



Anatomy

Lecture: 2

Skeletal Muscle



- Important
- Term
- Female notes
- Male notes
- Extra explanation

(وَقُلْ رَبِّ زِدْنِي عِلْمًا) . عليك بكل نوع من العلم فخذ منه، فإن المرء عدو ما جهل

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

Types of Muscles

Involuntary muscles

Smooth:



in the walls of viscera.

Cardiac

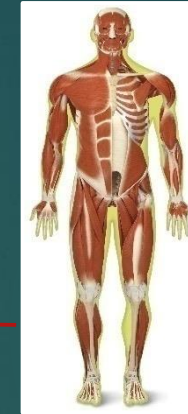


only in the Heart

- Located in the **walls** of the heart
- striated

Voluntary muscles

Skeletal



Criteria of Skeletal Muscle

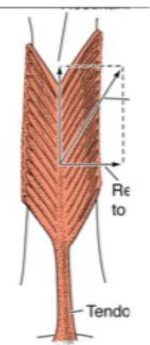
- Striated
- Voluntary
- Attached to skeleton.
- Produce movement of skeleton.
- Supplied by Somatic Nerves.

DIRECTION OF MUSCLE FIBERS



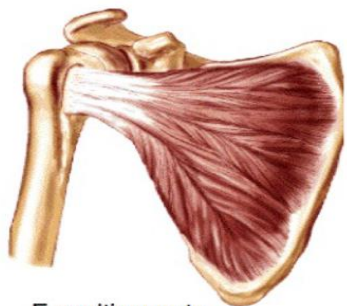
C. Unipennate

Unipennate



D. Bipennate

Bipennate



E. multipennate

Multipennate

Pennate muscles (oblique to the line of pulls)

What is Pennate muscles?

Shaped like feathers, fascicles are arranged obliquely, forming a common angle with a central tendon that may extend along almost the entire length of the muscle

Characteristics :

- 1-It is less movable
- 2- It is more powerful

EXAMPLE-

that extends the fingers

(unipennate muscle)

Rectus Femurs--Extensor of the knee (bipennate)

Deltoid Muscle (multipennate)



Direction of muscle fibers



A. Strap

Parallel to the line of pull

What is parallel muscles?

It's any muscle having the long fibers arranged parallel to each other along the axis of muscle

Characteristics :

- 1-It is more movable(**greater range**)
- 2- It is less powerful
- 3- When parallel muscles contract, the entire muscle shortens equally.

EXAMPLE--Most muscles of the body are

Parallel

Biceps Brachii, Hamstrings

Directions of Muscle Fibers

Fusiform

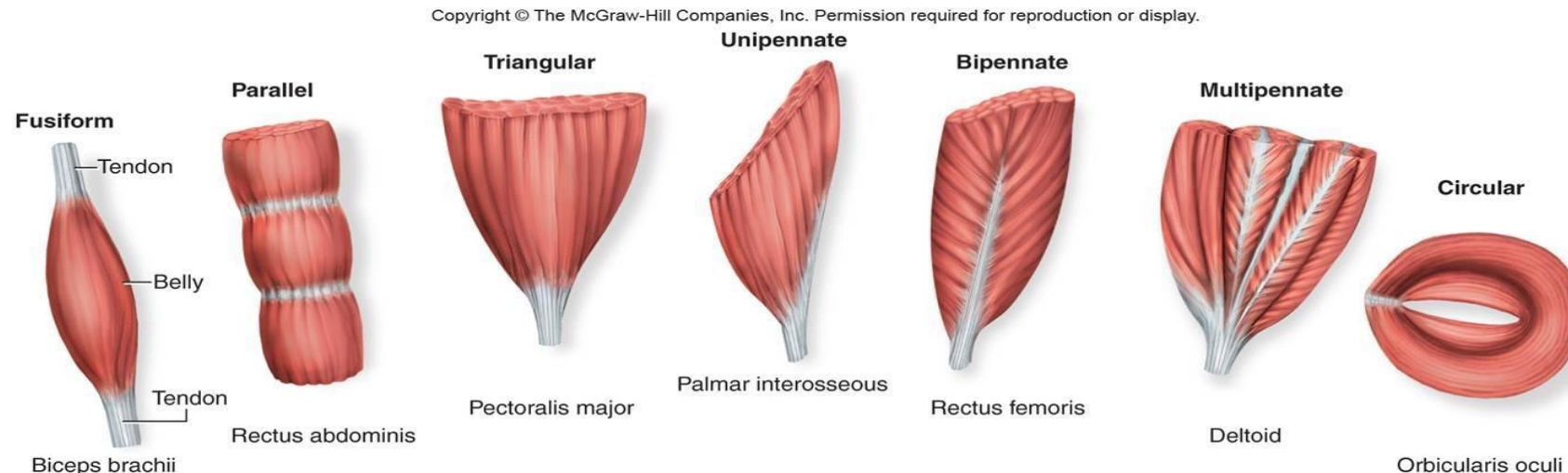
spindle-shaped (round, thickbelly, & tapered ends).

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.

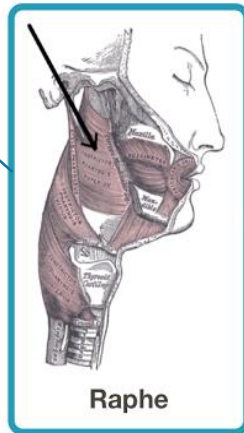


Types of attachments of skeletal muscles

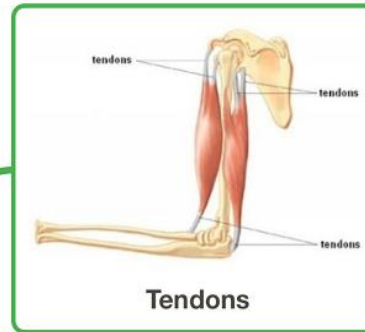
Definition:
The seam like union (interdigitation) of the two lateral halves of a part or organ having externally a ridge or furrow .

An interdigitation of the tendinous ends of the flat muscles.

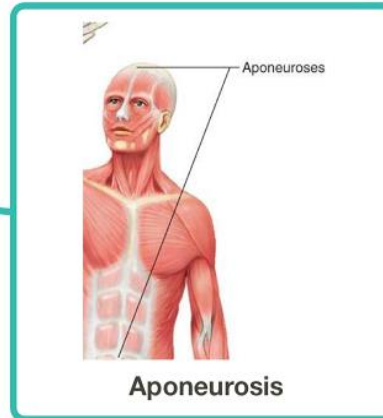
Where? Mylohyoid muscles (floor of the mouth)



Muscles are attached to bones, cartilage or ligament through

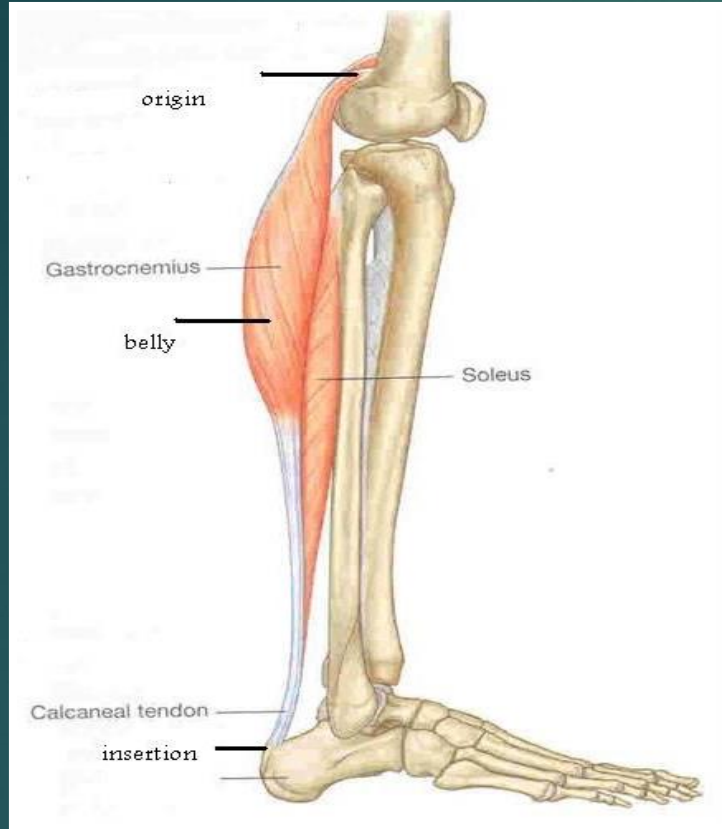


Definition:
A band or cord of strong, fibrous tissue that connects muscle to the bone.
Where? - hamstring of a quadruped



Definition:
A thin and strong sheet like fibrous tissue. It mainly serving to connect a muscle with the parts it moves.
Where? abdominal external oblique

NUMBER OF ATTACHMENTS



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

-Origin is the beginning of the muscle fibers.

-Insertion is the end of the muscle fibers.

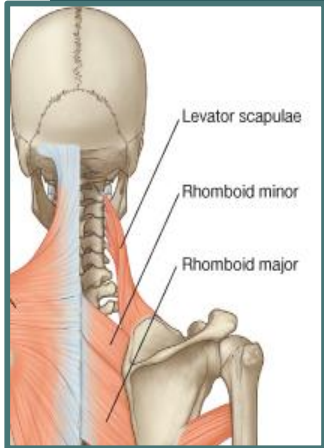
-إذا قامت العضلة بفعل أو حركة في العادة تقرب (انسيرشن) من (اوريجن) فتقصر الألياف العضلية وبالتالي تحصل الحركة.

-عند حركة العضلة لأبد من أن يكون أحدهما ثابت والآخر يتحرك نحوه.

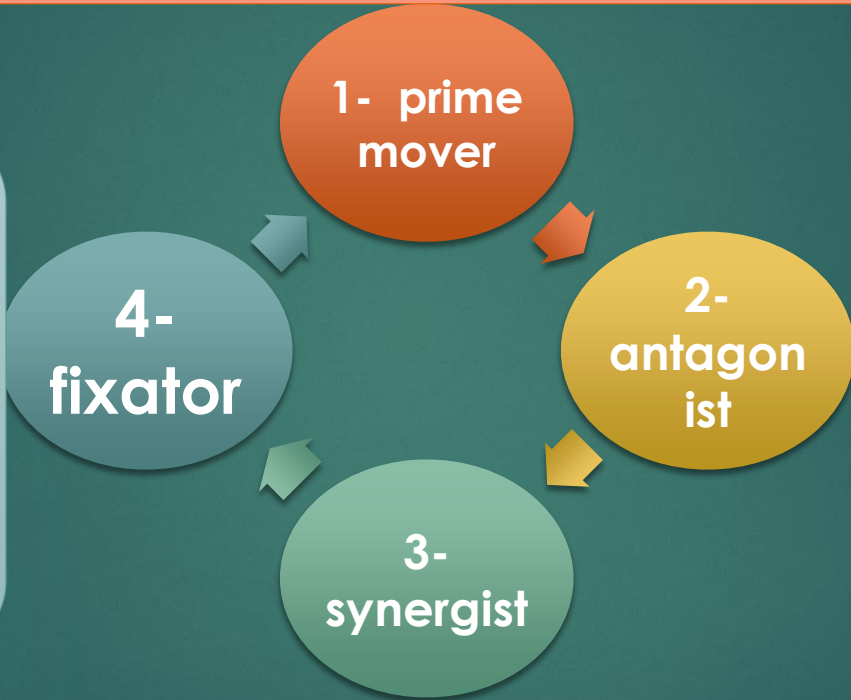
Modes of action



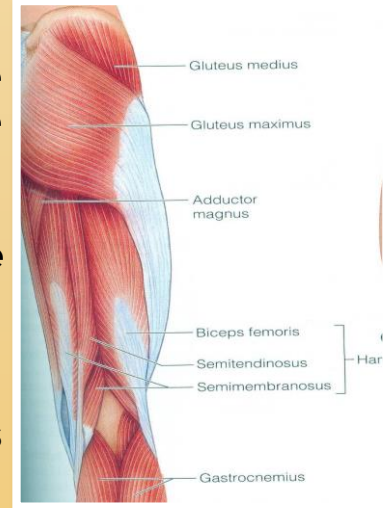
agonist (**prime mover**): the chief muscle that is responsible for a particular movement. (العضلة الأساسية المسؤولة عن حركة معينة), when it is absent there is no movement. e.g.: quadriceps femoris for the extension of the knee joint



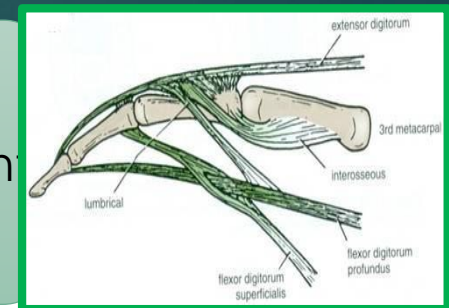
it's contraction doesn't produce obvious movement, but it stabilizes the origin of the prime mover so it can act efficiently. e.g.: muscles attaching shoulder girdle to the trunk.



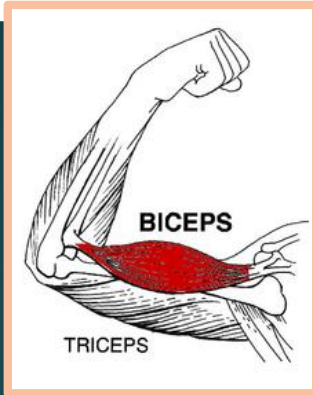
opposes the action of the prime mover; before the contraction of prime mover (agonist) the antagonist must be relaxed. For every move there is both an agonist and antagonist. e.g.: biceps femoris "which opposes the quadriceps action.



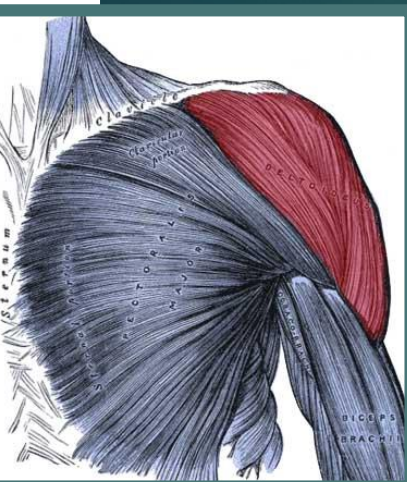
muscles that prevent unwanted movement in an intermediate joint crossed by the prime mover (they are muscles that assist the movement or stabilize a part of the body). e.g.: flexors and extensors of the wrist



Modes of action (2) Boys Example



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



Example: Deltoid muscle for Biceps prime mover muscle.
(**same movement**)

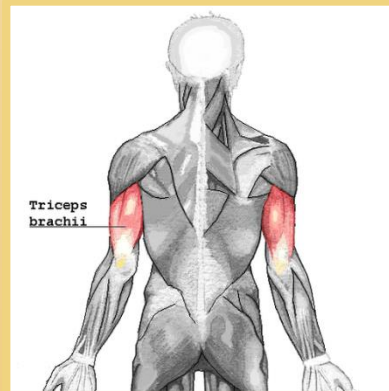
4-
fixator

1- prime
mover

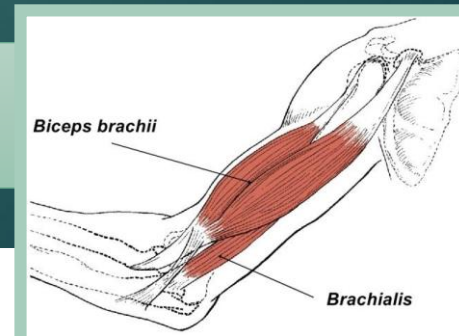
2-
antagonist

3-
synergist

Example: Triceps Brachii is the antagonist for prime mover (Biceps Brachii) for **flexion of the elbow joint and forearm. (same movement)**



Example: Brachialis muscle for Biceps prime mover muscle.
(**same movement**)



Naming Of Muscles According To:

1. Size

Major or Maximus (Large)
Minor or Minimus (Small)
Latissimus (Broad)
Longus (Long)
Brevis (Short)

2. Position

Pectoralis (Pectoral region)

3. Depth

Superficialis (Superficial)
Profundus (Deep)
Externus (External)

4. Shape

Deltoid (Triangular)
Teres (Rounded)
Rectus (Straight)

5. Number Of Heads

Biceps (2 Heads)
Triceps (3 Heads)
Quadriceps (4 Heads)

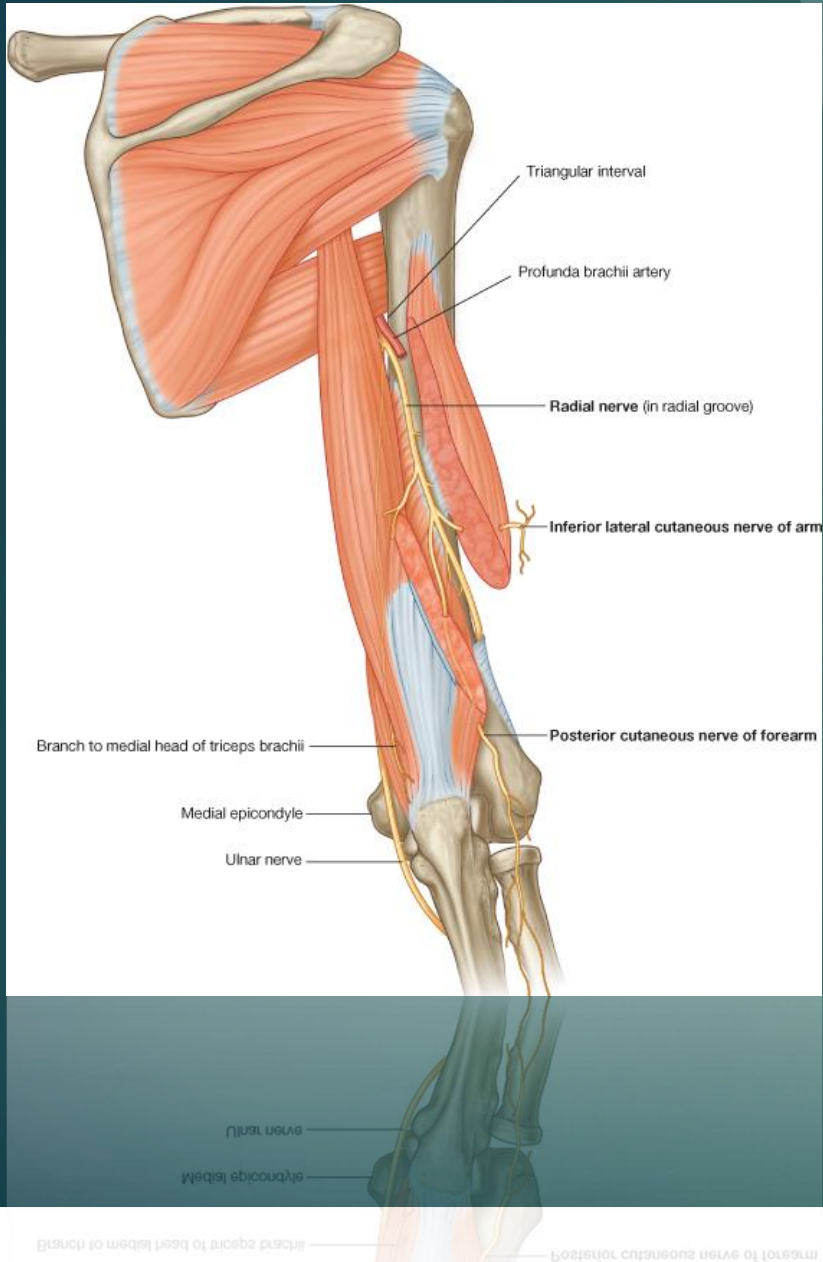
6. Attachments

Coracobrachialis
(From coracoid process to arm)

7. Action

Flexor digitorum: flexion of digits

NERVE SUPPLY of Skeletal Muscles



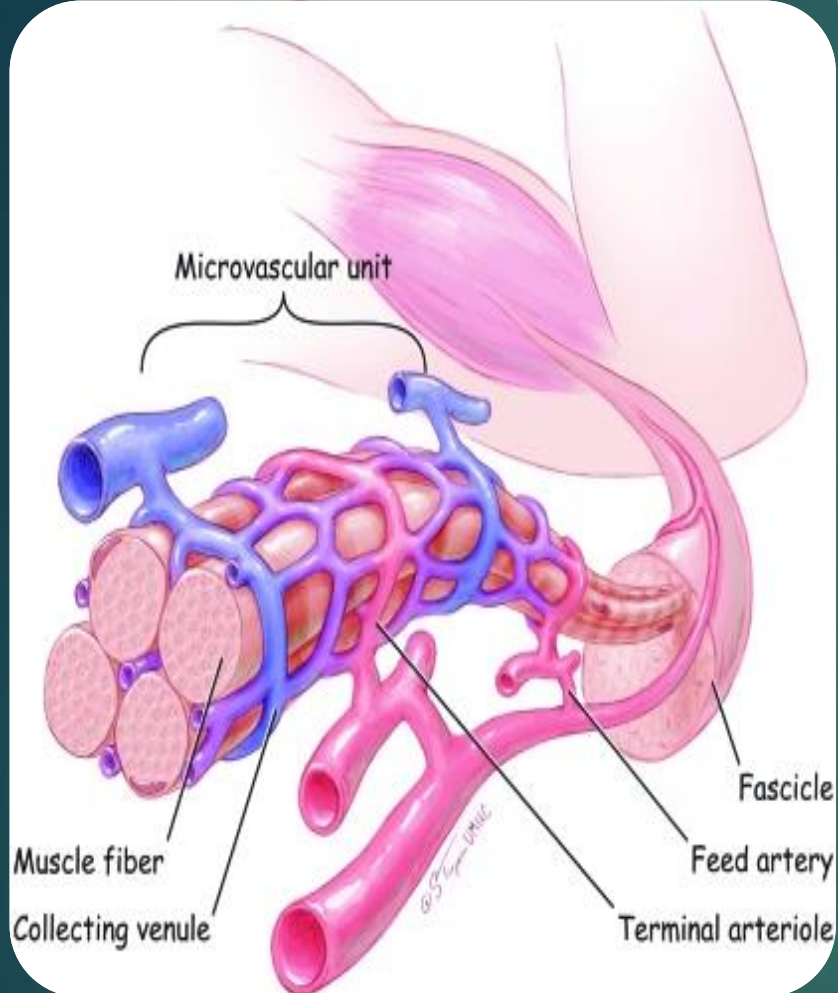
- The somatic nervous system: is the part of the peripheral nervous system associated with skeletal muscle voluntary control of body movements.
- The nerves supplying the skeletal muscles are Mixed.
- 60% are Motor: gives supply to fiber to do the action.
- 40% are Sensory : carries sensation from muscles.
- The nerve enters the muscle at about the middle point of its deep surface.

العضلة تقوم بالإحساس لكن يطلق عليه **Deep sensation** لا يشبه الإحساس بالألم أو الحرارة , نحن لا ندركه.

كما تحتوي العضلة الهيكلية على بعض من الألياف العصبية اللاإرادية **autonomic fibers (sympathetic)** المسؤولة عن الأوعية الدموية **(blood vessels)**

Blood SUPPLY of Skeletal Muscles

- ❑ 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.
- ❑ Secondary arteriolar branches divide at right angles to these feed vessels and extend longitudinally.
- ❑ The arteriolar network consists of branching vessels that originate from the feed arteries at the point where the latter vessels enter the muscle.



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 nerve**.

- ▶ **Some websites that can help you with Anatomy:**
www.Innerbody.com
<https://www.biodigitalhuman.com/default.html>
<http://www.medicalmnemonics.com/cgi-bin/browse.cfm>
<http://www.getbodysmart.com/index.htm>

- ▶ **Websites from youtube to help you memorize the skeletal system:**
<http://www.youtube.com/user/jameeljo?feature=watch>
<https://youtu.be/Of3XS-gU8dc>
<https://youtu.be/rDGqkMHPDqE>
<https://youtu.be/floBoGSPkws>
<https://youtu.be/hnQctcB-zwM>

- ▶ **Online Quiz:**
<https://www.onlineexambuilder.com/anatomy-skeletal-muscle/exam-35330>

Apps that you can download :

- ▶ Essential Skeleton 3.
- ▶ Skeletal System 3D Anatomy Lt.
- ▶ Anatomy Learning 3D Atlas.

فريق العمل

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