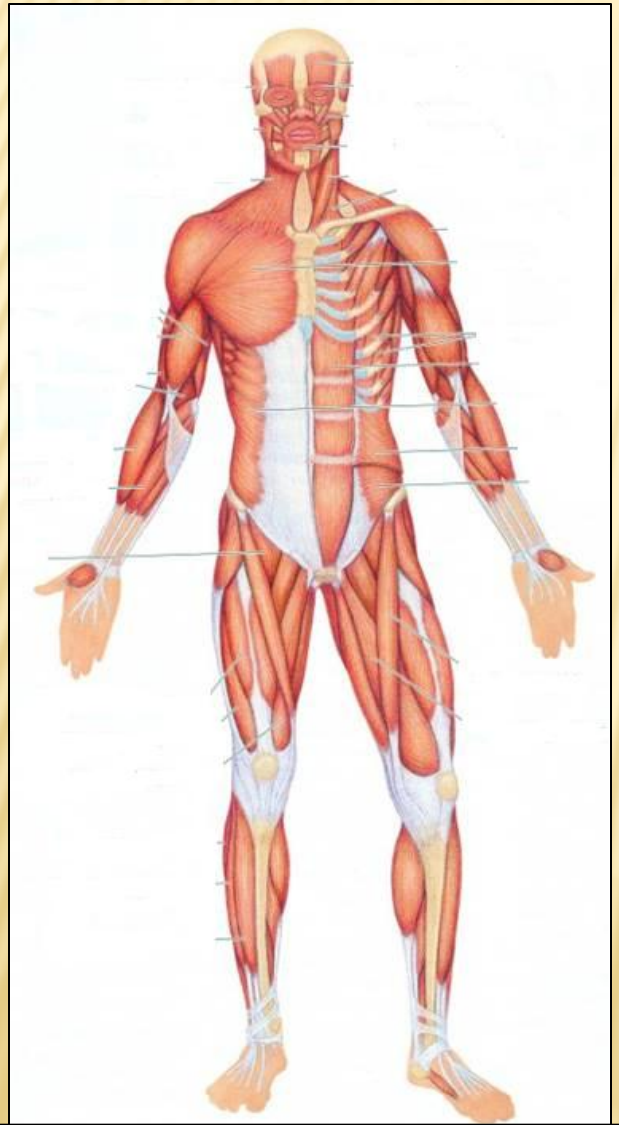

بسم الله الرحمن الرحيم

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.*

CLASSIFICATION OF MUSCLES

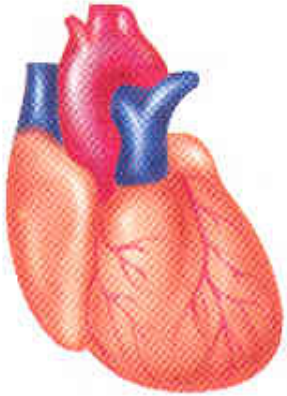
- Muscles are classified on the base of their:
  - Location
  - Action
  - Microscopic structure

LOCATION

Skeletal

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

Cardiac



Walls of the heart

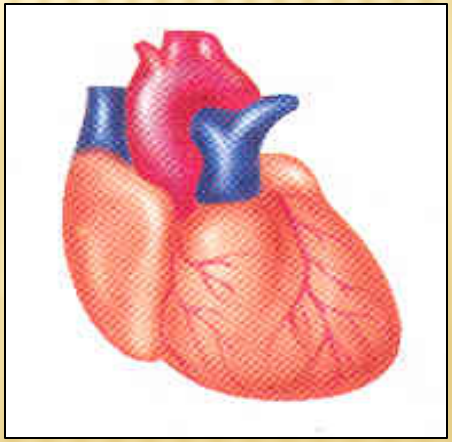
Visceral

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

ACTION

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

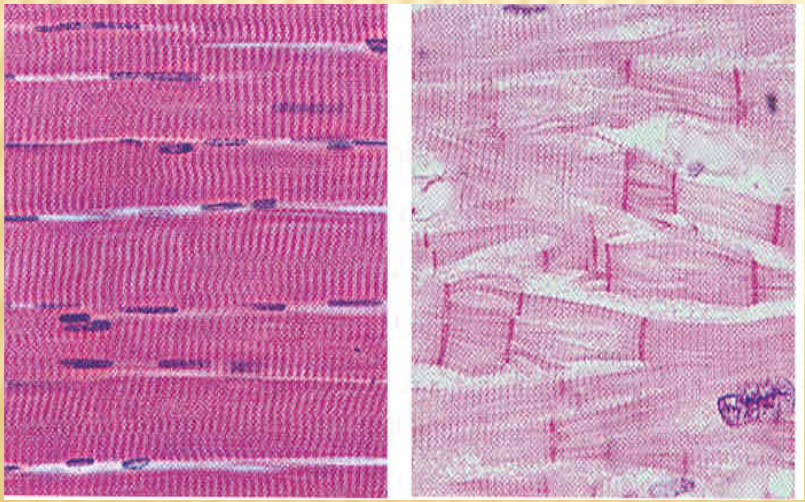
- **Involuntary: muscles**
- **Not under conscious control:** e.g. muscles of the heart and other organs



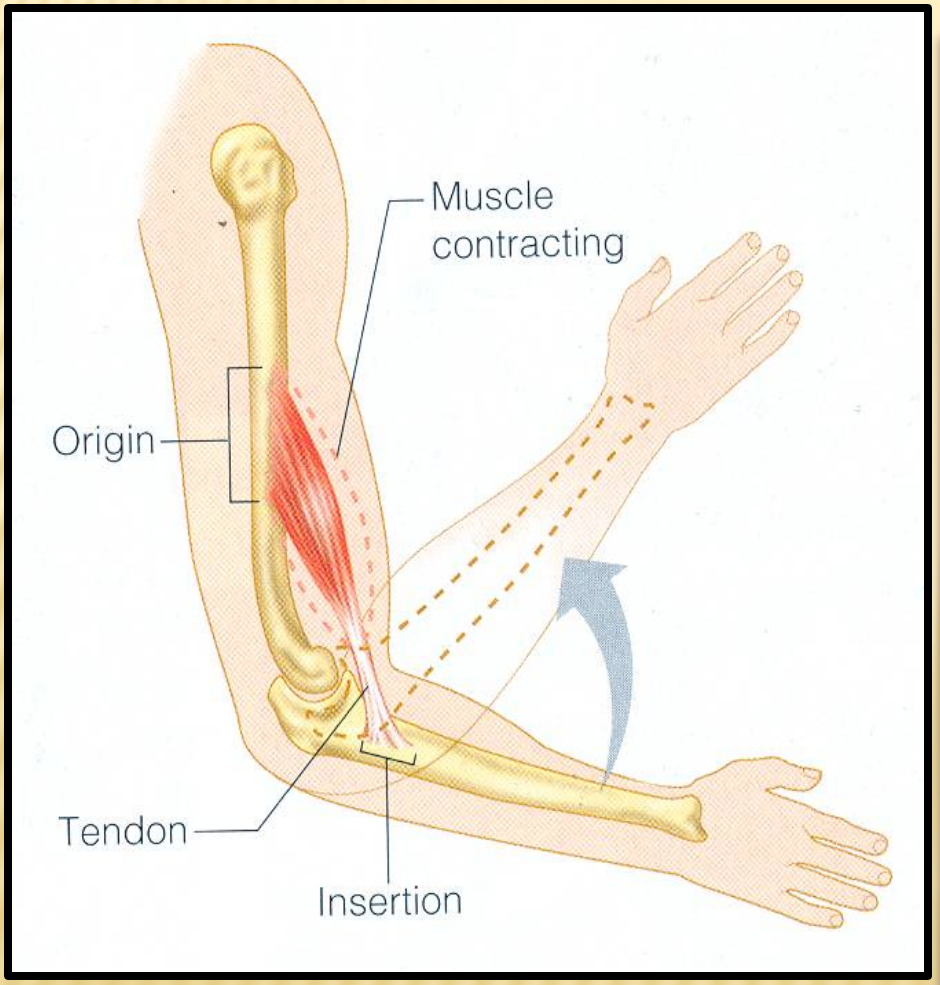
MICROSCOPIC STRUCTURE

- **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.

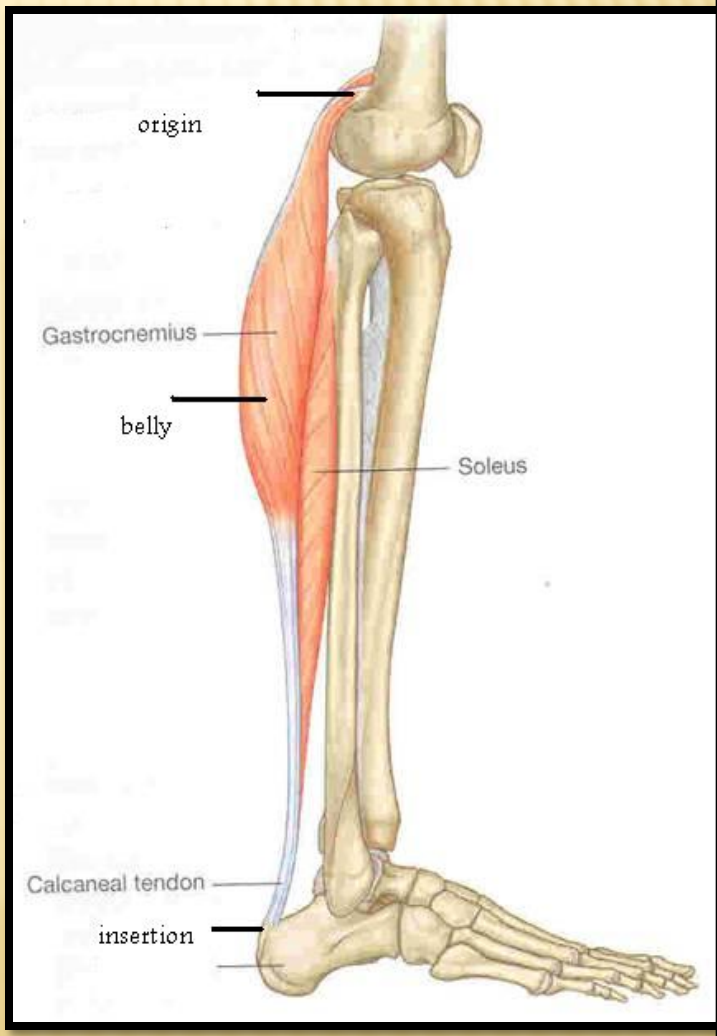
FUNCTIONS OF SKELETAL MUSCLES

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

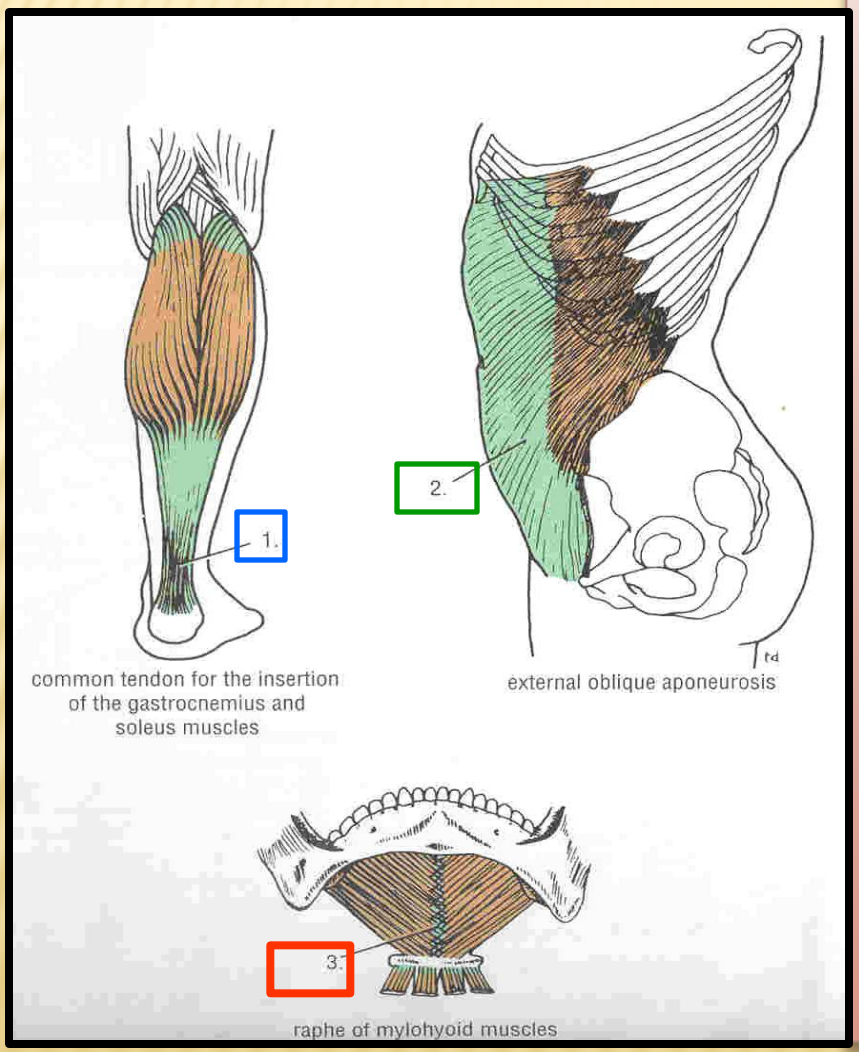
ATTACHMENTS OF SKELETAL MUSCLES

Number: (MOSTLY TWO)

ORIGIN	INSERTION
❑The Proximal end ❑Mostly Fleshy, ❑Least Movable,	❑The Distal end ❑Mostly Fibrous, ❑Most Movable,

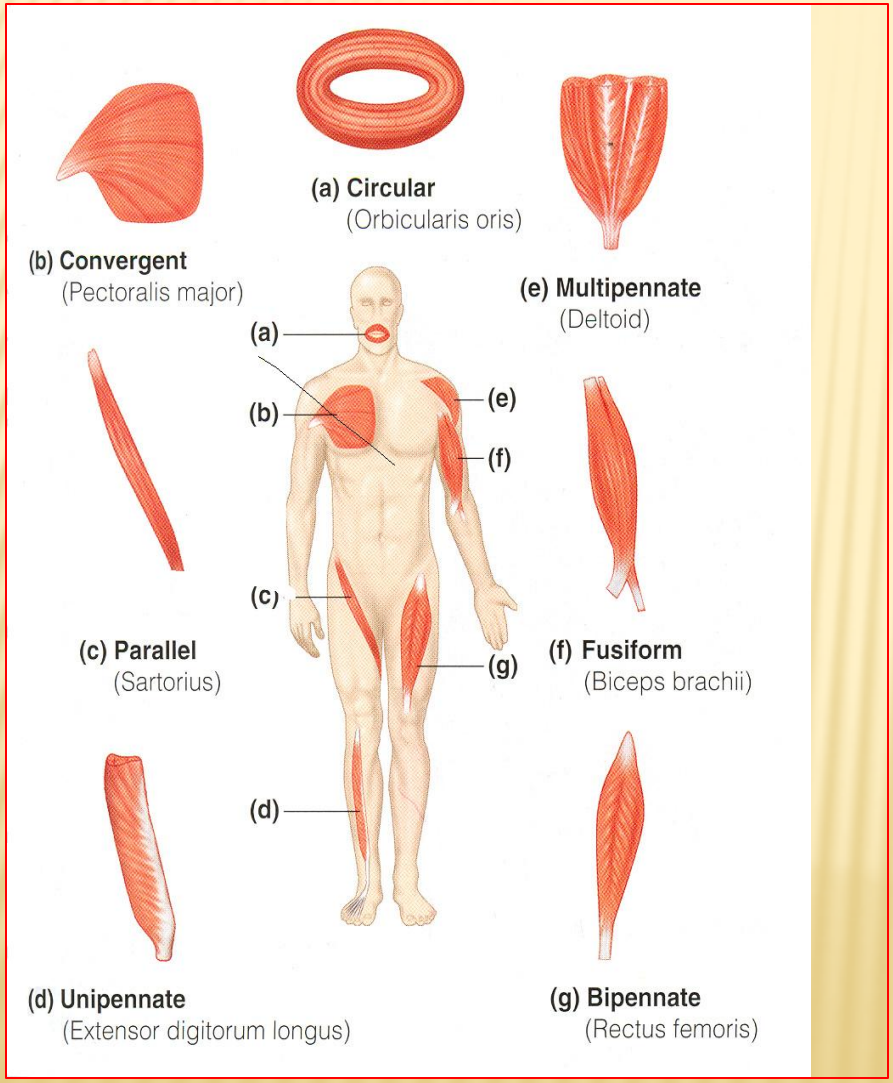


TYPES OF ATTACHMENT



- 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 flat muscles.

THE DIRECTION OF MUSCLE FIBERS

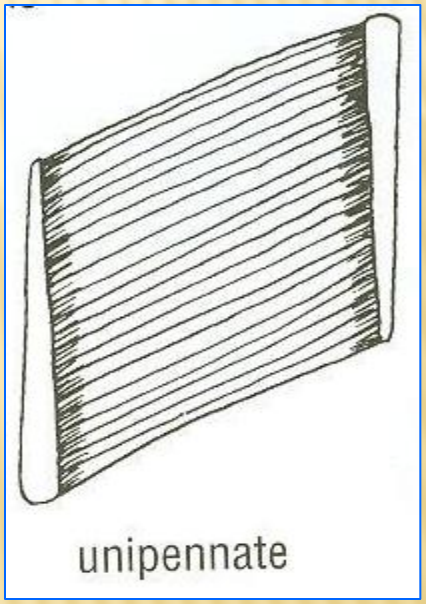


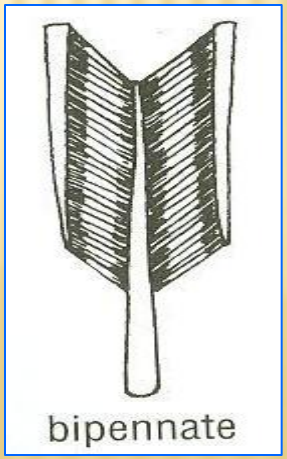
- The range of motion and the power of a muscle depends on the arrangement of its fascicles. It can be:
  - Circular
  - Convergent
  - Fusiform

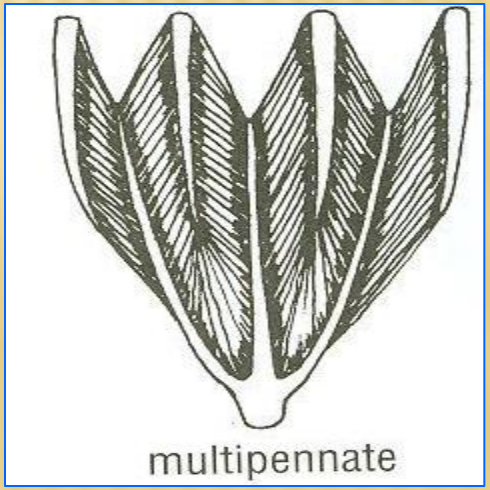
DIRECTION OF MUSCLE FIBERS

- **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

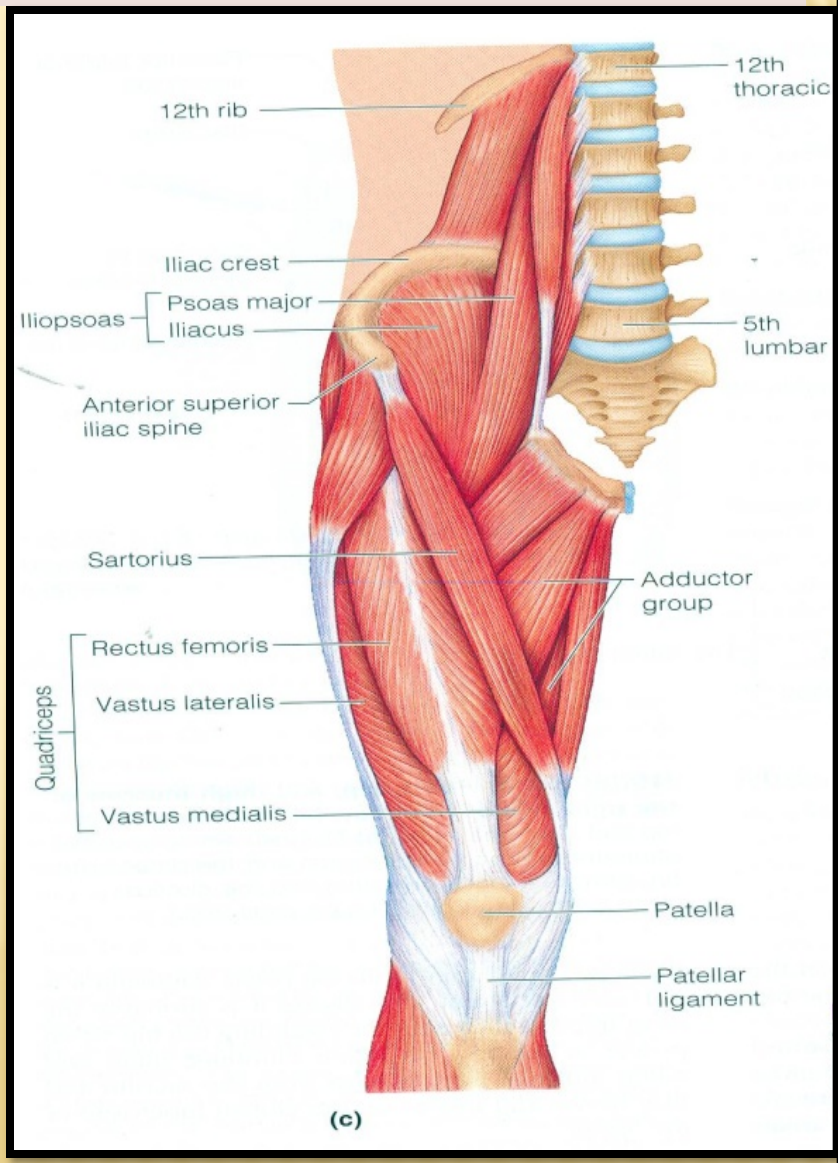






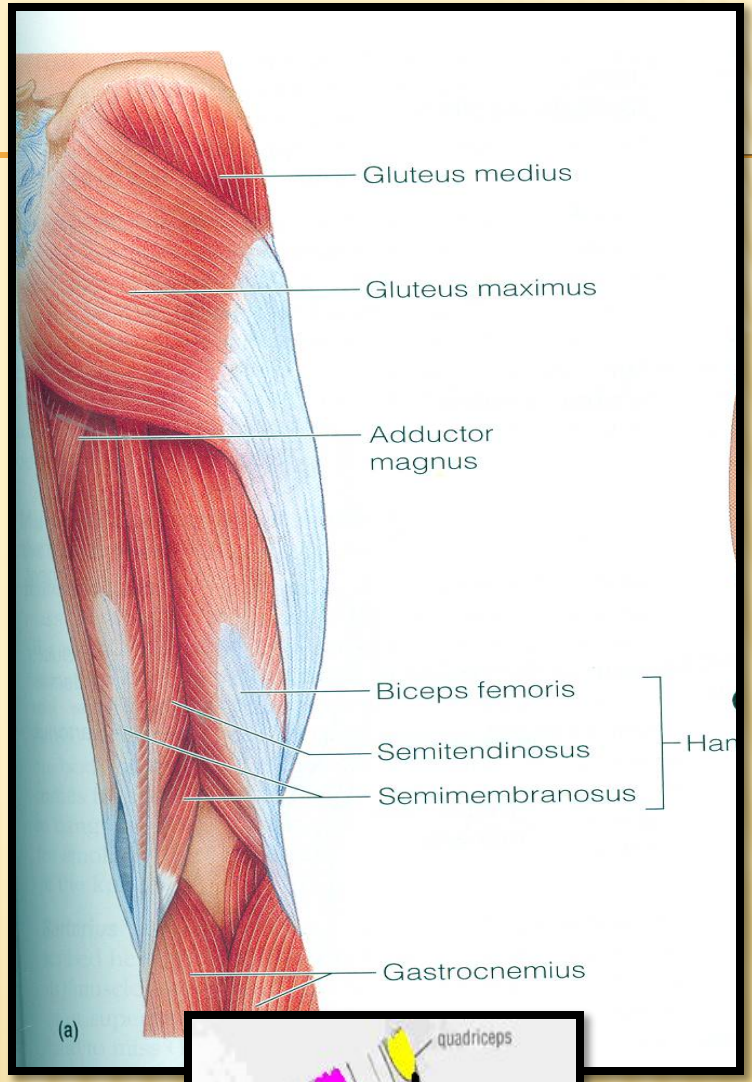
MECHANISM OF ACTION

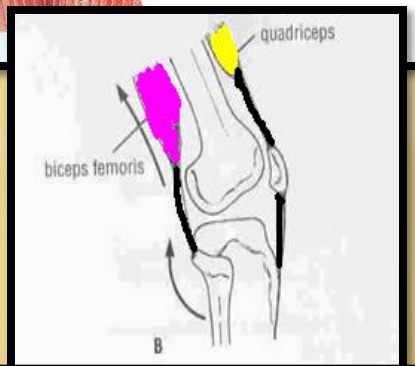
- **(1) Prime mover (Agonist) :**
  - It is the chief muscle responsible for a particular movement
  - **Example:**
  - **Quadriceps Femoris is the prime mover for extension of the knee joint.**



(2) Antagonist :

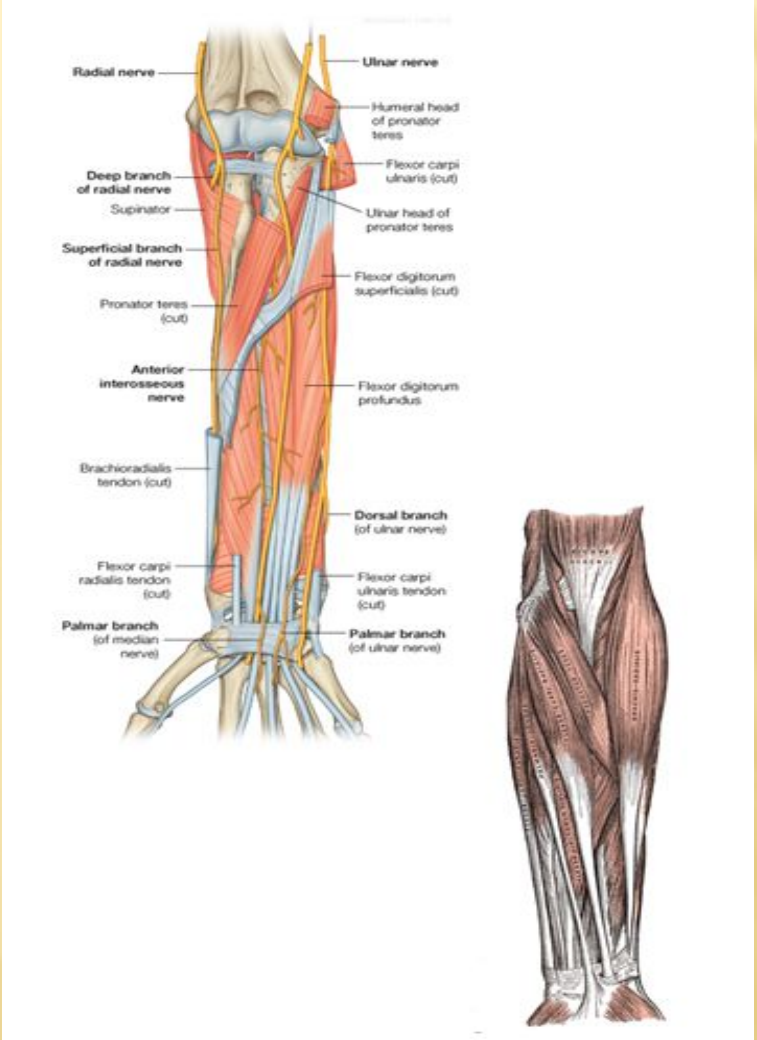
- It opposes the action of the prime mover.
- Before contraction of prime mover, the antagonist must be relaxed.
- **Example: Biceps Femoris** (Flexor of knee)
- It opposes the action of quadriceps when the knee joint is extended.



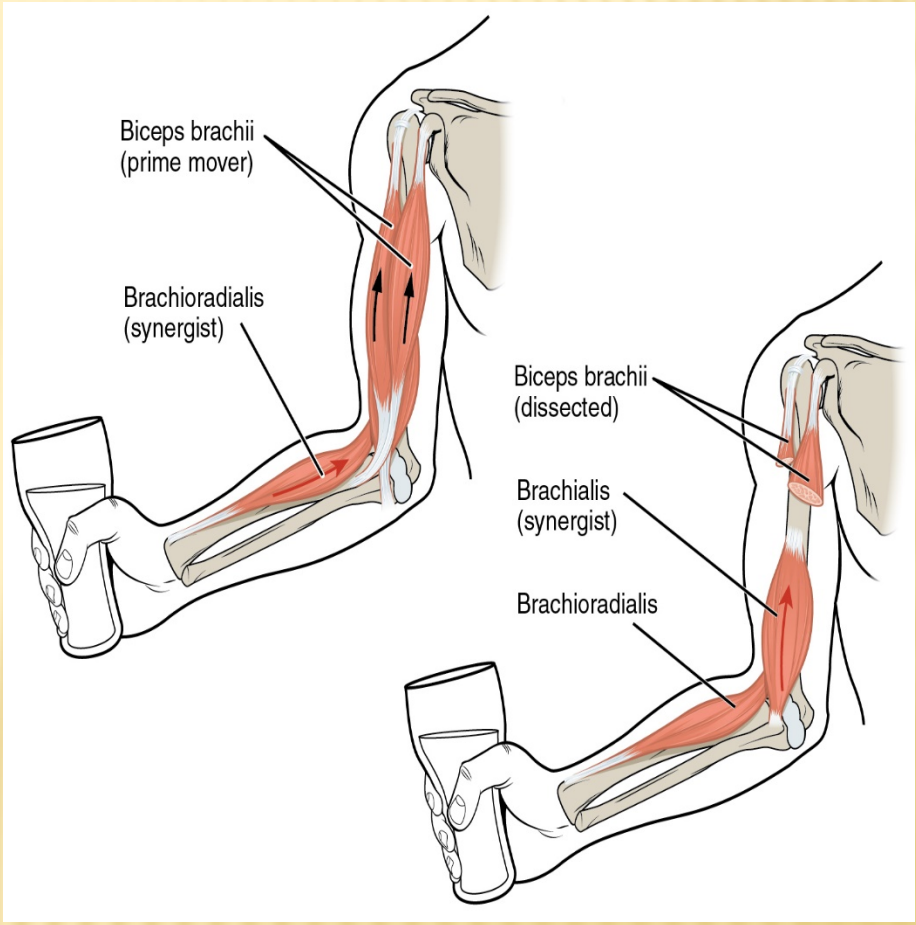


(3) Synergist :

- 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.



- They are referred to as **Neutralizers** because they help to cancel out or neutralize extra motion from the agonists to make sure that the force generated works within the plane of motion.
- **Example:**
- **Biceps &**
- **Brachioradialis**
- The bicps is the prime mover in the elbow j.
- Bracioradialis acts as a synergistic muscle to stabilize the joint thus aiding in the motion.

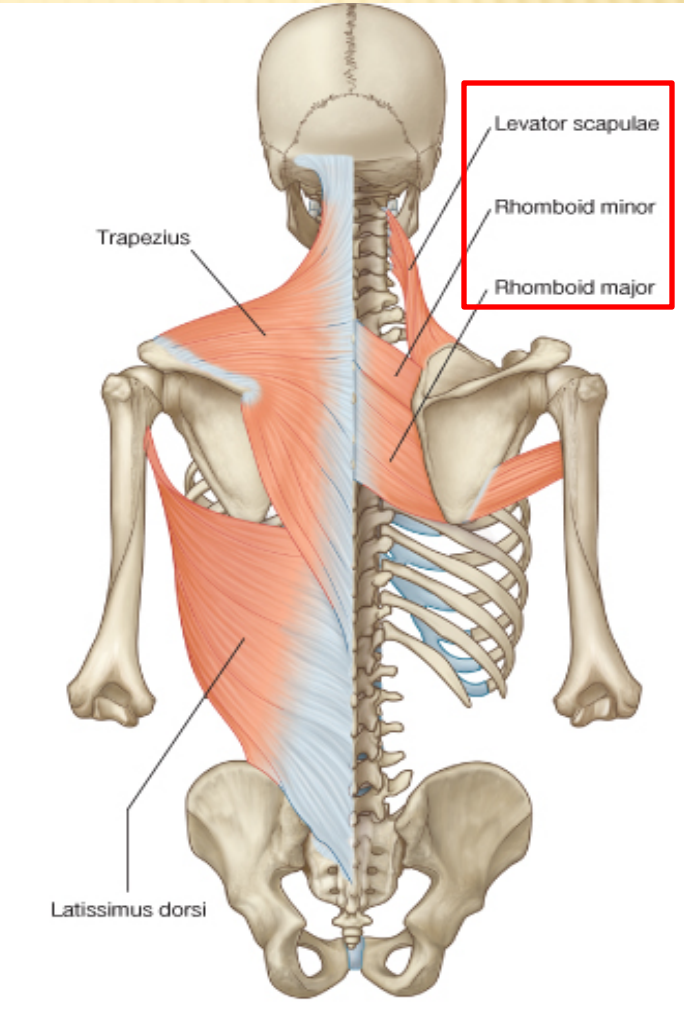


ANTAGONIST& SYNERGIST

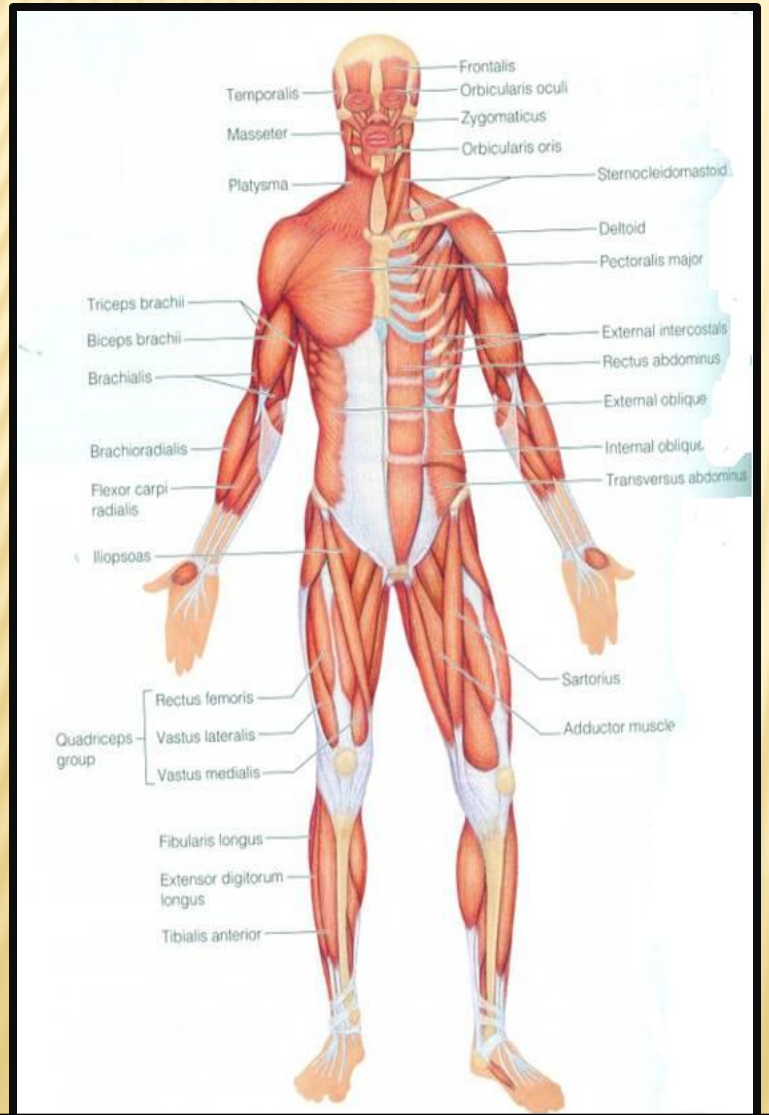
- **Antagonist:**
- **Opposes or reverses a particular movement.**
- **Synergist:**
- **Helps prime movers by adding a little extra force to the same movement**
- **OR**
- **By reducing undesirable or unnecessary movement.**

(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).

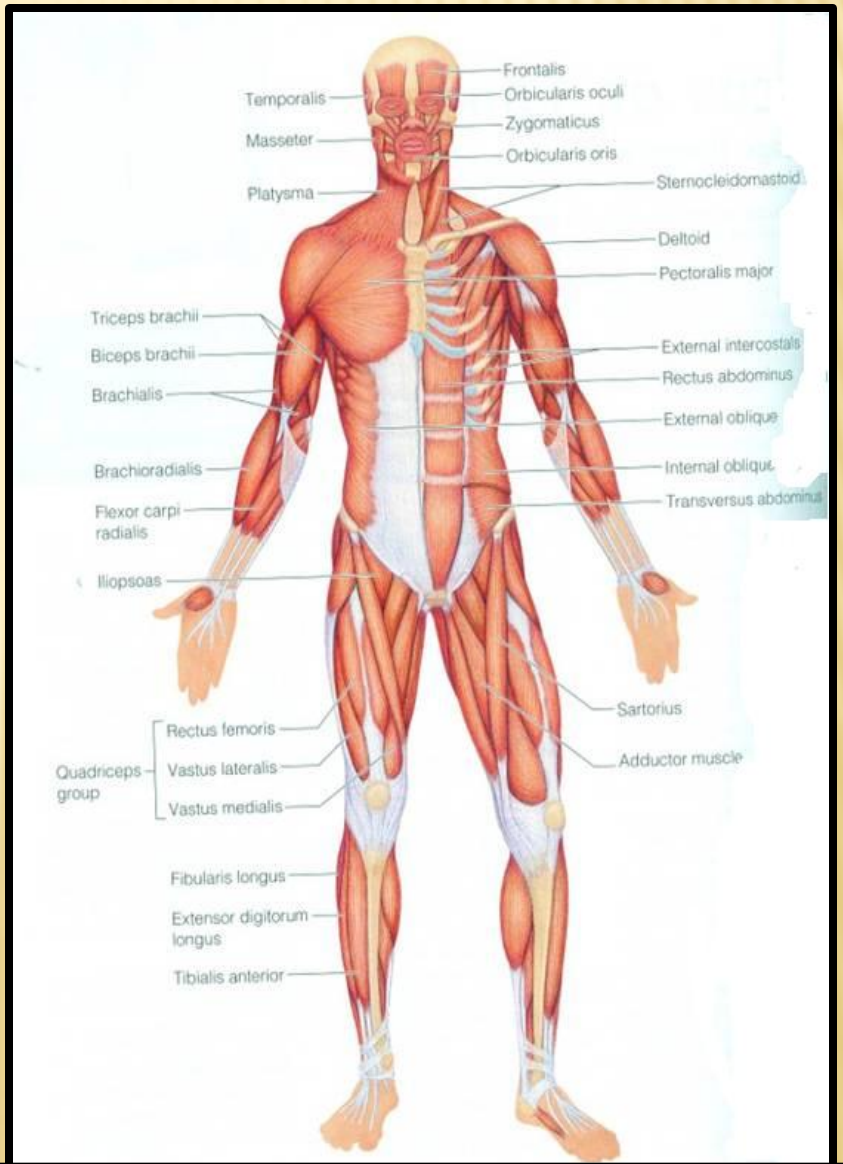


NAMING OF MUSCLES

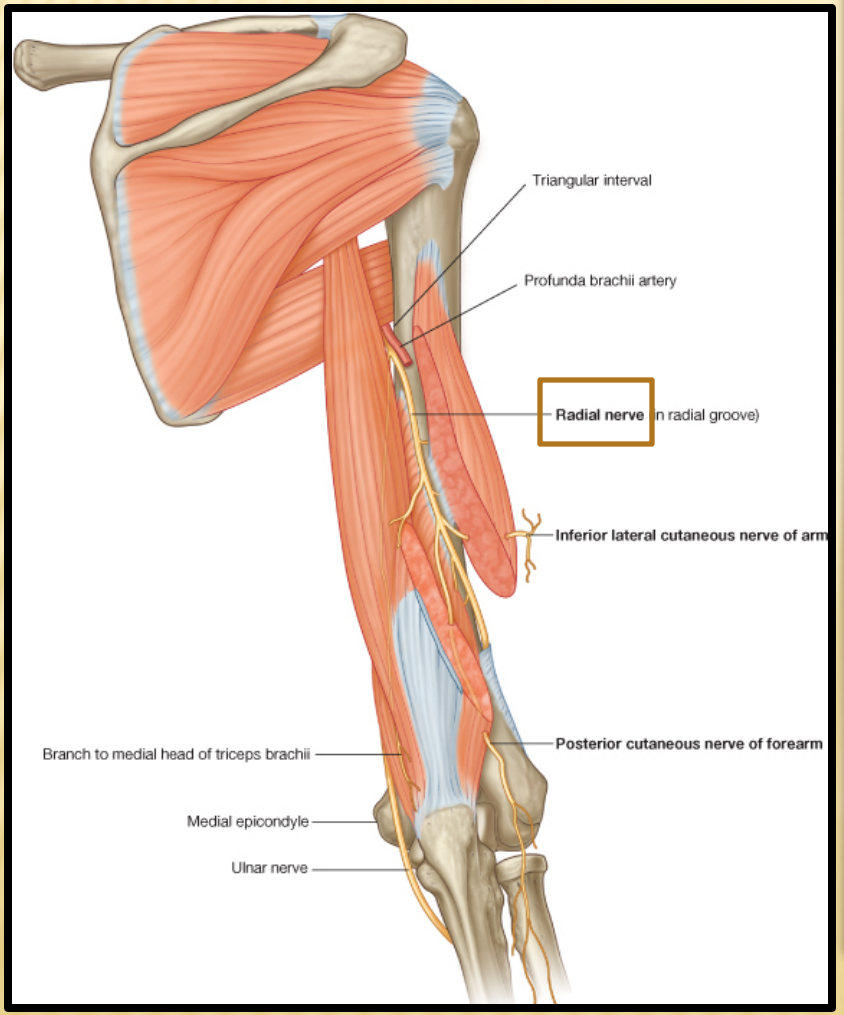


- It is according to:
- **1. Size:**
  1. Major or maximus (large).
  2. Minor or minimus (small).
  3. Latissimus (broad).
  4. Longus (long).
  5. Brevis (short).
- **2. Position:**
  1. Pectoralis (pectoral region)
- **3. Depth:**
  1. Superficialis (superficial).
  2. Profundus (deep).
  3. Externus (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 somaticnerve.

THANK YOU