

# Thoracic wall

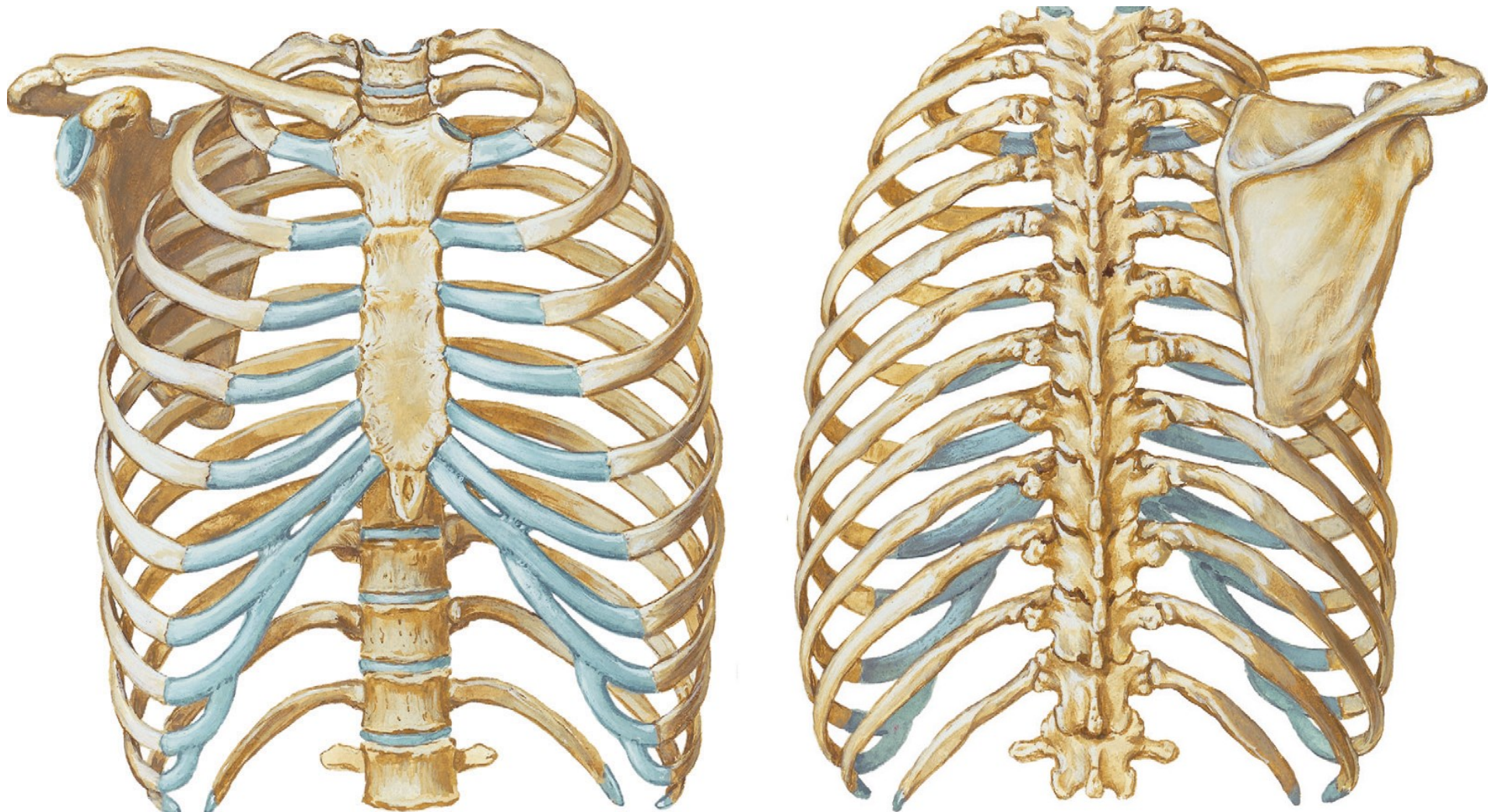
By

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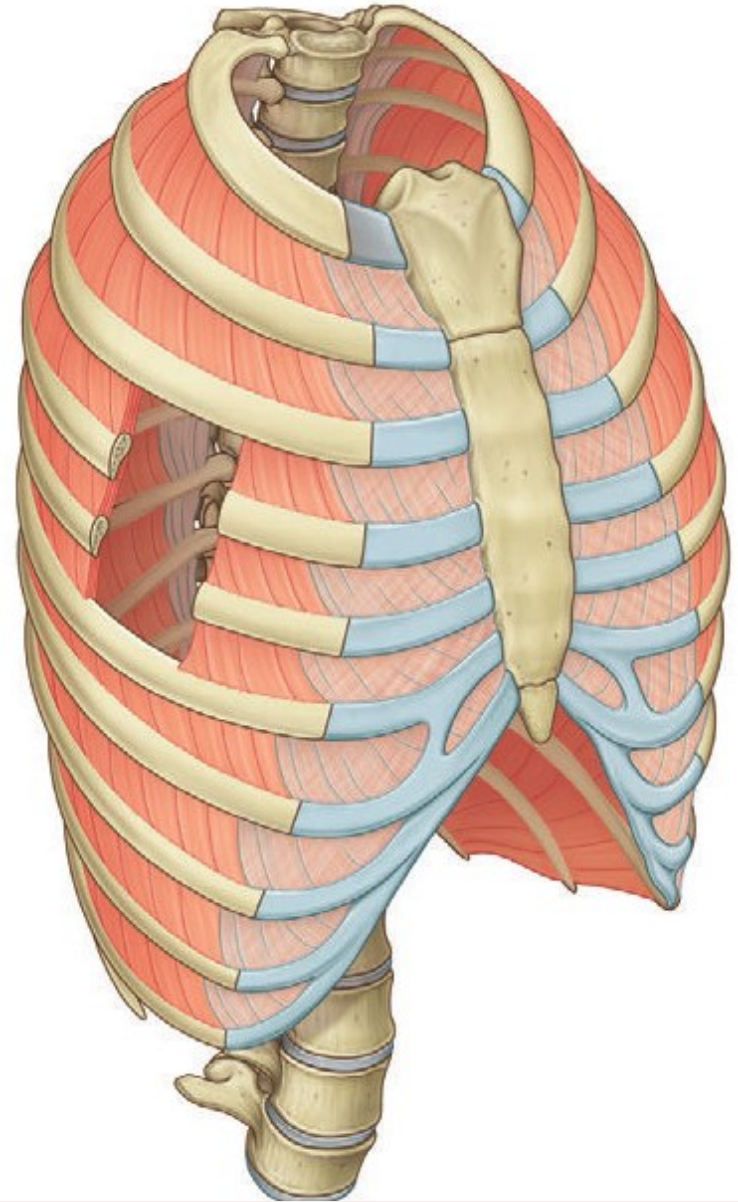
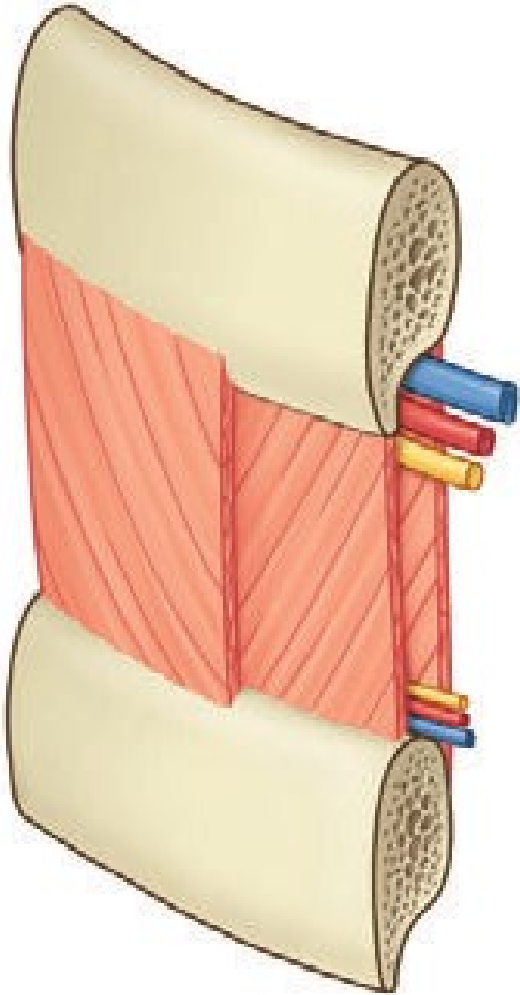
**Faculty of Medicine, Cairo University**

# The intercostal spaces



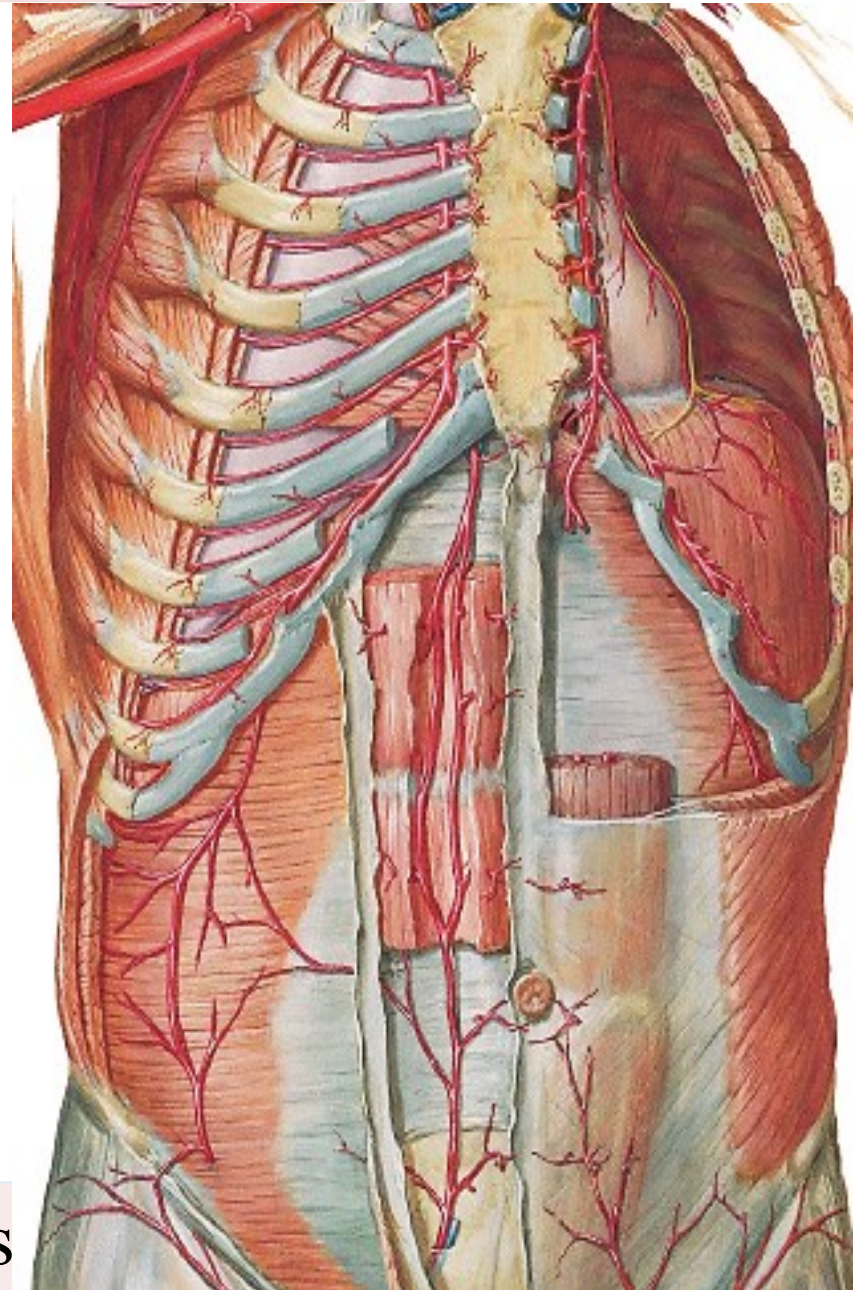
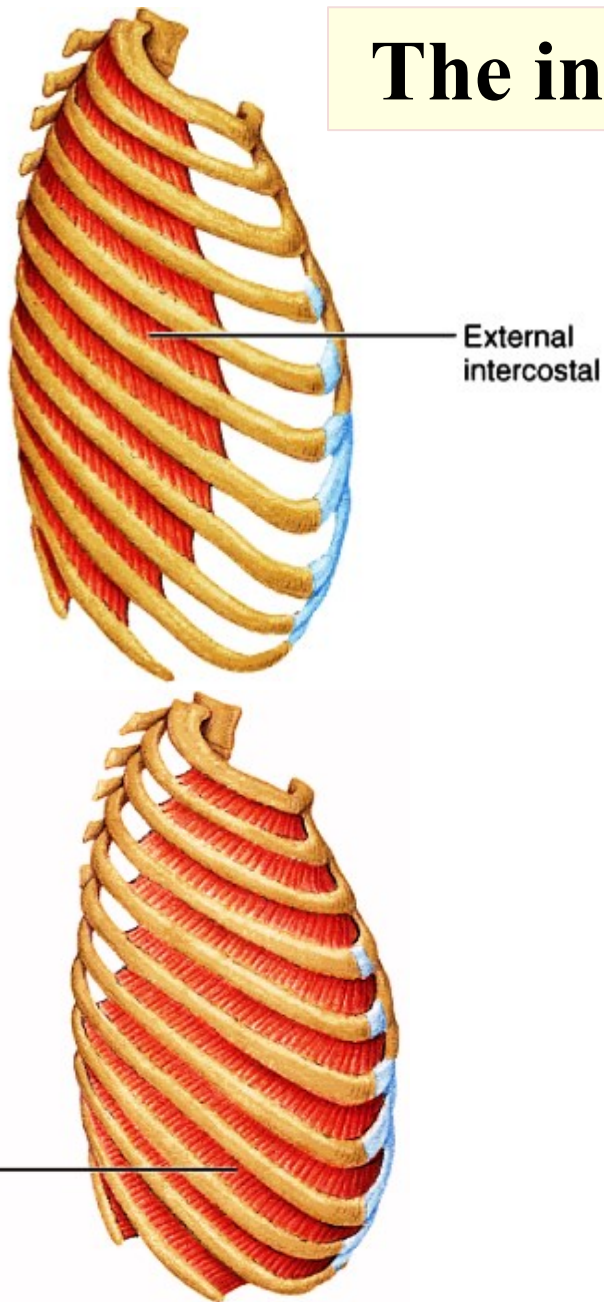
The intercostal spaces are the gaps between each 2 successive ribs. Each space lies **below** its numerically corresponding rib. There are 11 intercostal spaces; the upper 9 spaces have anterior and posterior parts. The lowest 2 spaces are incomplete anteriorly; they have posterior parts only.

# The intercostal space



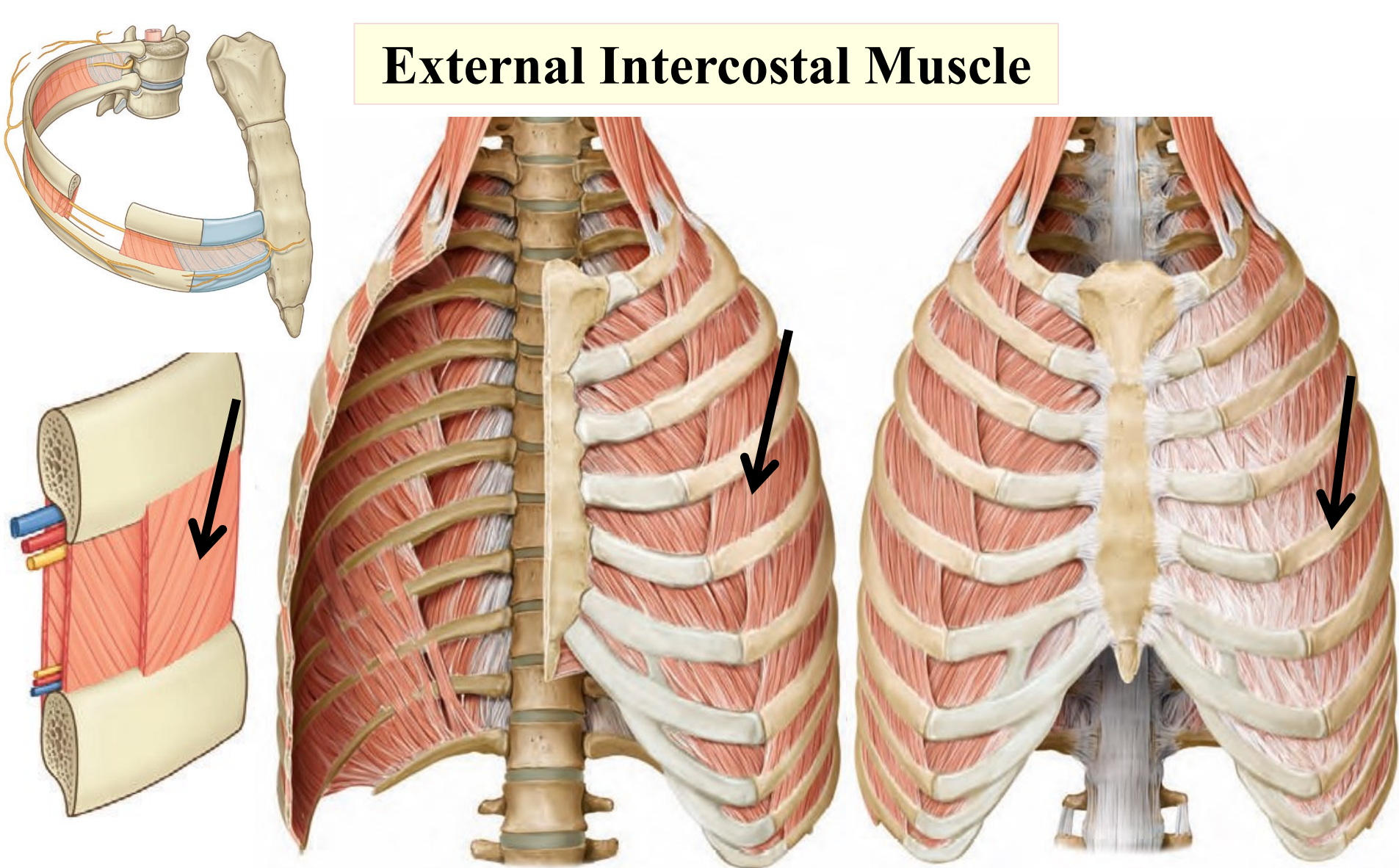
Each intercostal space contains intercostal muscles and membranes and a neurovascular bundle.

# The intercostal muscles



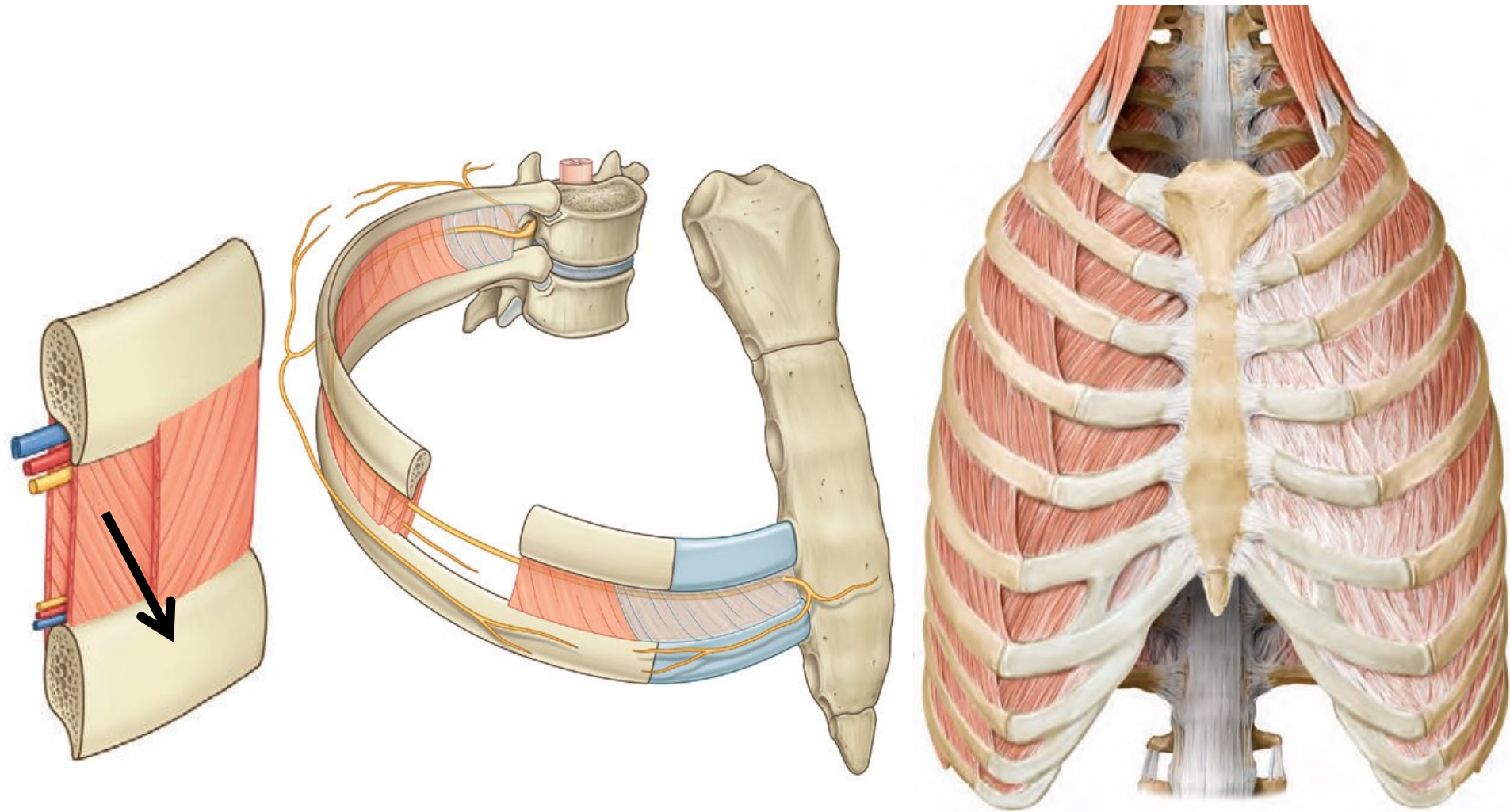
Synchronous to abdominal muscles

# External Intercostal Muscle



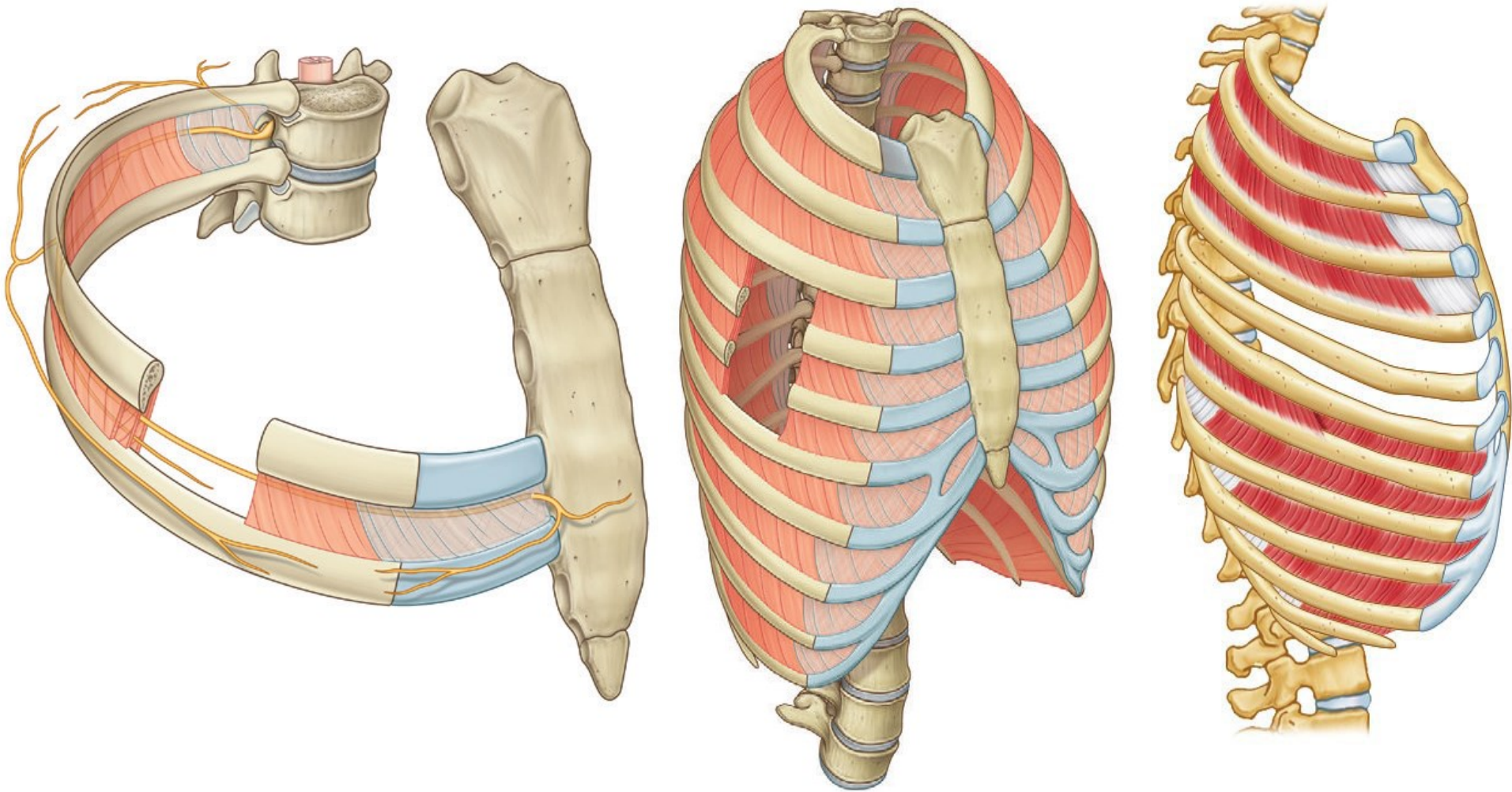
**Origin:** from lower border of the rib above. **Insertion:** into the upper border of the rib below.  
**Direction of fibres:** obliquely downwards and forwards.  
**Extent:** from the tubercle of the rib posteriorly to the costochondral junction anteriorly where it becomes aponeurotic and continues to the sternum as the **anterior intercostal membrane**.

# Internal Intercostal Muscle



**Origin:** from floor of costal groove of rib above. **Insertion:** into upper border of the rib below.  
**Direction of fibres:** obliquely downwards and backwards.  
**Extent:** from the sternum anteriorly to the angle of the rib posteriorly where it becomes aponeurotic and continues to the tubercle of the ribs as the **posterior intercostal membrane**.

# Compare



# Innermost Intercostal Muscle

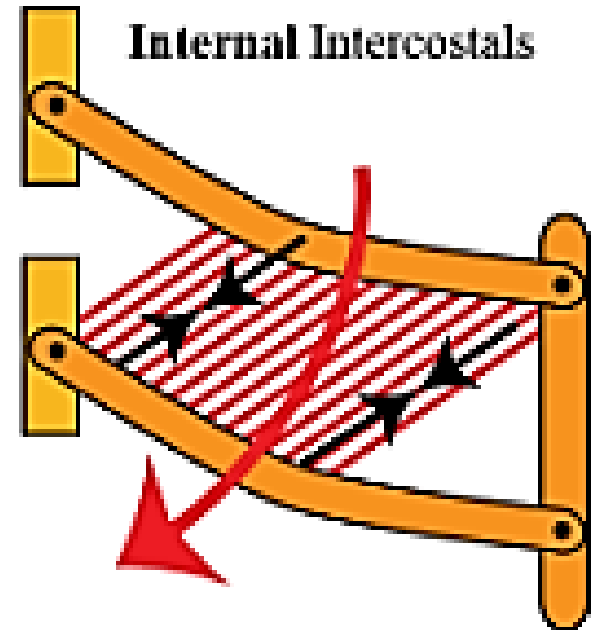
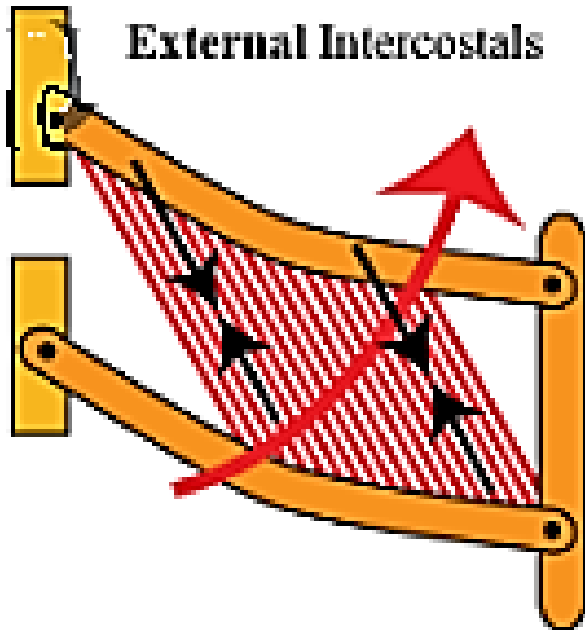
**Origin:** from the upper lip of the costal groove of the rib above.

**Insertion:** into the upper border of the rib below.

**Direction of fibres:** as the internal intercostal muscle.

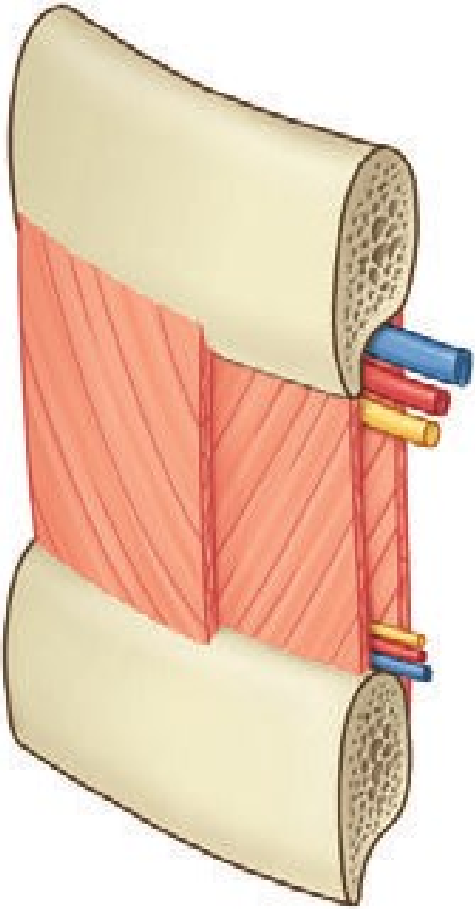
**Extent:** from the mid-axillary line anteriorly to the angle of the rib posteriorly.

# Action of intercostal muscles



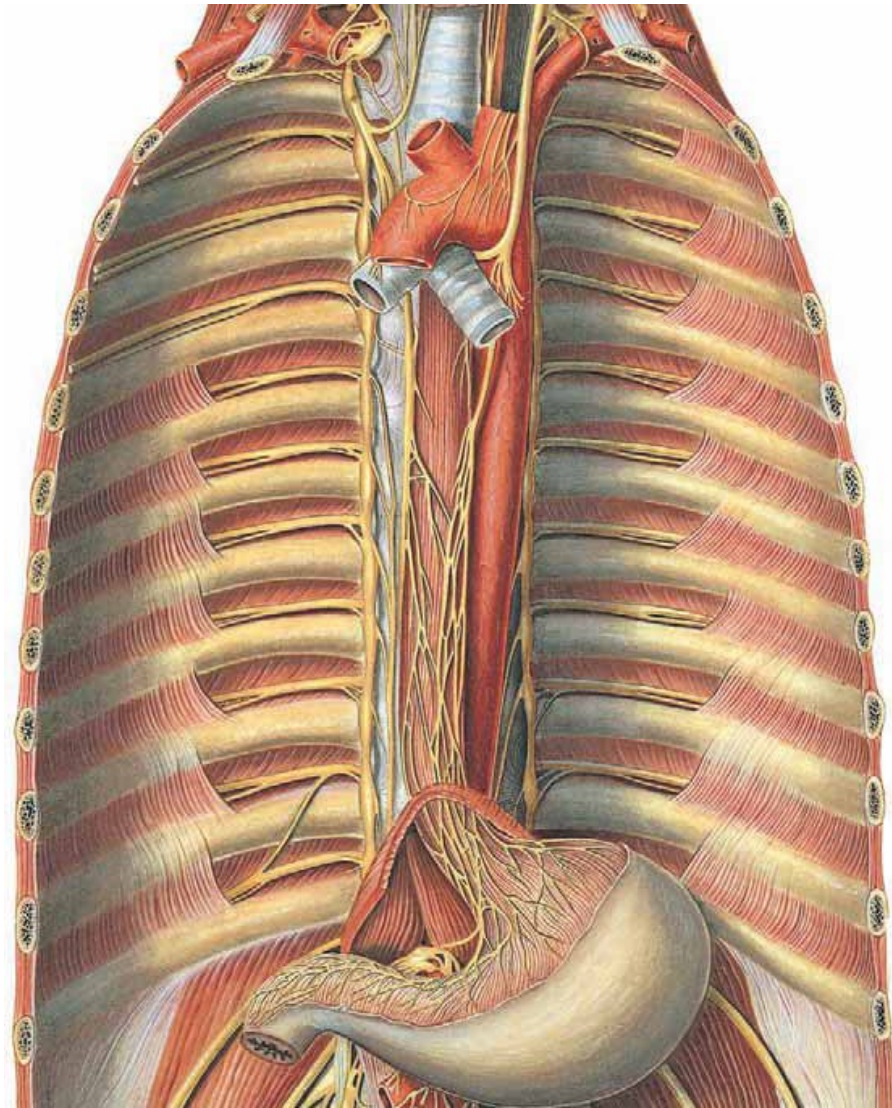
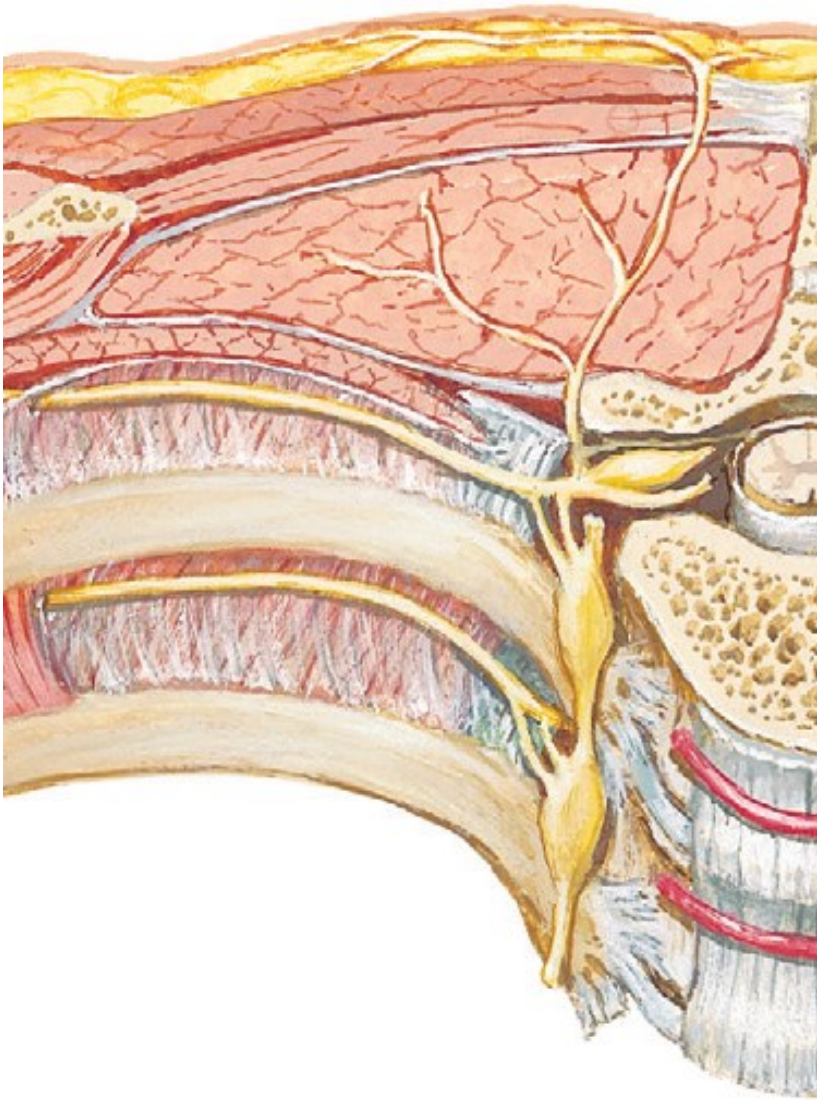
- The intercostal muscles are elevators of ribs (inspiratory muscles).
- However, some authors restrict this action to the external muscles only;
- internal and innermost are considered as depressors of the ribs (expiratory muscles).
- The intercostal muscles prevent intercostal spaces from being sucked inwards during inspiration or puffed outwards during expiration.

# Neurovascular Bundle



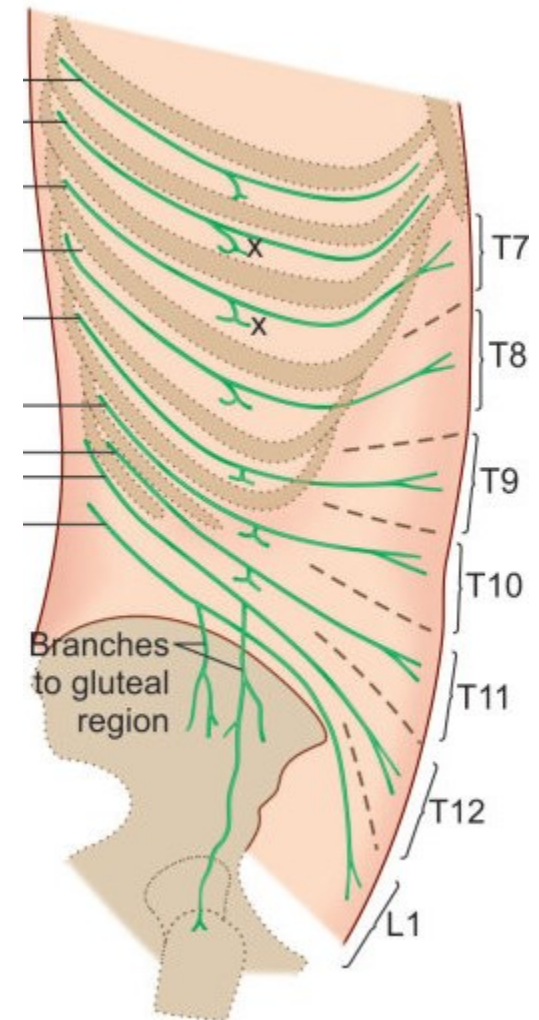
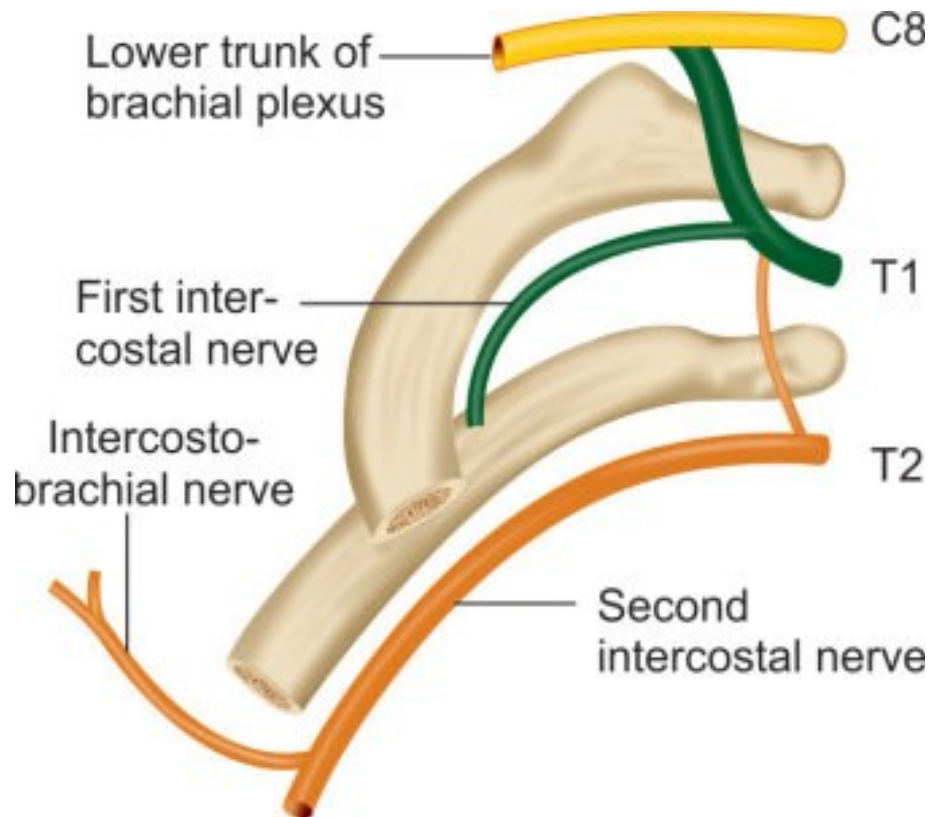
- 3 structures occupy costal groove of rib, lying between internal and innermost intercostal muscles.  
(**Remember neuro-vascular plane of abdomen**).
- Arranged from above downwards as **VAN**- intercostal vein is uppermost, then artery--nerve is lowermost.
- 12 thoracic nerves&vessels on each side. But, there are only 11 spaces, structures in spaces called intercostal.
- Neurovascular bundle along lower border of last rib (T12) and 12<sup>th</sup> vessels; are called **subcostal**.

# The Thoracic Nerves



- 12 thoracic spinal nerves. Each divides into dorsal (posterior) and ventral (anterior) primary rami.
- Anterior 11 rami of upper 11 thoracic spinal nerves (intercostal nerves), last (T12) is subcostal.

# The Thoracic Nerves



- **Nerves of special characteristics:**

**1<sup>st</sup> nerve:** most of its fibres ascend to join brachial plexus.

**12<sup>th</sup> (subcostal) nerve:** runs its whole course in abdominal wall.

- **Typical intercostal nerves:** from 2<sup>nd</sup> to 6<sup>th</sup> nerves; run their whole course in thoracic wall.

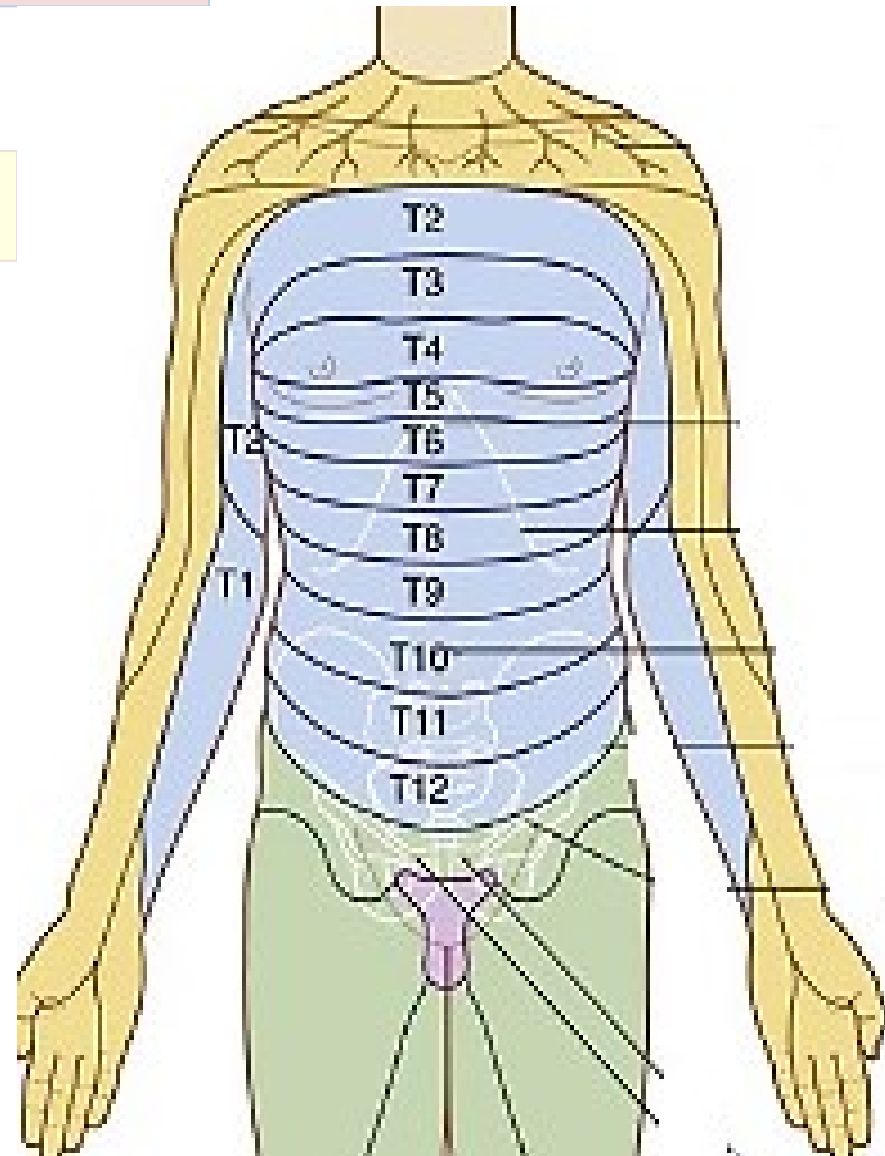
- **Non-typical intercostal nerves:** from 7<sup>th</sup> to 11<sup>th</sup> nerves; run part of their course in thoracic wall and part in abdominal wall.

# The Thoracic Nerves

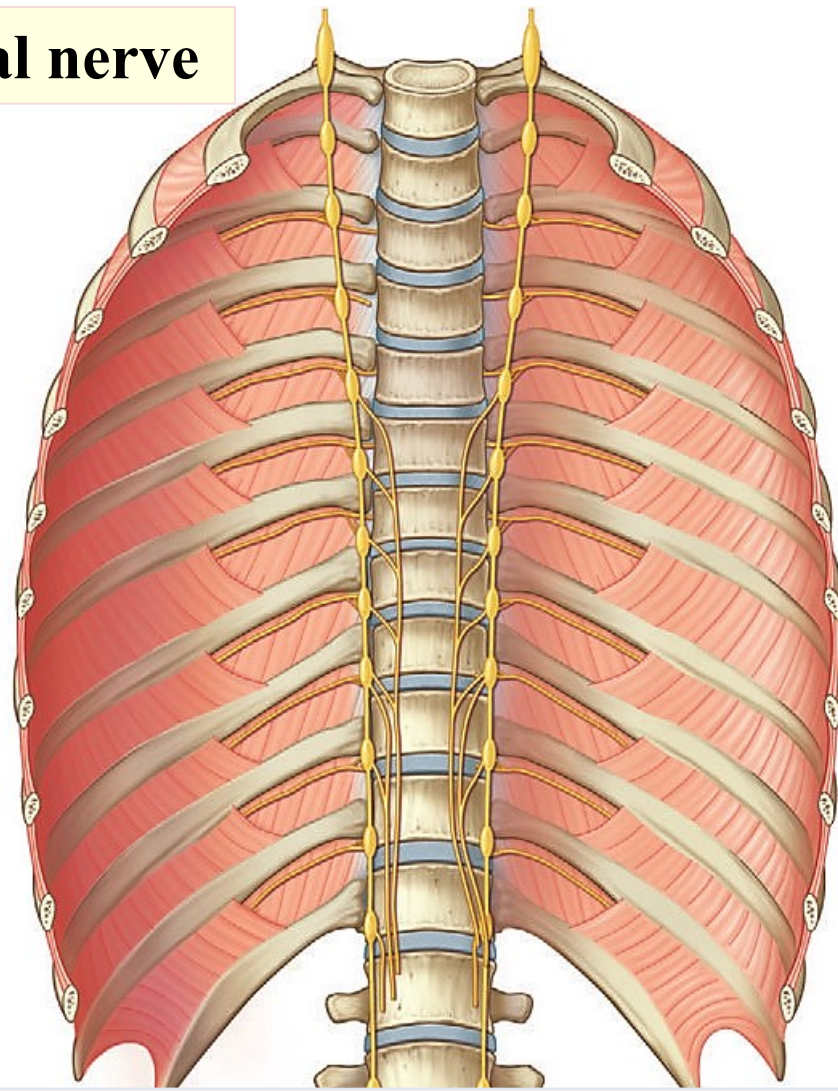
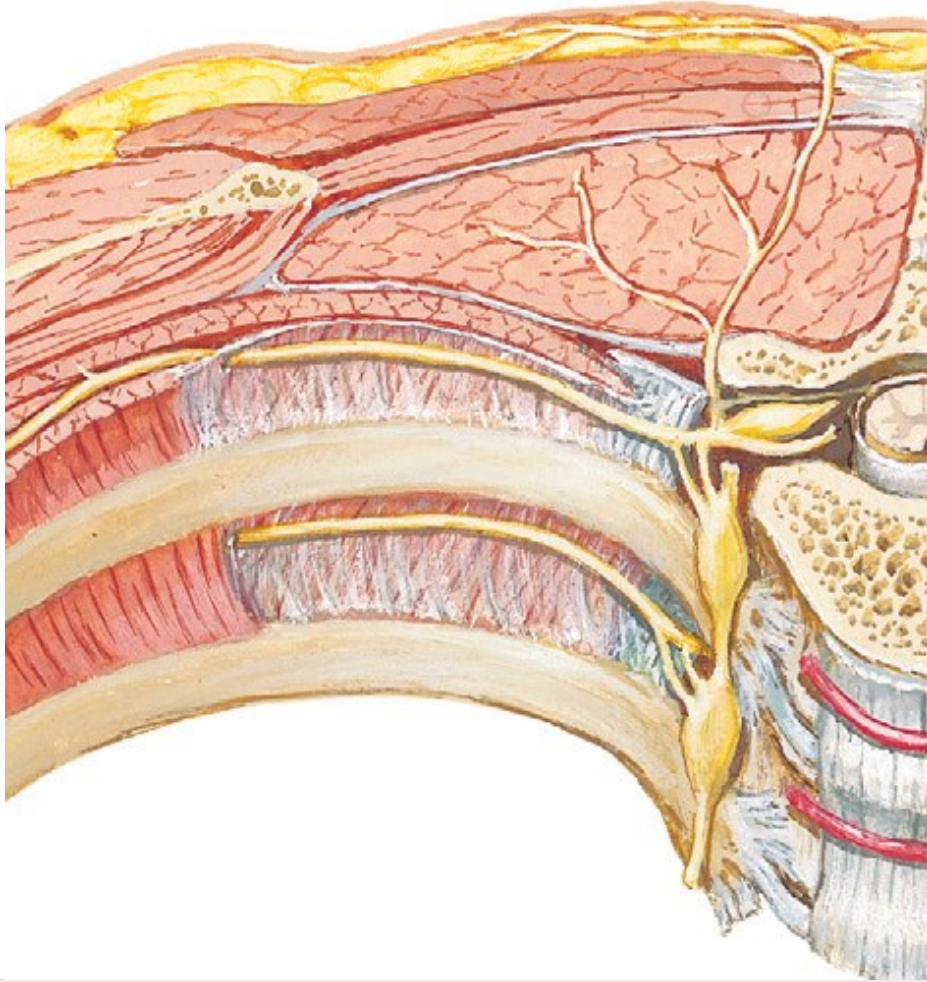
**1<sup>st</sup>, 2<sup>nd</sup>----- Upper limb**

**3 to 6----- Thorax**

**7 to 12----- Abdomen**



## Course of typical intercostal nerve



These are the anterior primary rami of the thoracic spinal nerves from the 2<sup>nd</sup> to the 6<sup>th</sup>.

**In posterior part of intercostal space (medial to the angle of the rib):**

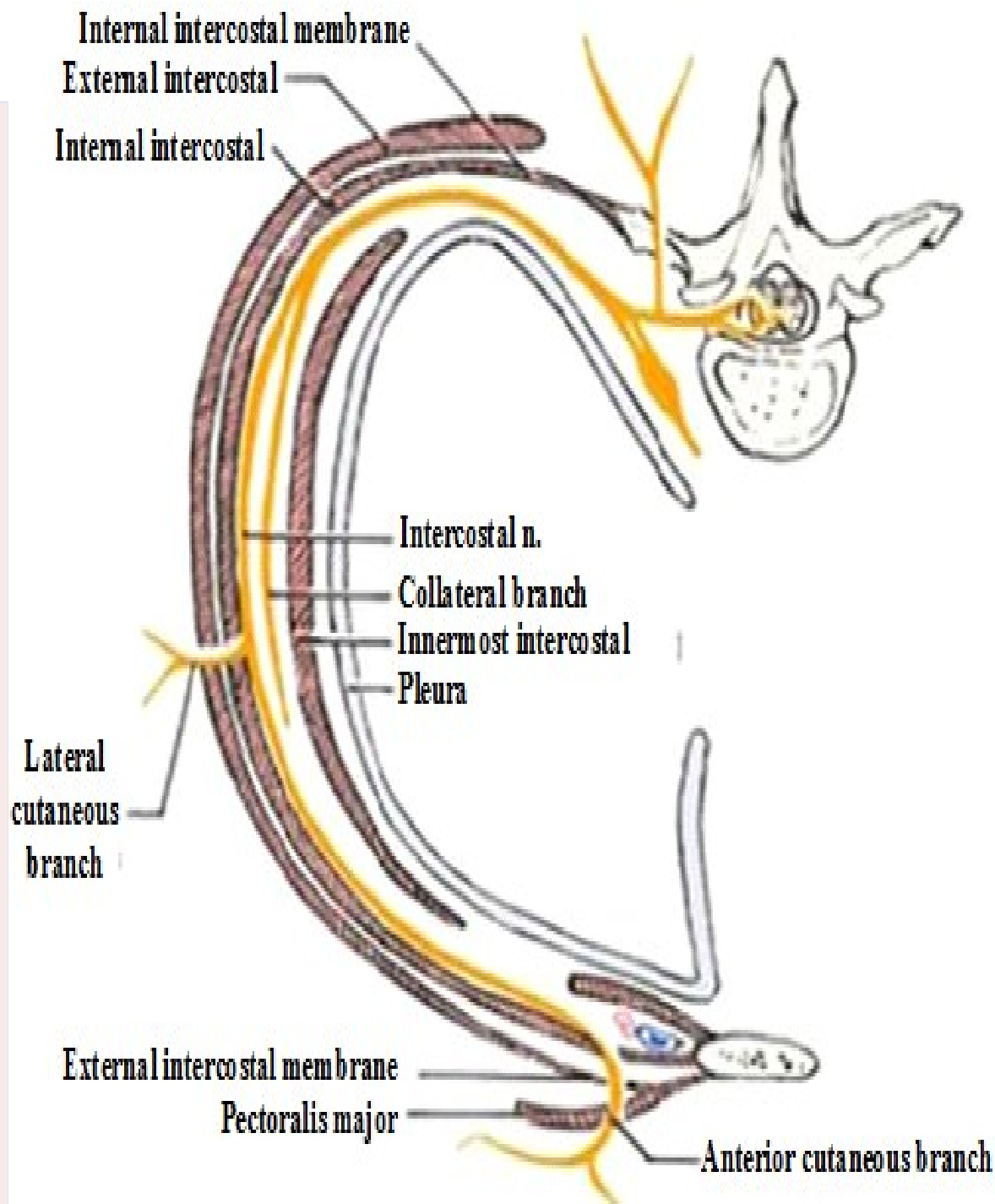
- The nerve comes out through intervertebral foramen
- Runs laterally behind sympathetic chain.
- Lies between parietal pleura (in front) and posterior intercostal membrane (behind).

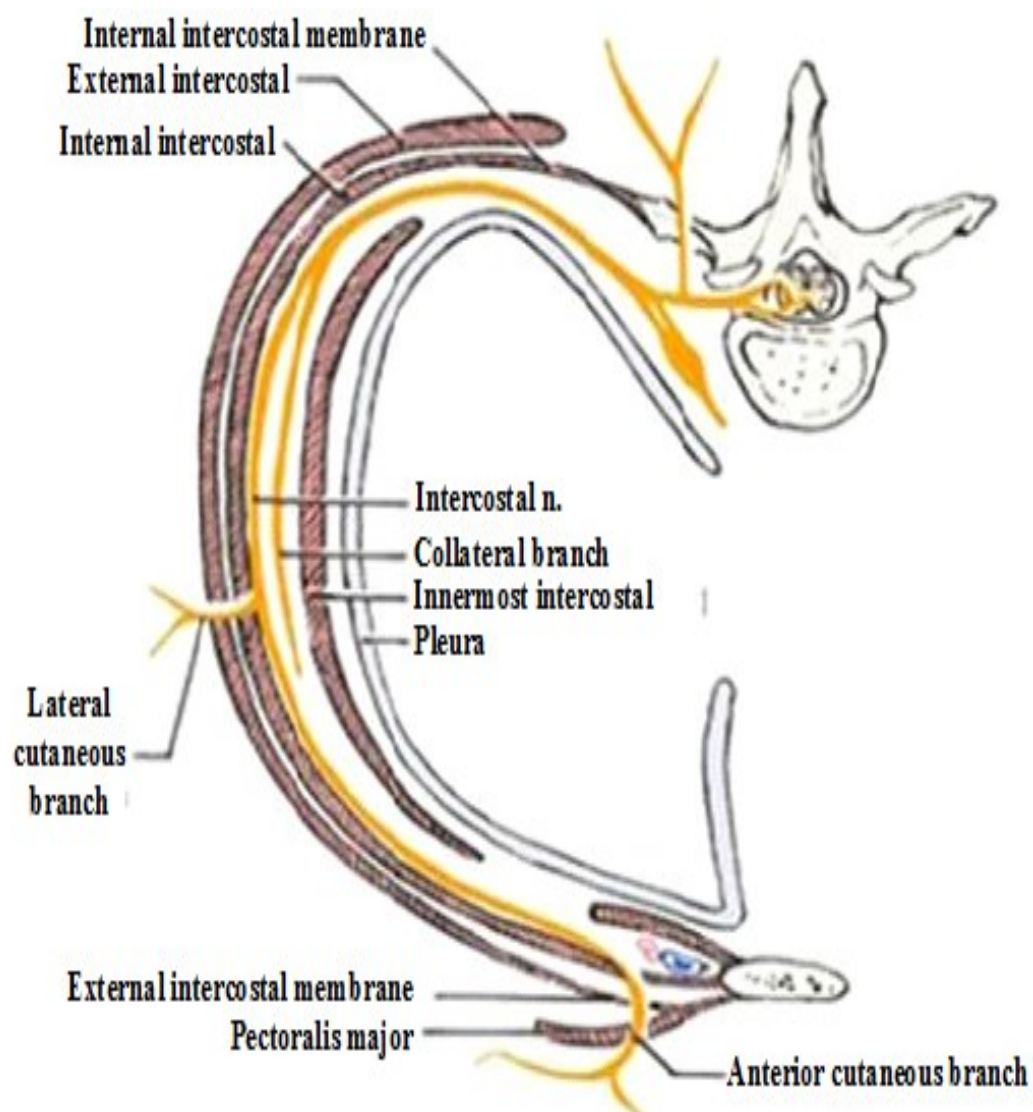
## Typical intercostal nerve

**In costal groove (lateral to angle of rib** in neurovascular plane bet. internal intercostal ms (to outside) and innermost intercostal ms (to inside). within neurovascular bundle, below intercostal vessels.

**In anterior part of intercostal space (medial to costochondral junction):** crosses in front of internal thoracic vessels, lying bet. internal intercostal ms (in front) & parietal pleura (behind).

**1/2 an inch lateral to sternum:** it turns forwards piercing (عضلة **membrane** عضلة) internal intercostal ms, anterior intercostal membrane & pectoralis major ms to **end** in skin as **anterior cutaneous branch**.





- Between parietal pleura and posterior intercostal membrane.
- Between internal and innermost intercostal (In neurovascular plane)
- Between parietal pleura and internal intercostal

# Branches of typical intercostal nerve

**Ganglionic branches:** 2 rami communicantes, white and grey

**Collateral branch:** arises close to angle of rib-runs along upper border of rib below-supplies intercostal ms.

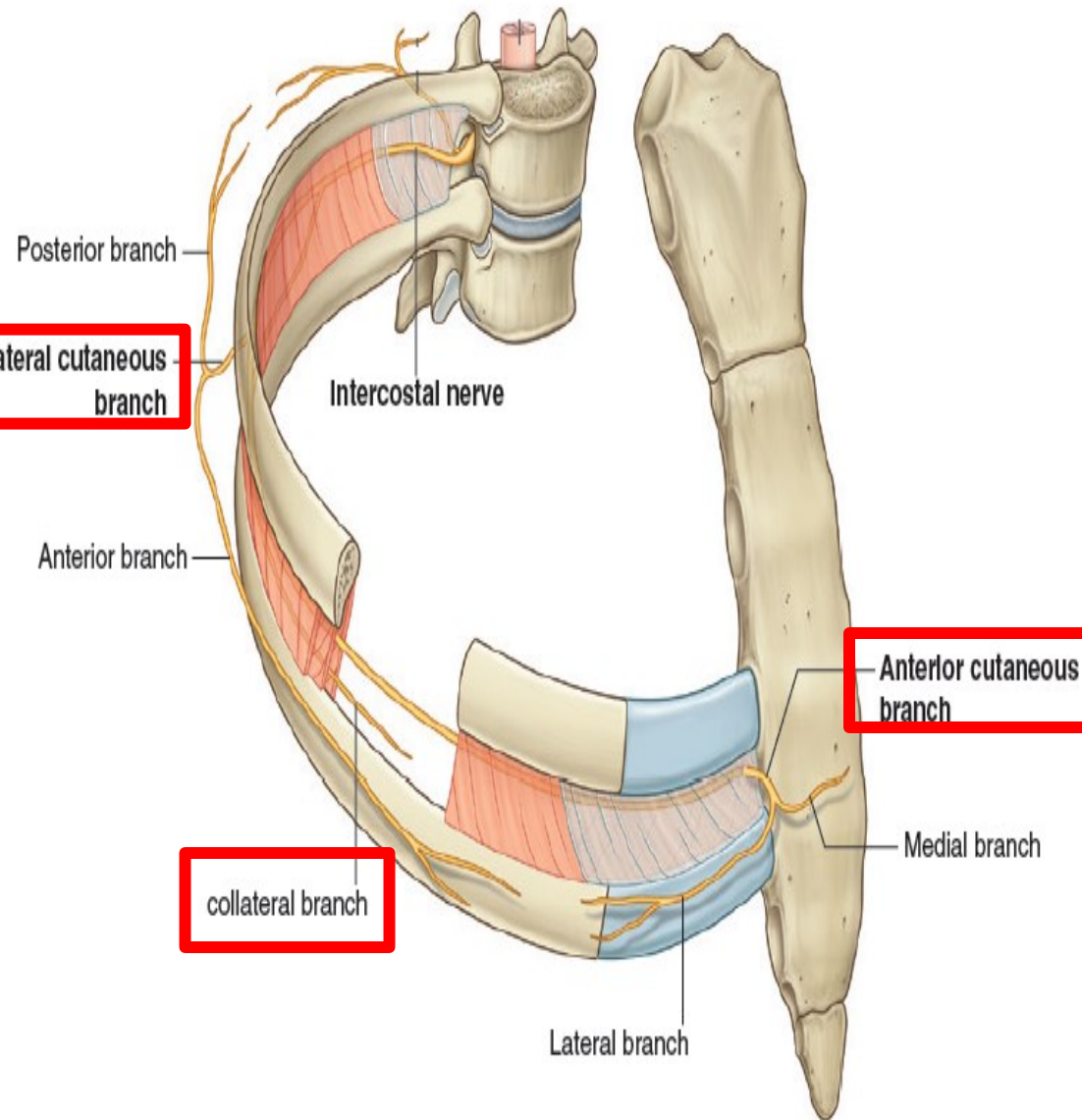
**Lateral cutaneous branch:**  
Arises near angle of rib  
Pierces internal and external intercostal ms.  
Pierces serratus ant. ms in midaxillary line.  
Divides into anterior & posterior divisions  
w' run forwards & backwards to supply skin over front & side of thorax.

**Anterior cutaneous branch:** it is the termination of intercostal nerve.  
Divides into medial and lateral branches which supply skin over front of thorax.

**Muscular branches:** supply intercostal ms.

**Articular branches:** to rib joints.

**Pleural branches:** to parietal pleura.



## Put true or false

- The intercostal nerve gives two cutaneous branches and two muscular branches (**True**)
- The intercostal nerve supplies the intercostal muscles twice (by the main nerve (muscular) and by its collateral branch)
- Pain of osteoarthritis in the thorax is felt through collateral branch of intercostal nerve (**False**)
- The intercostal nerves give autonomic branches to the visceral pleura (**False**)

# **Branches of typical intercostal nerve**

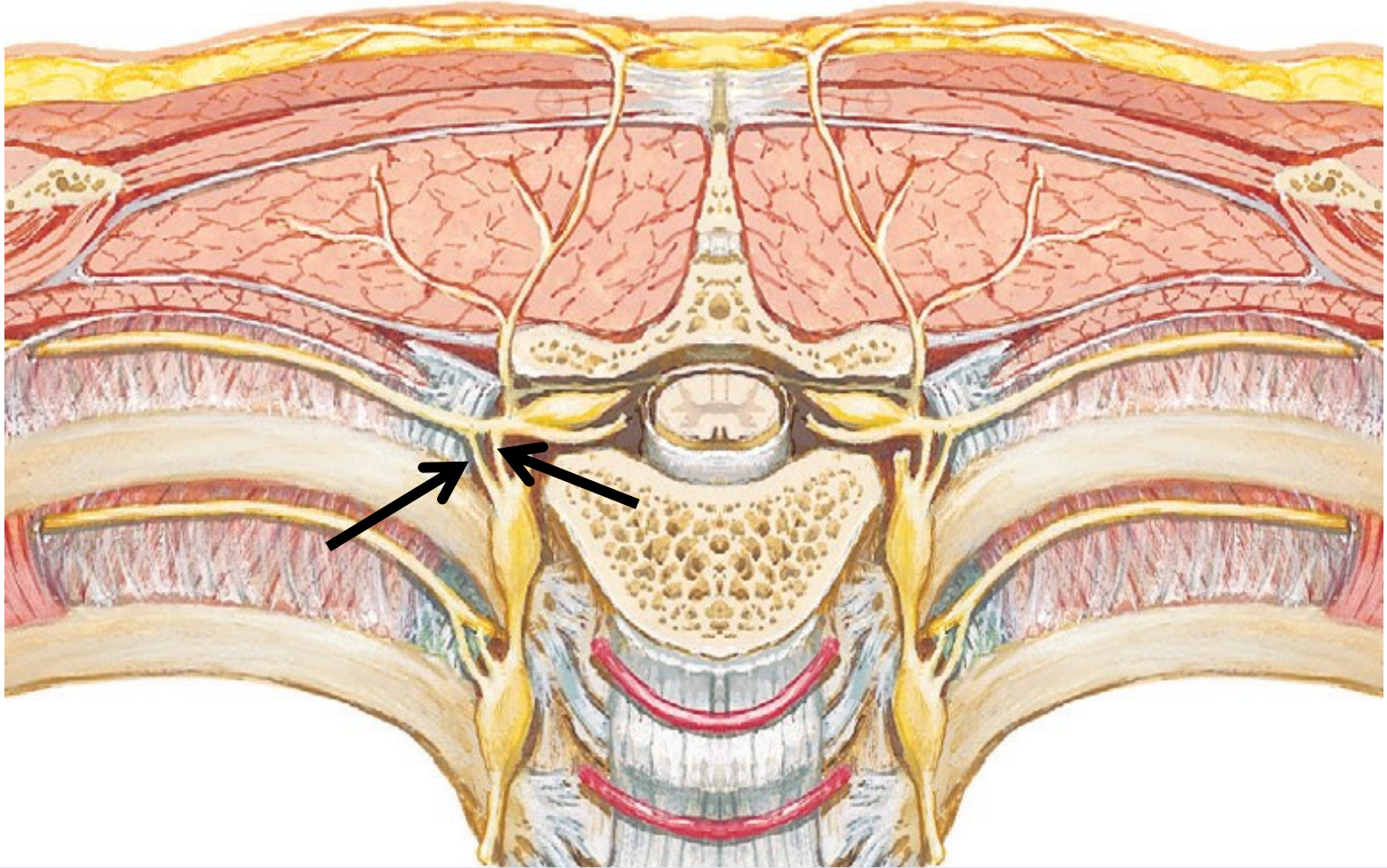
**2 Ganglionic**

**2 muscular**

**2 cutaneous**

**Articular and pleural**

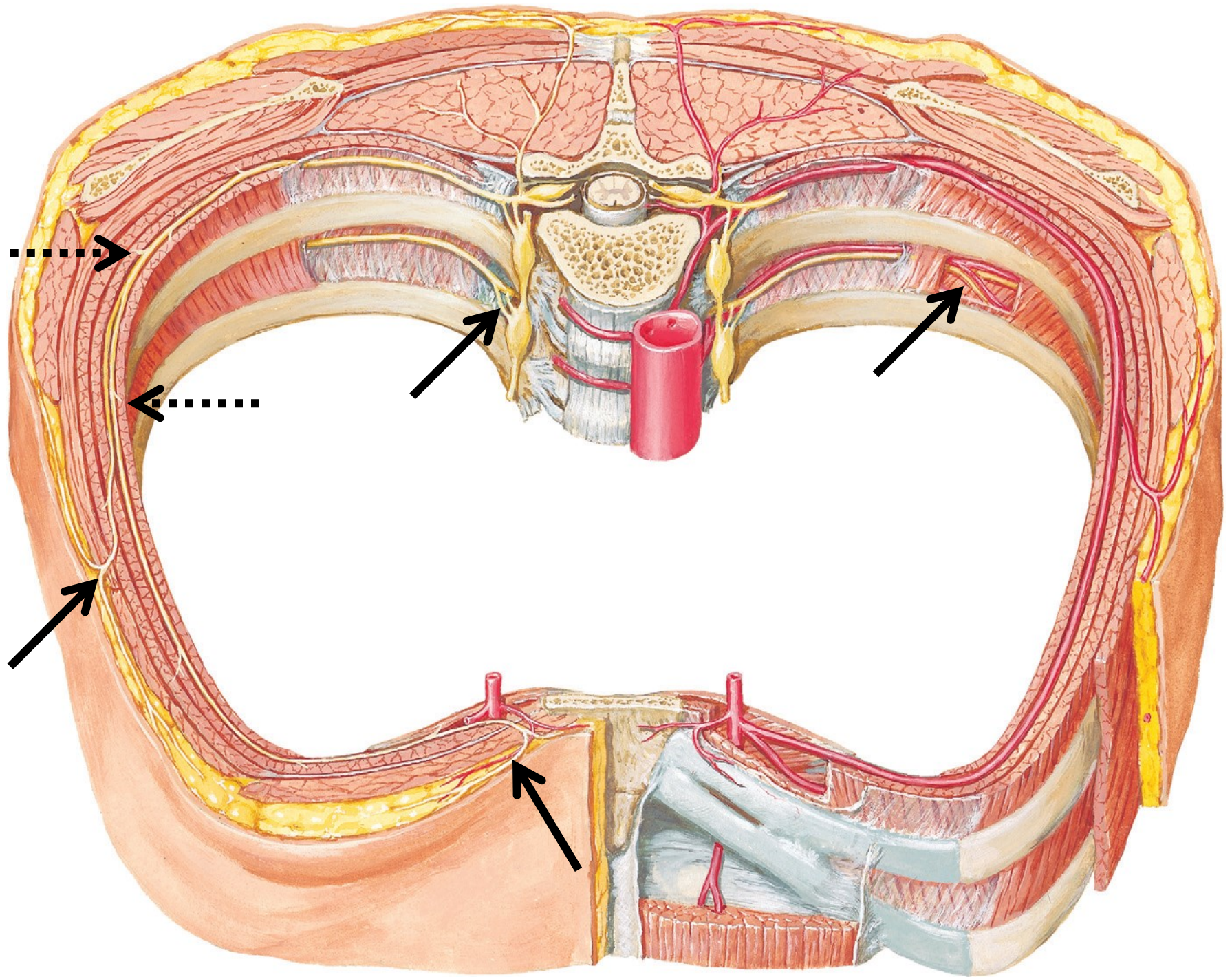
# Ganglionic branches



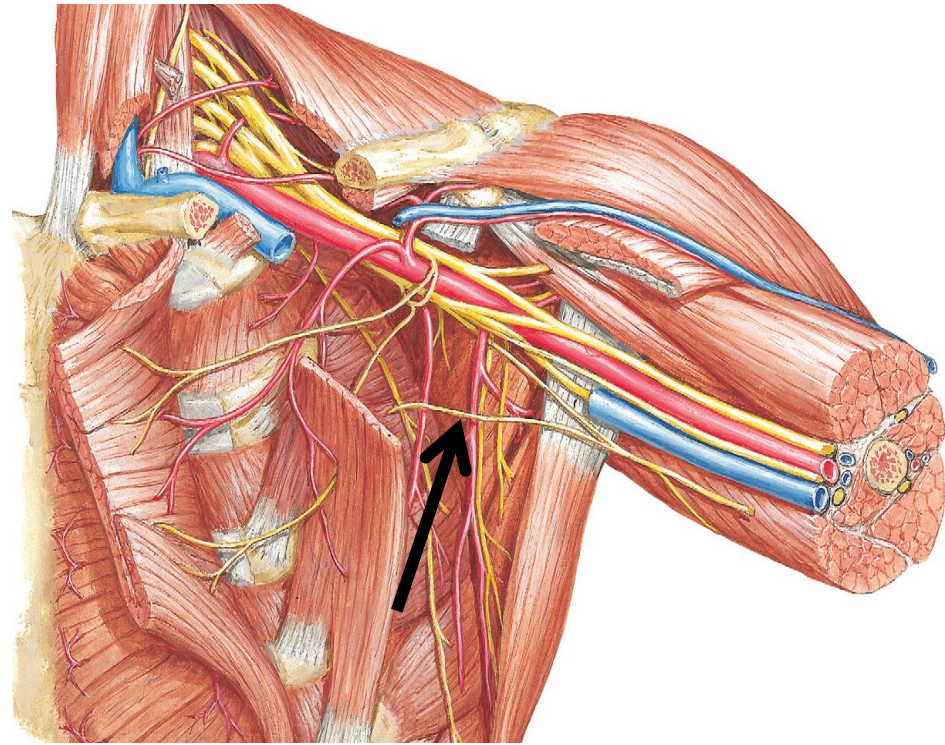
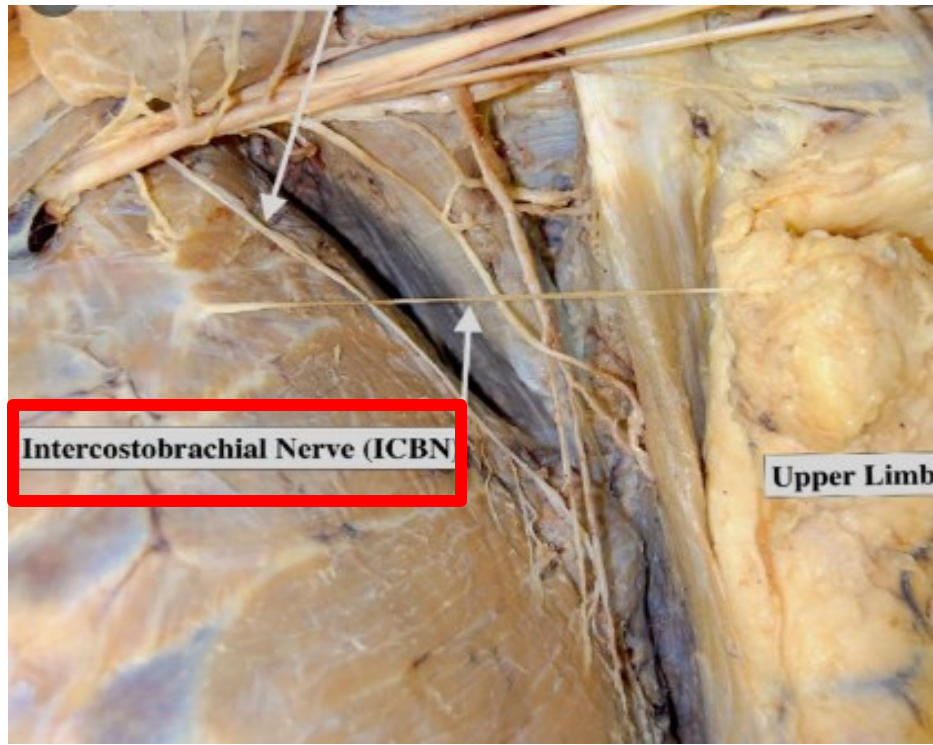
**Ganglionic branches:** each nerve is connected with the corresponding sympathetic ganglion by 2 rami communicantes, white and grey. (Sympathetic outflow---Thoraco-lumar)

The white ramus communicans conveys preganglionic sympathetic fibres to ganglion (myelinated)

The grey receives postganglionic fibres from it (non-myelinated).

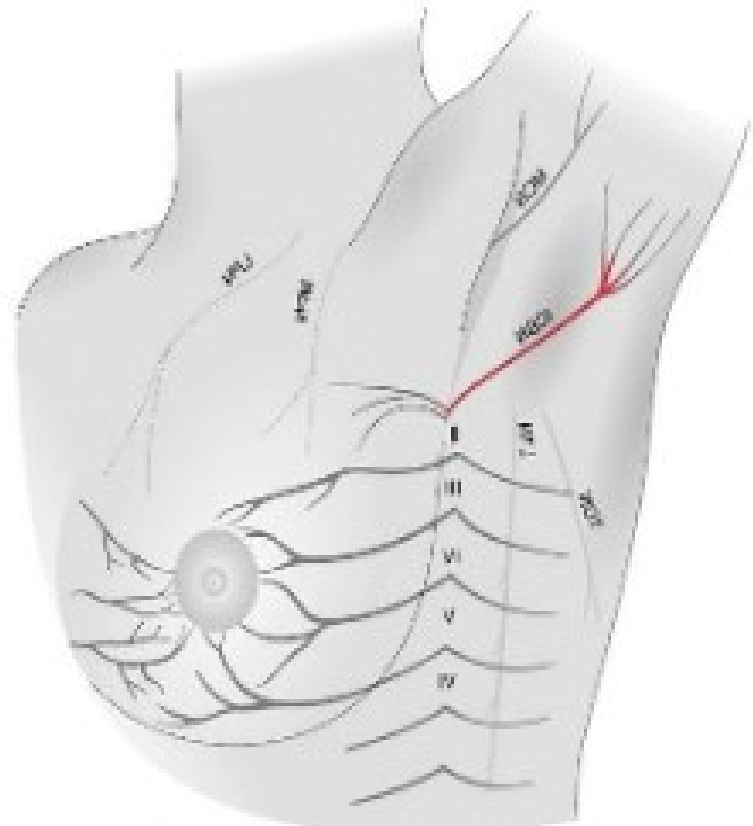


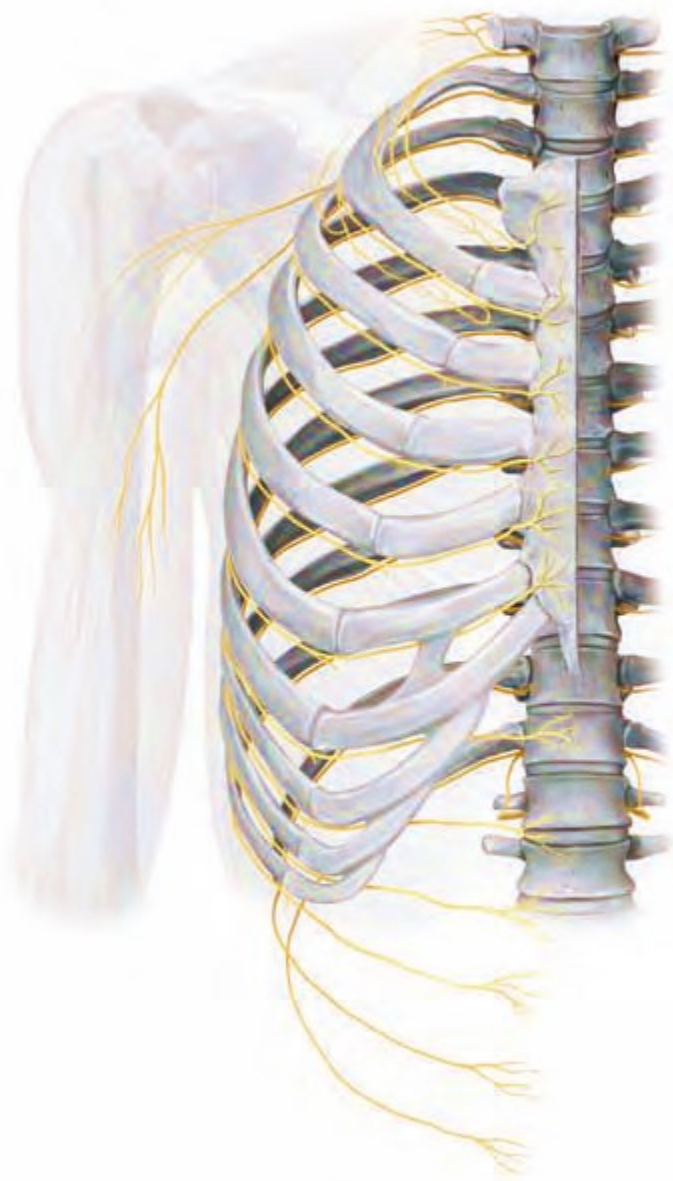
# The 2<sup>nd</sup> Intercostal Nerve



Resembles typical intercostal nerve but its **lateral cutaneous branch** doesn't divide into ant.& post. divisions. Instead, it crosses the axilla to upper limb where it supplies skin over floor of the axilla and the upper 1/2 of medial side of the arm. It is called **intercostobrachial nerve**.

# Intercostobrachial nerve block



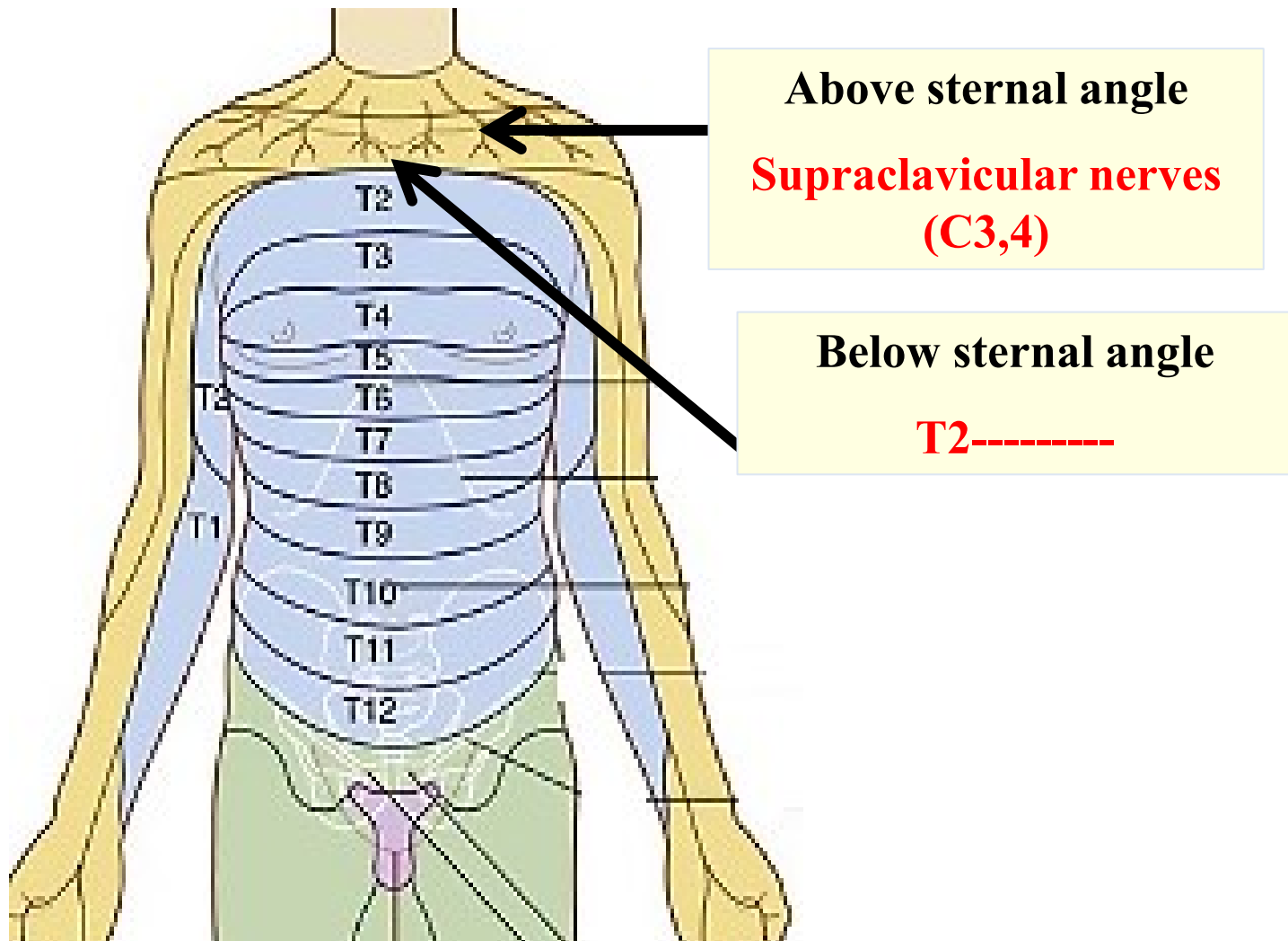


## ***Non-Typical Intercostal Nerves***

**(7<sup>th</sup>-11<sup>th</sup>)**

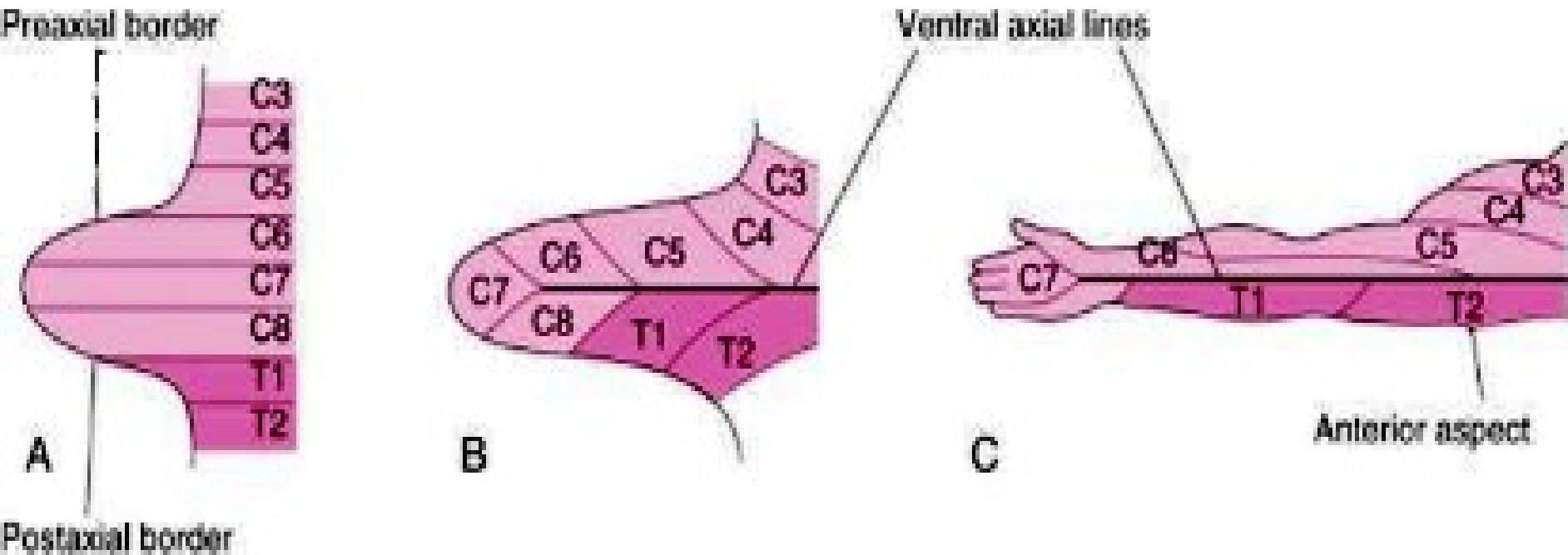
**Course and Relations:** they are lower 5 intercostal nerves (from 7<sup>th</sup> to 11<sup>th</sup>). They run part of their course in thoracic wall. The nerves have the same course and relations as typical intercostal nerves in their posterior and costal parts. However, they leave the anterior ends of intercostal spaces by crossing deep to costal margin of thoracic outlet to enter abdominal wall. They have the same branches as typical intercostal nerves.

# Cutaneous Innervation (Dermatomes)



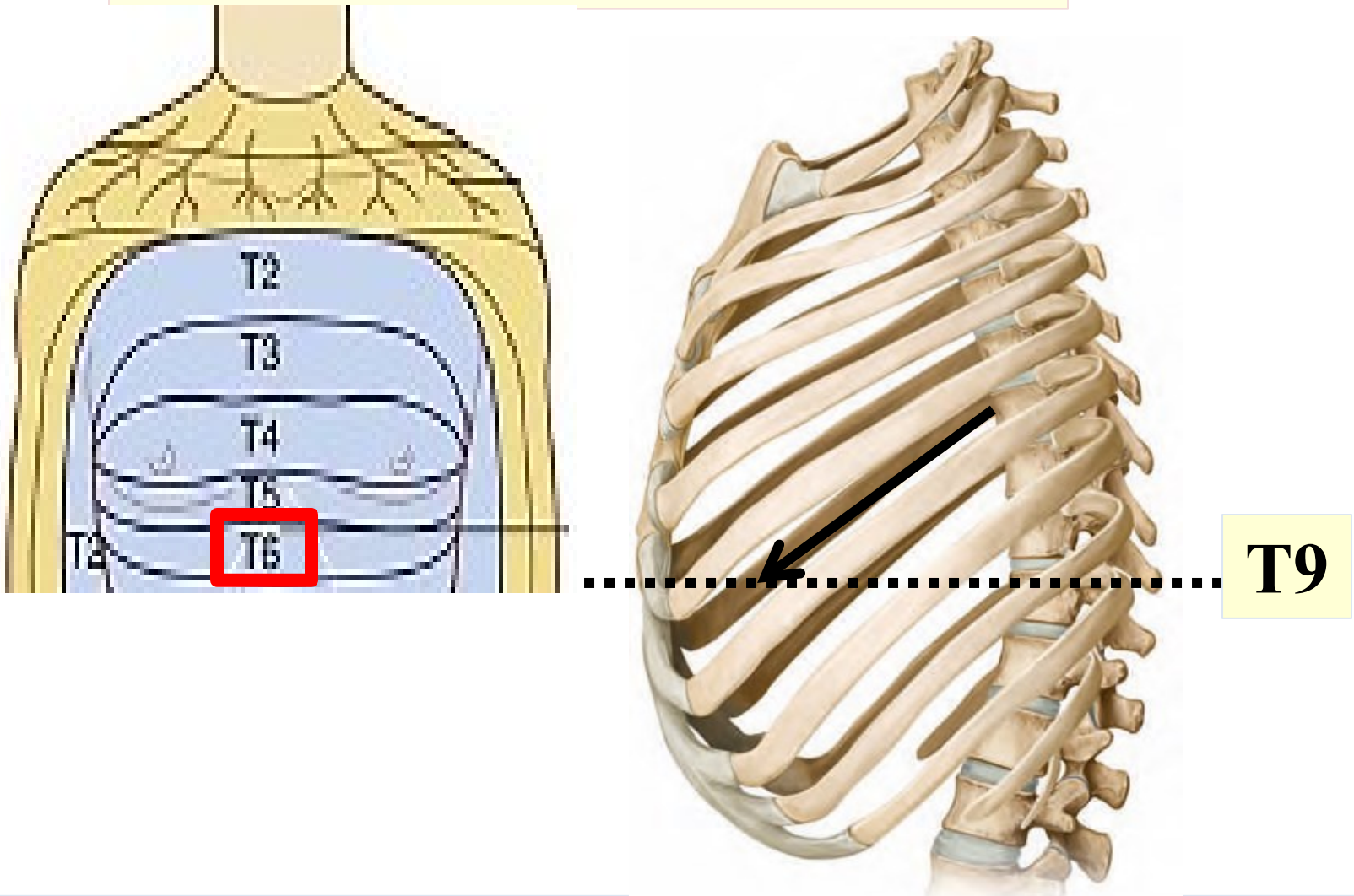
- Skin of thoracic wall above level of sternal angle is supplied by C3,4 via supraclavicular nerves
- Below angle: supplied by thoracic nerves (starting from T2) via lateral and anterior cutaneous branches of intercostal nerves (mainly the typical).

# Cutaneous Innervation (Dermatomes)



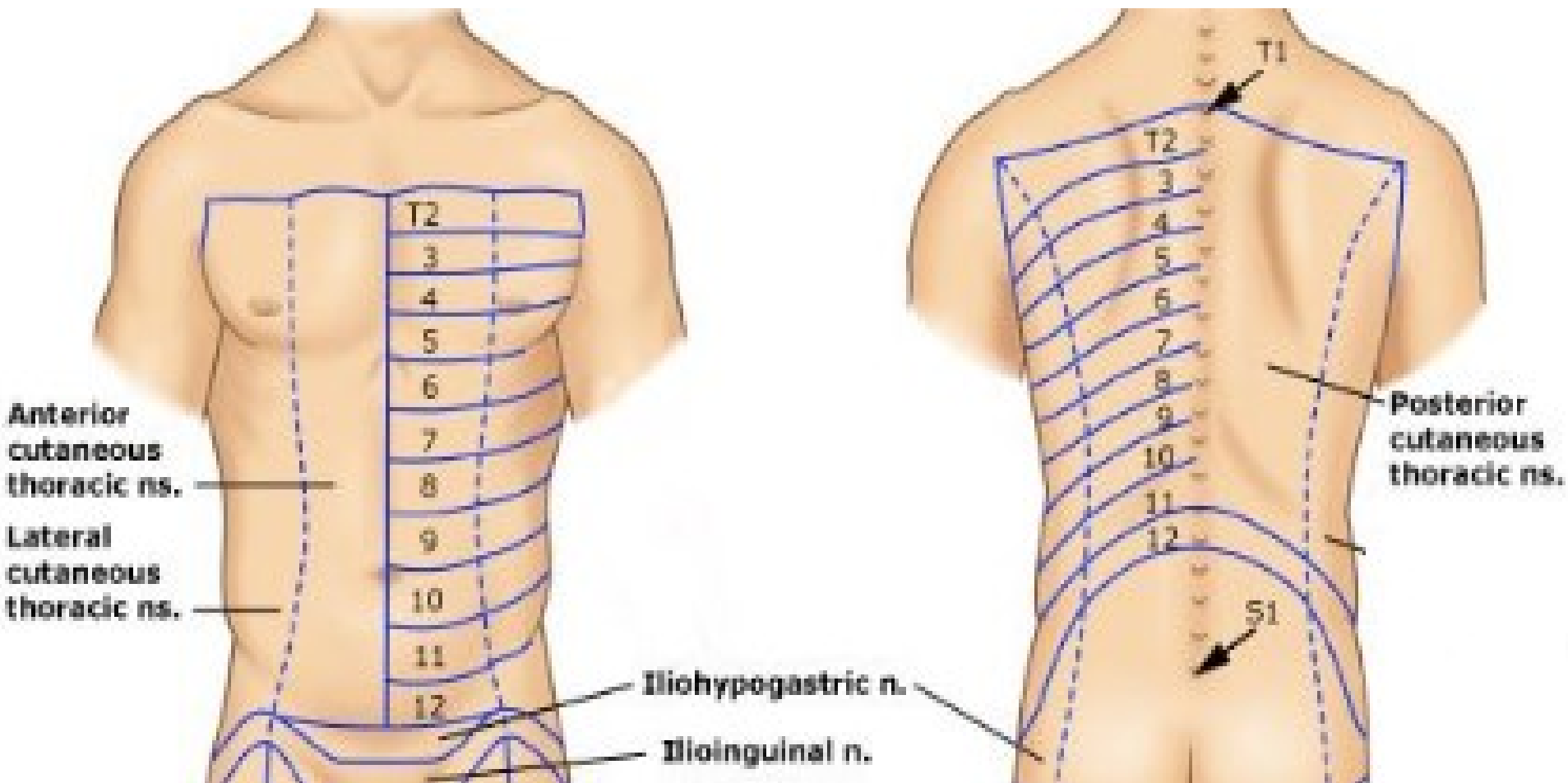
- The missing nerves between C4 and T2 (C5,6,7,8 and T1) are drawn with limb bud forming brachial plexus which supplies U.L.

## Cutaneous Innervation (Dermatomes)



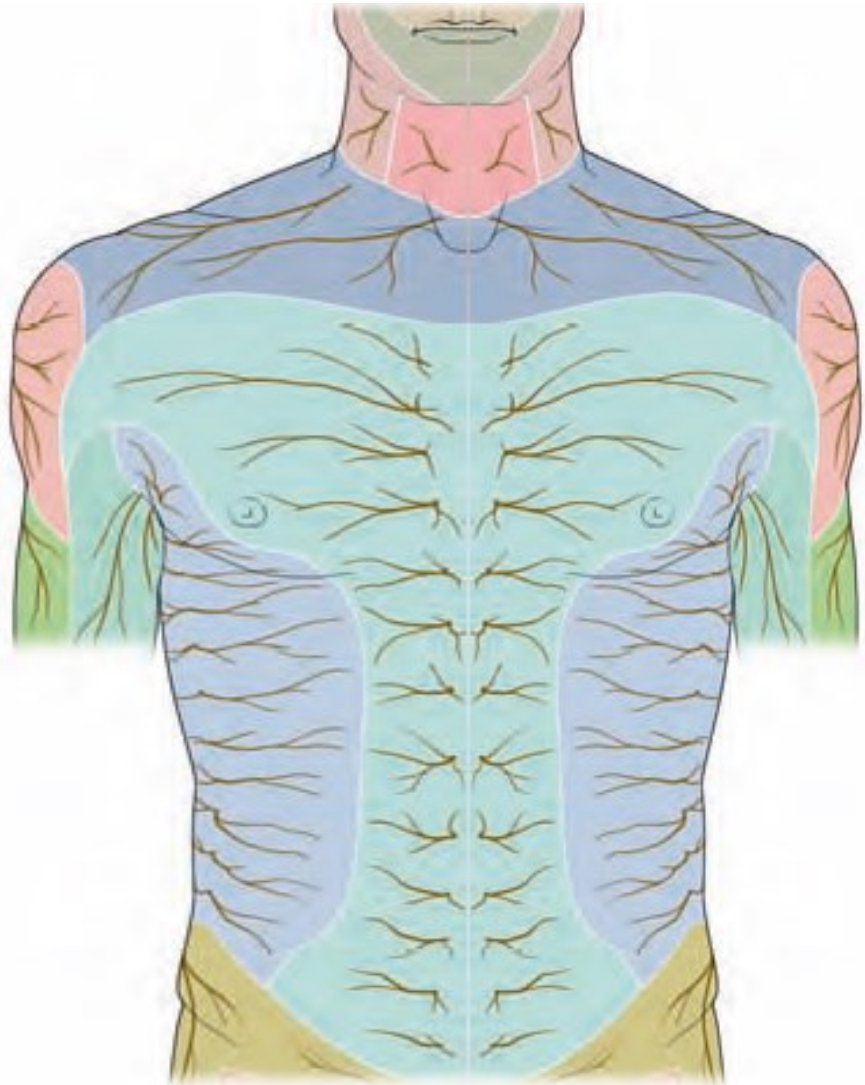
- Each intercostal nerve supplies an oblique band of skin.
- Skin over xiphoid process, for example, is supplied by T6 (lies opposite T9 vertebra).

## Cutaneous Innervation (Dermatomes)



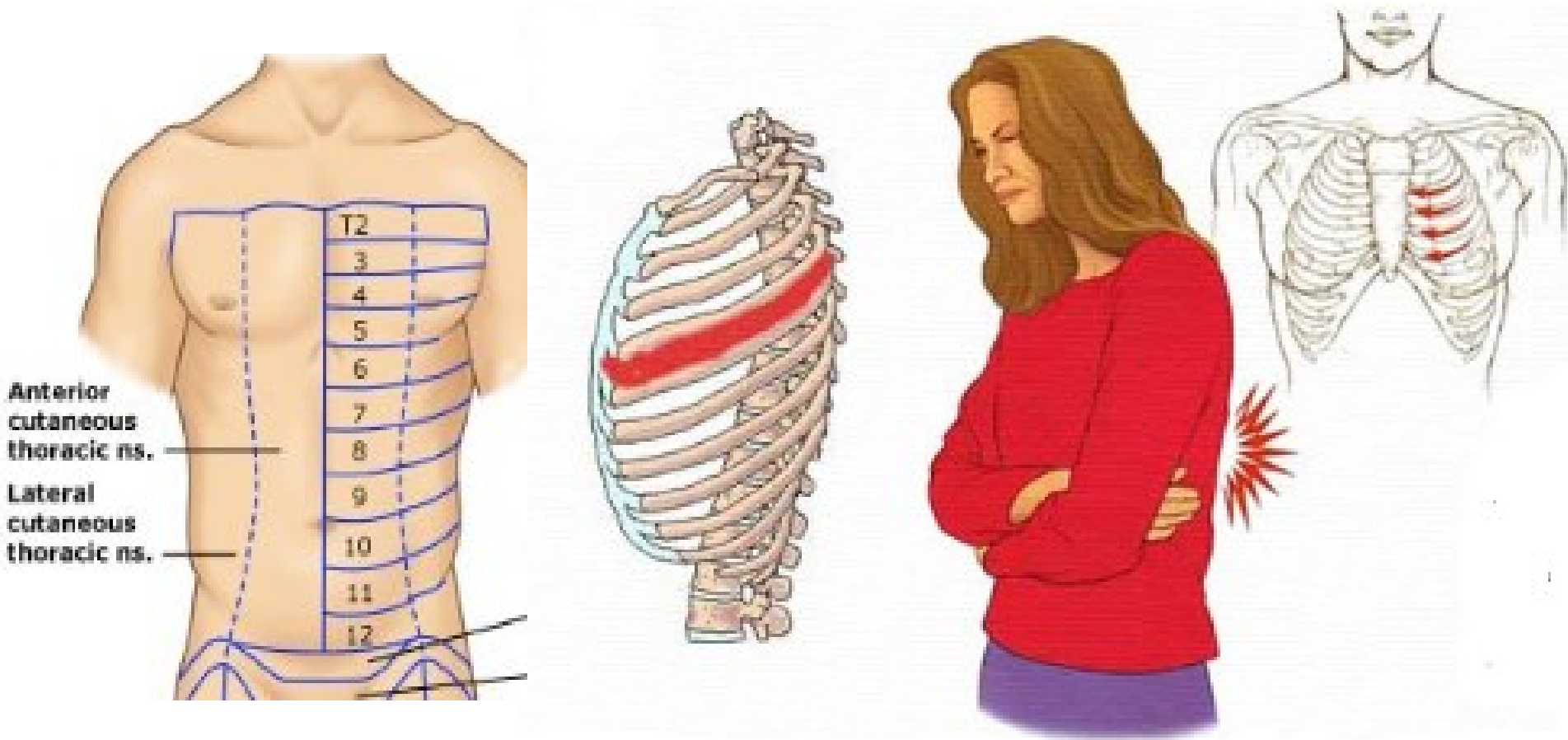
- Skin of posterior thoracic wall is supplied by cutaneous branches of posterior 1ry rami of thoracic nerves.

## Cutaneous Innervation (Dermatomes) of Thoracic Wall



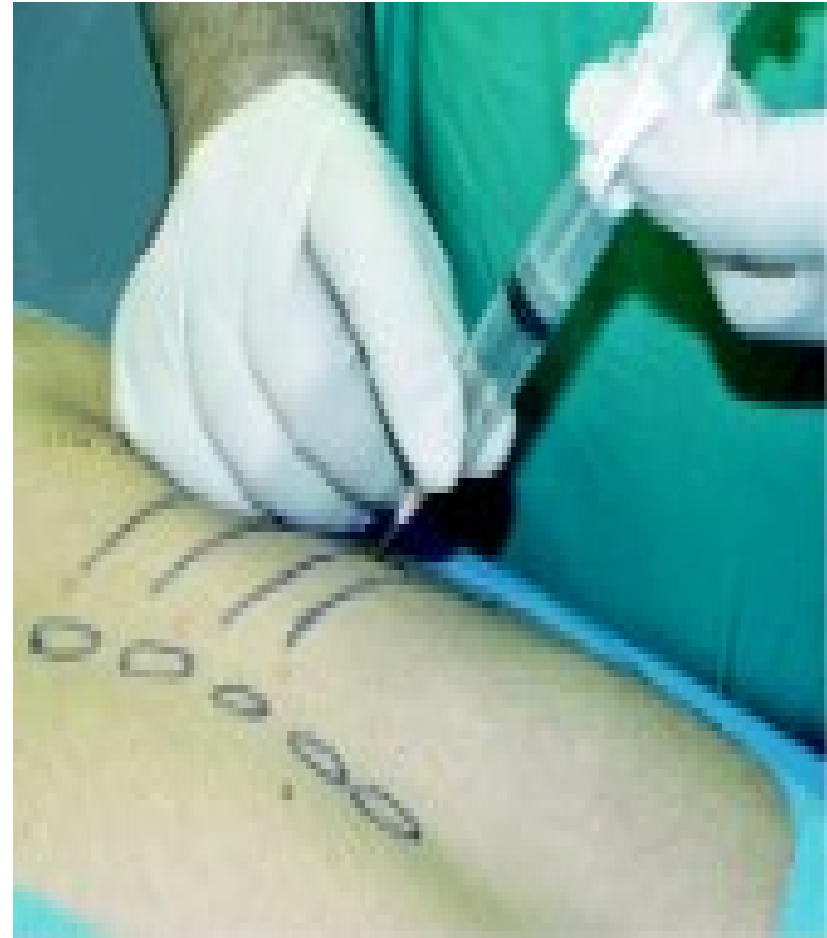
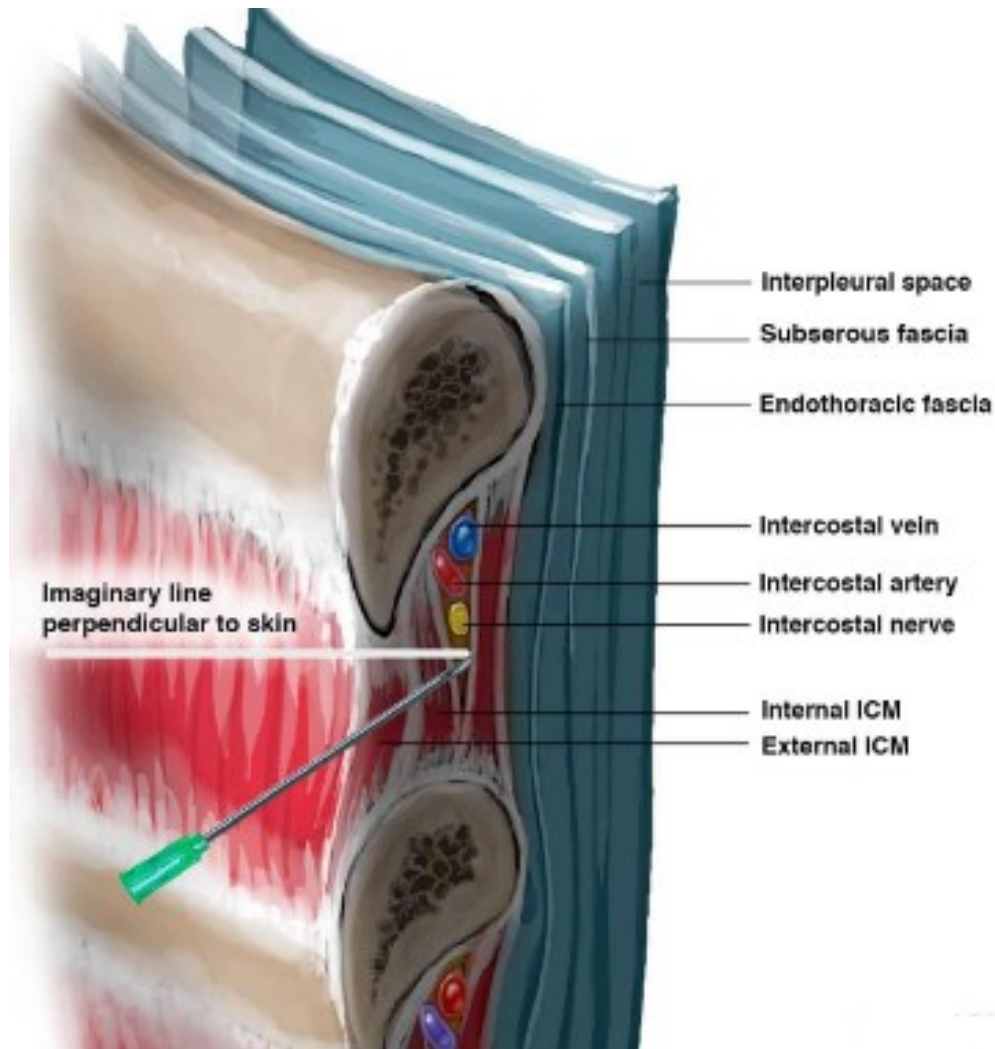
- The lower 5 intercostal nerves and the subcostal nerve extend into the abdominal wall.

# Irritation of intercostal nerve



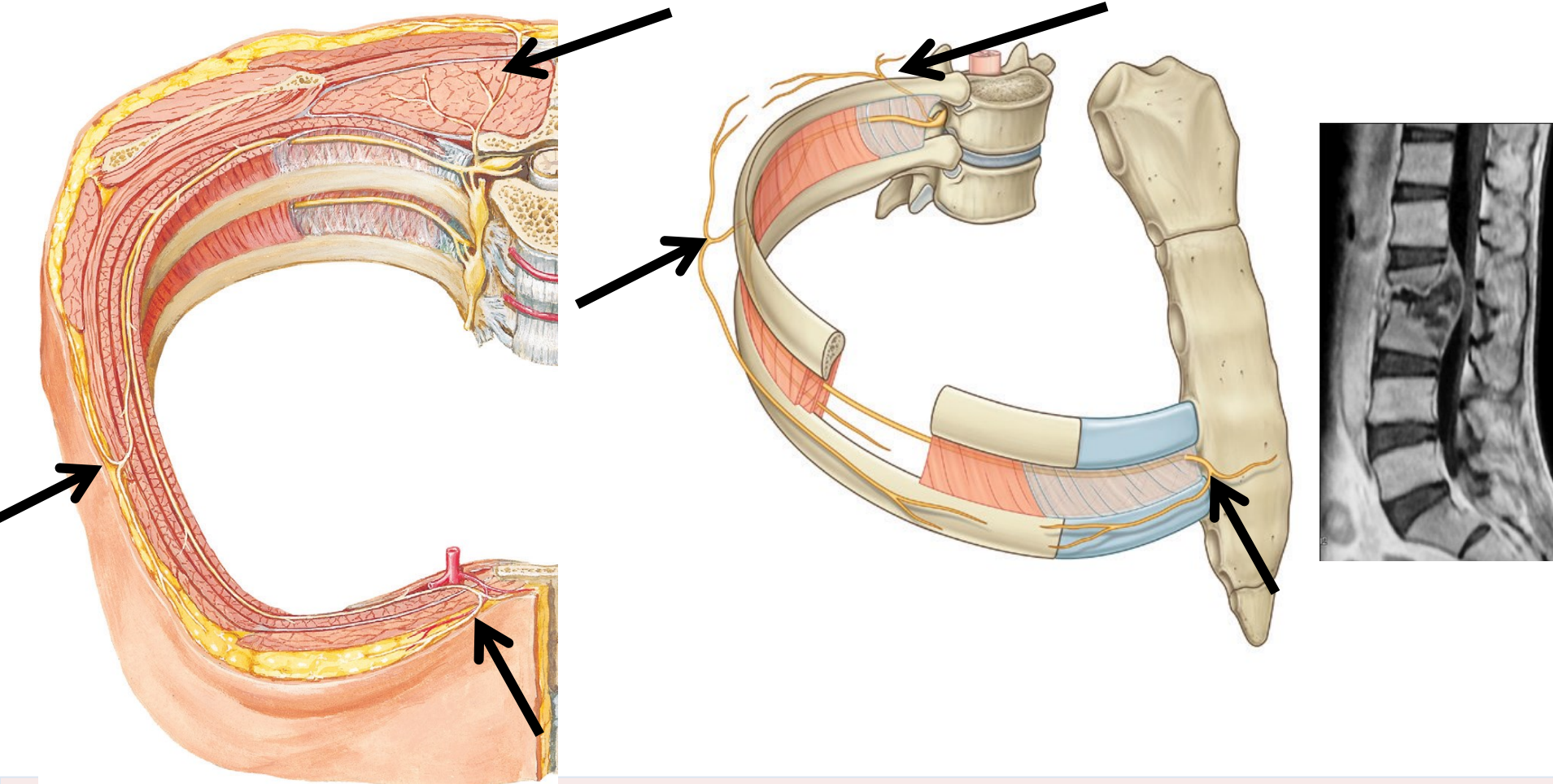
A lesion involving an intercostal nerve causes severe **referred** pain at its cutaneous distribution (????? Pain in anterior abdominal wall)  
i.e. areas supplied by its **lateral or anterior cutaneous branches**.

# Intercostal nerve block



Injection of local anesthesia around intercostal nerve can relieve root pain. There is minimal overlap between the intercostal nerves.

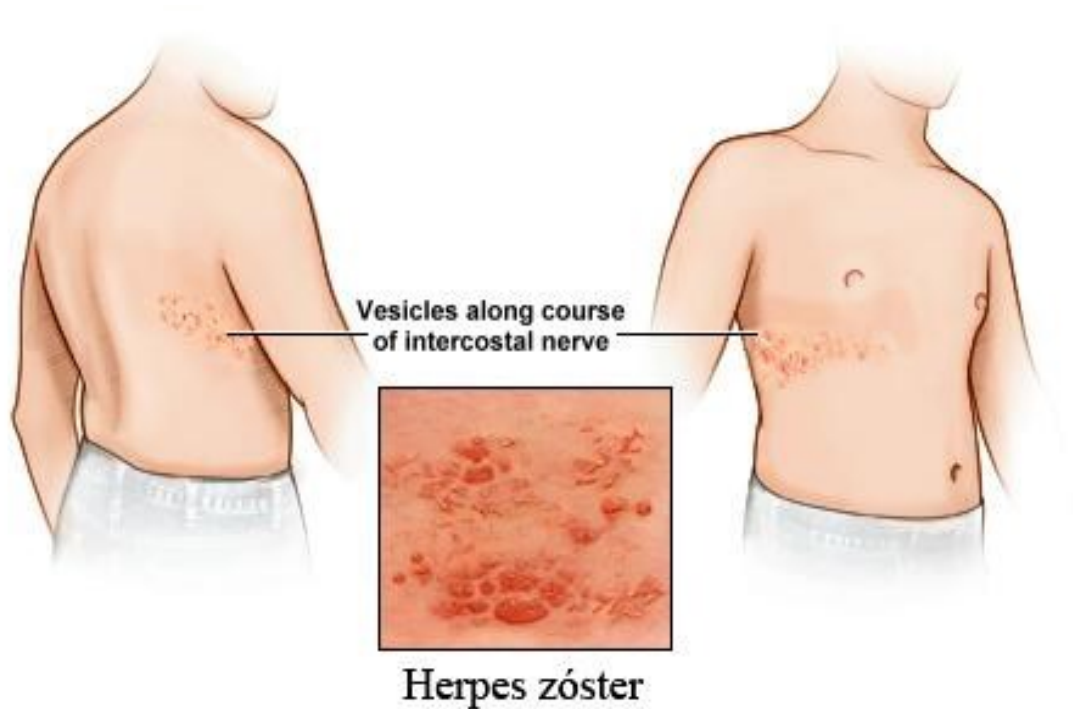
## Pus from the vertebral column follows the neurovascular bundle



Follows the course of neurovascular bundle  
may appear at any of 3 sites of exit of cutaneous branches of thoracic nerve (Pott's disease).

- **Lateral to sacrospinalis** (posterior 1ry ramus).
- **In midaxillary line** (lateral branch).
- **Lateral to sternum** (anterior branch).

# Infection with herpes zoster virus



The intercostal nerves may be infected by a virus called **herpes zoster**; severe burning sensation and a red strip of skin with small vesicles appear along the course of the affected nerve.

## Anterior Intercostal arteries

**9 pairs** of anterior intercostal a: 2 in each space, on each side.

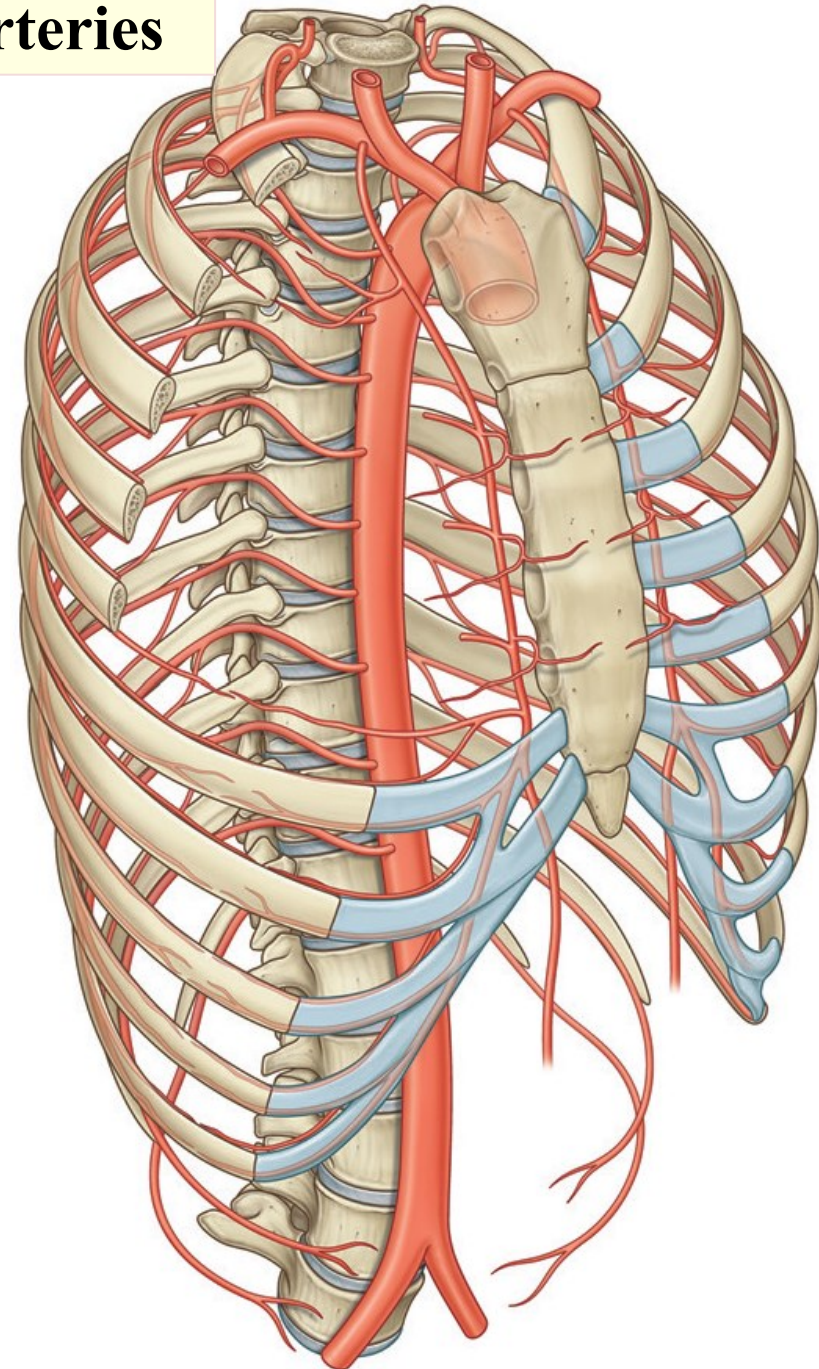
There are no anterior intercostal a in lower 2 spaces (10th and 11th) (incomplete anteriorly).

### **Origin:**

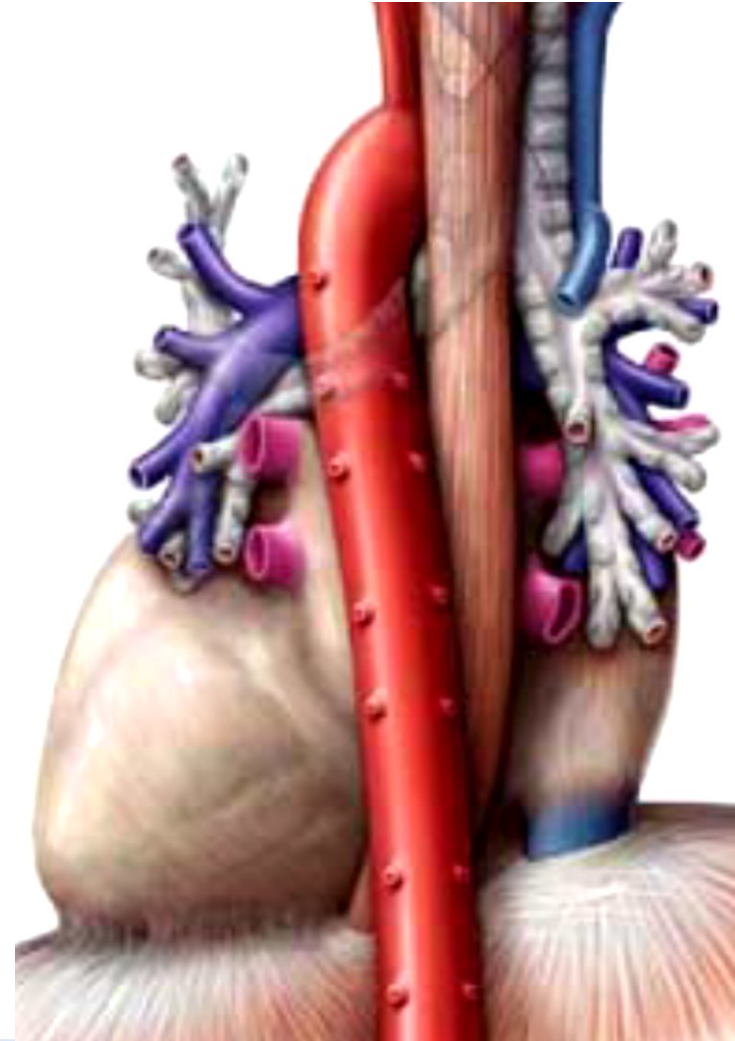
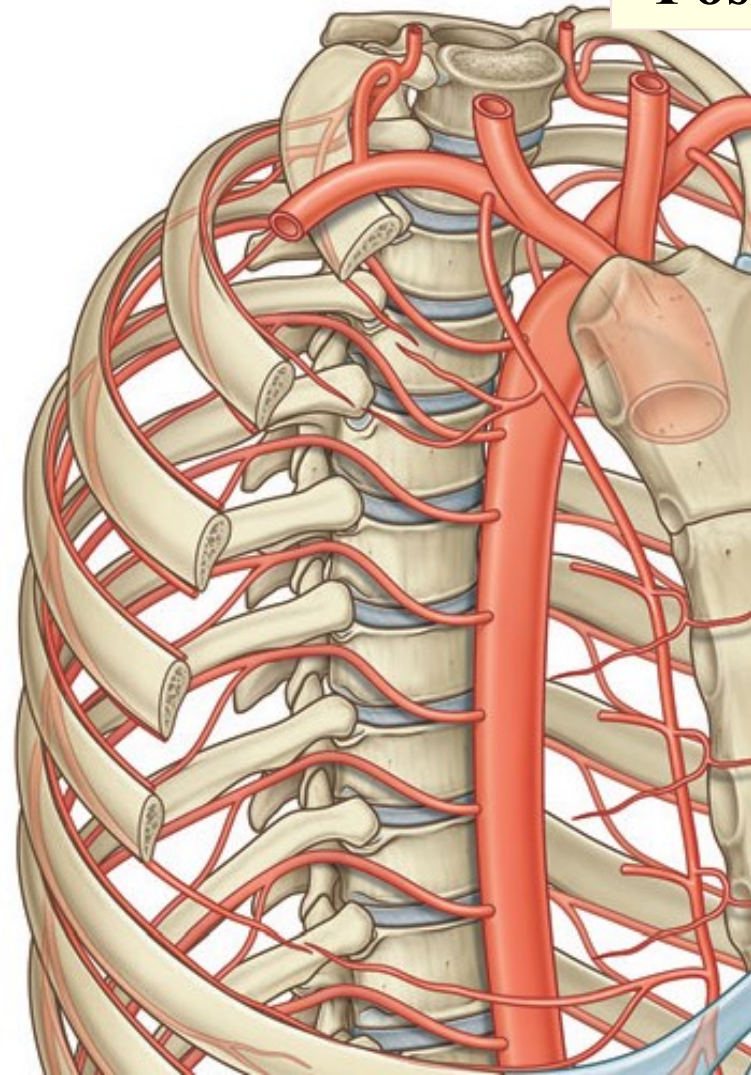
**upper 6 pairs** of arteries arise from **internal thoracic a.** (internal mammary).

**7th, 8th and 9th** pairs arise from **musculophrenic a.**

**Course and termination:** each pair of arteries enters its space at its anterior end and runs laterally to end by anastomosing with corresponding posterior intercostal artery and its collateral branch.



## Posterior Intercostal arteries



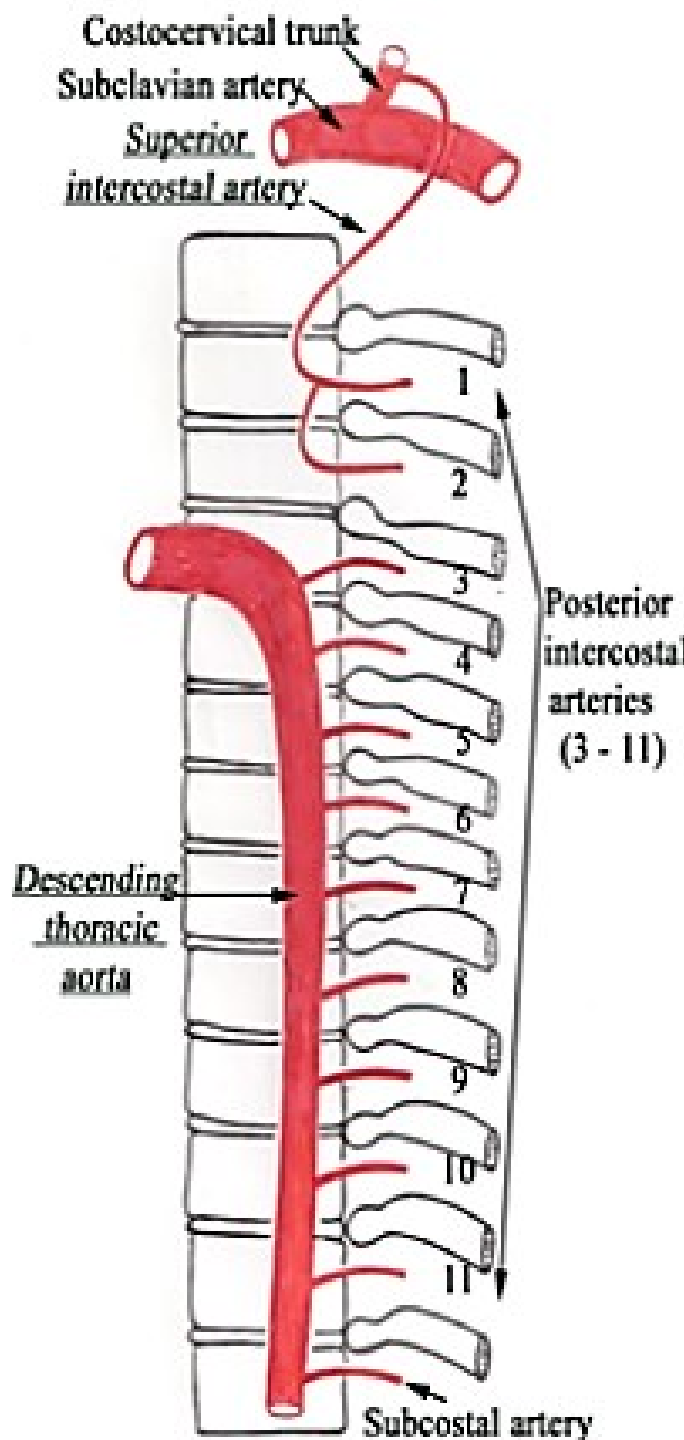
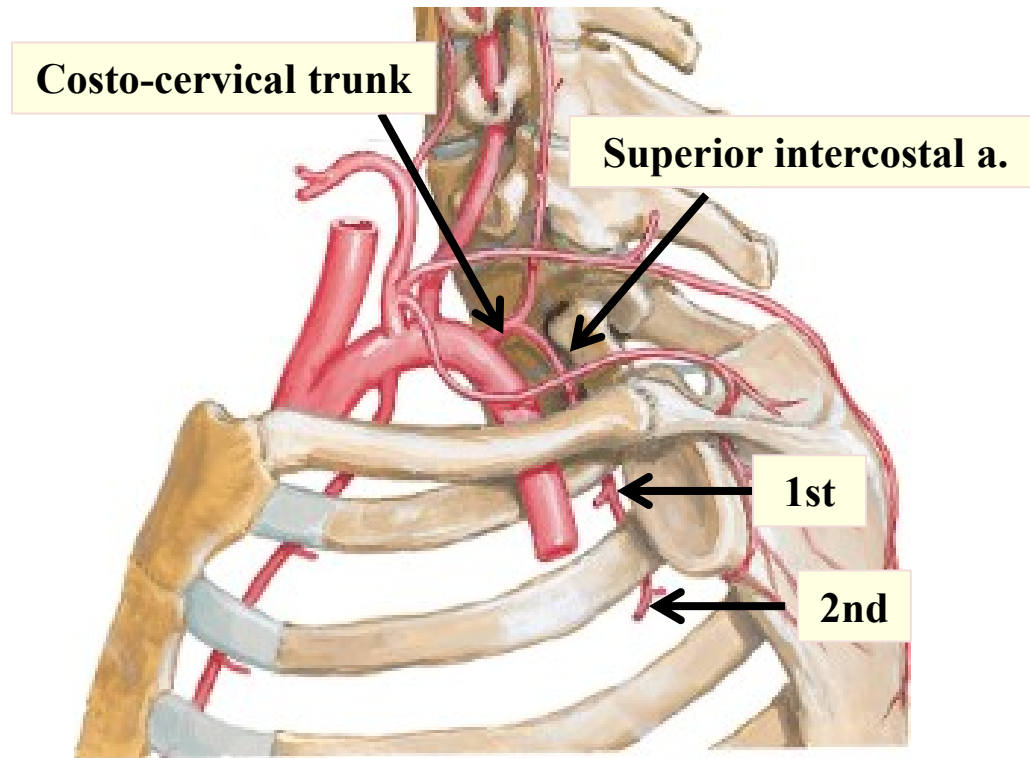
11 posterior intercostal arteries, 1 in each space 12<sup>th</sup> posterior a. runs along lower border of 12<sup>th</sup> rib (**subcostal**)

### Origin:

1<sup>st</sup> and 2<sup>nd</sup> posterior intercostal a. arise from **superior intercostal a.**; a branch of costocervical trunk of 2<sup>nd</sup> part of subclavian a.

**Lower 9 posterior intercostal (3<sup>rd</sup> to 11<sup>th</sup>) and subcostal artery are branches of descending thoracic aorta.**

# Posterior Intercostal arteries

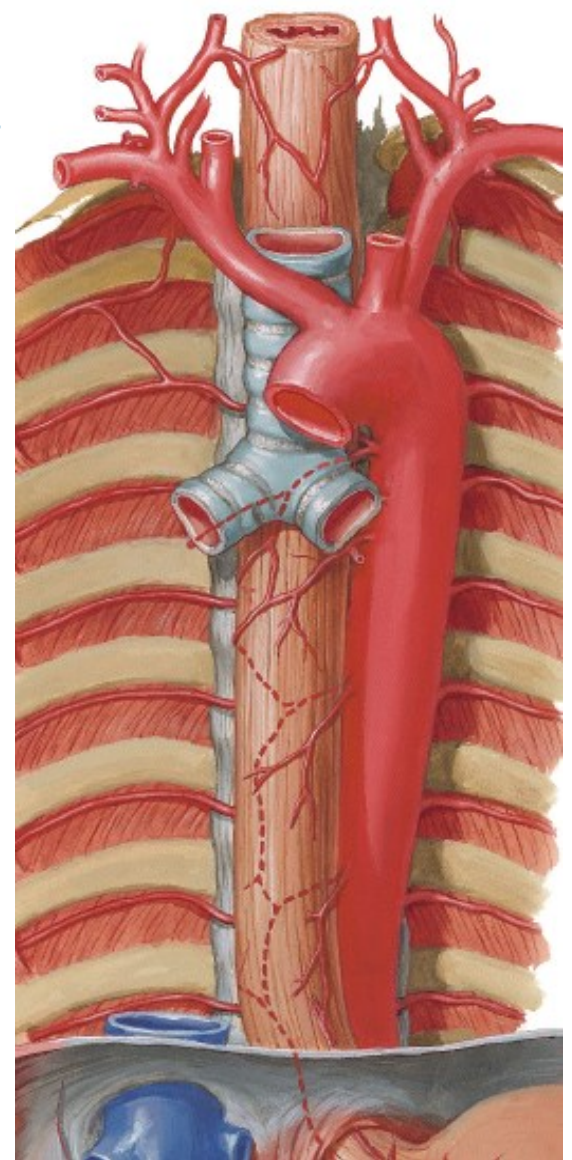
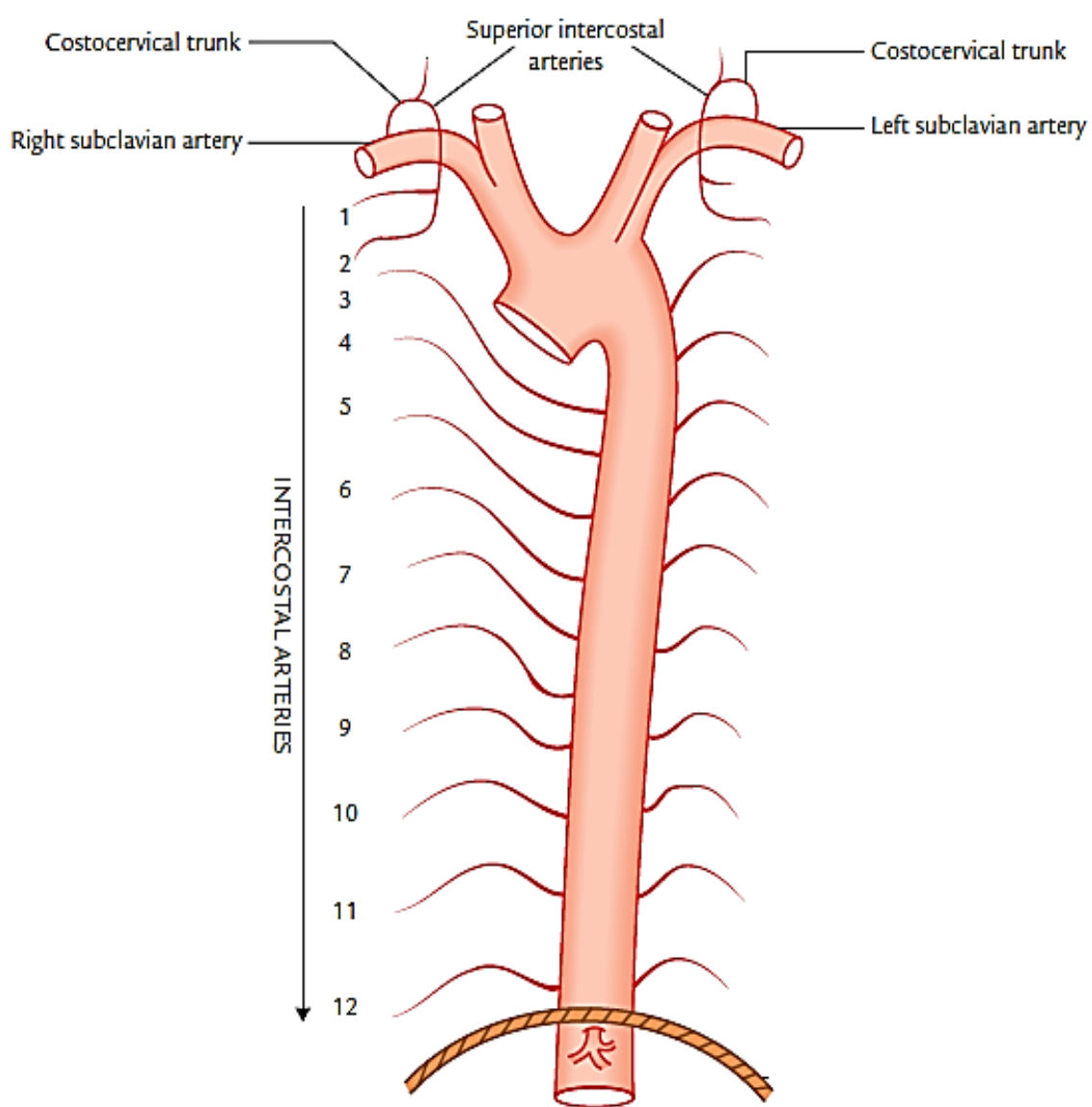


**11** posterior intercostal arteries, 1 in each space  
**12<sup>th</sup>** posterior a. runs along lower border of 12<sup>th</sup> rib (**subcostal**).

**1<sup>st</sup> and 2<sup>nd</sup> posterior intercostal a.** arise from **superior intercostal a.**; a branch of costocervical trunk (CC) of 2<sup>nd</sup> part of subclavian a.

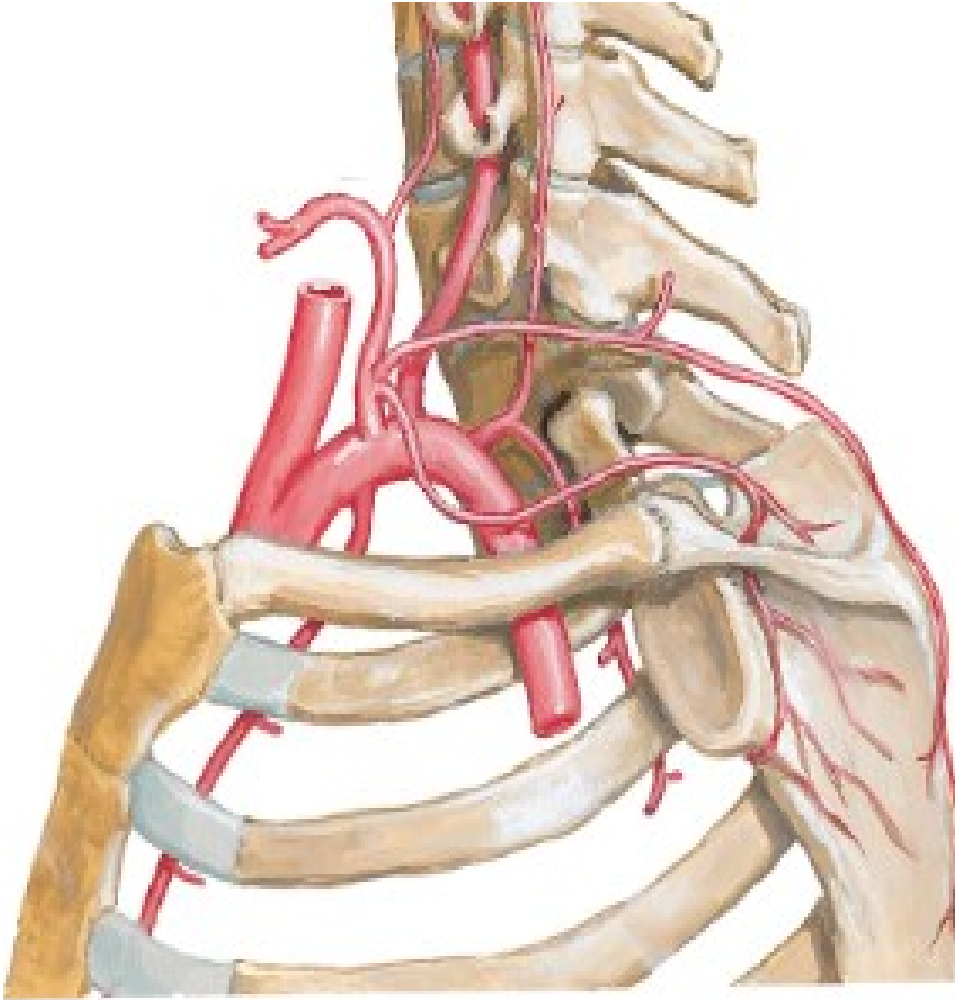
**Lower 9 posterior intercostal ( 3<sup>rd</sup> to 11<sup>th</sup>) and subcostal** arise from **descending thoracic aorta.**

(descending thoracic aorta starts at level of T4)

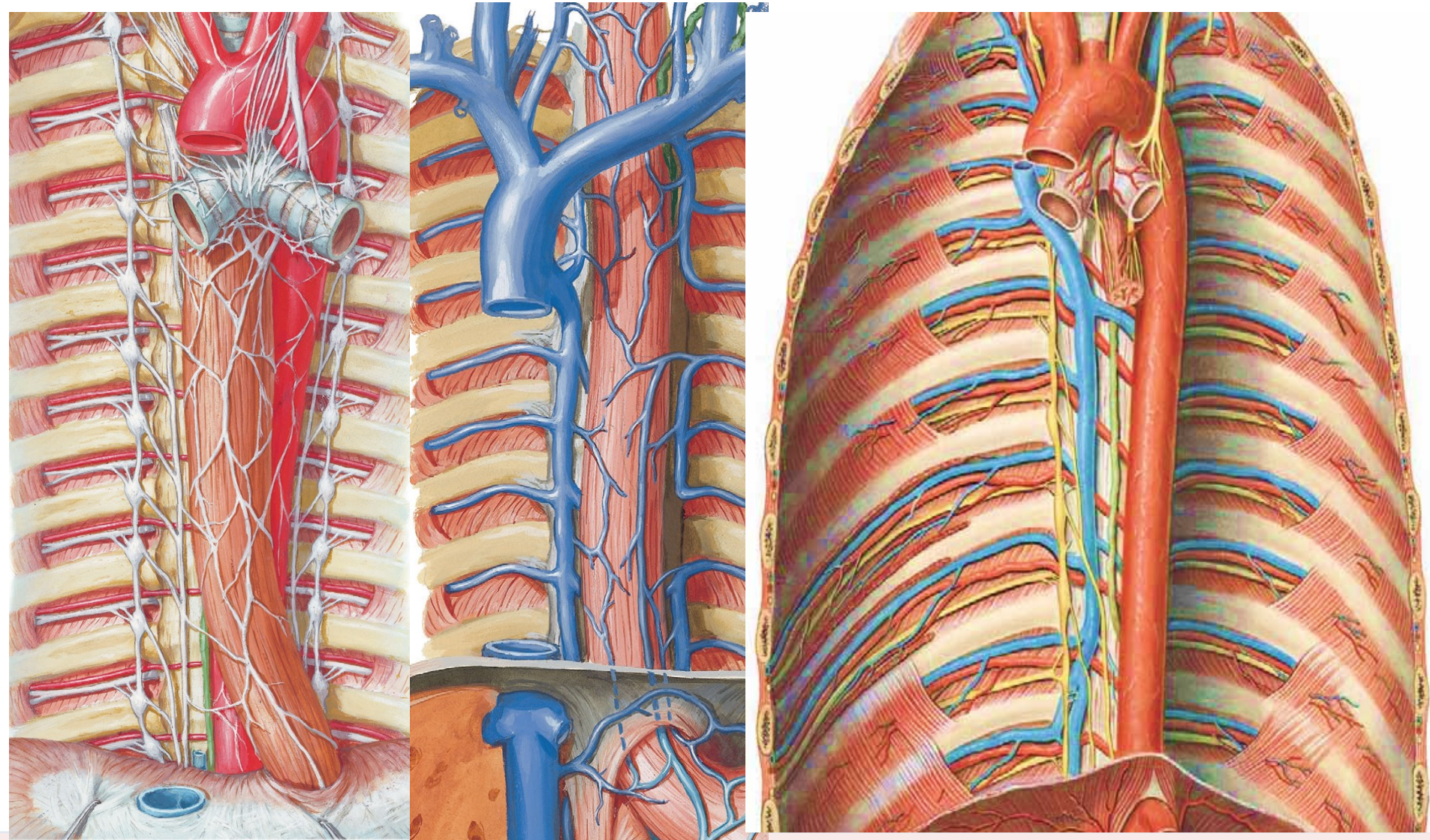


**1<sup>st</sup> and 2<sup>nd</sup> posterior intercostal a. arise from superior intercostal a; a branch of costocervical trunk of 2<sup>nd</sup> part of subclavian a.**  
**Lower 9 posterior intercostal ( 3<sup>rd</sup> to 11<sup>th</sup>) and subcostal artery are branches of descending thoracic aorta.**

# Anastomoses of Posterior Intercostal Arteries



- 1)The anterior intercostal arteries and hence 1st part of subclavian artery:** by the main artery and its collateral branch in the intercostal spaces.
- 2)Arteries sharing in anastomosis around scapula (1st part of subclavian artery and 3rd part of axillary artery)** by dorsal and lateral cutaneous branches.

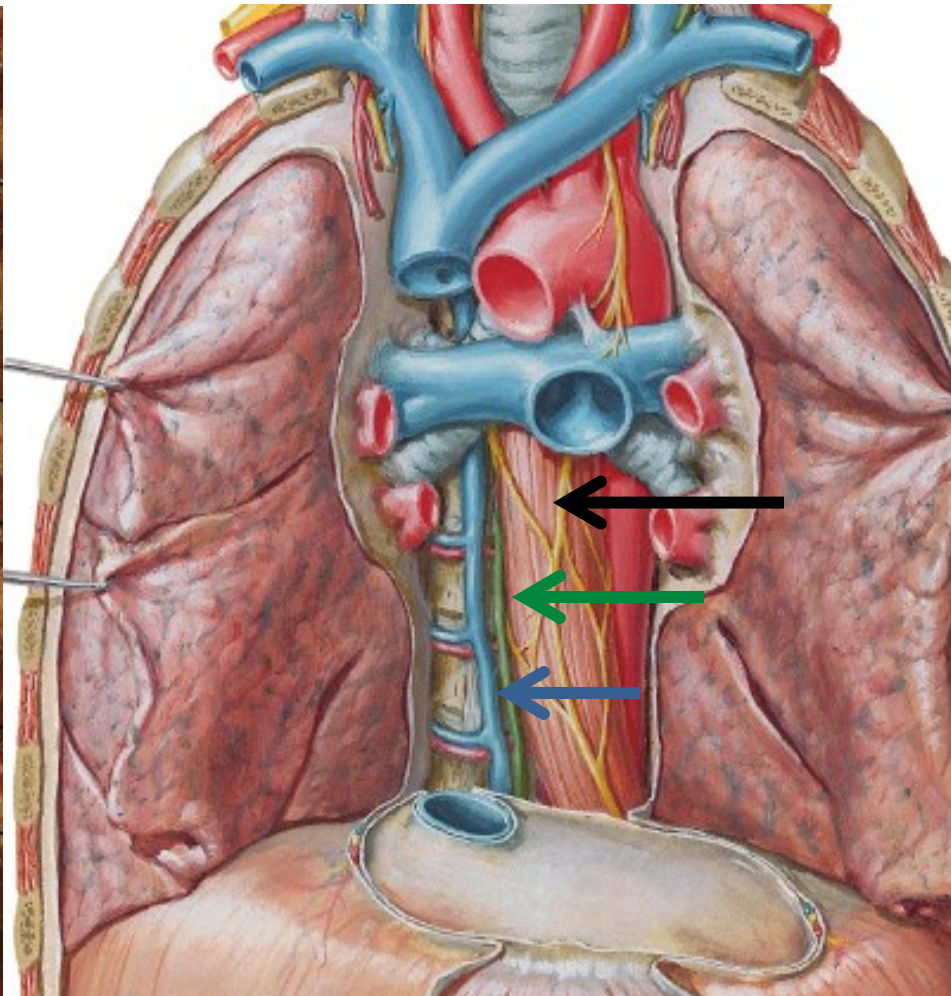
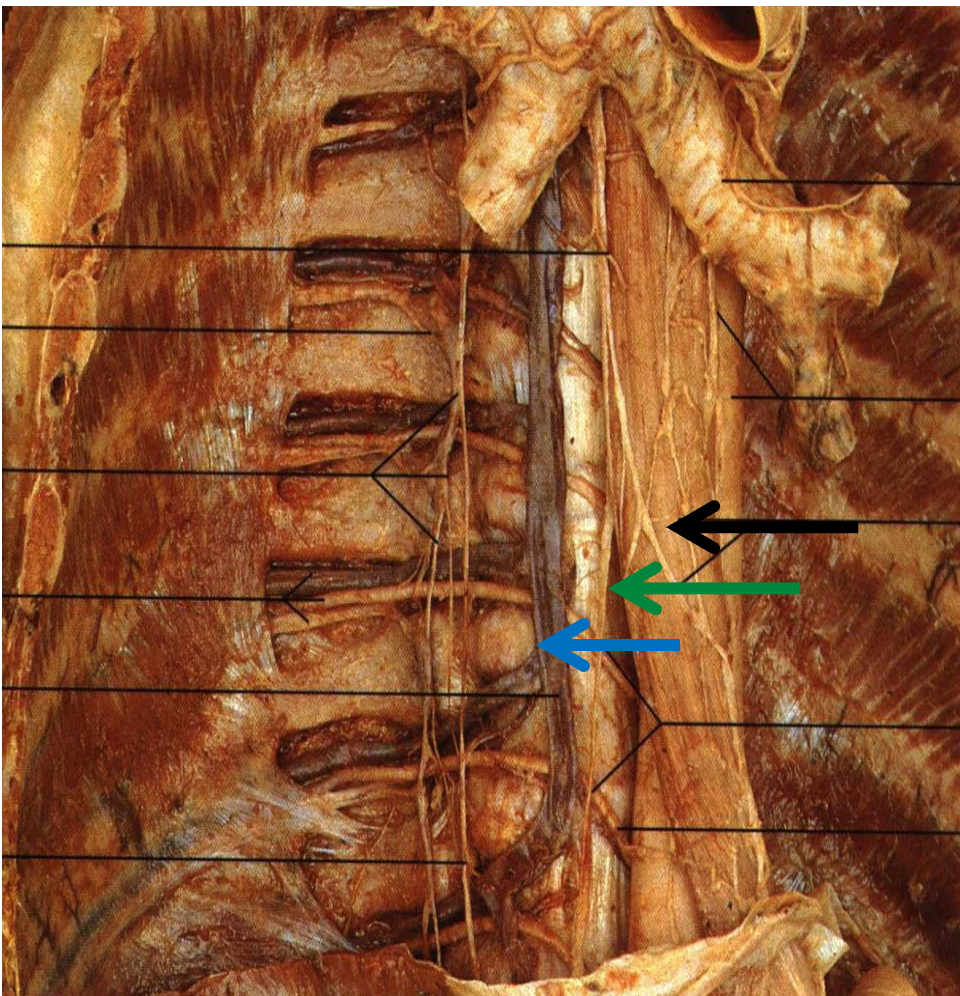


**At posterior part of intercostal space (medial to angle of rib):**

**Right** arteries cross midline in front of vertebral column then behind esophagus, thoracic duct & azygos vein.

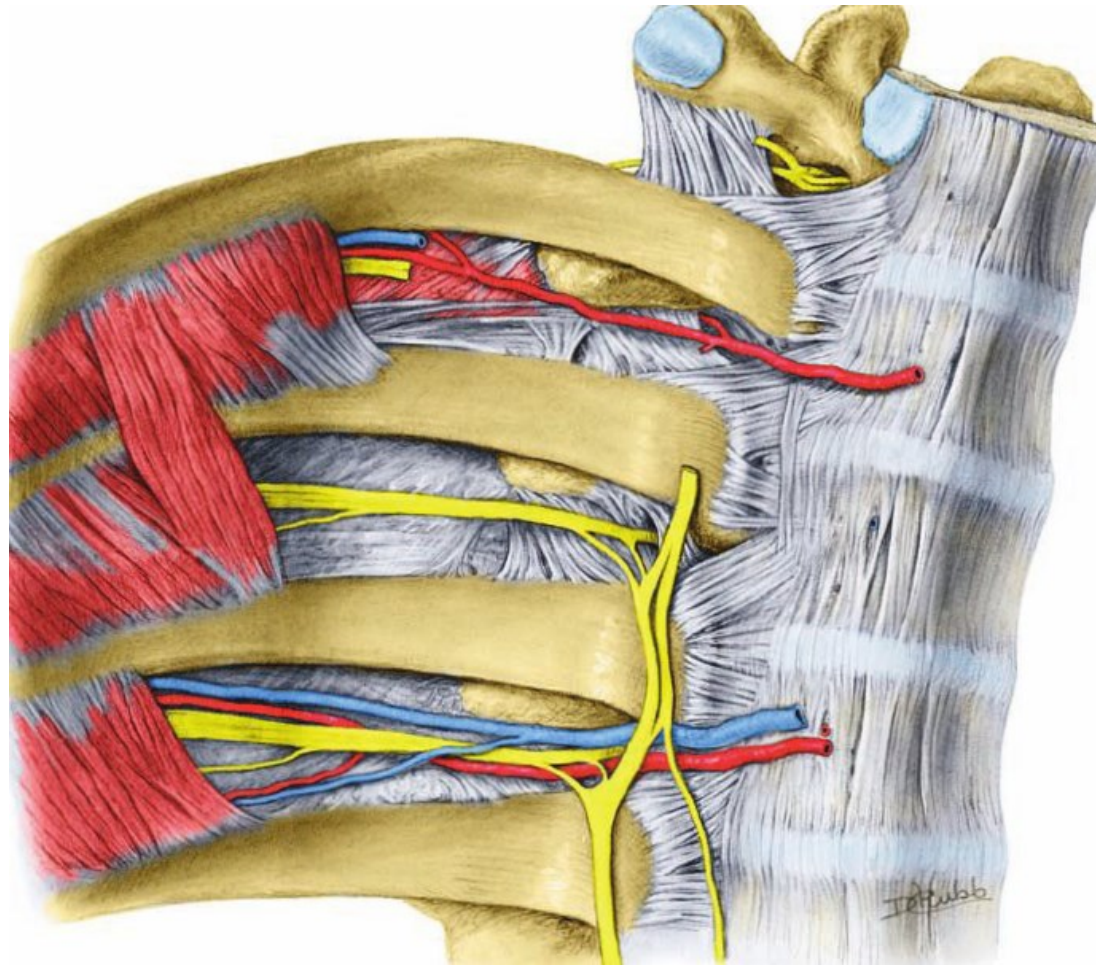
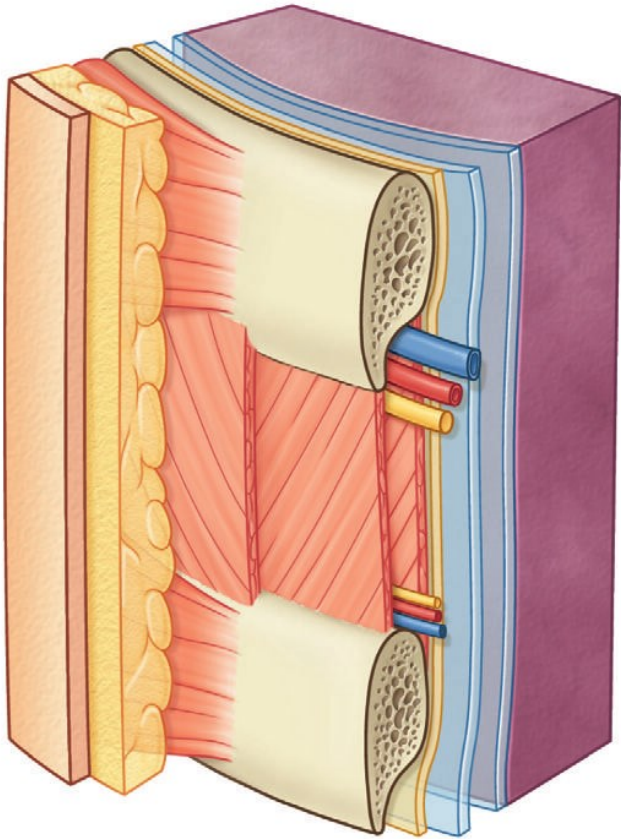
**Left** arteries pass behind hemiazygos veins.

**On both sides,** pass behind sympathetic chain & parietal pleura.

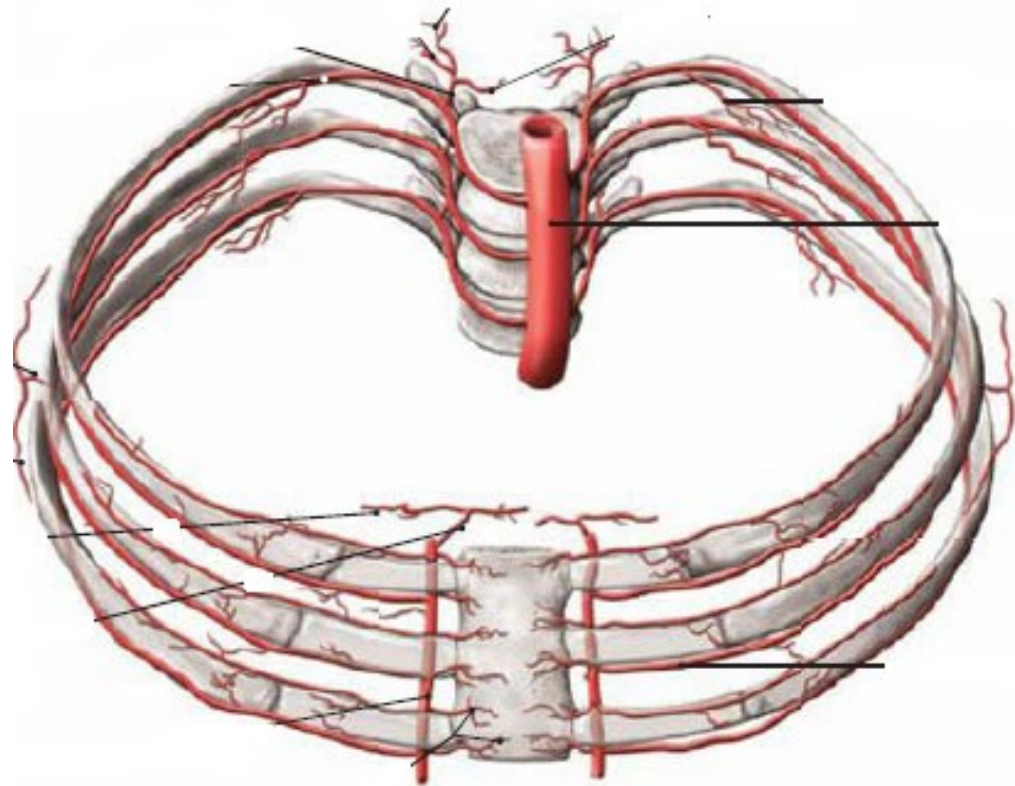
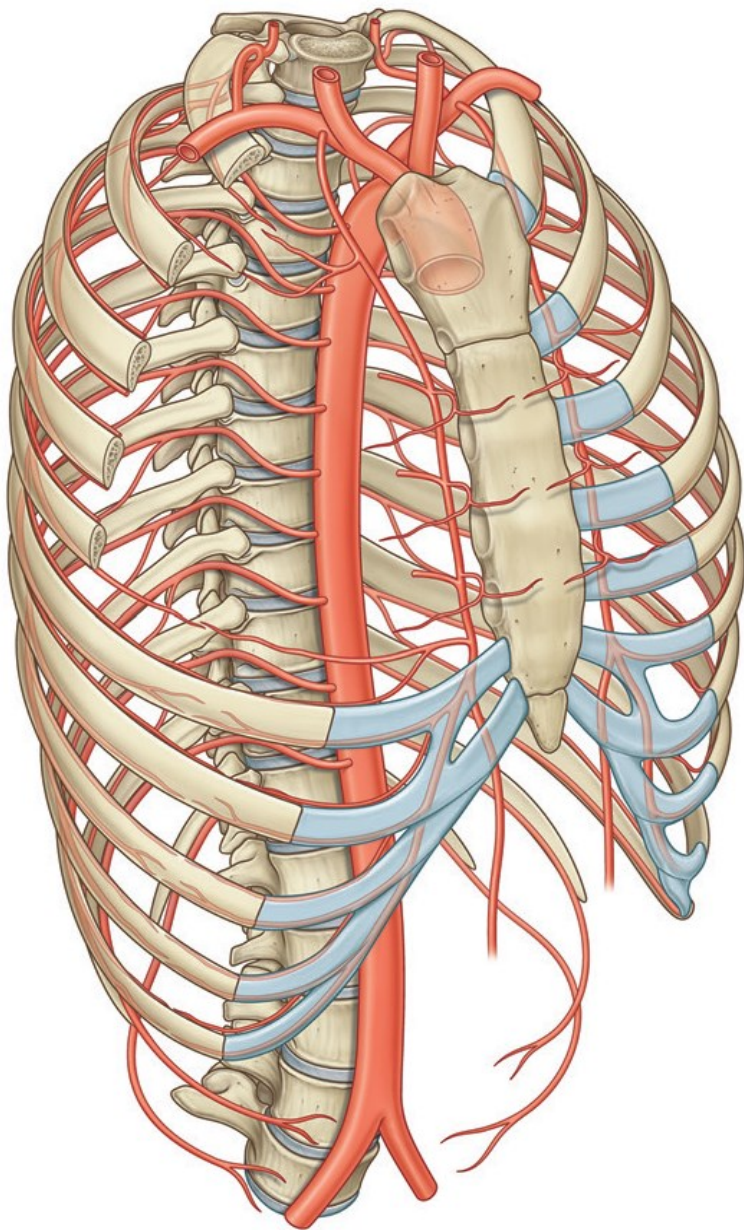


The **right** posterior arteries cross the midline-----in front of vertebral column  
 -----behind the esophagus, thoracic duct and azygos vein.

## Course, relations and termination of Posterior Intercostal arteries



**In the intercostal space:** From angle of rib onwards- in costal groove- in neurovascular plane between internal and innermost intercostal ms. In neurovascular bundle (VAN) .



Each artery **ends** anteriorly by anastomosing with uppermost of corresponding ant. intercostal a.  
**Lower 2** posterior intercostal arteries and **subcostal** artery pass into **anterior abdominal wall**.  
 Right posterior intercostal arteries are longer than the left???

## Branches:

### 1- Dorsal branch:

Arises near the neck of the rib and passes backwards to supply the muscles of the back. It gives also a **spinal branch** to spinal cord. The upper dorsal branches anastomose with the deep branch of the transverse cervical artery along medial border of the scapula.

### 2- Collateral branch:

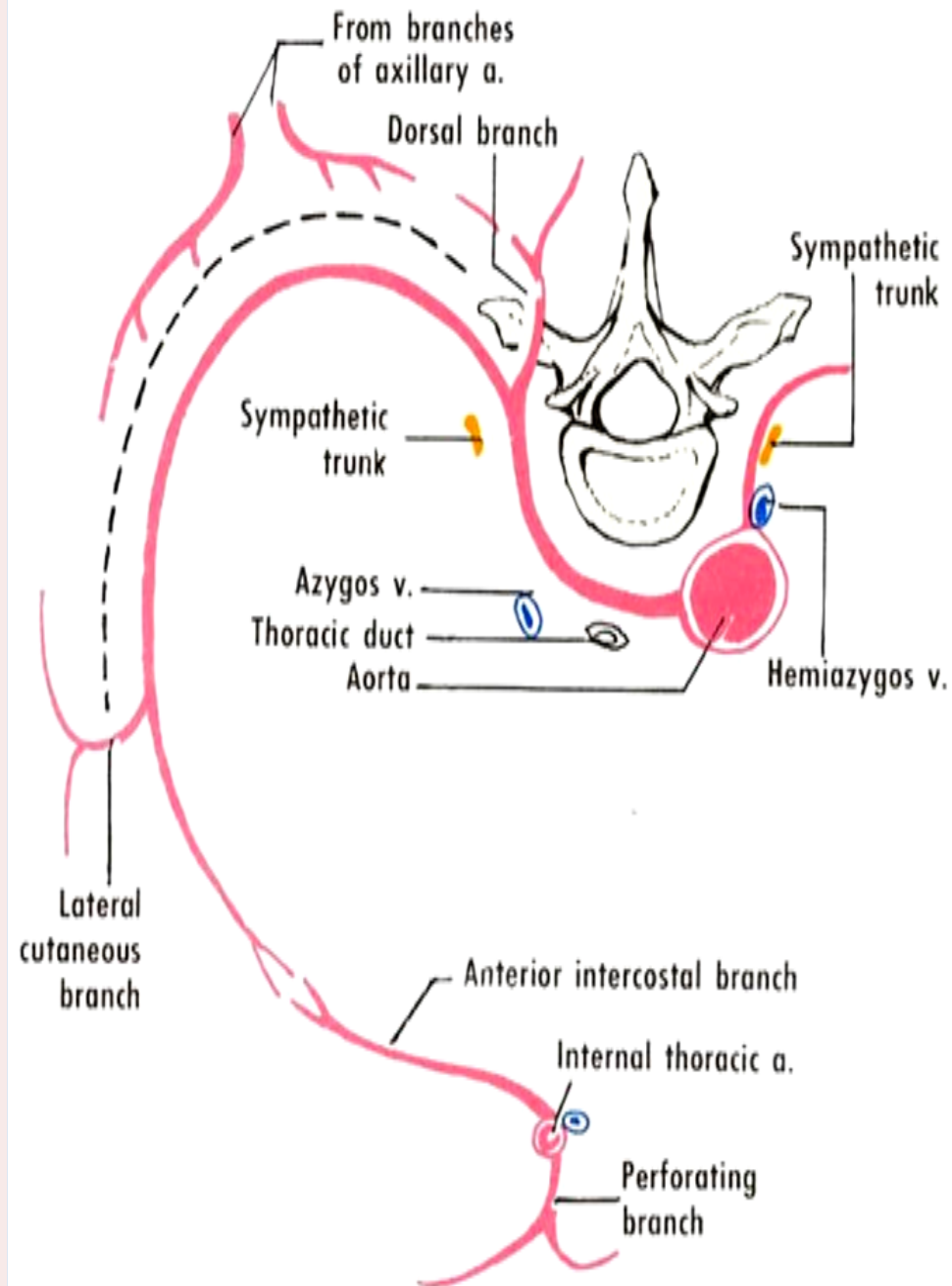
Arises near angle of rib and runs forwards along upper border of rib below together with collateral branch of the intercostal nerve. It anastomoses with lowermost of anterior intercostal arteries of the corresponding space.

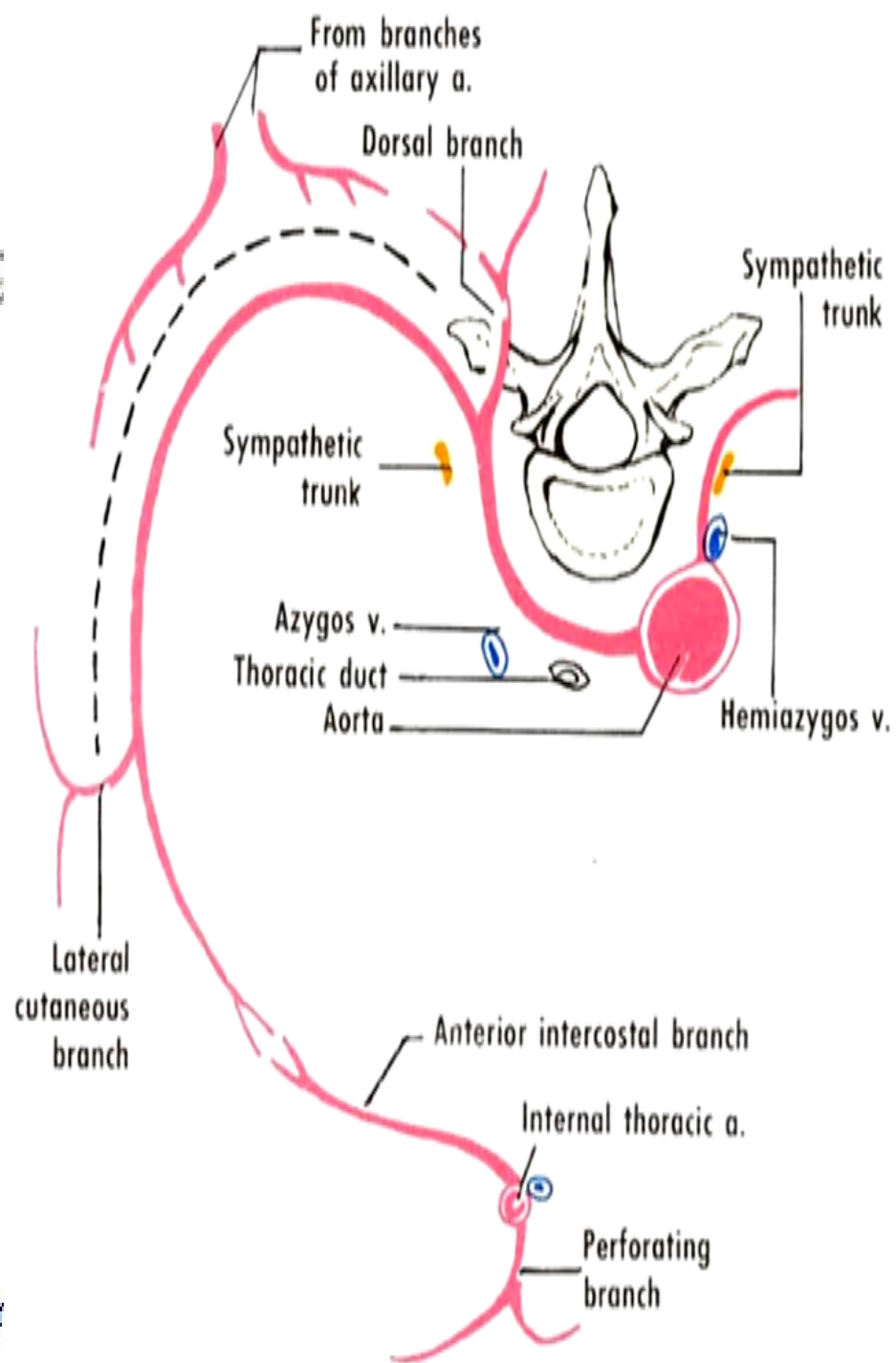
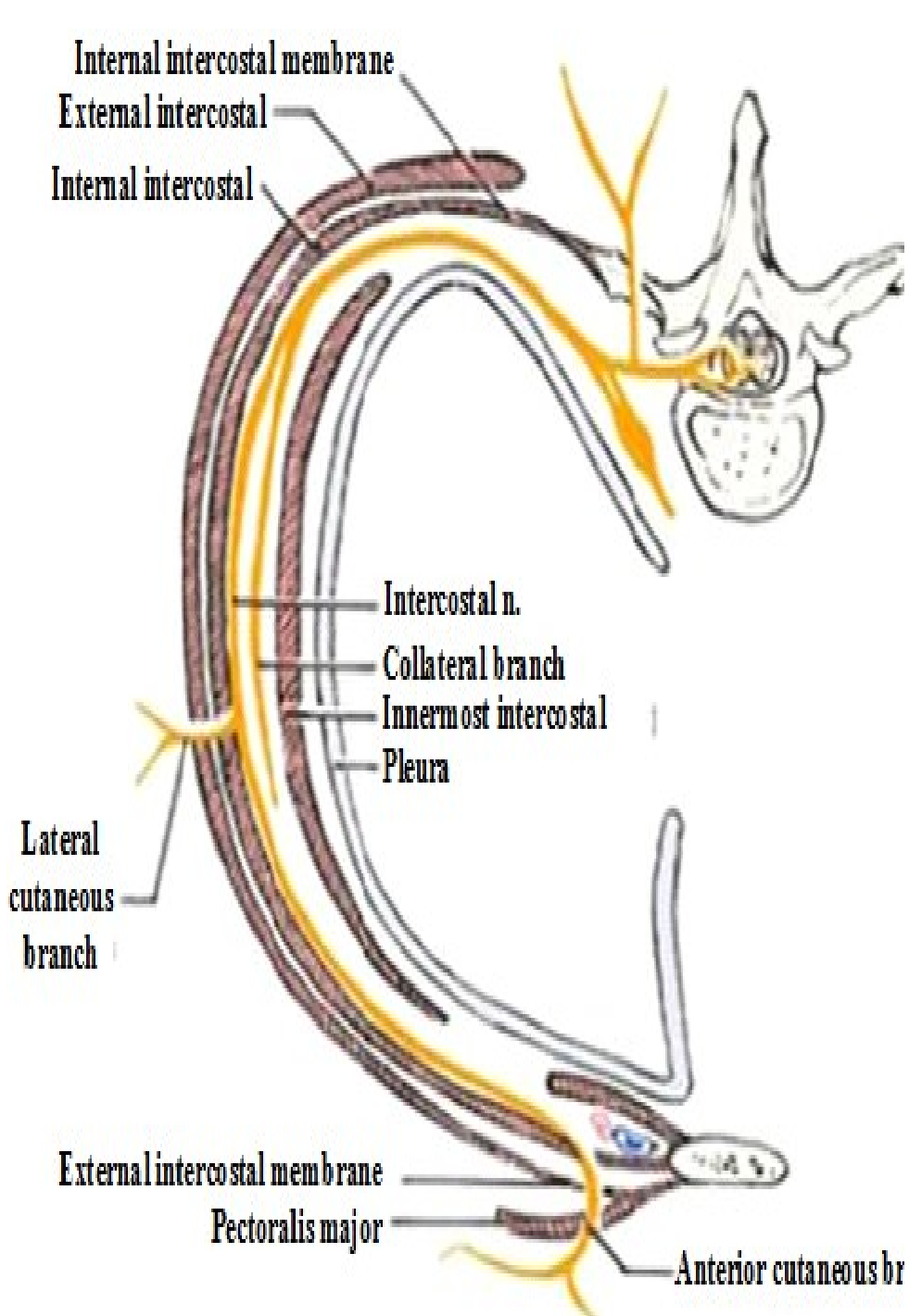
### 3- Lateral cutaneous branch:

Arises near angle of rib and accompanies lateral cutaneous branch of intercostal nerve to emerge on side of thorax in midaxillary line. **It joins anastomosis around scapula** (similar to dorsal branch).

### 4- Mammary branches:

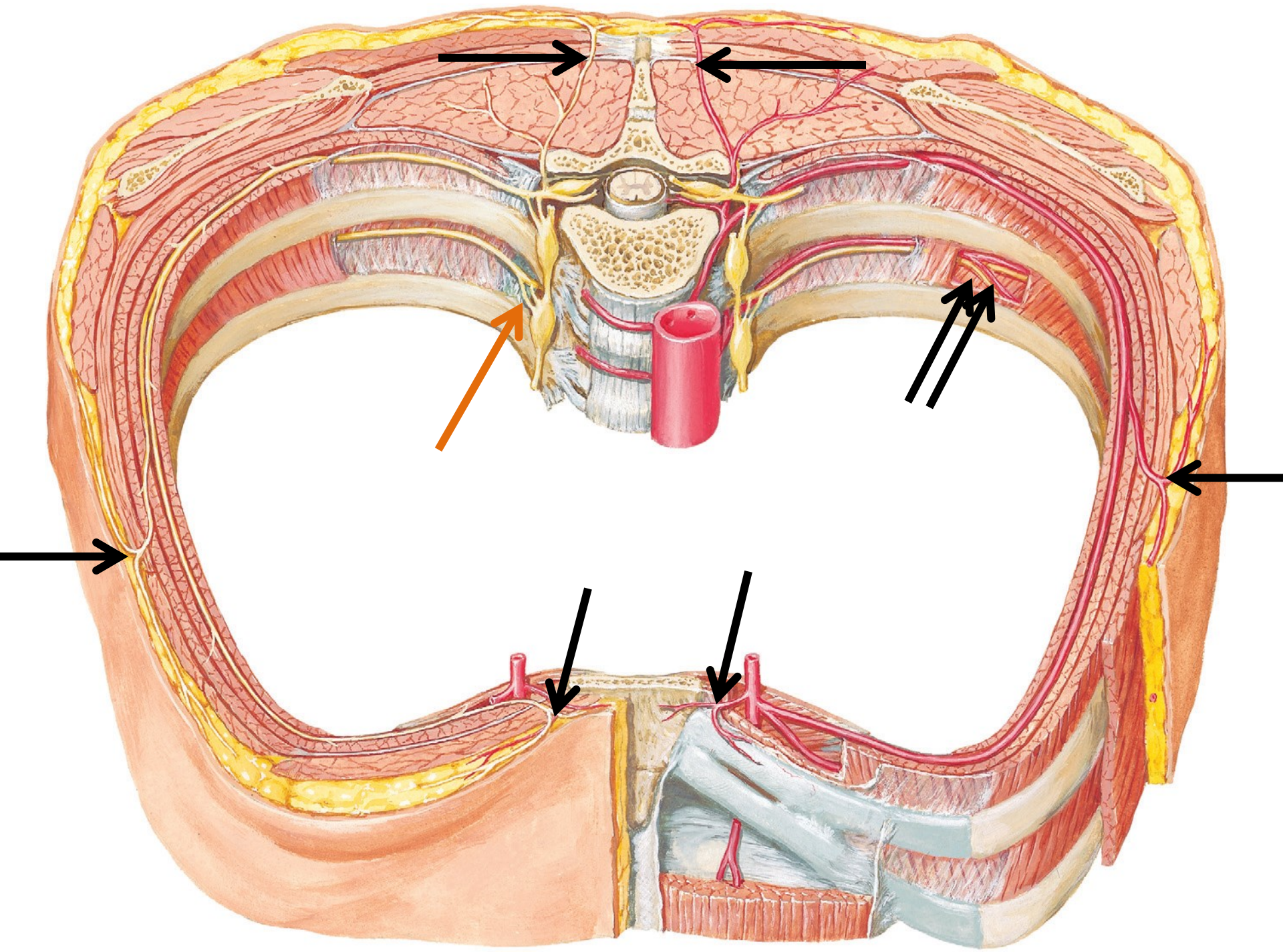
Arise from the 2<sup>nd</sup>, 3<sup>rd</sup> and 4<sup>th</sup> posterior intercostal arteries to supply mammary gland.

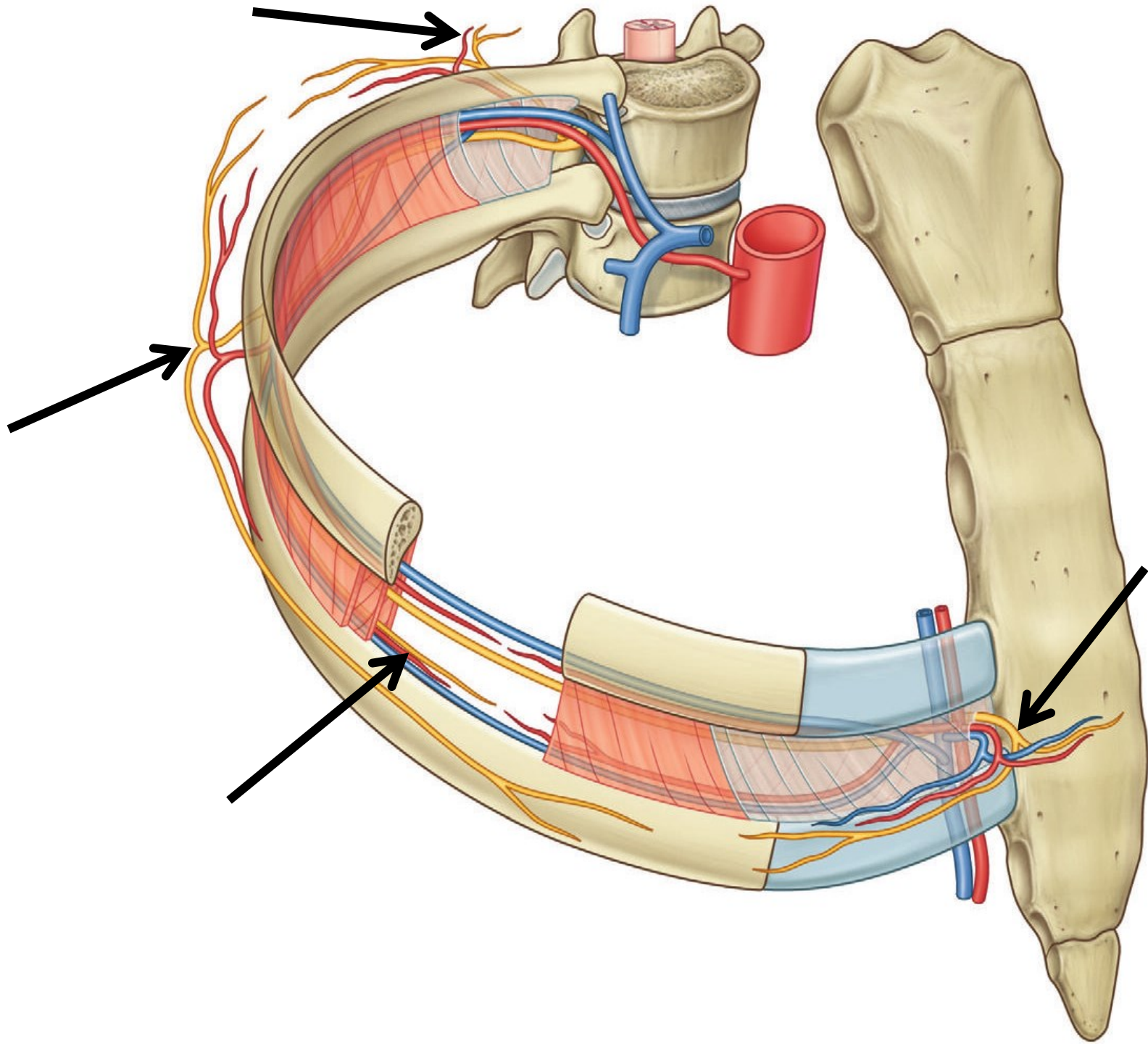




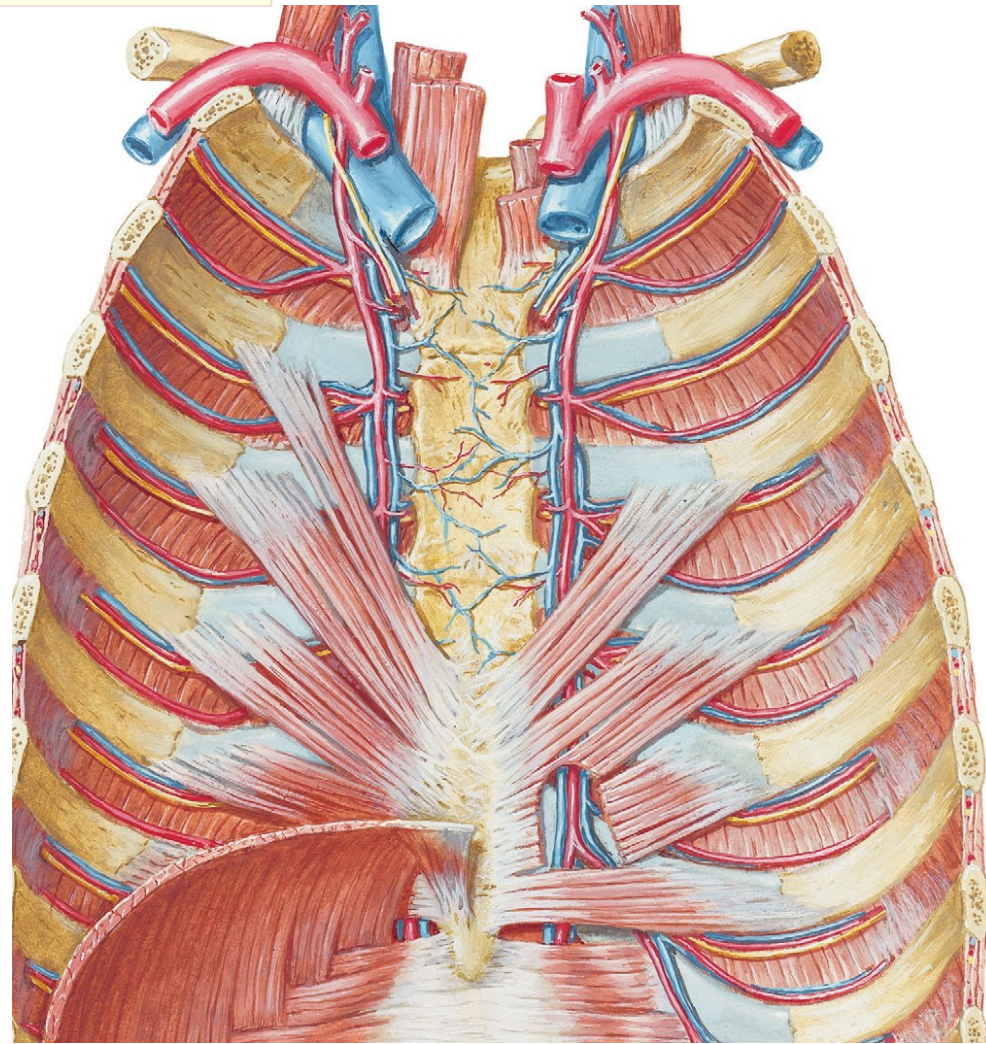
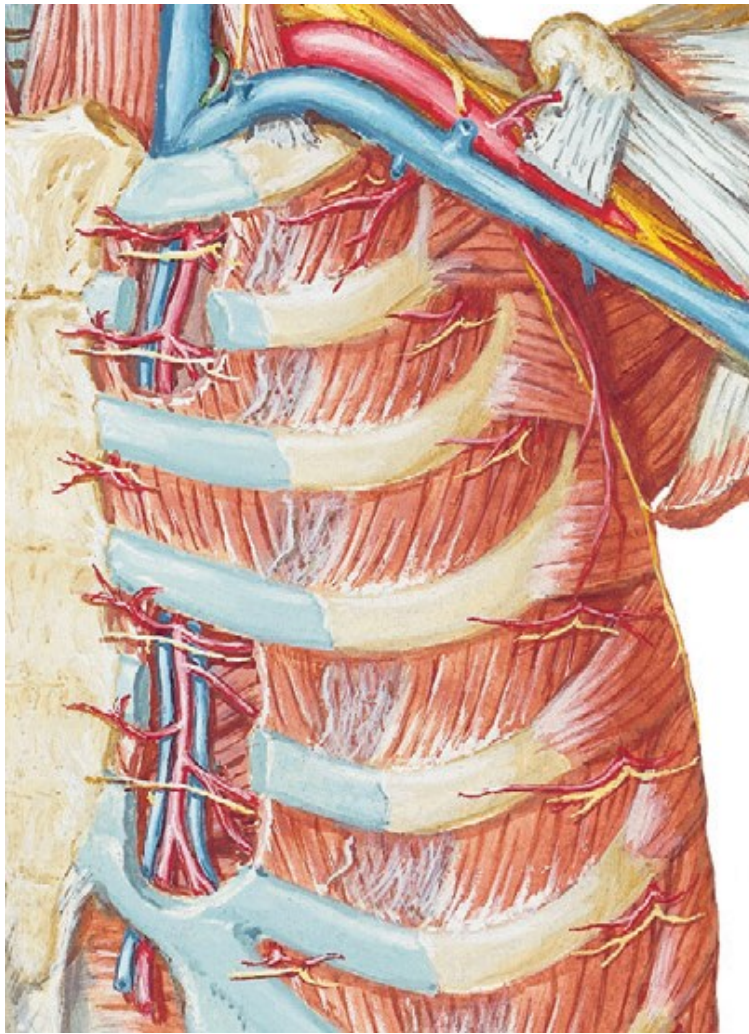
# Complete

- The posterior intercostal arteries arise from.....  
and .....
- The anterior intercostal arteries arise from.....  
and .....





# Internal mammary artery



- In root of neck, from **1<sup>st</sup> part of the subclavian** artery, **1 inch above sternal end of clavicle**.
- Descends downwards and medially behind clavicle, in front of the cervical pleura and apex of the lung.
- Enters the thorax by passing through thoracic inlet behind the 1<sup>st</sup> costal cartilage.
- Descends vertically behind upper 6 costal cartilages and intervening intercostal spaces,
- **Ends** opposite 6<sup>th</sup> space by dividing into: superior epigastric and musculophrenic arteries.

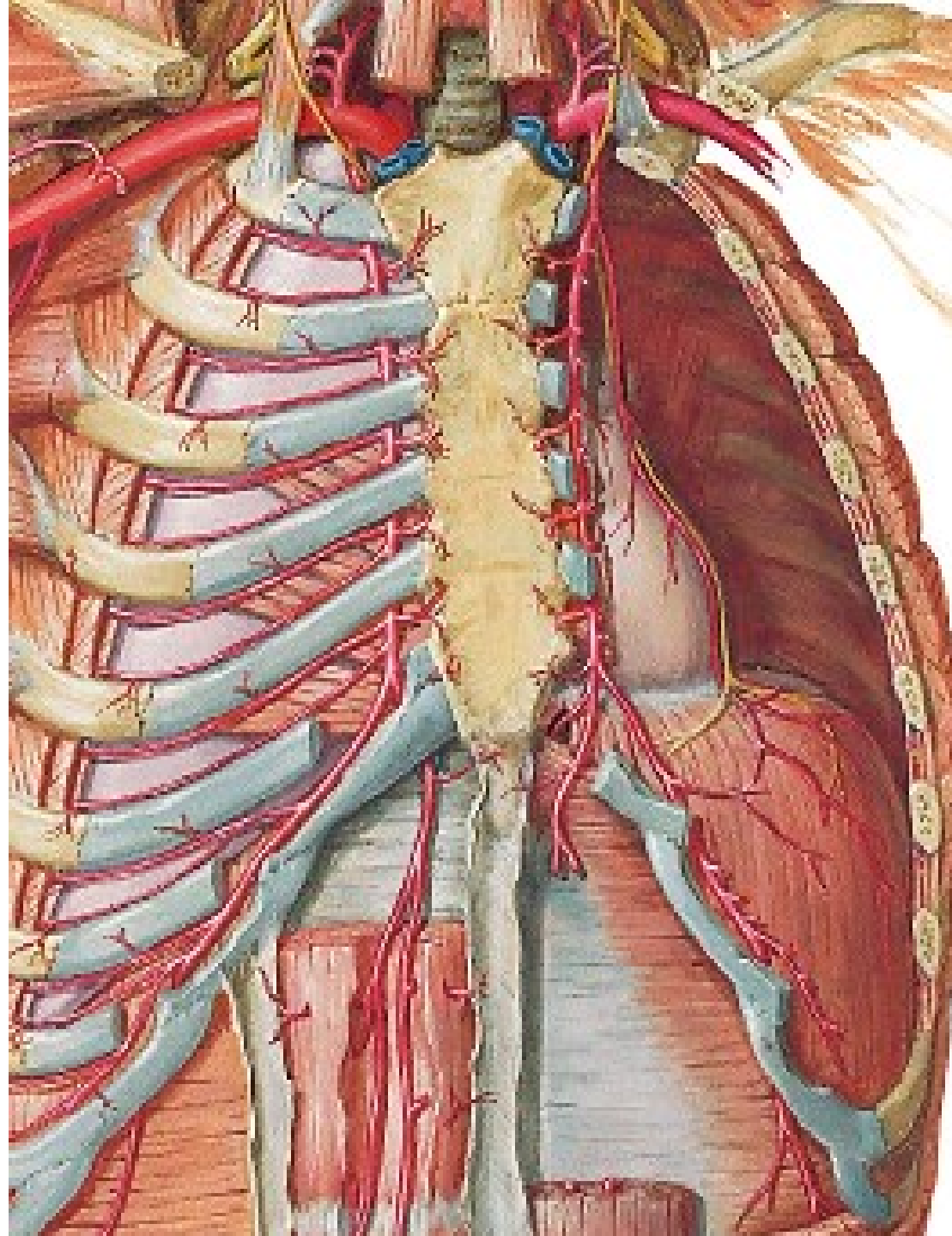
**1<sup>st</sup> part of subclavian  
artery**

**1 inch above sternal end of  
clavicle**

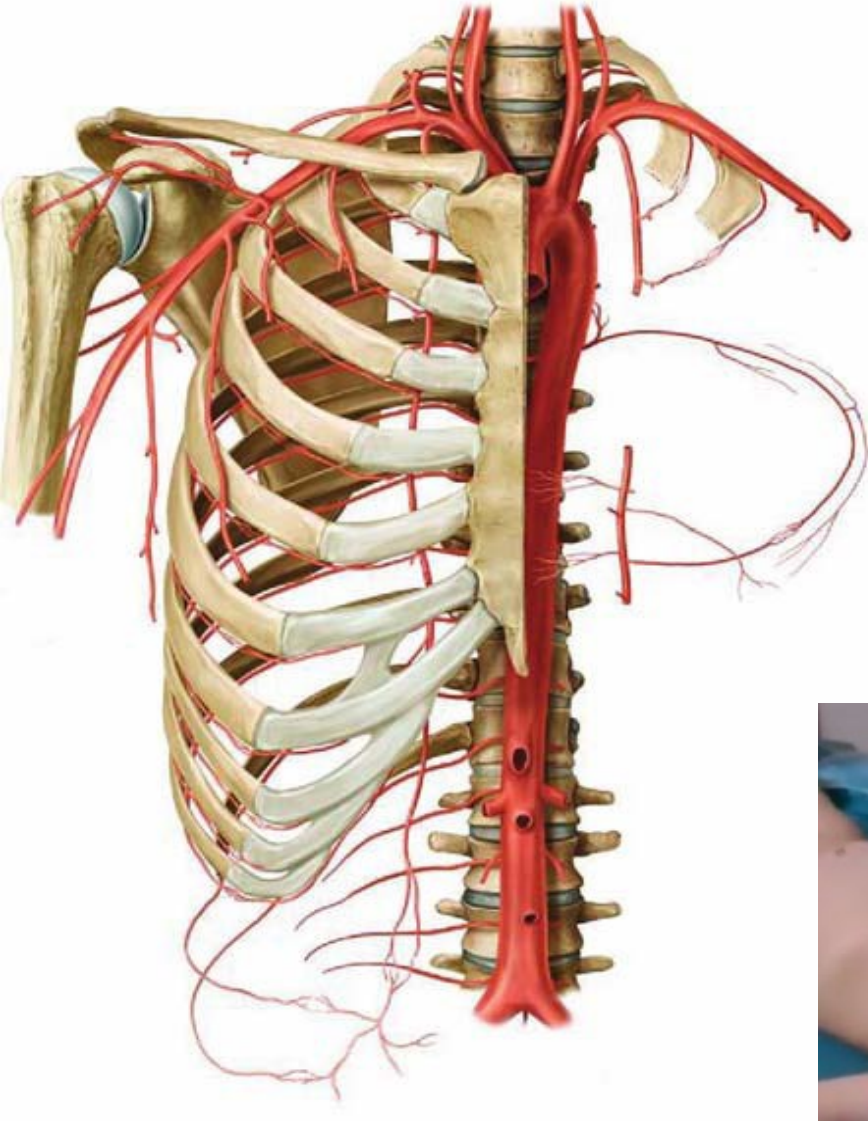
**Behind upper 6 costal  
cartilages**

**Ends at 6<sup>th</sup> space**

**Divides into  
musculophrenic &  
superior epigastric**

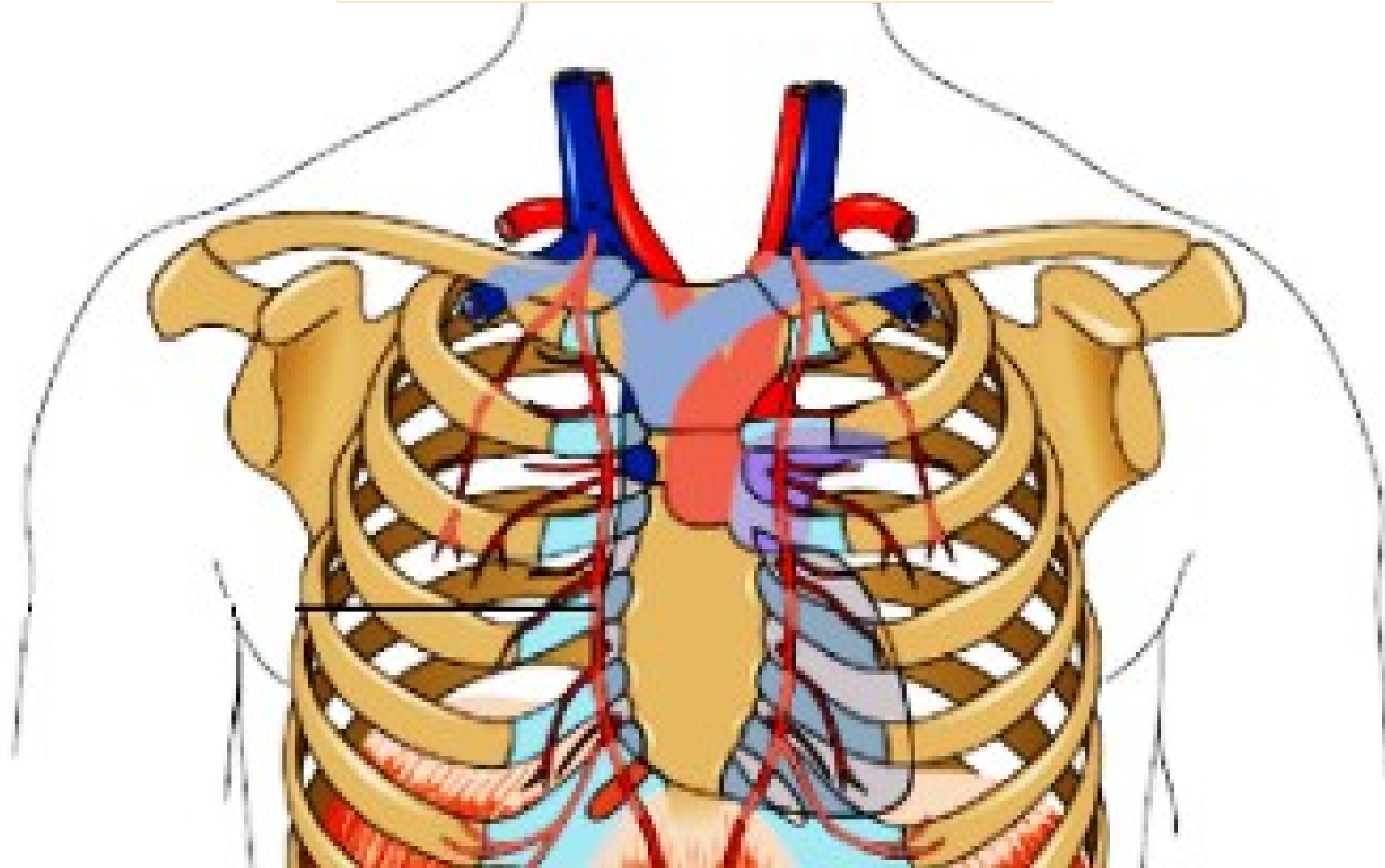


# Internal mammary artery



- **½ an inch** from lateral border of sternum
- approach with needle as close to the sternum as possible.

## Superficial (anterior) relations

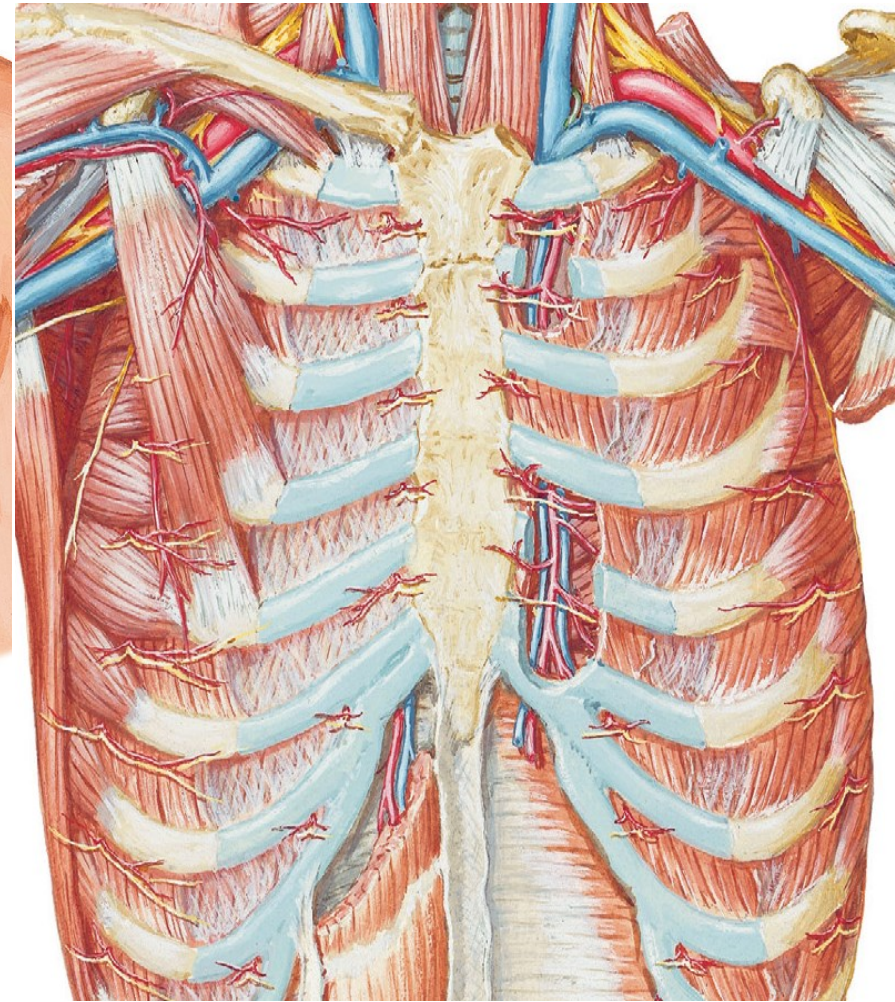
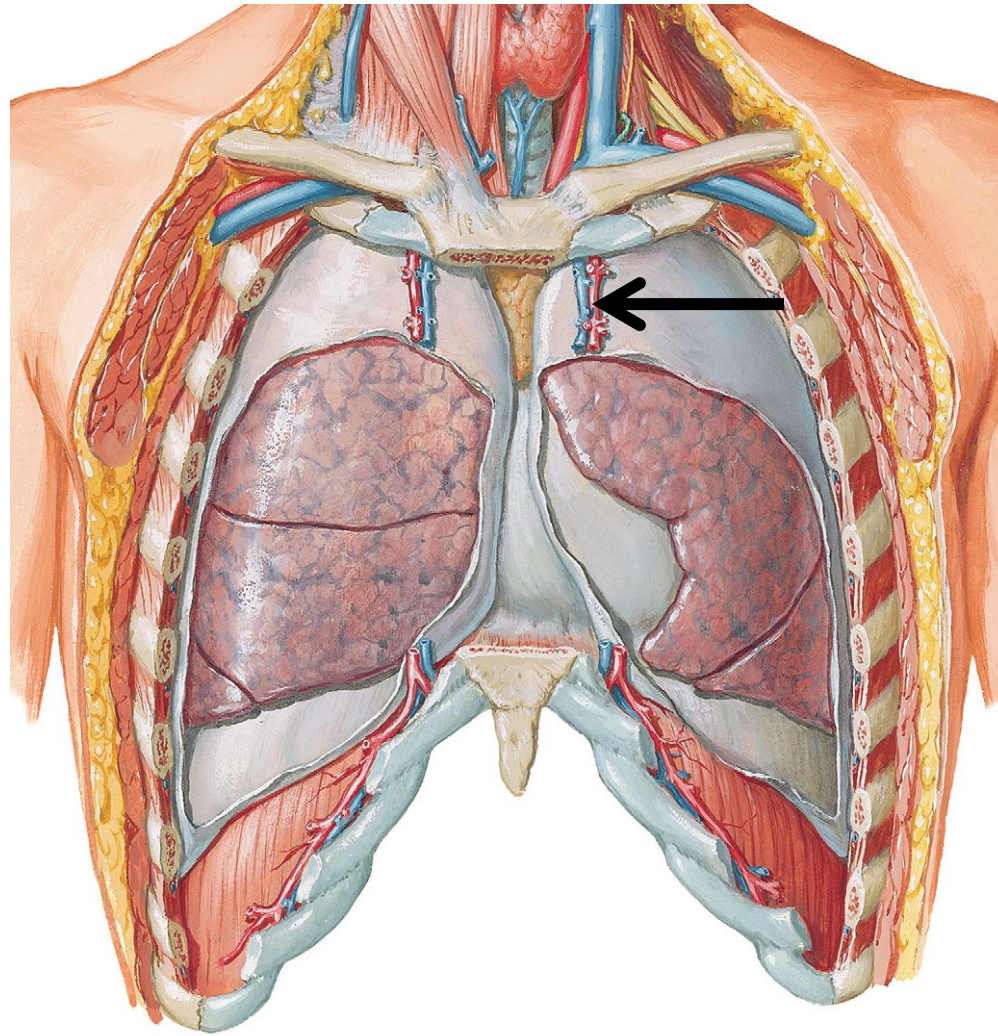


1- Sternal end of the clavicle

2- Brachiocephalic vein

4- Upper 6 costal cartilages

## Superficial (anterior) relations

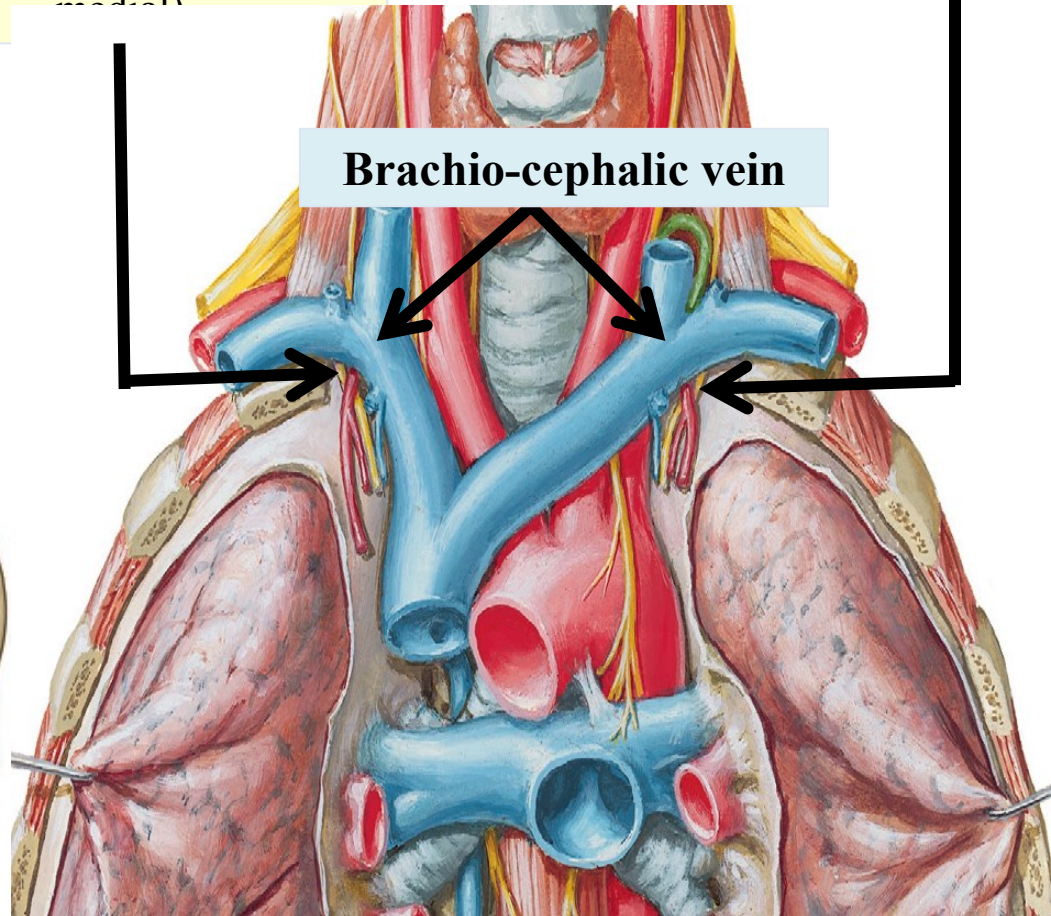
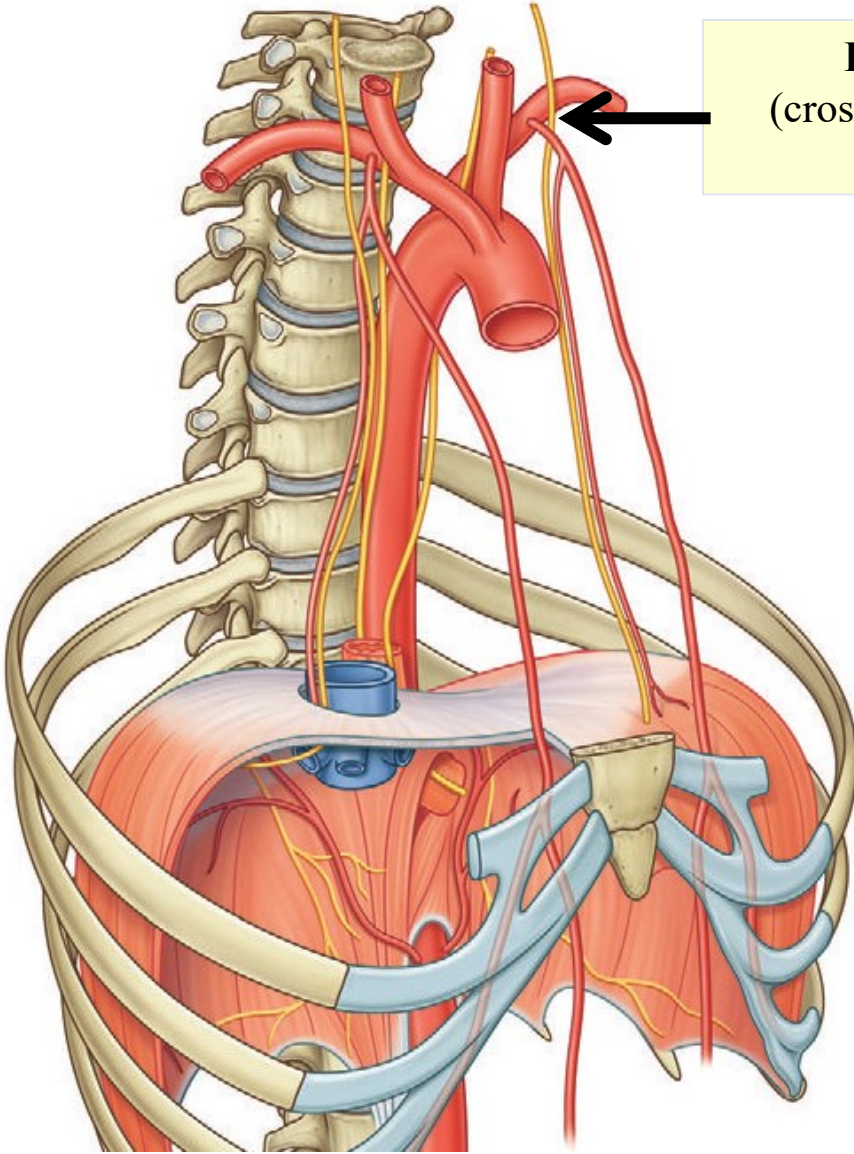


- |                                |                                 |                                                    |
|--------------------------------|---------------------------------|----------------------------------------------------|
| 1- Sternal end of the clavicle | 2- Brachiocephalic vein         | 3- Phrenic nerve (crossing from lateral to medial) |
| 4- Upper 6 costal cartilages   | 5- Internal intercostal muscles | 6- Anterior intercostal membranes                  |

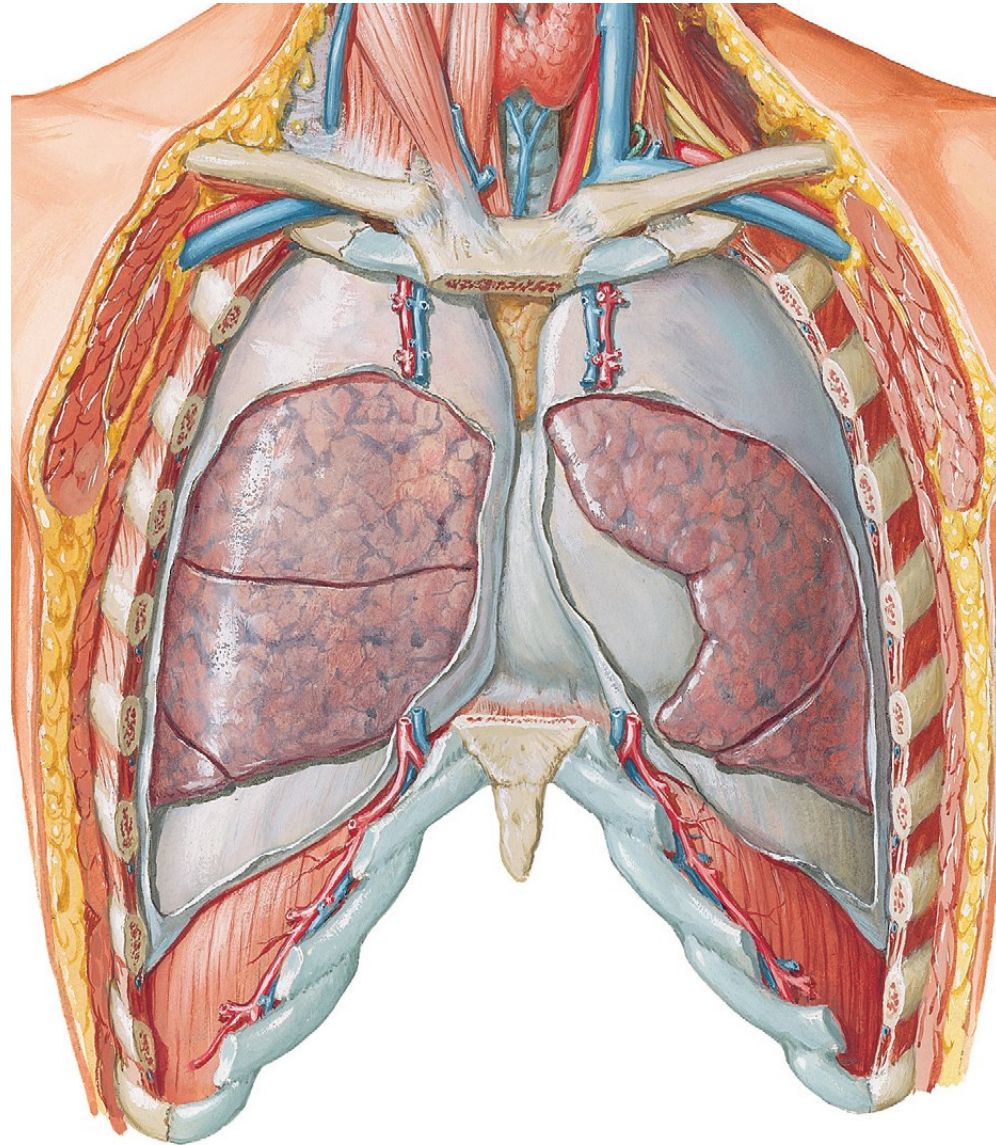
## Superficial (anterior) relations

**Phrenic nerve**  
(crossing from lateral to medial)

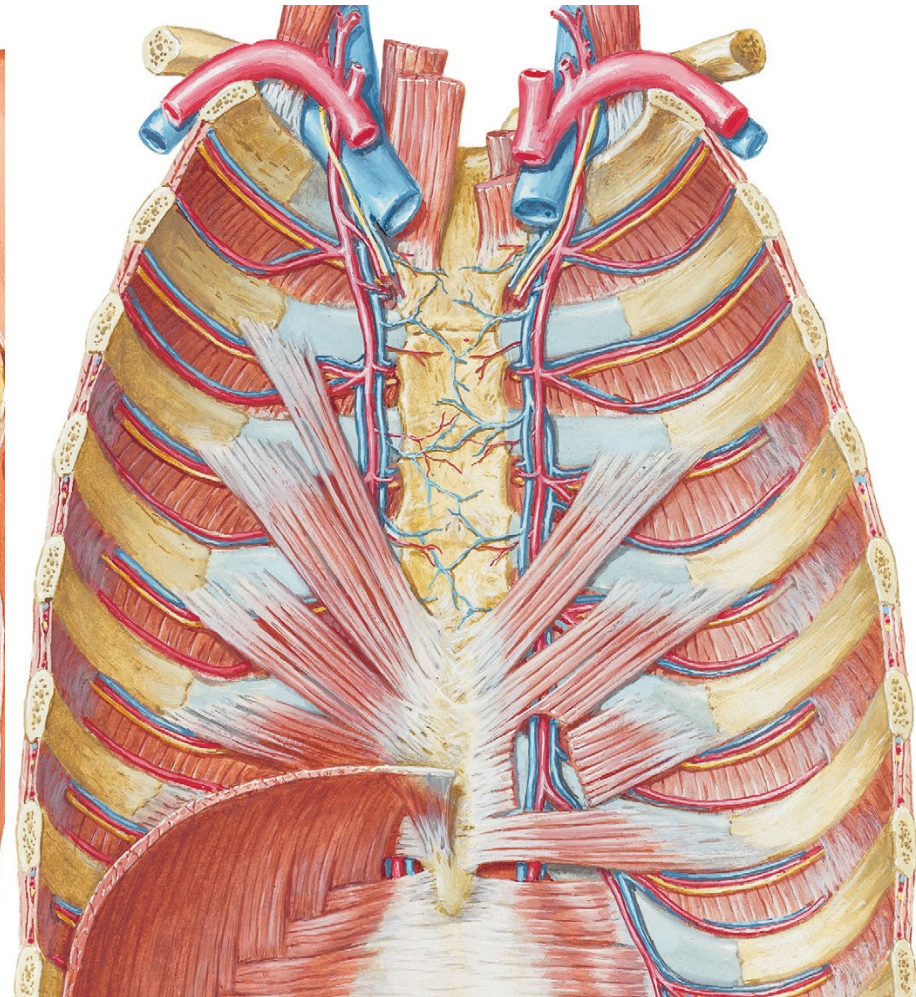
**Brachio-cephalic vein**



## Posterior relations

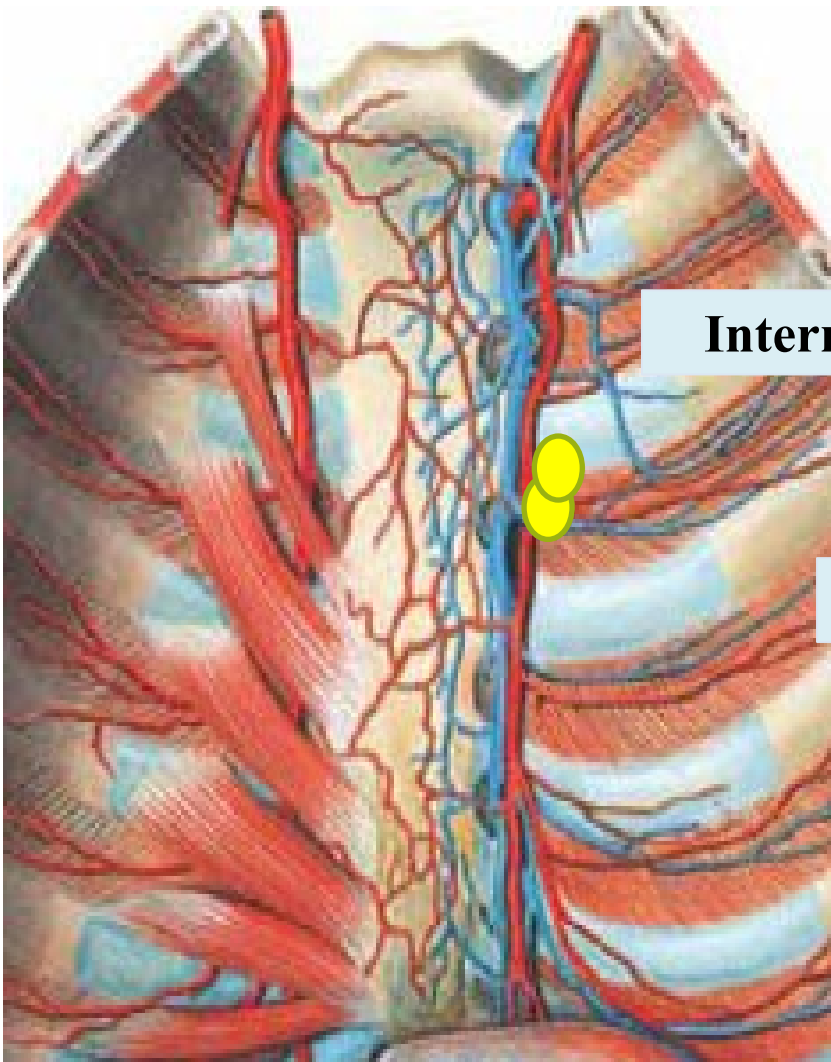


Parietal pleura and apex of lung.



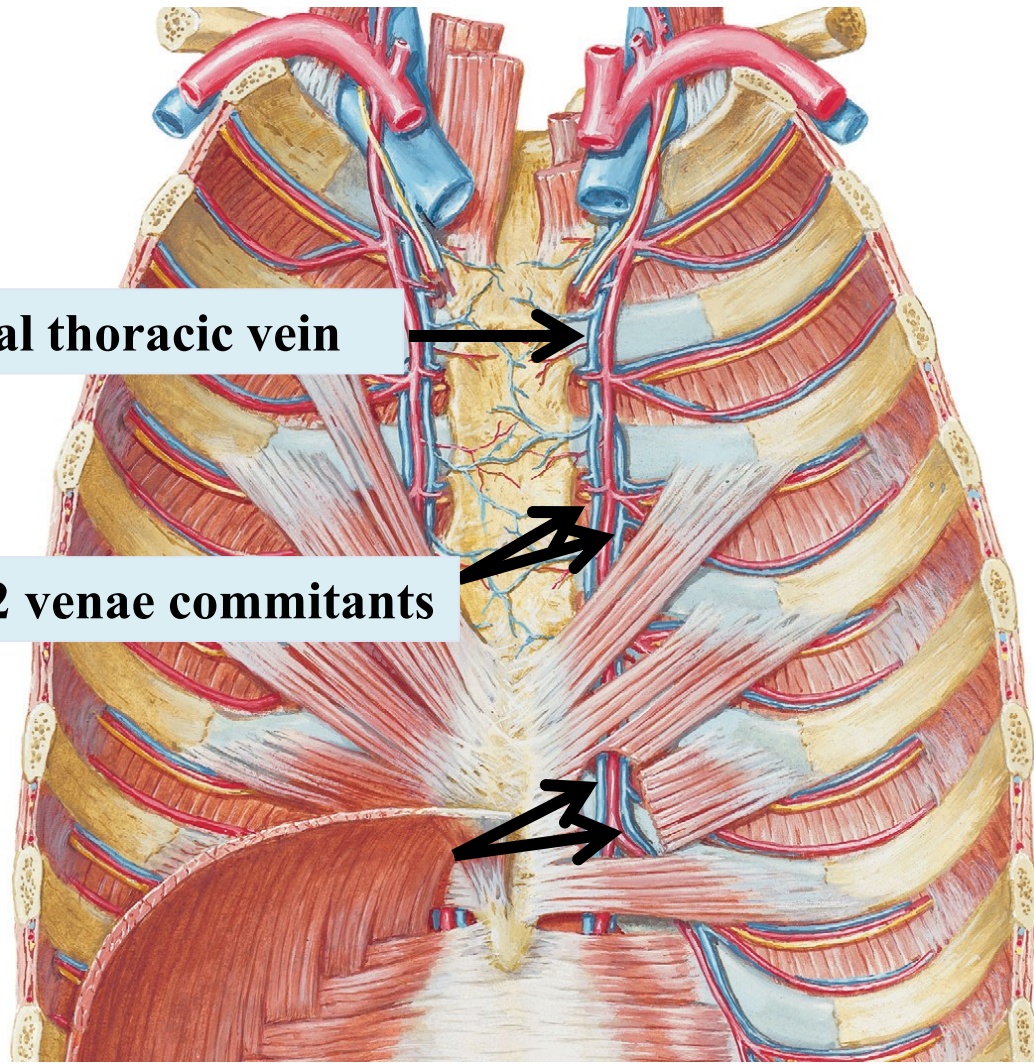
Sternocostalis muscle

## Side relations (medial and lateral)



Internal thoracic vein

2 venae comitantes



- 1-Internal thoracic vein:** along medial side of upper part of artery, above 3rd costal cartilage.
- 2-Two venae comitantes:** accompany lower part, below 3rd costal cartilage downwards.
- 3-Parasternal lymph nodes.**

# Branches

## 2- Anterior intercostal branches:

Six pairs ; 2 arteries in each of upper 6 spaces-VAN-anastomose with corresponding posterior intercostal a. and its collateral branch.

## Perforating branches:

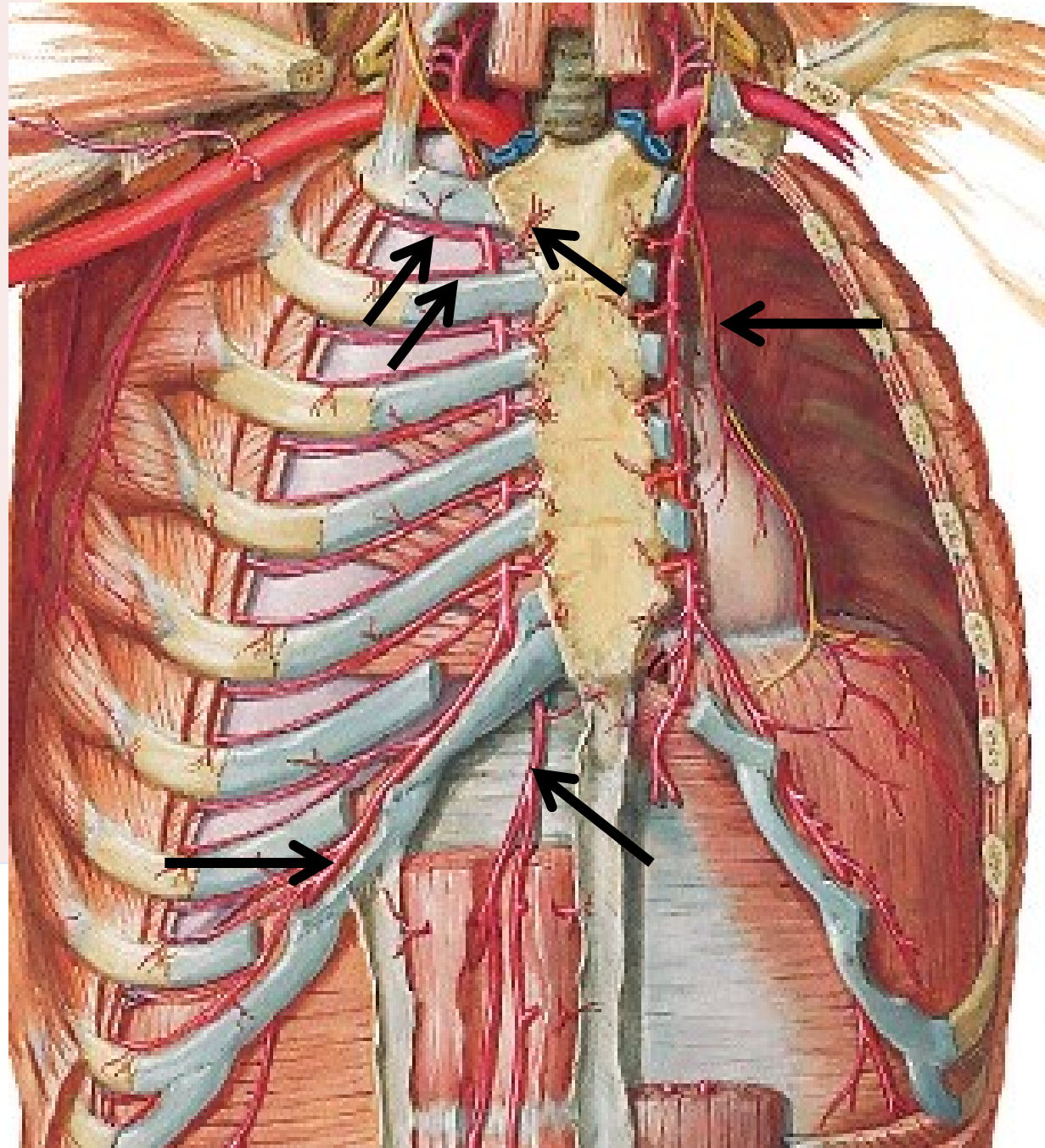
in upper 6 spaces-accompany anterior cutaneous branches of intercostal nerves.

perforate internal intercostal muscles, anterior intercostal membranes and pectoralis major muscle to reach skin.

**Pericardial, sternal and mediastinal branches.**

**Musculophrenic artery**

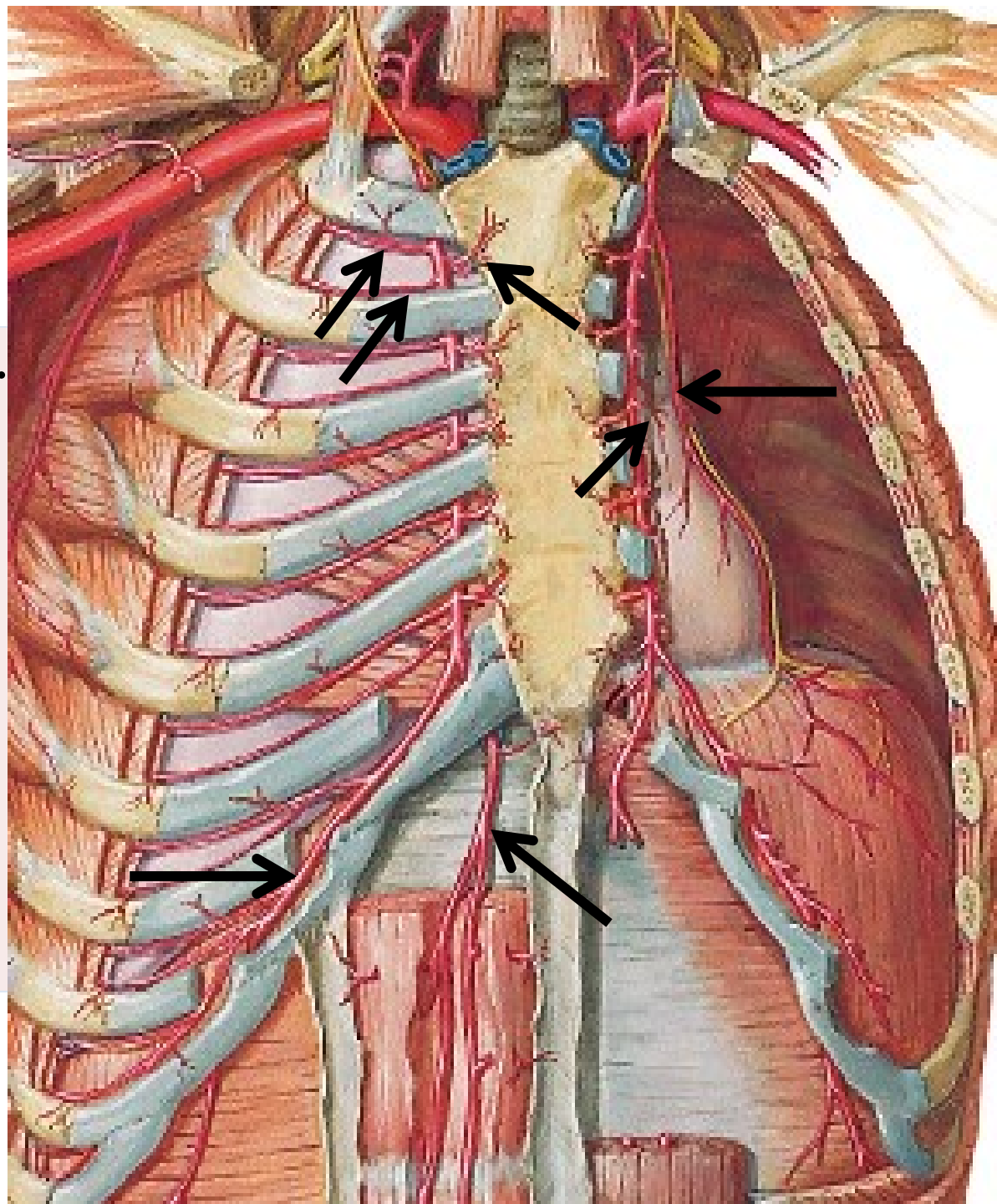
**Superior epigastric artery**



## Branches

4 Ps + MS+ MS

- 2- Pair of anterior intercostal a.
- 1- Pericardiophrenic artery
- 3- Perforating branches
- 4- Pericardial branches
- 5- Mediastinal, sternal
- 6- Musculophrenic artery
- Superior epigastric artery



# Branches

4 Ps + MS+ MS

**2- Pair of anterior intercostal a.**

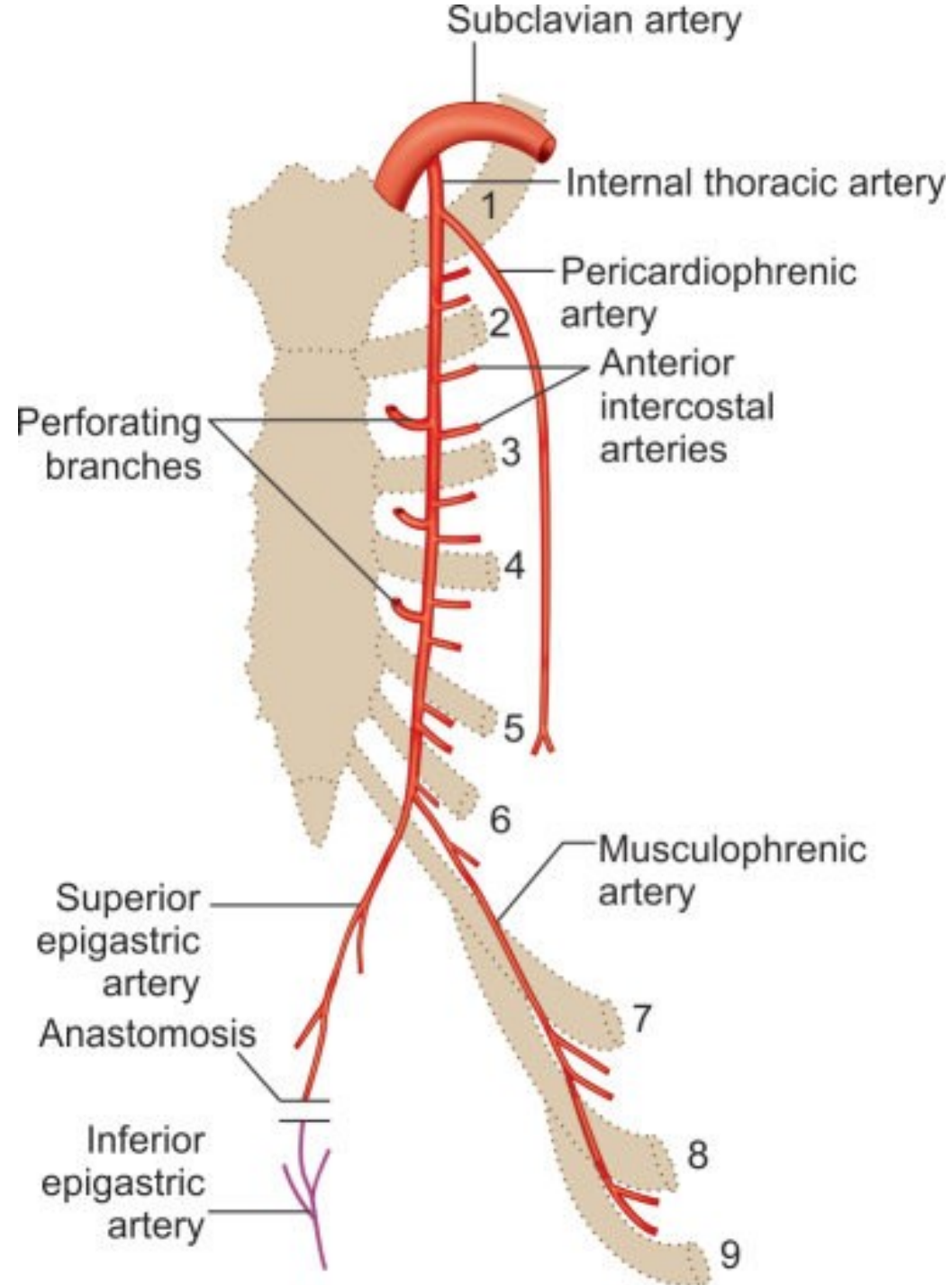
**1- Pericardiacophrenic artery**

**3- Perforating branches**

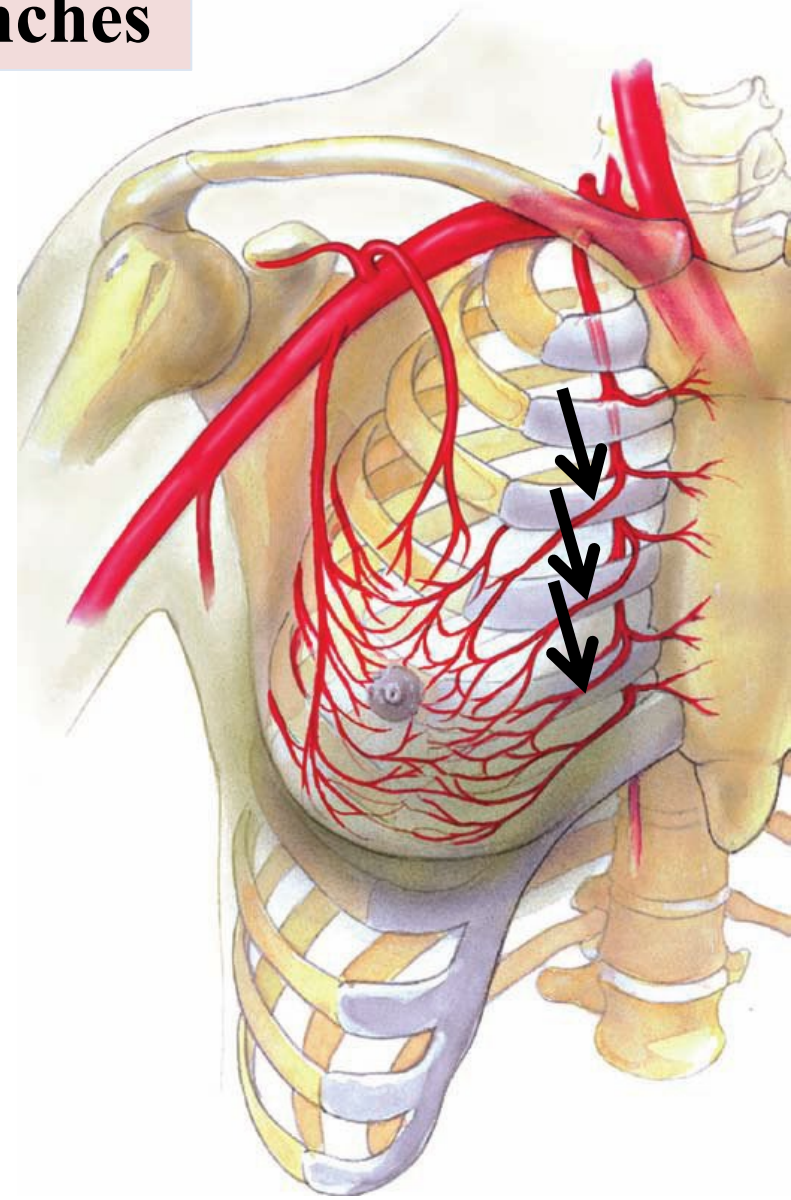
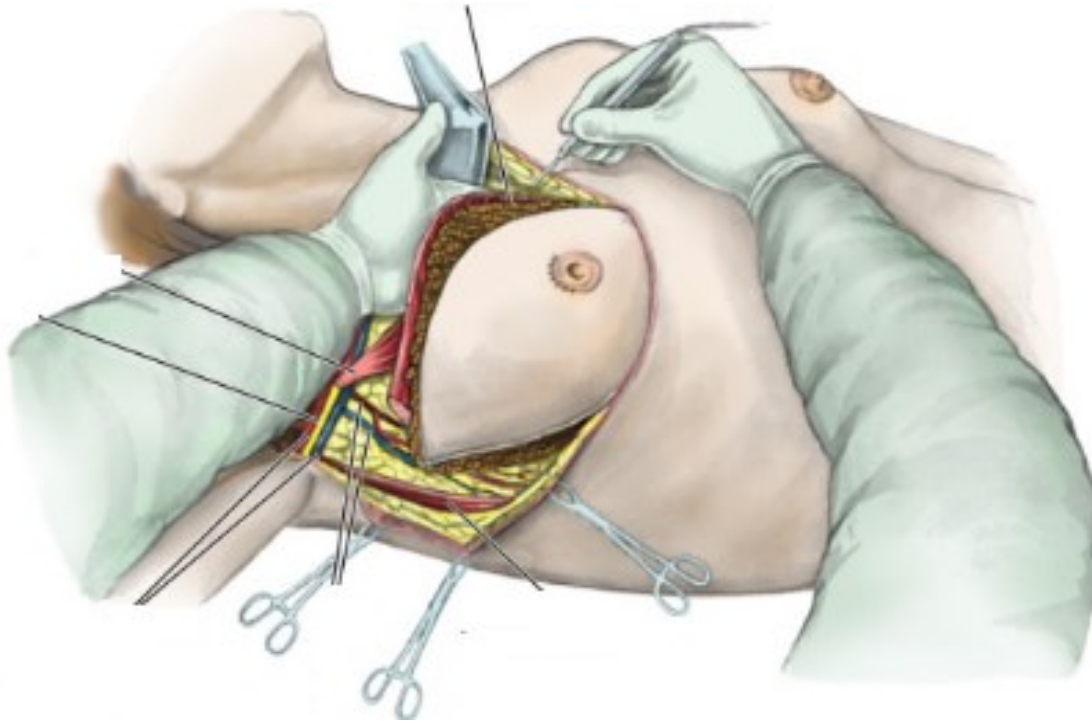
**4- Pericardial branches**

**5- Mediastinal, sternal**

**6- Musculophrenic artery**  
**Superior epigastric artery**

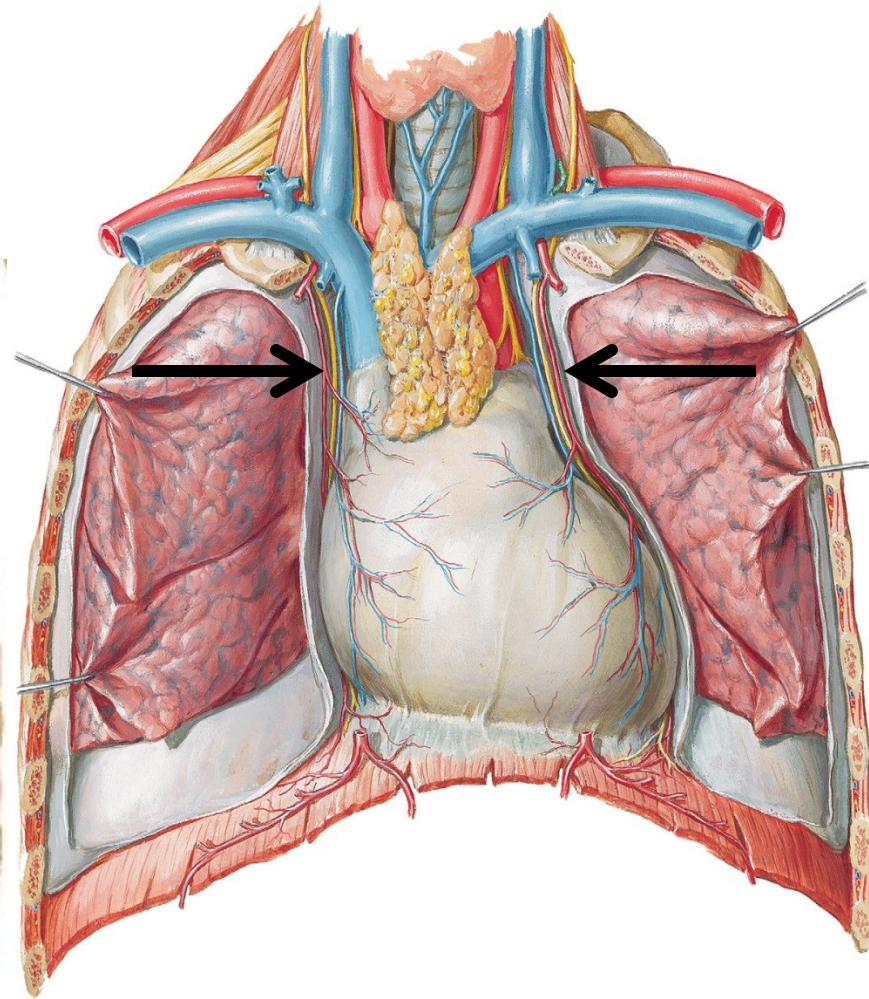
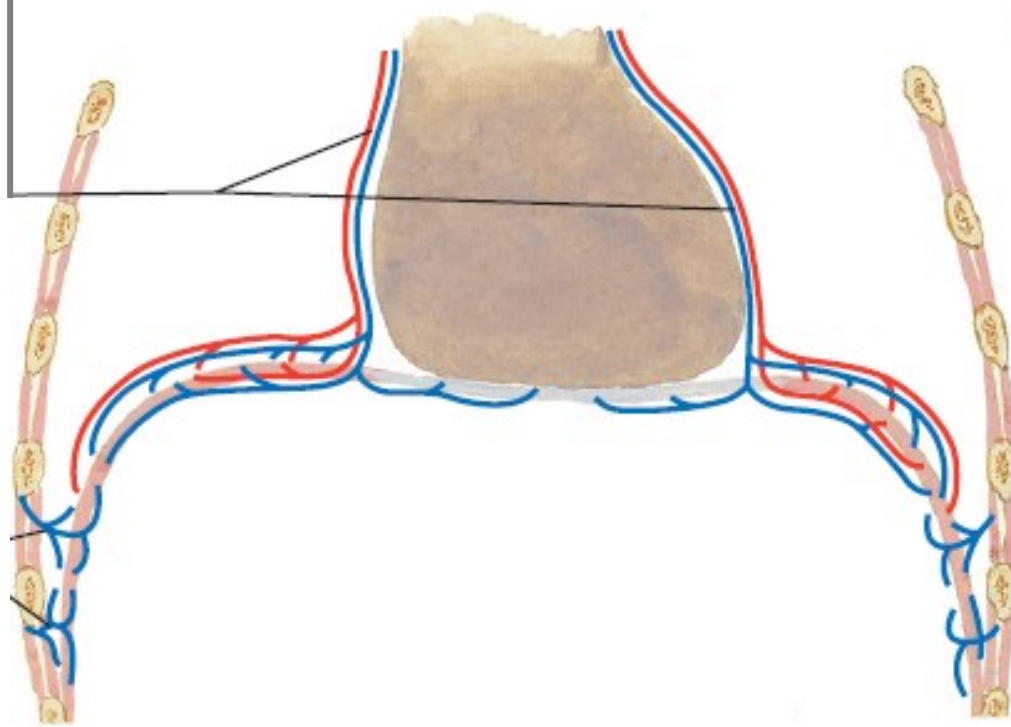


## Perforating branches



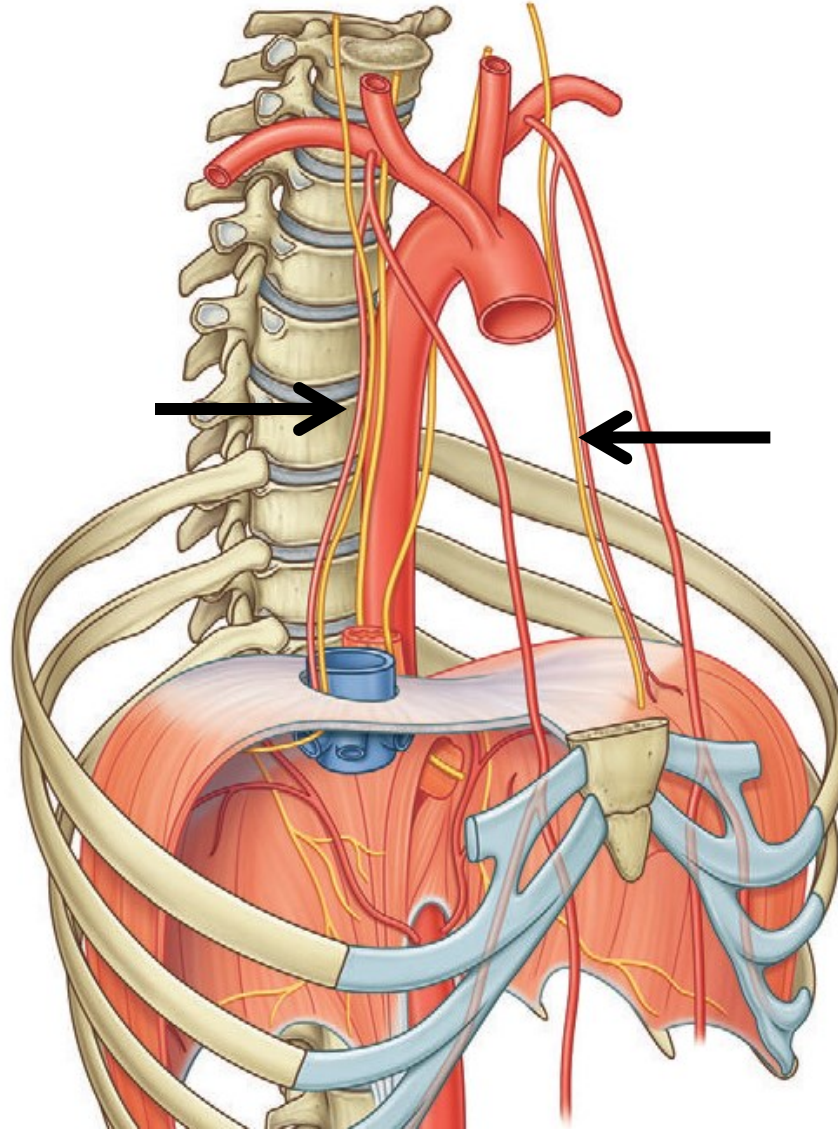
The perforating arteries of **2<sup>nd</sup>**, **3<sup>rd</sup>** and **4<sup>th</sup>** spaces supply medial part of mammary gland (must be ligated in radical mastectomy lest they retract causing internal hemorrhage).

## Pericardio- phrenic artery



**1- Pericardiophrenic artery:** descends in company with phrenic nerve. It supplies pericardium, parietal pleura and diaphragm.

# Pericardiaco-phrenic artery



**1- Pericardiophrenic artery:** descends in company with phrenic nerve. It supplies pericardium, parietal pleura and diaphragm.

## **Musculophrenic artery:**

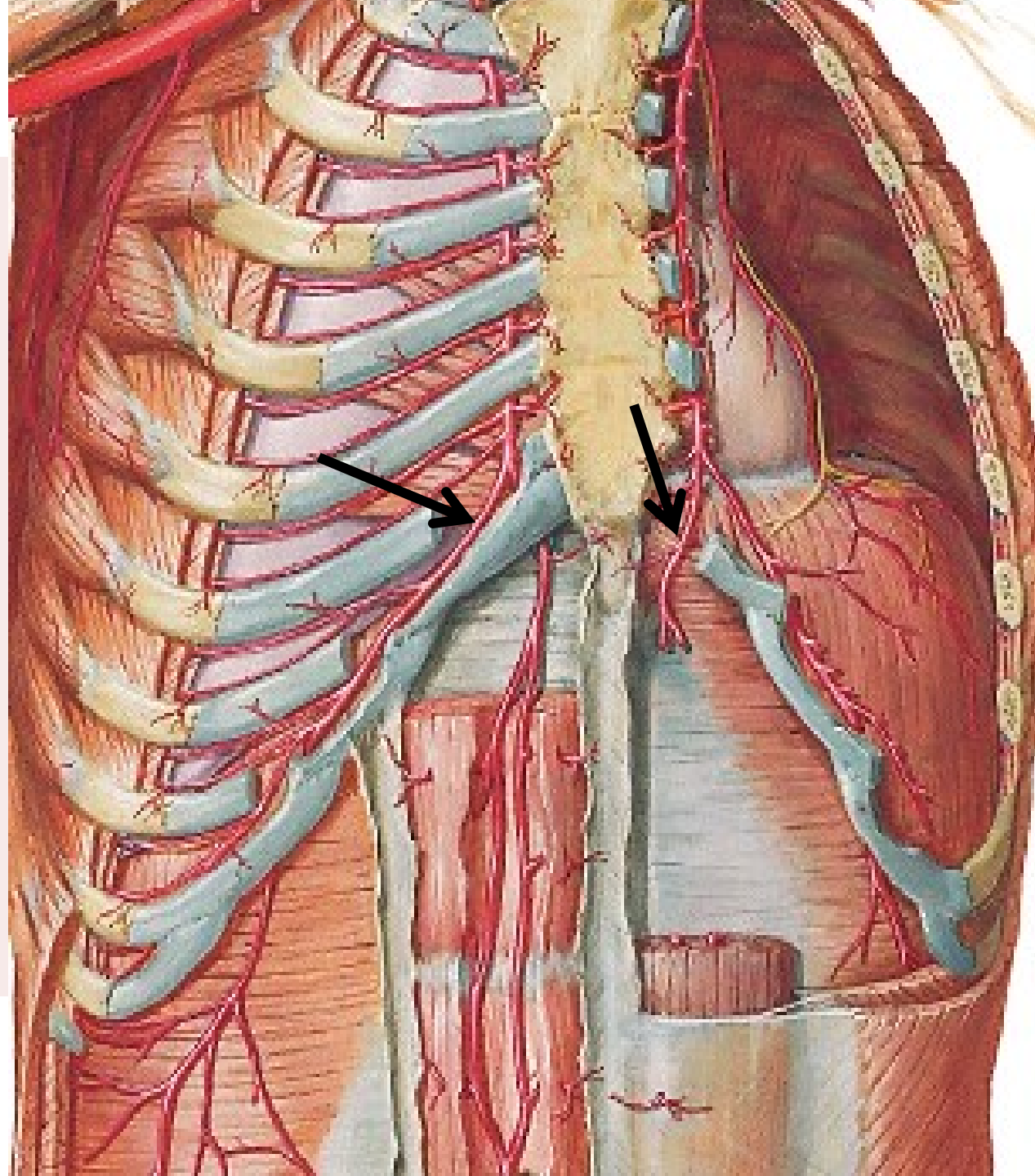
Begins at 6<sup>th</sup> space

Passes downwards and laterally behind 7<sup>th</sup>, 8<sup>th</sup> and 9<sup>th</sup> costal cartilages.

Pierces diaphragm to enter anterior abdominal wall.

Gives 7<sup>th</sup>, 8<sup>th</sup> and 9<sup>th</sup> pairs of anterior intercostal a. which anastomose with posterior intercostal a.

## **Superior epigastric artery**



## **Put true or false**

**Internal mammary artery gives 3 arteries in each intercostal space  
(True)**

**All intercostal spaces contain anterior intercostal arteries  
(False)**

**All intercostal spaces contain posterior intercostal arteries  
(True)**

**Right posterior intercostal arteries are longer than the left  
(True)**

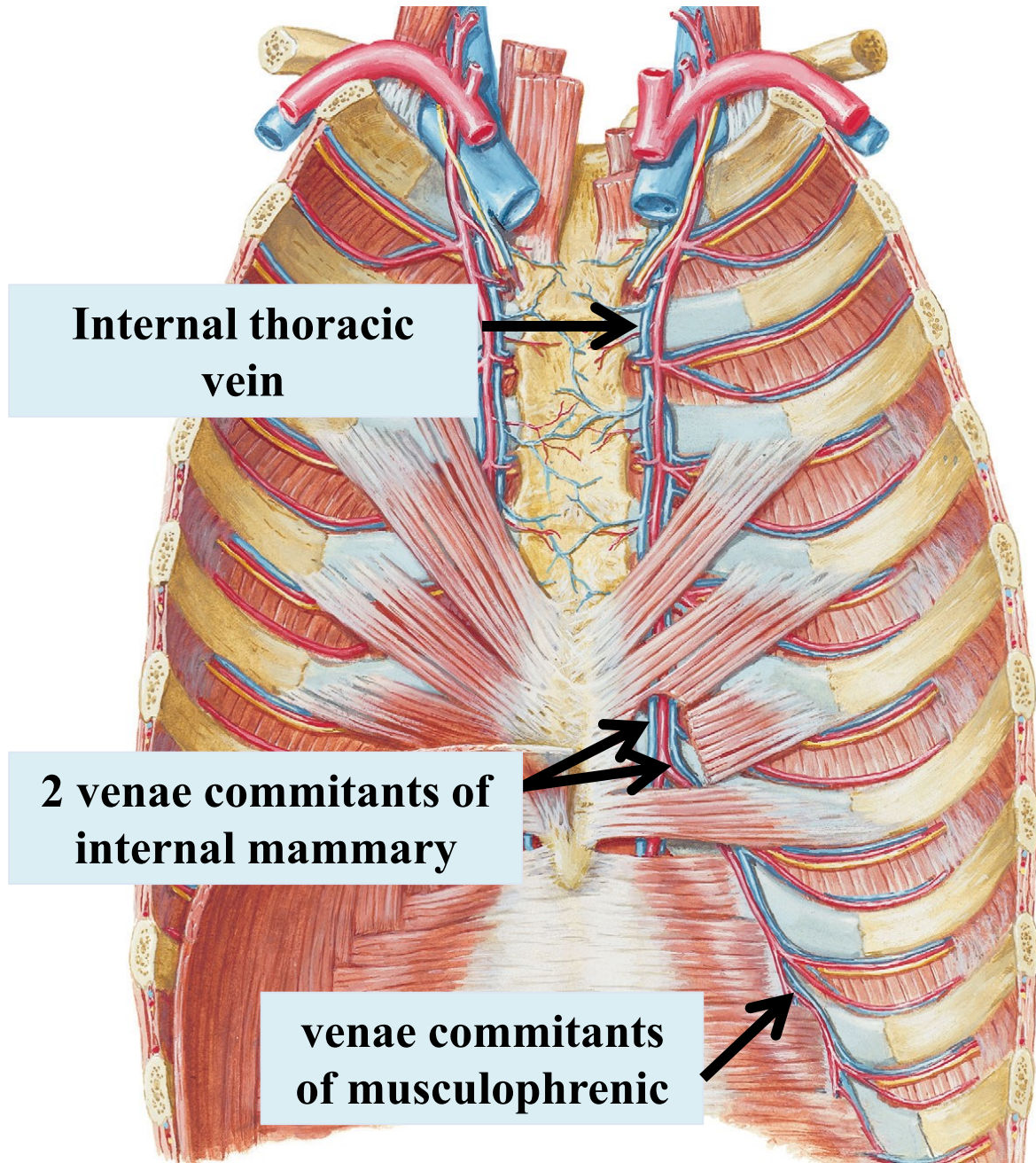
# Anterior intercostal veins

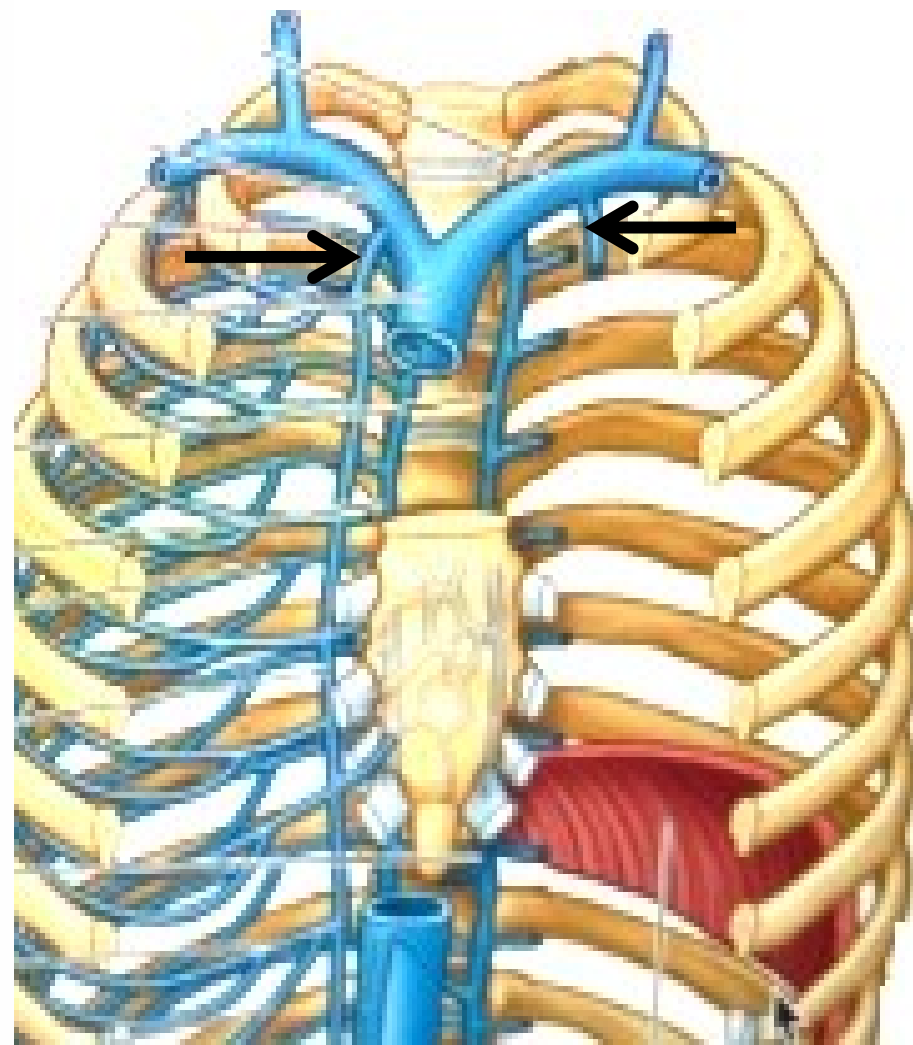
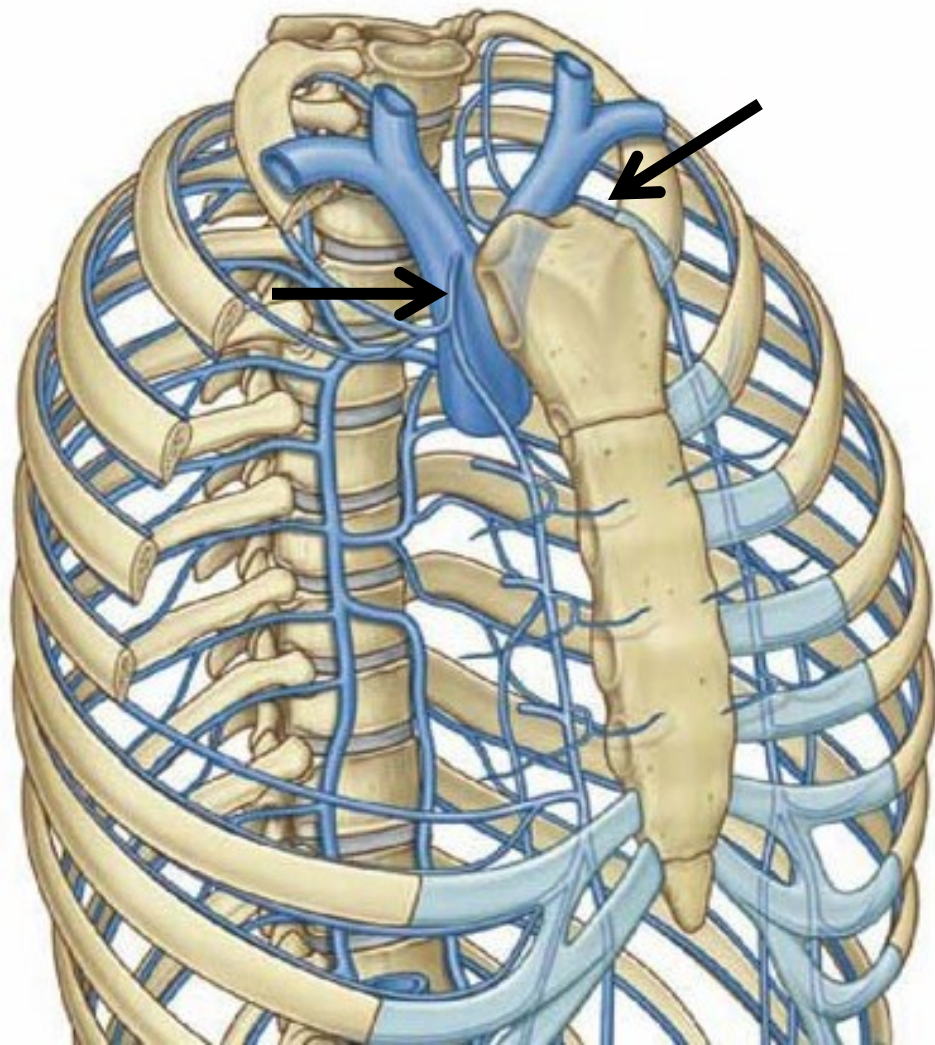
They correspond to anterior intercostal arteries i.e. **9 pairs** of veins; 2 in each space.

**1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup>** join **internal thoracic vein** itself.

- **4<sup>th</sup>, 5<sup>th</sup>, 6<sup>th</sup>** join **venae comitantes of internal thoracic artery**.

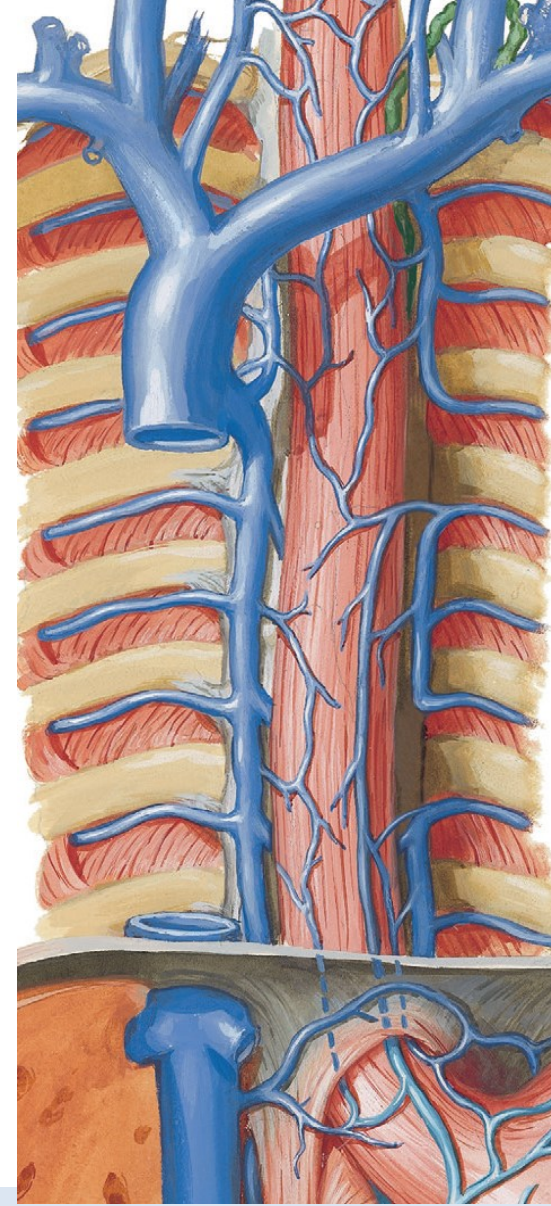
- **7<sup>th</sup>, 8<sup>th</sup>, 9<sup>th</sup>** join **venae comitants of musculophrenic artery**.





- Internal mammary veins end into brachiocephalic veins

# Azygos vein



- Azygos (= unpaired) vein connects back of **I.V.C.** (in abdomen) with back of **S.V.C.** (in thorax).
- Drains most of thoracic wall whether directly (from right side)  
or indirectly via superior and inferior hemiazygos veins (from left side)
- It is the main route of collateral venous circulation passes in obstruction to **S.V.C.** or **I.V.C.**

# Azygos vein

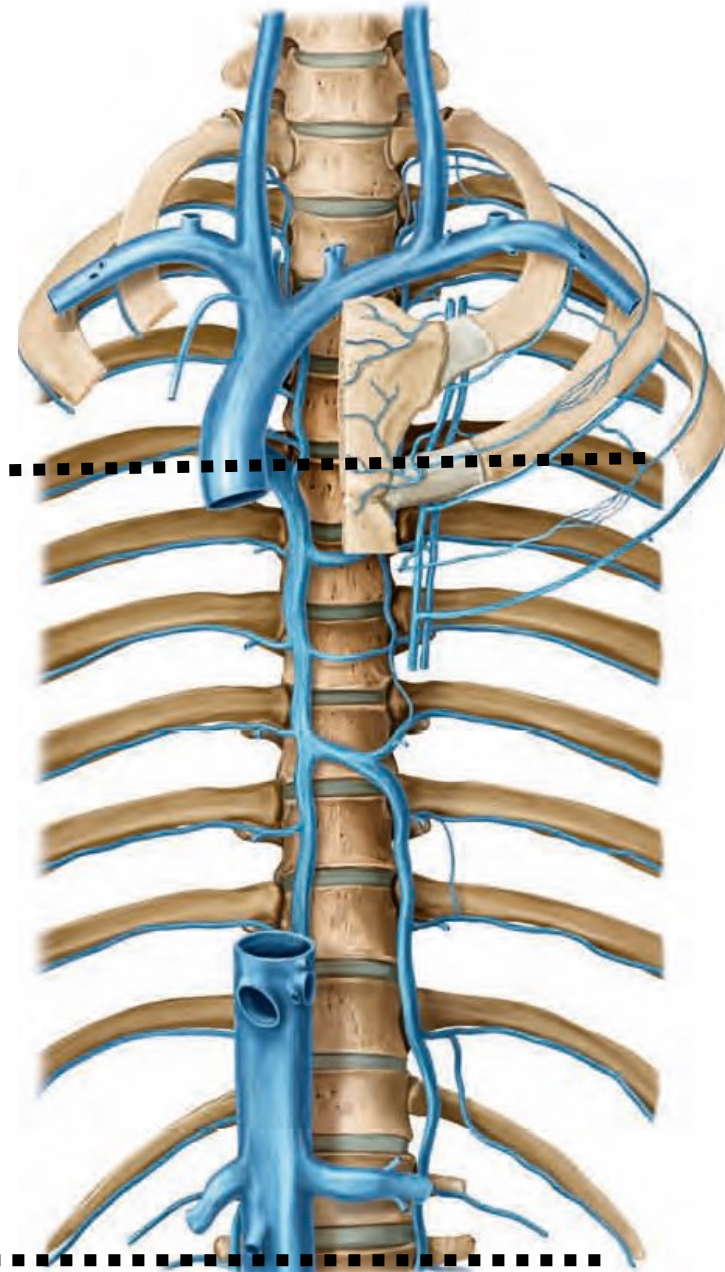
**From Back to Back**

**2<sup>nd</sup>**

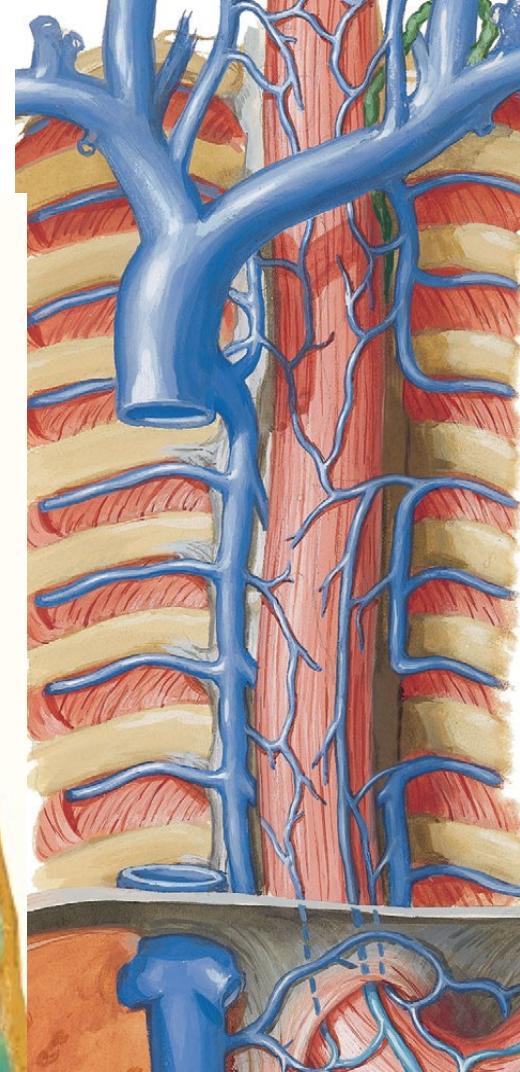
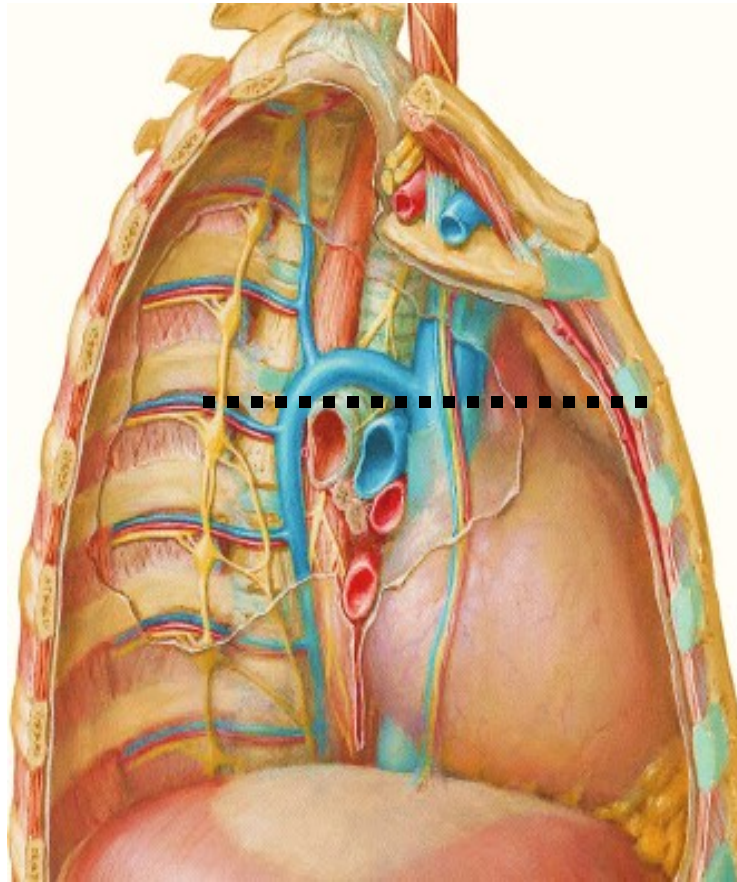
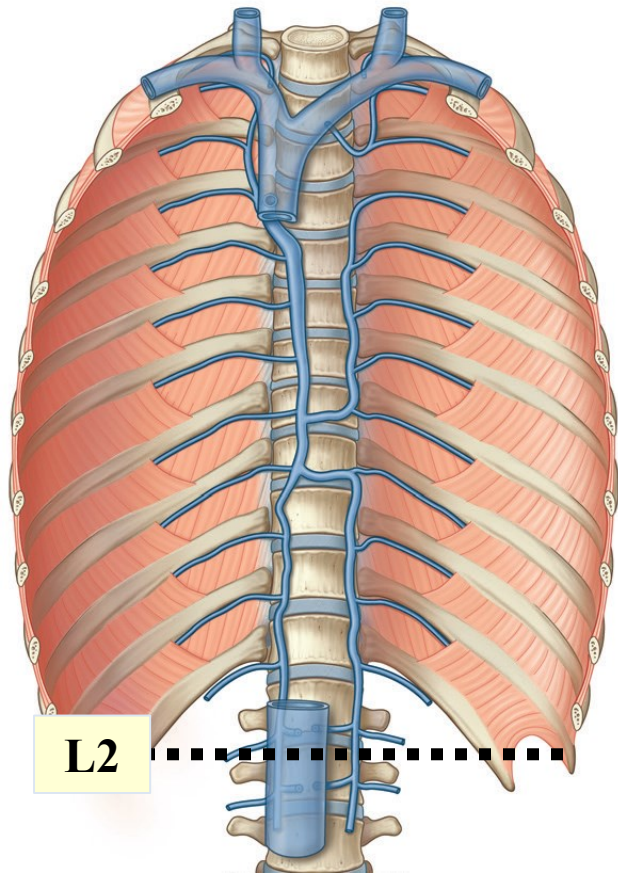
**Beginning: L2**

**Termination: 2<sup>nd</sup> right costal cartilage**

**L2**

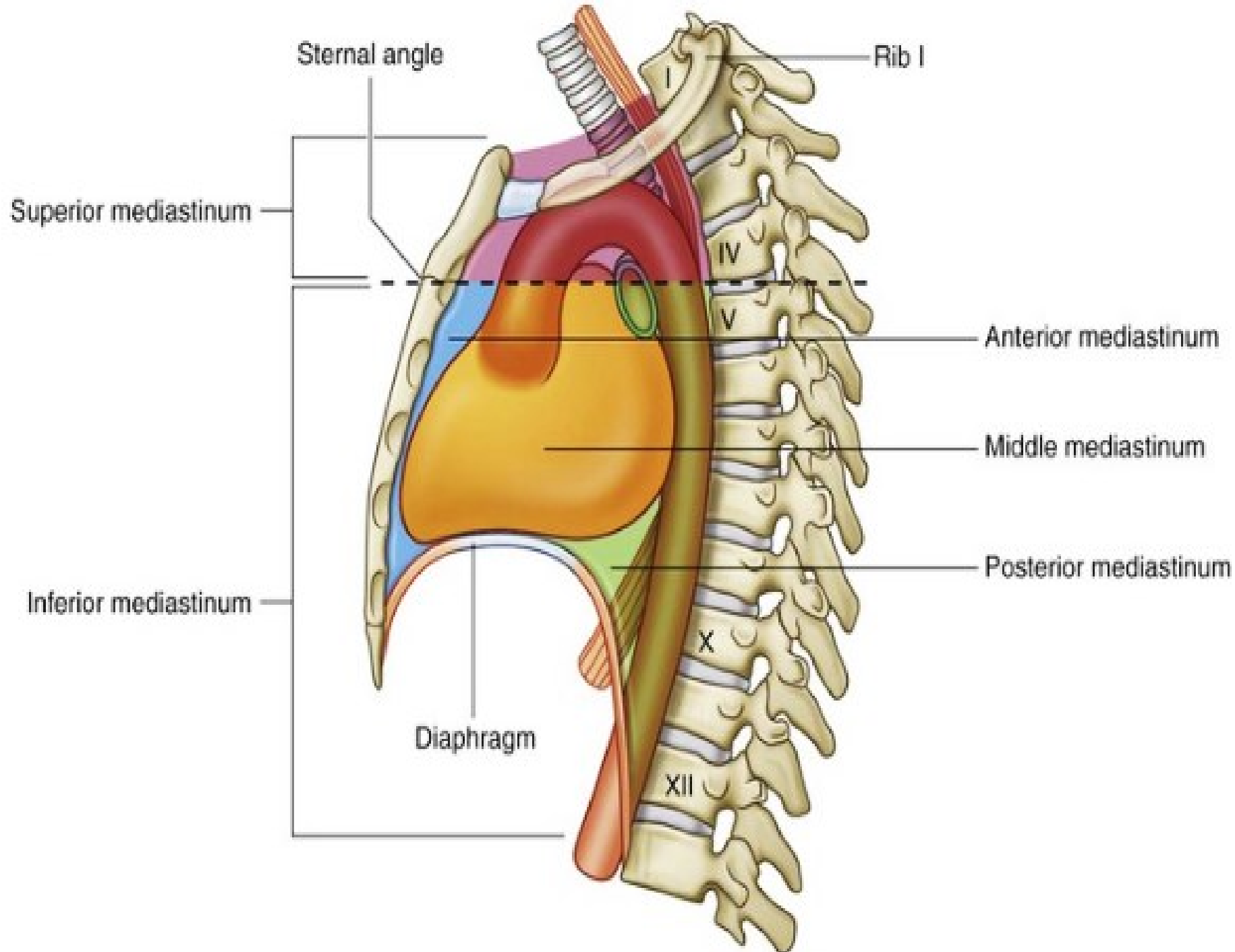


# Azygos vein

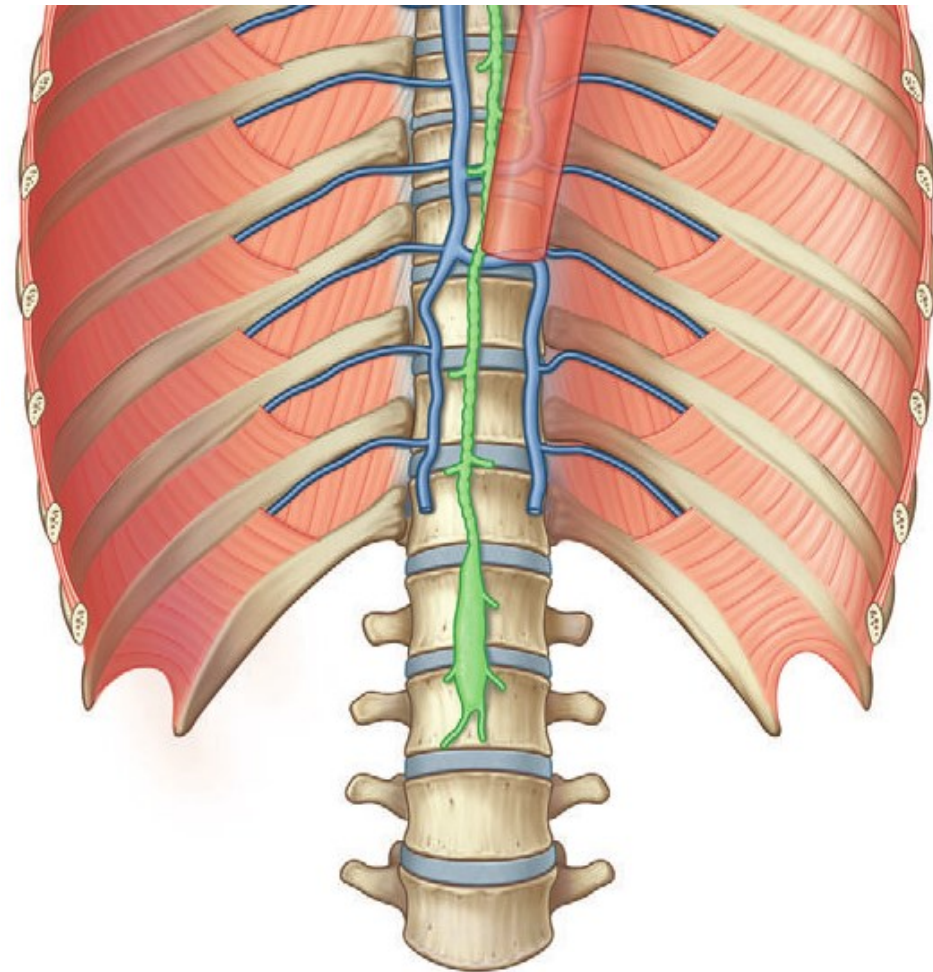


**Origin:** Azygos vein has a variable origin most commonly from back of I.V.C. opposite L2 (may be continuation of subcostal or ascending lumbar vein)

**Course and Termination:** Enters thorax through aortic opening of diaphragm. In thorax, azygos vein **ascends** first in posterior mediastinum (up to disc between T4/T5), then in superior mediastinum--**arches** forwards just above root of right lung **ends** in middle of back S.V.C. just before SVC pierces pericardium, opposite 2<sup>nd</sup> right costal cartilage

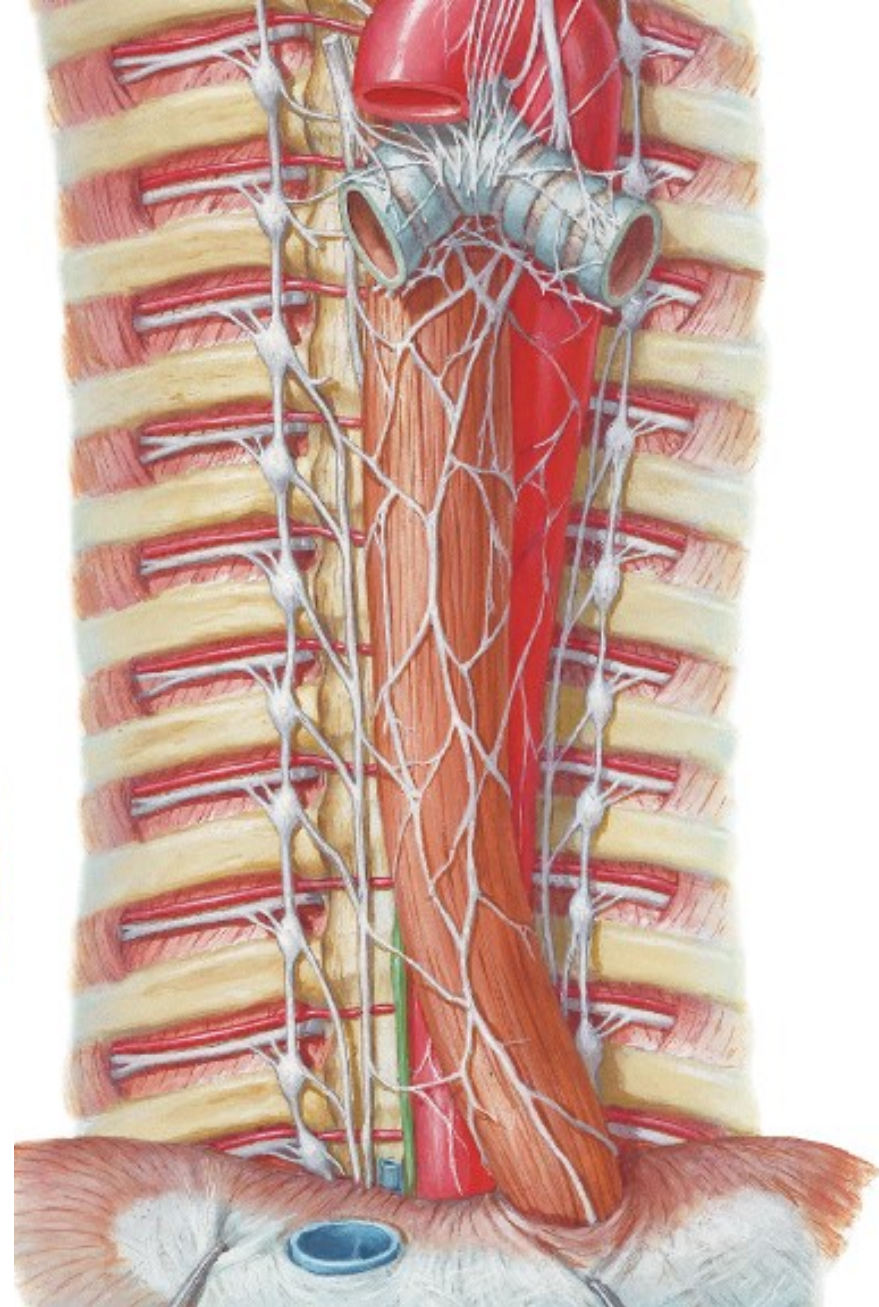
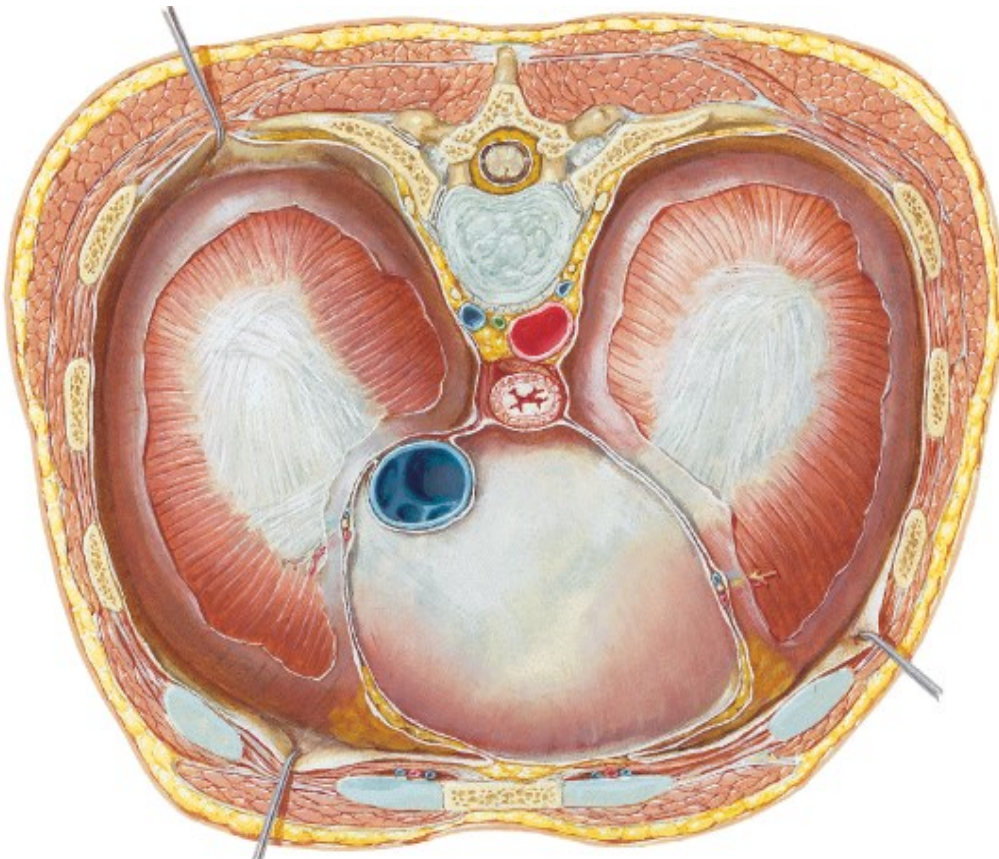


*Azygos vein Passes through  
aortic opening of diaphragm*

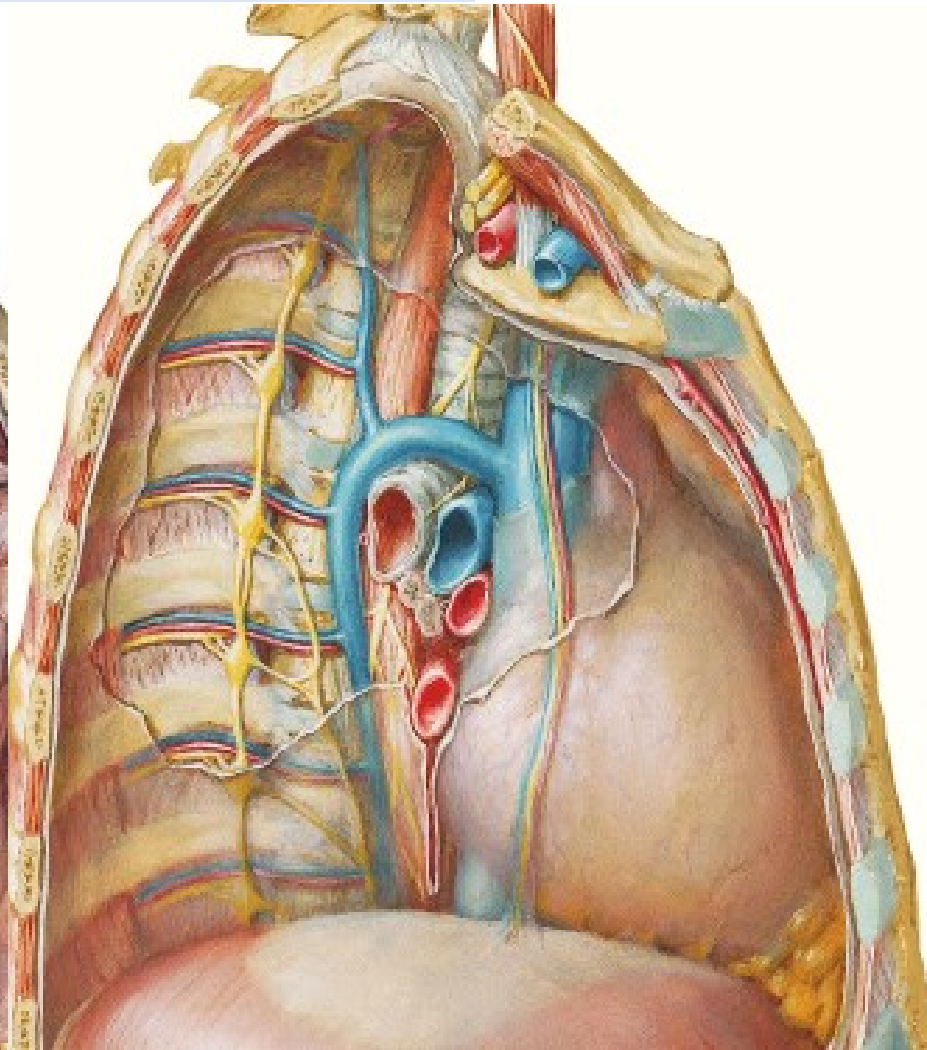
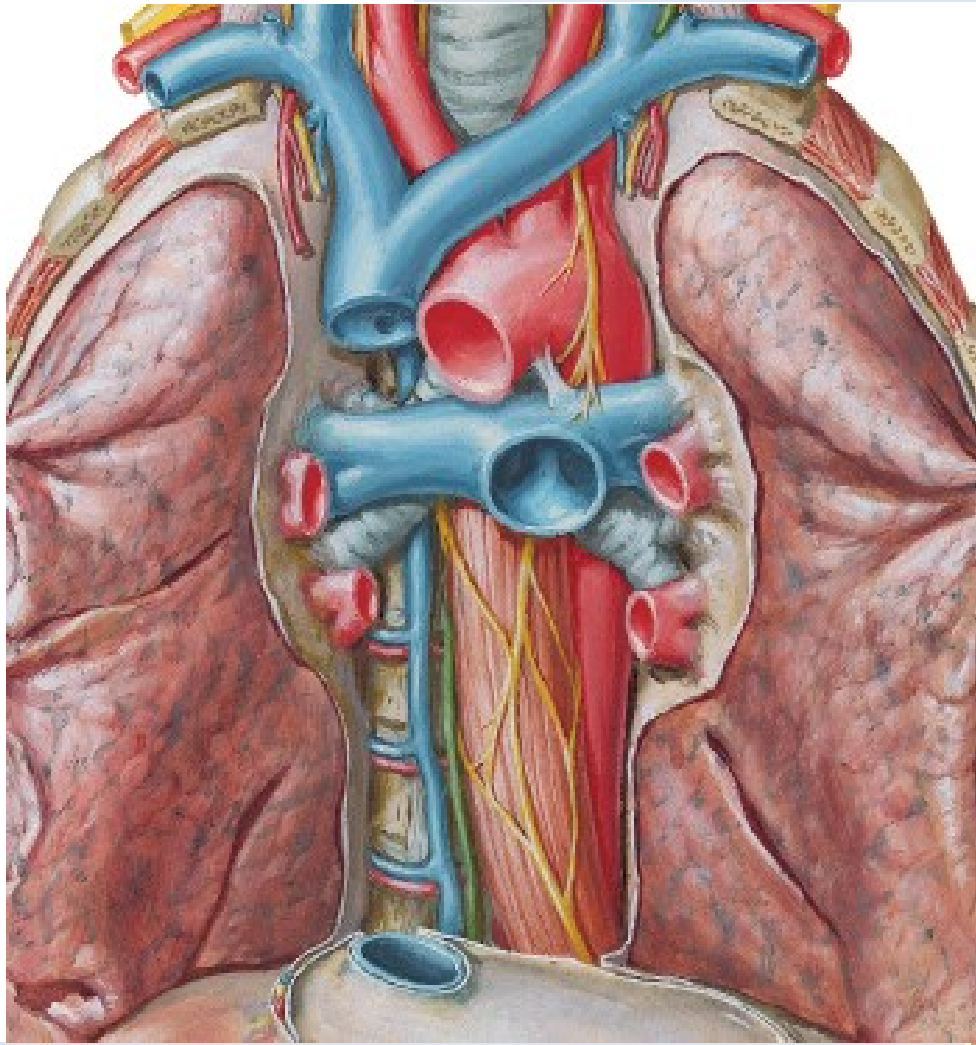


## *Aortic opening=*

- \* Descending aorta.
- \* Azygos vein.
- \* Thoracic duct.



## Relations in Posterior Mediastinum



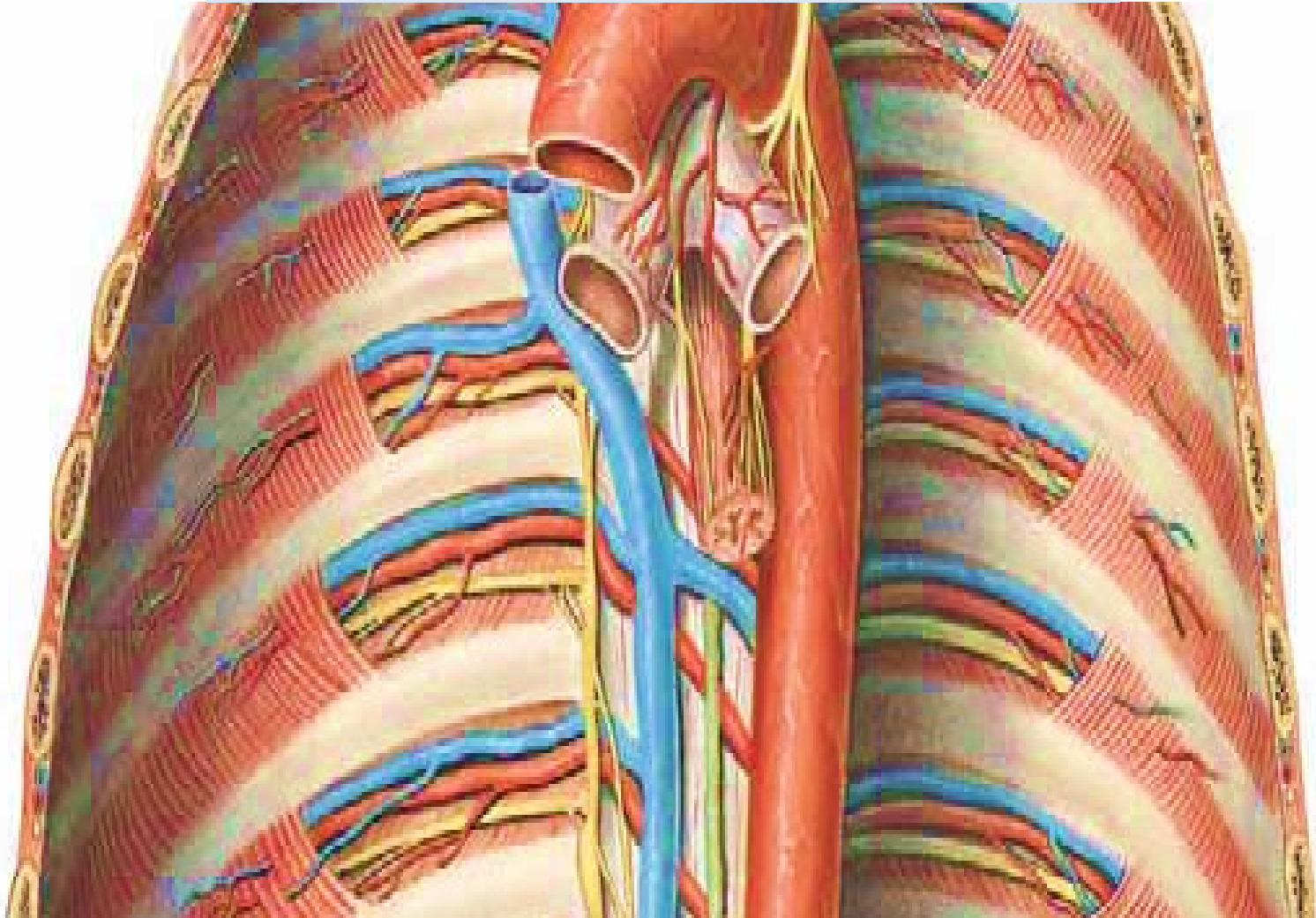
**Anteriorly:** oesophagus and the root of the right lung.

**Posteriorly:** lower 8 thoracic vertebrae, separated from them by right posterior intercostal a.

**On the right side:** right pleura, lung and greater splanchnic nerve.

**On the left side:** Thoracic duct and descending aorta.

## Relations in Posterior Mediastinum



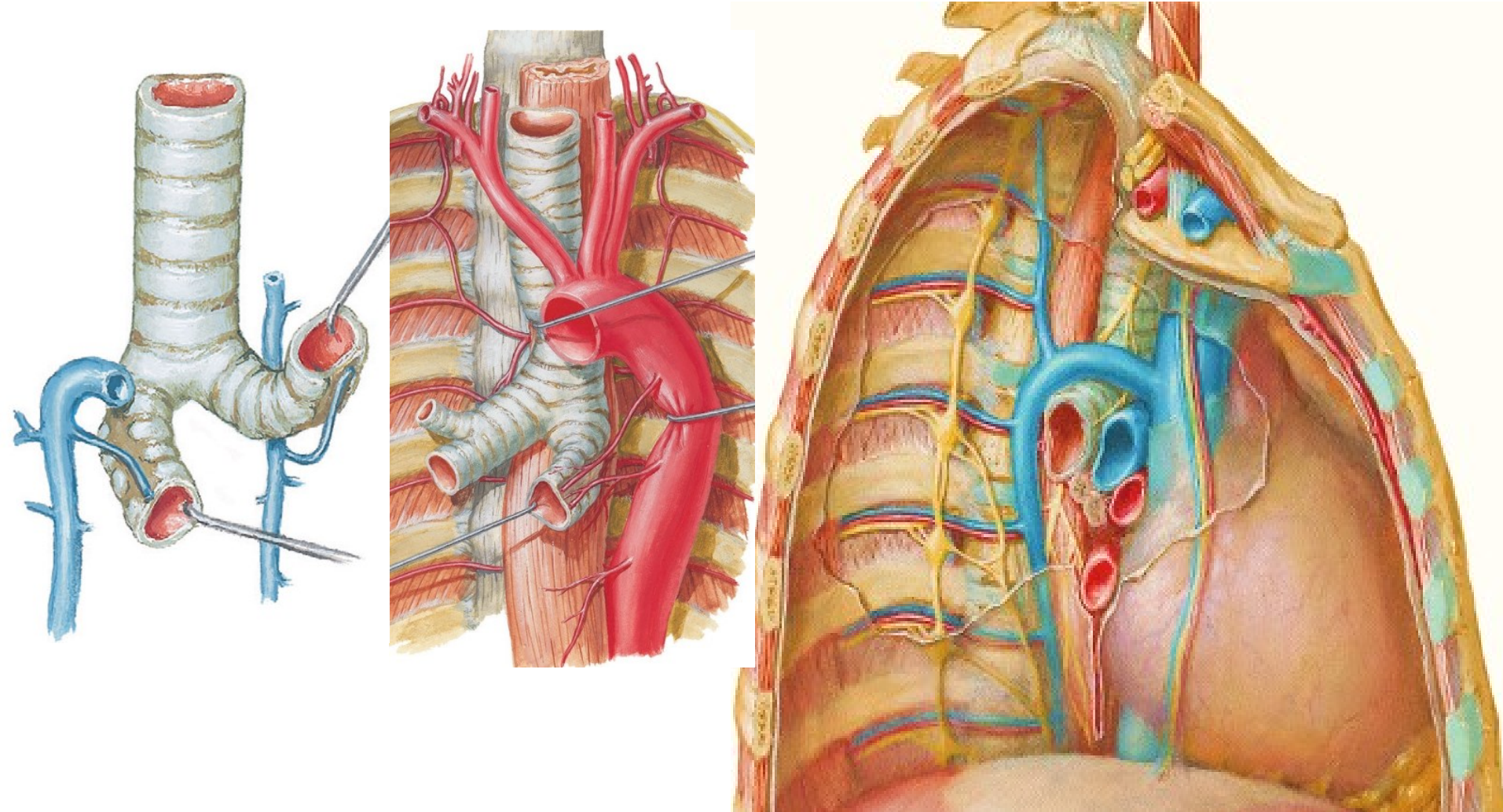
**Anteriorly:** Oesophagus and root of the right lung.

**Posteriorly:** lower 8 thoracic vertebrae, separated from them by right posterior intercostal a.

**On the right side:** right pleura, lung and greater splanchnic nerve.

**On the left side:** thoracic duct and descending aorta.

## Relations of the arch in Superior Mediastinum



**Below:** the root of the right lung.

**On the right side:** the right pleura and lung.

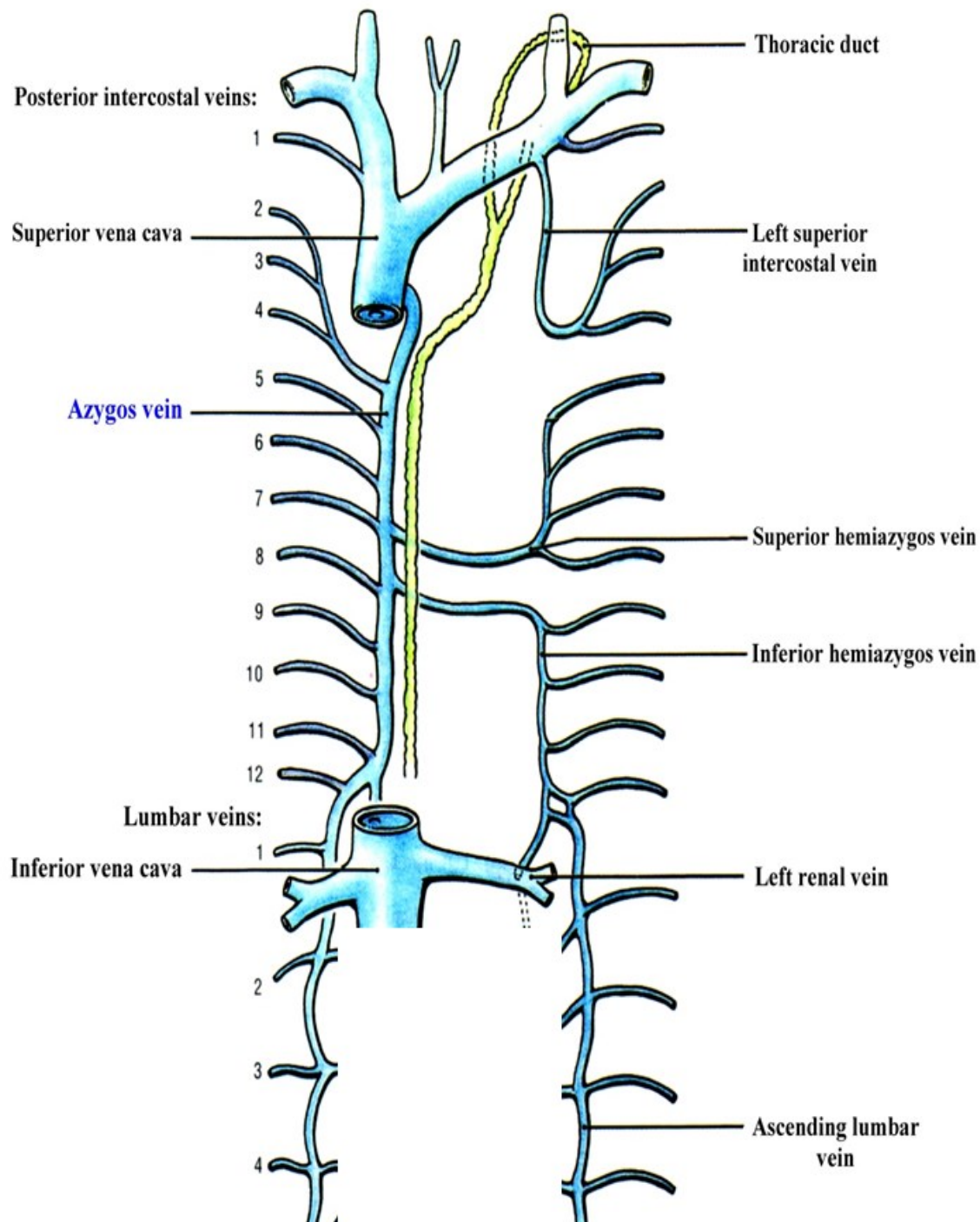
**On the left side:** oesophagus, trachea and right vagus nerve.

# Azygos vein

**All posterior intercostal veins join the azygos vein except:**

1<sup>st</sup> posterior intercostal on the right and left

Left 2, 3, 4 -----  
left superior intercostal vein.



# Tributaries of Azygos vein

4x2

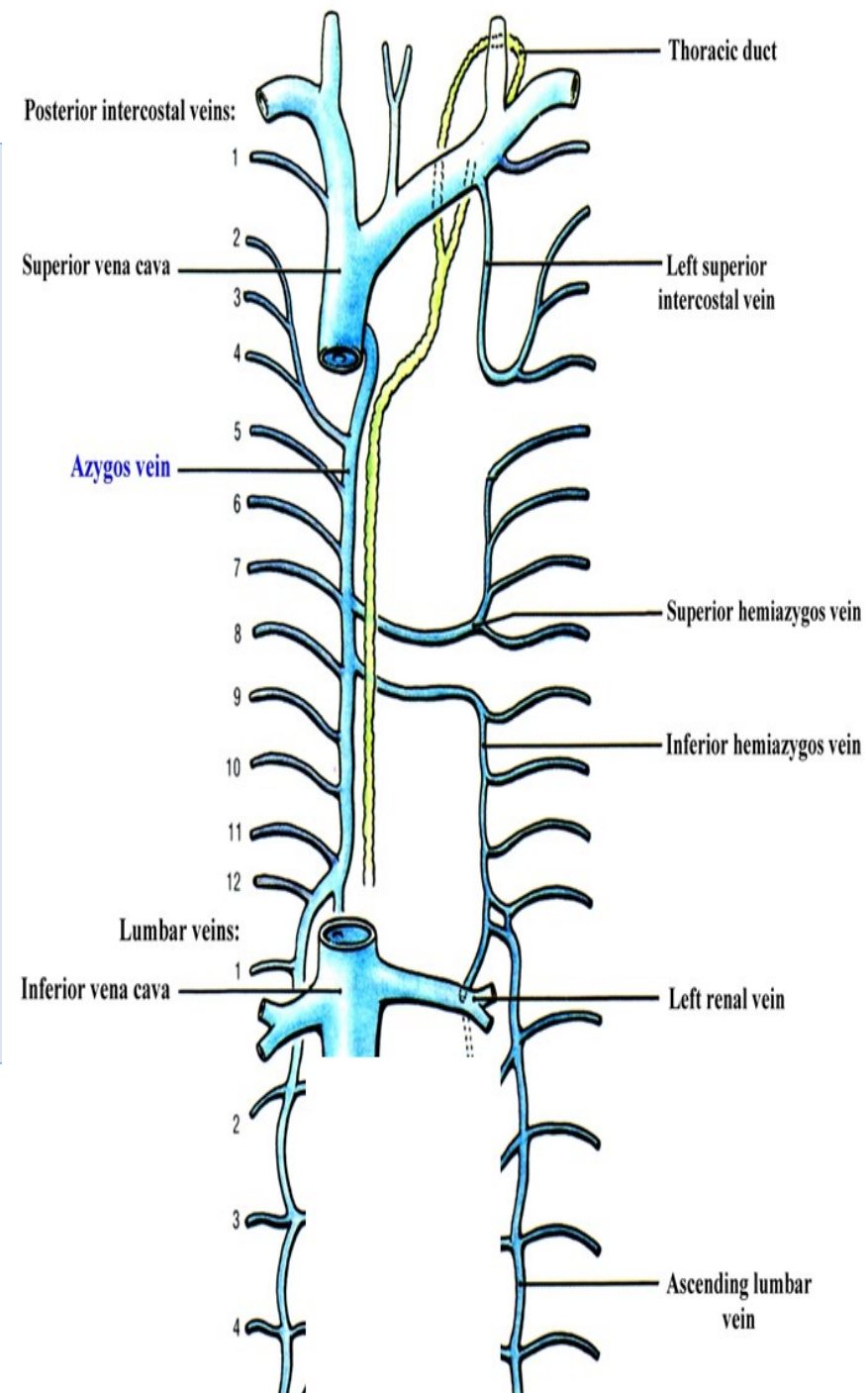
**Right subcostal  
& right ascending lumbar.**

**Right superior intercostal vein &  
Right posterior intercostal (from 11th to 5<sup>th</sup>).**

**Superior hemiazygos &  
Inferior hemiazygos vein**

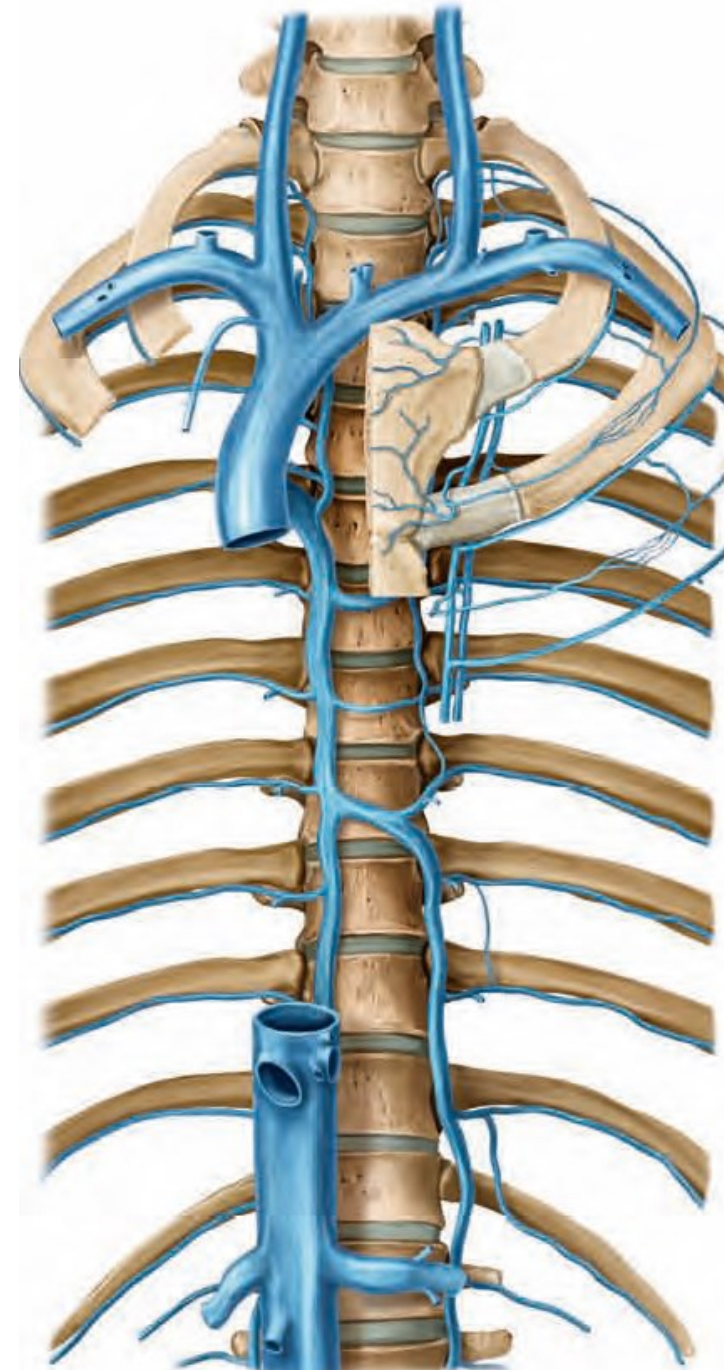
Right bronchial veins: from right lung.

7-Oesophageal, pericardial & mediastinal veins.

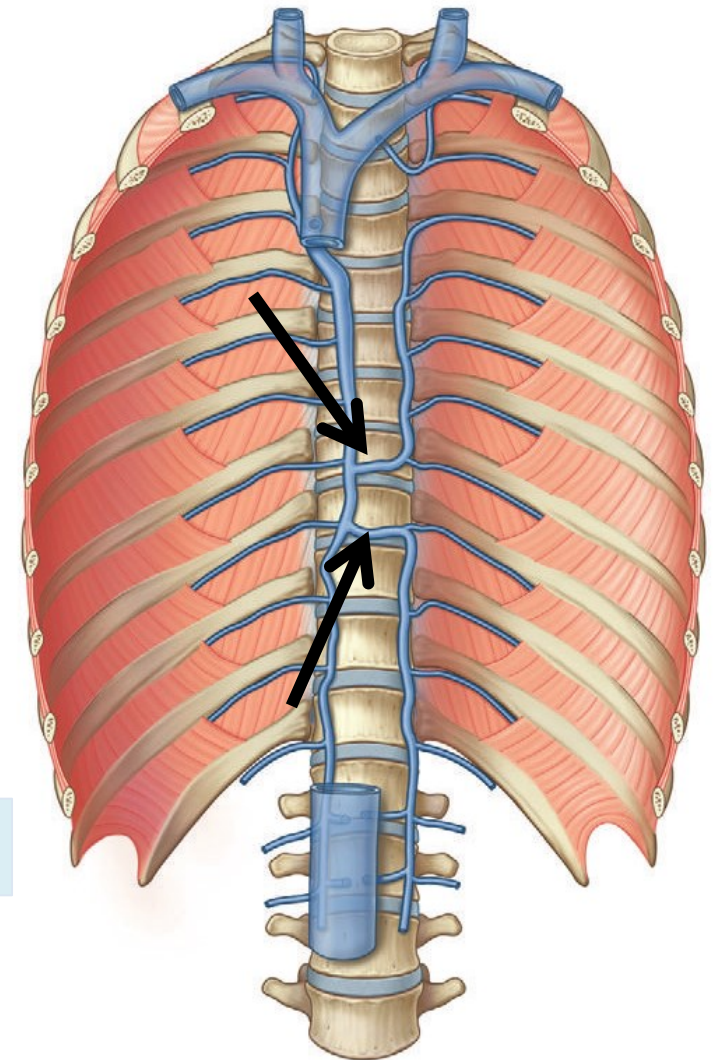
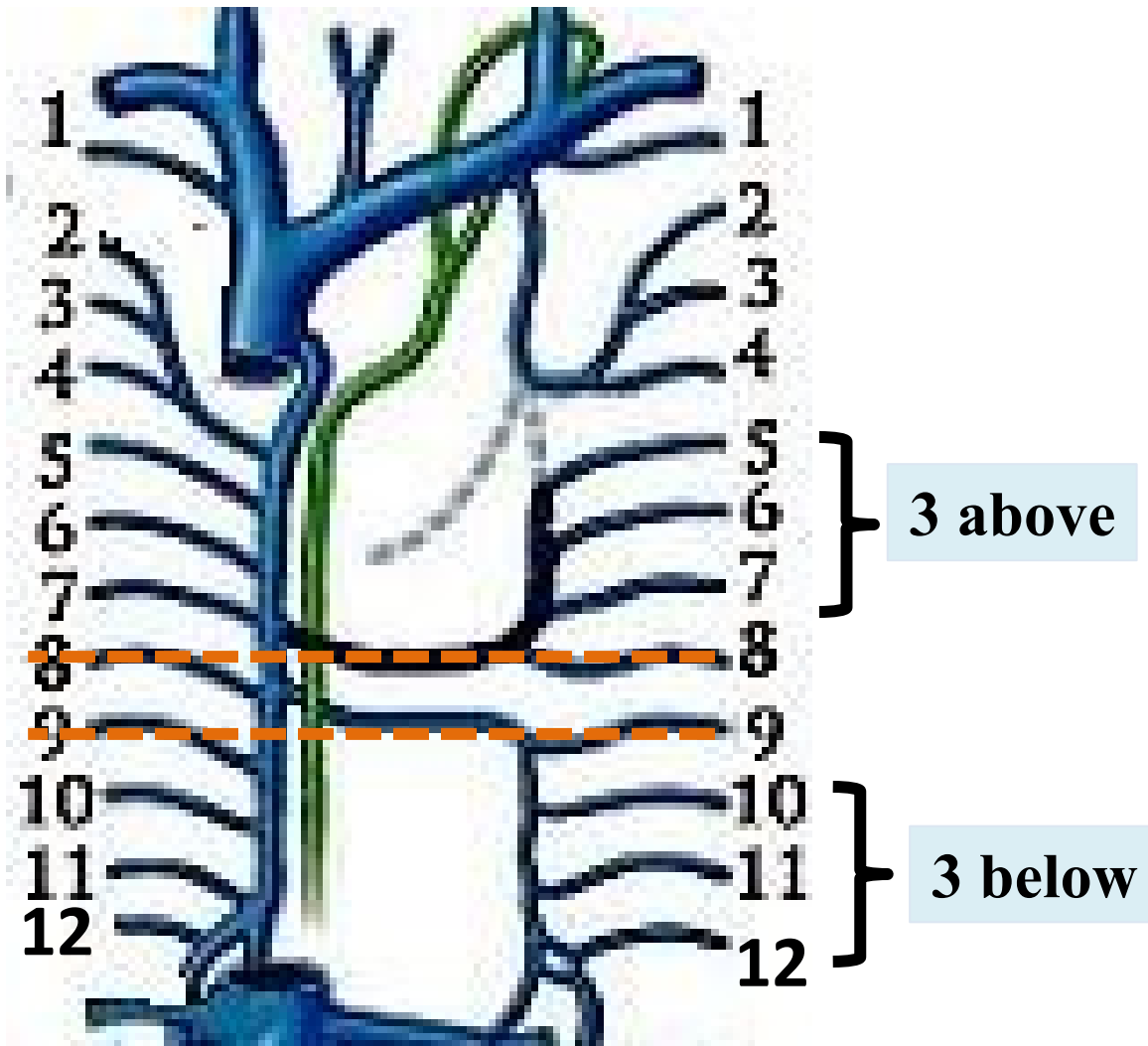


## Tributaries of Azygos vein

- 1-A common trunk formed by union of right ascending lumbar and right subcostal veins.
- 2-Right posterior intercostal vein. from 11th to 5<sup>th</sup>
- 3-Right superior intercostal vein**, formed by union of 4th, 3rd and 2nd posterior intercostal v., joins arch of azygos.
- 4-Inferior hemiazygos vein:** join azygos at T9.
- 5-Superior hemiazygos vein:** joins azygos at T8.
- 6-Right bronchial veins: from right lung.
- 7-Oesophageal, pericardial& mediastinal veins.

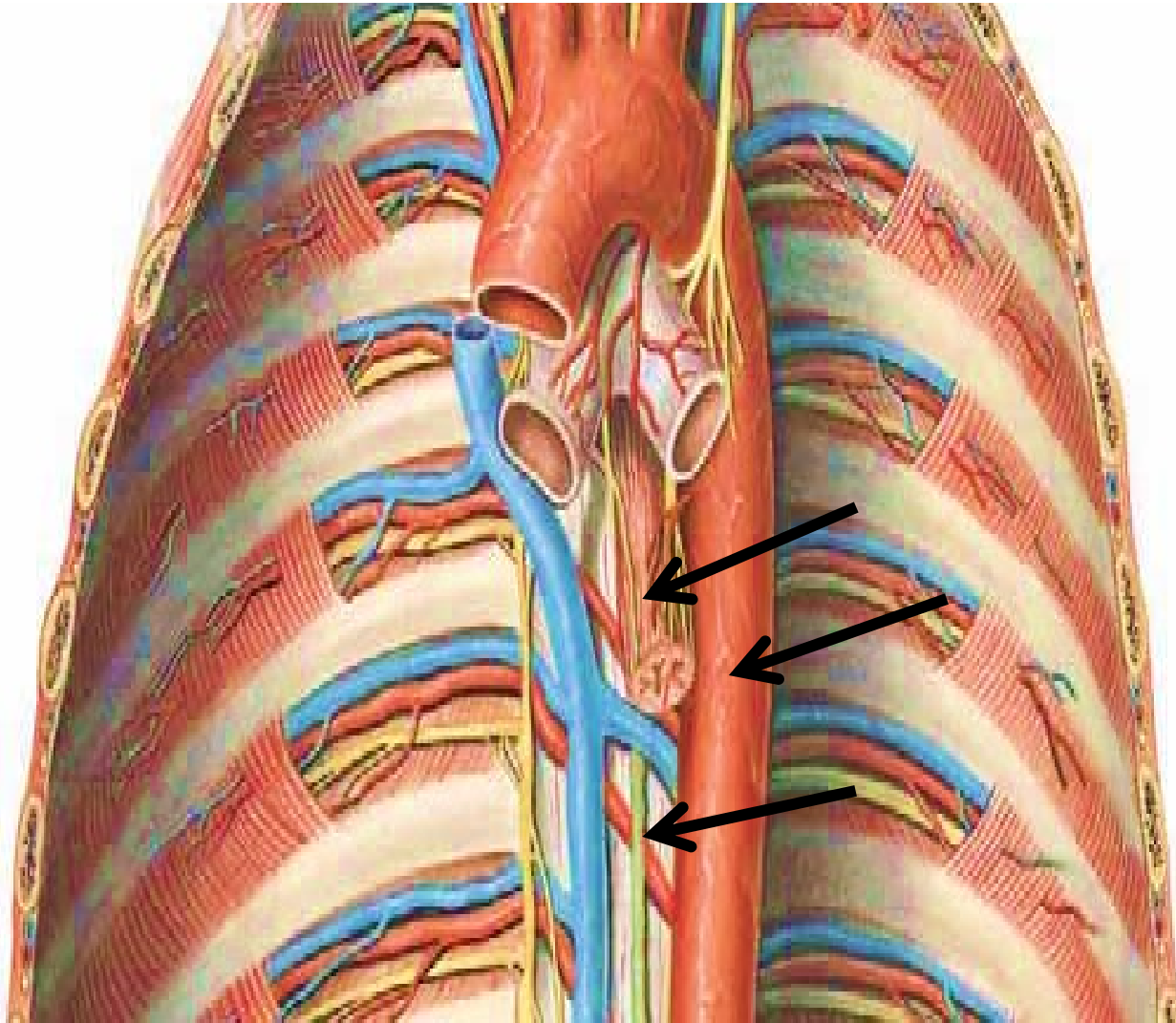


# Superior & Inferior Hemiazygos Vein



**Both bend in front of body of vertebra (Superior---T8, Inferior---T9).**

# Superior & Inferior Hemiazygos Vein

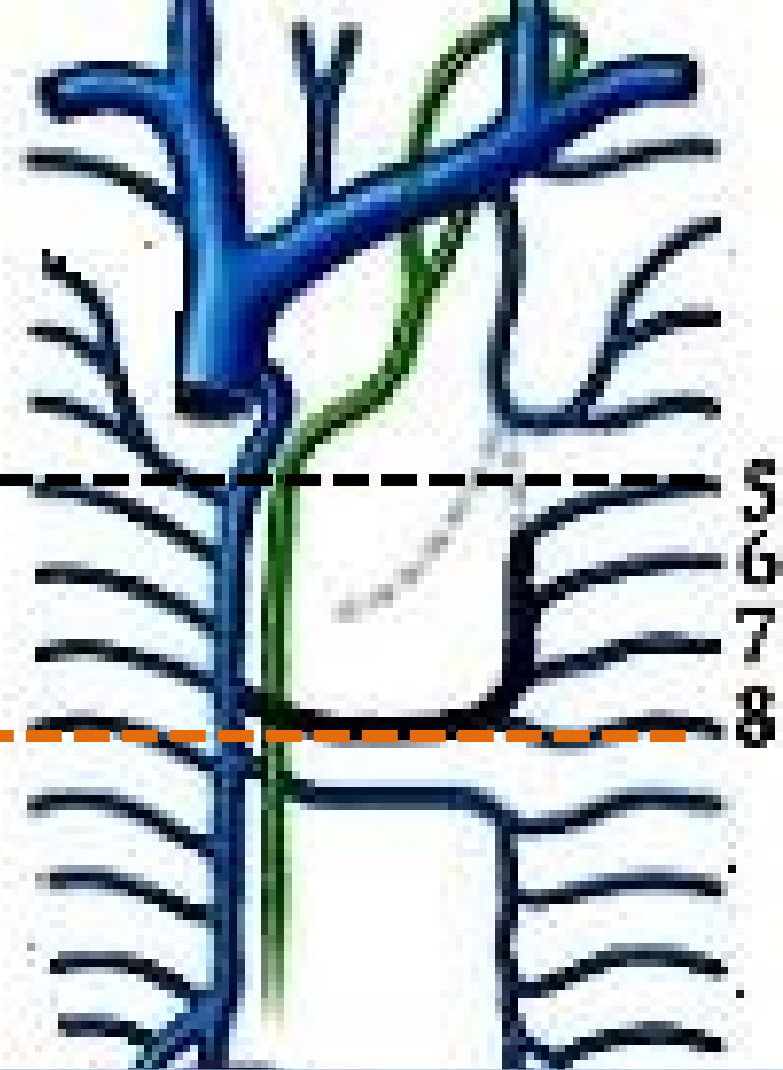


**behind** descending aorta, thoracic duct and oesophagus to **end** in azygos vein.

## II- Superior Hemiazygos Vein

**Begins ----5<sup>th</sup> space**

**Ends ----T8**



**Origin:** 5<sup>th</sup> left intercostal space as a continuation of 5<sup>th</sup> left posterior intercostal vein.

**Course:** descends on left side of bodies of middle 4 thoracic vertebrae.

At level of T8, it **bends** to right **in front** of body of T8

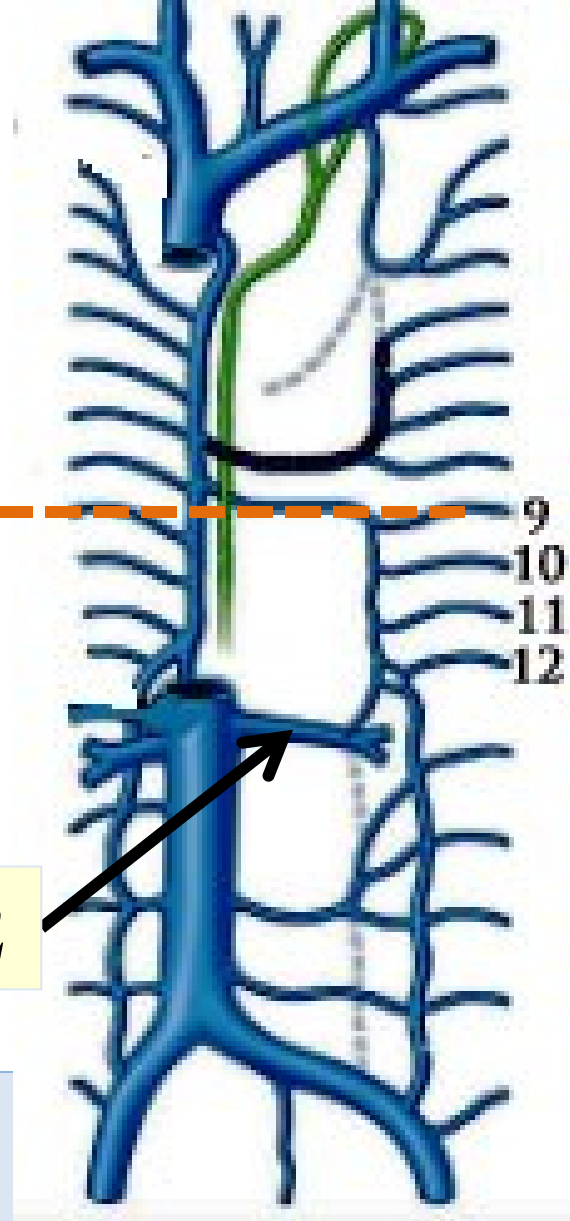
**behind** descending aorta, thoracic duct and oesophagus to **end** in azygos vein.

**Tributaries:** left posterior intercostal v. from 5<sup>th</sup> to 8<sup>th</sup>.

# I- Inferior Hemiazygos vein

**Ends ----T9**

**Begins ---left renal vein ----L2**



**Origin:** back of left renal vein at level of L2..

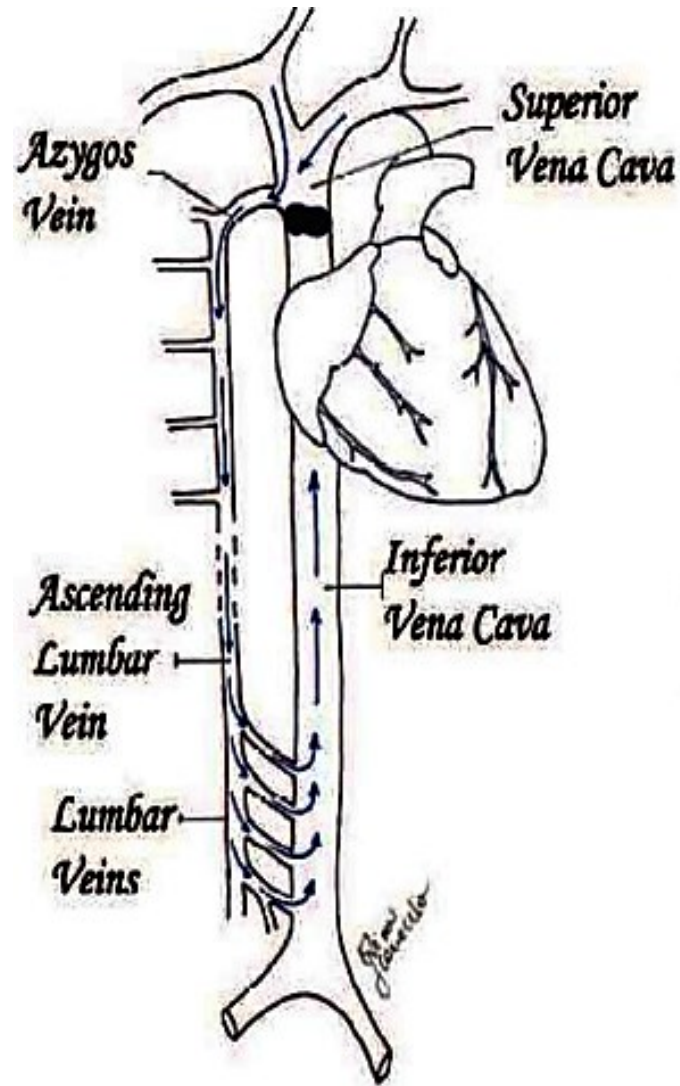
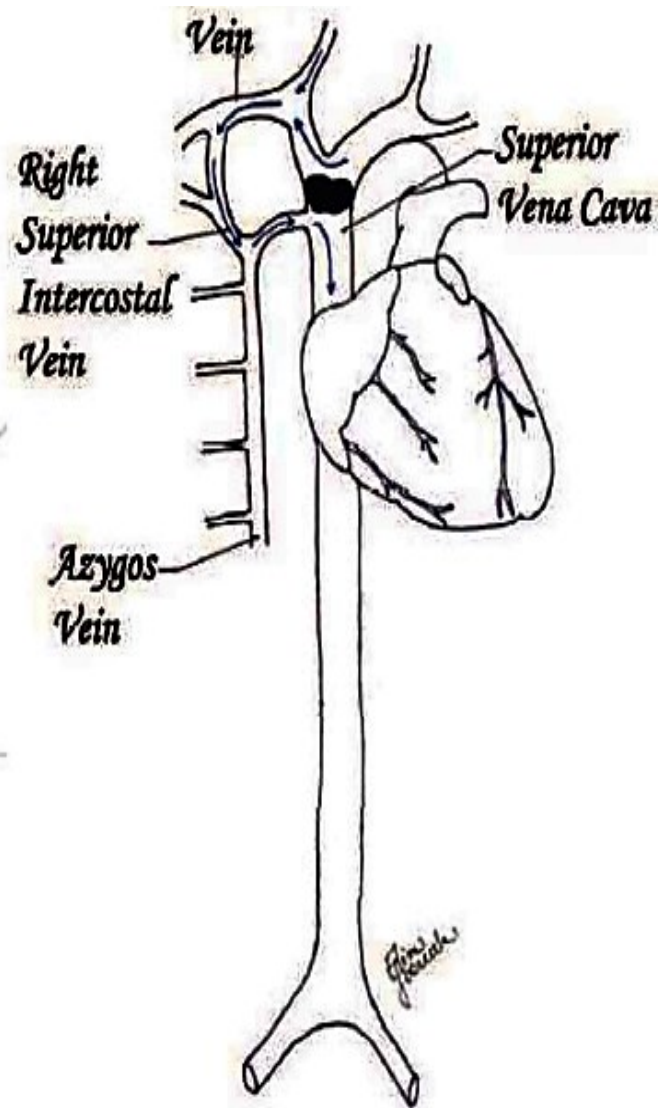
**Course:** Piercing left crus of diaphragm.

At level of T9, it **bends** to right **in front** of body of T9

**behind** descending aorta, thoracic duct and oesophagus to **end** in azygos vein.

**Tributaries:** left subcostal vein and left posterior intercostal veins from 9<sup>th</sup> to 11<sup>th</sup>.

# Obstruction of S.V.C.



If obstruction is **below** entrance of azygos vein: venous drainage of upper  $\frac{1}{2}$  of body reaches heart via azygos.  
If obstruction is **above** opening of vena azygos: venous blood from regions drained by S.V.C. is returned to heart via anastomotic channels between S.V.C. and I.V.C.

# **Describe Azygos venous system**

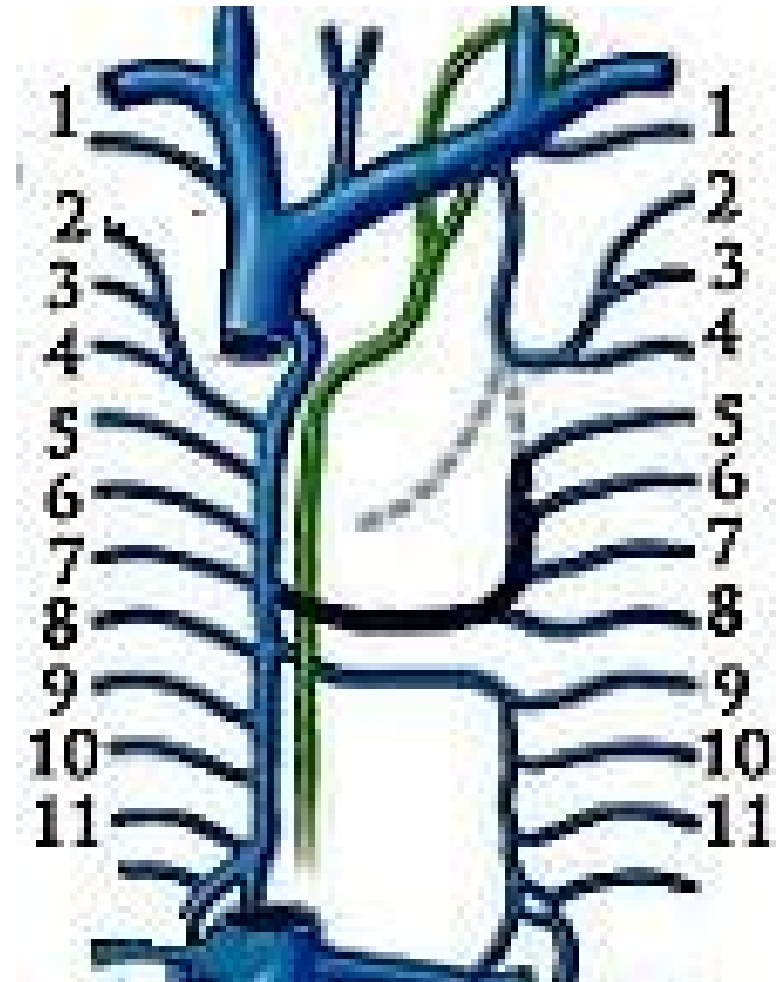
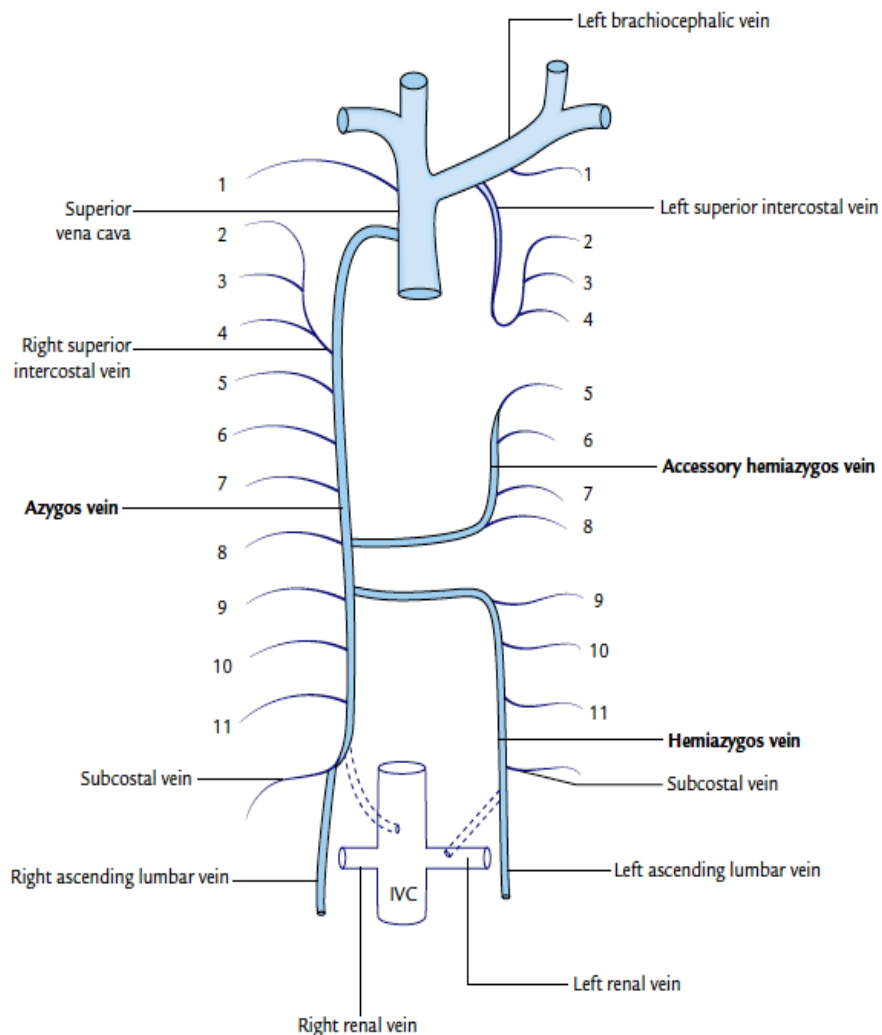
**Azygos vein**

**Superior hemiazygos vein**

**Inferior hemiazygos vein**

# Superior hemiazygos = Accessory azygos

# Inferior hemiazygos = Hemiazygos

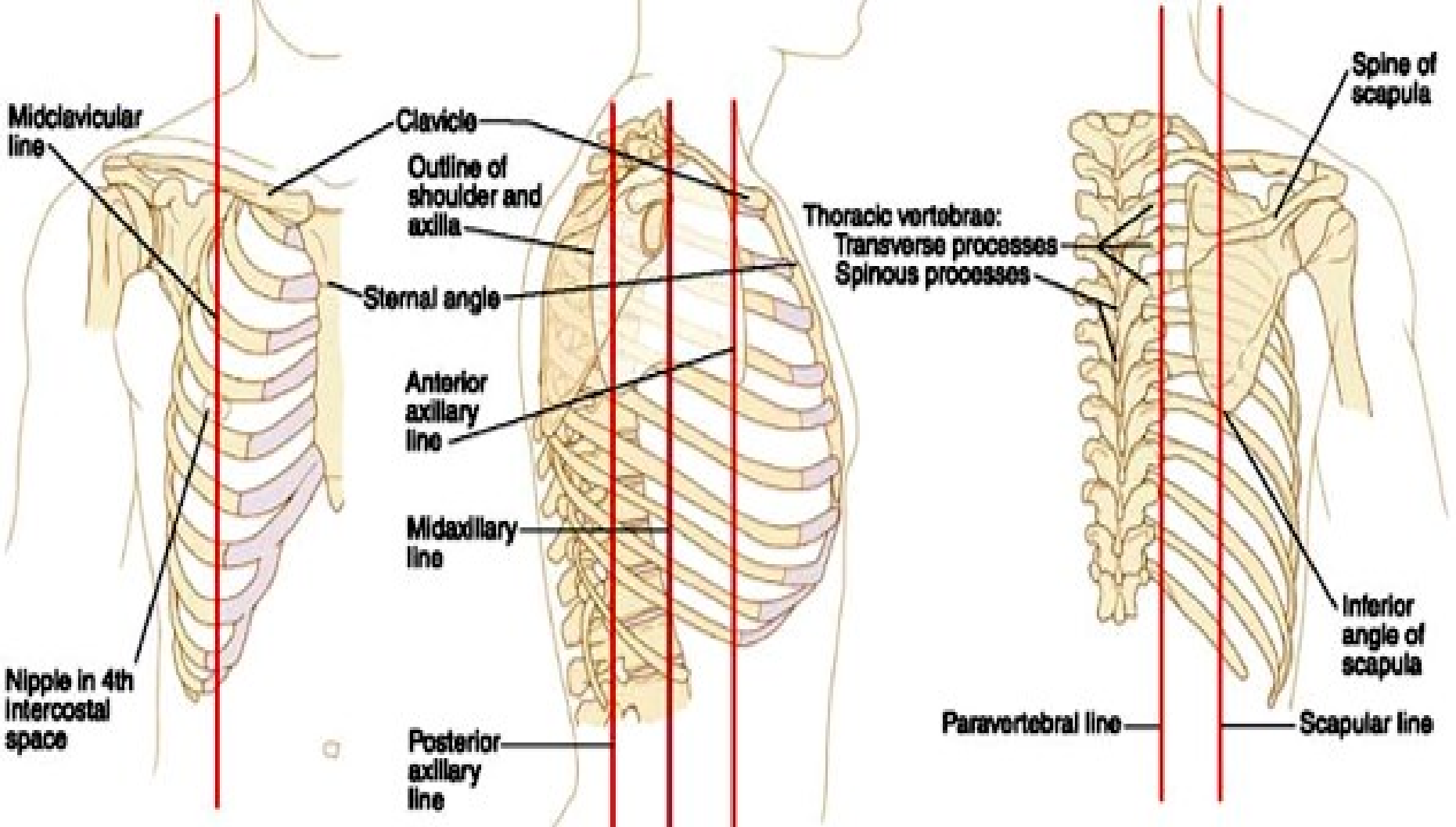


**Very important**

**Internal mammary artery**

**Azygos vein**

**Typical intercostal nerve**



- 1- Midsternal line:** in median plane.
- 2- Midclavicular line:** from midpoint of clavicle
- 3- Midaxillary line:** midway between anterior& posterior folds of axilla (apex of axilla).
- 4- Scapular line:** on posterior thoracic wall passing through inferior angle of scapula.
- 5- Lateral border of sacrospinalis muscle:** important line of demarcation for the pleura and lung on the posterior thoracic wall.

وَقُلِ الْحَمْدُ لِلَّهِ

