



Human Anatomy - 1st year 2020-2021



Muscles Of chest wall

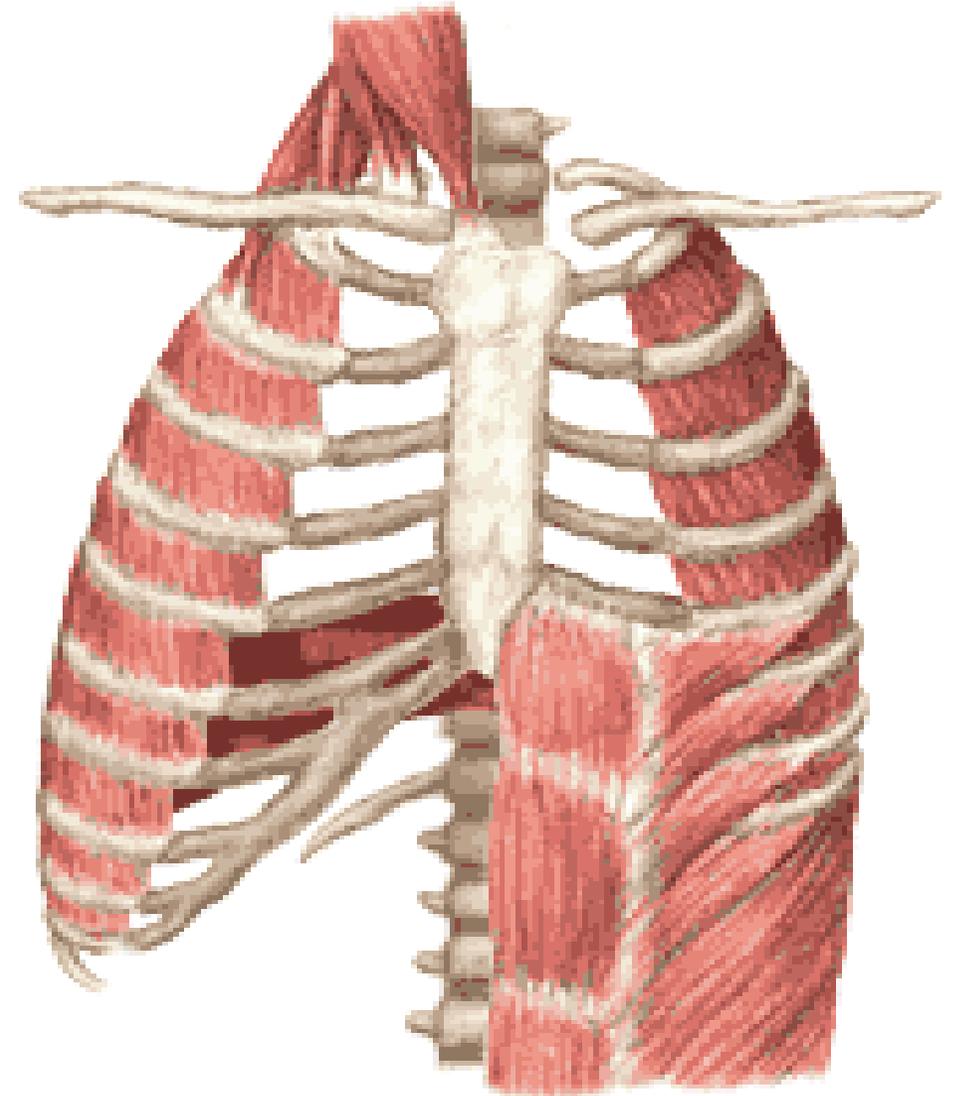
Lecture (2)

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Learning objective

- 1. Define intercostal spaces**
- 2. List the contents of intercostal space**
- 3. Describe Intercostal muscles**
- 4. Define neurovascular bundle**
- 5. Clinical notes regarding intercostal spaces**
- 6. Other muscles of thoracic wall**



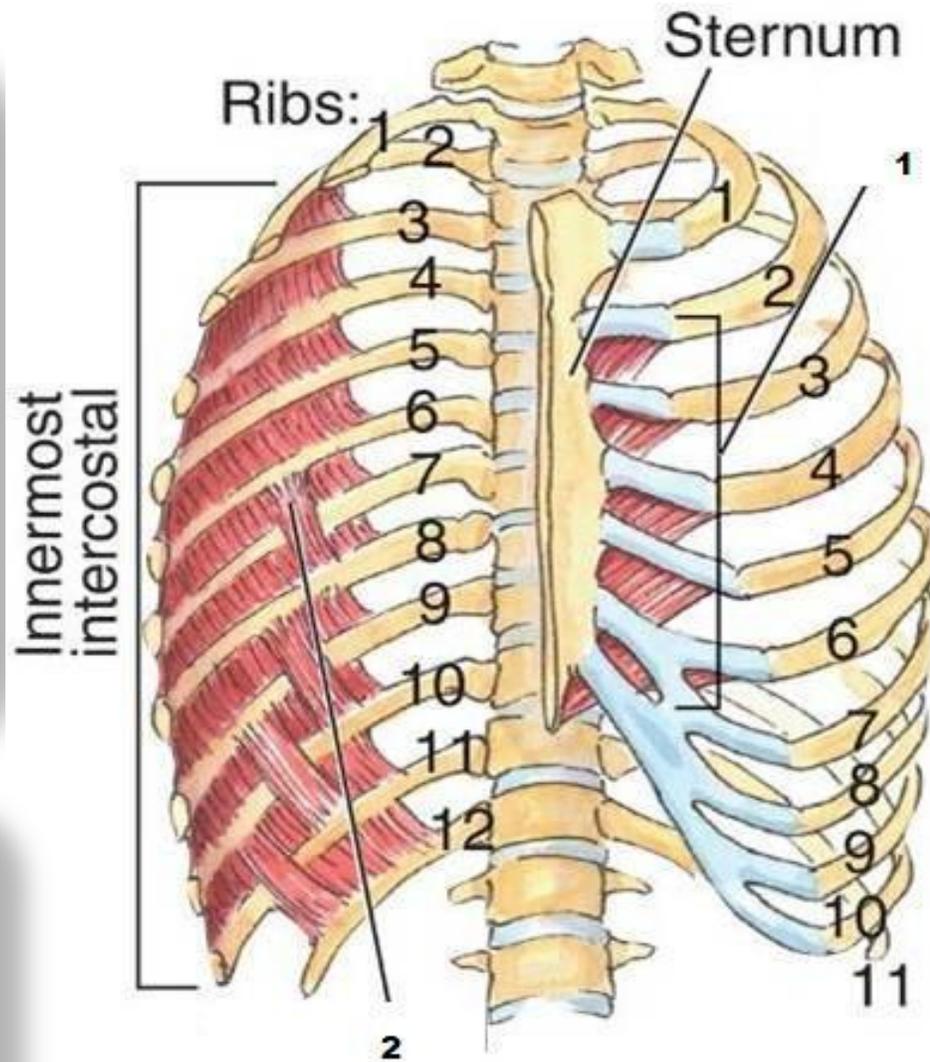
Intercostal Space

Definition : It is the space •
between two ribs.

There are **11** intercostal •
spaces on each side.

Each space contains:

1. Intercostal muscles
2. Intercostal neurovascular bundle
3. Lymphatics

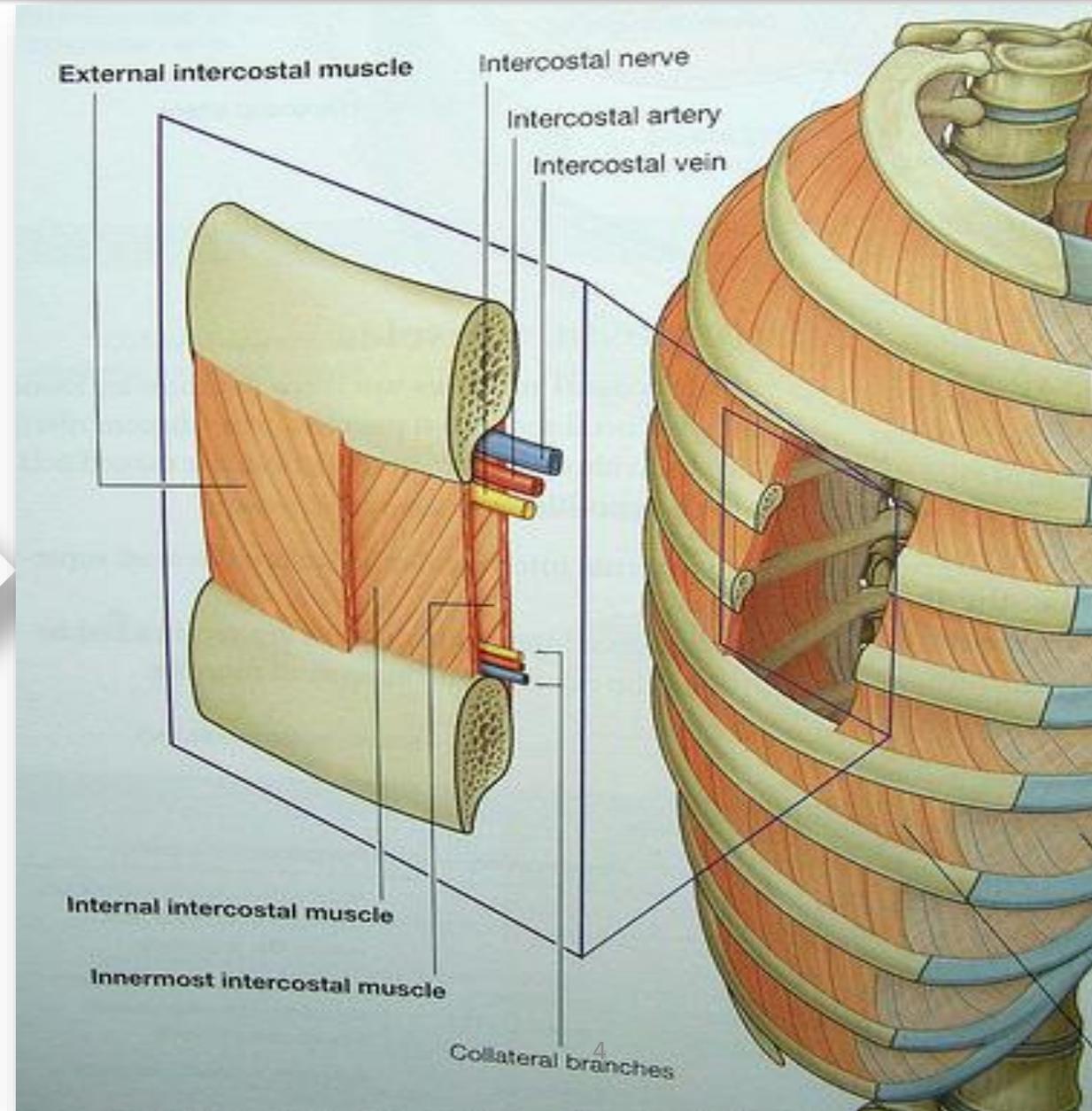


Anterior view

Intercostal Muscles

Each intercostal space has three muscles:

- ***External Intercostal***
- ***Internal Intercostal***
- ***Innermost Intercostal***



External Intercostal Muscle

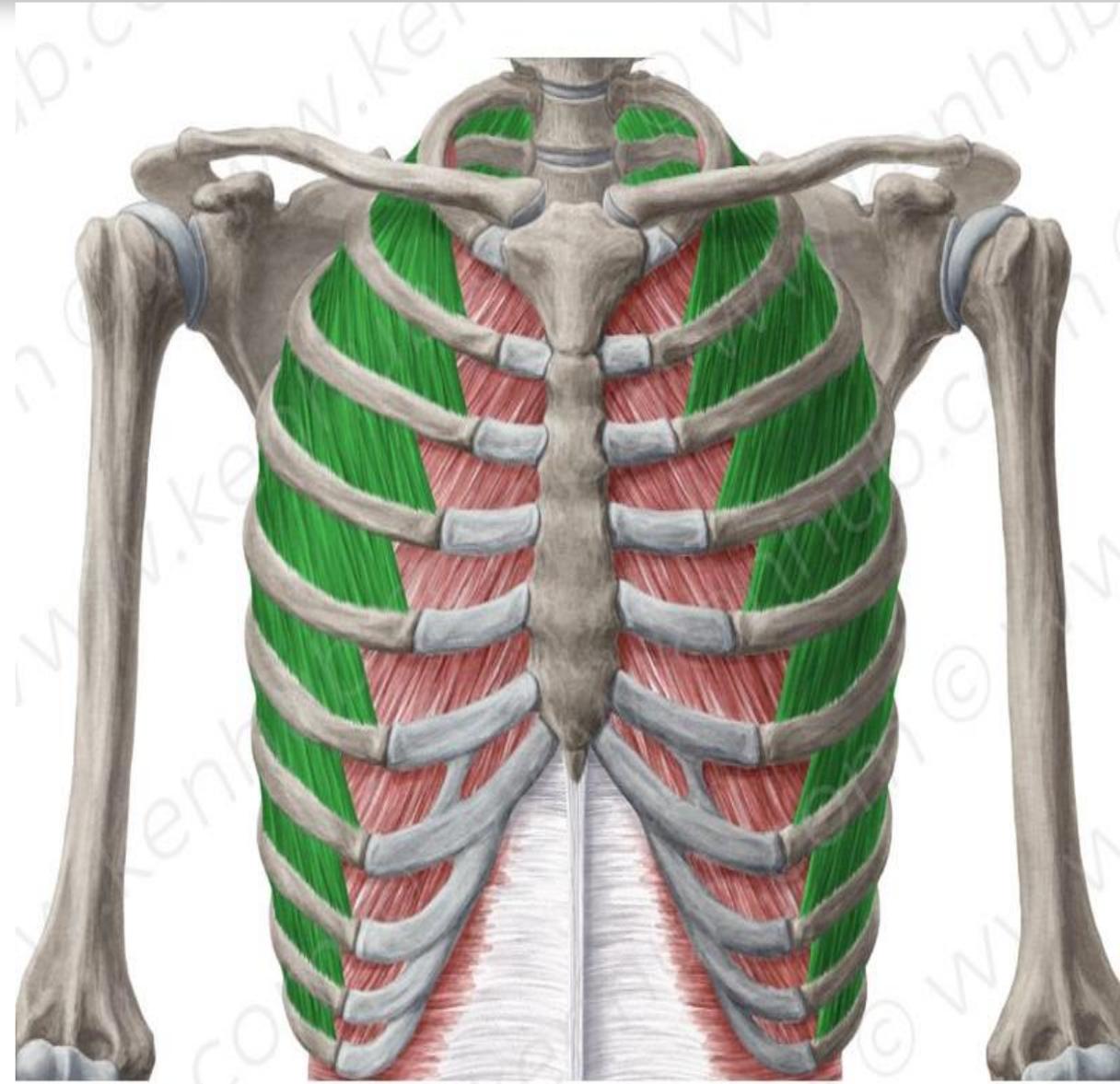
The superficial layer consisted of 11 pairs •
,run downward and forward

Originates : from lower border of one rib. •

Inserted : into the superior border of the •
rib below.

Each one occupies its intercostal space •
starting from the tubercles of
ribs posteriorly, to the costochondral
junctions anteriorly and replaced
anteriorly by aponeuroses called by
external (anterior) intercostal
membrane.

Actions: It is inspiratory muscle .It •
Elevates the ribs, increasing the thoracic
volume



Internal Intercostal Muscle

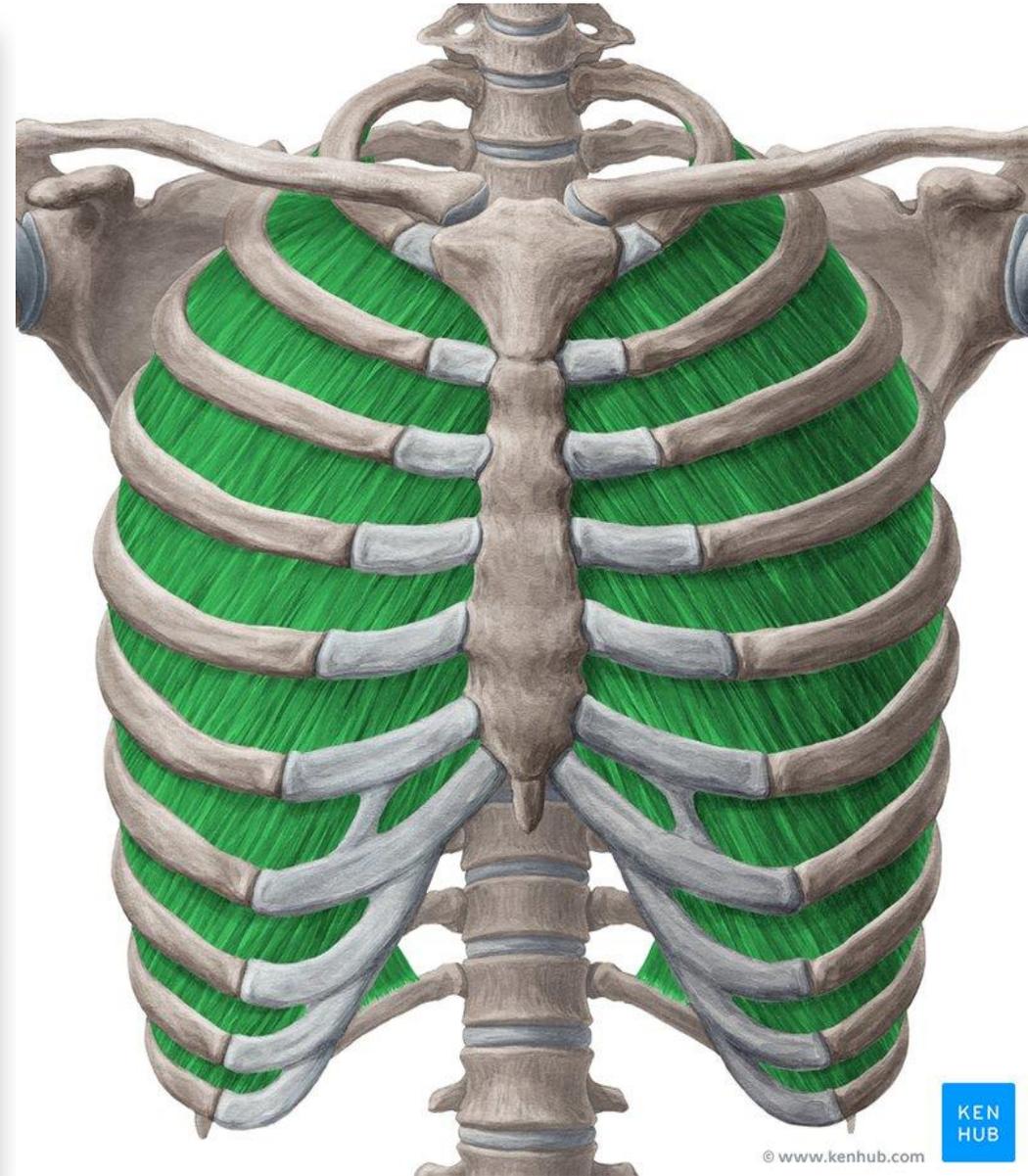
The intermediate layer consisted of flat 11 pairs •
muscles lie deep to the external intercostals.

Originate from subcostal groove of rib above •

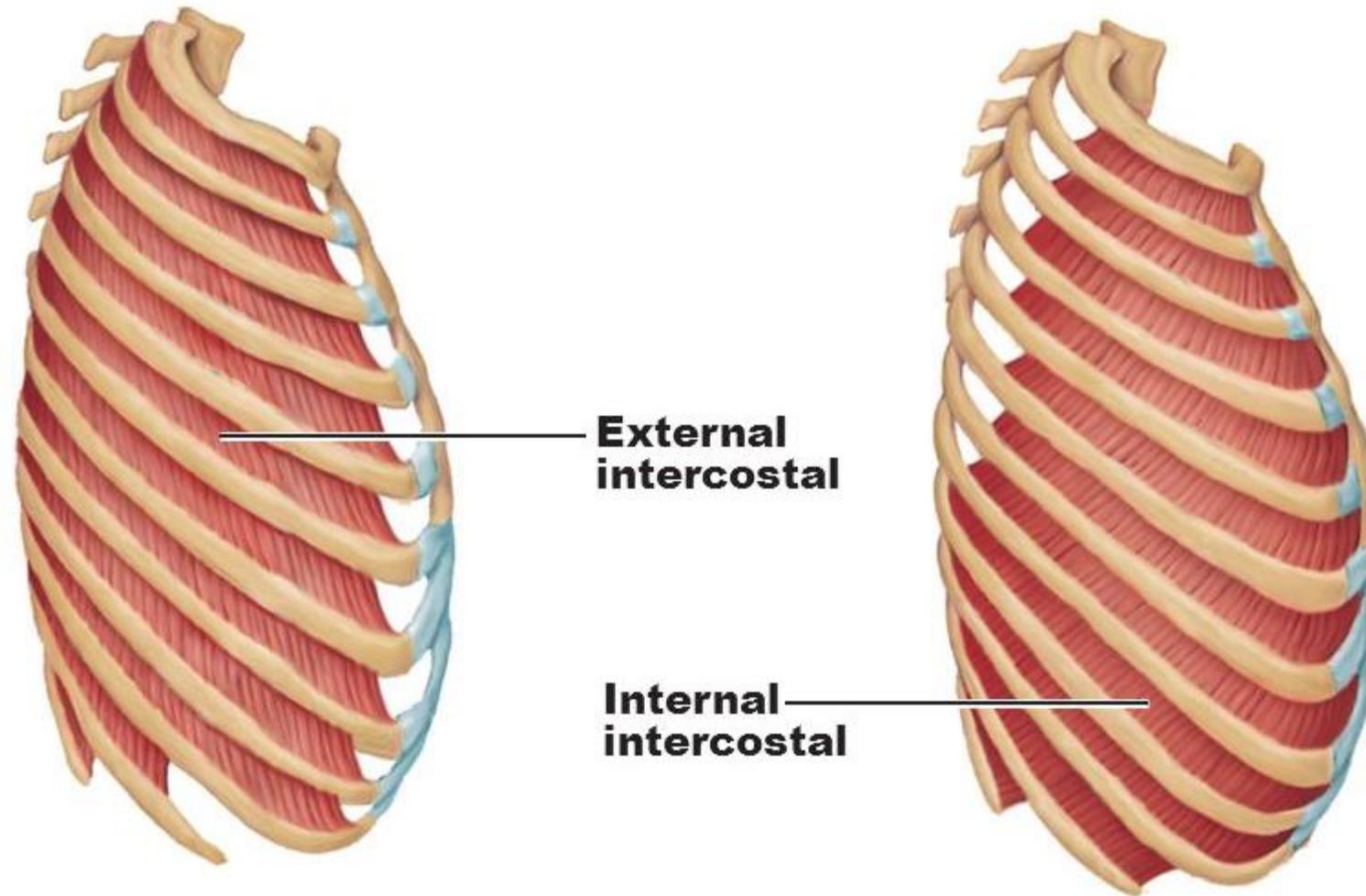
Inserted into the superior border of the rib •
below.

Each one occupies its intercostal space starting •
from the lateral border of sternum anteriorly to
the angle of ribs posteriorly and replaced at the
level of the posterior angle of rib, by an
aponeurosis called posterior or internal
intercostal membrane.

Actions: It is an expiratory muscle its contraction •
reduces the thoracic volume by depressing the
ribcage.



Intercostal Muscles



Innermost Intercostal Muscle

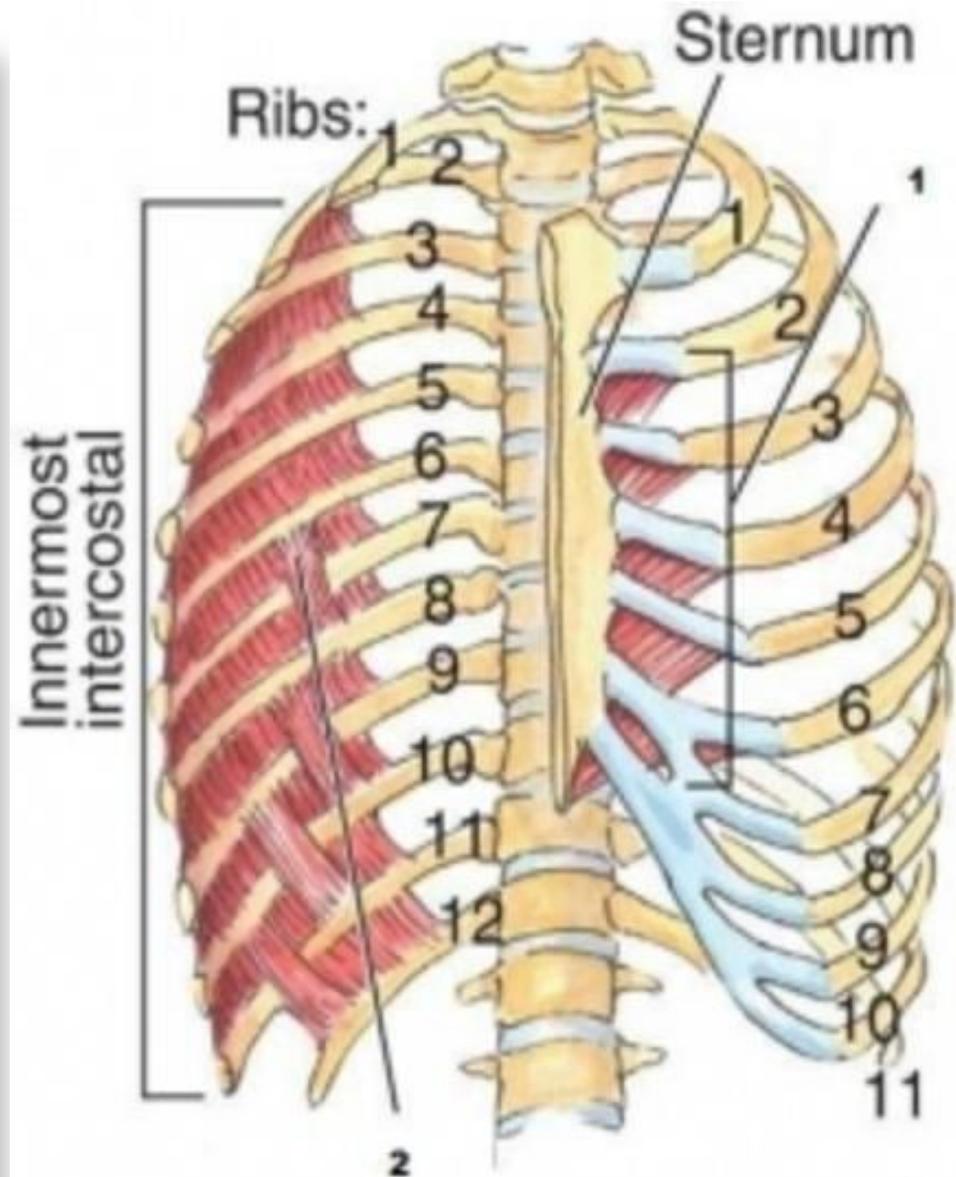
These muscles are the deepest of the intercostal muscles, and are similar in structure to the internal intercostals muscle.

Originate :from the costal groove and •
inserted : into the superior border of the rib below.

They are separated from the internal •
intercostals by the intercostal neurovascular bundle and are found in the most lateral portion of the intercostal spaces.

It is incomplete layer of muscle may cross •
more than one intercostal spaces

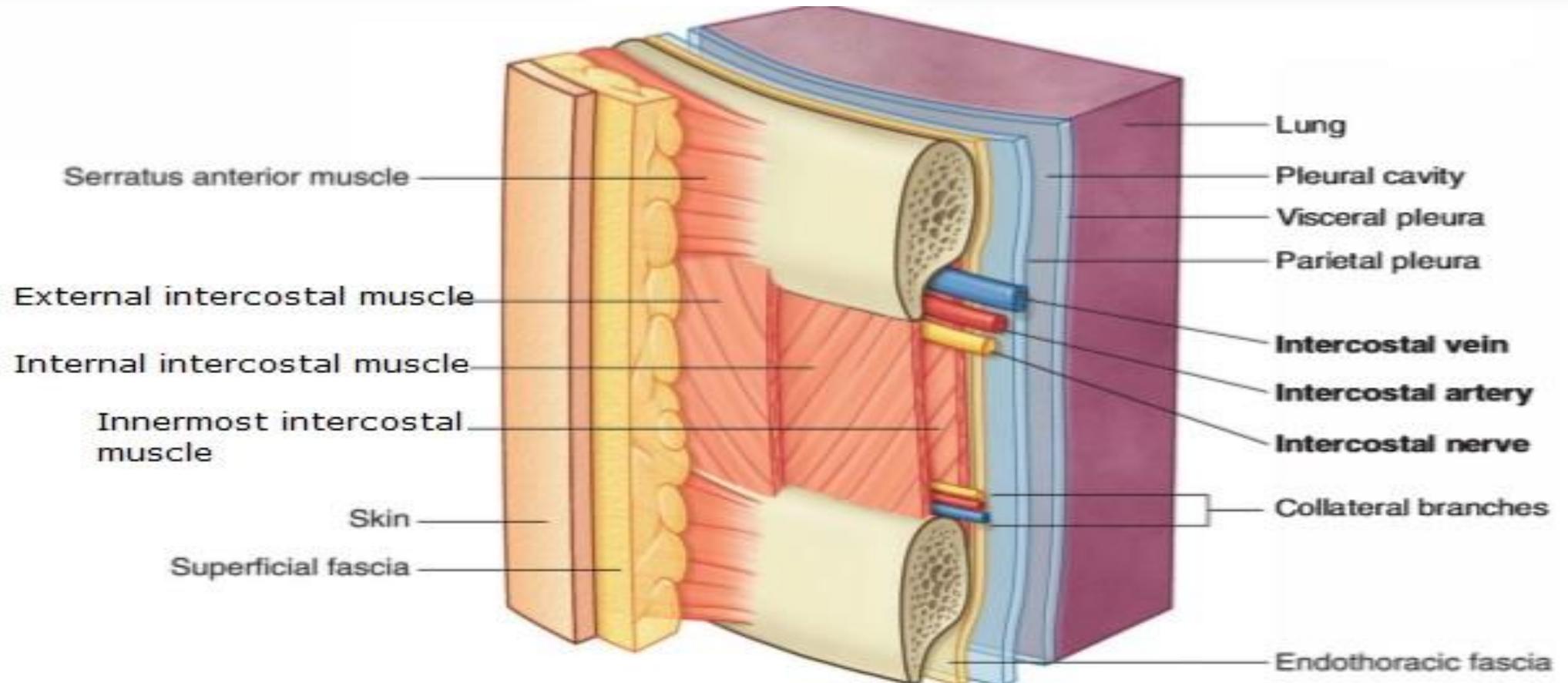
Actions: It is expiratory muscle ,its •
contraction elevates the rib .



Blood and nerve supply

Innervation:
Intercostal nerves (T1-T11)

Blood supply by:
intercostal vessels

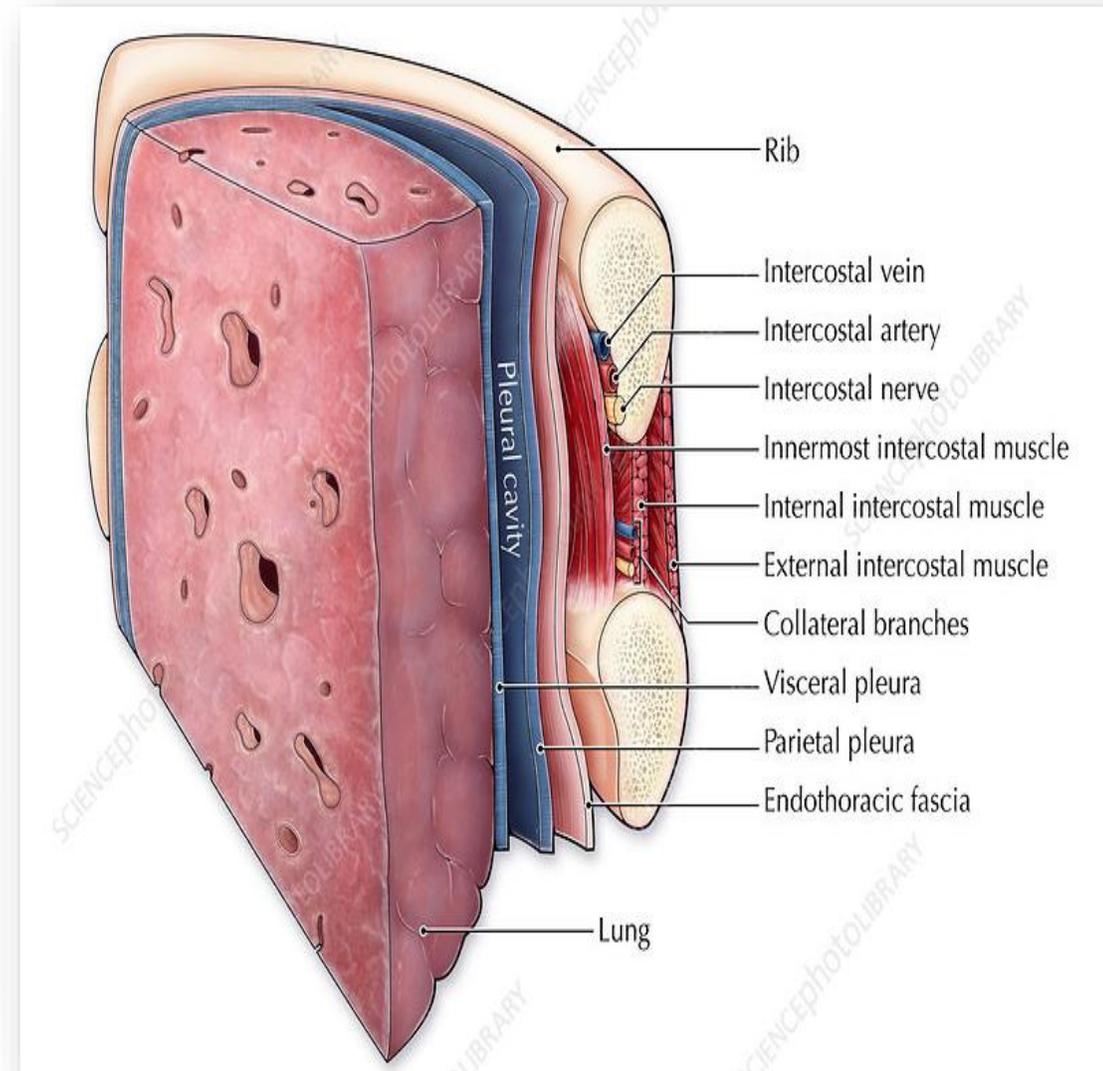


Endothoracic Fascia

The endothoracic fascia is the layer of loose connective tissue lines the wall of the chest.

Lies deep to the intercostal spaces and ribs, separating these structures from the underlying pleura.

*Extends over the apex of the pleura as the supra pleural membrane, and forms a thin layer between the diaphragm and the pleura.

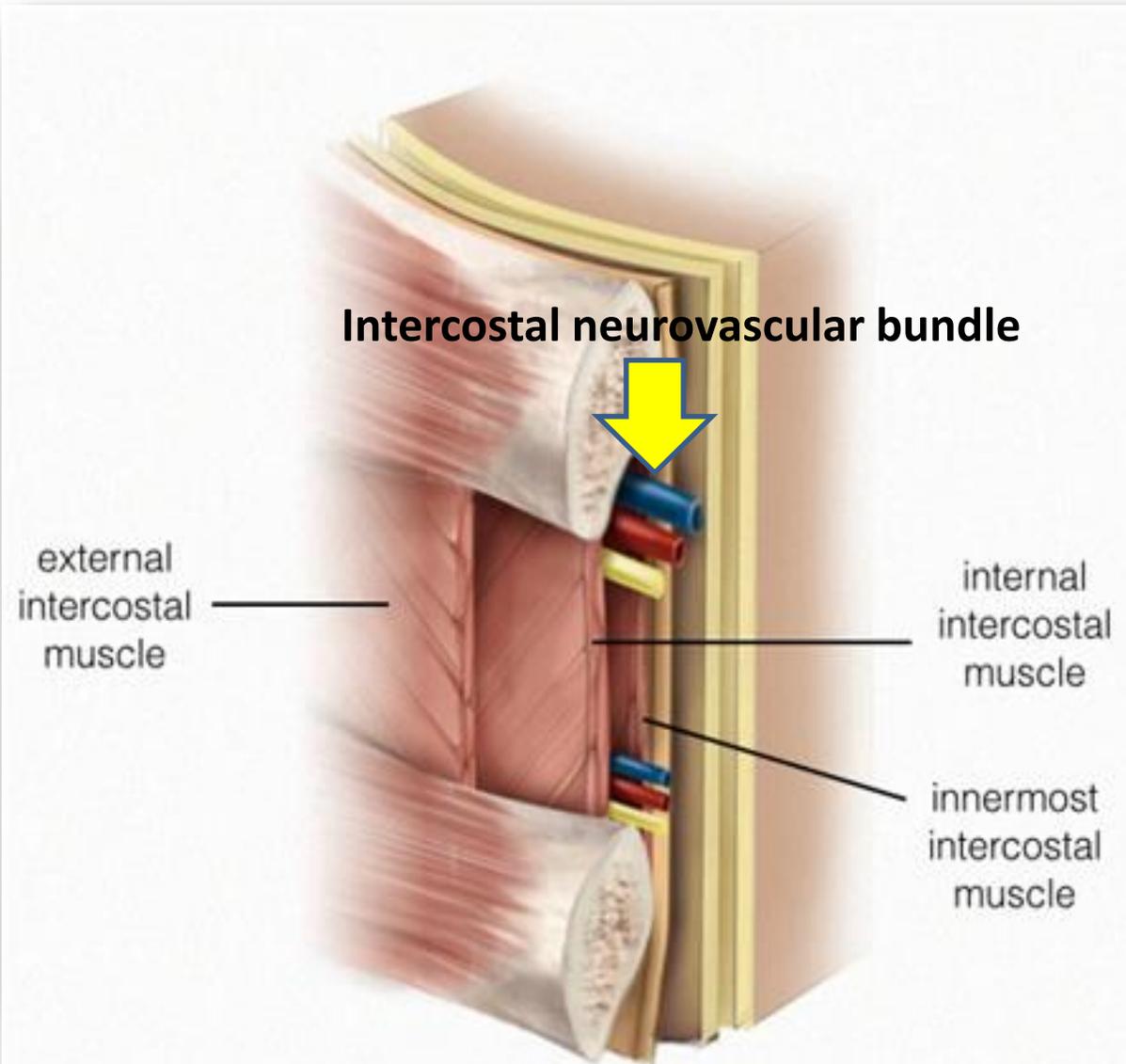


Intercostal Neurovascular Bundle

***The neurovascular bundle**, located in the costal groove between the **internal intercostal** & innermost intercostal Muscles .

***Arranged from above downward as (intercostal Veins ,Artery and nerve)** .

***Supplies much of the innervation and vascular supply to the thoracic wall.**



Intercostal Nerves

Arise from the anterior rami of the thoracic spinal nerves from T1 to T11

T1 supply fibers to the upper limb and and cutaneous supply to chest.

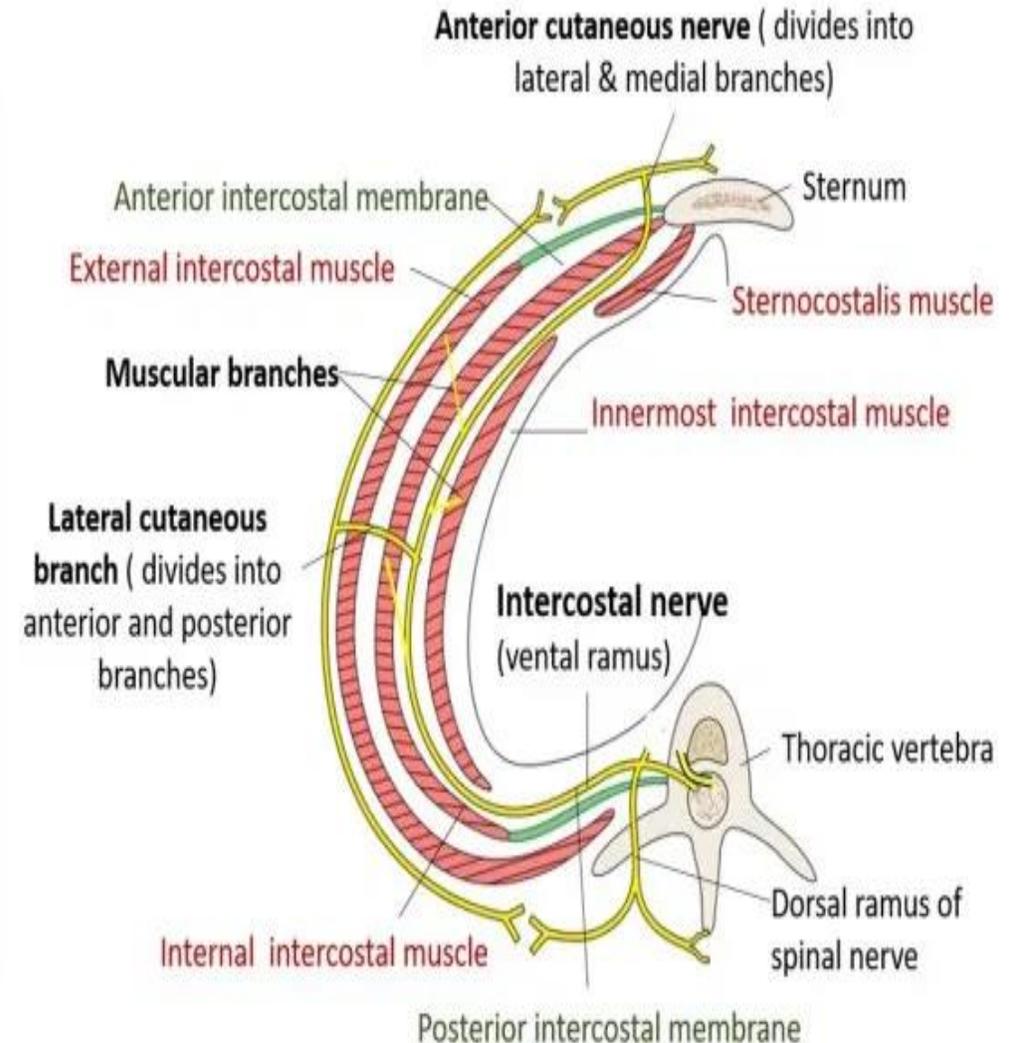
T2-T6 are limited in their distribution to the wall of the thorax.

T7-T11 supply the walls of the thorax and abdomen.

The 7th intercostal nerve terminates at the xiphoid process.

The T10 intercostal nerve terminates at the navel (umbilicus).

T12 (subcostal) thoracic is distributed to the abdominal wall and groin.

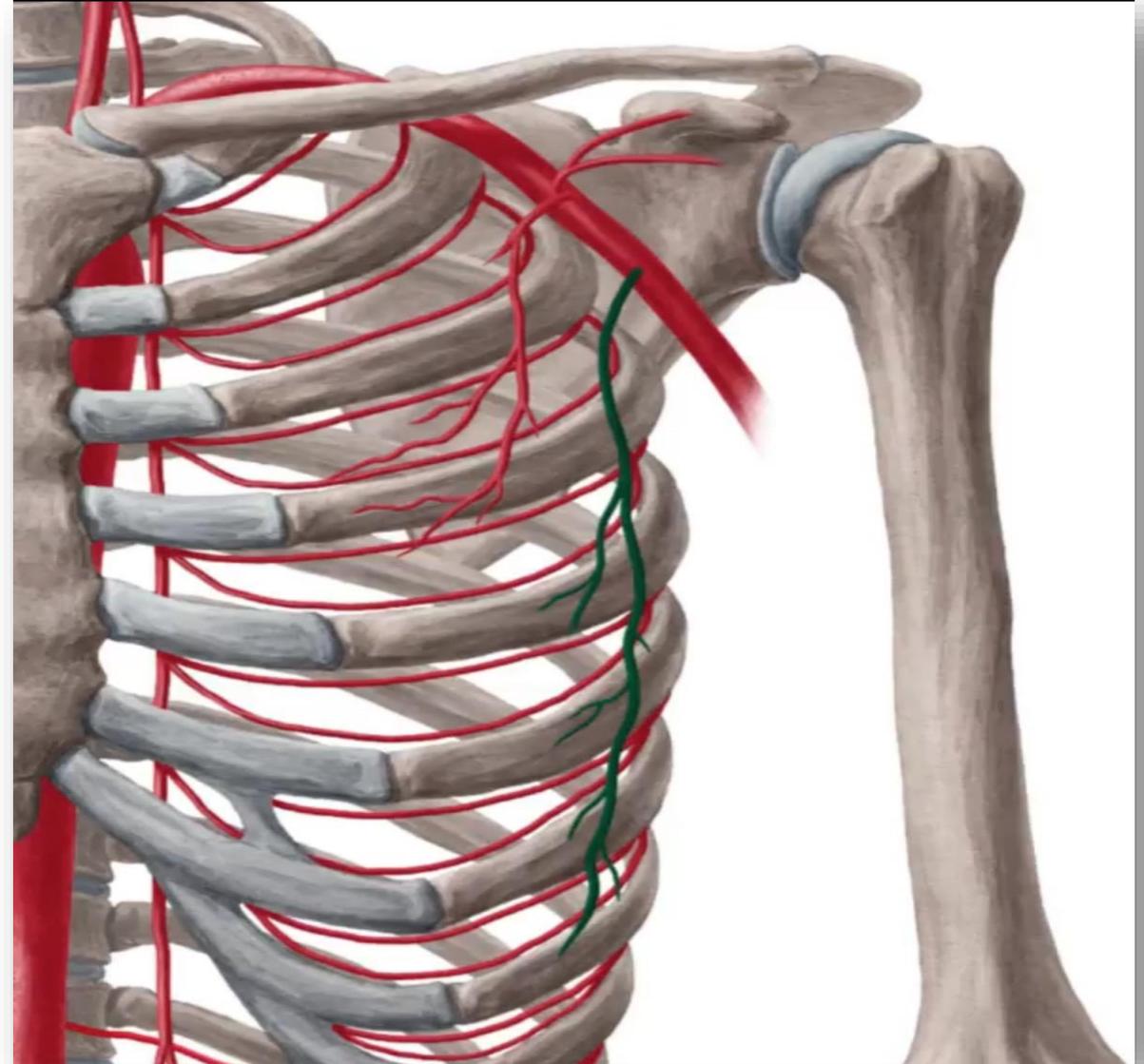


Intercostal Arteries

**Each intercostal space •
contains:**

**A single posterior & ■
Two anterior ■
intercostal arteries**

**Each artery gives off •
branches to the
muscles, skin, parietal
pleura breast.**

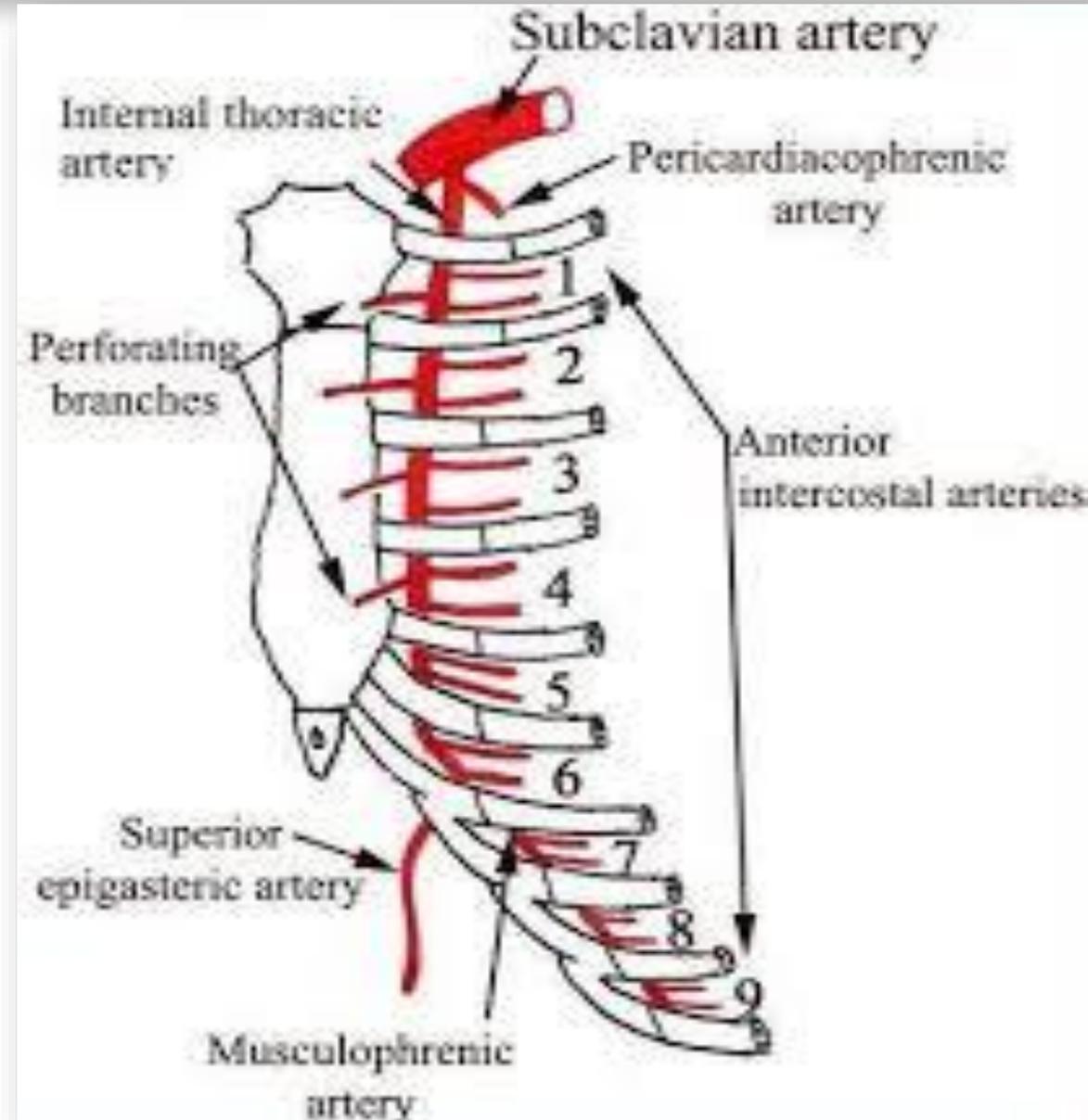


Anterior Intercostal Arteries

The upper six anterior intercostal arteries arise from the internal thoracic artery .

The lower five anterior intercostal arteries arise from the musculophrenic artery (one of the terminal branch of internal thoracic)

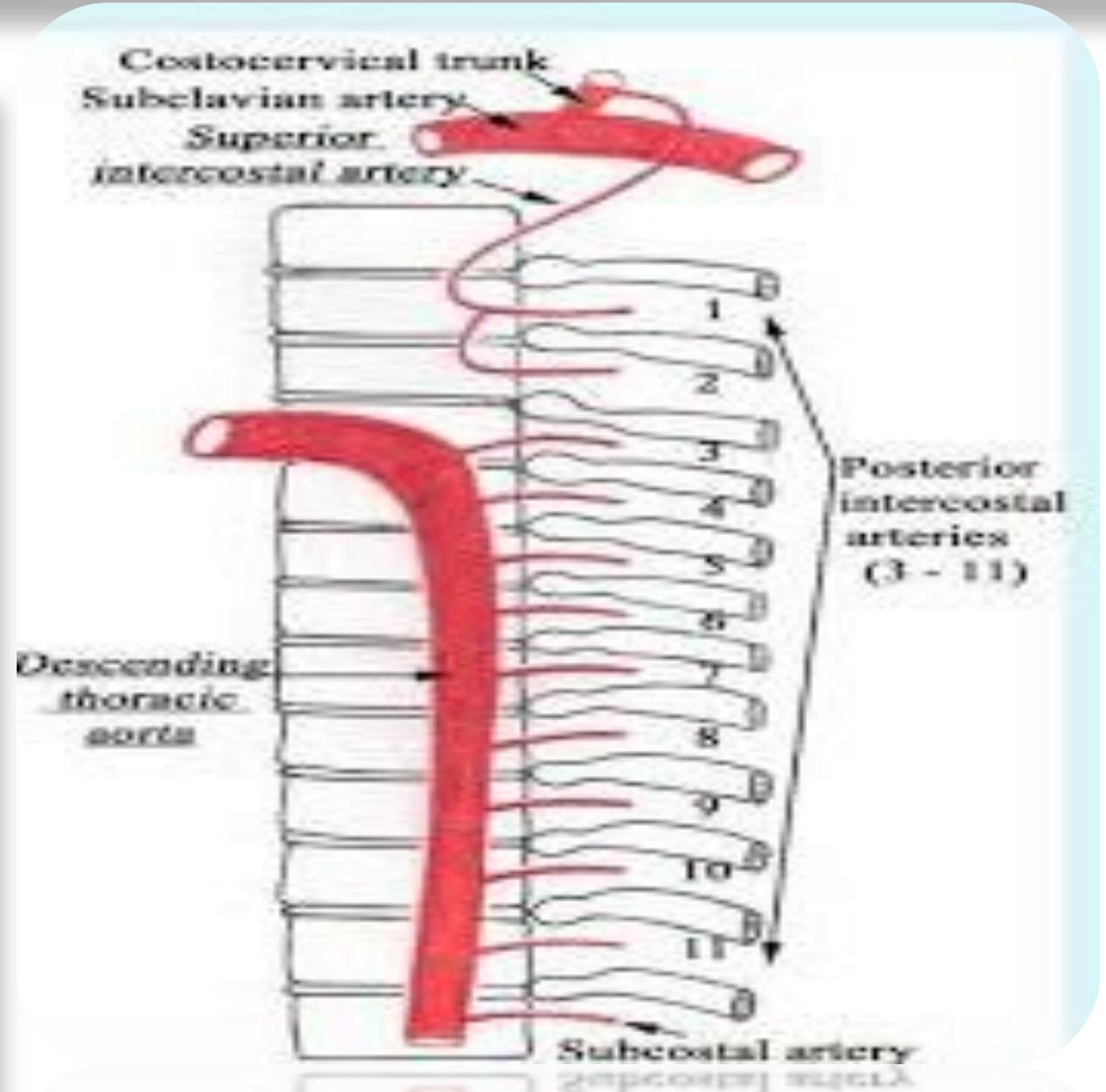
Form anastomosis with the posterior intercostal arteries.



Posterior Intercostal Arteries

***The upper two posterior intercostal arteries**, arise from the superior intercostal artery (a branch of costocervical trunk of the subclavian artery).

***The lower nine posterior intercostal arteries**, arise from the branches of thoracic aorta.

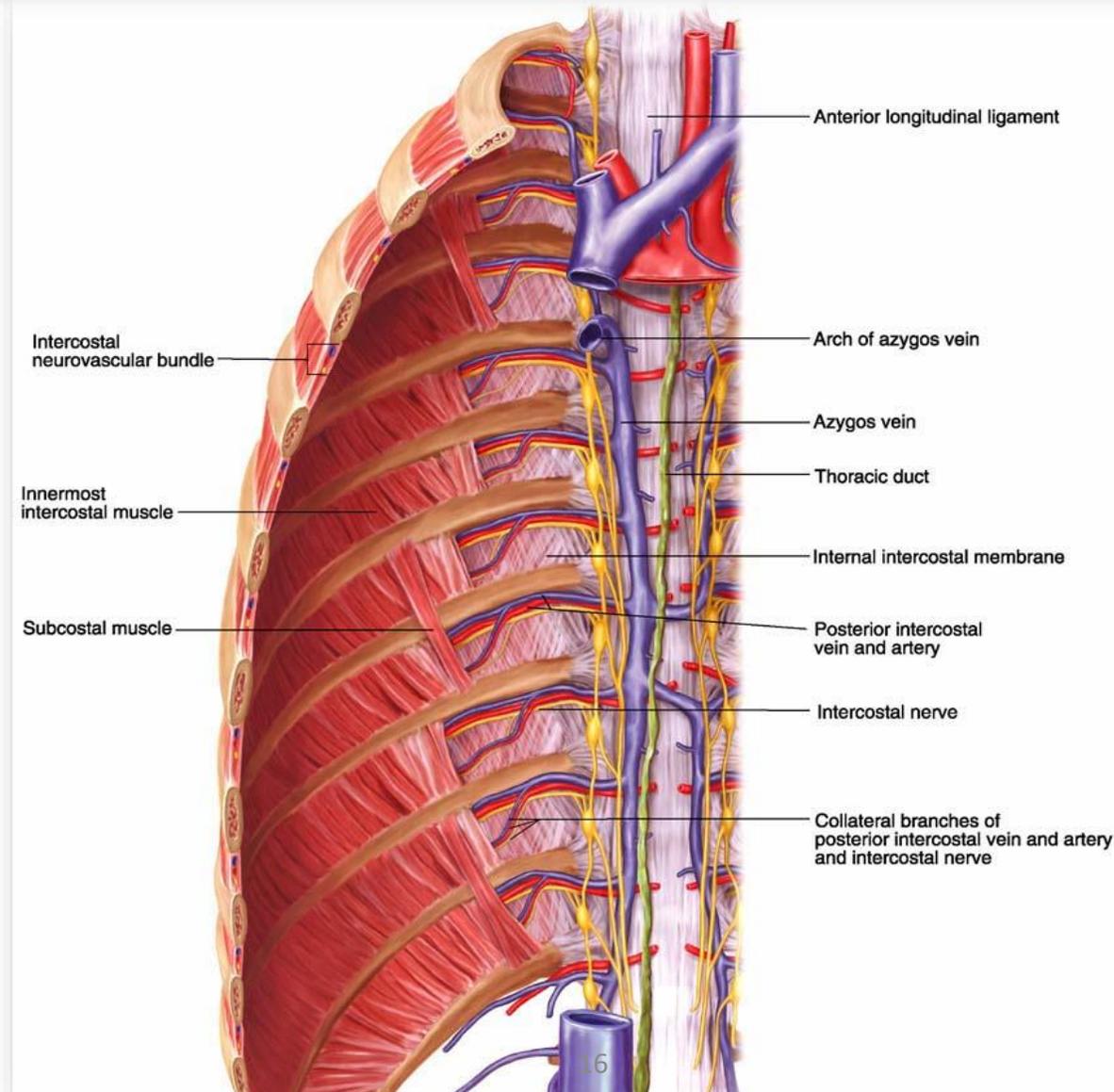


Intercostal Veins

**Intercostal veins •
Accompany intercostal
arteries and nerves.**

**Each space has •
posterior & anterior
intercostal veins**

**Eleven posterior •
intercostal and one
subcostal vein.**



Posterior Intercostal Veins

On right side:

In the first intercostal vein drains into the right brachiocephalic vein

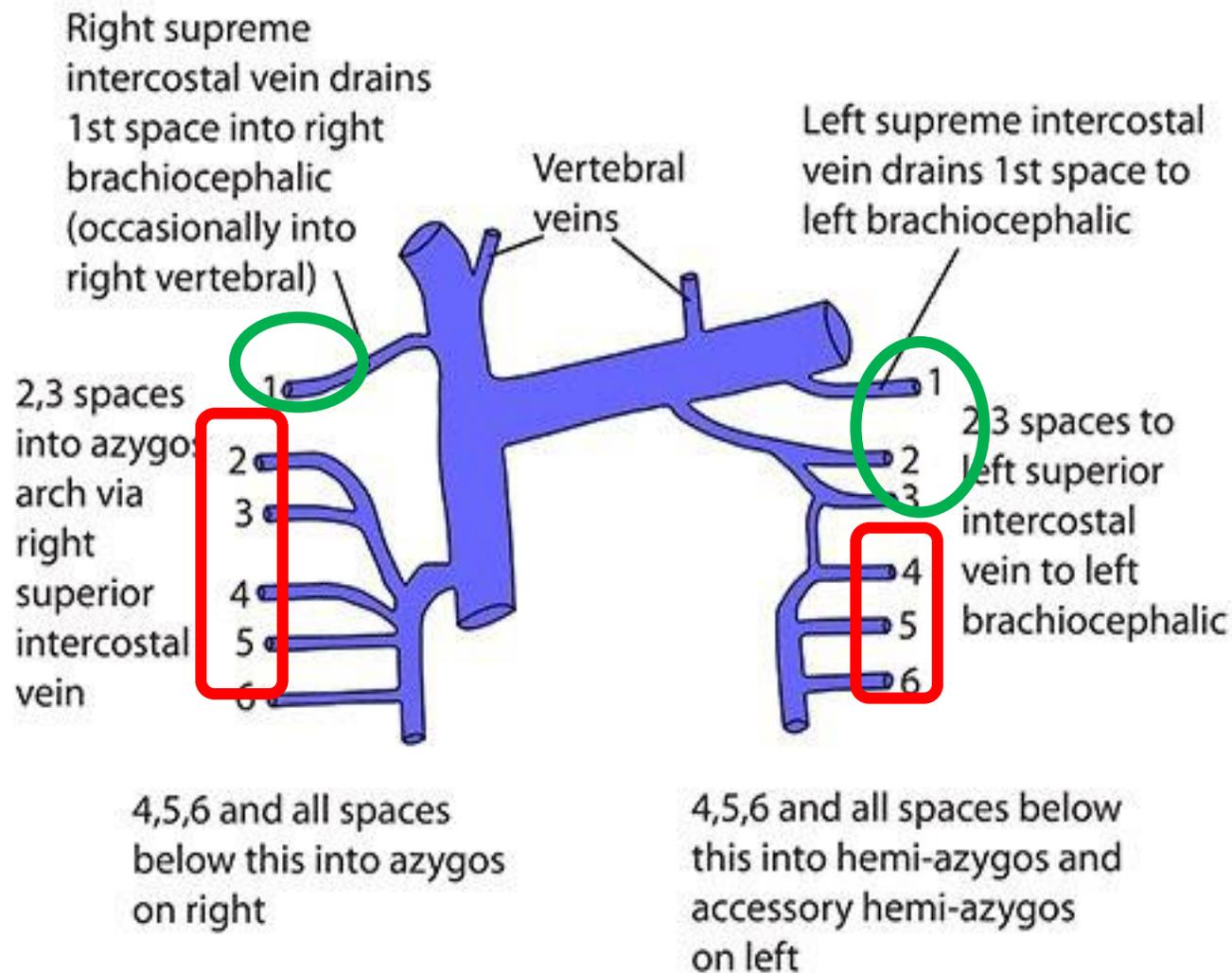
Veins of the intercostal spaces (2nd -11th) drain into the azygos vein

On left side:

The upper three intercostal vein drain into the left brachiocephalic vein.

Veins of intercostal spaces (4th -11th) drain into the hemiazygos and accessory hemiazygos veins, which drain into the azygos vein

VENOUS DRAINAGE OF INTERCOSTAL SPACES

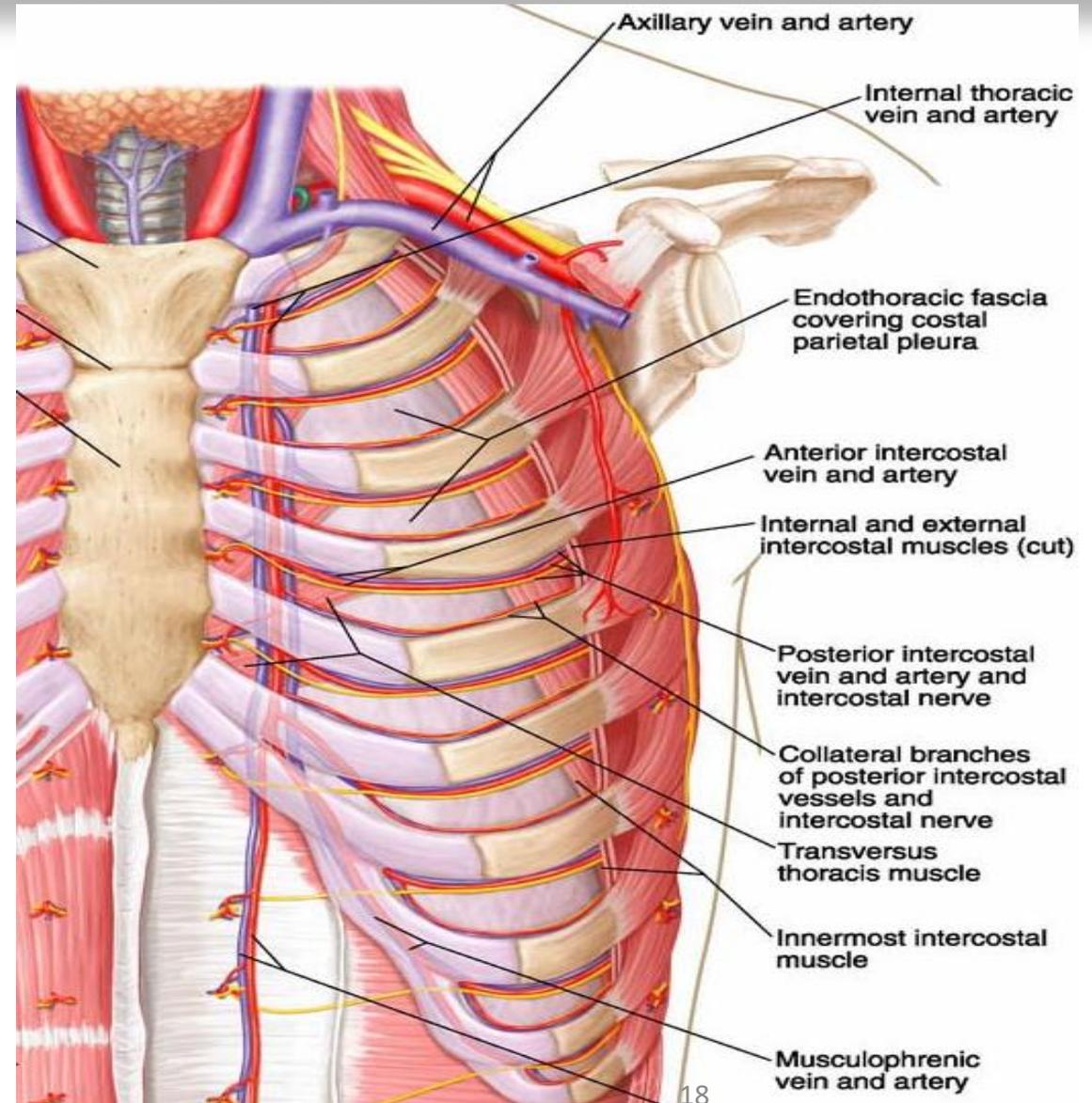


Anterior Intercostal Veins

***The upper six intercostal vein drain to** ⇒ **internal thoracic vein.**

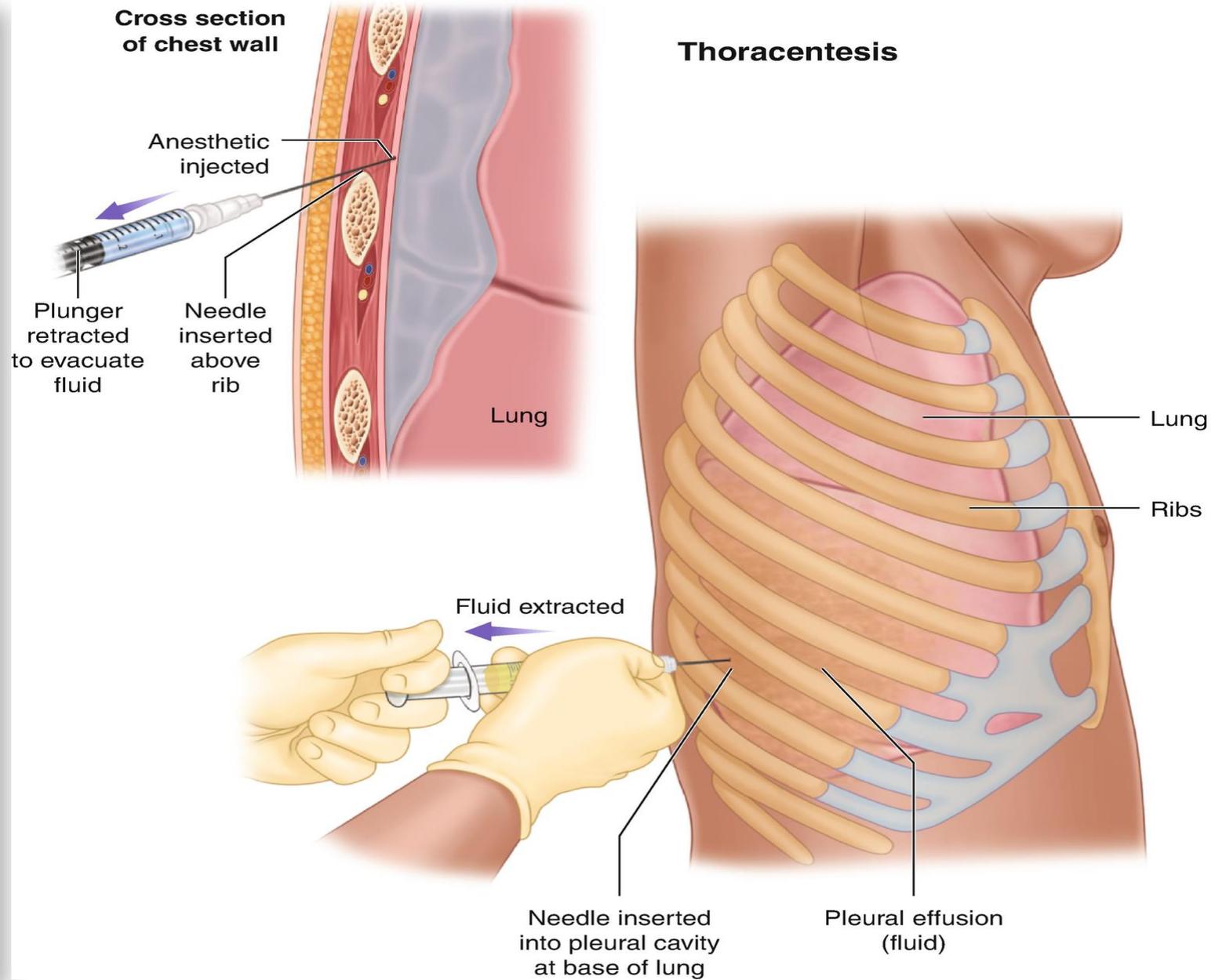
***The lower five intercostal veins drain to** ⇒ **musculophrenic vein (one of the tributary of internal thoracic vein).**

The internal thoracic vein drains into brachiocephalic vein .



Clinical notes

To obtain a sample of pleural fluid or drain pus or blood from the pleural cavity, the needle or drain is passed through the intercostal space just **above the upper border of the rib** to avoid the subcostal groove and the neurovascular bundle.

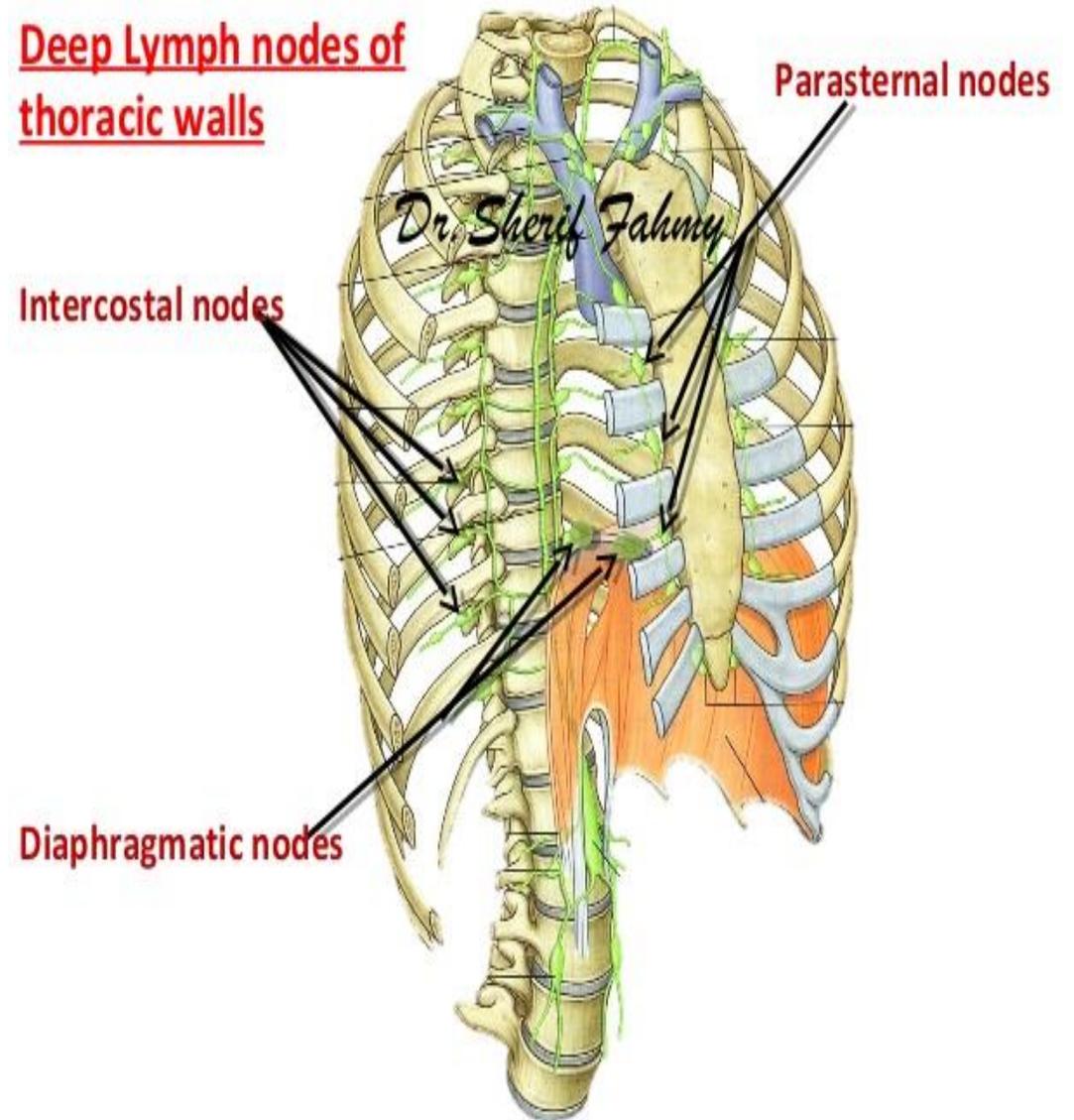


Lymphatics

Lymph vessels of the intercostal space conform to the general rule, that deep lymphatics follow arteries

Anteriorly drain into anterior intercostal nodes that lie along the internal thoracic artery

Posteriorly drain into posterior intercostal nodes that lie in the posterior mediastinum



Sternocostalis Muscle

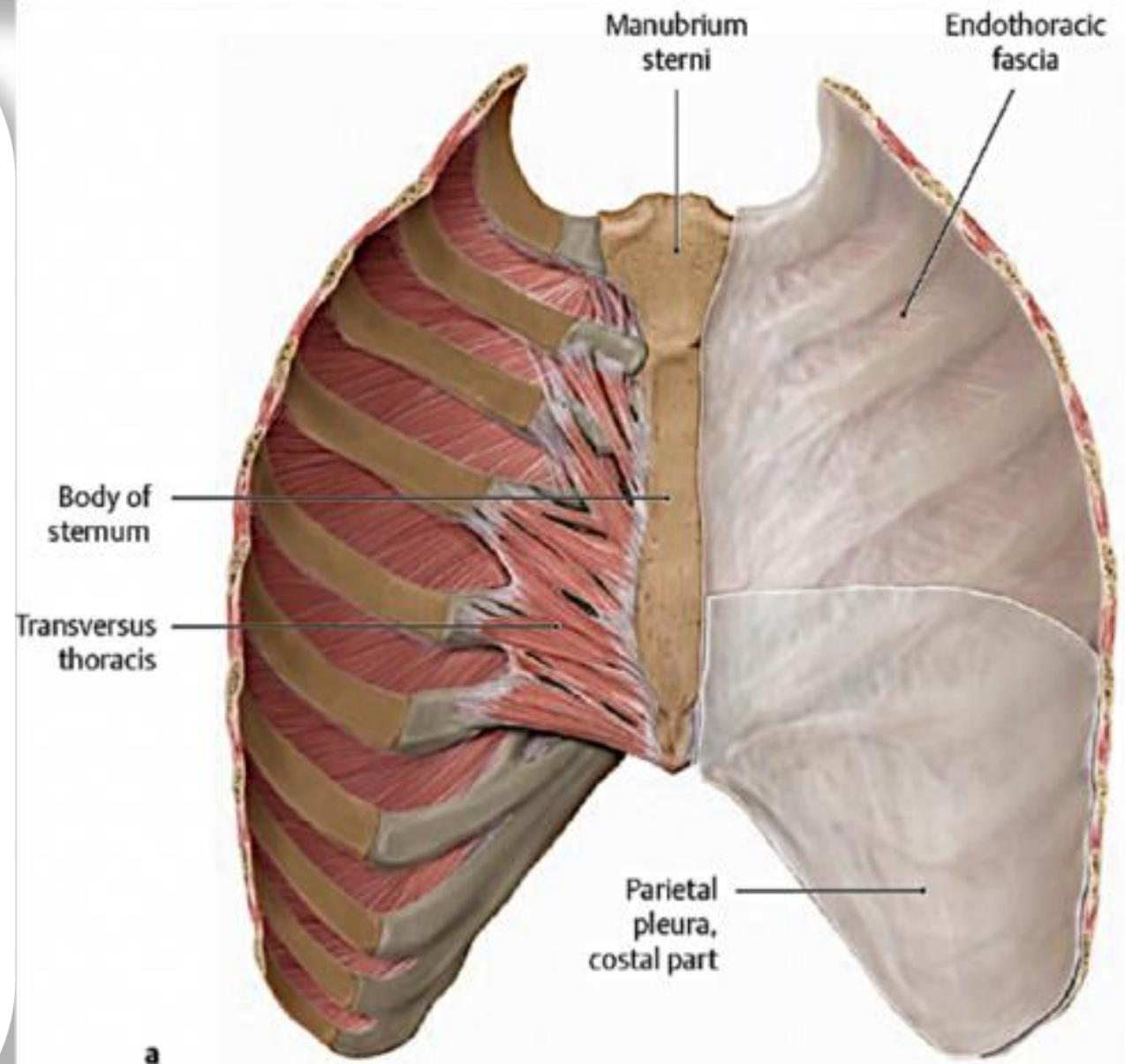
(Transversus thoracic) muscle has 4 to 5 slips .

Arises from inner surface of body of sternum and costal cartilages

Inserts into inner surface of costal cartilages from 2 to 6.

Actions: Weakly depress the ribs.

Innervation: Intercostal nerves (T2-T6)



Subcostalis Muscle

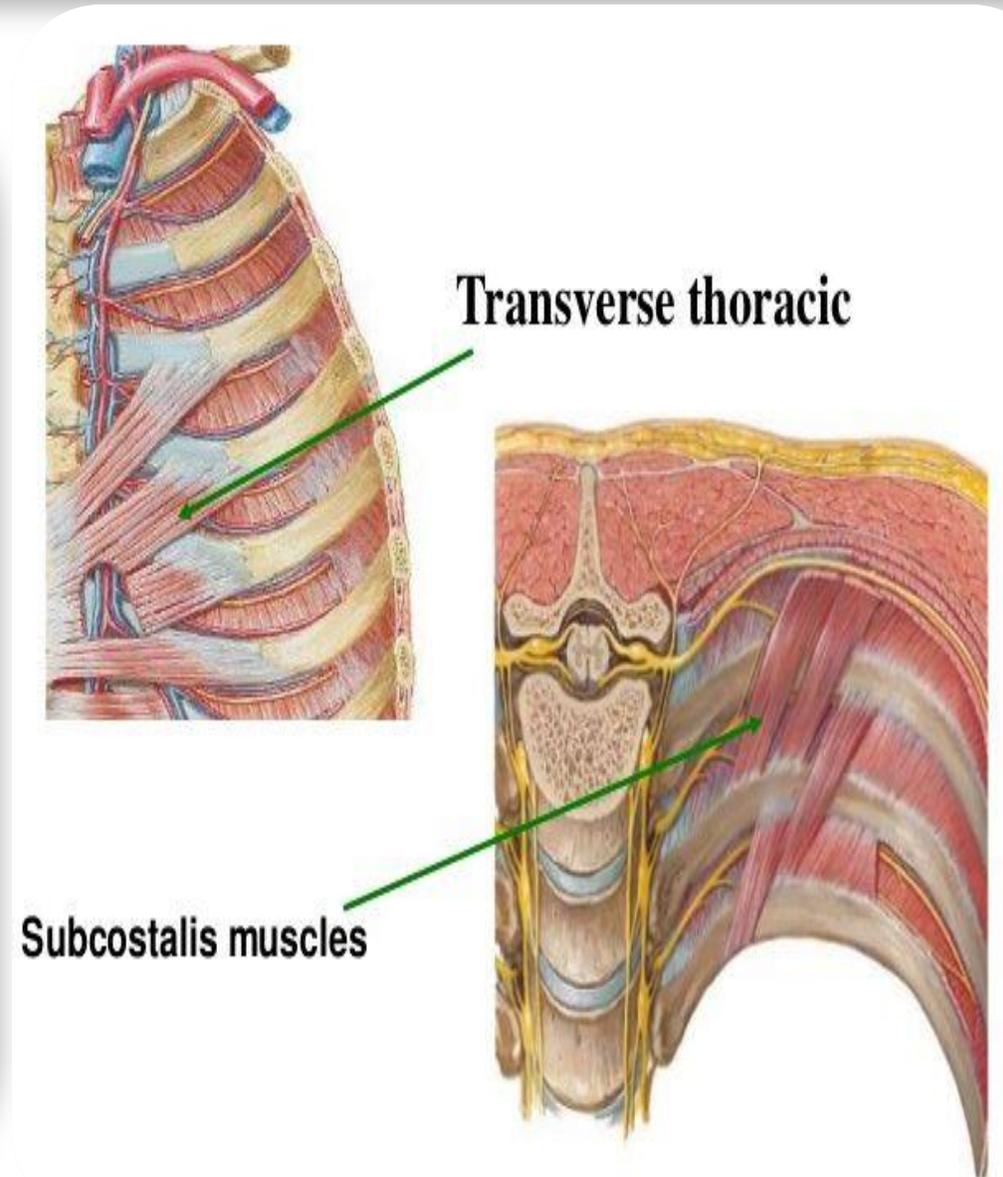
Thin muscles found on the inner surface of the posterior thoracic wall bridging two or three intercostal spaces.

originate from the inner surface of one rib near its posterior angle

Inserted to the inner surface of the second or third rib below its origin.

Action :Subcostal muscles belong to the accessory respiratory muscles, as their function is to depress the ribs during forced expiration .

Innervation: Intercostal nerves



Levator costarum Muscle

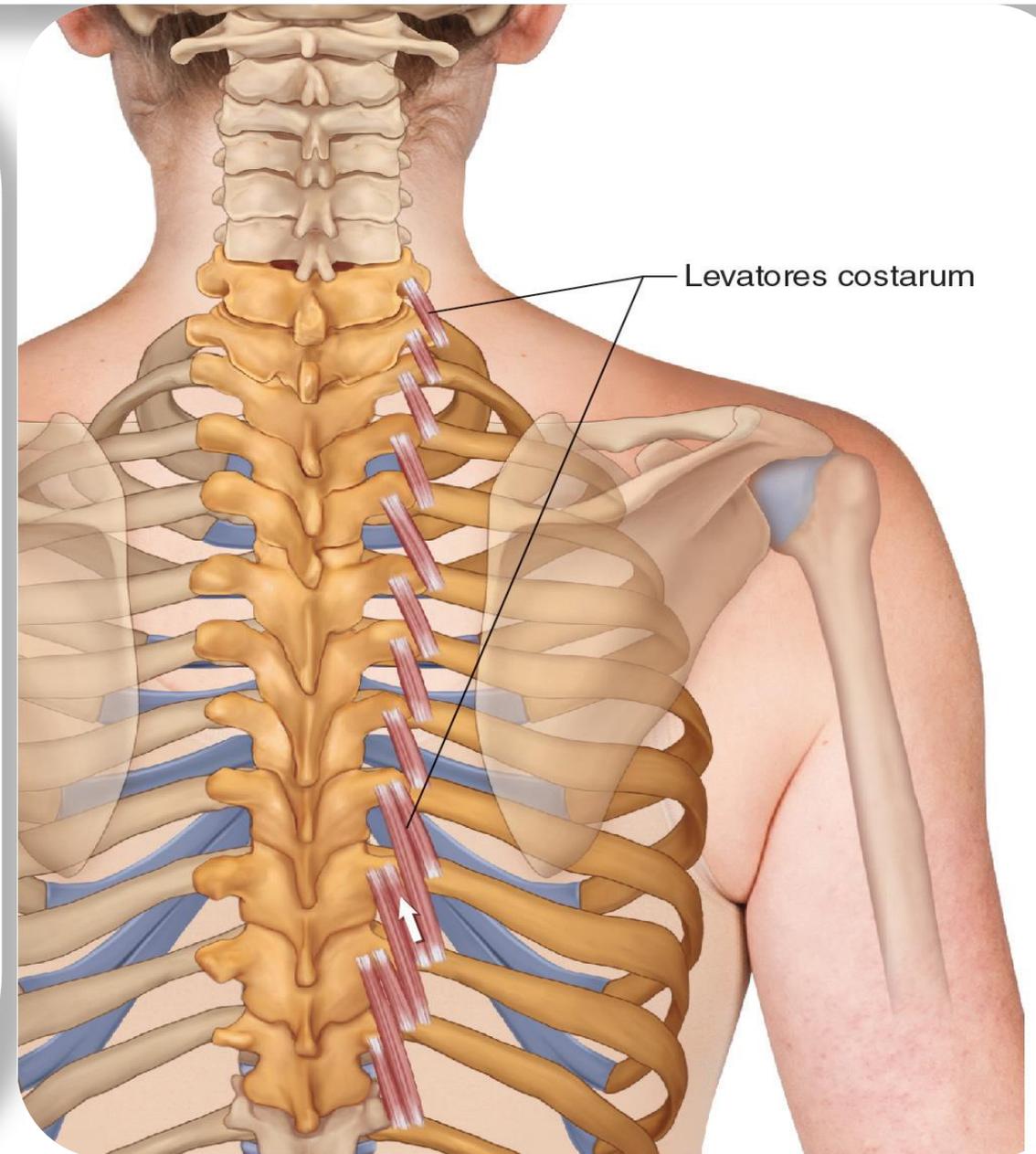
12 pairs of muscles arise from the ends of the transverse processes of the seventh cervical and upper eleven thoracic vertebrae

The apex of the triangle is attached to the transverse process of 7th cervical and upper 11 the thoracic vertebrae.

The base is attached to the upper border of rib below.

Nerve supply :C8-T11 (Intercostal nerves)

Action: Assists in elevation of the thoracic rib cage during inspiration .

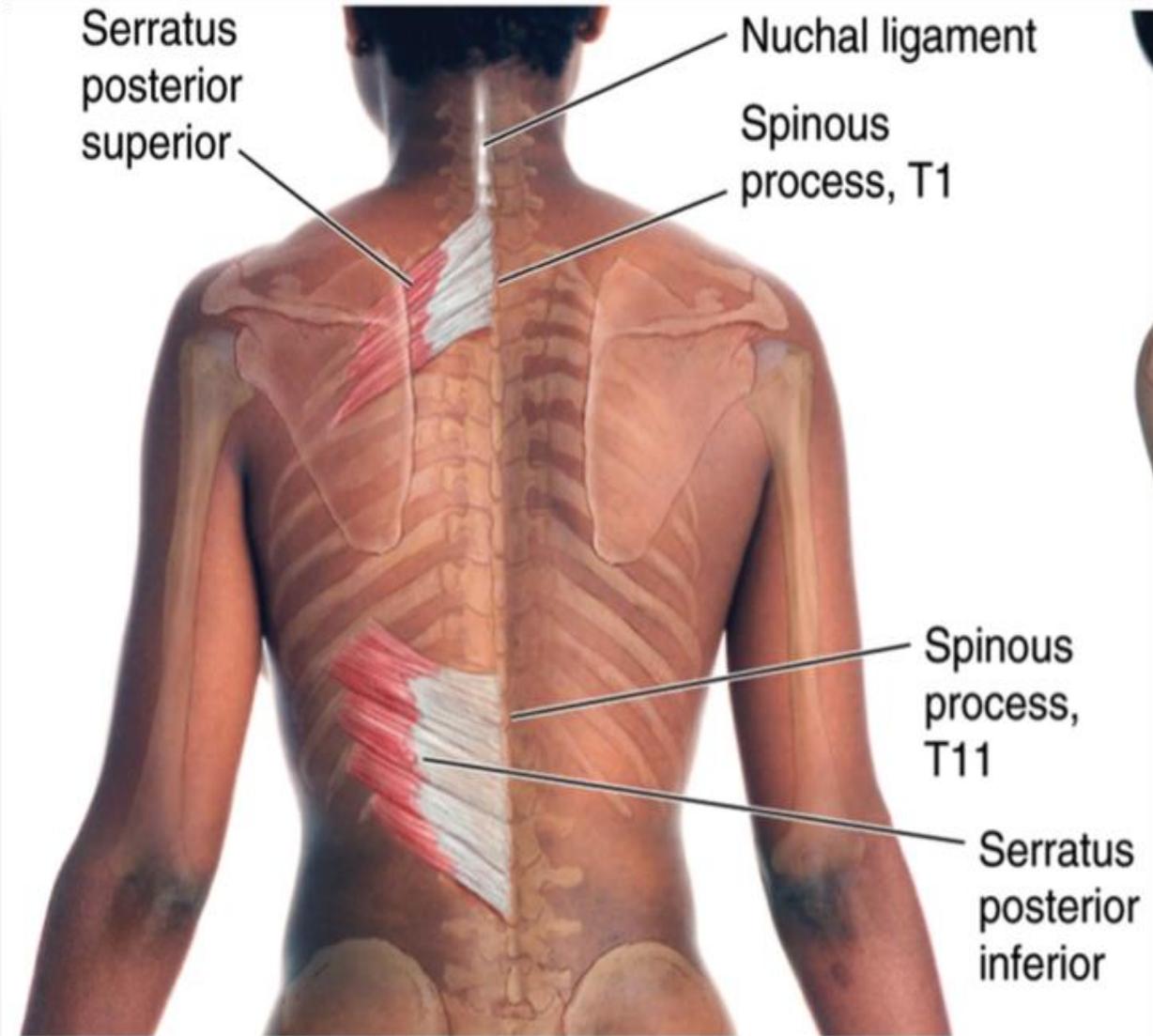


Serratus posterior superior

Origin :nuchal ligament ,the spine of the 7th cervical and upper two or three thoracic vertebrae and supraspinouevlevate second to fifth ribs, which aids deep inspiration.

Insertion: at the upper borders of the 2nd ,3rd ,4th &5th rib.

The function of serratus posterior superior is to **Innervated intercostal nerves T1-T5**



(A) Posterior view

Serratus posterior inferior

Arises ⇨ Spinous process of the lower two thoracic and upper two or three lumbar vertebrae and from the supraspinous ligament.

inserts ⇨ inferior borders of lower four ribs.

innervated by intercostal nerve

T9-T12

Action : helps to draw the lower ribs downward and backward during expiration.

