

SKELETAL MUSCLES

Foundation block - Anatomy - Lecture 2



Objectives

- **At the end of the lecture, students should be able to:**
 1. Describe the main criteria of skeletal muscles.
 2. Describe the attachments of skeletal muscles.
 3. Describe the different directions of skeletal muscle fibers.
 4. Describe the mode of action of skeletal muscles.
 5. Describe briefly the naming of skeletal muscles.
 6. Describe briefly the nerve supply of skeletal muscles

Color guide :

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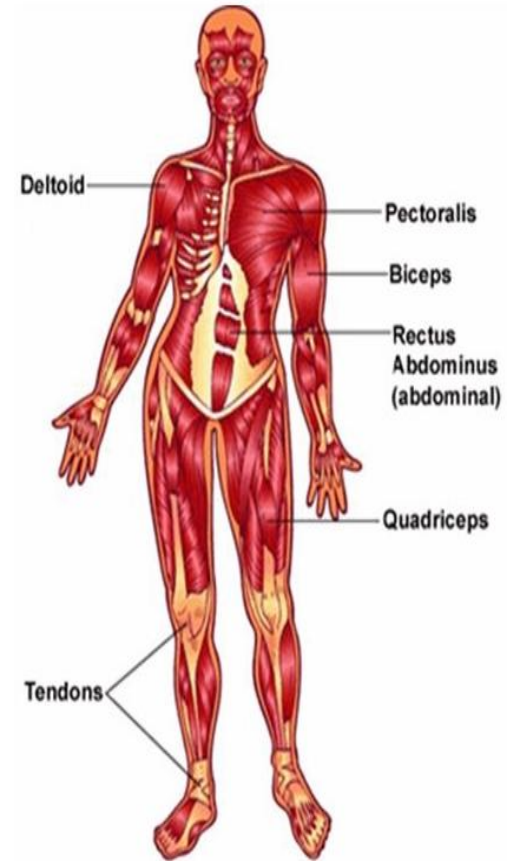
Only in girls slides in **Purple**
important and doctors note in **Red**

Extra information in **blue**

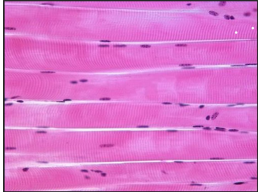
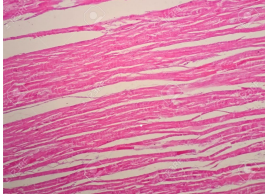
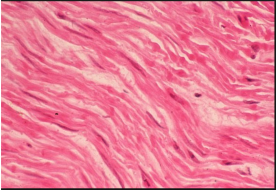
Functions of Muscles

- **Movement of body and its parts**
- **Maintain posture** (الحفاظ على قوام الجسد)
- **Generate heat** (تخليق الحرارة)
- **Stabilize joints** (جعل المفاصل اكثر استقرار)

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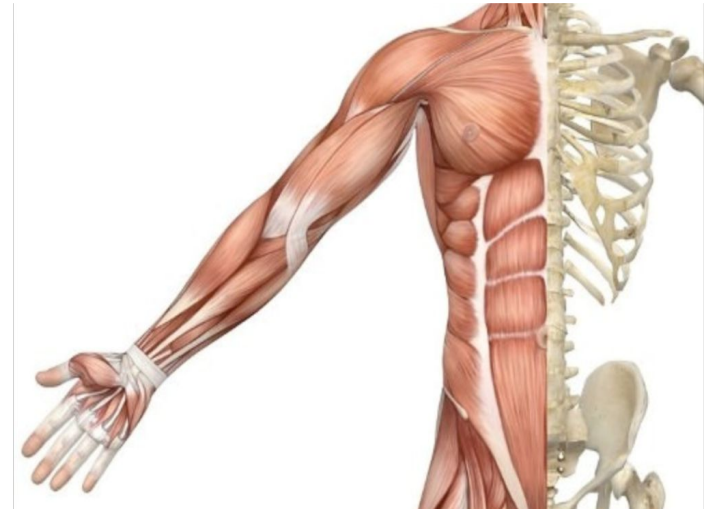


Classifications of Muscles :

	<i>Skeletal</i>	<i>Cardiac</i>	<i>Smooth (Visceral)</i>
<i>Location</i>	<u>Attached to bones</u> , or for some facial muscles, to skin	Wall of the <u>heart</u>	Mostly in <u>walls of hollow visceral organ</u> (other than the heart)
<i>Action</i>	<u>Voluntary muscles</u> Subject to conscious control	<u>Involuntary muscles</u> Not under conscious control	<u>Involuntary muscles</u> Not under conscious control
<i>Microscopic structure</i>	<u>Striated</u> The muscle fibers show transverse striations e.g. skeletal & cardiac muscles 	<u>Striated</u> The muscle fibers show transverse striations e.g. skeletal & cardiac muscles 	<u>Non-striated</u> (smooth spindle shape) No striations e.g. visceral muscles 

Main criteria of skeletal muscles :

- Voluntary
- Striated
- Attached to skeleton
- Produce movement of skeleton
- Supplied by **somatic nerves** (عصب جسدي)



Attachments of skeletal muscles

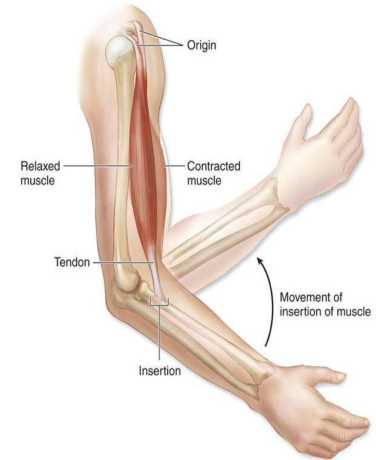
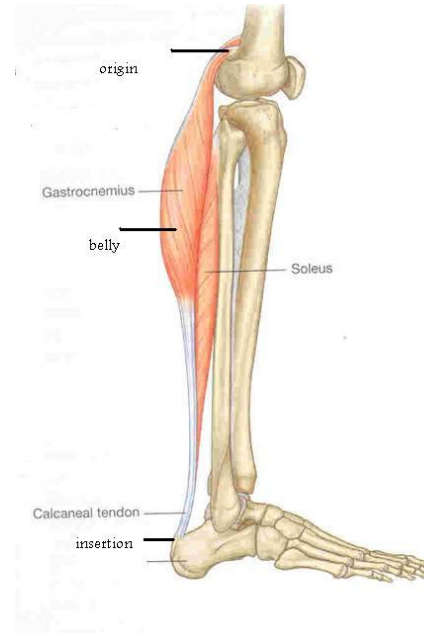
Number of attachments: **Mostly two.**

Origin	Insertion
<ul style="list-style-type: none">● The Proximal end● Mostly Fleshy● Least movable	<ul style="list-style-type: none">● The Distal end● Mostly Fibrous● Most movable

Note :

1. The origin is where muscle start and the insertion where it end

2. Muscles can have more than one origin but they must have **only one insertion**



Types of attachment:

Muscles are attached to bones, cartilage or ligaments through:

(1) Tendons

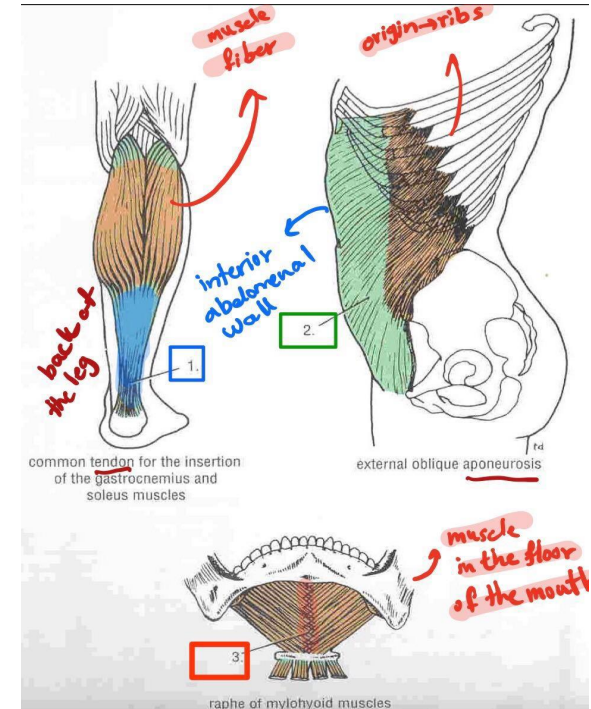
A tough cord of fibrous connective tissue that usually connects muscle to bone and is capable of withstanding tension.

(2) Aponeurosis:

A thin broad and strong sheet of fibrous tissue, **white sheet of fibrous**, e.g. **Scalp** (فروة الرأس) **interior abdominal wall** (الجدار الداخلي للبطن)

(3) Raphe:

An interdigitation of the tendinous ends of the flat muscles, e.g. **Mylohyoid Raphe**. (منطقة تحت اللسان)

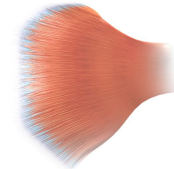
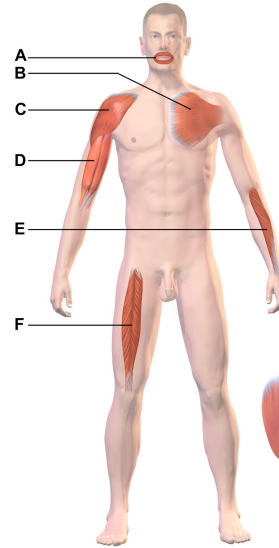


Directions of muscle fibers:

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

- **Circular**
- **Convergent**
- **Fusiform**

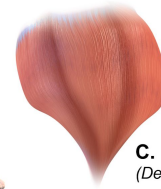
Muscle Types



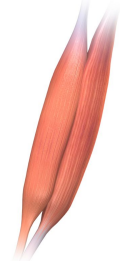
B. Convergent
(Pectoralis muscle)



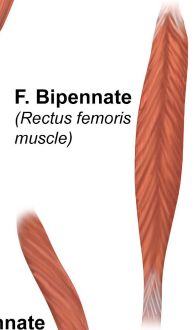
A. Circular
(Orbicularis oris muscle)



C. Multipennate
(Deltoid muscle)



D. Parallel
(Biceps brachii muscle)



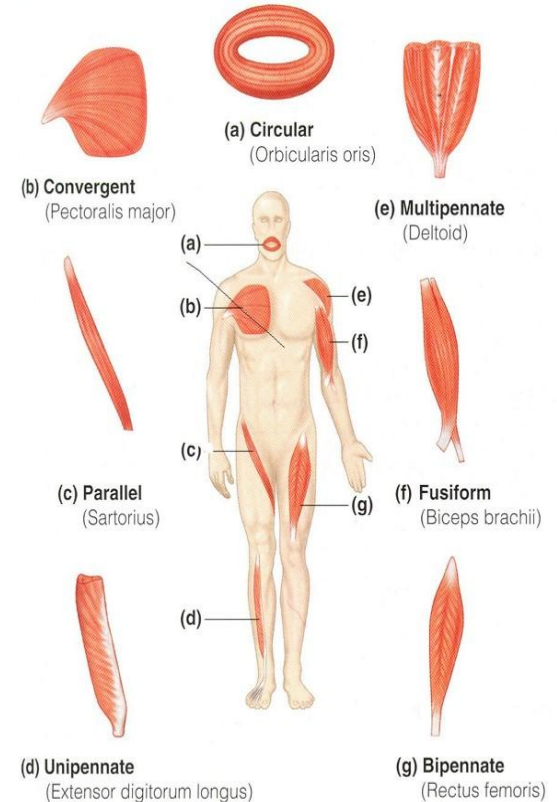
F. Bipennate
(Rectus femoris muscle)

E. Unipennate
(Extensor digitorum muscle)

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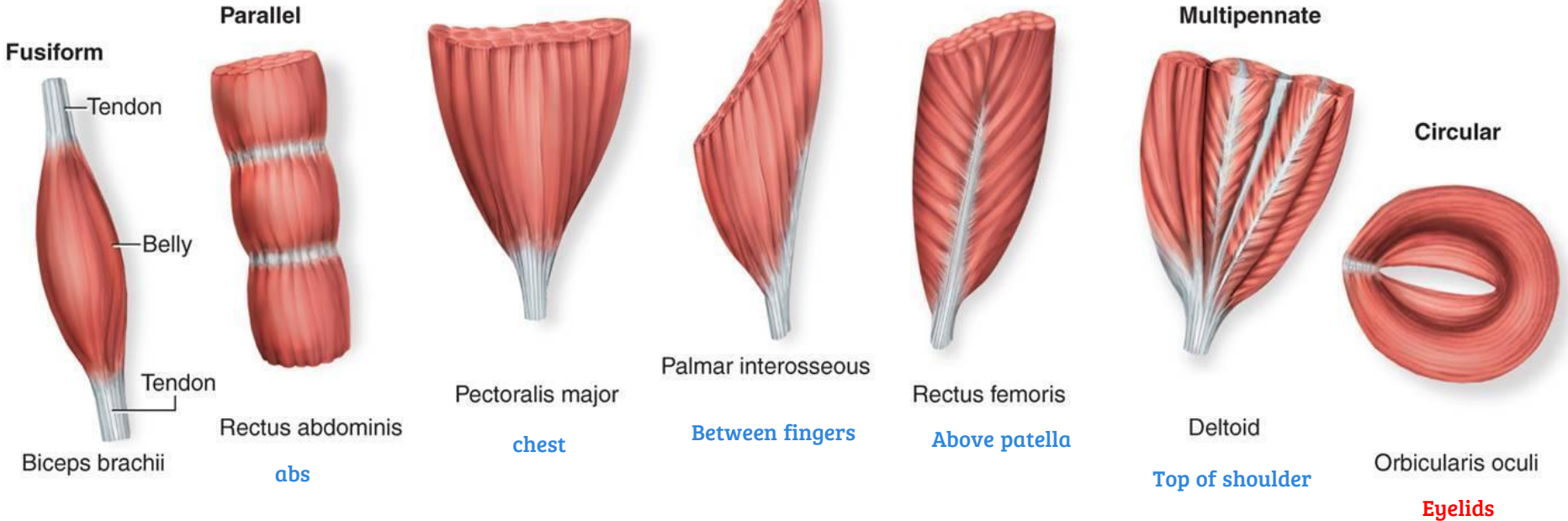
Directions of muscle fibers:

- **Parallel to line**
More range of movement, **less powerful.**
- **Pennate (oblique to line)**
More powerful, **less range of movement.**
 - 1-Unipennate
 - 2-Bipennate
 - 3-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 Action (Mechanism) :

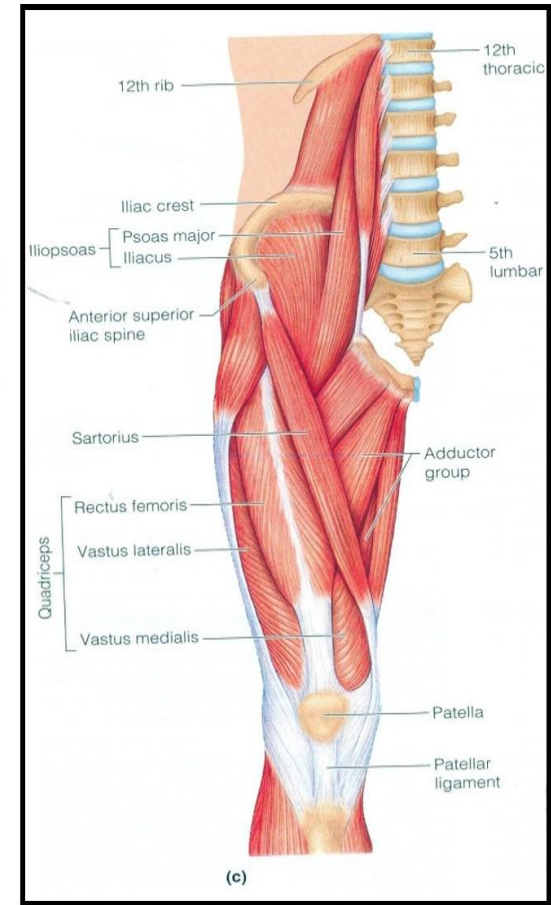
Prime mover (Agonist):

It is the Chief muscle responsible for particular movement

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

E.x: Quadriceps Femoris is the prime mover for knee joint.

Extra note:
Biceps brachii
bi= two
ceps= head
brach= arm



Mode of Action (Mechanism) :

Antagonist:

It **opposes** the action of the prime mover.

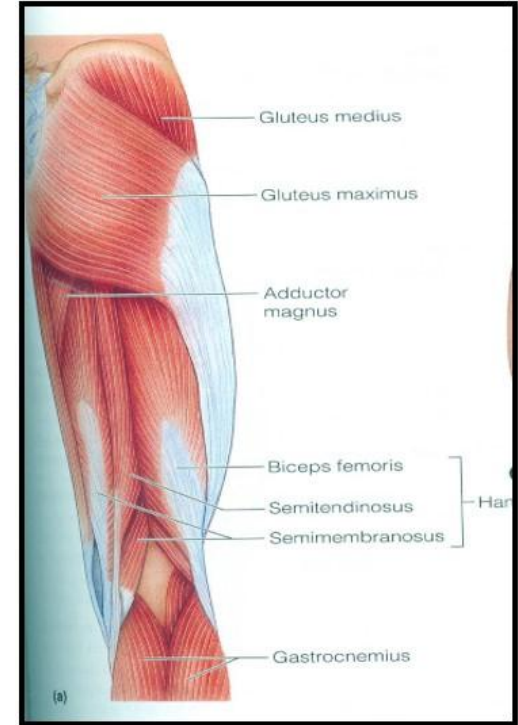
Before contraction of prime mover, antagonist must be **relaxed**.

E.x :Triceps Brachii is the antagonist for prime mover for the flexion of elbow joint and forearm

E.x: Biceps Femoris (Flexor of knee)

It opposes the action of quadriceps when the knee joint is extended.

Note: Each muscle can be both agonist & antagonist.



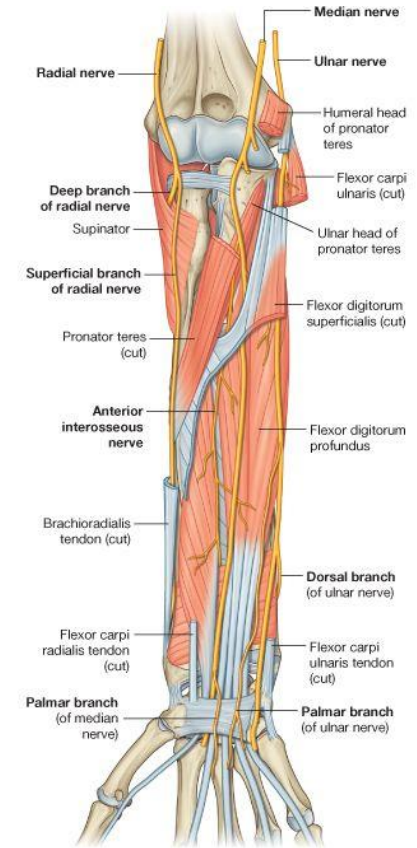
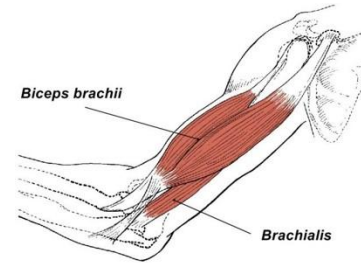
Mode of Action (Mechanism) :

Synergist:

Muscles that **assist the prime mover** in a particular movement and **Prevents unwanted movement** in an intermediate joint crossed by the Prime Mover

E.x: Brachialis muscle for Biceps prime mover muscle

E.x: Flexors and Extensors of wrist joint
They contract to fix wrist joint in order that flexors and extensors of fingers work efficiently.



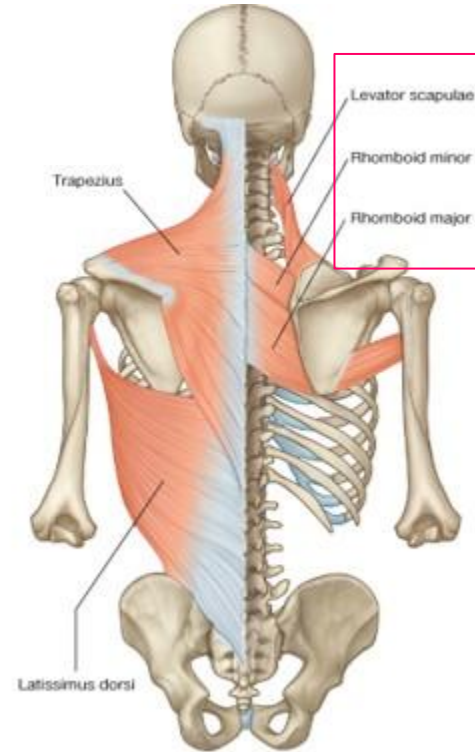
Mode of Action (Mechanism) :

Fixator:

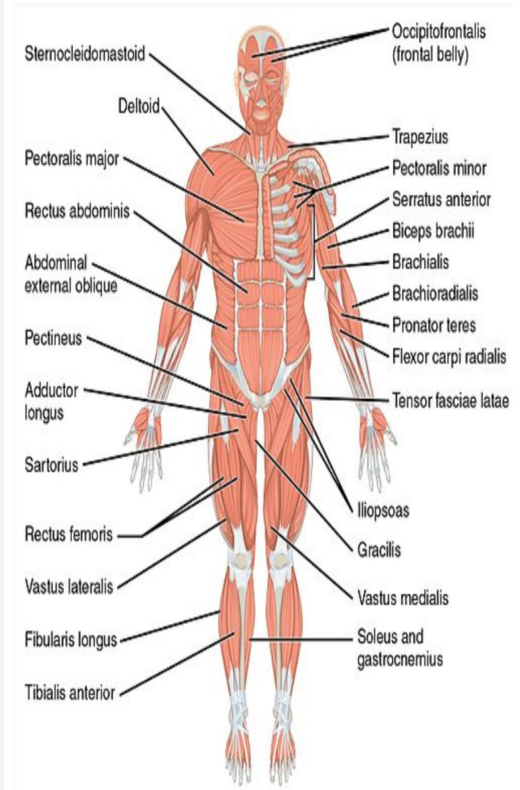
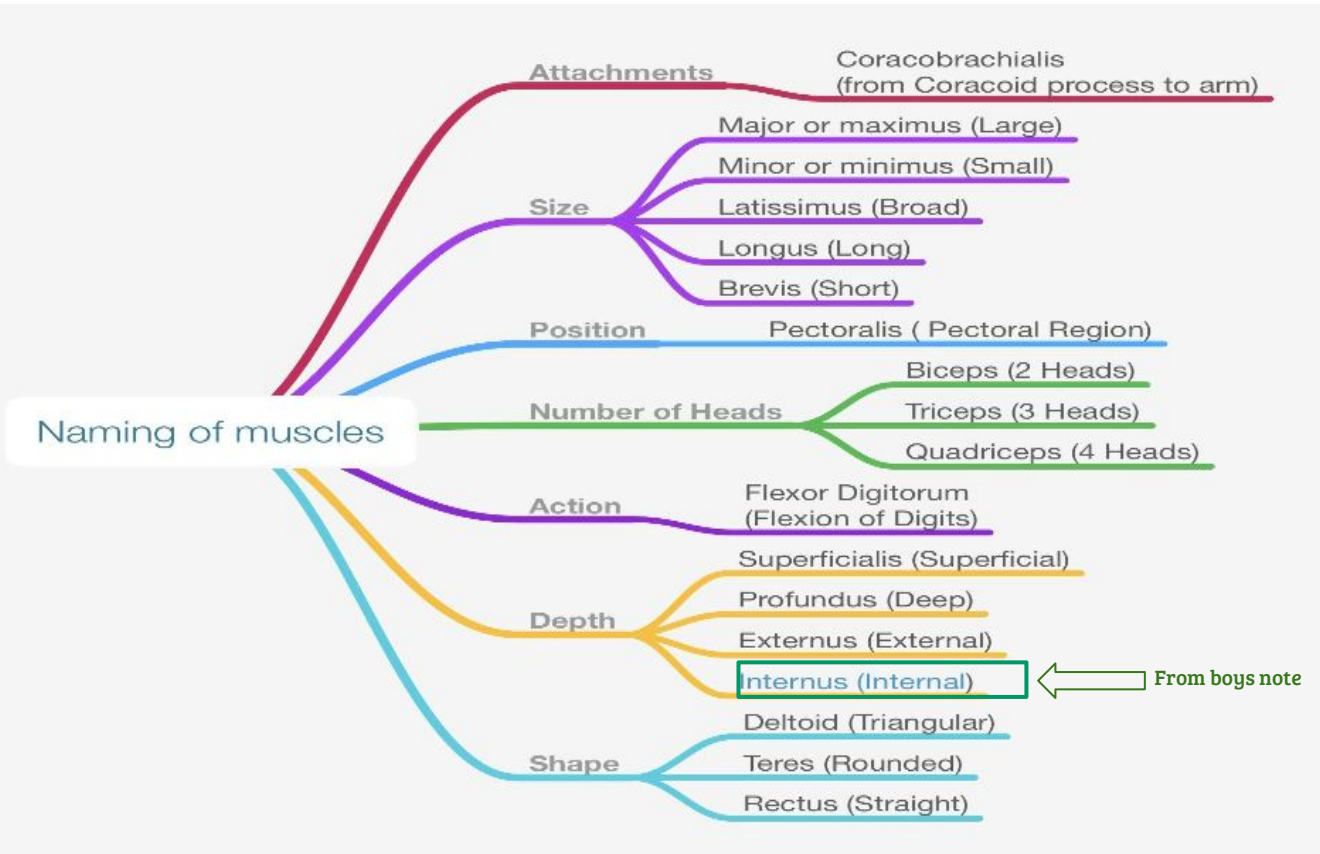
Its contraction does not produce movement by itself but it **stabilizes the origin of the prime mover** so that it can act efficiently.

E.x: Deltoid muscle for Biceps prime mover muscle.

E.x: 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: Mind map



Nerve Supply Of Skeletal Muscles (INNERVATION)

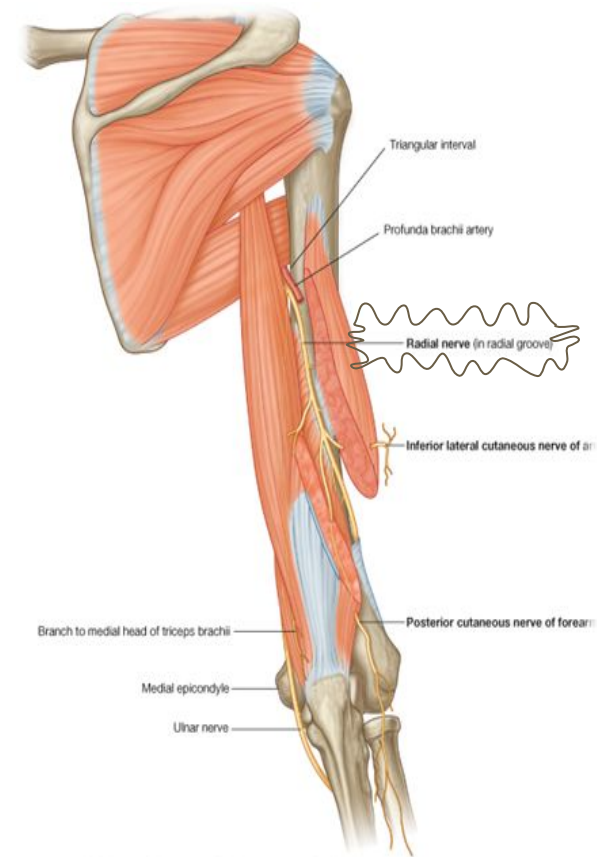
The **somatic nervous system** (is the part of the peripheral nervous system associated with skeletal muscle voluntary control of body movements.)

The nerves supplying the skeletal muscles are **Mixed**.

- o **60%** are Motor fibers. carries information from the brain and the spinal cord to the muscles

- o **40%** are Sensory fibers carries information from the nerves to the central nervous system

It contains some Autonomic fibers, (Sympathetic) **for its blood vessels**. The nerve enters the muscle at about the middle point of its deep surface.



MUSCLE DISEASES & INJURIES:

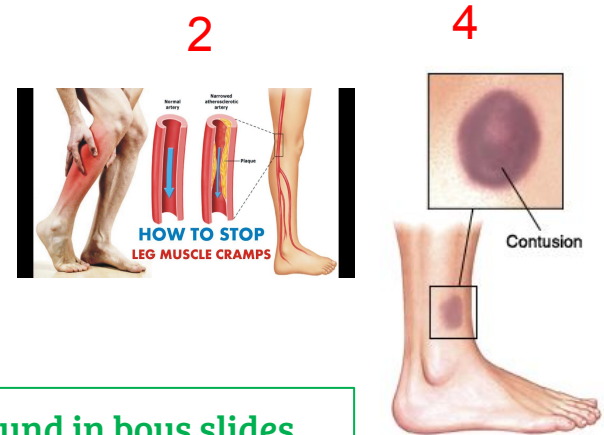
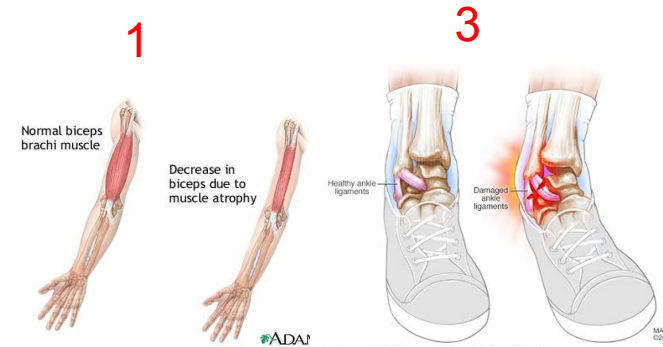
Muscle diseases and injuries are common, especially in sports activities. A severe muscle injury can keep you from participating in the activities that you love and enjoy for living.

Muscle diseases and injuries could be one of the major factors that threaten someone's professional career(s).

1. **Muscular Dystrophy** (ضمور العضلات): A genetic disease that causes a damage of muscle fibers.
2. **Muscle Cramps** (تقلصات العضلات): can occur suddenly and involuntarily in one or more muscles.
3. **Sprains and Strains** (التواء العضلات): 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.
4. **Contusions** (كدمات): 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

You can see this video for more information

https://www.youtube.com/watch?v=NS_SxMobnX0



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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 healthcare provider.
- A torn muscle (التمزق العضلي) or tendon may need to be surgically repaired.



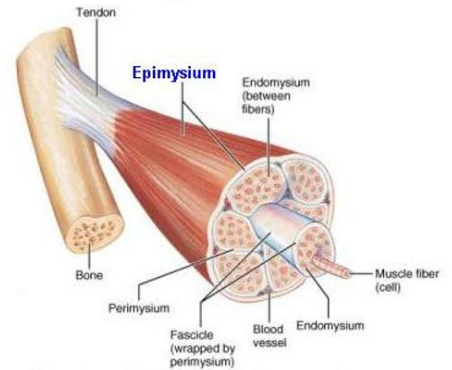
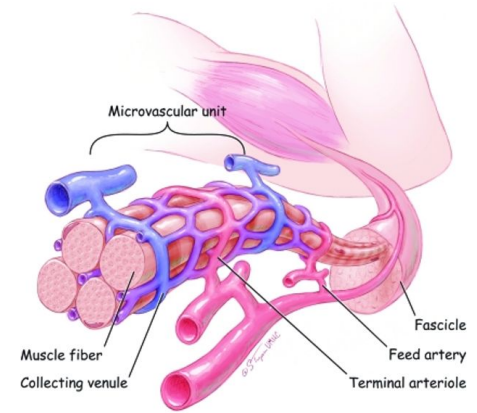
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BLOOD SUPPLY:

During extreme physical exertion (مجهود) , 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.



*Science, Natural Phenomena,
and Medicine*

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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



Note: this slide only found in girls slides

MCQs

Question 1: The type of attachment in interior abdominal wall is :

- A. Raphe .
- B. Tendon
- C. Aponeurosis
- D. None of these

Question 2: Which of these is naming of muscle according to its shape:

- A. Deltoid
- B. Brevis
- C. Biceps
- D. Clavicle

Question 3: It is the chief muscle responsible for a particular movement:

- A. Agonist
- B. Antagonist
- C. Synergist
- D. fixator

Question 4: Each muscle can't be both agonist & antagonist:

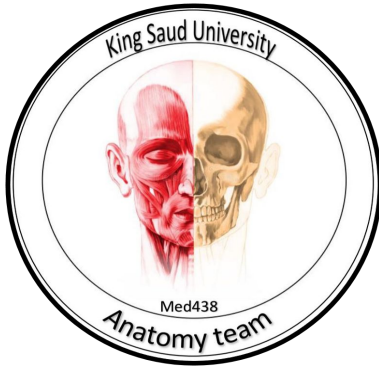
- A. True
- B. False

Question 5: The nerve enters the muscle at about the.....of its deep surface

- A. superior point
- B. anterior point
- C. middle point
- D. specific point

Question 6: which of these is not one of the muscles function :

- A. maintain posture
- B. generate heat
- C. control body
- D. stabilize joints



Good luck to you all

Team members

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- Naif Al-Dossari
- Faisal Alqifari
- Salman Alagla
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- Taif Alotaibi
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- Amirah Al-zahrani
- Alhanouf Al-haluli
- Sara Al-Abdulkarim
- Rawan Alzayed
- Reema Almasoud
- Renad Alhaqbani
- Nouf Alhumaidhi
- Fay AlBuqami
- Jude Alkhalifah
- Nouf Alhussaini

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