بِسْمِ اللَّهِ الرَّحْمَٰنِ الرَّحِيمِ

ANATOMY

وَلَقَدْ خَلَقْنَا الْإِنسَانَ وَنَعْلَمُ مَا تُوَسْوِسُ بِهِ نَفْسُهُ ۖ وَنَحْنُ أَقْرَبُ إِلَيْهِ مِنْ حَبْلِ الْوَرِيدِ

Final | Lecture 2

Skeletal Muscles Pt.1

Written by : Abdullah Saffarini
مهند برهوم

Reviewed by : Abdullah Saffarini
Yamen Aljarrah

6

Gross lecture-11

Skeletal Muscles-1

Dr A.Hamida

Dr A.Hamida

Muscular System

Gross lecture-11

Types of Muscle Tissue

1. Skeletal muscle:

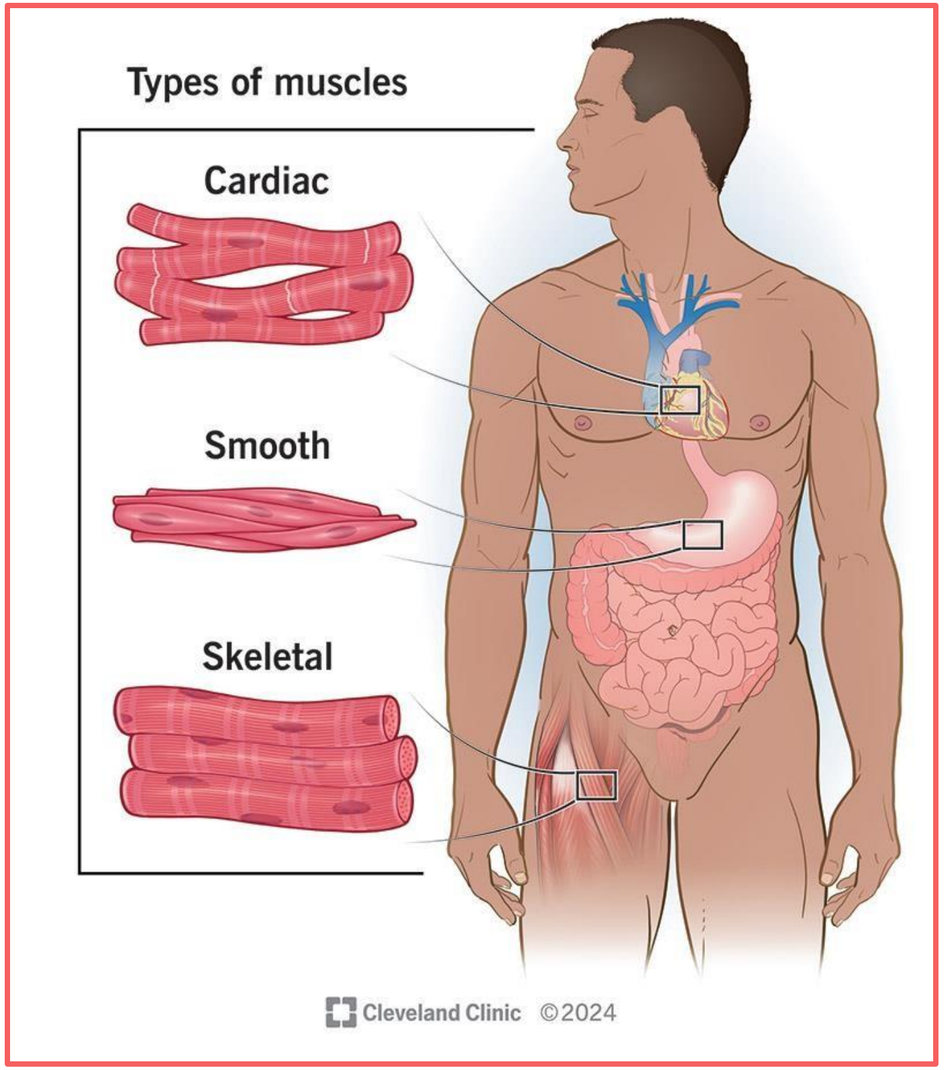
- **Voluntary, attached to the skeleton**

2. Cardiac muscle:

- **Involuntary, found only in the heart, forming the walls of the heart.**

3. Smooth muscle:

- **Involuntary, forms the walls of internal structures such as blood vessels, airways, and most organs of the abdominopelvic cavity.** Stomach, small and large intestines



6 Skeletal Muscles-1

Gross lecture-11

Lecture Outline:

- 6.1 General features of Skeletal Muscle
- 6.2 Muscles of the Head
- 6.1 Muscles of the Neck
- 6.2 Muscles of the Trunk

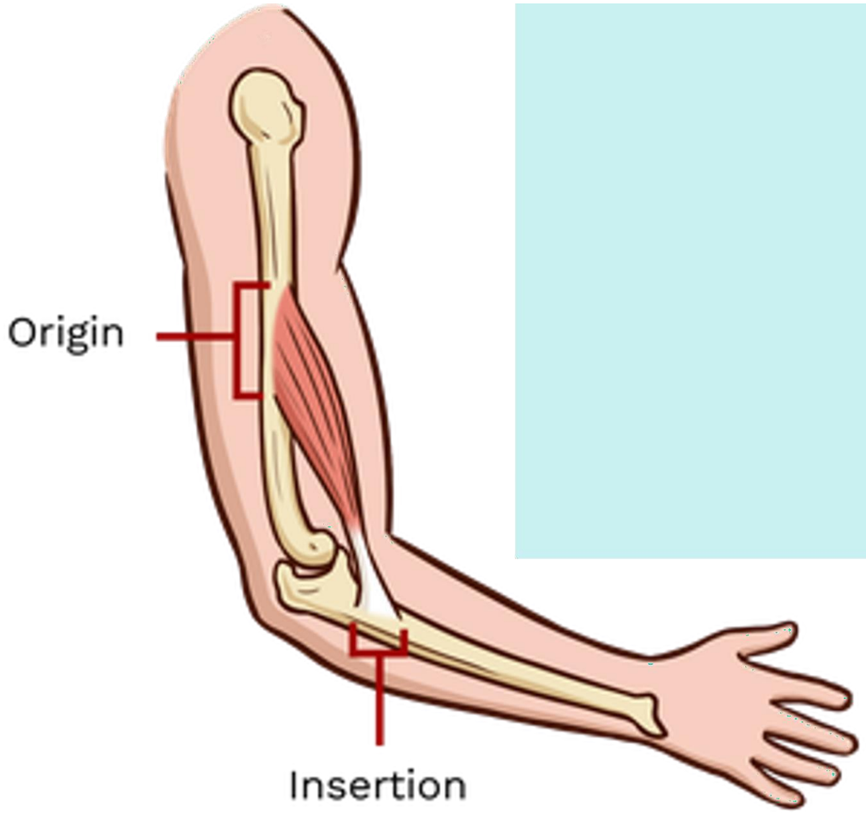
General features of Skeletal Muscle

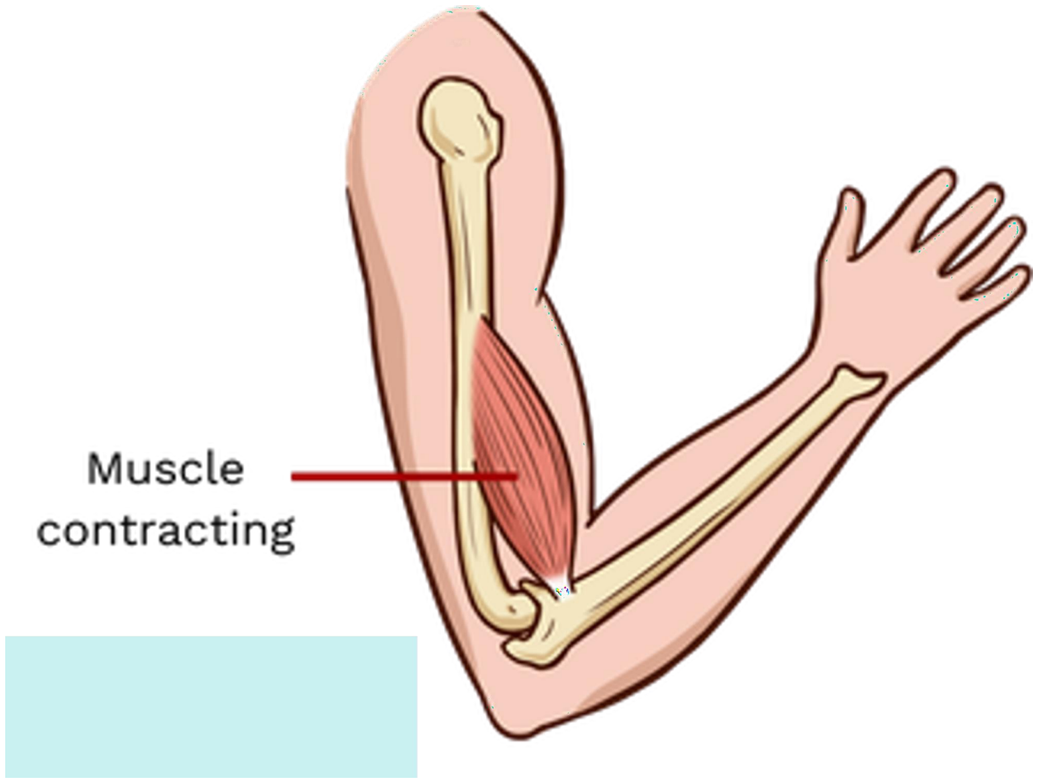
❖ Muscle Attachment Sites: Origin and Insertion

- Most muscles cross at least one joint and are usually attached to the bones forming that joint.
- The attachment of a muscle's tendon to the stationary bone is called the **origin**.
- The attachment of the muscle's tendon to the movable bone is called the **insertion**.

In order to predict the motion of the muscle, imagine the insertion is pulled toward the origin

Imagine we have a muscle that its origin and insertion are on the same bone, this would result in no action of that muscle, since it must cross two bones at least





General features of Skeletal Muscle

❖ Muscle Parts:

➢ Belly of the muscle:

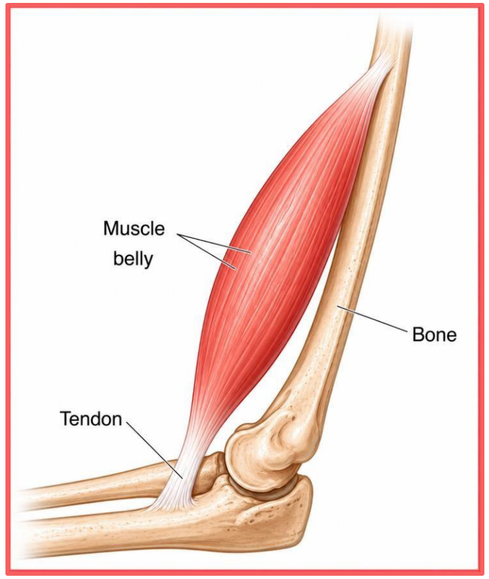
- Thickened, fleshy part; it is the contractile part of the muscle.
- Generally attached to the bone proximal to the bone that is to be moved.

➢ Tendon of the muscle:

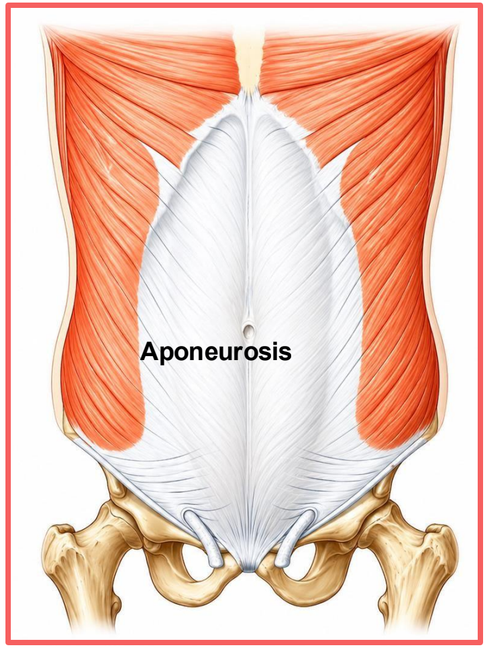
- Cord- or rope-like fibrous structure, formed by dense regular connective tissue, connecting the muscle belly to the bone.
- Attached to the bone that is to be moved.

➢ Aponeurosis

- It is a wide, flat sheet of connective tissue that works like a flattened tendon. It is weaker than the tendon and most often Aponeurosis connects between two muscles
- Instead of forming a rope-like structure, it spreads out into a thin but strong layer, allowing a muscle to attach over a large surface area and distribute force more evenly.



There are several types of skeletal muscles based on the shape, some examples are:
1.Fusiform muscles: Spindle-shaped muscle like biceps. These muscles have a thick cylindrical part called "Belly".
2. Triangular muscles



Here, the "Transversus Abdominis" is a flat muscle, its continuation is a flat dense connective tissue called Aponeurosis, one from the right muscle and another from the left one. They superiorly connect with xiphoid process of the sternum, inferiorly with symphysis pubis, and they meet in the midline to form what is called Linea alba

6.1

General features of Skeletal Muscle

Notes:

1. if the insertion was made of tendons and not muscle fibers it would result in a better and stronger movement, because tendons are stronger than muscle fibers, that’s why most of the skeletal muscles in the long bones have tendons at the insertion.

2. Aponeurosis are stronger than muscle fibers, and tendons are stronger than the both.

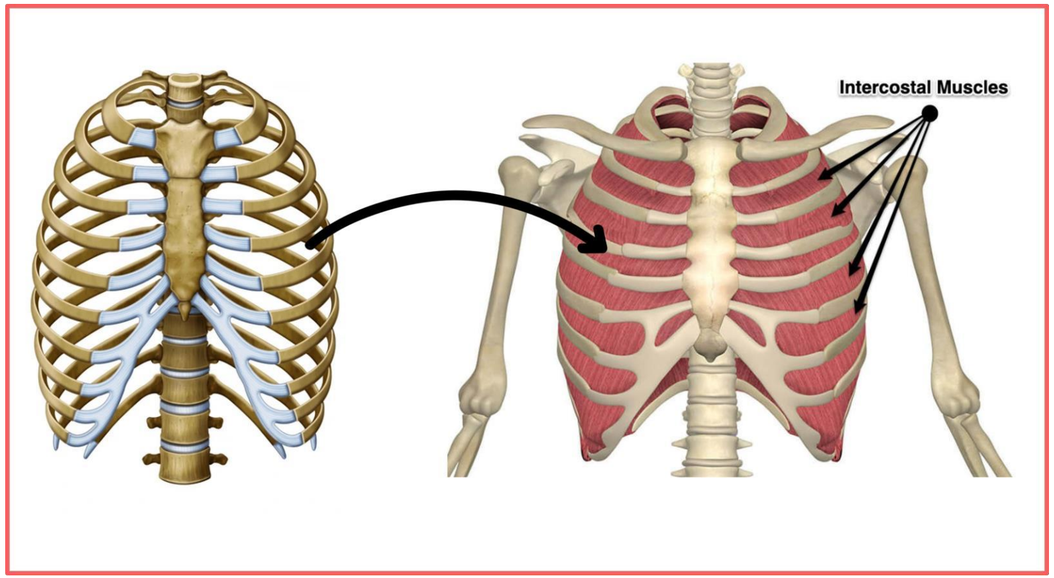
General features of Skeletal Muscle

❖ Naming of skeletal muscles

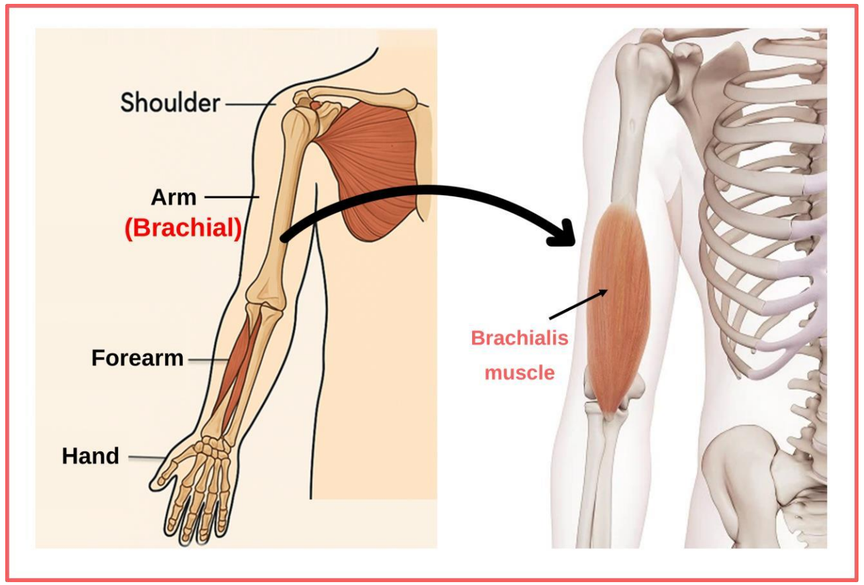
➢ **Muscles are named based on several criteria:**

1. Location:

- **Between the ribs → Intercostal muscles**



- **Arm region (Brachial region) → Brachialis muscle**



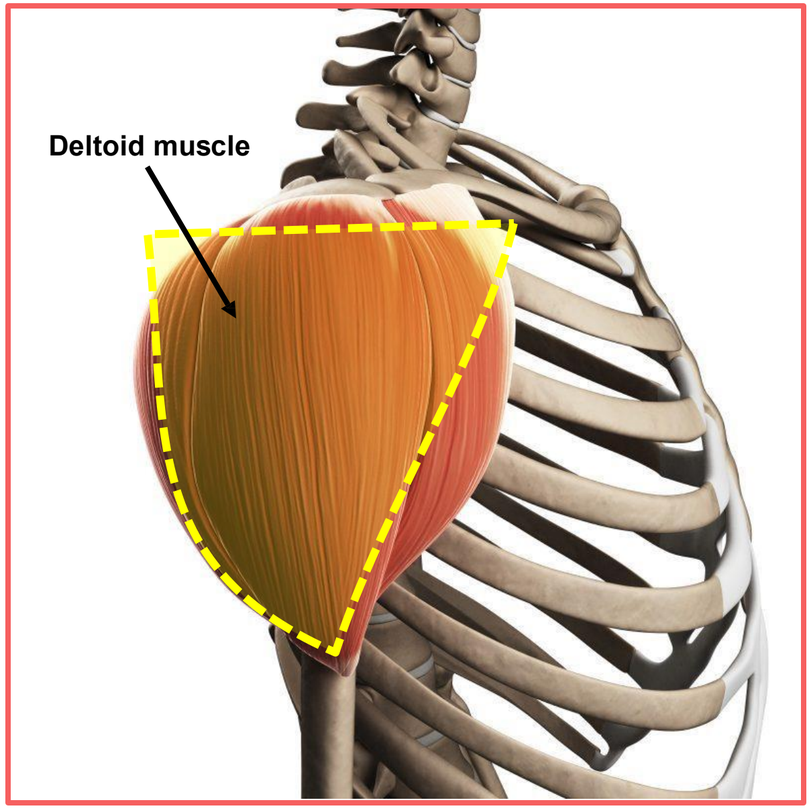
General features of Skeletal Muscle

❖ Naming of skeletal muscles

➢ **Muscles are named based on several criteria:**

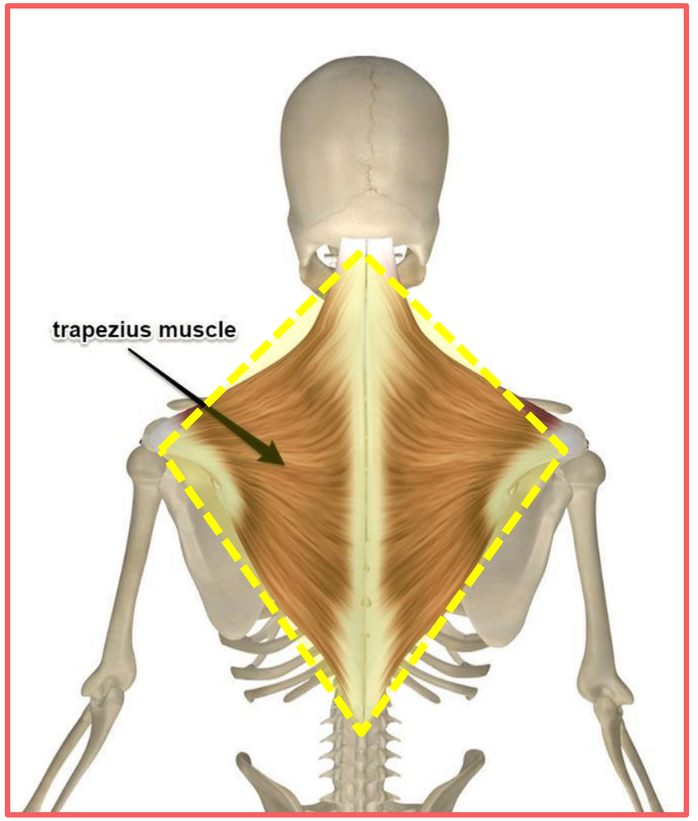
2. Shape

- **Triangular → Deltoid muscle**



In Latin, delta means triangle –> deltoid = triangular

- **Trapezoid → Trapezius muscle**



Trapezoid = شبه منحرف

General features of Skeletal Muscle

❖ Naming of skeletal muscles

➢ **Muscles are named based on several criteria:**

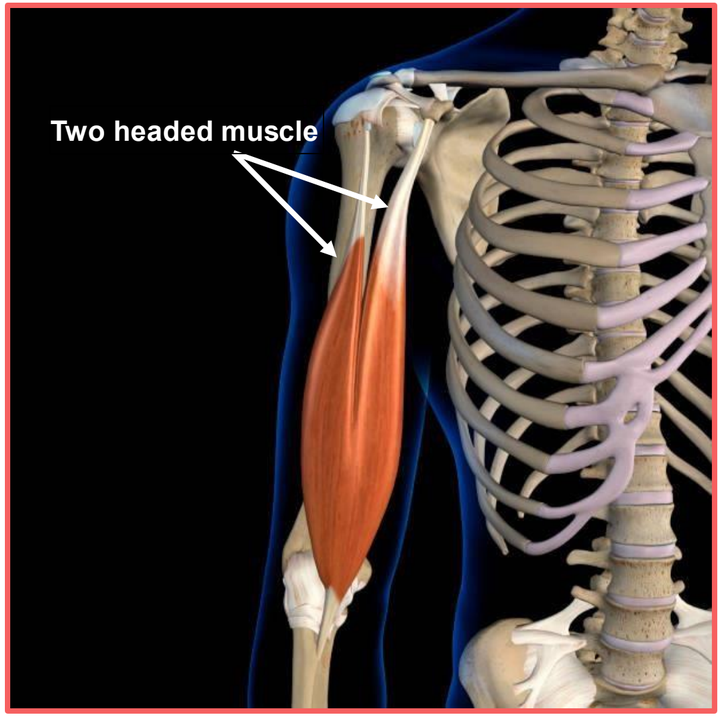
3. Number of heads: Cep = head in latin

- **Two-headed muscle on the front of the arm**

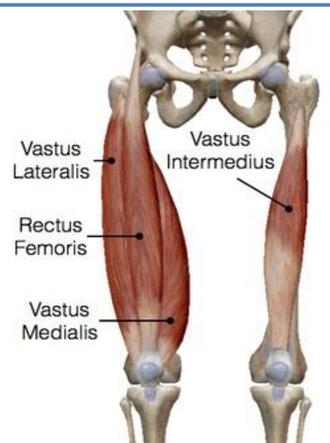
  → **Biceps brachii muscle** The name comes from the number of heads as well as the location.

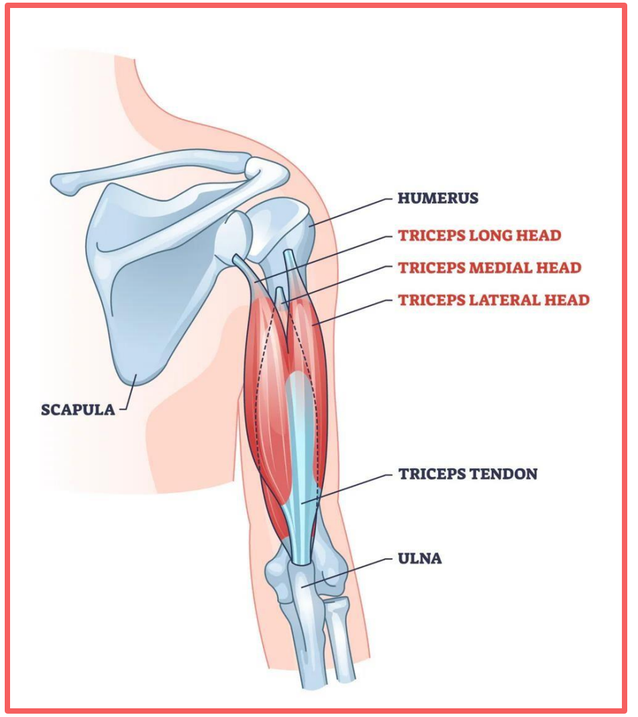
- **Three-headed muscle on the back of the arm**

  → **Triceps brachii muscle**



Another example is The quadriceps femoris which is a muscle that has four ceps, these ceps have different origins from the thigh and hip bone but the insertion of all is the Tendon of quadriceps muscle that continues as a Patellar Ligament which is attached to the Tibia. The quadriceps, patella and patellar ligament do the action of extension the knee joint together.





General features of Skeletal Muscle

❖ Naming of skeletal muscles

➢ **Muscles are named based on several criteria:**

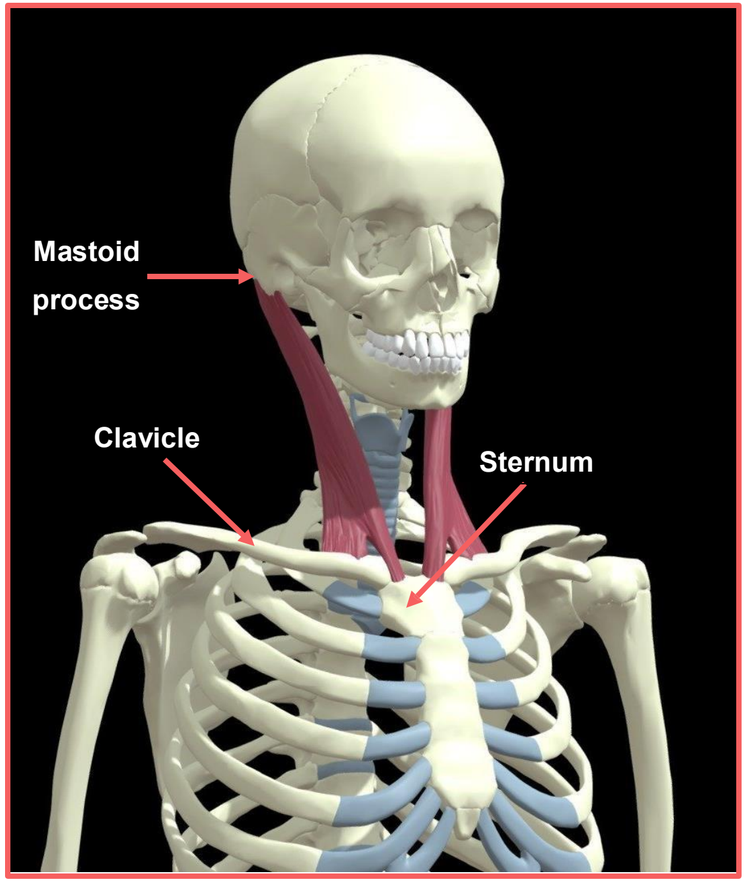
4. Attachments (origin and insertion):

- **Originates from the sternum and clavicle and inserts into the mastoid process→ Sternocleidomastoid muscle**

- Sternocleidomastoid

Stereno = sternum
Cleido = clavicle
Mastoid = mastoid proccess

The Mastoid process in the temporal bone (behind the ear)



Another example is the sternohyoid muscle
Origin : sternum
Insertion : hyoid bone
Extra: The hyoid bone is a unique U-shaped, "floating" bone located in the anterior neck (at the C3 vertebra level) that does not articulate with any other bone.

General features of Skeletal Muscle

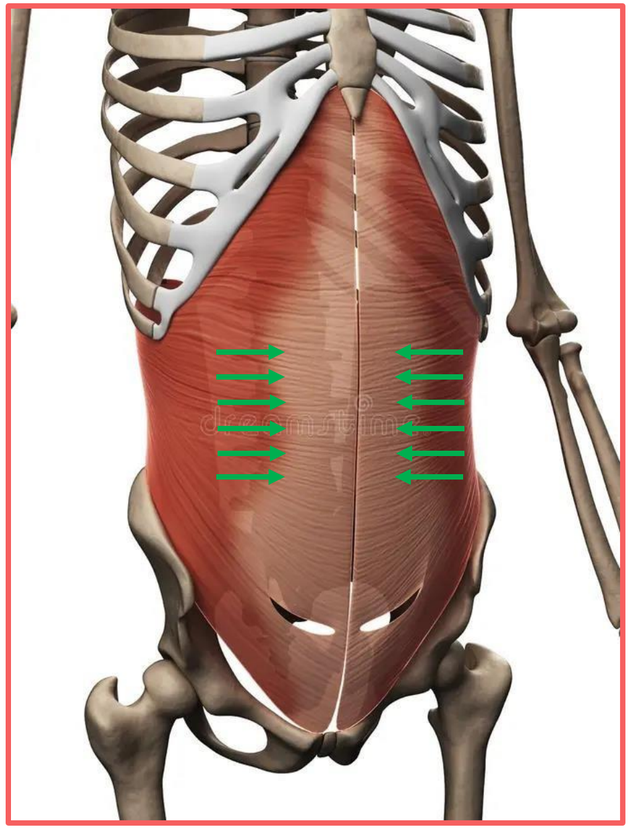
❖ Naming of skeletal muscles

➢ **Muscles are named based on several criteria:**

5. Direction of fibers

- **Muscle running transversely on the anterior abdominal wall → Transversus abdominis muscle**

External and Internal Oblique muscles:
muscle fibers run obliquely



General features of Skeletal Muscle

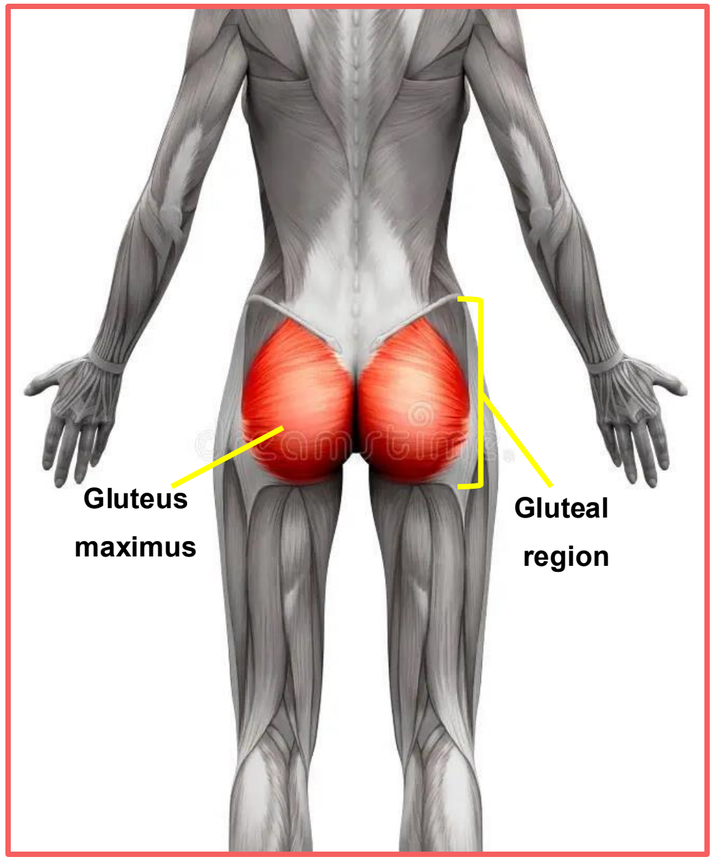
❖ Naming of skeletal muscles

➢ **Muscles are named based on several criteria:**

6. Size of muscles:

- **Largest muscle attached to the gluteal surface of the hip bone → Gluteus maximus muscle**

The name comes from the location of the muscle and it's size



Muscles of the Head

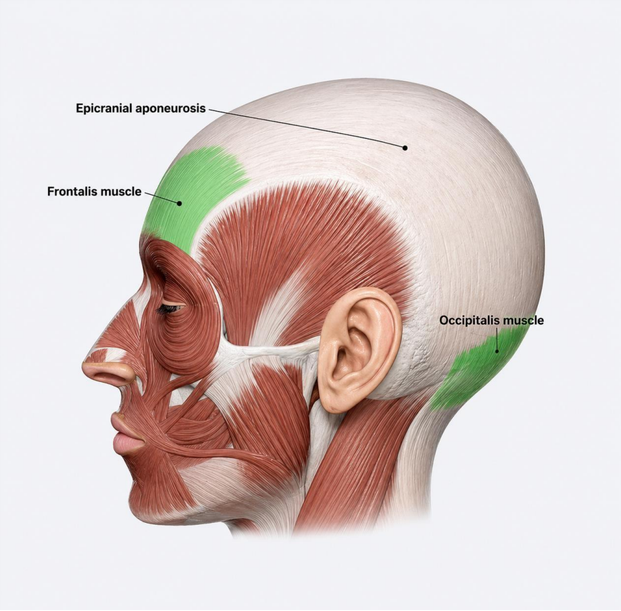
❖ Muscles of the Facial Expression

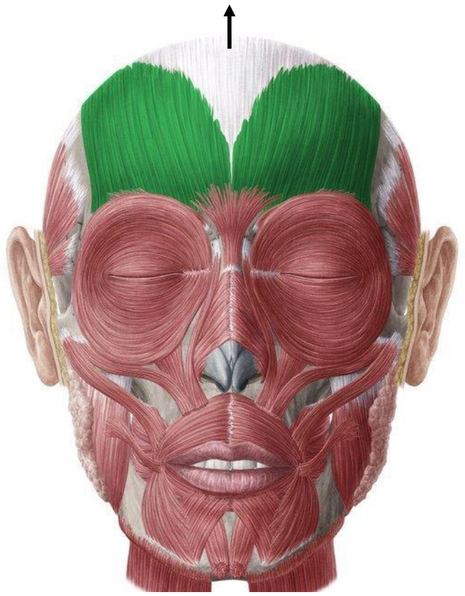
The frontalis muscle is the anterior belly of the occipitofrontalis muscle. The occipitofrontalis consists of an occipital belly and a frontal belly, which are connected by the epicranial aponeurosis. The frontalis muscle originates from the epicranial aponeurosis and inserts into the skin of the forehead and eyebrows. It raises the eyebrows and wrinkles the skin of the forehead.

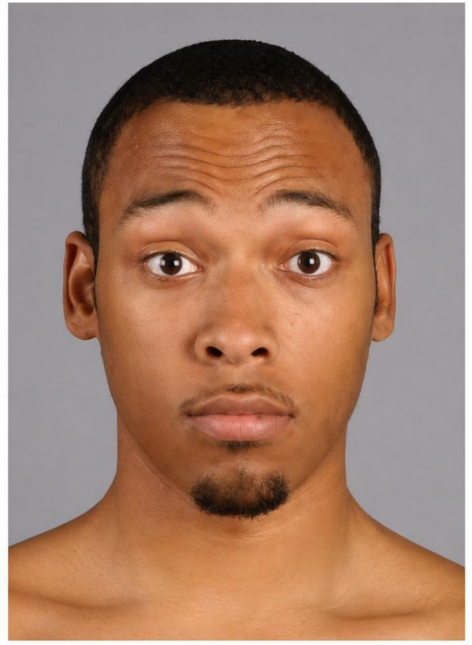
1. Frontalis muscle

Origin	• Epicranial aponeurosis
Insertion	• Skin of the forehead and eyebrows
Action	• Elevates eyebrows and wrinkles skin of forehead.
Nerve Supply	• Facial Nerve

Note: all the muscles of the facial expression are supplied by the facial nerve (VII)



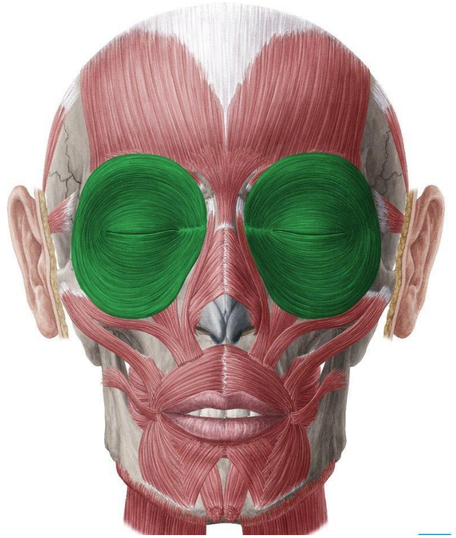




Muscles of the Head

❖ Muscles of the Facial Expression

2. Orbicularis Oculi	
Origin	Frontal bone and maxilla (around the eye)
Insertion	Skin around the eyelids
Action	Closes eyelids
Nerve Supply	**Facial Nerve**

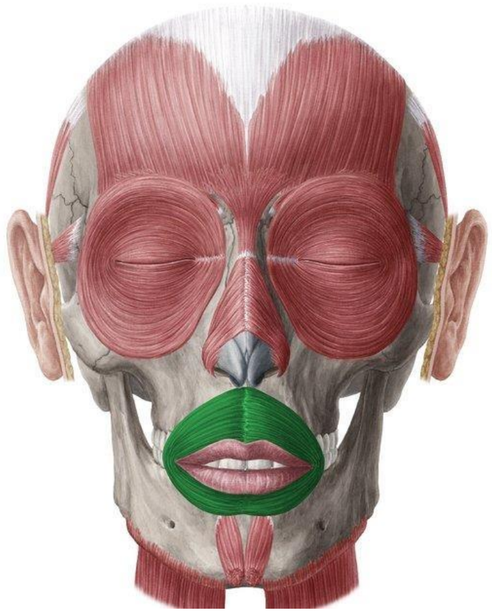


If the facial nerve is cut or damaged, the eye may not close properly because the orbicularis oculi muscle becomes paralyzed. The orbicularis oculi is the main muscle responsible for closing the eyelids and is supplied by the facial nerve. Its antagonist muscle is supplied by the oculomotor nerve, not the facial nerve, so it remains functional.

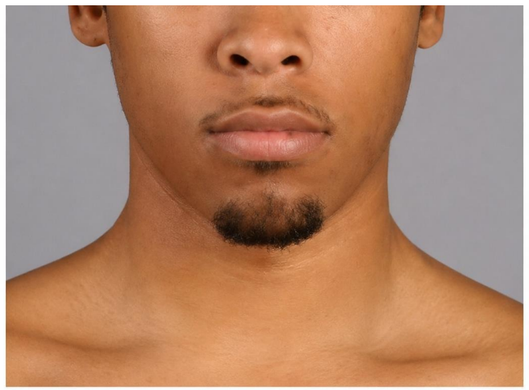
Muscles of the Head

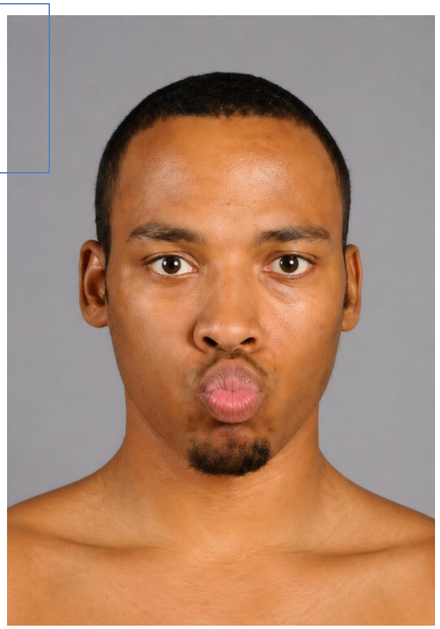
❖ Muscles of the Facial Expression

3. Orbicularis Oris (oris: round muscle around the oral cavity)	
Origin	• Maxilla and mandible around the mouth
Insertion	• Skin and mucous membrane of lips
Action	• Close lips, compresses and protrudes lips
Nerve Supply	• Facial Nerve



In the normal state while you are closing your mouth your actually using this muscle .However, you can notice that even more when you increase the contraction while you compress your lips



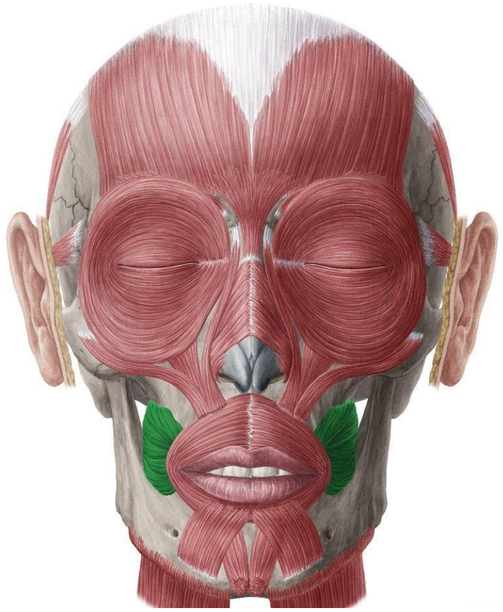


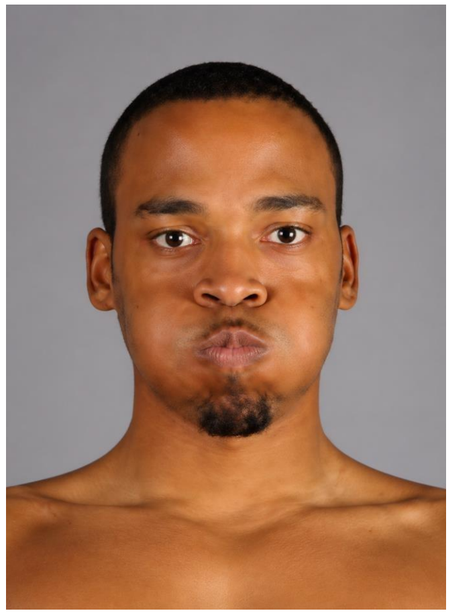
Muscles of the Head

If u ask a patient with a disability in this muscle to whistle or blow, you will notice that only one side of his mouth blow.

❖ Muscles of the Facial Expression

4. Buccinator	
Origin	• **Lateral side of maxilla and mandible.**
Insertion	• **Blends with muscles of upper lip** (the upper part of orbicularis oris)
Action	• **Blowing, whistling, and sucking**
Nerve Supply	• **Facial Nerve**





Babies cheeks are big because they use their buccinator muscles a lot to suck milk from the mother's breast.

Clinical examples:

If someone has facial palsy (شلل الوجه النصفي أو شلل العصب السابع) , the following will happen:

1. you won't be able to elevate one of your eyebrows and the same side of your forehead will appear completely flat without wrinkles. (Frontalis)

2. You cannot close one of your eyelids properly. (Orbicularis oculi)

3. Your mouth will always be deviated to one side because it cannot close properly. (Orbicularis oris)

4. If you try to whistle or blow one of the sides of your mouth will work while the other won't. (buccinator)

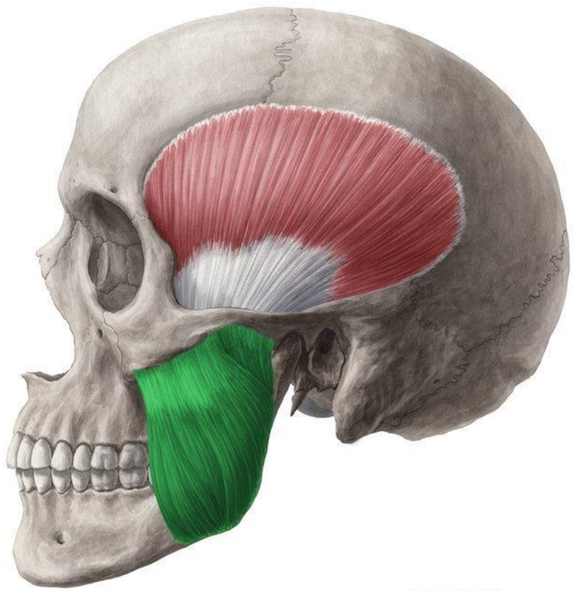
IMPORTANT NOTE: all these happen in THE SAME SIDE of the face, meaning if you can't raise your right eyebrow, all of the other symptoms happen at the right side of your face aswell.

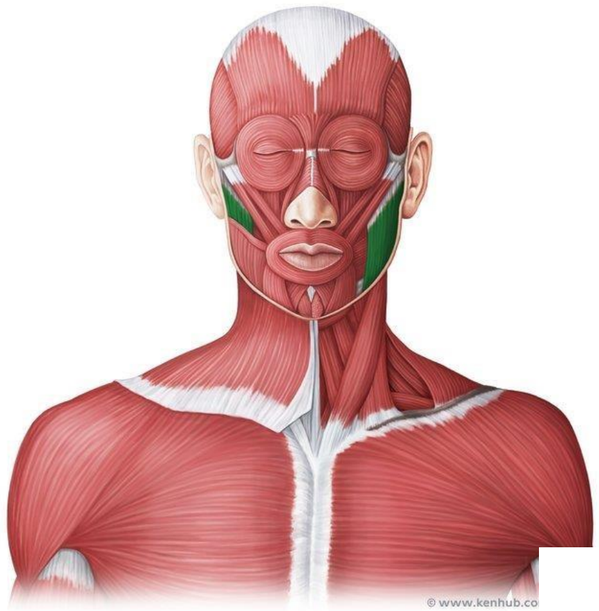
Muscles of the Head

❖ Muscles of the Mastication

1. Masseter	
Origin	• Zygomatic bone
Insertion	• Lateral surface of ramus and angle of mandible
Action	• Elevates the mandible (closes the jaw, helps chewing)
Nerve Supply	• Trigeminal Nerve

Note : all the muscles of mastication are supplied by the trigeminal nerve (V)



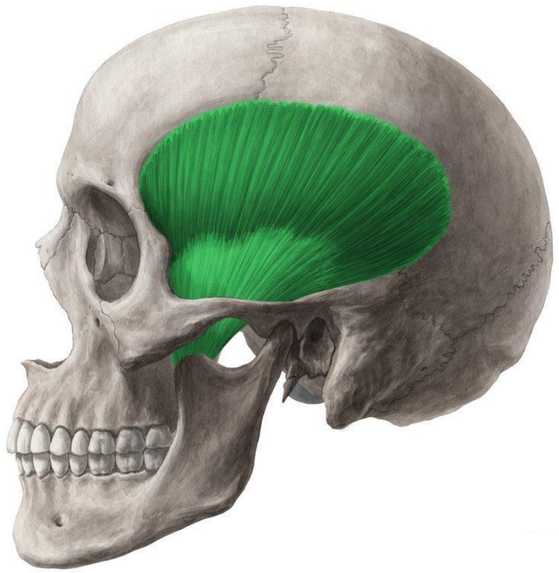


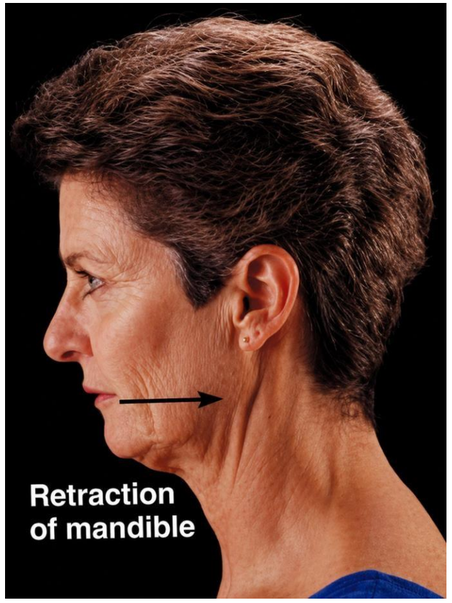
Muscles of the Head

The anterior fibers (vertical) does elevation while the posterior ones aid in retraction

❖ Muscles of the Mastication

2. Temporalis	
Origin	• Temporal bone (side of the skull)
Insertion	• Coronoid process of mandible
Action	• Elevates and retracts the mandible (chewing movement)
Nerve Supply	• Trigeminal Nerve





Muscles of the Head

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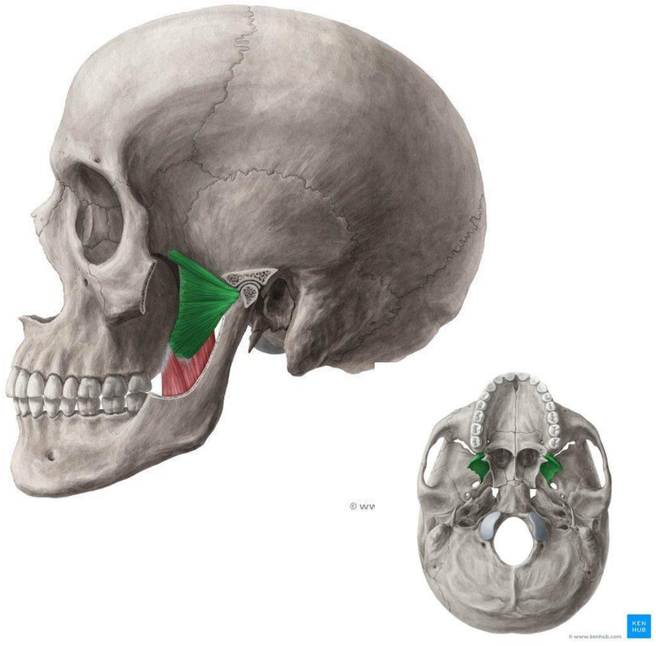
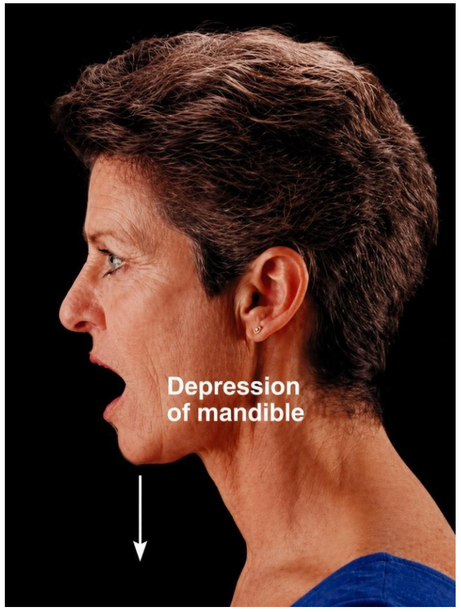
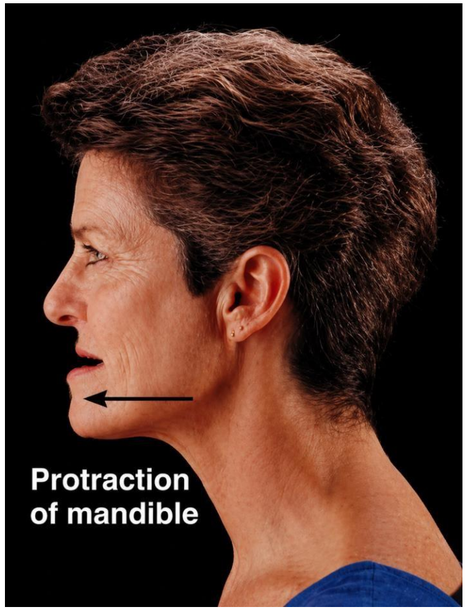
❖ Muscles of the Mastication

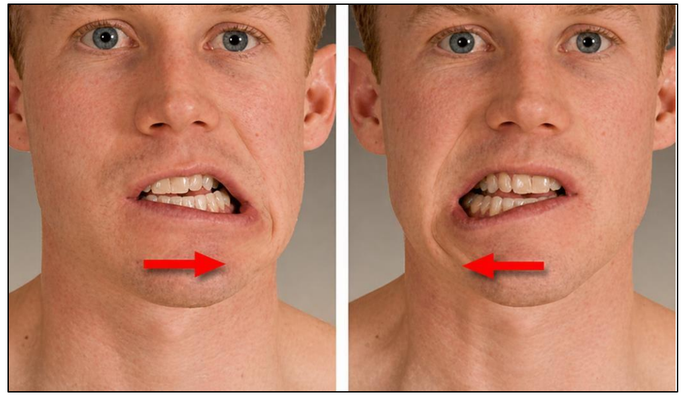
3. Lateral pterygoid	
Origin	• Lateral surface of lateral pterygoid plate of sphenoid bone
Insertion	• TMJ and Neck of condyloid process of mandible
Action	• Opens jaw, protrudes mandible, and moves it side to side
Nerve Supply	• Trigeminal Nerve







The only muscle when contracted results in depression (opening the mouth)



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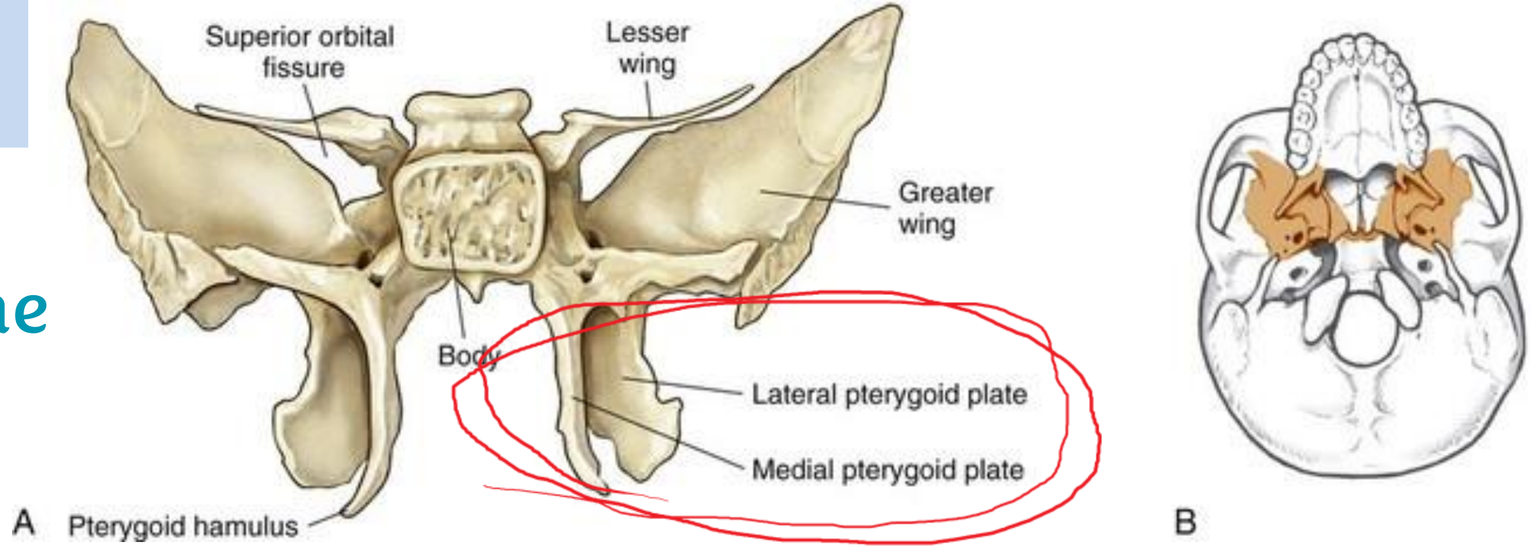
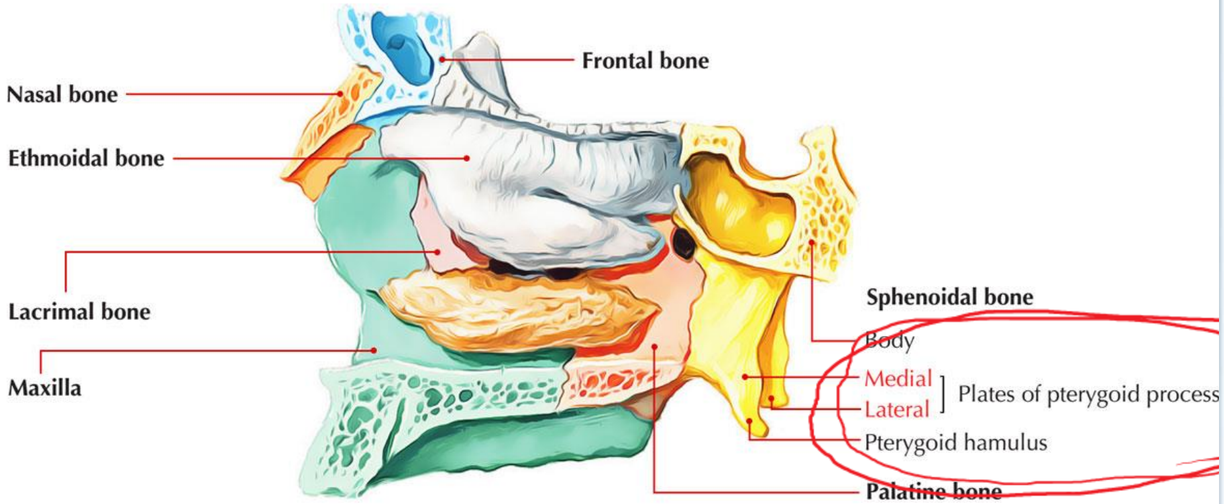
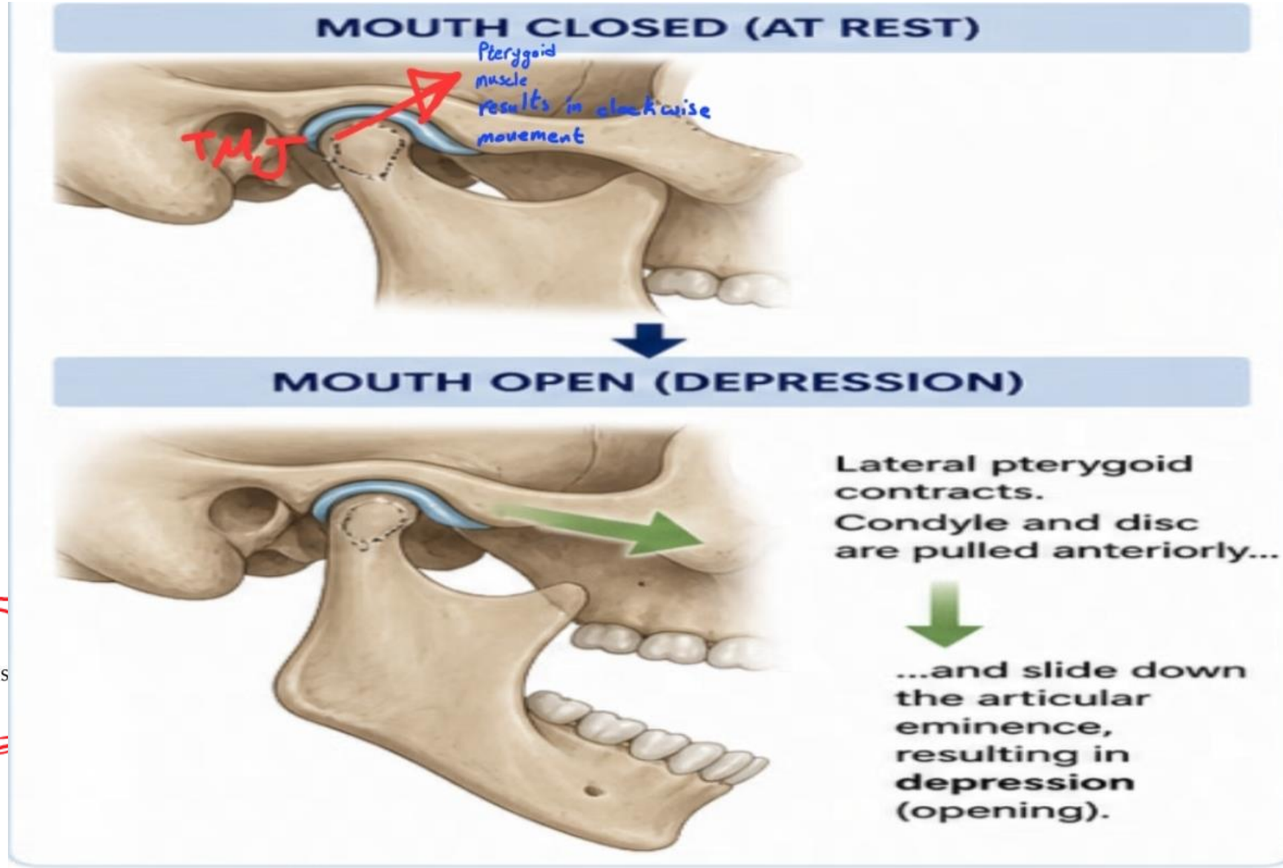
Additional images to help you understand:

Note: no mastication muscles originate from the medial pterygoid plate.





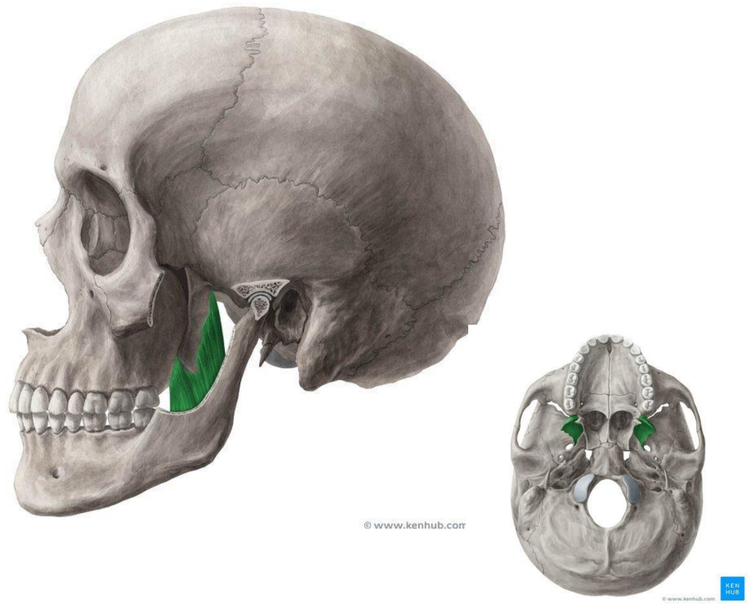


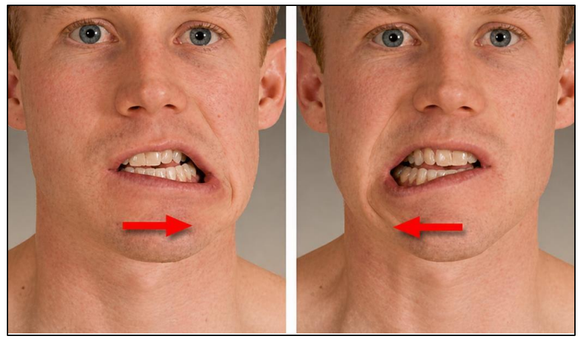
Muscles of the Head

Gross lecture-11

❖ Muscles of the Mastication

4. Medial pterygoid	
Origin	• Medial surface of lateral pterygoid plate of sphenoid bone
Insertion	• Medial surface of ramus and angle of mandible
Action	• Elevates the mandible (closes jaw) and moves it side to side
Nerve Supply	• Trigeminal Nerve





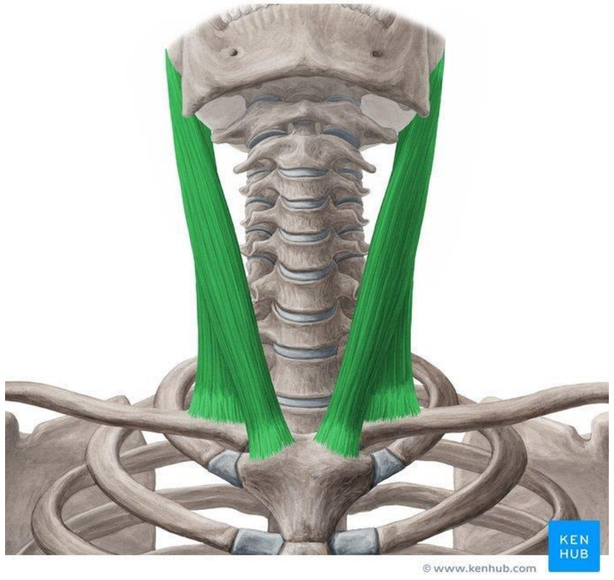
6.3

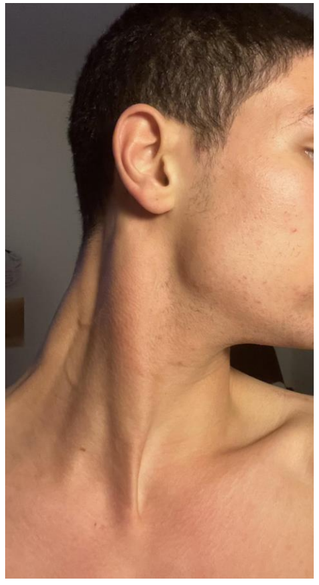
Muscles of the Neck

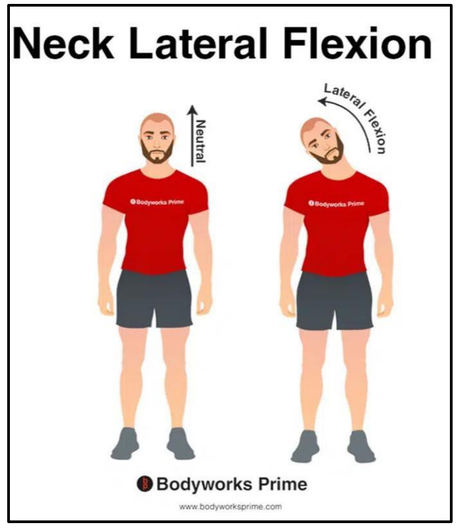
Gross lecture-11

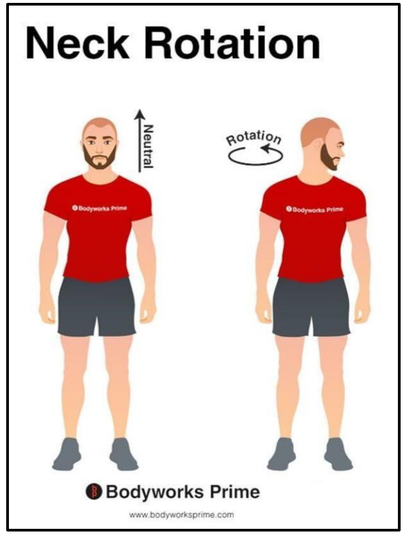
1. Sternocleidomastoid

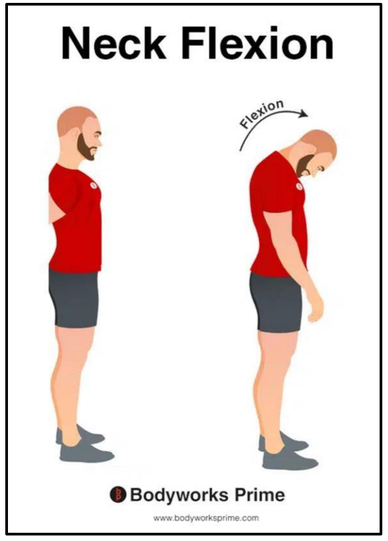
Origin	• Sternal head: superior part of manubrium sterni • Clavicular head: superior surface of medial third of the clavicle
Insertion	• Mastoid process of the temporal bone
Action	• Unilateral contraction: Neck lateral flexion, neck rotation • Bilateral contraction: Neck flexion.
Nerve Supply	• Spinal accessory nerve











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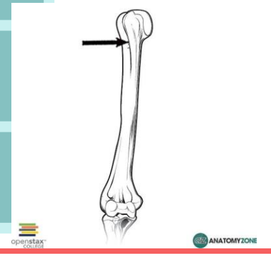
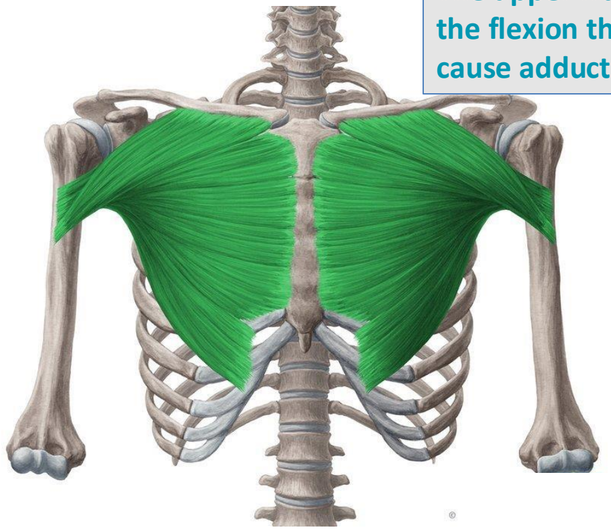
Muscles of the Trunk

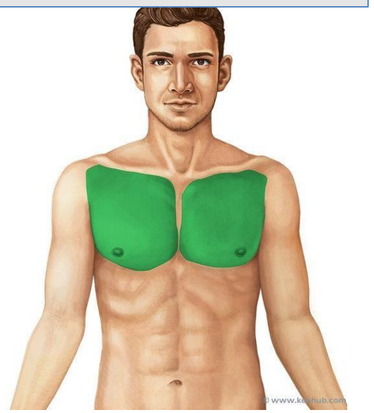
❖ Muscles of the Thoracic wall:

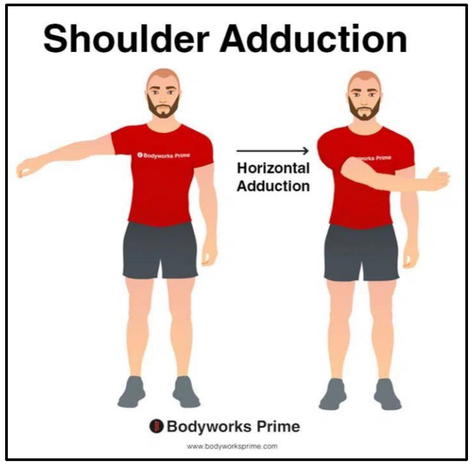
1. Pectoralis major	
Origin	• Clavicular part: anterior surface of medial half of clavicle • Sternocostal part: anterior surface of sternum and Costal cartilages of ribs 1-6
Insertion	• Lateral lip of intertubercular sulcus of humerus
Action	• Arm adduction, Arm internal rotation, Arm flexion

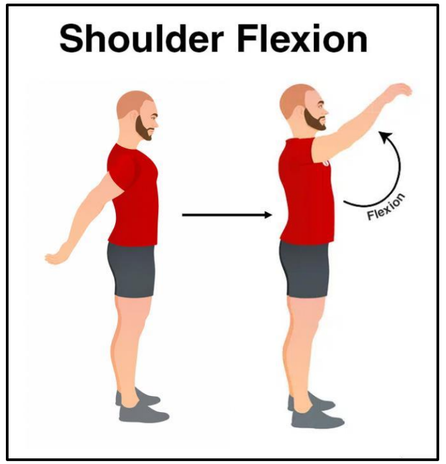


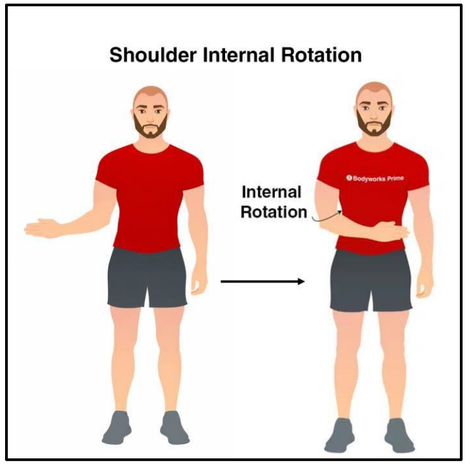
The upper fibers of the muscle causes the flexion the transverse (middle) fibers cause adduction and internal rotation











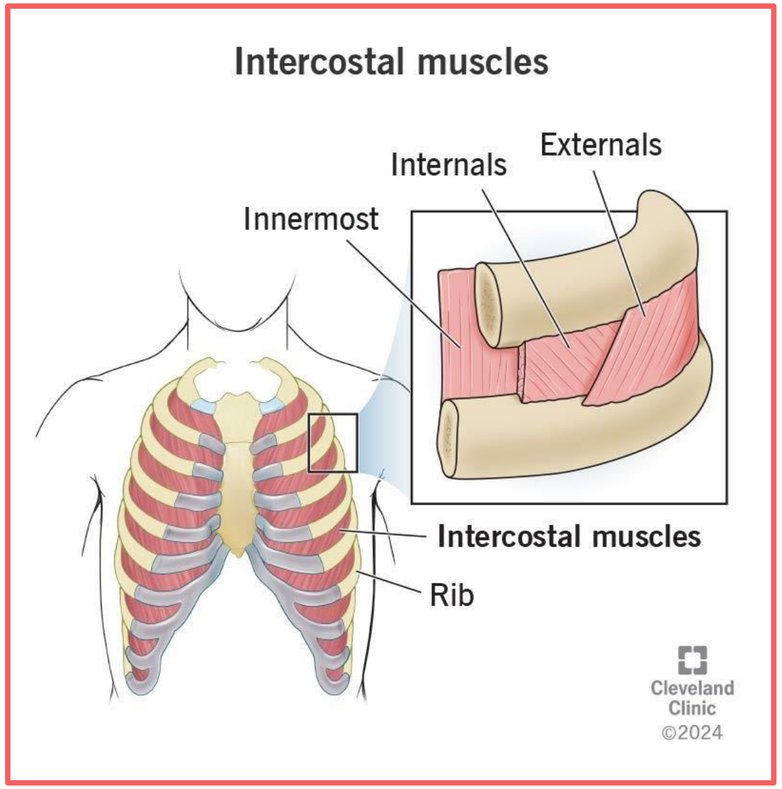
Muscles of the Trunk

❖ Muscles of the Thoracic wall:

2. Intercostal muscles:

- The intercostal muscles are a group of muscles that occupy the 11 intercostal spaces.
- They are arranged in three layers from superficial to deep:
  1. External intercostal muscles
  2. Internal intercostal muscles
  3. Innermost intercostal muscles
     The closest muscle to the chest cavity
- They are all accessory respiratory muscles that participate in the process of breathing.

There are 11 intercostal spaces on each side of the thoracic cage. Each space contains three layers of intercostal muscles: external, internal, and innermost intercostals. Therefore, there are 11 pairs of external intercostals, 11 pairs of internal intercostals, and 11 pairs of innermost intercostals.

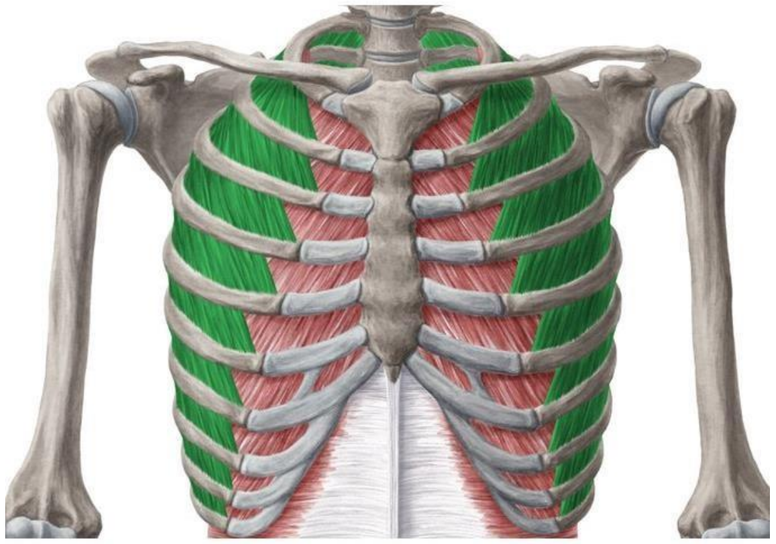


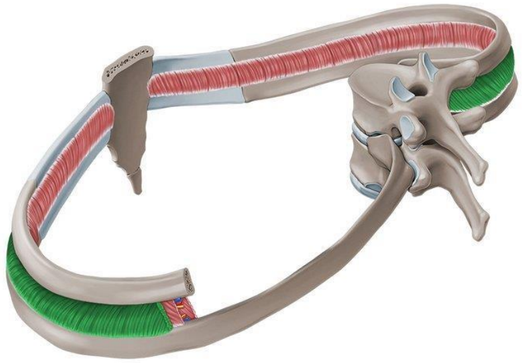
Muscles of the Trunk

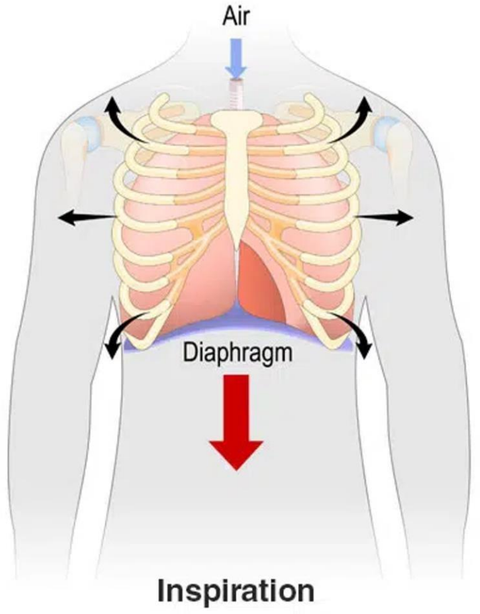
The contraction of the EIM increases the size of the chest cavity resulting in increasing the size of the lung so the pressure inside becomes lower than the pressure outside resulting in inhalation

❖ Muscles of the Thoracic wall:

2. Intercostal muscles: 1. External intercostal muscle		
Origin	• Lower border of rib above.	Fibers pass downward and forward
Insertion	• Upper border of the rib below	
Action	• Elevates the ribs during inspiration (helps with breathing in).	







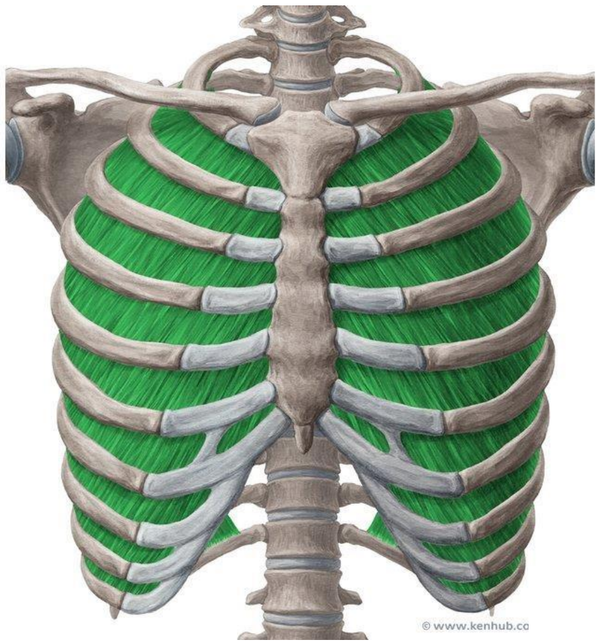
Muscles of the Trunk

During forced exhalation, The contraction of the internal intercostal muscle decreases the size of the chest cavity so the pressure inside becomes higher than the pressure outside resulting in exhalation. However, during normal or quiet expiration, there is no need for this muscle as it happens passively.

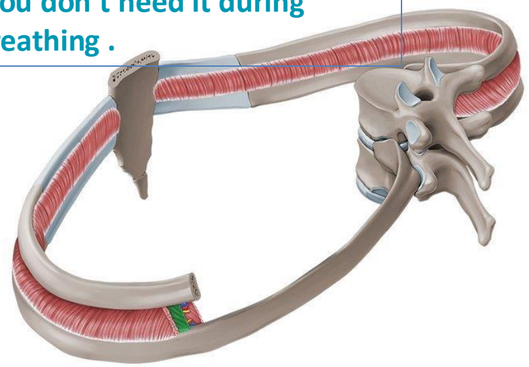
❖ Muscles of the Thoracic wall:

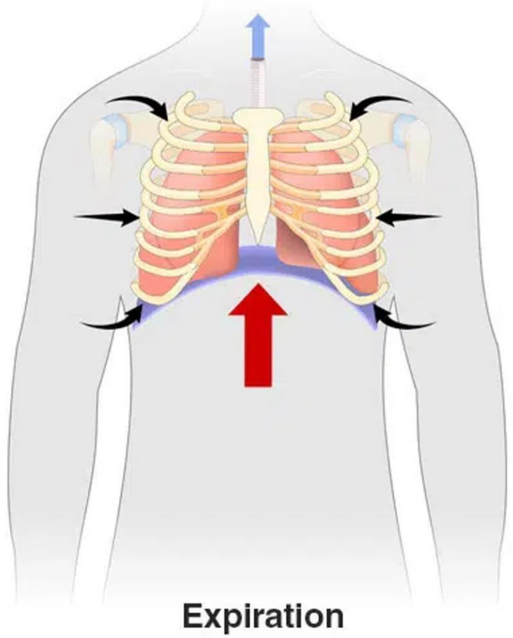
2. Intercostal muscles:
2.2 Internal intercostal muscle

Origin	• Lower border of rib above.	Fibers pass downward and backward
Insertion	• Upper border of the rib below	
Action	• Depresses the ribs during forced expiration (helps with breathing out)	



This muscle works only when there is a need of force as when cough strongly you don't need it during normal breathing .

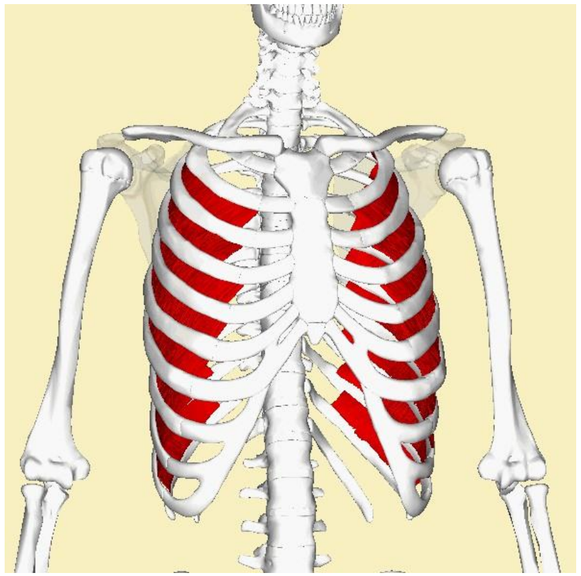


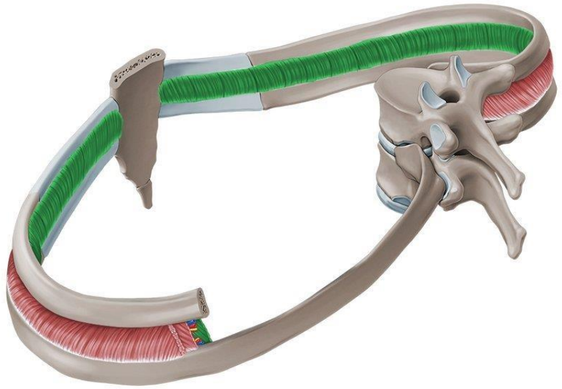


Muscles of the Trunk

❖ Muscles of the Thoracic wall:

2. Intercostal muscles: 2.3 Innermost intercostal muscle		
Origin	• Internal surface of the rib above	Fibers pass downward and backward But more vertical than internal intercostal muscle
Insertion	• Internal surface of the rib below.	
Action	• Assist internal intercostals in forced expiration	



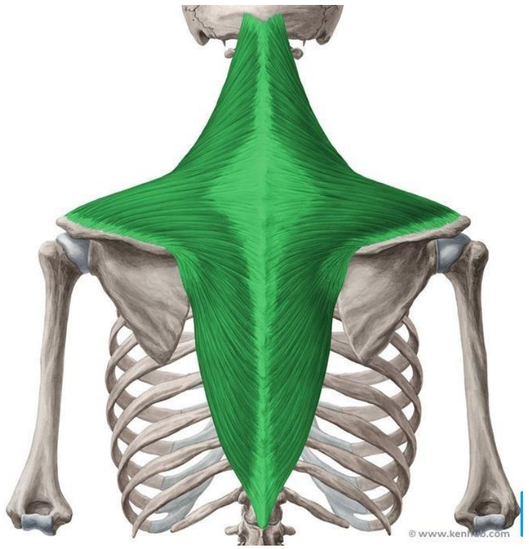


Muscles of the Trunk

❖ Muscles of the Thoracic wall:

Excellent video to understand the trapezius muscle:
https://youtu.be/0WaZmrgt624?si=qbbvatfxIWw9Scdx

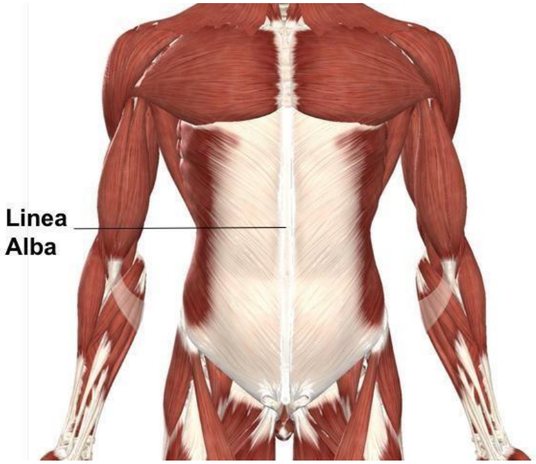
4. Trapezius	
Origin	• Occipital bone, spines of C7 and T1 to T12 vertebrae
Insertion	• Lateral third of clavicle and spine of scapula.
Action	• Elevation of the shoulder (as in shrugging) Upper oblique fibers. lower oblique fibers make the depression movement of the shoulders • Retraction of the shoulder Transverse fibers
Nerve Supply	• Spinal accessory nerve

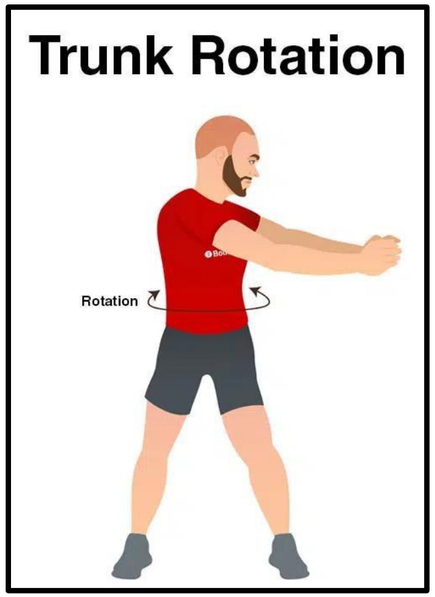


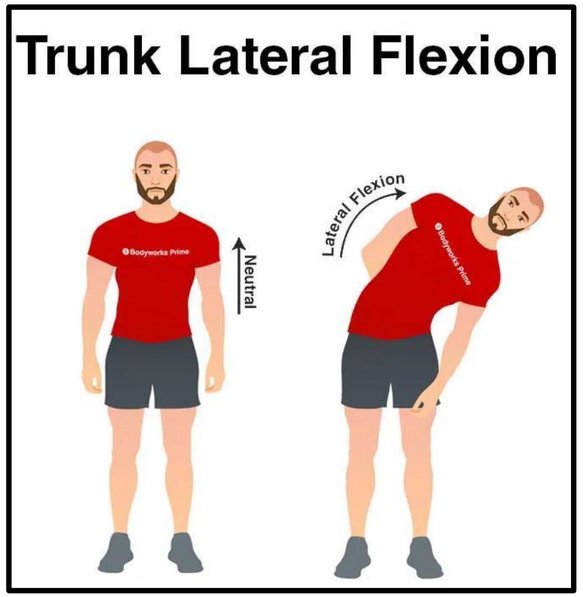
Muscles of the Trunk

❖ Muscles of the Abdominal wall:

1. External oblique		
Origin	• Lower eight ribs	Fibers pass downward and medially
Insertion	• Xiphoid process, pubic tubercle, iliac crest, and Linea alba The joining of two aponeurosis.	
Action	• Rotates trunk and bends trunk to the side.	





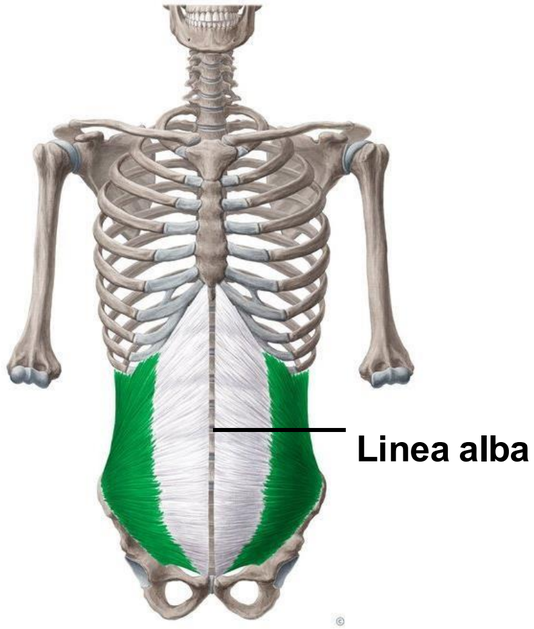


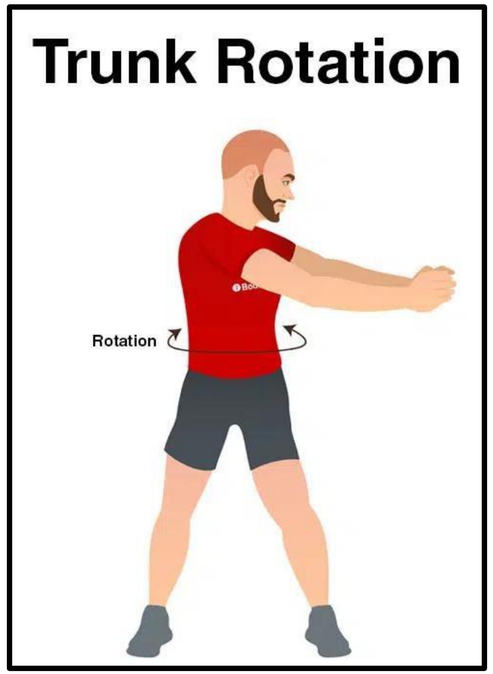
Muscles of the Trunk

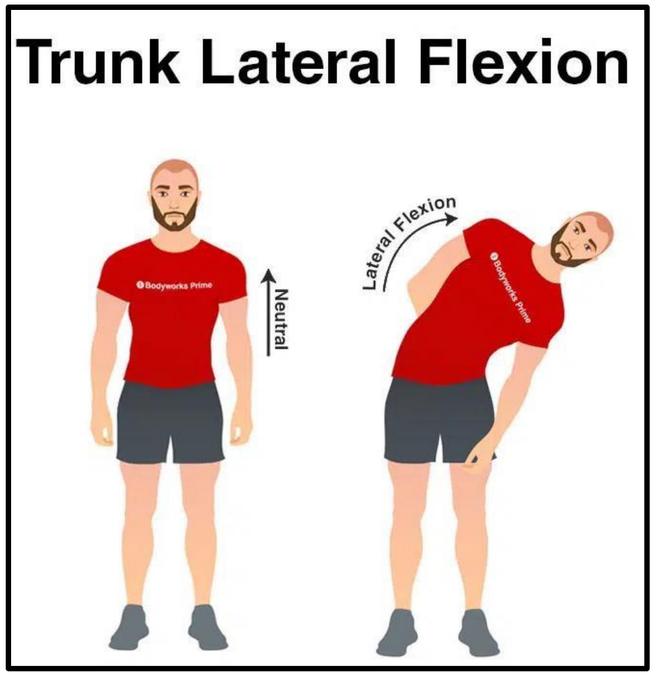
Remember: there is something called linea aspera which is a line in the posterior surface of the femur

❖ Muscles of the Abdominal wall:

2. Internal oblique		
Origin	• Iliac crest	Fibers pass upward and medially
Insertion	• Lower ribs (7th –10th ribs) and Linea alba	
Action	• Rotates trunk and bends trunk to the side.	



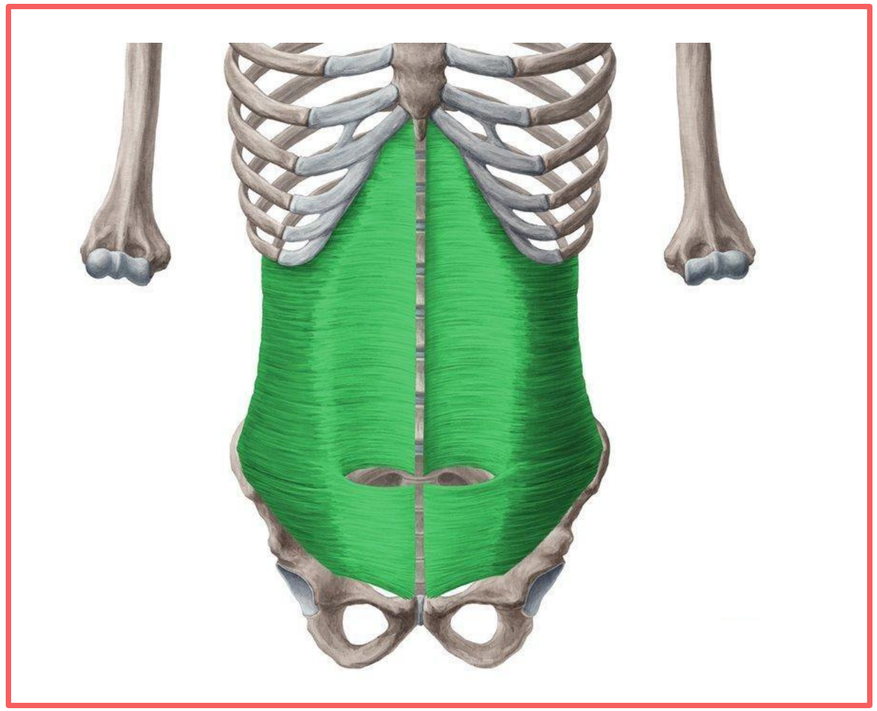




Muscles of the Trunk

❖ Muscles of the Abdominal wall:

3. Transversus Abdominis		
Origin	• Iliac crest and lower ribs (7th –12th ribs)	Fibers pass horizontal (transverse)
Insertion	• Linea alba, Aponeurosis of the anterior abdominal wall and Pubic bone	
Action	• Compresses abdomen; stabilizes trunk	

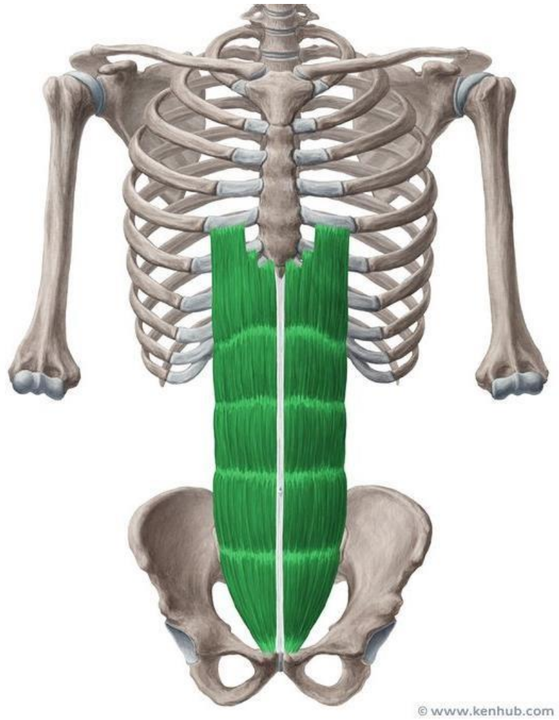


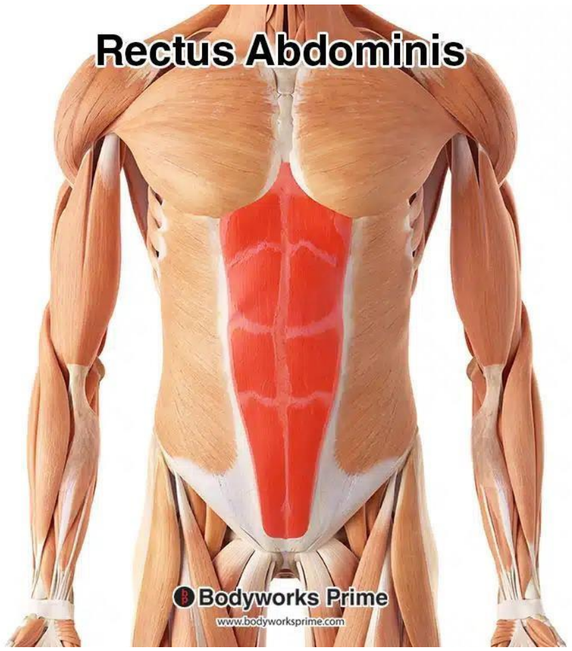
Muscles of the Trunk

❖ Muscles of the Abdominal wall:

4. Rectus Abdominus		
Origin	• Pubic bone and pubic symphysis	Fibers pass vertical
Insertion	• Xiphoid process and costal cartilages of ribs 5–7	
Action	• Flex trunk (sit ups), Compresses abdomen	

Six packs





Quiz

https://forms.gle/7mpy7ZXrpcN3b1bFA

Good luck

Additional Resources:

رسالة من الفريق العلمي:

اللهم إنا توكلنا عليك وسلمنا أمورنا إليك، لا ملجأ
ولا منجى منك إلا إليك، رب أدخلنا مدخل
صدق، وأخرجنا مخرج صدق، واجعل لنا من
لدنك سلطانًا نصيرًا.

For any feedback, scan the code or click on it.

Corrections from previous versions:

Versions	Slide # and Place of Error	Before Correction	After Correction
V0 → V1	30	Lower oblique fibers causes elevation of the shoulder	Causes depression of the shoulder
	25	Medial fibers in the pectoralis major cause flexion of the arm	It causes adduction of the arm.
V1 → V2			