract to fix wrist joint in order that flexors and extensors of fingers work efficiently.

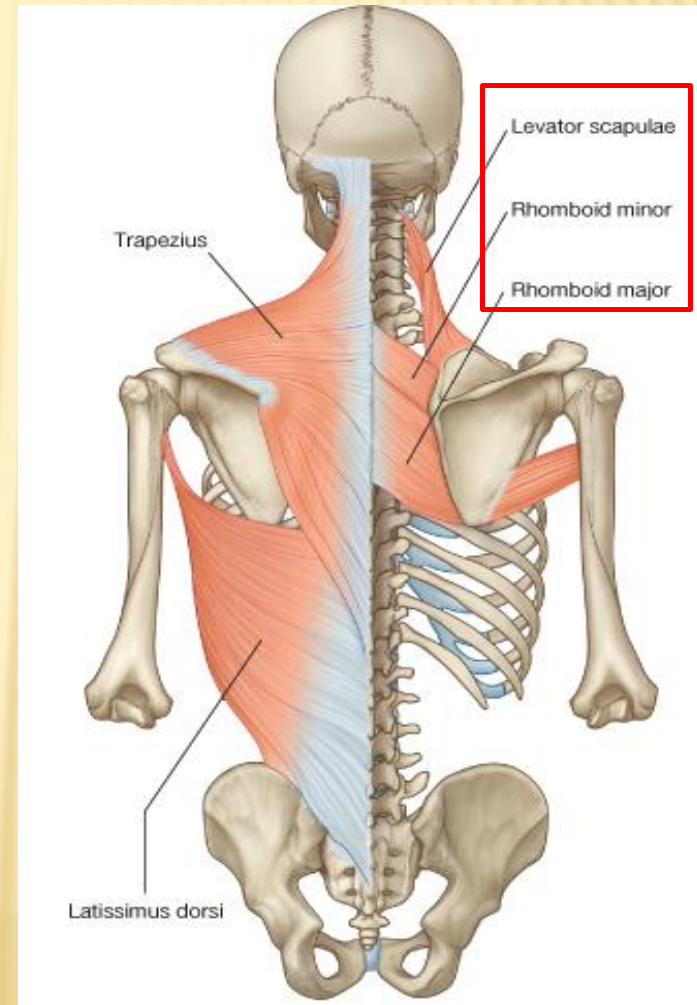


❑ **(4) FIXATOR:**

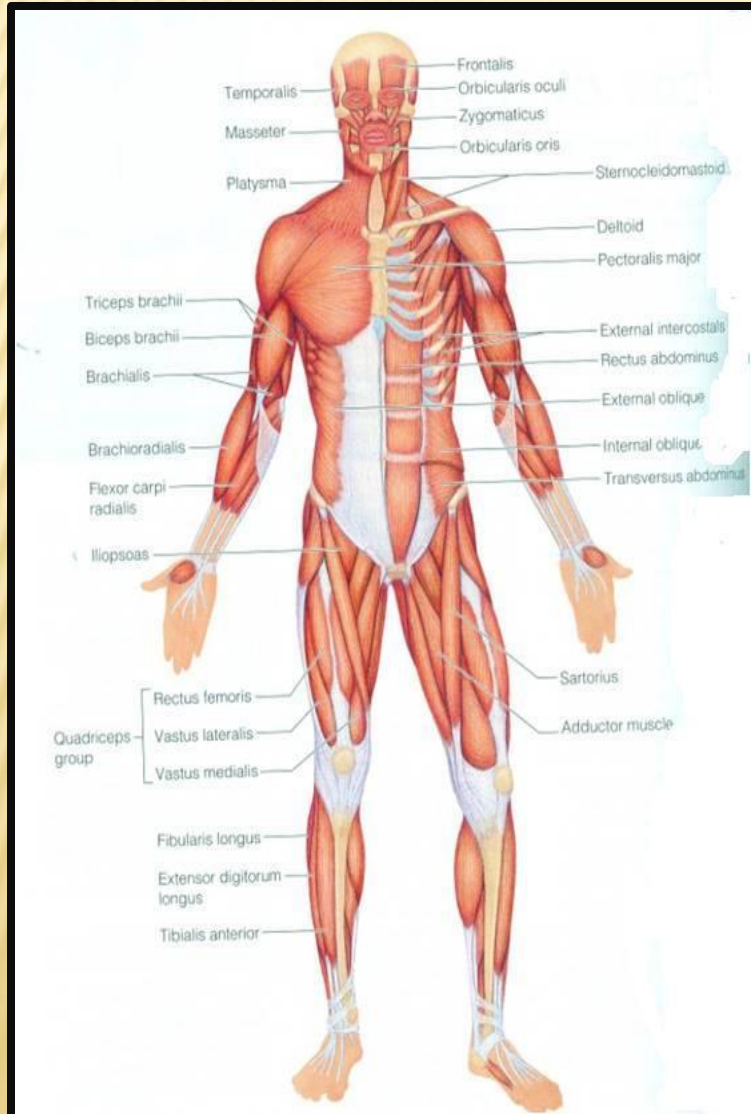
✗ Its contraction does not produce movement by itself but it stabilizes the origin of the prime mover so that it can act efficiently.

✗ **Example:**

✗ **Muscles attaching the shoulder girdle to the trunk** contract to fix shoulder girdle, allowing deltoid muscle (taking origin from shoulder girdle) to move shoulder joint (humerus).



NAMING OF MUSCLES



□ It is according to:

□ **1. SIZE:**

1. Major or maximus (large).
2. Minor or minimus (small).
3. Latissimus (broad).
4. Longus (long).
5. Brevis (short).

□ **2. POSITION:**

1. Pectoralis (pectoral region)

□ **3. DEPTH:**

1. Superficialis (superficial).
2. Profundus (deep).
3. Externus (external).

□ **4. SHAPE:**

1. **Deltoid** (triangular).
2. **Teres** (rounded)
3. **Rectus** (straight).

□ **5. NUMBER OF HEADS:**

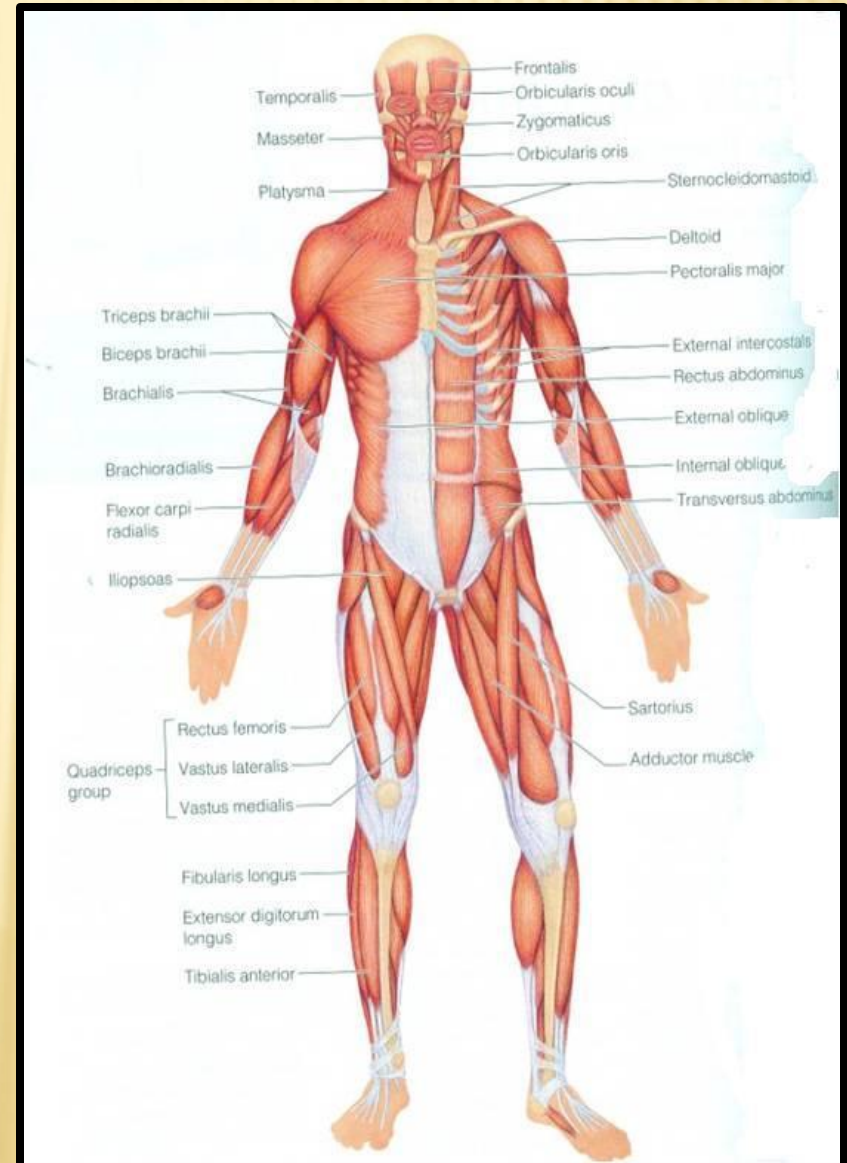
1. **Biceps** (2 heads).
2. **Triceps** (3 heads).
3. **Quadriceps** (4 heads).

□ **6. ATTACHMENTS:**

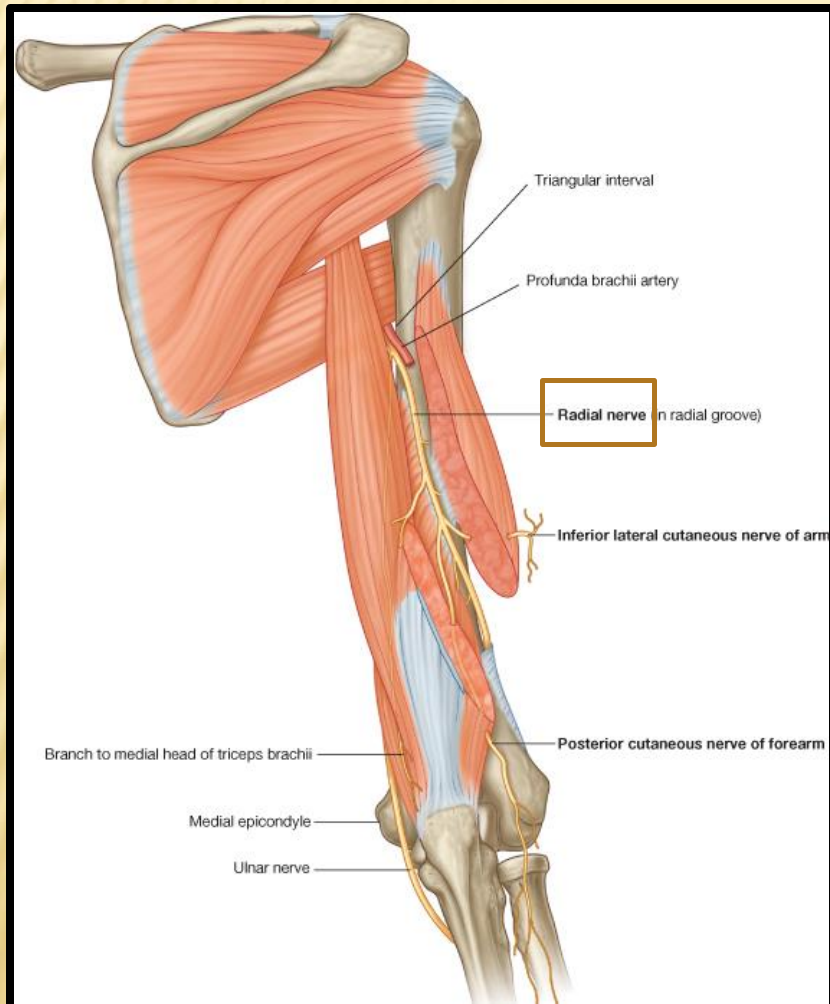
1. **Coracobrachialis** (from coracoid process to arm).

□ **7. ACTION:**

1. **Flexor digitorum:** flexion of digits.



NERVE SUPPLY OF SKELETAL MUSCLES



- ✘ The nerves supplying the skeletal muscles are **Mixed**:
- ✘ 60% are **Motor**.
- ✘ 40% are **Sensory**.
- ✘ It has some **Autonomic fibers (Sympathetic)** for its blood vessels.
- ✘ The nerve enters the muscle at about the middle point of its deep surface.

EFFECT OF EXERCISE ON MUSCLES

- ✘ The amount of work done by a muscle is reflected in changes in the muscle itself
- ✘ Muscle inactivity leads to muscle weakness and wasting
- ✘ Regular exercise increases muscle size, strength and endurance

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, attachments, depth or action.**
- ❑ They are supplied by a **mixed somatic nerve.**

THANK YOU