

Muscles Involved in Respiratory

Respiratory Block
ANATOMY
team 435

no rest is worth except the
rest that is earned

COLORCODES

- IMPORTANT NOTES
- EXTRA NOTES
- DEFINITION



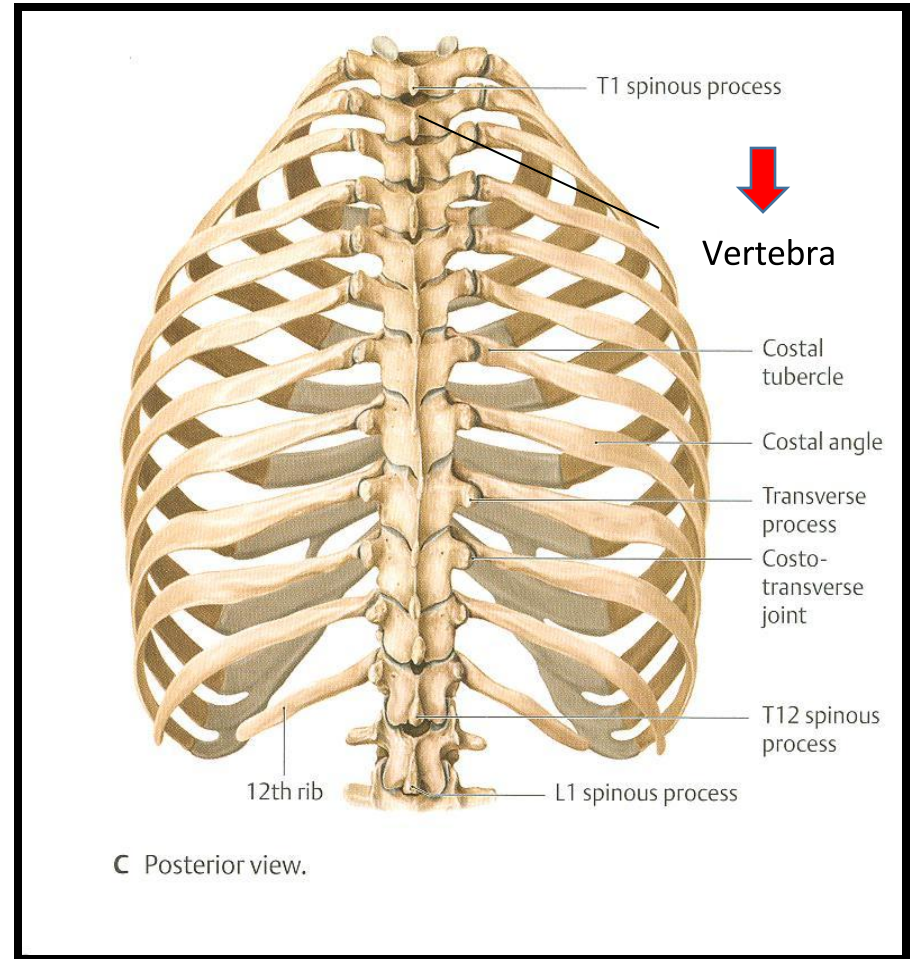
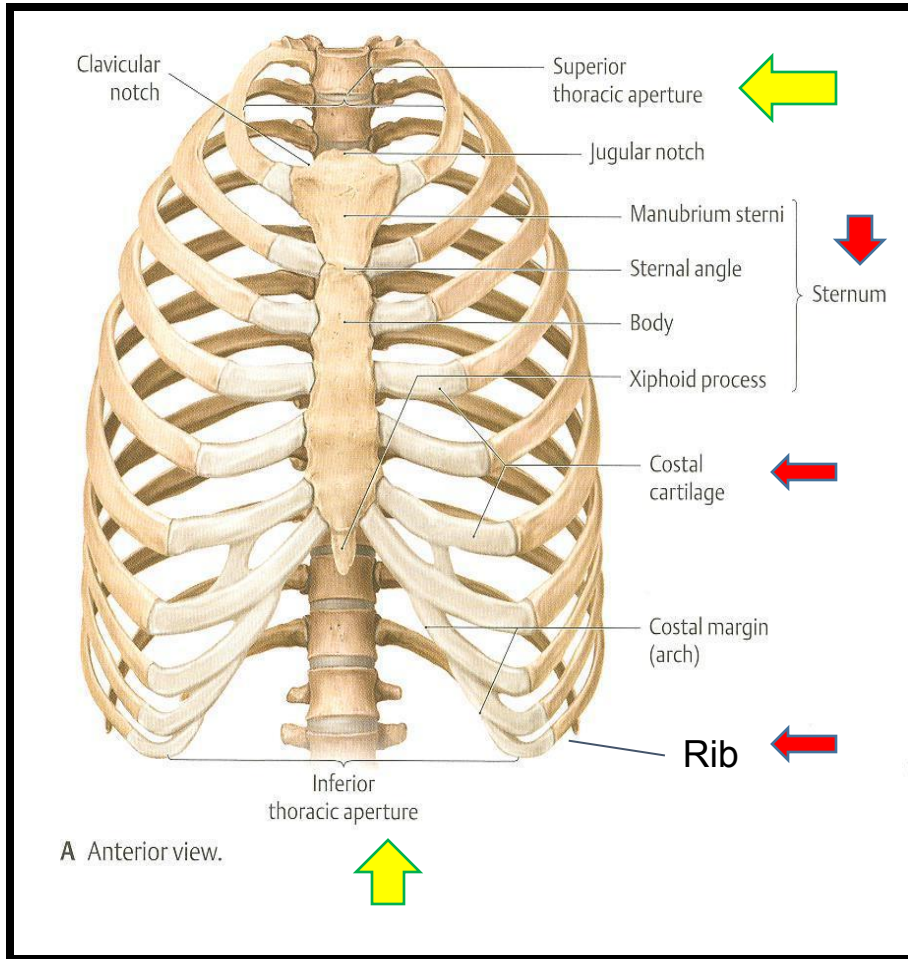
OBJECTIVES

At the end of the lecture, students should:

- *Describe the components of the thoracic cage and their articulations.*
- *Describe in brief the respiratory movements.*
- *List the muscles involved in inspiration and in expiration.*
- *Describe the attachments of each muscle to the thoracic cage and its nerve supply.*
- *Describe the origin, insertion, nerve supply of diaphragm.*



THORACIC CAGE



THORACIC CAGE

Conical in shape

Has 2 apertures (openings):

INFERIOR	(SUPERIOR (THORACIC OUTLET
WIDE	NARROW
CLOSED BY DIAPHRAGM	OPEN
	CONTINUOUS WITH NECK

| :Formed of
| Sternum & costal cartilages: **anteriorly**
| Twelve pairs of ribs: **laterally**
| Twelve thoracic vertebrae: **posteriorly**

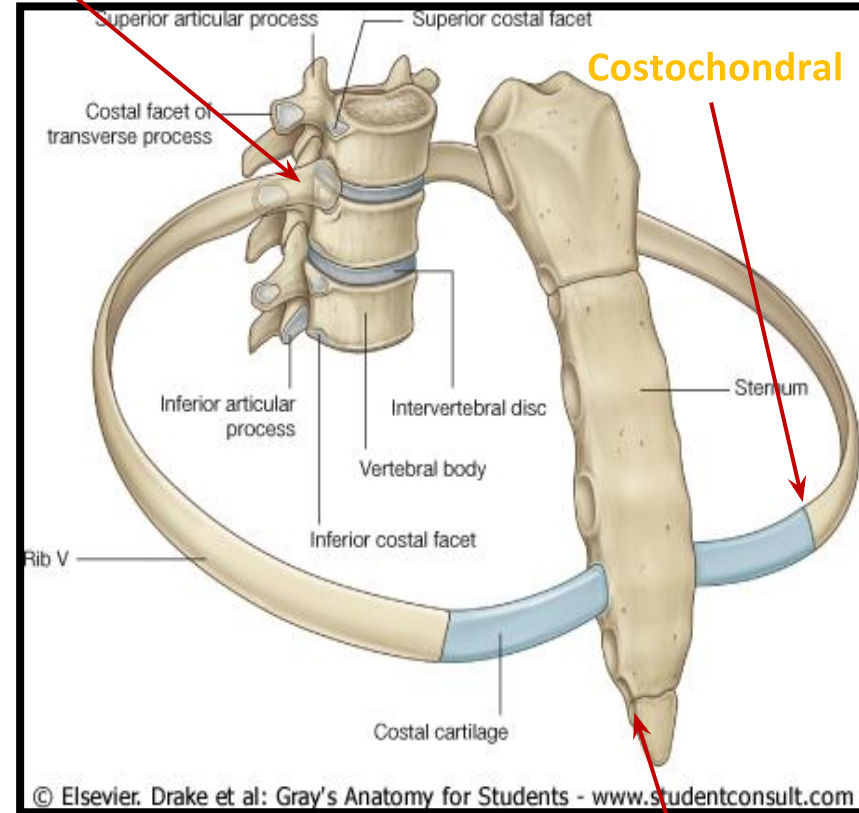
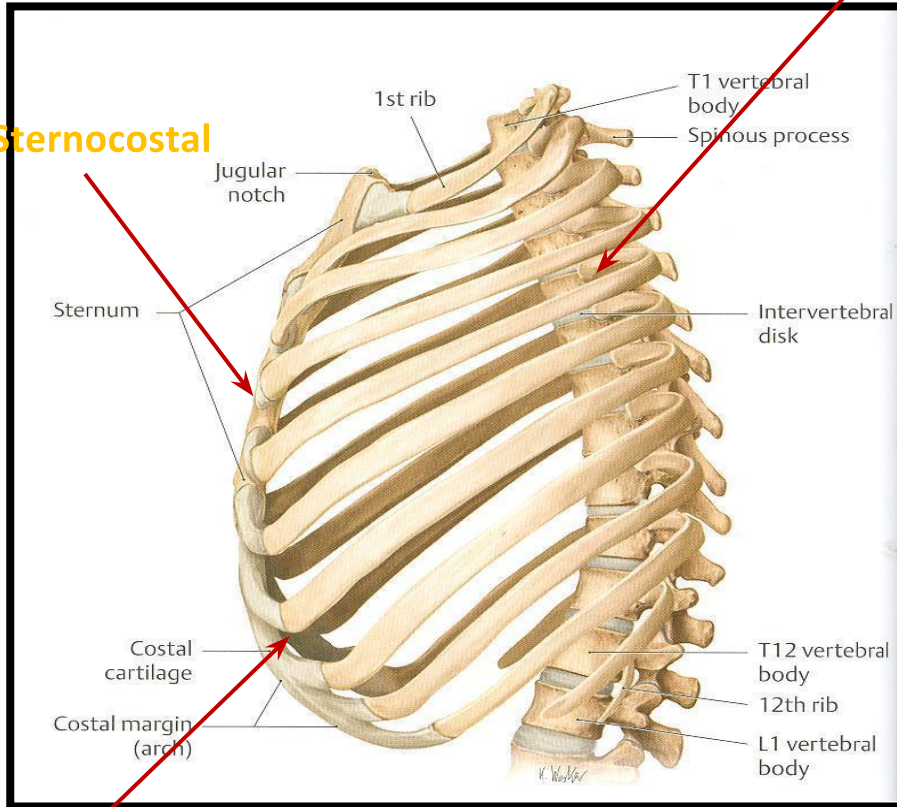


ARTICULATIONS

Costovertebral

- These are plane synovial joints.
- Between heads of ribs & thoracic vertebrae.

Sternocostal



Costochondral

Sternocostal

Costochondral

- Between the costal cartilage and the ribs
- Cartilagenous j.

- 1st costal cartilage: articulates with manubrium by a primary cartilaginous j.
- From 2nd to 7th cartilages articulate with sternum by synovial js.



Complete Respiration and the 3D Diaphragm

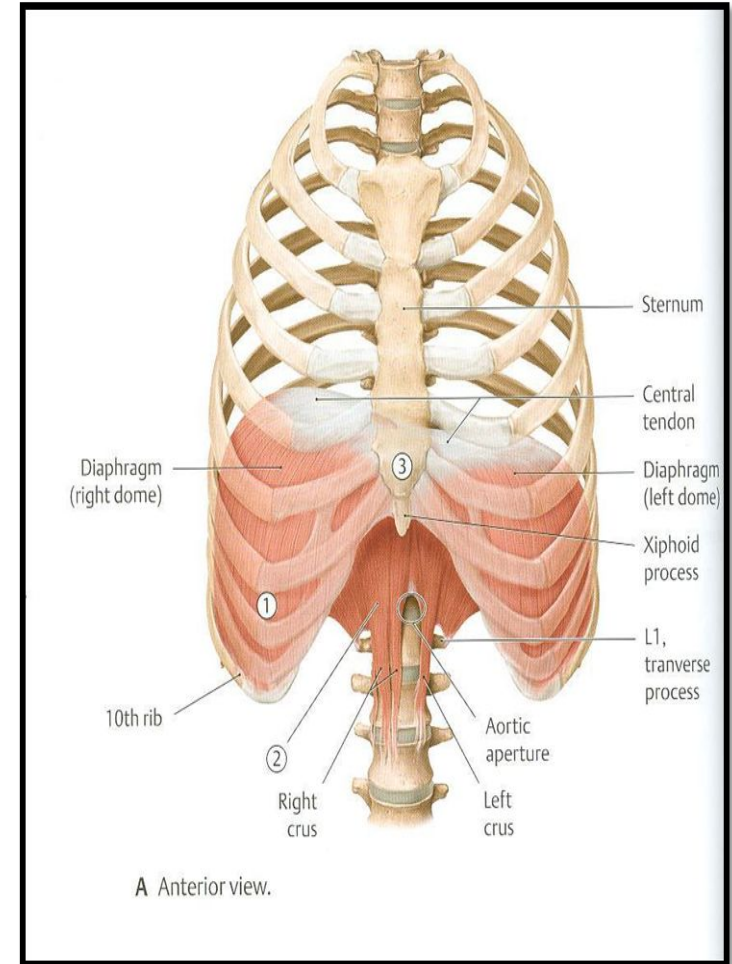
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RESPIRATORY MOVEMENTS : A- MOVEMENTS OF DIAPHRAGM

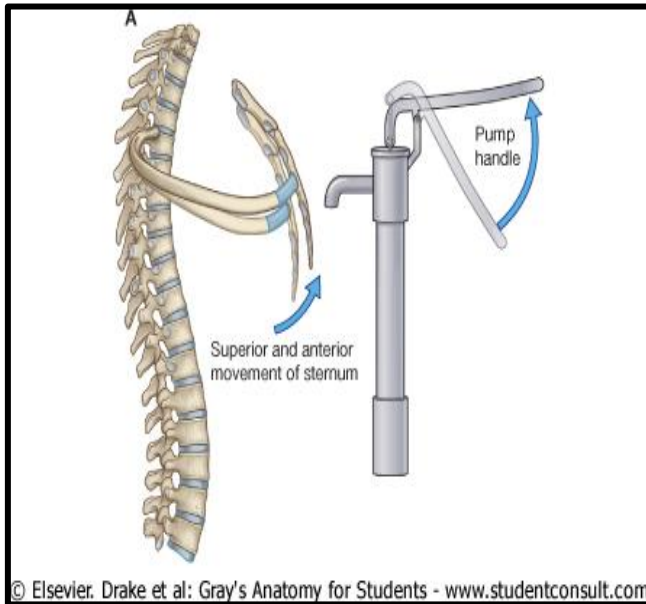
- **Inspiration**
- **Contraction (descent) of diaphragm.**
- **Increase of vertical diameter of thoracic cavity.**
- **Expiration**
- **Relaxation (ascent) of diaphragm.**



RESPIRATORY MOVEMENTS : B- MOVEMENTS OF RIBS

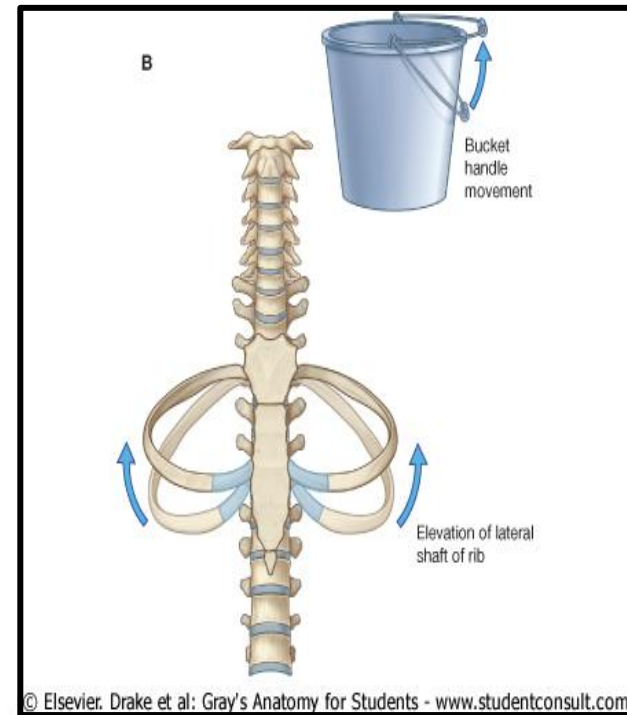
• PUMP HANDLE MOVEMENT

- Elevation of ribs.
 - Increase in **antero-posterior** diameter of thoracic cavity.



• BUCKET HANDLE MOVEMENT

- Elevation of ribs
 - Increase in **lateral** diameter of thoracic cavity



INSPIRATORY MUSCLES:

- ❑ **Diaphragm (most important muscle)**
- ❑ Rib elevators: **External intercostal muscles.**
- ❑ Accessory muscles (only during forced inspiration) :
 1. Muscles attaching cervical vertebrae to first & second rib: **scalene muscles.**
 2. Muscles attaching thoracic cage to upper limb: **pectoralis major .**



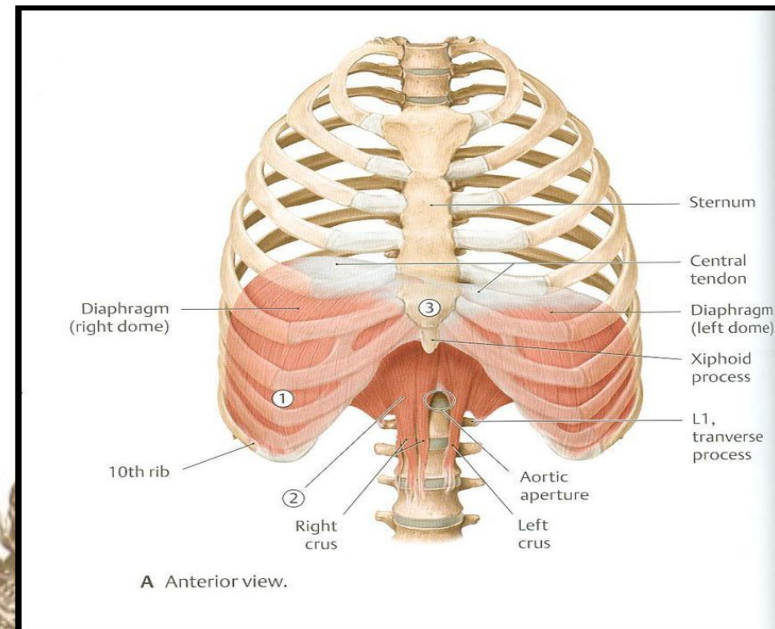
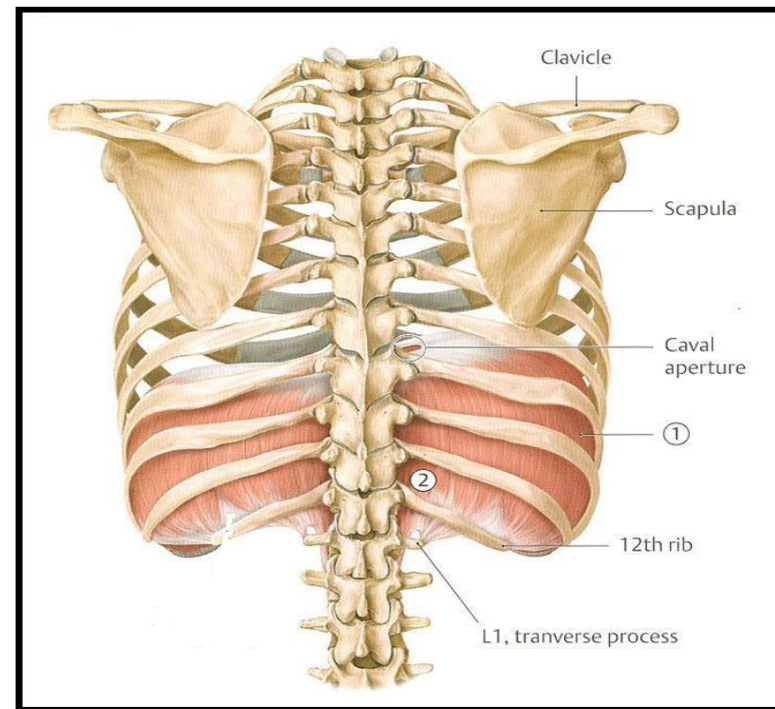
ORIGIN OF DIAPHRAGM:

1-Costal: lower 6 costal cartilages .

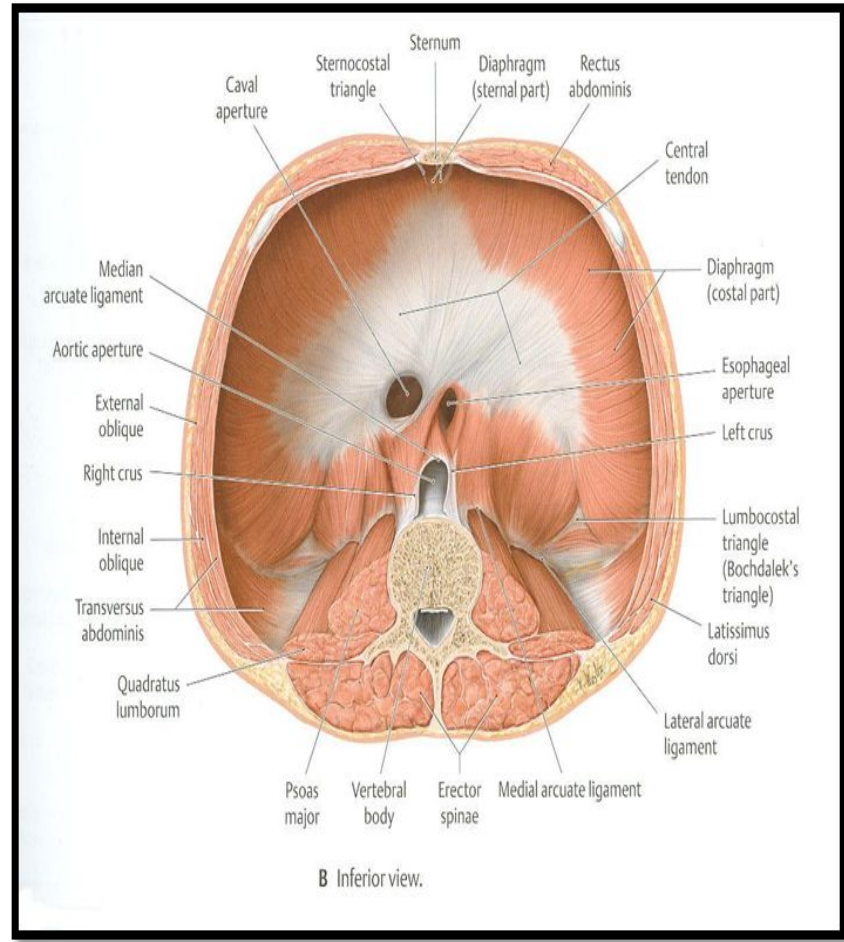
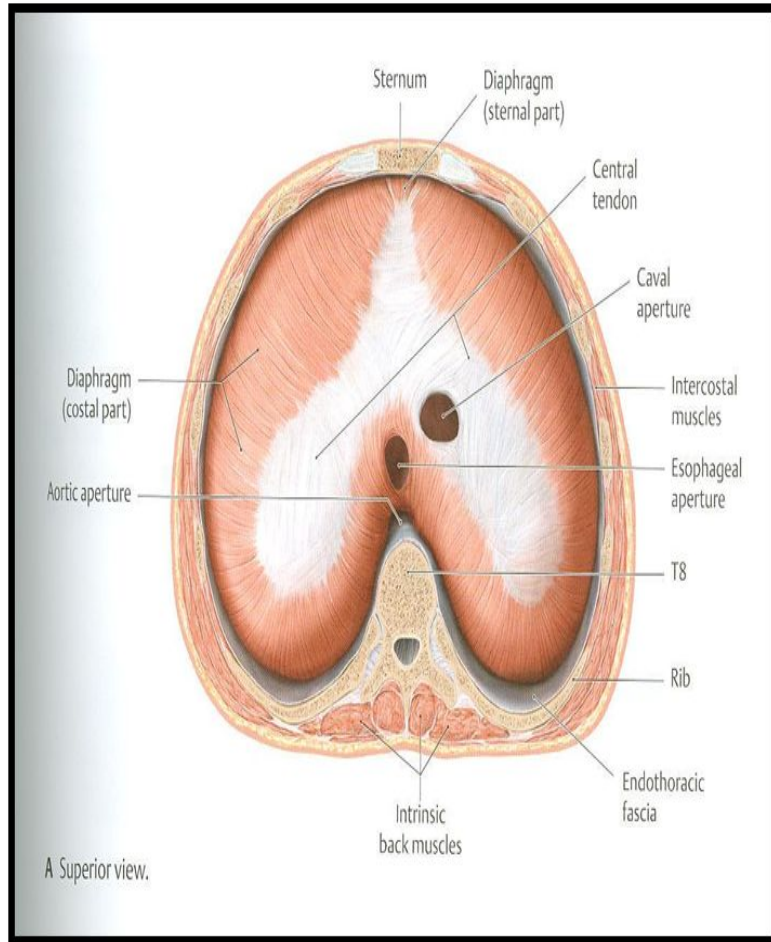
2-Vertebral: upper 3 lumbar
vertebrae

(right & left crus + arcuate ligaments.

3-Sternal: xiphoid process of sternum.



INSERTION OF DIAPHRAGM (CENTRAL TENDON)



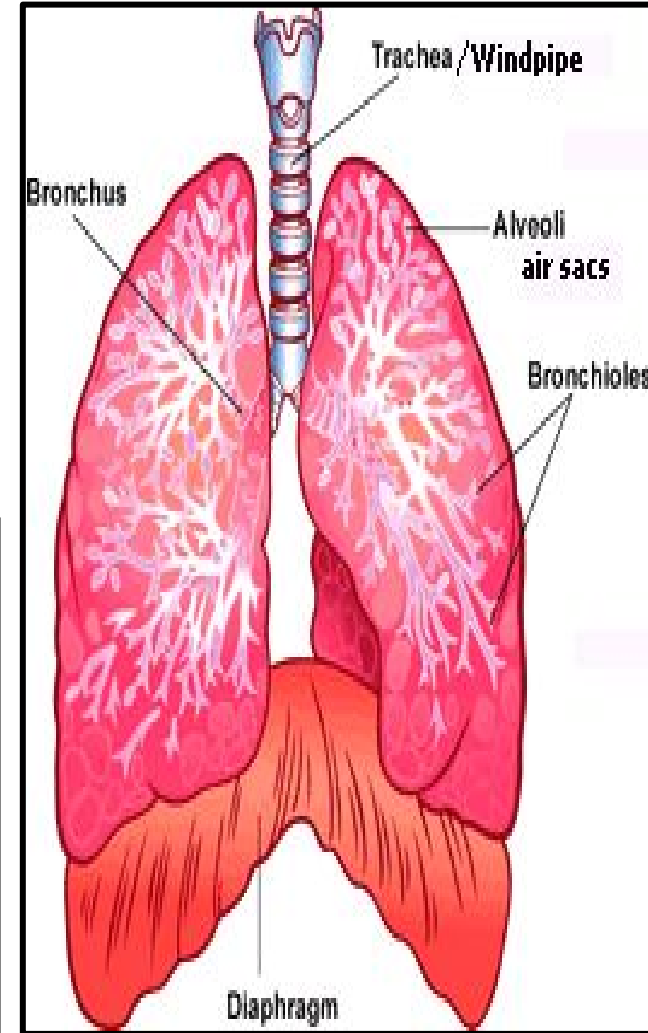
central tendon: lies at the level of xiphisternal joint, at 9th thoracic Vertebra



DIAPHRAGM

A musculotendinous partition between thoracic & abdominal cavity.

Convex toward thoracic & **concave** toward abdominal cavity



Attached

- sternum, costal cartilages, 12th rib & lumbar vertebrae

- Fibers converge to join the **central tendon**

Nerve supply

- **phrenic nerve (C3, 4, 5)**, penetrates diaphragm & innervates it from abdominal surface

action

- contraction (descent) of diaphragm increase vertical diameter of thoracic cavity **(essential for normal breathing)**

EXTERNAL INTERCOSTAL

:Attachments

from lower border of rib above to upper border of rib below •

: Direction of fibers

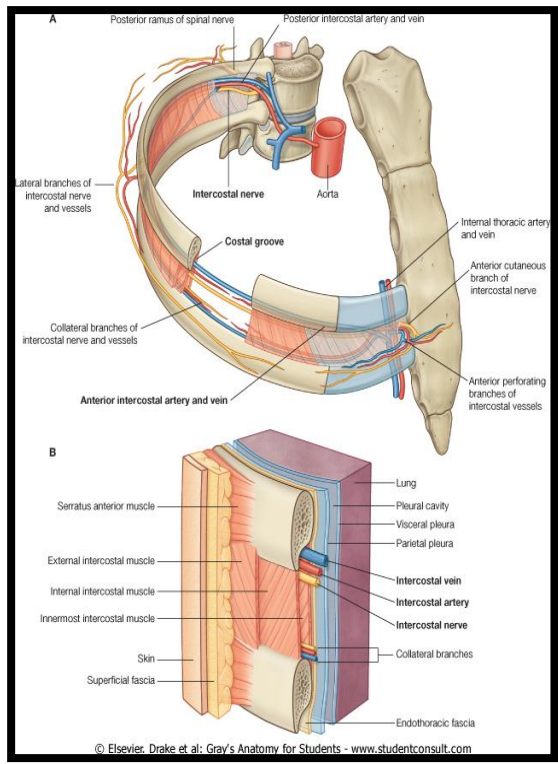
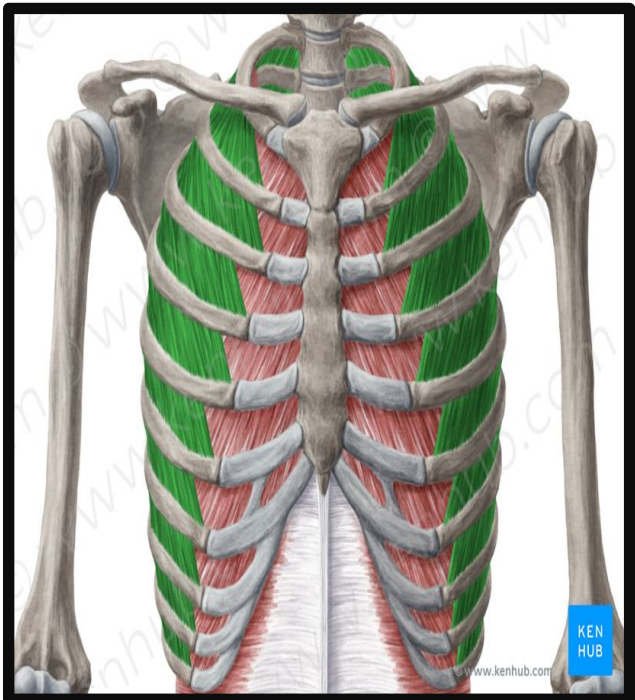
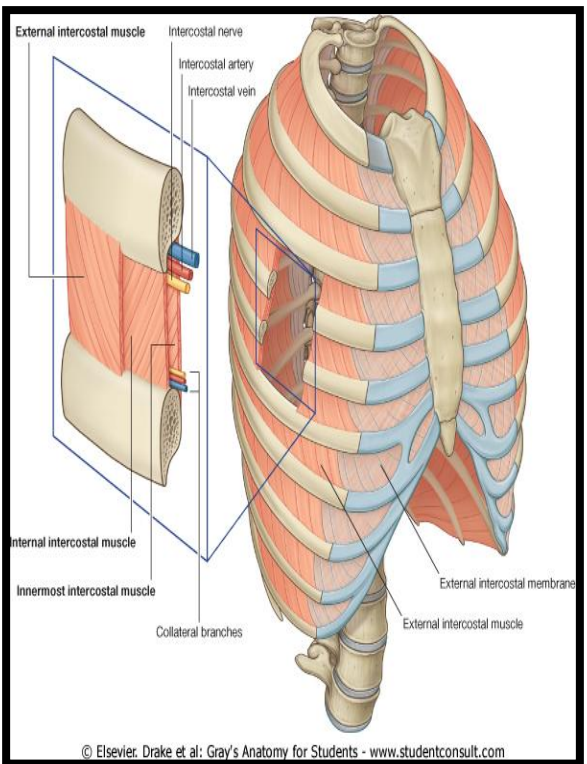
downward & medially •

: Nerve supply

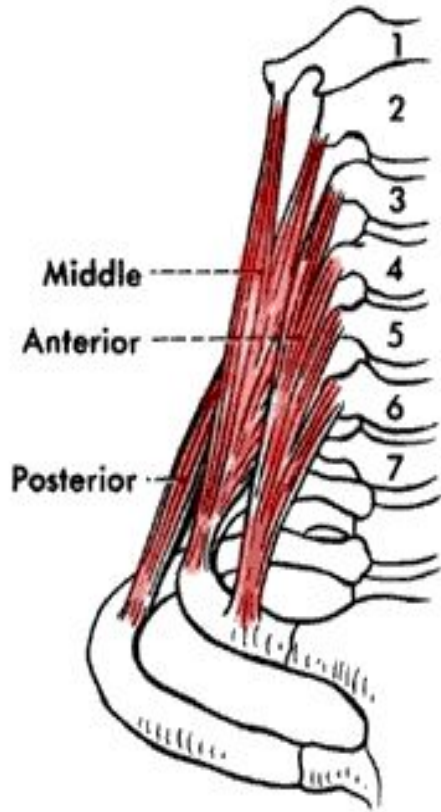
intercostal nerves •

:Action

(rib elevators (inspiratory) •



SCALENE MUSCLES

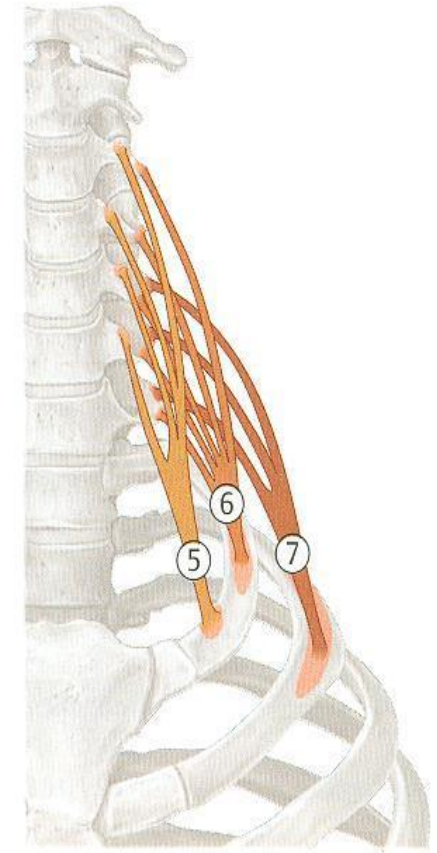


The scalene muscles.

:Origin cervical •
vertebrae

:Insertion 1st & 2nd ribs •

:Action elevates 1st & •
2nd ribs
(inspiratory



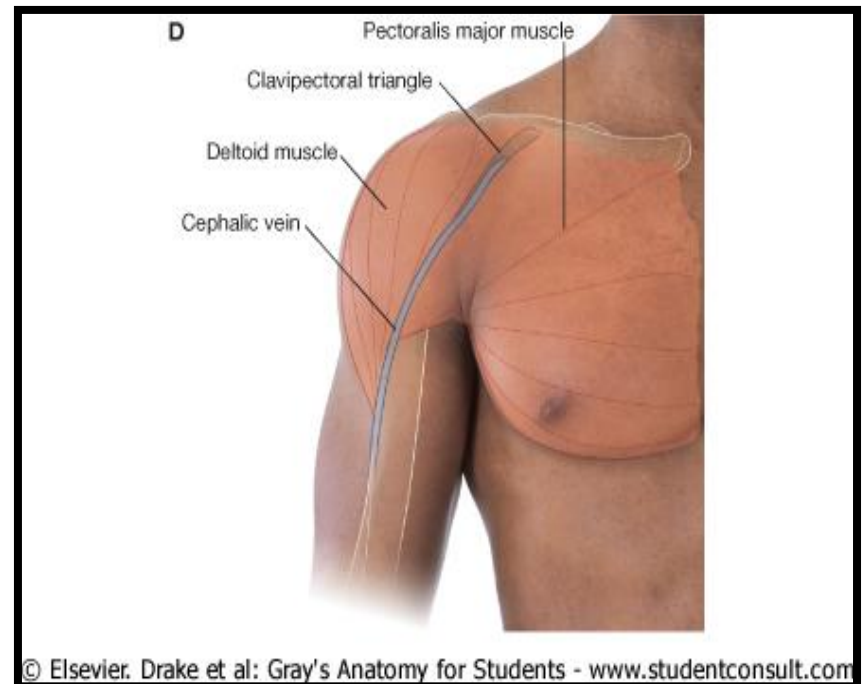
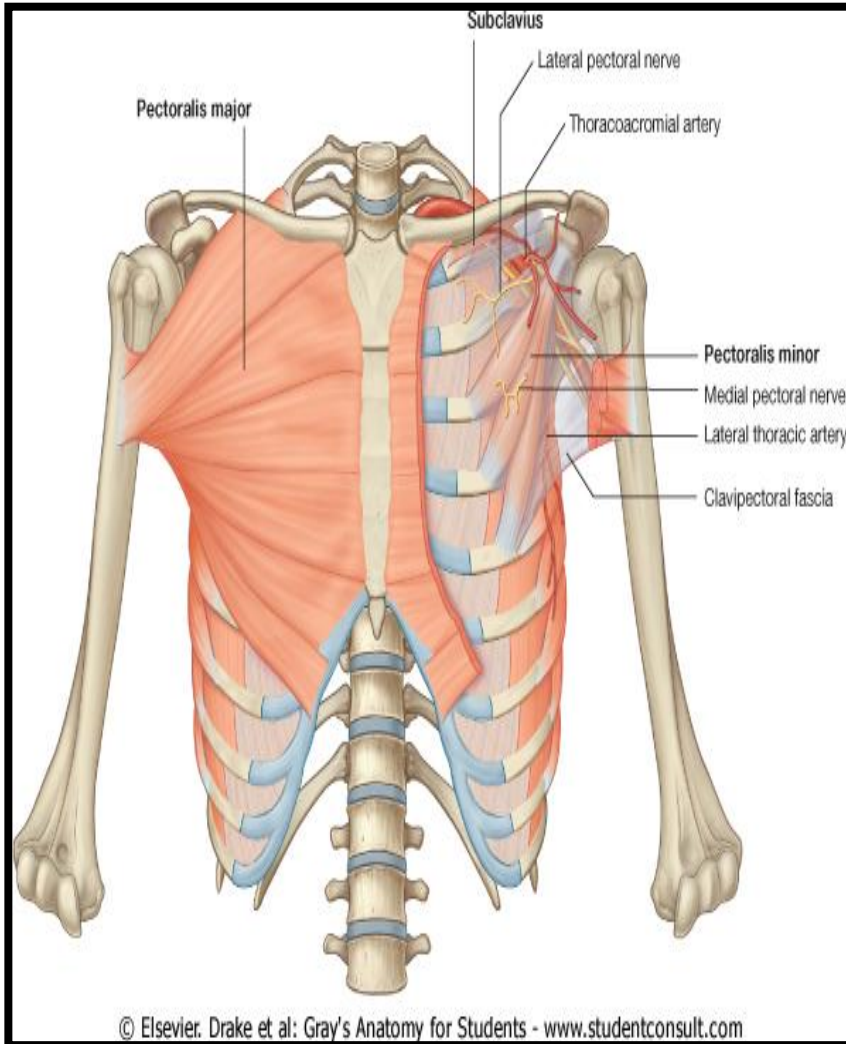
B Scalene muscles, anterior view.

PECTORALIS MAJOR

:Origin sternum + costal cartilages

:Insertion humerus

:Action increases antero-posterior diameter of thoracic cavity, (when arm is fixed (inspiratory



EXPIRATORY MUSCLES

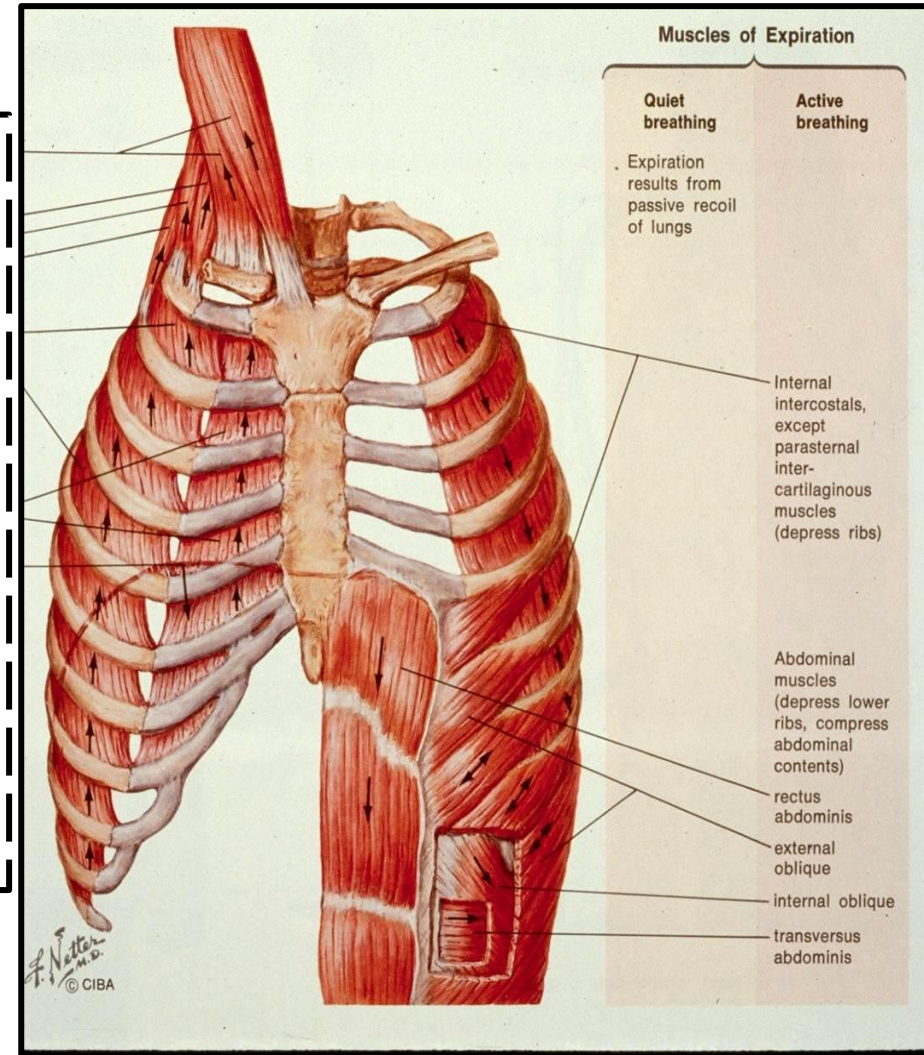
Act only during forced expiration

Rib depressors:

1. Internal intercostal
2. Innermost intercostal
3. Subcostals
4. Transversus thoracis

Anterior abdominal wall muscles:

1. External oblique
2. Internal oblique
3. Transversus abdominis
4. Rectus abdominis

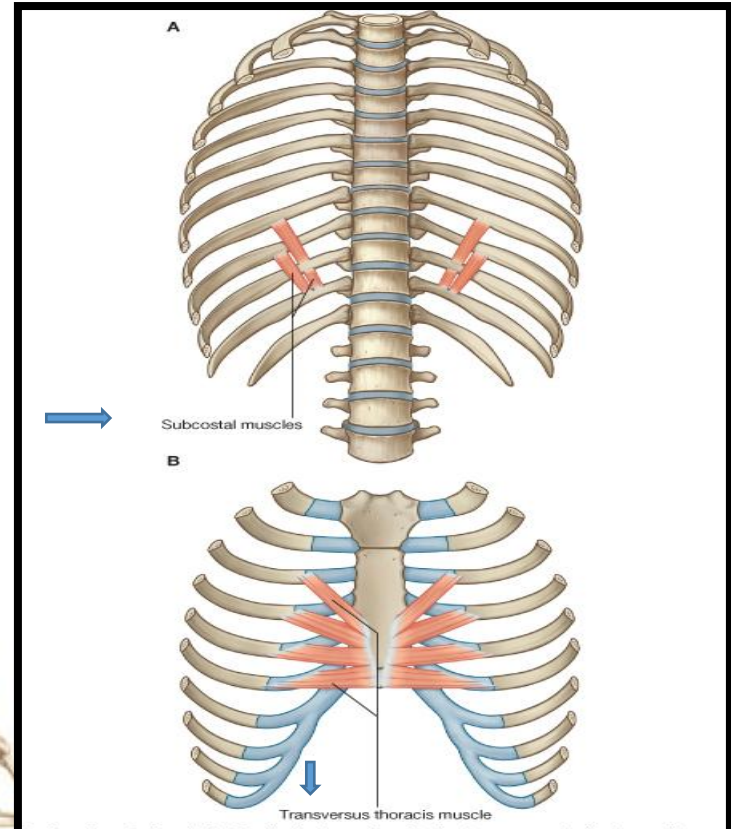
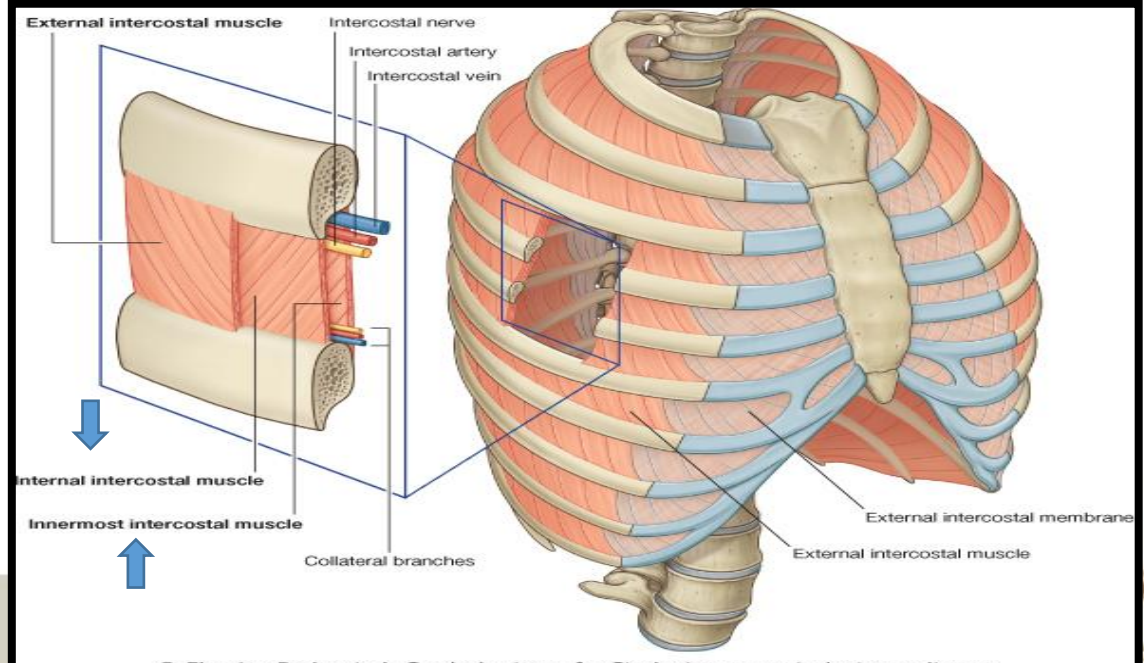
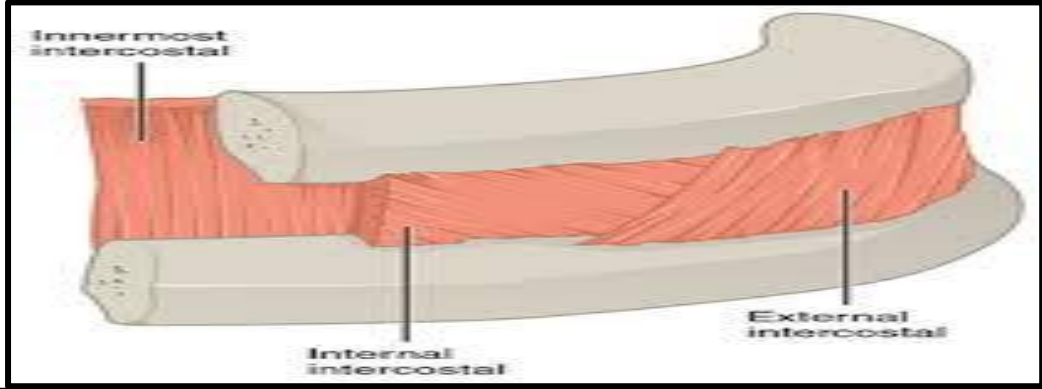


RIB DEPRESSORS: REST OF INTERCOSTAL MUSCLES

- 1. Internal intercostal
- 2. Innermost Intercostal
- Subcostal
- 4. Transversus thoracis .3

Nerve supply: intercostal nerves. (ventral rami of T1-T11)

DIRECTION: upward & medially

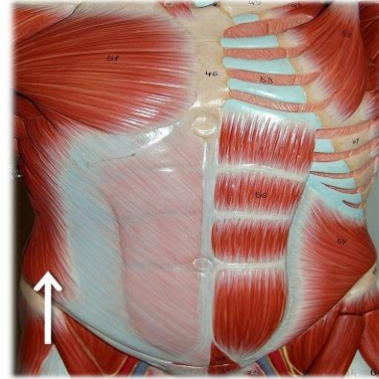


ANTERIOR ABDOMINAL WALL

External oblique
(outer layer)

Direction:
downward & medially

External oblique



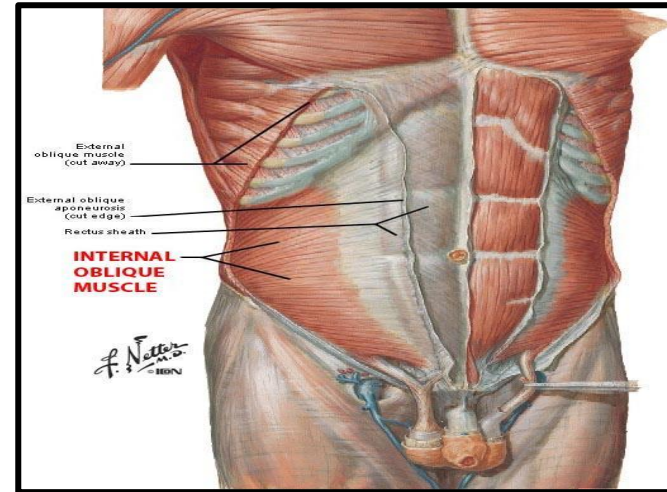
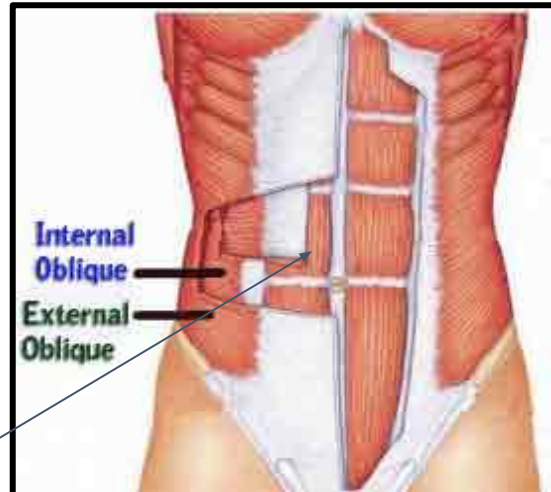
Compresses abdomen;
laterally flexes and rotates
vertebral column

External oblique



Internal oblique
(middle layer)

Direction:
upward & medially



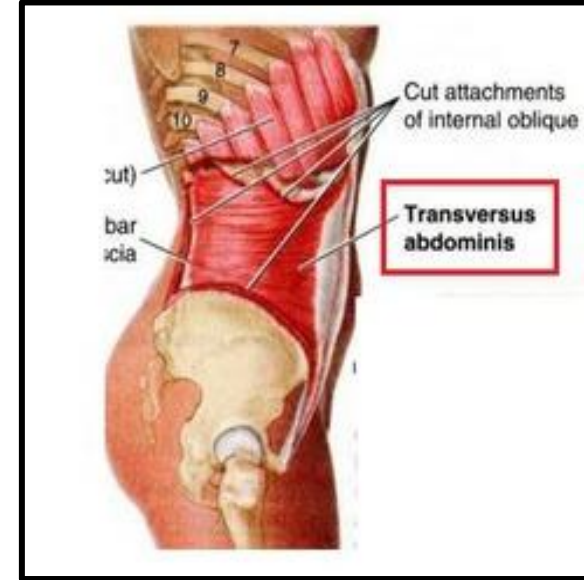
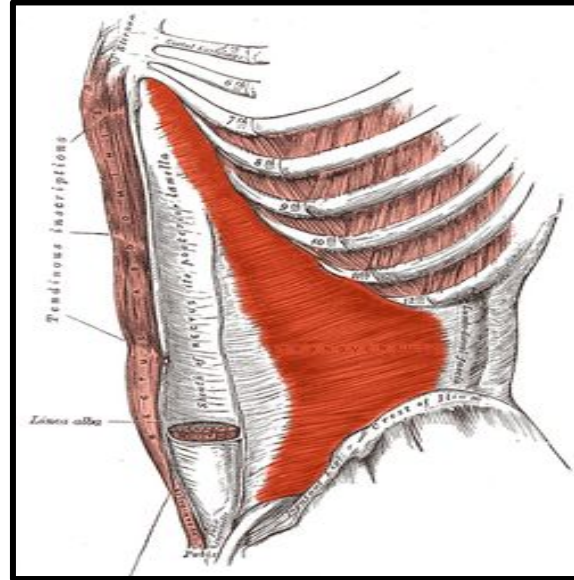
the white medline in abdomen is linea alba
mentioned in girls slides



ANTERIOR ABDOMINAL WALL

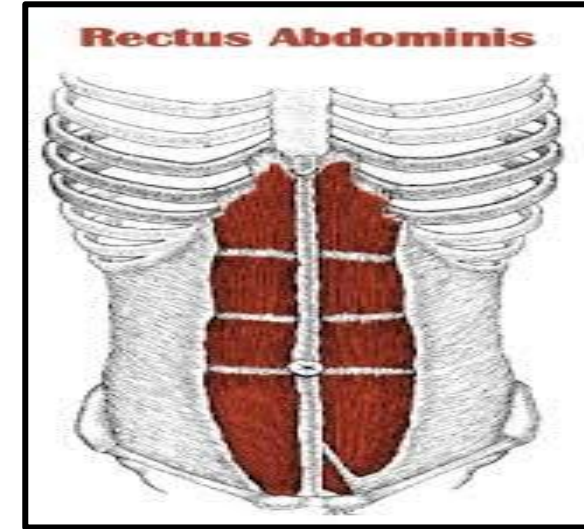
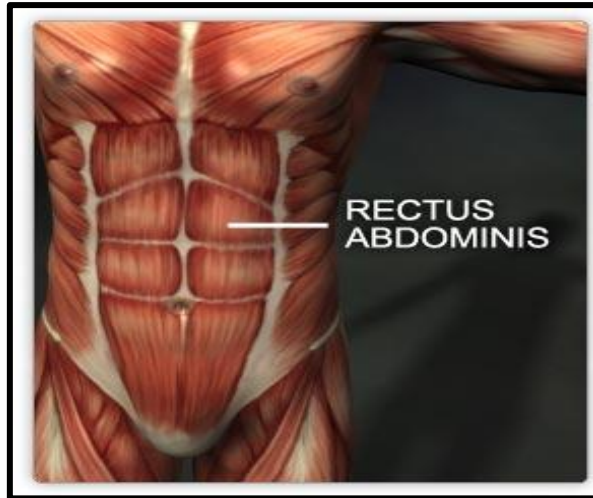
Transversus abdominis
(inner layer)

Direction: transverse



Rectus abdominis

Direction: vertical



ANTERIOR ABDOMINAL WALL

- ❖ Is formed of **3 layers of muscles of fibers running in different directions** (to increase strength of anterior abdominal wall)
- ❖ The 3 muscles form a sheath in which a fourth muscle lies (rectus abdominis)
- ❖ Muscles are attached to: sternum, costal cartilages and ribs + hip bones
- ❖ The aponeurosis of the 3 muscles on both sides fuse in the midline to form **linea alba**
- ❖ **Action (during forced expiration):** Compression of abdominal viscera to help in ascent of diaphragm (during forced expiration)
- ❖ **Nerve supply:** lower intercostal nerves (T7 – T11), subcostal nerve (T12) and first lumbar nerve.



SUMMARY OF RESPIRATORY MOVEMENTS

Inspiration

▪ Quiet Inspiration (active)

- **Contraction (Descent) of diaphragm**
 - Increase in **vertical** diameter
- **Elevation of ribs** (external intercostal)
 - Increase in:
 - ❖ **anteroposterior** diameter
 - ❖ **lateral** diameter

▪ Forced Inspiration (active)

Accessory muscles of inspiration:

1. Pectoralis major
2. Scalene muscles

Expiration

▪ Quiet Expiration (passive)

1. Elastic recoil of lung
2. Relaxation of diaphragm & external intercostal

▪ Forced Expiration (active):

- **Contraction of anterior abdominal wall muscles**
 - Compression of abdominal viscera
 - Ascent of diaphragm
- **Depression of ribs** (rest of intercostal muscles)





Quiz:

<https://www.onlineexambuilder.com/muscles-involved-in-respiration/exam-56543>

هذا العمل إجتهد من طلاب و طالبات
إن أصبنا فمن الله وإن أخطأنا فمن أنفسنا ومن الشيطان

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