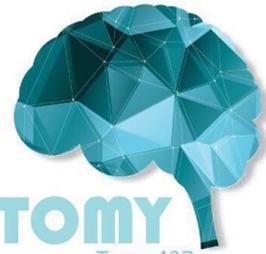




MED437
KING SAUD UNIVERSITY



Skeletal Muscles

SECOND LECTURE

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عبدالرحمن الحيسوني

Revised by

{ وَمَنْ يَتَوَكَّلْ عَلَى اللَّهِ فَهُوَ حَسْبُهُ }

هذا العمل لا يغني عن المصدر الأساسي للمذاكرة

Please check our [Editing File](#) BEFORE studying this lecture

Guide:

- Text in **BLUE** was founded only in the boys' slides
- Text in **PINK** was founded only in the girls' slides
- **Text in RED is considered important**
- Text in **GREY** is considered extra notes

Objectives:

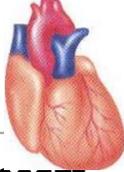
- Describe the **main criteria** of skeletal muscles.
- Describe the **attachments** of skeletal muscles.
- Describe the **different directions** of skeletal muscle fibers.
- Describe the **mode of action** of skeletal muscles.
- Describe briefly the **naming** of skeletal muscles.

Functions of Muscles:

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

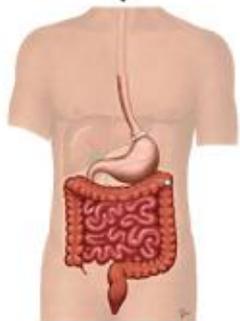


Classification Of Muscles:

	Skeletal muscles 	Cardiac muscles 	Visceral muscles 
<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>	<u>Striated</u>	<u>Non-striated</u> [smooth spindle shape] No striations

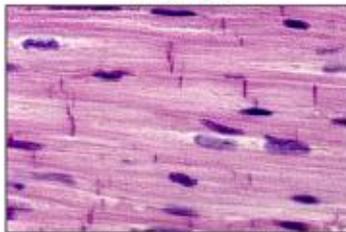


Smooth Muscle
Tissue



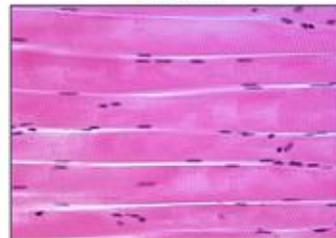
Involuntary
Control

Cardiac Muscle
Tissue



Involuntary
Control

Skeletal Muscle
Tissue

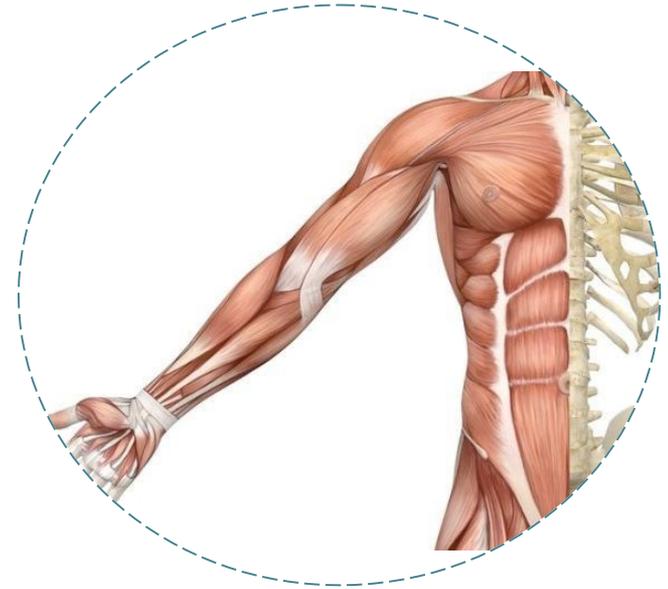


Voluntary
Control

Main Criteria of Skeletal Muscles:

- **Striated.**
- **Attached to skeleton.**
- **Produce movement of skeleton.**
- **Voluntary.**
- **Supplied by somatic nerves.**

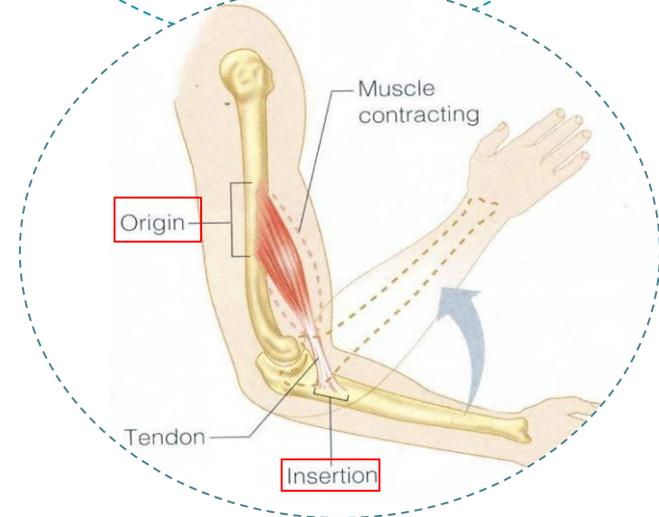
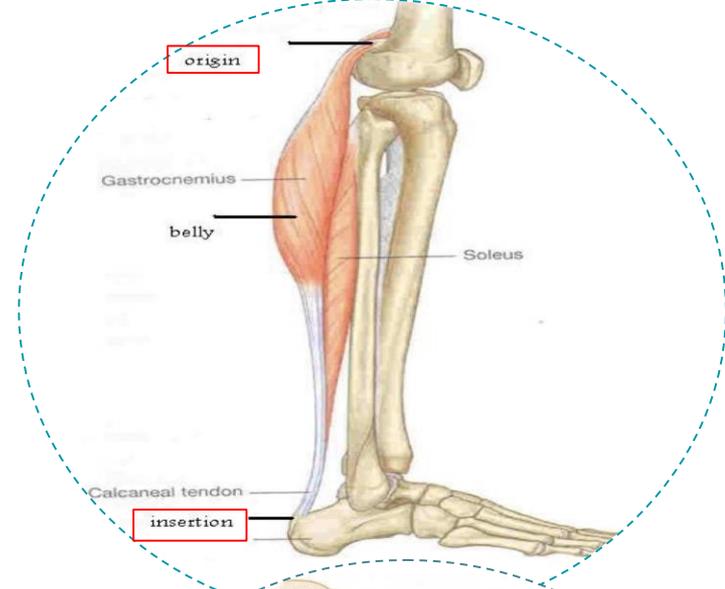
(The somatic nerves supply the skin, joints and muscles)



Attachments of Skeletal Muscles:

(Mostly two.)

Origin	Insertion
<ul style="list-style-type: none">- The proximal end.- Least moveable.- Mostly fleshy.	<ul style="list-style-type: none">- The distal end.- Most moveable.- Mostly fibrous.



Types of Attachments:

Muscles are attached to bones, cartilage, or ligaments through:

1- Tendons (Cords of Fibrous tissue):

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

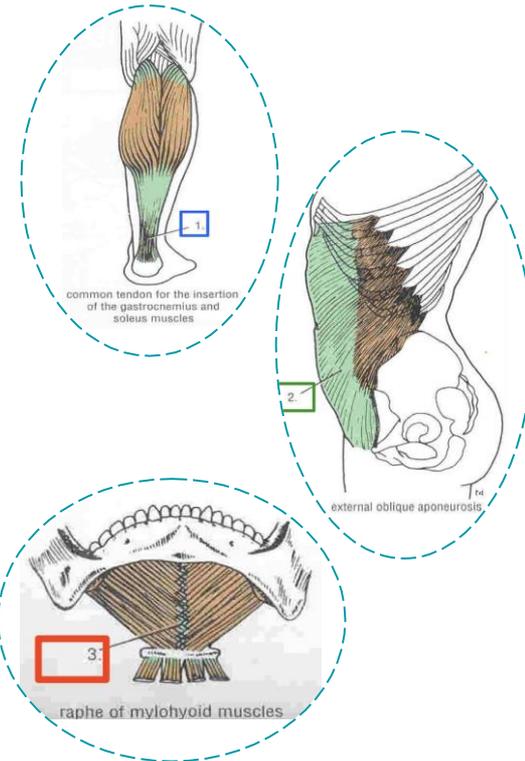
2- Aponeurosis:

A thin broad and strong sheet of fibrous tissue.

3- Raphe:

An interdigitation of the tendinous ends of the flat Muscles.

e.g. Raphe of mylohyoid muscle.



The difference between tendons and aponeurosis is that the tendons is more flexible (allowing the muscle to move), and even though the aponeurosis has less flexibility it makes the body strong and stable since it has a wide area attachment.

Direction of Muscle Fibers:

Muscle types

- all skeletal muscle contains fascicles
- fascicular arrangement determines name!

Anterior

- Bipennate**
 - 2 directional fibers
 - fibers set angle to force-generating axis (parallel)
- Unipennate**
 - all fibers same side of tendon
- Triangular**
 - 3 headed
 - posterior to humerus
- Triangular**
 - also convergent
 - fibers fan out from tendon
- Strap**

2 muscle bellies

- intermediate tendon
- spindle/cylindrical
- straight line

Fusiform

- fibers at multiple angles
- reflects function

Multipennate

- fibers in rings
- surround openings

Sphincter

The picture is from the boys' lecture

Pectoralis major

Orbicularis oris

Deltoid

(a) Circular

(b) Convergent

Sartorius

(c) Parallel

(d) Unipennate

(e) Multipennate

Biceps brachii

(f) Fusiform

Rectus femoris

(g) Bipennate

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Fusiform

Tendon

Belly

Tendon

Biceps brachii

Parallel

Rectus abdominis

Triangular

Pectoralis major

Unipennate

Palmar interosseous

Bipennate

Rectus femoris

Multipennate

Deltoid

Circular

Orbicularis oculi

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:**

Surround a body opening or orifice, constricting it when contracted. **Ex: Orbicularis oculi**

- **Convergent (triangular) :**

have a broad attachment from which the fascicles converge to a single tendon.

Ex : Pectoralis Major

- **Fusiform :**

spindle-shaped (round, thick belly, & tapered ends). **Ex: Biceps brachii**

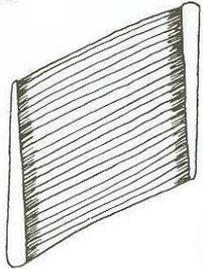
Direction of Muscle Fibers

Pennate

(oblique to line of pull)

More powerful, less range of movement

Unipennate



unipennate

EX: Extensor digitorum longus

Bipennate



bipennate

EX: Rectus femoris

Multipennate



multipennate

EX: Deltoid

Parallel

(to line of pull)

More range of movement ,less powerful

EX: Sartorius



Mode (Mechanism) of Action:

Prime Mover (Agonist)	Antagonist	Synergist	Fixator
<p>- It is the <u>chief muscle</u> responsible for a particular movement.</p>	<p>- It <u>opposes the action of the prime mover</u>.</p> <p>- Before contraction of prime mover, antagonist must be relaxed.</p>	<p><u>Prevents unwanted movement</u> in an intermediate joint crossed by the Prime Mover.</p>	<p>Its contraction does not produce movement by itself but it <u>stabilizes the origin of the prime mover</u> so that it can act efficiently.</p>
<p>Muscles always work in pairs if one is pulled the other is relaxed: agonist and antagonist, so if both pull there will be no movement.</p>			
<p><u>Example:</u></p> <p>- Extension of the knee joint: Quadriceps Femoris</p> <p>- Flexion of the elbow joint and forearm: Biceps Brachii</p>	<p><u>Example:</u></p> <p>- Flexion of the knee joint: Biceps Femoris (Flexor of knee)</p> <p>- Extension of the elbow joint and forearm: Triceps Brachii</p>	<p><u>Example:</u></p> <p>Flexors and Extensors of <u>wrist joint</u></p> <p>They contract to fix wrist joint in order that flexors and extensors of fingers work efficiently.</p>	<p><u>Example:</u></p> <p>Muscles attaching the shoulder girdle to the trunk contract to fix the scapula, allowing deltoid muscle (taking origin from shoulder girdle) to move shoulder joint (humerus).</p>

Naming of muscles

Attachments

Coracobrachialis
(from Coracoid process to arm)

Size

Major or maximus (Large)

Minor or minimus (Small)

Latissimus (Broad)

Longus (Long)

Brevis (Short)

Position

Pectoralis (Pectoral Region)

Number of Heads

Biceps (2 Heads)

Triceps (3 Heads)

Quadriceps (4 Heads)

Action

Flexor Digitorum
(Flexion of Digits)

Depth

Superficialis (Superficial)

Profundus (Deep)

Externus (External)

Internus (Internal)

Shape

Deltoid (Triangular)

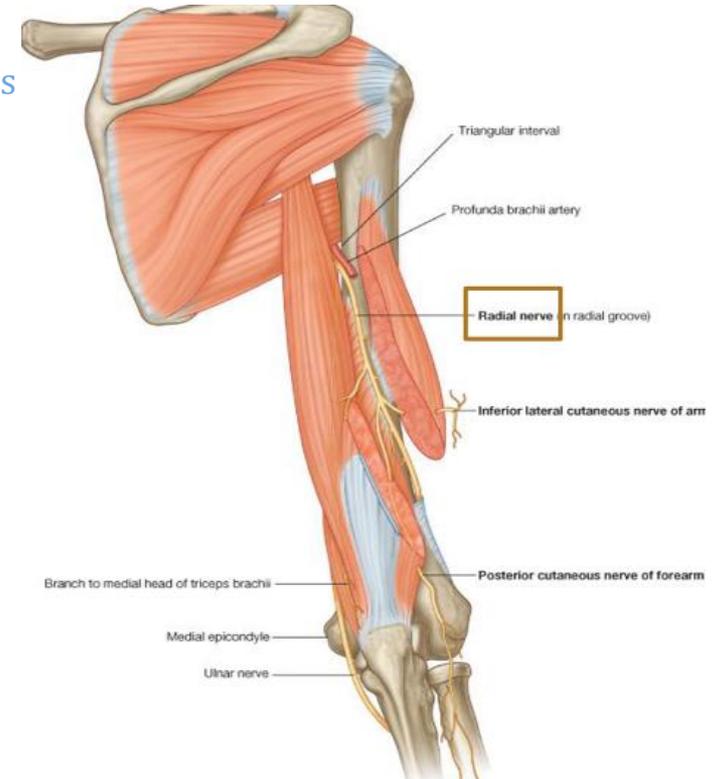
Teres (Rounded)

Rectus (Straight)

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 fibers.
40% are Sensory fibers.
- It contains some Autonomic fibers, (Sympathetic) for its blood vessels.
- The nerve enters the muscle at about the middle point of its deep surface.



Notes: • Sensory nerves: carries information from the nerves to the central nervous system
• Motor nerves: carries information from the brain and the spinal cord to the muscles .

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:

ببساطة كل ما اشتغلت على العضلة راح يتغير حجمها وقوتها
وإذا ما تحركها راح تضعف

Helpful Video:

<https://m.youtube.com/watch?v=rMcg9YzNSEs>

Quiz:

1) Skeletal muscles are attached to?

- A) Bones
- B) Bones, and skin for facial muscles
- C) Walls of visceral organs
- D) Wall of the heart

2) Which of these is called smooth muscles?

- A) Cardiac
- B) Skeletal

3) Somatic nerves supply?

- A) Skeletal
- B) Cardiac
- C) Visceral

4) Which of the attachment points is the proximal end?

- A) Origin
- B) Insertion

5) Which of the attachment points is the most moveable?

- A) Origin
- B) Insertion

6) How many types of attachments are there?

- A) 1 type
- B) 2 types
- C) 3 types
- D) 4 types

8) Attachment points are ..

- A) Mostly 2
- B) Mostly 3
- C) Always 2

Answers:

1)B. 2)C. 3)A. 4)A. 5)B. 6)C. 7)Tendons,Aponeurosis,Raphe. 8)A

GOOD LUCK

Team Members

Lamia Abdullah AlKuwaiz (Team Leader)

Abeer Alabduljabbar
Afnan Abdulaziz Almustafa.
Alanoud Mansour AlEssa.
Albandari Alshaye.
AlFahdah Abdullah Alsaleem.
Layan Hassan Alwatban.
Majd Khalid Albarrak.
Norah Alharbi.
Rinad Musaed Alghoraiby.
Rawan Mohammad Alharbi
Wafa Alotaibi.
Wejdan Fahad Albadrani

Faisal Fahad ALsaif (Team Leader)

Abdulrahman Sulaiman ALDawood
Fahad aldhowaihy
Abdullah AlMeaither
Abdulelah Abdulhadi Aldossari
Saleh abduallah almoaiqel
Abdulaziz Mohammed Alabdulkareem
Abdulmajeed Khaled Alwardi
Abdulaziz Ibrahim Aldrgam
Akram alfandi
saud Abdulaziz alghufaily
Mohammed Alquwayfili
ali alammari
Sultan alfuhaid
Zeyad Alkhenizan
Fahad alshughhaithry
saad aloqile
Abduljabbar Alyamni

Mohammed Alomar
Abdulelah alsergani
Abdulelah alqarni
Fahad alshugaithry
Mohammed Alomar
Yazeed Aldossari