Introduction to Human Anatomy

General Anatomy of Muscles

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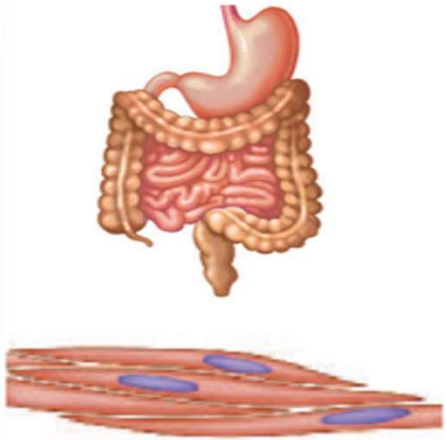
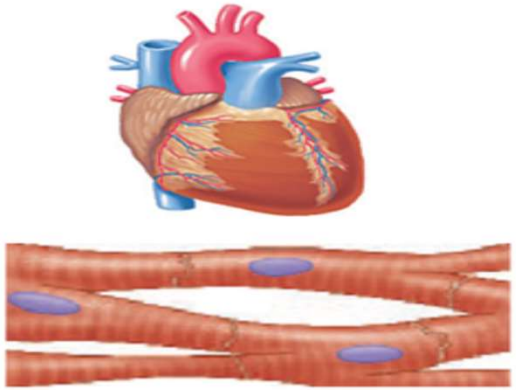
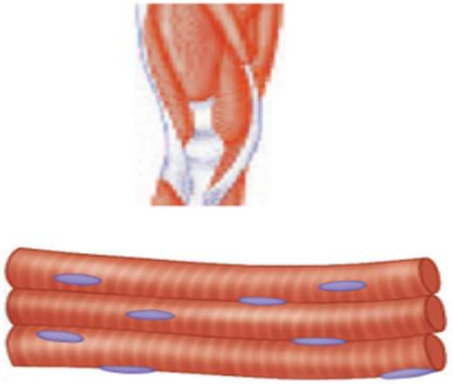
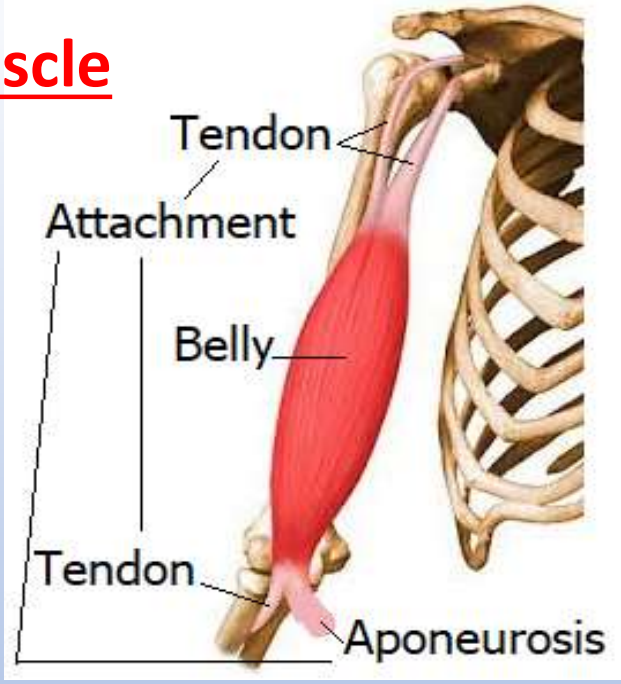
Muscles

- **Definition:**
  - Red flesh of our body.
  - Contractile (becomes short in response to nerve impulse).
  - Responsible for movements.
- **Functions:**
  - Production of movements (body movement, expressions, respiration, circulation, ...).
  - Maintenance of posture.
  - Stabilization of the joints.
  - Generation of heat.

Types of Muscles

	1. Smooth Muscle	2. Cardiac Muscle	3. Skeletal Muscle
Site:	• Wall of internal viscera & blood vessels	• Myocardium	• Attached to skeleton
Nerve supply:	• Autonomic	• Autonomic	• Somatic
Contraction:	• Involuntary	• Involuntary	• Voluntary
Striation:	• Absent	• Present	• Present
Muscle cell:	• Spindle-shaped	• Branch & anastomose	• Doesn't branch
Nucleus:	• Single & central	• Single & central	• Multiple & peripheral
Fatigue:	• Doesn't occur	• Never	• Occurs
			

Skeletal (Striated / Voluntary) Muscle



- **Definition:**
  - Muscles which are attached to the skeleton to generate movement.
  - It has belly and two or more attachments.
- **Attachment:**
  - It has belly & two or more attachments.
  - The more fixed attachment is called origin.
  - The more fixed attachment is called insertion.
  - Muscle may be attached to bone, cartilage, ligament, fascia, skin or other muscle.
  - Muscle attachment may be direct or through fibrous tissue (tendon / aponeurosis) or both.
  - Tendon is a rounded cord-like white fibrous tissue.
  - Aponeurosis is an expanded sheet-like white fibrous tissue.

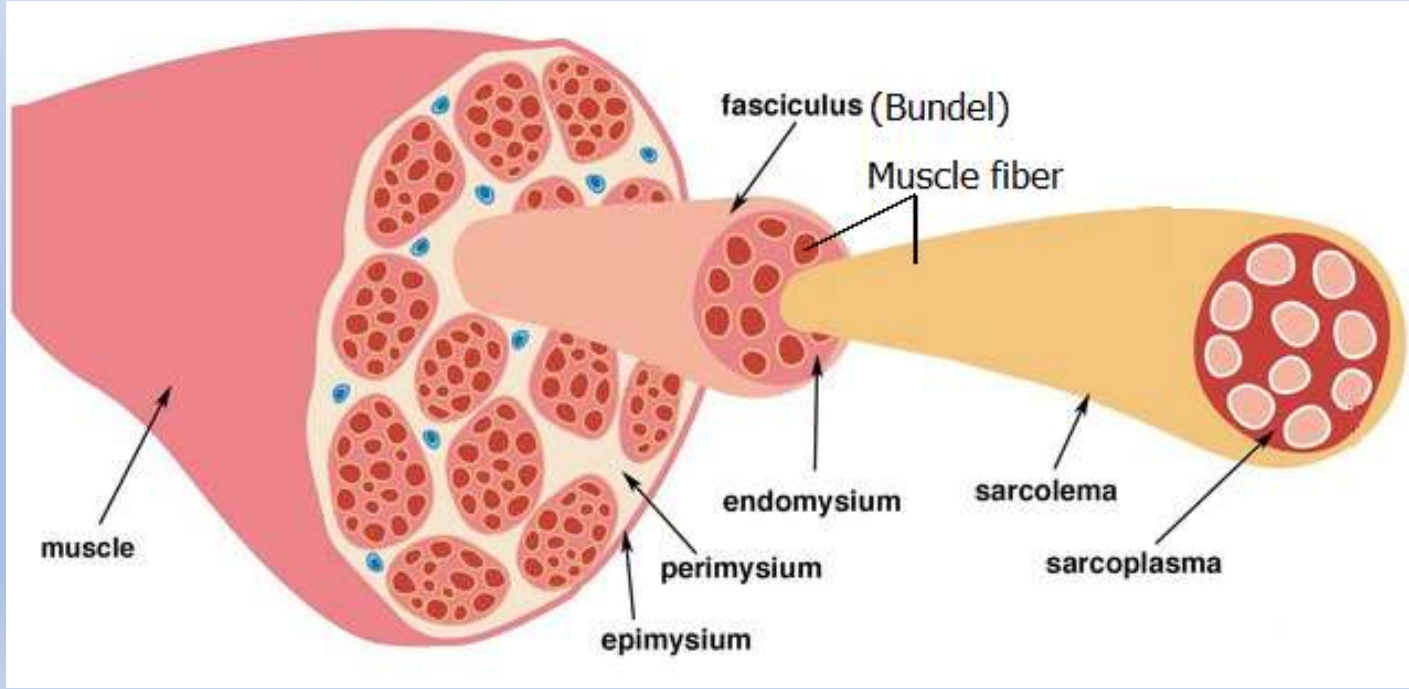
Skeletal (Striated / Voluntary) Muscle

❑ Connective tissue coverings:

- ➢ **Epimysium:** the outermost connective tissue sheath which surrounds the entire muscle.
- ➢ **Perimysium:** the connective tissue sheath which covers each bundle (fasciculus).
- ➢ **Endomysium:** the innermost connective tissue sheath which surrounds the individual muscle fiber.

❑ NB:

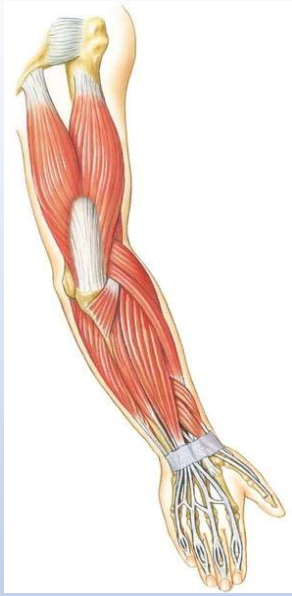
- ➢ **Sarcolemma:** the cell membrane of skeletal muscle.
- ➢ **Sarcoplasm:** the cytoplasm of skeletal muscle.

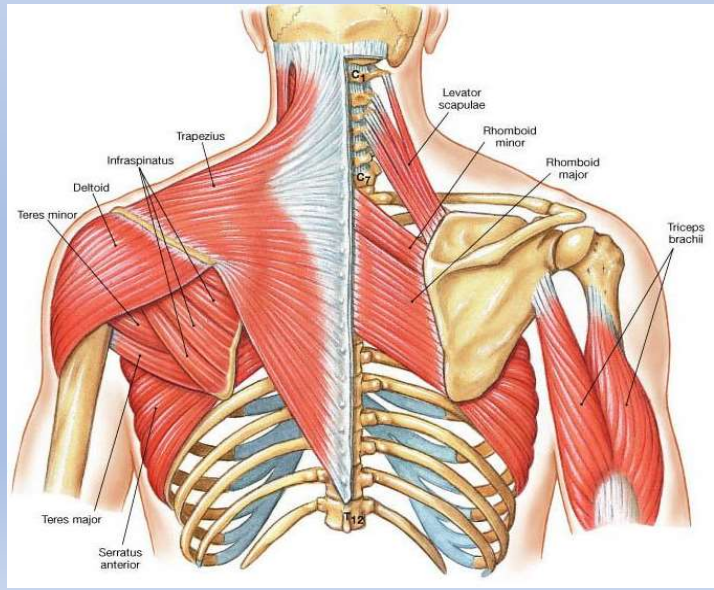


Classification of Skeletal Muscles

❑ According to action:

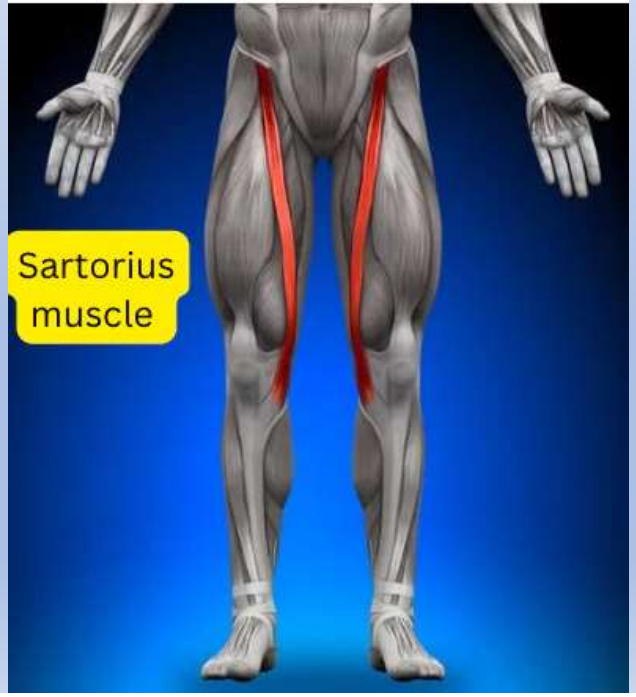
- **Prim mover:** muscle which initiates particular movement. (eg. Brachialis is a prim flexor to the elbow).
- **Antagonists:** muscle which opposes the action of the prim mover (e.g. triceps antagonizes elbow flexion).
- **Synergists:** muscle which eliminates unwanted movement in proximal joints while distal joints are in action (e.g. extensors of wrist contract during flexion of fingers, to eliminate the unwanted flexion at the wrist).
- **Fixators (Stabilizers):** muscles which help the prime mover by fixing (stabilizing) its origin (e.g. muscles attaching the scapula to the trunk act as fixators to allow other muscles to move the shoulder joint).

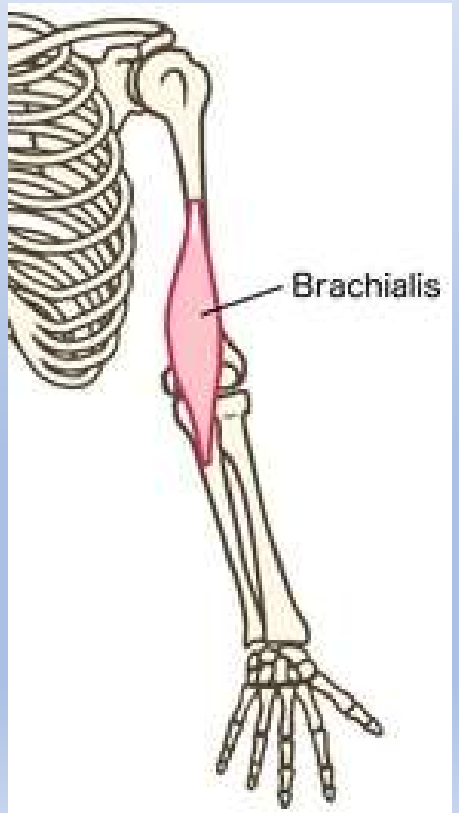


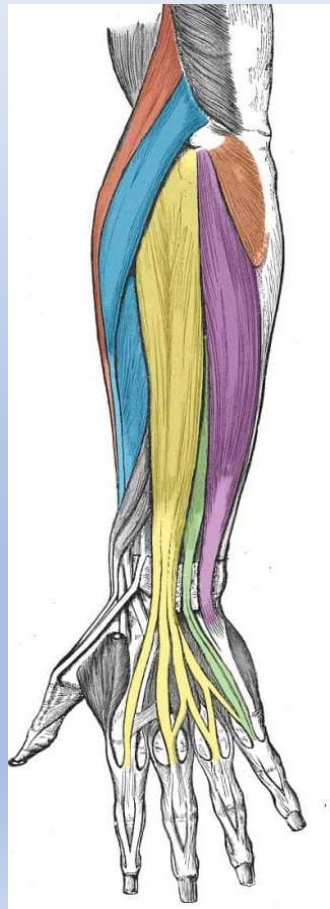


Classification of Skeletal Muscles

- **According to the number of joints they act upon:**
  - **Uni-articular:** muscle which acts on one joint only (e.g. brachialis acts only on the elbow joint).
  - **Bi-articular:** muscle which acts on 2 joints (e.g. sartorius acts on both hip & knee joints).
  - **Muti-articular:** muscle which acts on more than 2 joints (e.g. long flexors & extensors of digits).

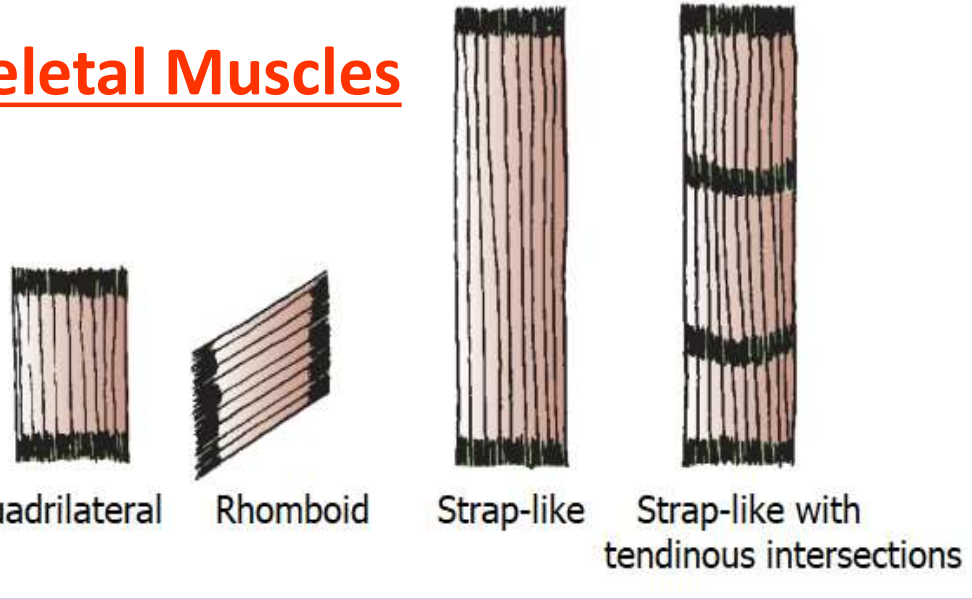


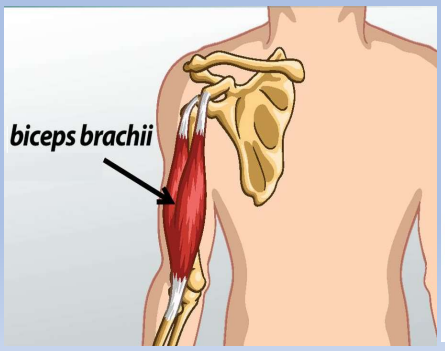


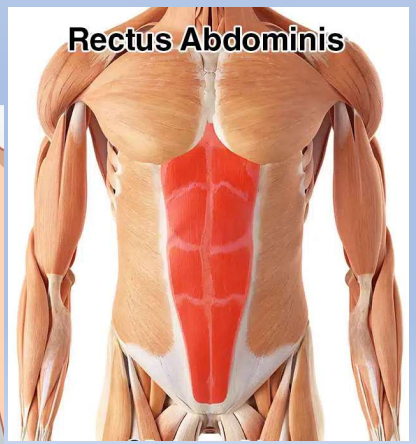


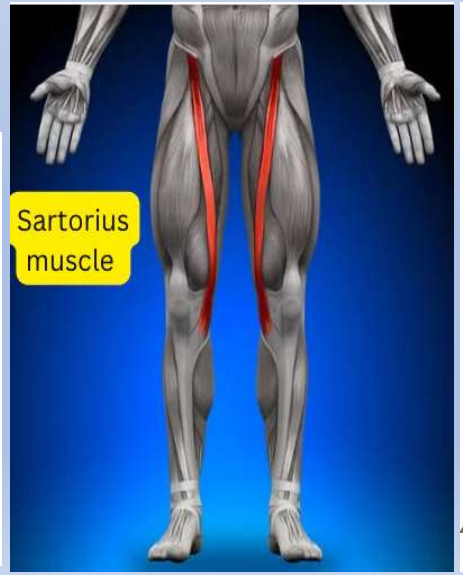
Classification of Skeletal Muscles

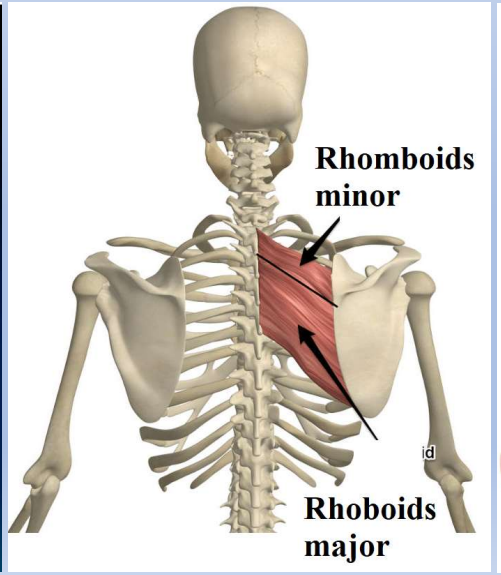
- **According to arrangement of muscle fibers (shape):**
  - **Parallel:** muscle fibers run parallel to the line of pull
    - ✓ Quadrilateral (e.g. quadratus lumborum).
    - ✓ Rhomboid (e.g. rhomboids major).
    - ✓ Strap-like (e.g. sartorius).
    - ✓ Strap-like with tendinous intersections (e.g. rectus abdominis).
  - **Fusiform** (e.g. biceps brachii).

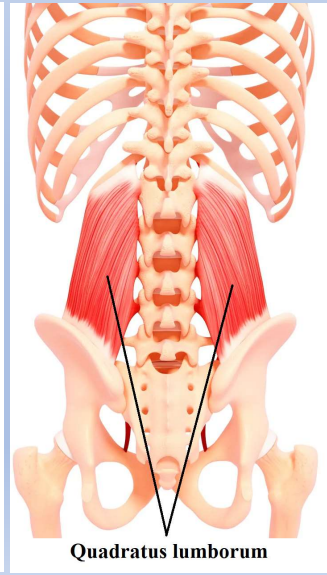






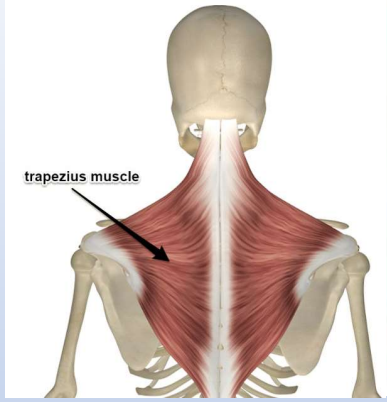


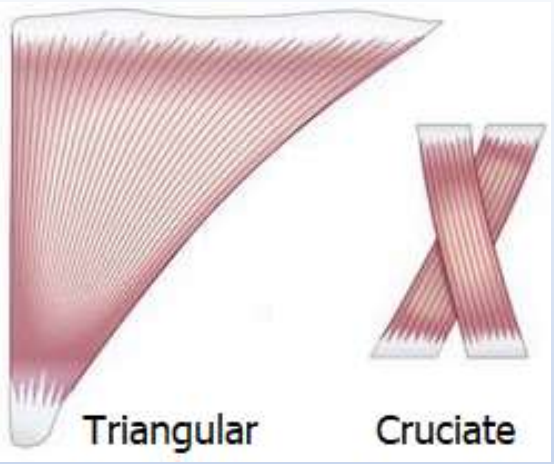


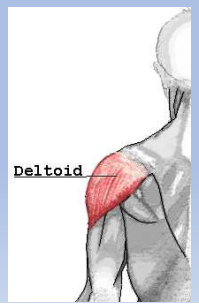


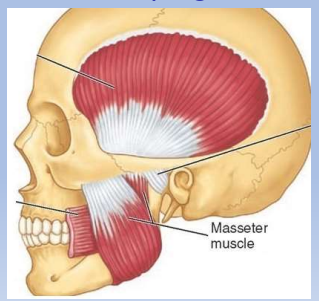
Classification of Skeletal Muscles

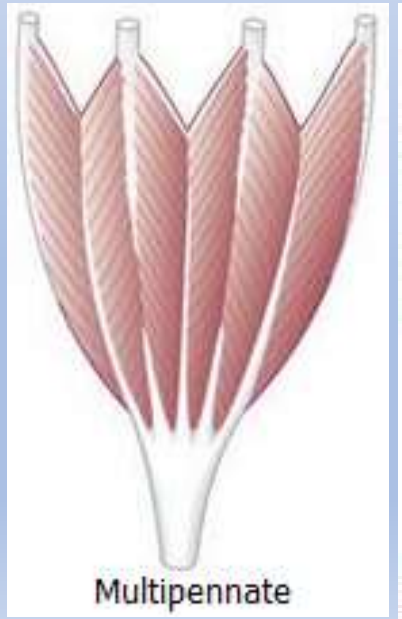
- **According to arrangement of muscle fibers (shape):**
  - **Oblique:** muscle fibers run oblique to the line of pull.
    - ✓ Convergent / triangular (e.g. trapezius).
    - ✓ Cruciate / X-shaped (e.g. masseter).
    - ✓ Pennate (feather-like):
      - Unipennate: fibers arranged at one side of the tendon (e.g. plantar interossei).
      - Bipennate: fibers arranged at both sides of the tendon (e.g. dorsal interossei).
      - Multipennate: formed of multiple bipennate (e.g. deltoid).

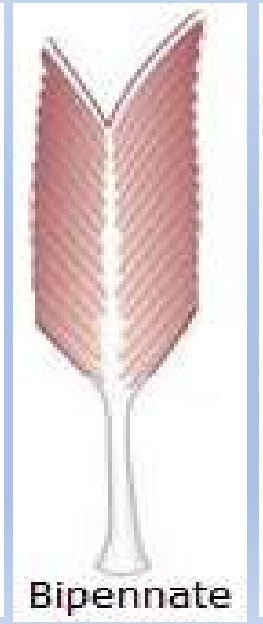


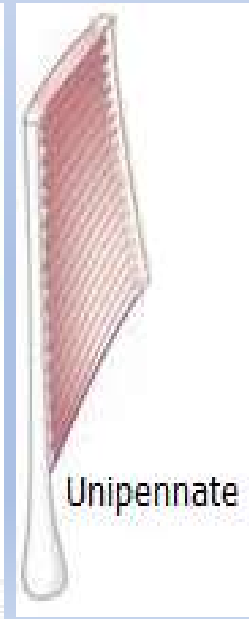






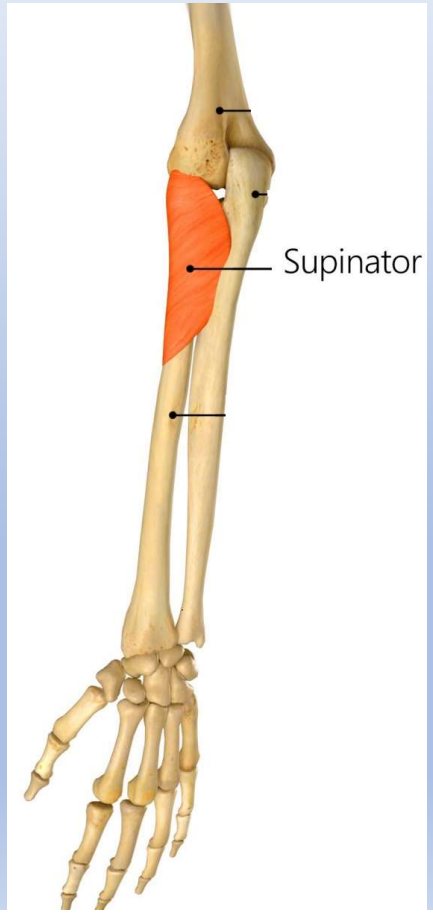


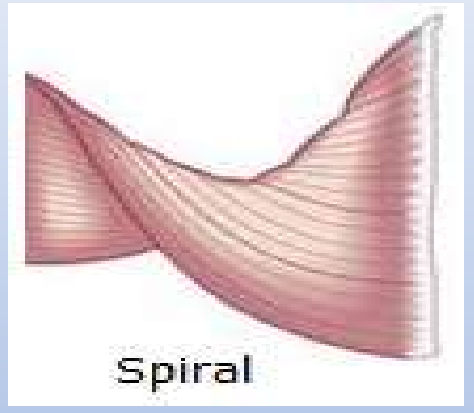


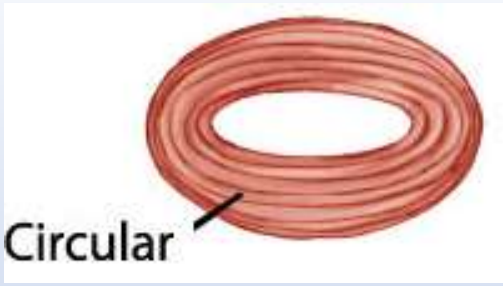


Classification of Skeletal Muscles

- **According to arrangement of muscle fibers (shape):**
  - **Circular:** muscle fibers run in circles around orifice.(e.g. Orbicularis oris).
  - **Spiral:** (e.g. supinator)







Classification of Skeletal Muscles

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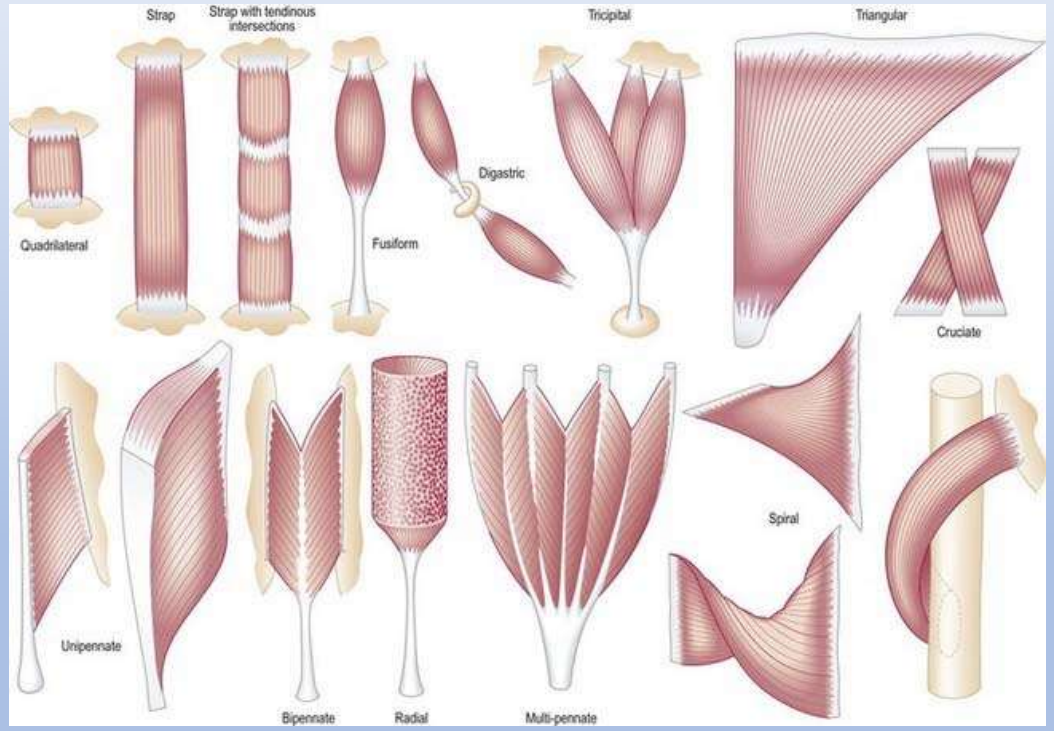
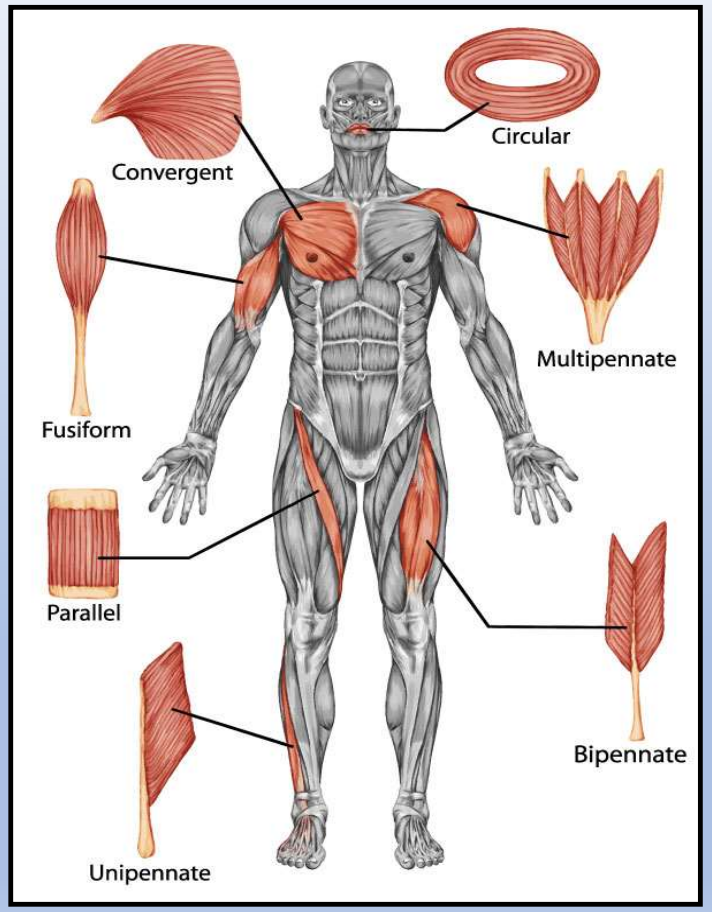
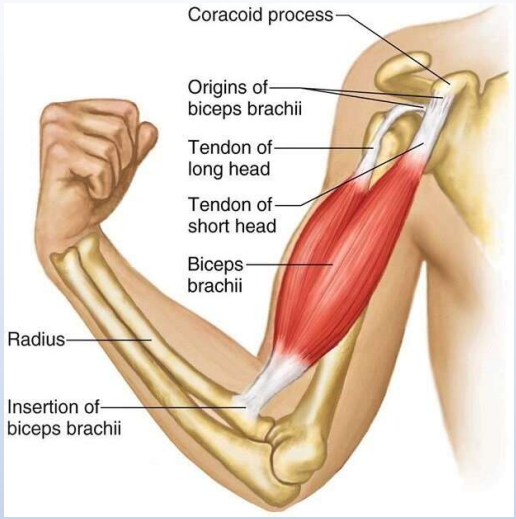




Naming of Skeletal Muscles

Naming of Skeletal Muscles[a]

Name	Shape	Size	Number of Heads or Bellies	Position	Depth	Attachments	Actions
Deltoid	Triangular						
Teres	Round						
Rectus	Straight						
Major		Large					
Latissimus		Broadest					
Longissimus		Longest					
Biceps			Two heads				
Quadriceps			Four heads				
Digastric			Two bellies				
Pectoralis				Of the chest			
Supraspinatus				Above spine of scapula			
Brachii				Of the arm			
Profundus					Deep		
Superficialis					Superficial		
Externus					External		
Sternocleidomastoid						From sternum and clavicle to mastoid process	
Coracobrachialis						From coracoid process to arm	
Extensor							Extend
Flexor							Flex
Constrictor							Constrict



Questions

The more fixed attachment of skeletal muscle is called:

A. Tendon.

B. Belly.

C. Insertion.

D. Origin.

Answer: D

Questions

Muscles opposing action of prime movers are called:

A. Synergists.

B. Fixators.

C. Antagonists.

D. Stabilizers.

Answer: C


Thank
YOU!