

أهلا

وسهلا



الأستاذ الدكتور / يوسف حسين

أستاذ التشريح وعلم الأجنة - كلية الطب - جامعة الزقازيق - مصر

رئيس قسم التشريح و الأنسجة و الأجنة - كلية الطب - جامعة مؤتة - الأردن

دكتورة من جامعة كولونيا المانيا

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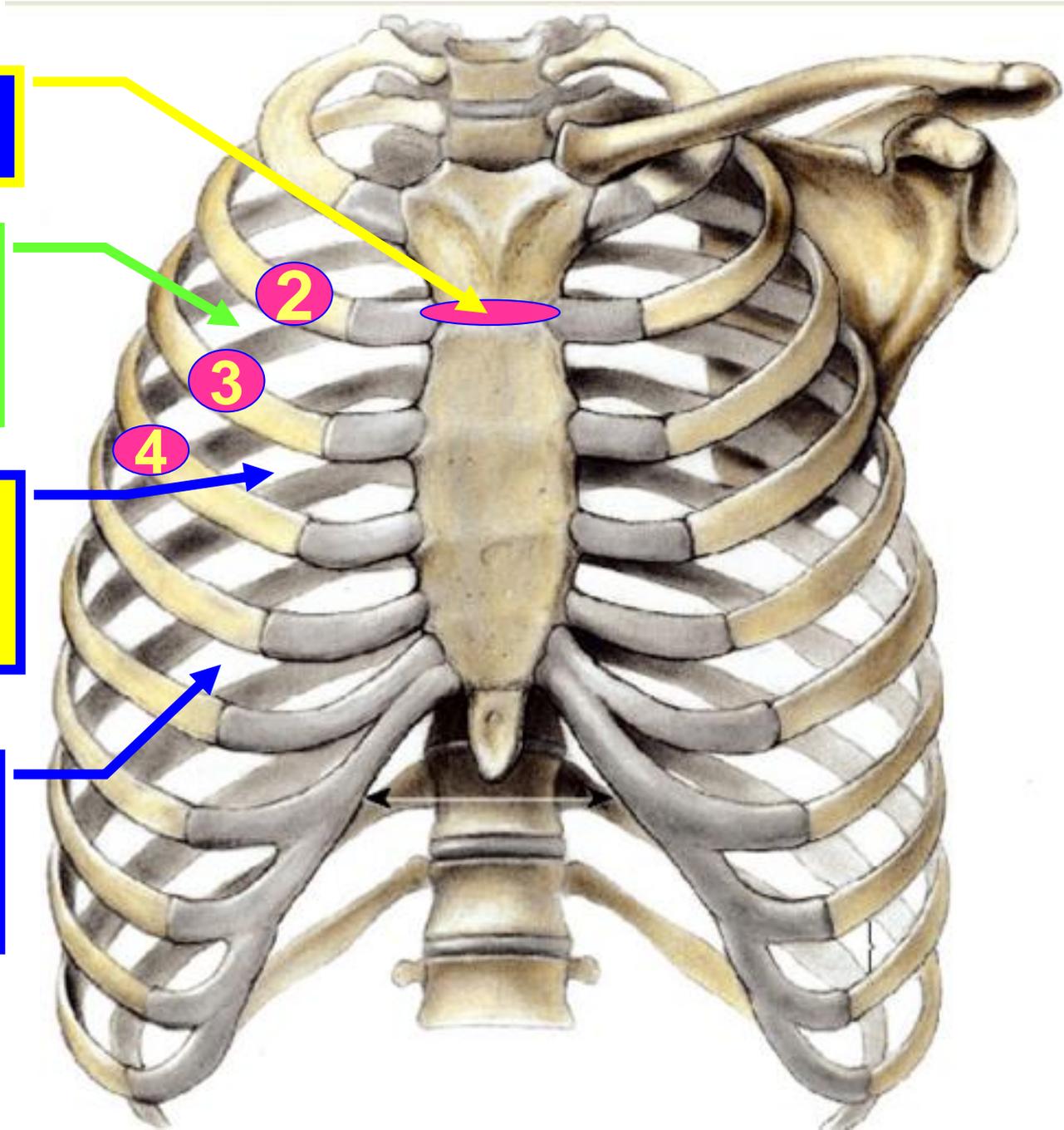
INTERCOSTAL Nerves

Sternal angle

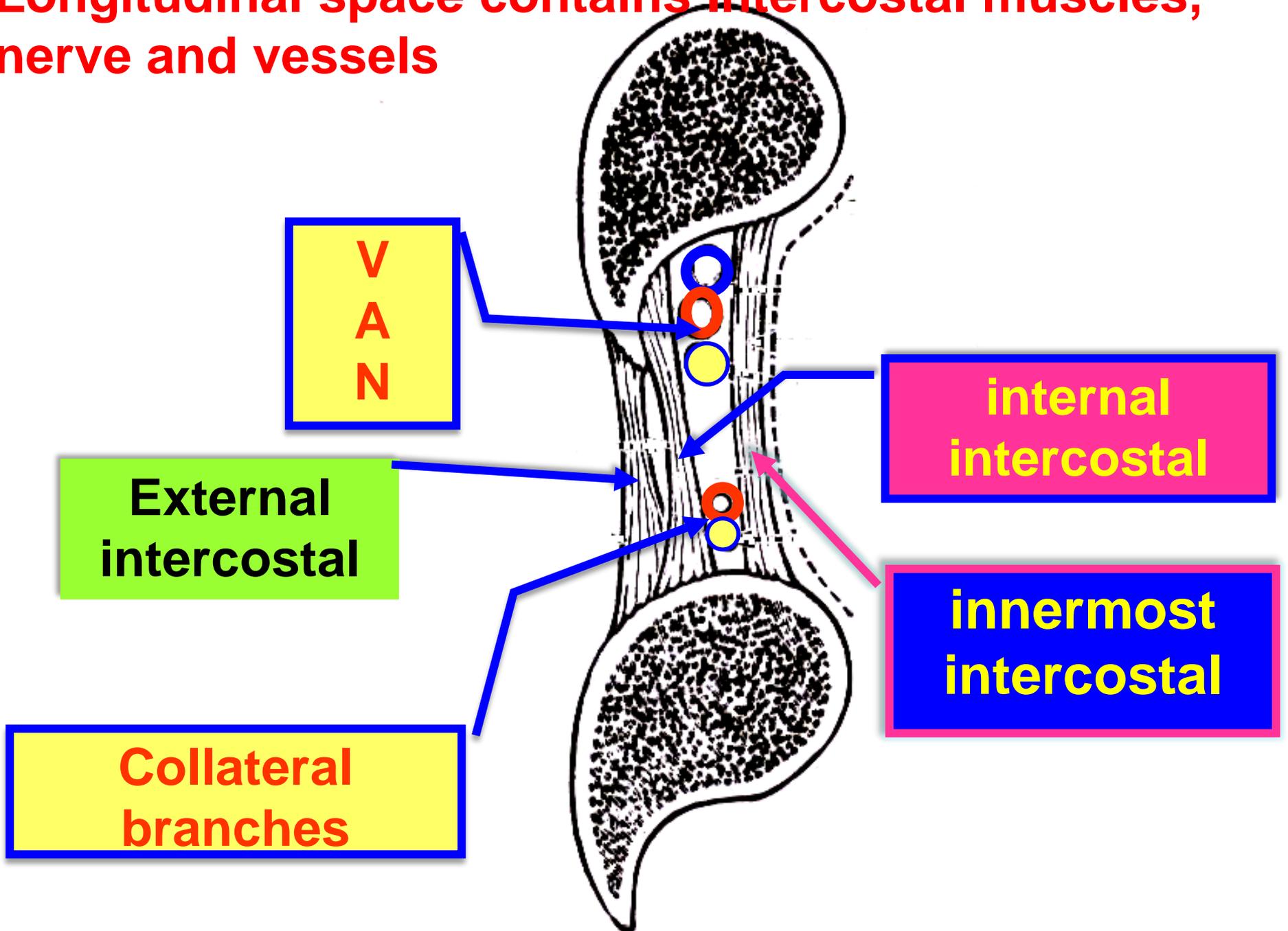
2nd Intercostal space

3rd Intercostal space

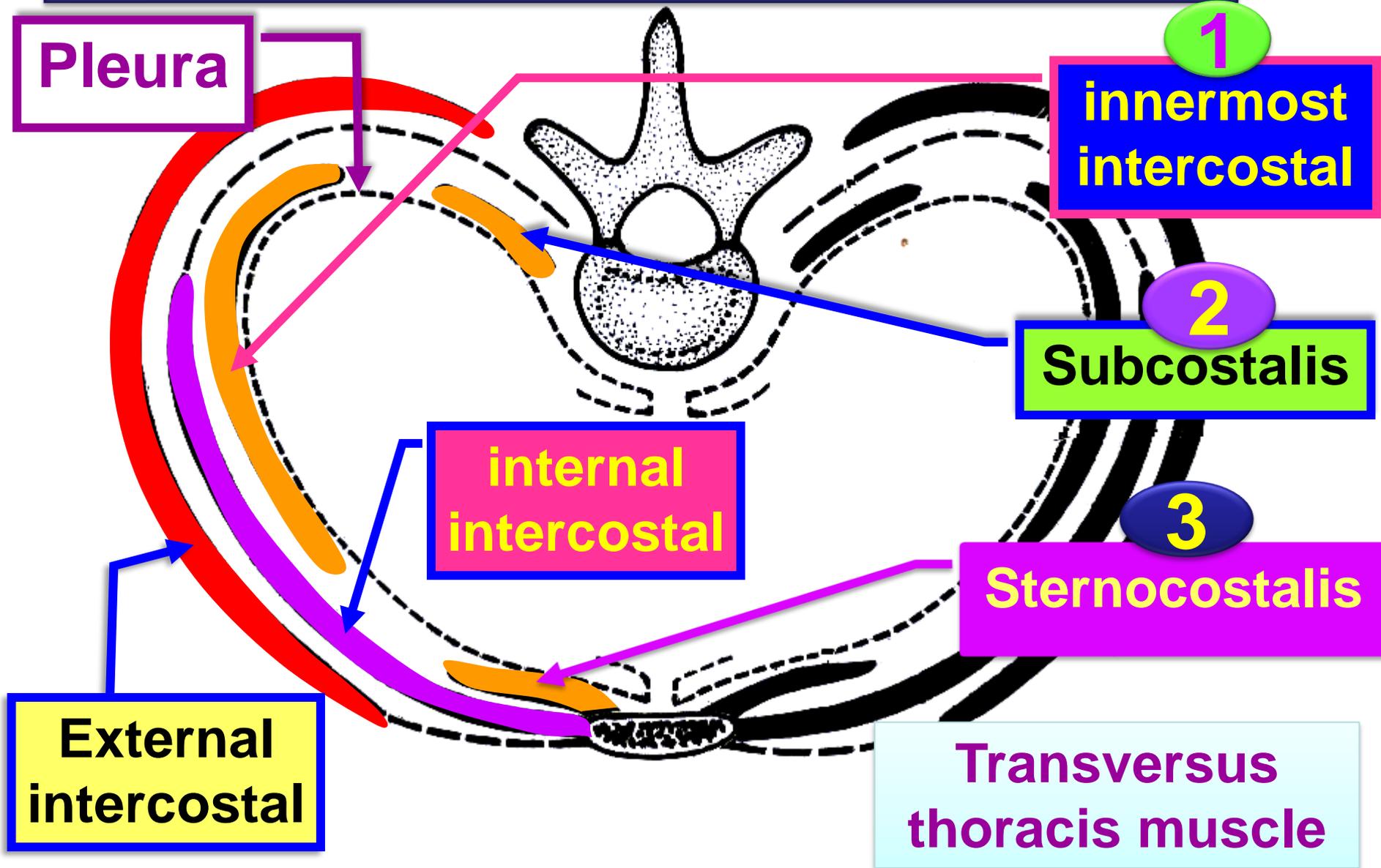
Intercostal space



Longitudinal space contains Intercostal muscles, nerve and vessels



Transverse section of the thoracic wall



Nerve supply of Thoracic Wall

**Intercostal
nerves**

Beginning

End

Course

Types

Branches

Thoracic spinal nerves

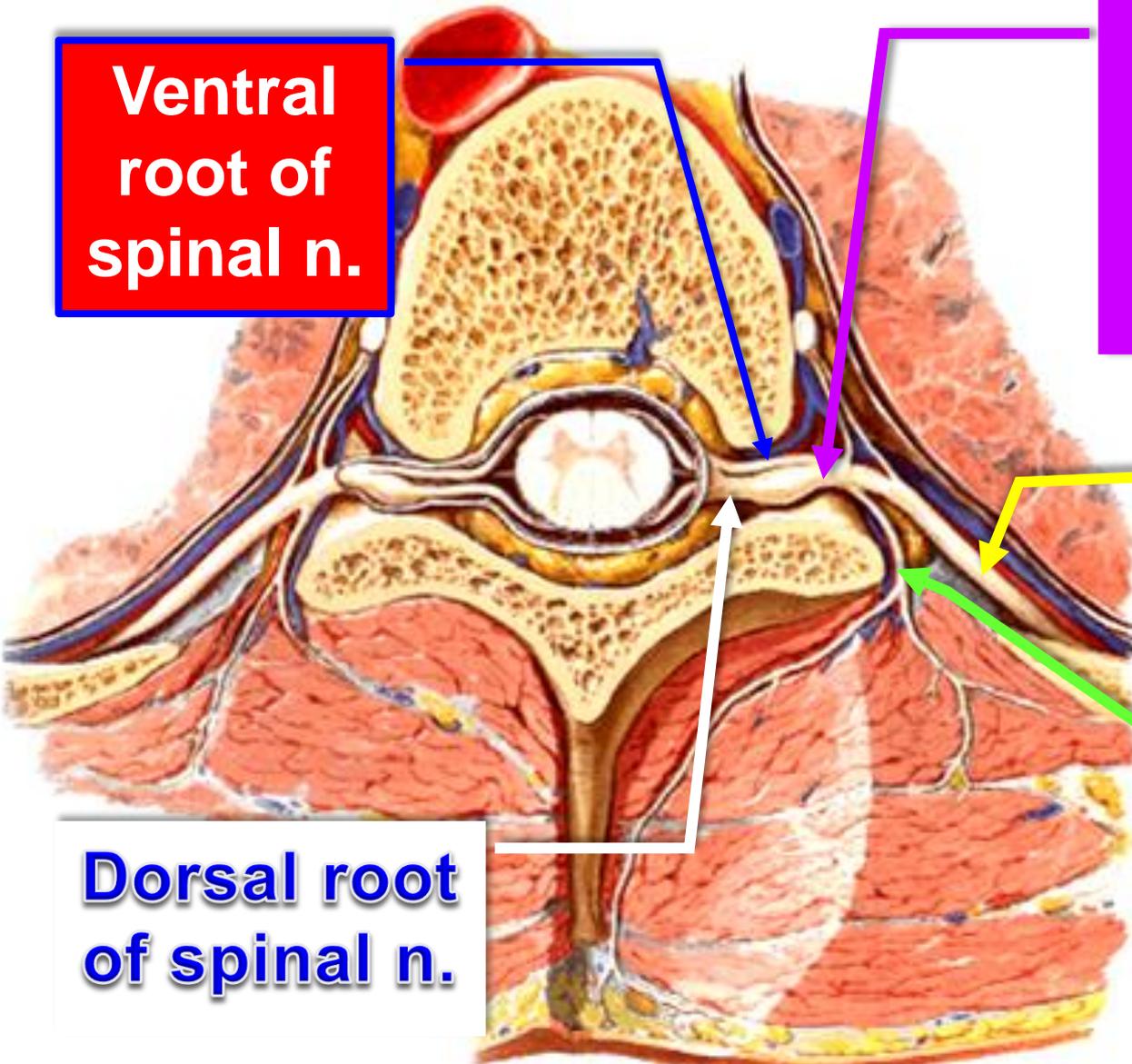
Ventral root of spinal n.

Trunk of the spinal nerve (intervertebral foramen)

Ventral ramus

Dorsal root of spinal n.

Dorsal ramus



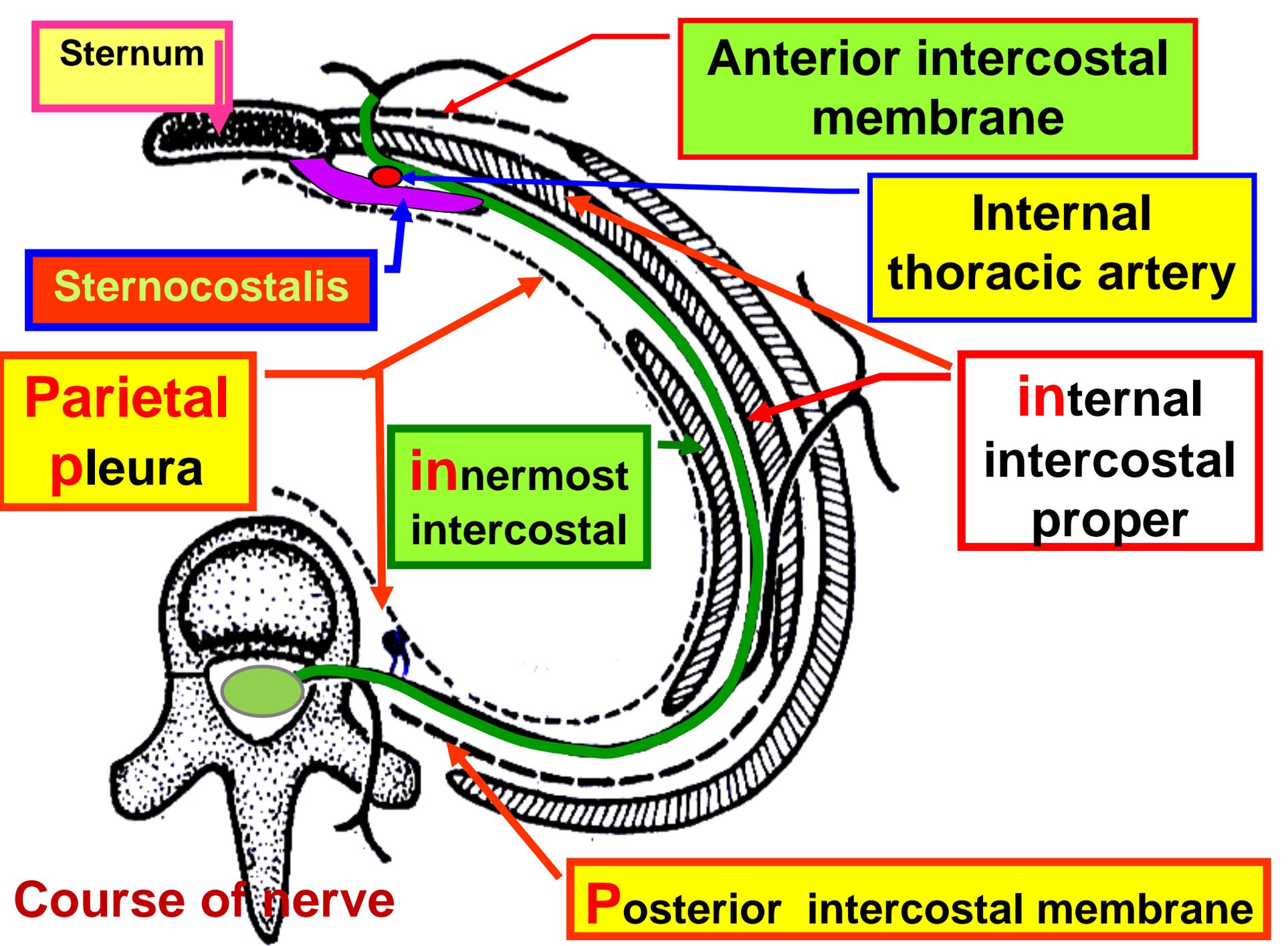
- **Intercostal Nerves**

- **Typical (3rd-6th)** : supplied thoracic wall only
- **A Typical Intercostal Nerve:** supplied thoracic wall and structures outside

1- The first Intercostal Nerve (ventral ramus): shares in the formation of the **brachial plexus**.

2- The Second Intercostal Nerve: its lateral cutaneous branch does not divide (**intercosto-brachial nerve**) supply the skin of the floor of the axilla and medial side of the arm.

3- Lower five intercostal and subcostal (12th) Nerves: supply muscles and skin of anterior abdominal wall.



- **Typical intercostal nerves**

**** Roots**, ventral rami of the thoracic spinal nerves.

**** End**: as anterior cutaneous nerves.

**** Course and relations**;

- It runs forwards in the intercostal groove below intercostal vessels (**V.A.N.**) as follows:-

- **At first**, it runs between **Posterior** intercostal membrane and Parietal **Pleura**.

- **Then**, between **Internal** intercostal muscle (Outer) and **Innermost** intercostal (Inner).

- **It** passes between **Internal** intercostal muscle and **Pleura**.

- **Then**, **in front of** sternocostalis and internal mammary artery.

- **Finally**, it curves **forward and pierces** internal intercostal muscle and anterior intercostal membrane.

Sternum

M

L

Anterior cutaneous branch

Parietal Pleura

Collateral

A

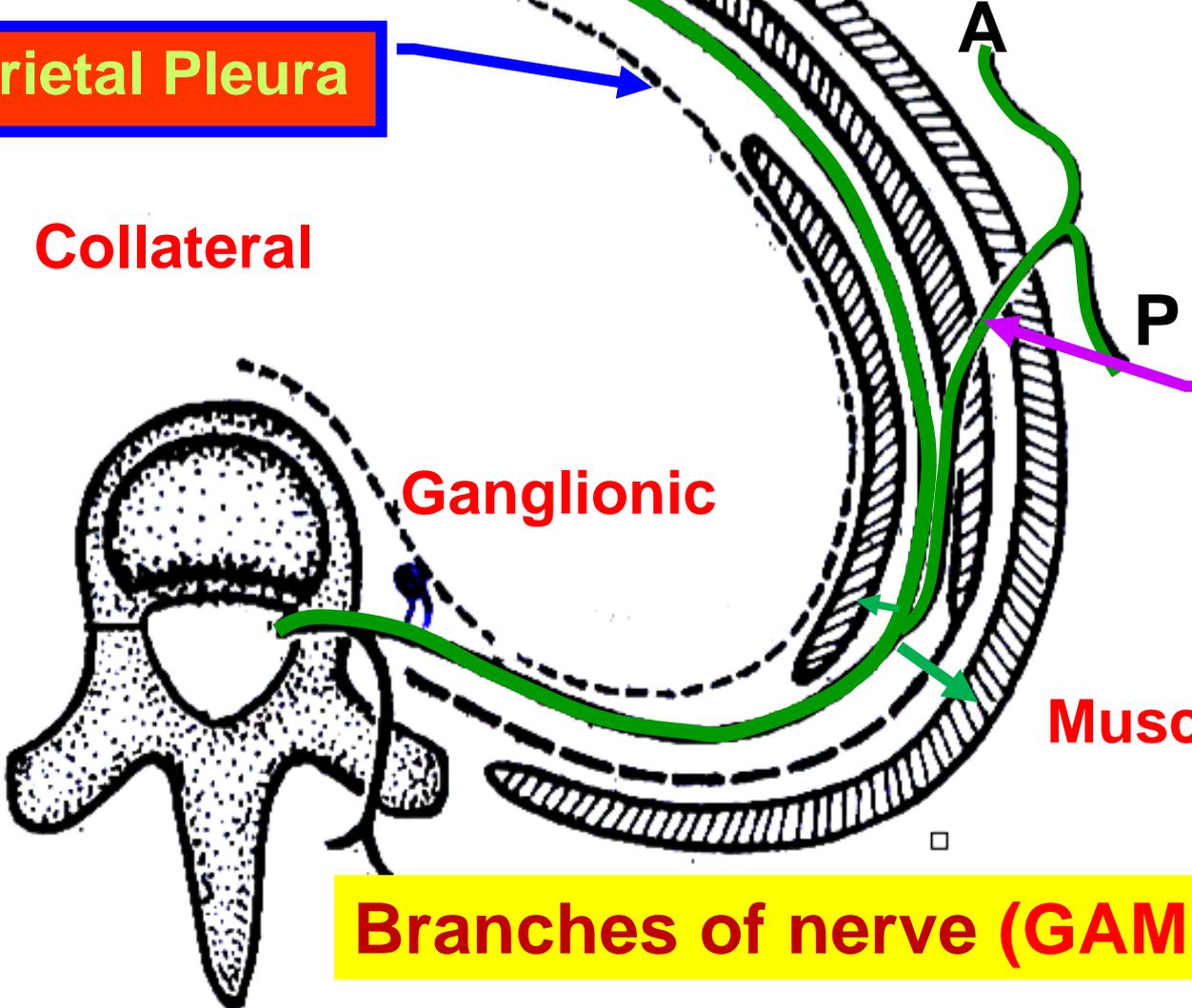
P

Lateral cutaneous branch

Ganglionic

Muscular

Branches of nerve (GAML CP)



- **Branches of typical intercostal nerve (GAML CP):**

- 1) **Ganglionic branches:**

- They give white ramus communications to the corresponding sympathetic ganglion.

- They receive gray ramus communications

- 2) **Anterior cutaneous branch (terminal branch)** divided into lateral and medial divisions to the skin of anterior thoracic wall.

- 3) **Muscular branches** to the intercostal muscles.

- 4) **Lateral cutaneous branch** divided into anterior and posterior divisions to the skin of lateral thoracic wall.

- 5) **Collateral branch:** runs along the upper border of the rib below.

- 6) **Pleural branches** to the costal part of the parietal pleura.

Herpes Zoster

- **Herpes Zoster**
- **Viral infection characterized by painful skin rash with vesicles along the course of intercostal nerves**
- **It appears on the single side only.**



Blood Vessels of Thoracic Wall

Internal thoracic artery

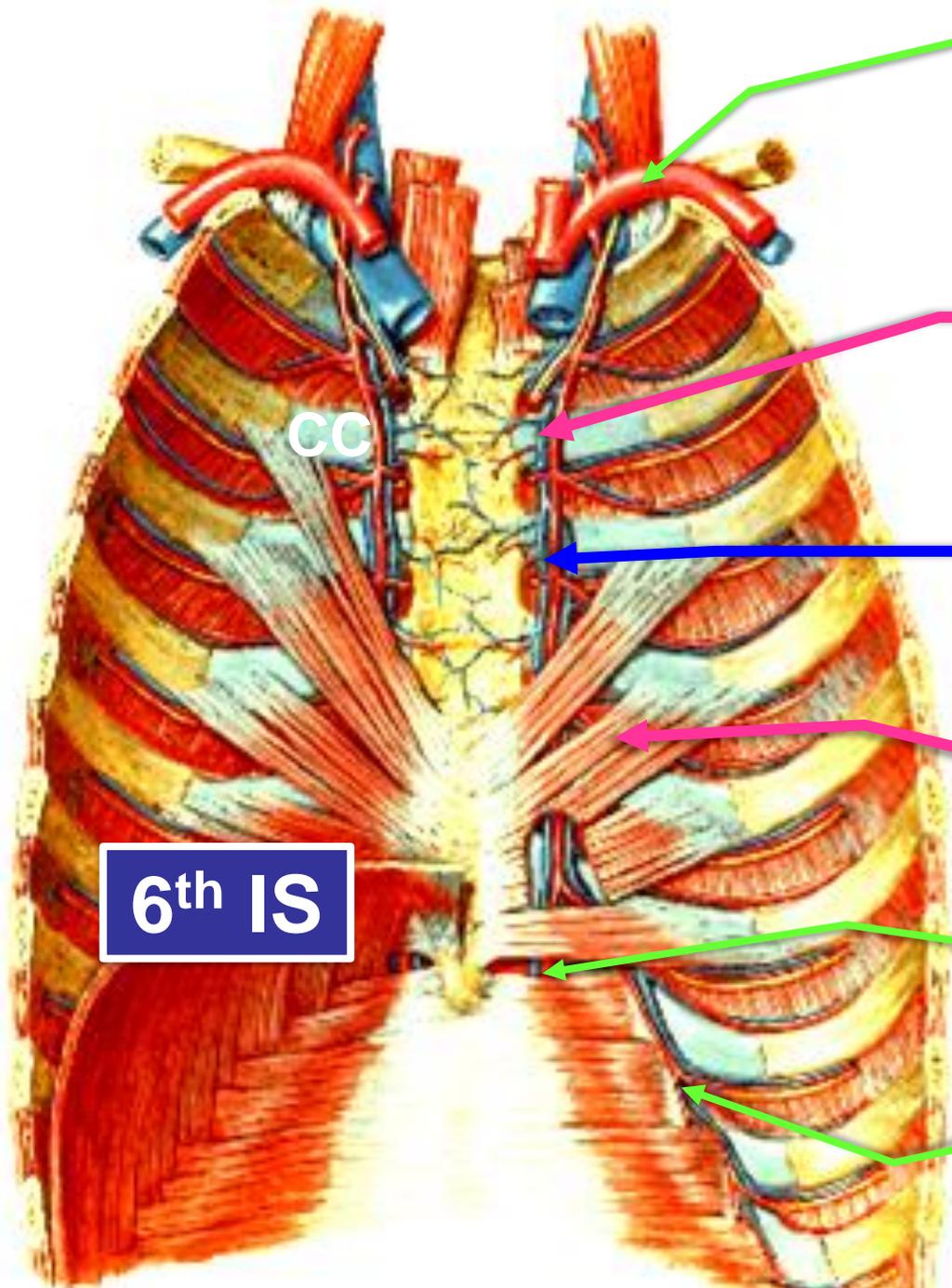
Beginning

End

Course

Relations

Branches



1st part of subclavian artery

Internal thoracic vein

Internal thoracic artery

Sternocostalis

Superior epigastric A

Musculophrenic A

CC

6th IS

- **Internal Thoracic (Mammary) Artery**

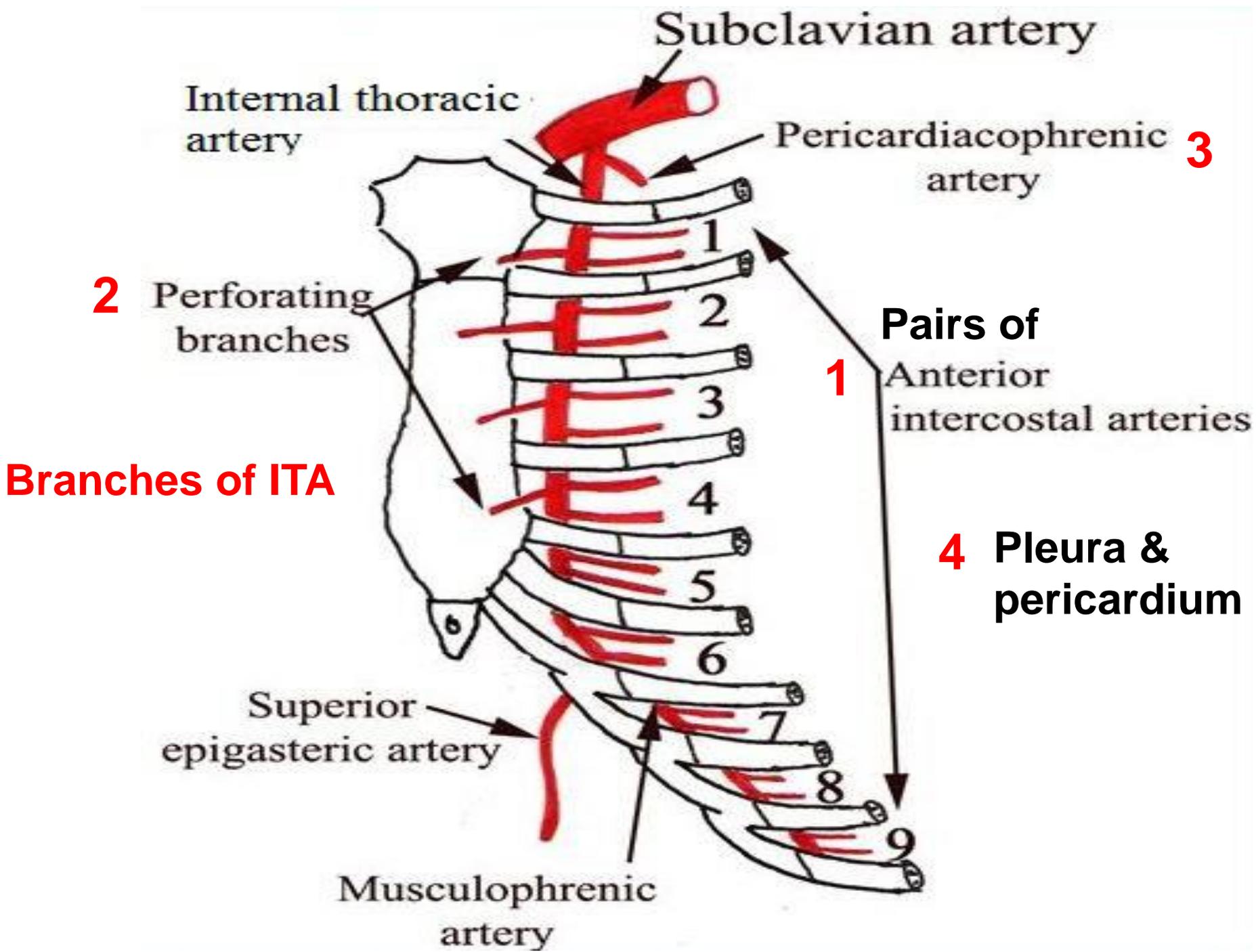
**** Begins:** From the **first part of the subclavian artery** behind the sternoclavicular joint.

**** End,** at the **6th intercostal space** by dividing into:

- a) Superior epigastric artery.
- b) Musculo-phrenic artery.

**** Course and Relations:-**

- It descends vertically:
- **Behind** upper 6 costal cartilages.
- **Infront** of sternocostalis muscle and pleura
- **lateral** to the internal thoracic vein.



**** Branches (4 Ps)**

1- Pairs of anterior intercostal arteries (upper and lower) to the **upper 6 intercostal spaces**.

2- Perforating branches: to the breast in female.

3- Pleural and pericardial branches.

4- Pericardiophrenic artery: to pericardium and diaphragm.

5- Two terminal branches:

A) Musculophrenic artery: along the costal margin.

- Pairs of anterior intercostal arteries to **7, 8, 9th** intercostal spaces.

B) Superior epigastric artery: enters the rectus sheath and supplies the anterior abdominal wall and diaphragm.

Posterior Intercostal Arteries

**** Number;** one artery in each 11 intercostal spaces and subcostal artery.

**** Origin;**

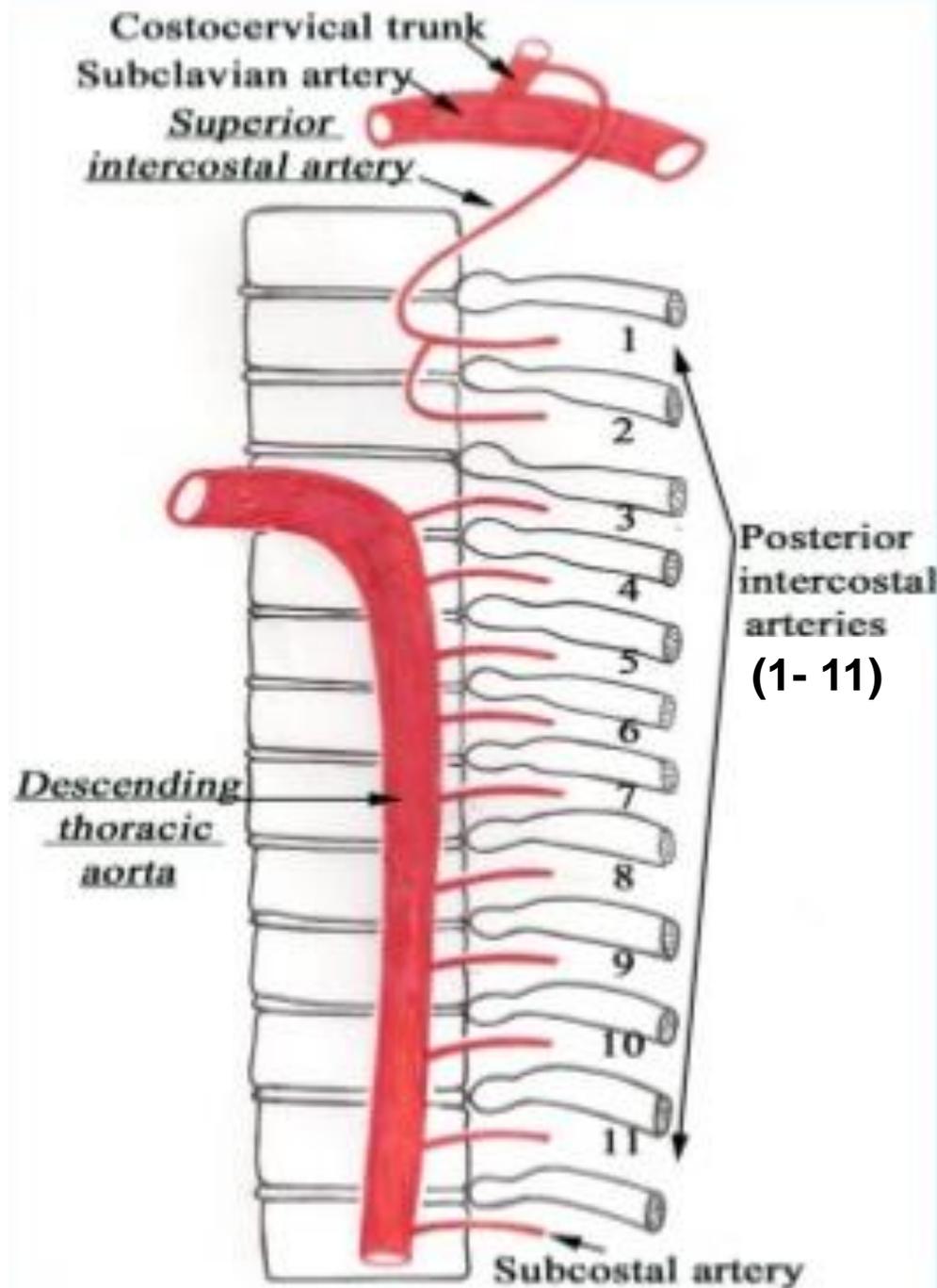
1- The 1st and 2nd arteries from superior intercostal artery.

- From costocervical trunk of **2nd part of subclavian artery.**

2- From the 3rd to 11th arteries from descending thoracic aorta.

2- Subcostal artery from descending thoracic aorta.

- The posterior intercostal artery gives collateral branch



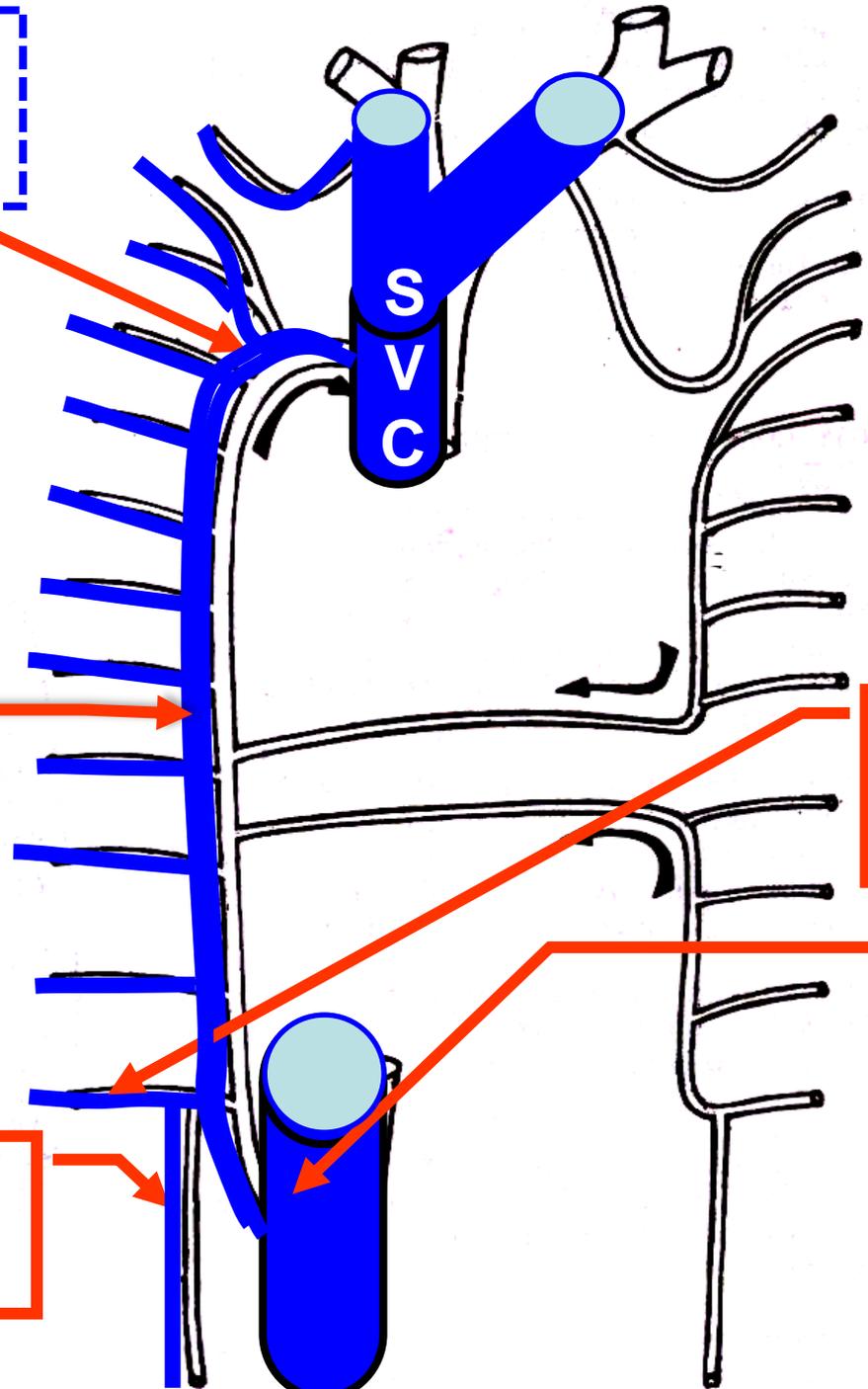
Azygos vein

- Beginning
- End

Arch of azygos vein

azygos vein

Rt. ascending lumbar vein



Rt. subcostal vein

Inferior vena cava

• Azygos Vein

** Beginning:

1- From **back of the inferior vena cava**.

2- **Union** of right subcostal and right ascending lumbar veins.

3- **Continuation** of right subcostal vein.

4- **Continuation** of right ascending lumbar vein.

** It ends into the back of the superior vena cava (**S.V.C**).

N.B; The azygos vein **connects** inferior vena cava **with** superior vena cava.

Esophagus

Trachea
Rt. vagus

arch of
azygos vein

T4

azygos
vein

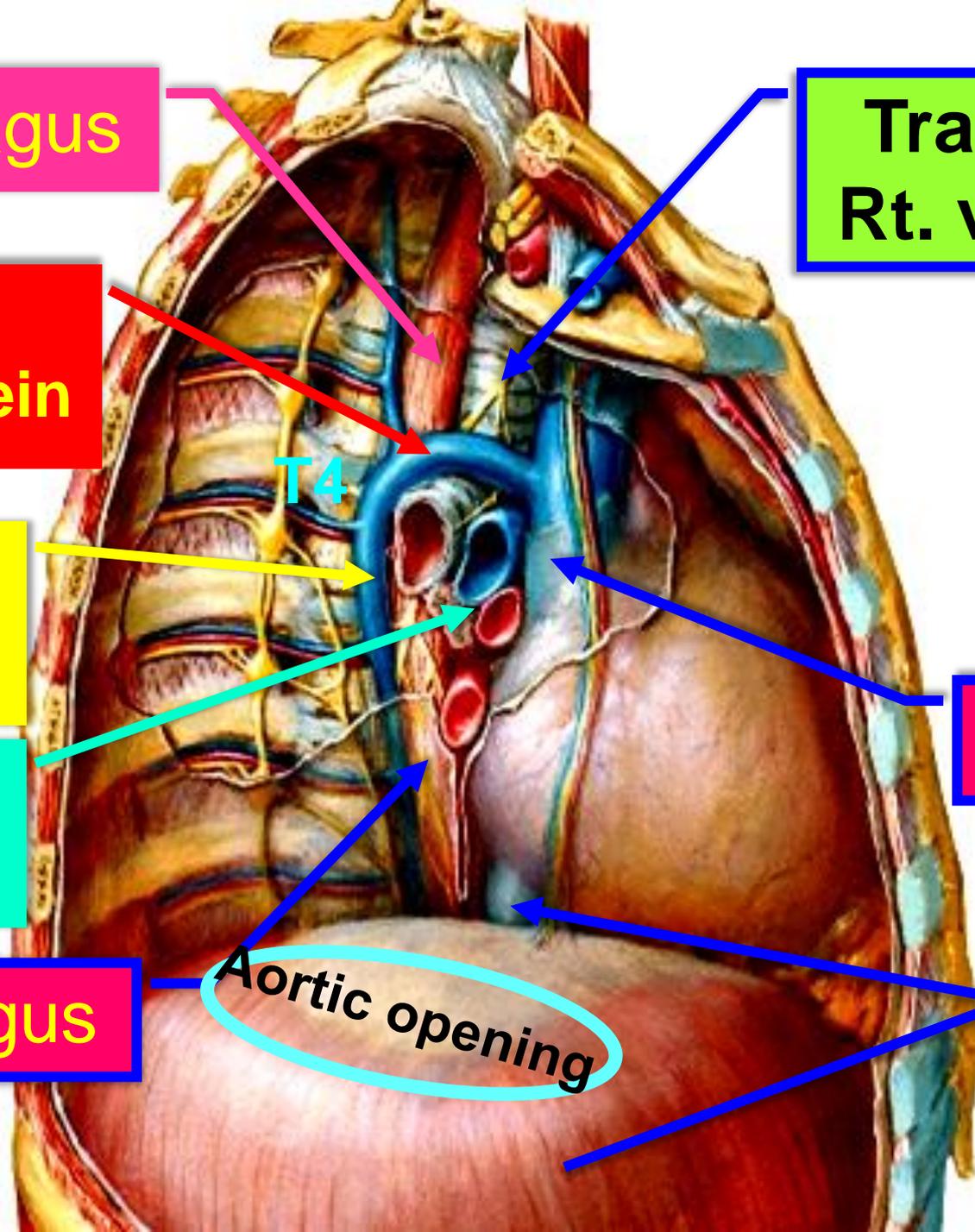
Root of
right lung

SVC

Esophagus

Aortic opening

IVC



**** Course and Relations**

1- In the abdomen;

* It **begins from the back of IVC** and ascends **in front of** the upper 2 lumbar.

* **It enters thoracic cavity** through **aortic opening of the diaphragm** with aorta and thoracic duct at **T 12**.

2- In the posterior mediastinum, it ascends

- **In front of** lower 8 thoracic vertebrae.

- **Behind** 1) Oesophagus. 2) Root of the right lung.

3- At the level of T4, it makes an **arch** above the root of the right lung **crossing** the oesophagus, and trachea.

4- It ends into the back of the superior vena cava (S.V.C).

2nd,3th

Arch of azygos vein

Right Superior intercostal vein

4th -11th

azygos vein

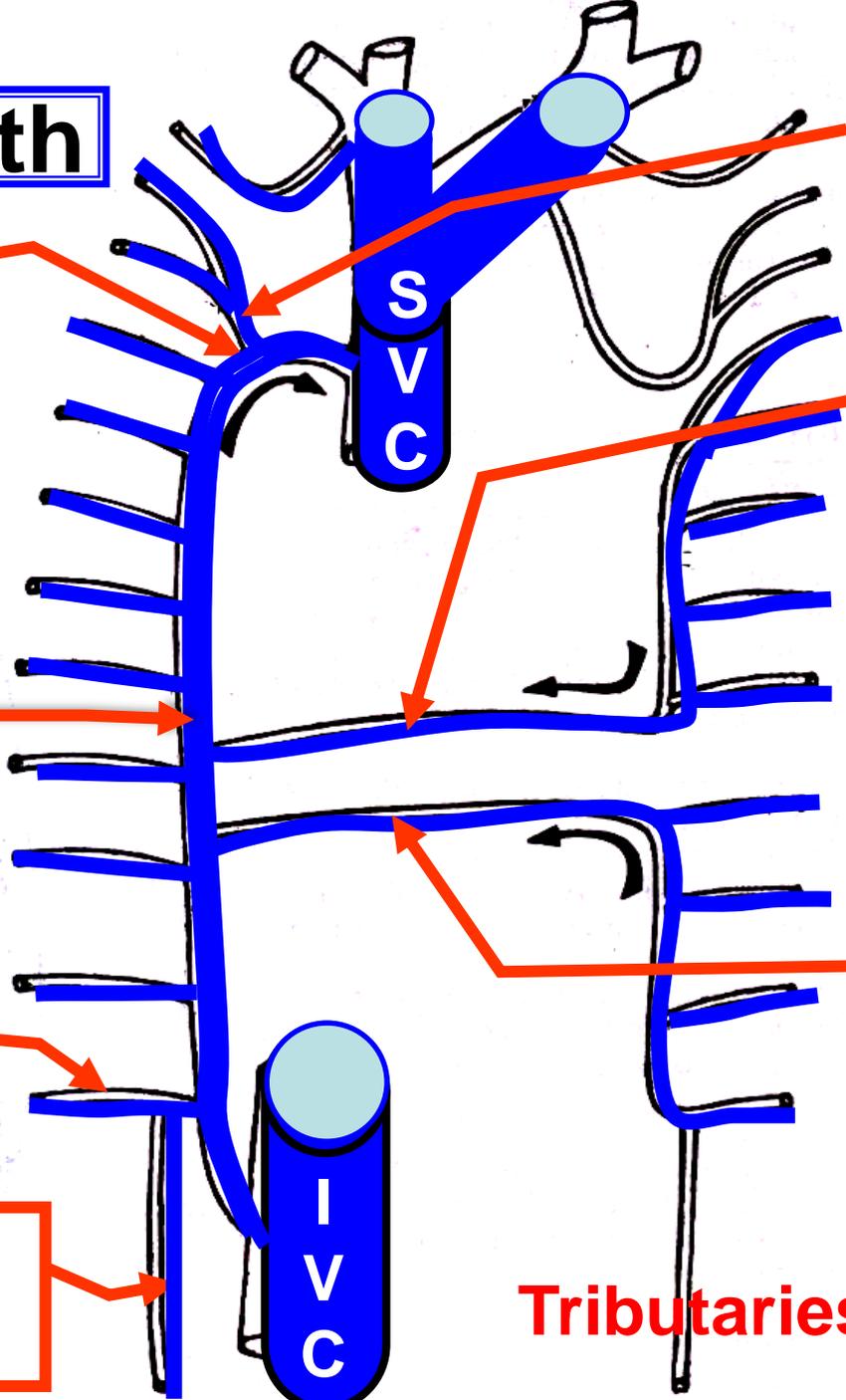
Accessory hemiazygos vein

Rt. subcostal vein

Hemiazygos vein

Rt. ascending lumbar vein

Tributaries of Azygos vein



**** Tributaries of the vein:**

1- Right ascending lumbar vein.

2- Right subcostal vein.

3- Right posterior intercostal veins from 4th to 11th.

4- Right superior intercostal vein (2nd + 3rd)

5- Hemiazygos vein.

6- Accesory hemiazygos vein.

7- Right bronchial vein.

8- Mediastinal veins

9- Oesophageal veins

Hemizygos vein

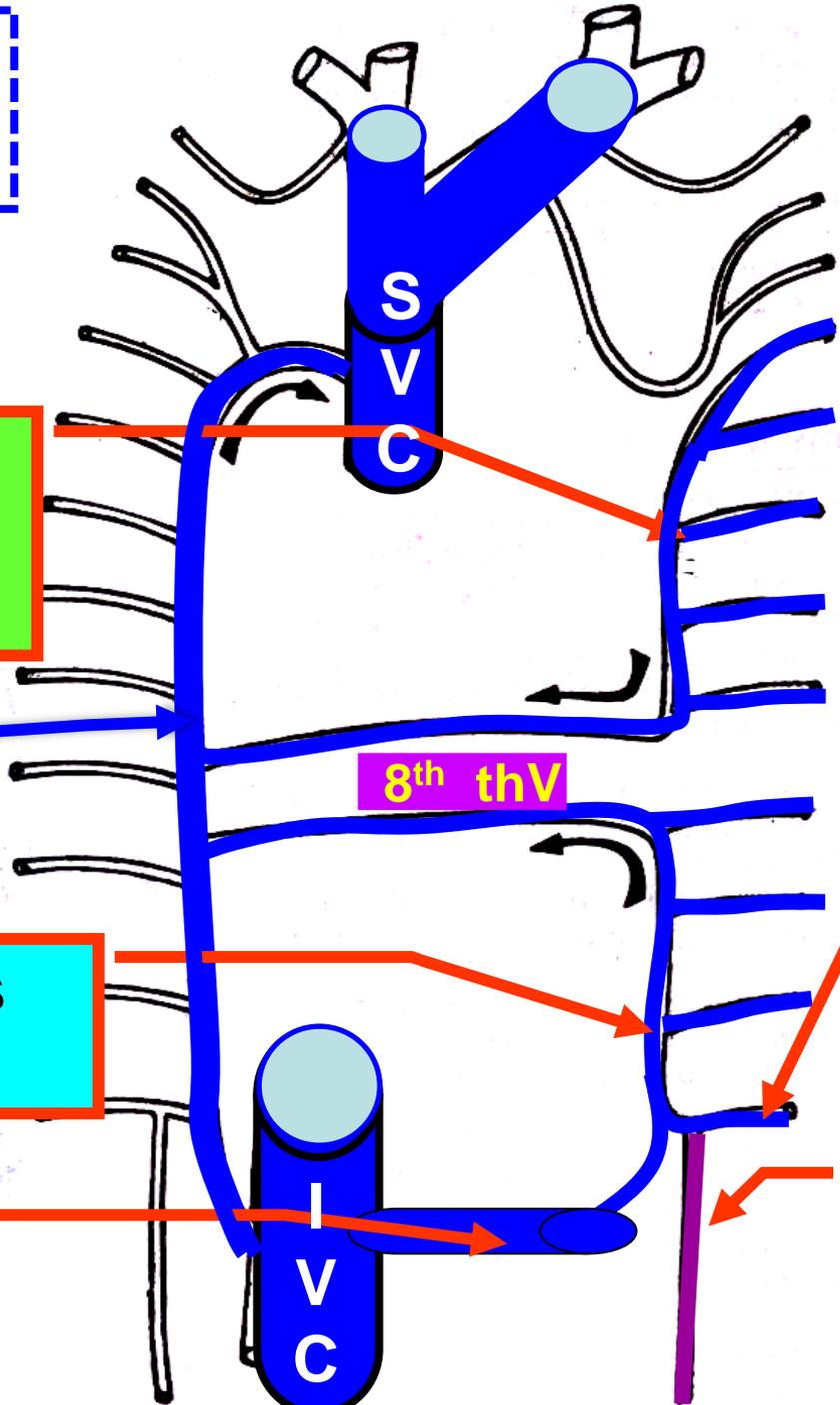
- Beginning
- End

Accessory hemiazygos vein

Azygos vein

Hemiazygos vein

Left renal vein



4th -8th

9th -11th

left subcostal vein

Lt. ascending lumbar vein

- **Hemiazygos (inferior) Vein**

**** Beginning;** it arises in the abdomen as follows (theories):

- 1- From the back of the left renal vein.
- 2- Union of the left subcostal and left ascending lumbar veins.
- 3- As a continuation of the left subcostal vein.
- 4- As a continuation of the left ascending lumbar vein.

**** Course;**

- It crosses the middle line **Infront of T8 behind thoracic aorta, and thoracic duct to end into** the **azygos vein.**

**** Tributaries;**

1. Left ascending lumbar vein.
2. Left subcostal vein.
3. Left posterior intercostal veins from the 9th to the 11th.

- **Accessory (Superior) hemiazygos Vein**

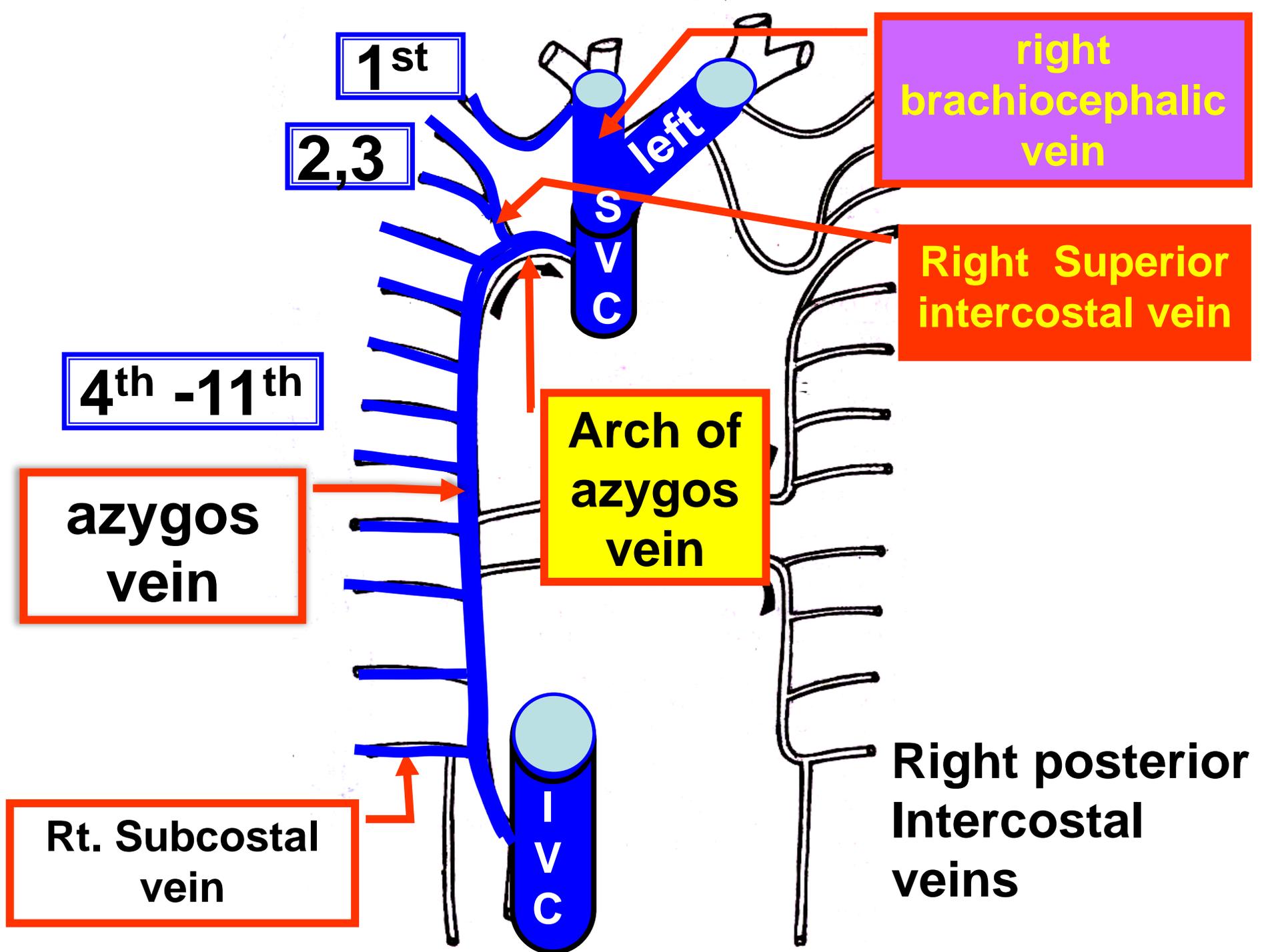
* It crosses middle line **Infront of T 8 to end into** the azygos vein.

**** Tributaries;** Left posterior intercostal veins from the 4th to 8th

- Left bronchial vein.



**Posterior
Intercostal veins**



**Left Superior
intercostal
vein**

1st

2,3

**Accessory
hemiazygos
vein**

4th -8th

Azygos vein

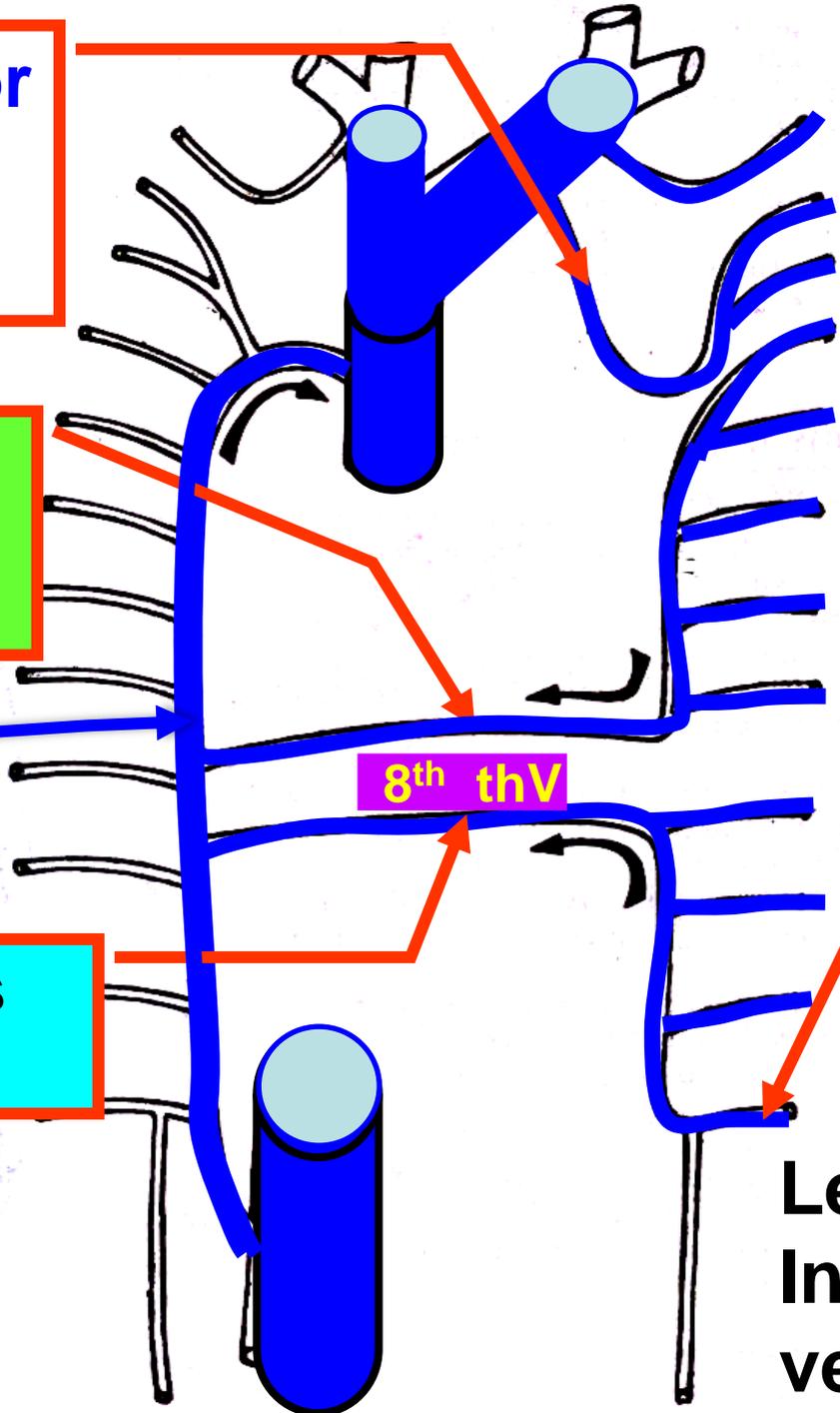
8th thV

9th -11th

**Hemiazygos
vein**

**left subcostal
vein**

**Left posterior
Intercostal
veins**



Posterior Intercostal Veins

Right side	left side
<ul style="list-style-type: none">- First vein ends into right brachio-cephalic vein.	<ul style="list-style-type: none">- First vein ends into left brachio-cephalic vein.
<ul style="list-style-type: none">- 2nd and 3rd veins: form right superior intercostal vein which ends in arch of azygos vein	<ul style="list-style-type: none">- 2nd and 3rd veins: form the left superior intercostal vein which ends into left brachio-cephalic vein
<ul style="list-style-type: none">• 4th till 11th and subcostal vein: end into azygos vein	<ul style="list-style-type: none">- Left 4th to 8th: end in accessory hemiazygos vein.
	<ul style="list-style-type: none">- 9th to 11th and subcostal vein: end in hemiazygos vein

