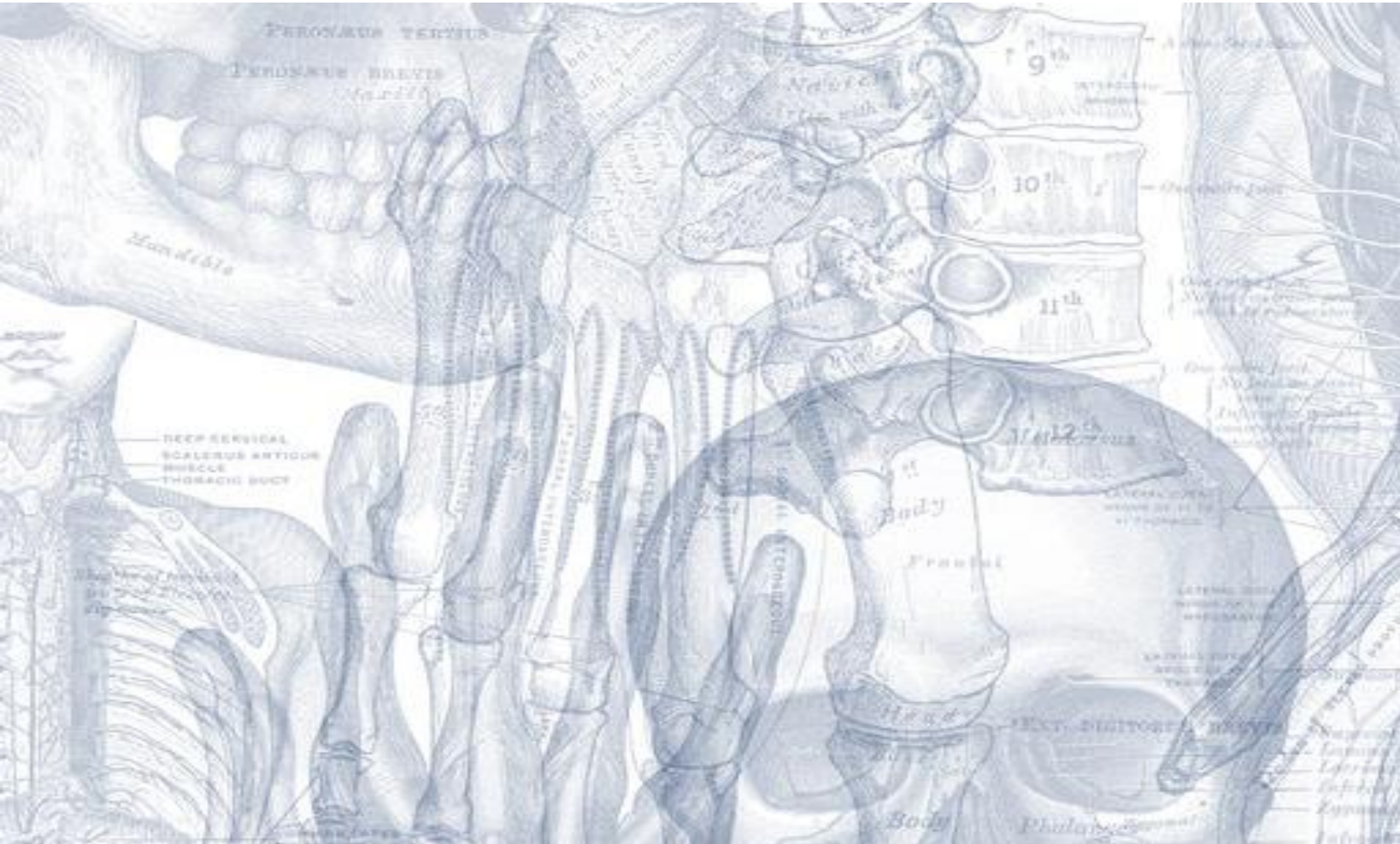


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# Mediastinum

Please view our [Editing File](#) before studying this lecture to check for any changes.

## Color Code

- **Important**
- **Doctors Notes**
- **Notes/Extra explanation**

# *Objectives*

At the end of the lecture, students should be able to:

- ✓ Define the “Mediastinum”.
- ✓ Differentiate between the divisions of the mediastinum.
- ✓ List the boundaries and contents of each division.
- ✓ Describe the relations between the important structures in each division.

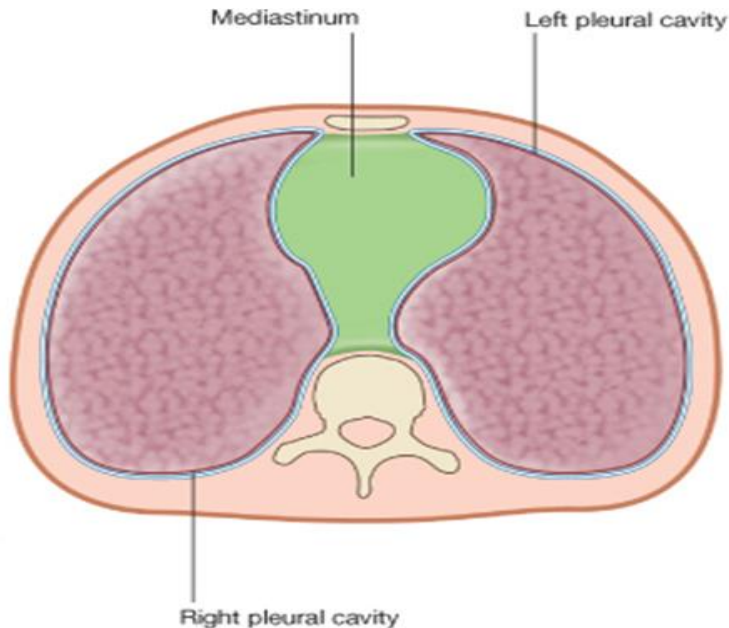
# Mediastinum



## Definition :

- It is a thick movable partition between the two (right and left) pleural sacs & lungs.
- It contains all the structures which lie in the intermediate compartment of the thoracic cavity.

Like: trachea, heart, vagus n (all structures except the 2 lungs).



## **Boundaries:**

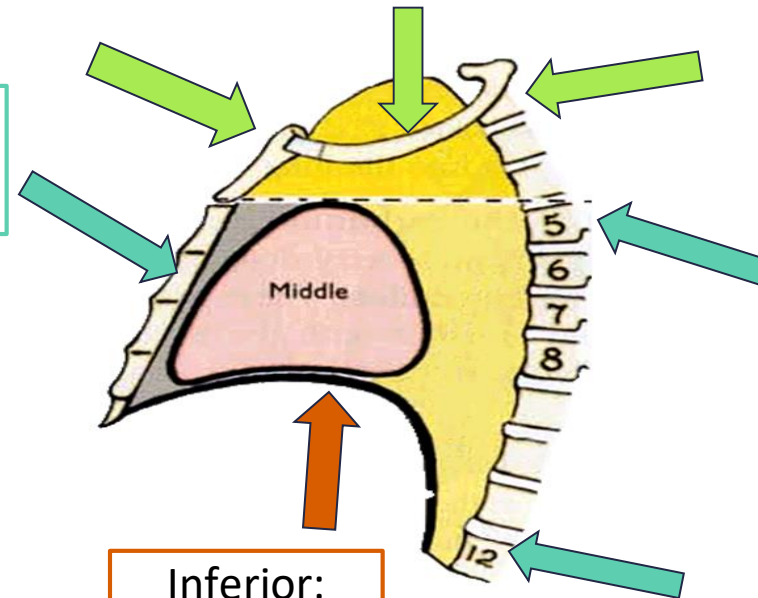
### Superior:

Thoracic outlet:

- manubrium [**Anteriorly**]
- 1<sup>st</sup> rib [**Laterally**]
- 1<sup>st</sup> thoracic vertebra T1 [**Posteriorly**]

Anterior:  
Sternum.

Posterior:  
The 12 thoracic vertebrae.



Inferior:  
Diaphragm.

Laterally:  
Lung and Pleurae

# Mediastinum

## Divisions

The mediastinum is subdivided by a Horizontal plane (extending from the Sternal angle\* to the lower border of T4 ) into:

- Superior mediastinum (S): above the plane
- Inferior mediastinum: below the plane.

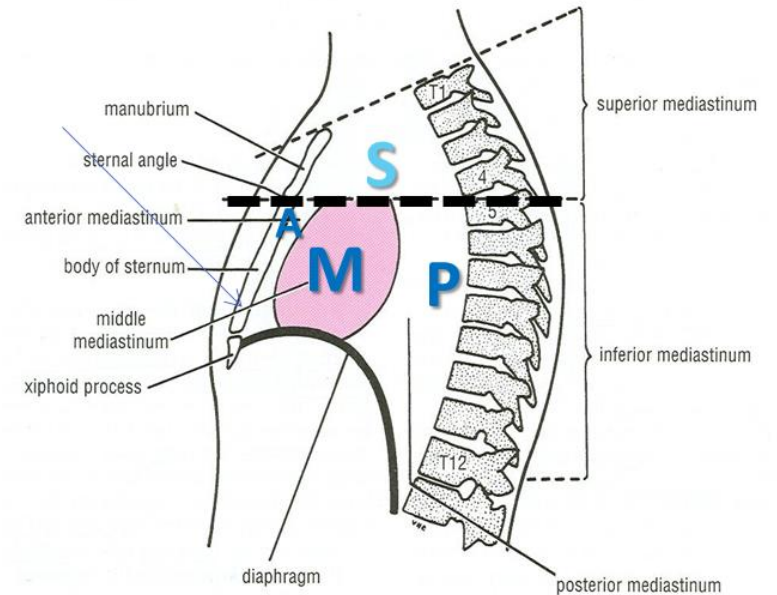
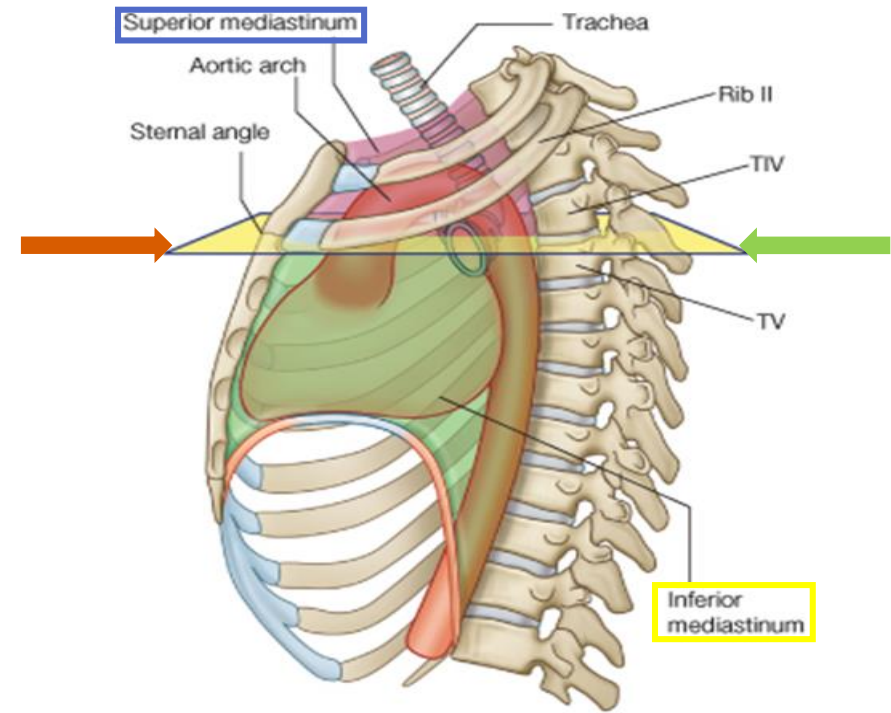
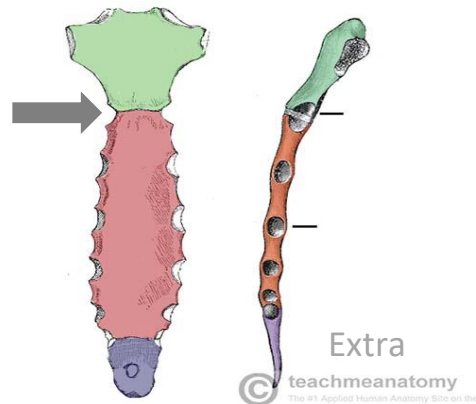
\* Note:

The sternum is divided into 3 parts

1. Manubrium
2. Body
3. Xiphoid Process

The sternal angle is at the junction of the manubrium and the body.

The sternal angle is also called angle of Lewis.



# Superior Mediastinum

## Boundaries:

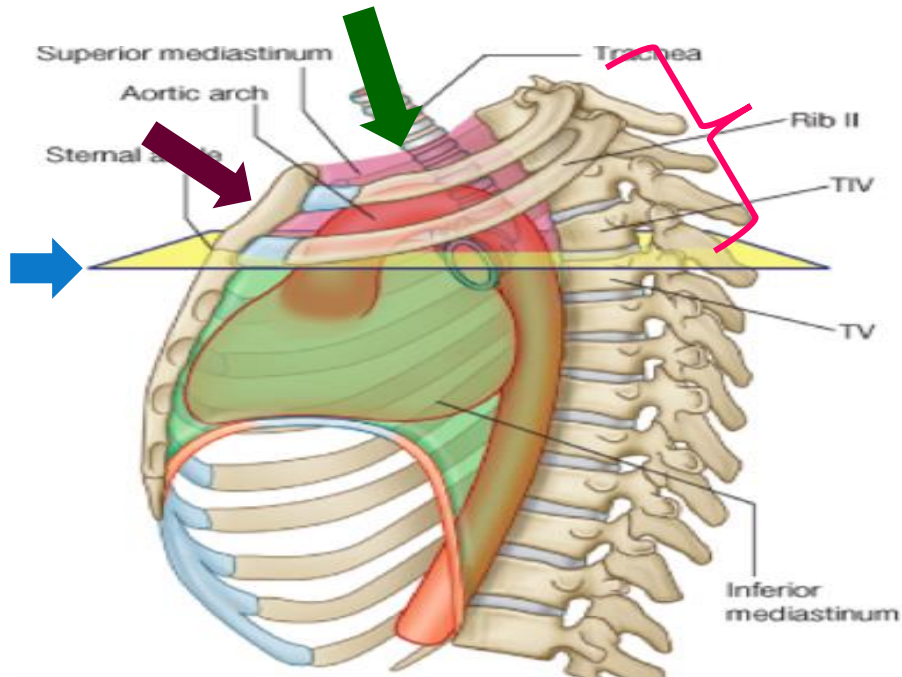
*Superior:* Thoracic outlet.

*Inferior:* Horizontal plane.

*Anterior:* Manubrium of sternum

*Posterior:* Upper (4) thoracic vertebrae.

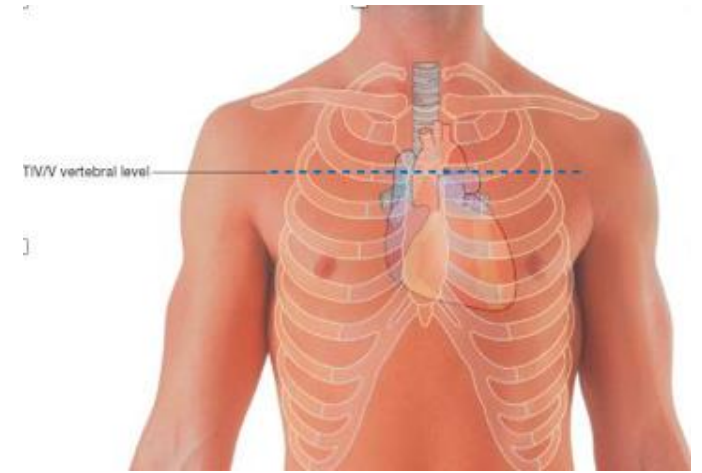
*Lateral:* Lungs & pleurae After T4 > inferior mediastinum.



## LEVEL OF T4

It is at the Level of:

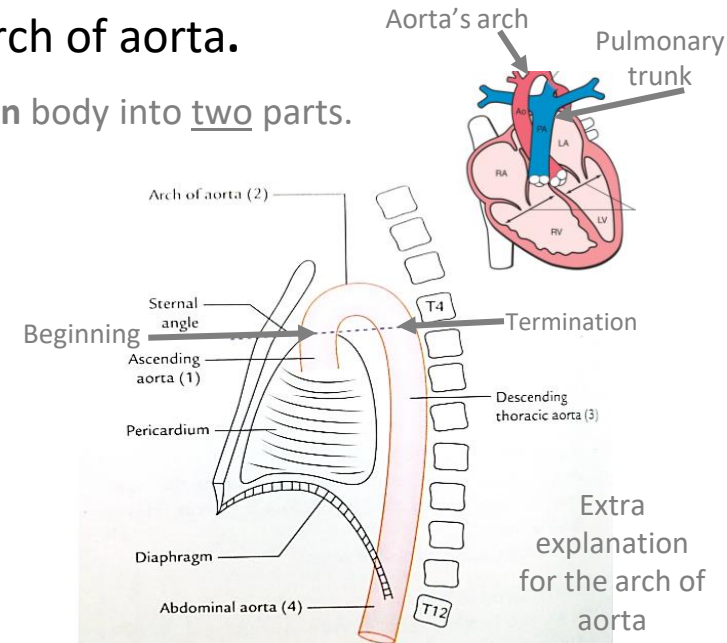
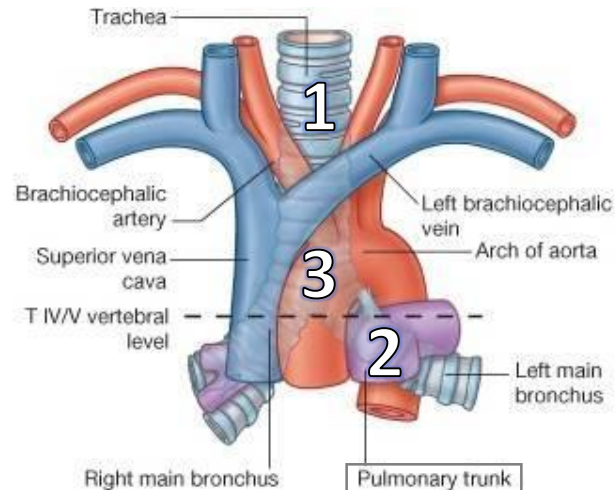
- **Sternal angle**
- **Second costal cartilage**



Why is the level of T4 important? **(important)**

- 1-Bifurcation of trachea (the division of the **trachea** into the right and left main bronchi )
- 2-Bifurcation\* of pulmonary trunk
- 3-Beginning & termination of arch of aorta.

\*Bifurcation means the splitting of a **main** body into two parts.



Extra explanation for the arch of aorta

# Superior Mediastinum Contents

Note: In the girls slides the superior mediastinum is divided into 3 parts (superficial, intermediate and deep) while in the boys slides the contents are only listed in order from superficial to deep (in the same order shown here).

The superior mediastinum is divided into 3 parts: superficial, intermediate, and deep.

## (A) Superficial (3 veins and a gland)

- Thymus Gland\*
- Three Veins:
  - Left brachiocephalic v.
  - Right brachiocephalic v.
  - Superior vena cava\*\*

## (B) Intermediate (4 arteries and 4 nerves)

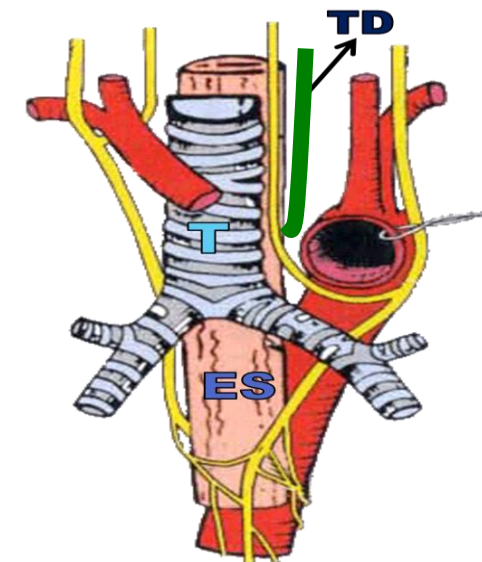
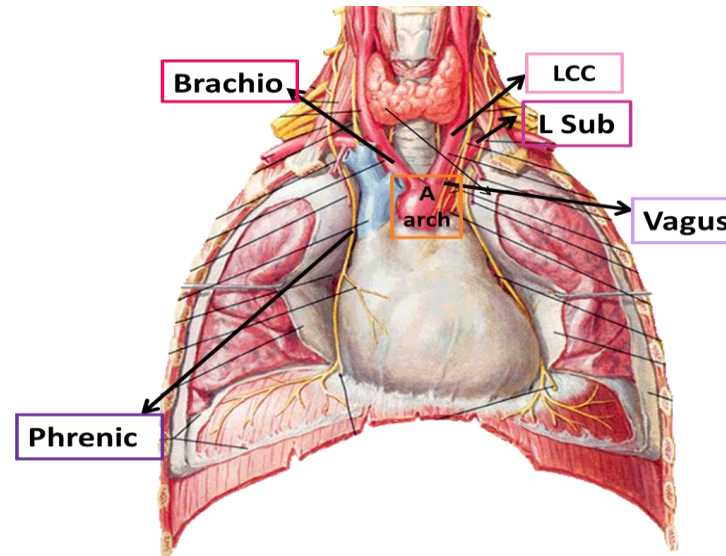
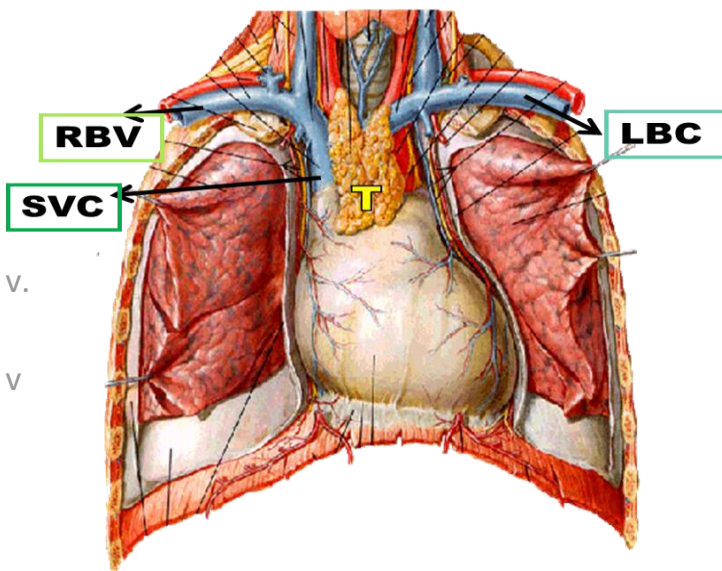
- Arch of aorta & its three branches:
  - Brachiocephalic artery (right side)
  - Left common carotid artery
  - Left Subclavian artery
- Nerves:
  - R & L Phrenic (lateral)
  - R & L Vagus (medial)

## (c) Deep (structures)

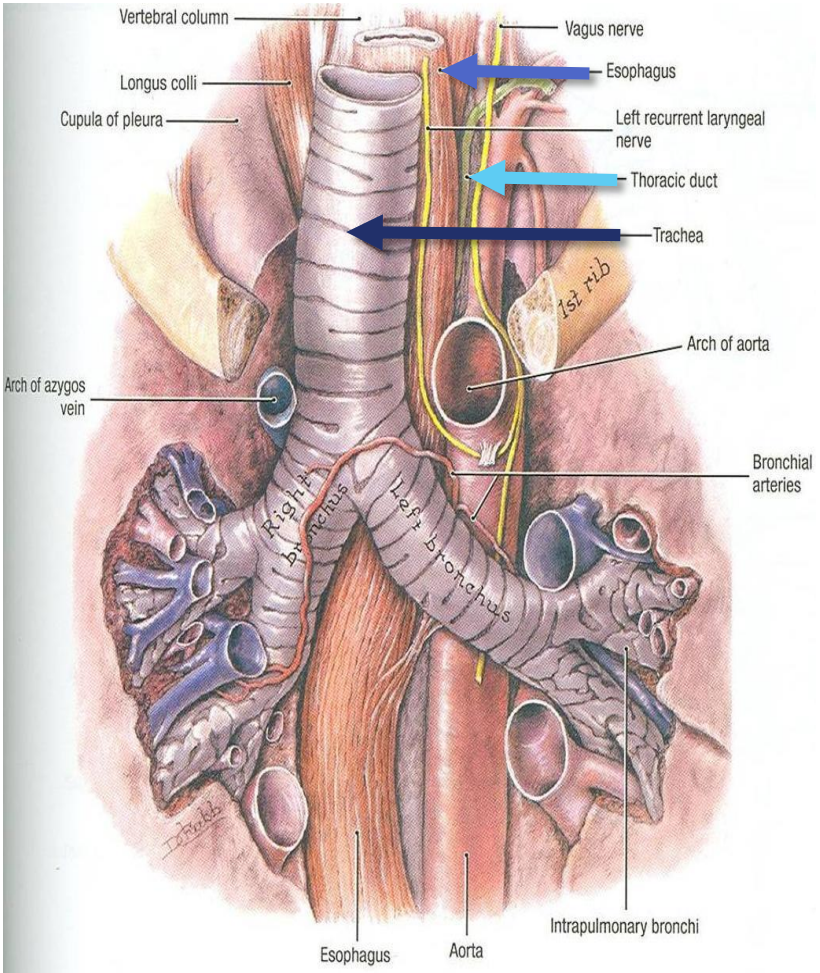
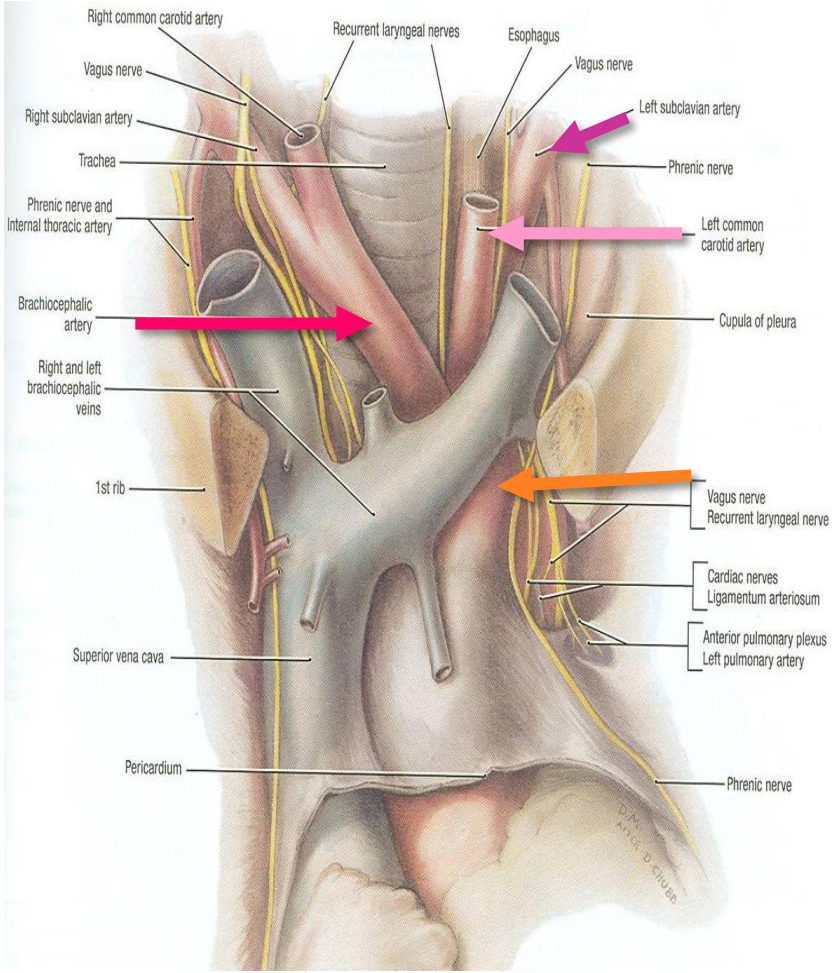
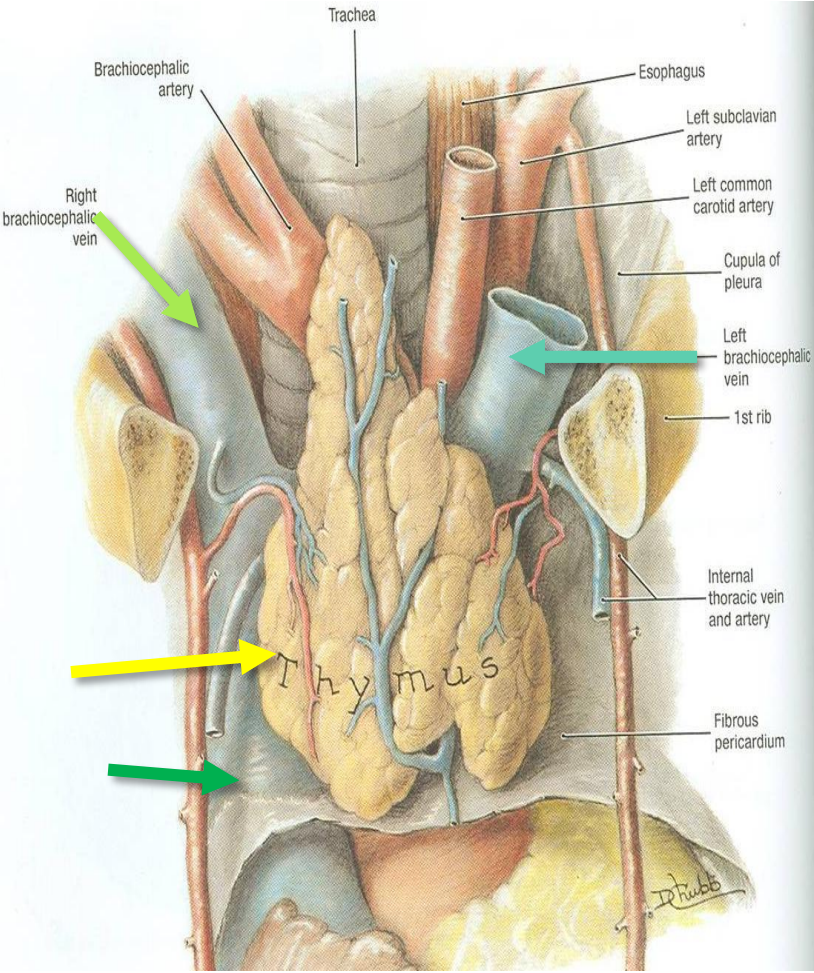
- Trachea
- Esophagus
- Thoracic Duct

\*(in young for immunity, degenerate after age of 15)

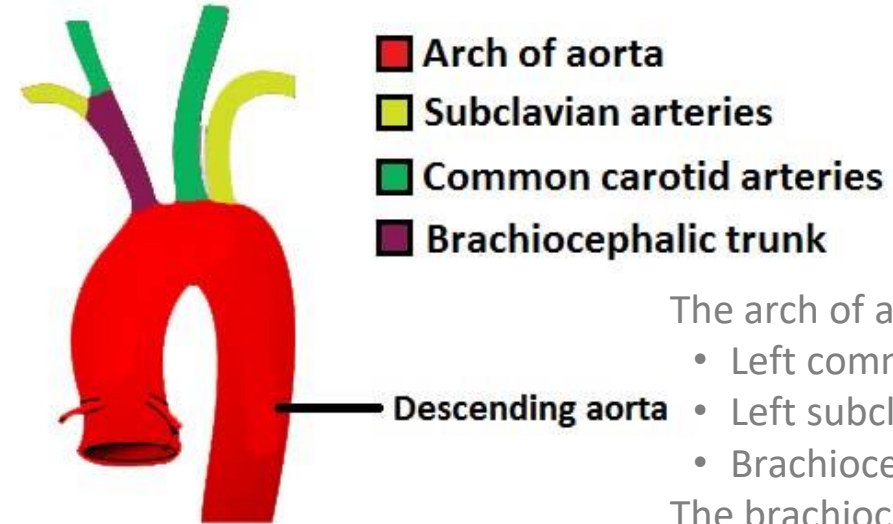
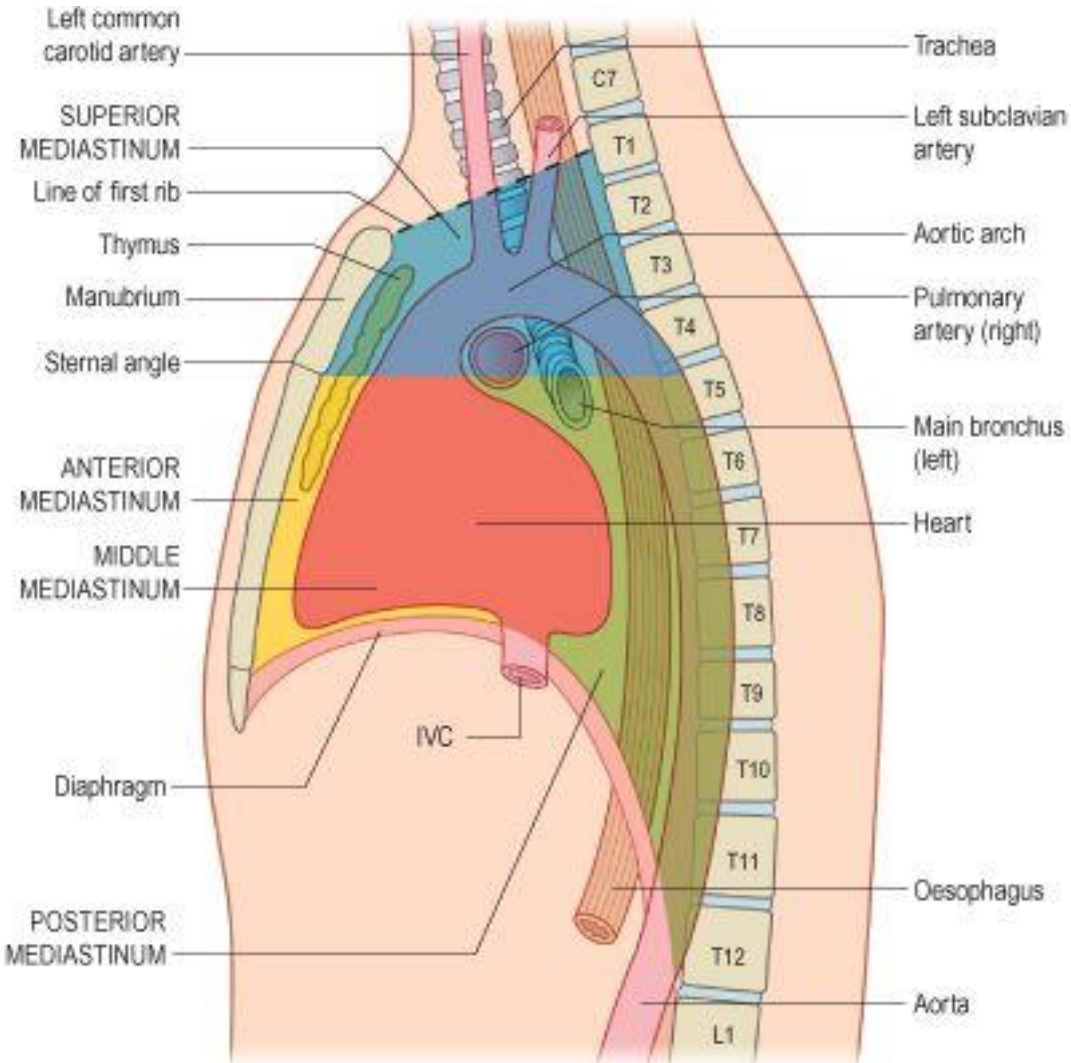
\*\* Left brachiocephalic v. and Right brachiocephalic v join and give superior vena cava.



# Superior Mediastinum Contents



# Extra pictures for understanding

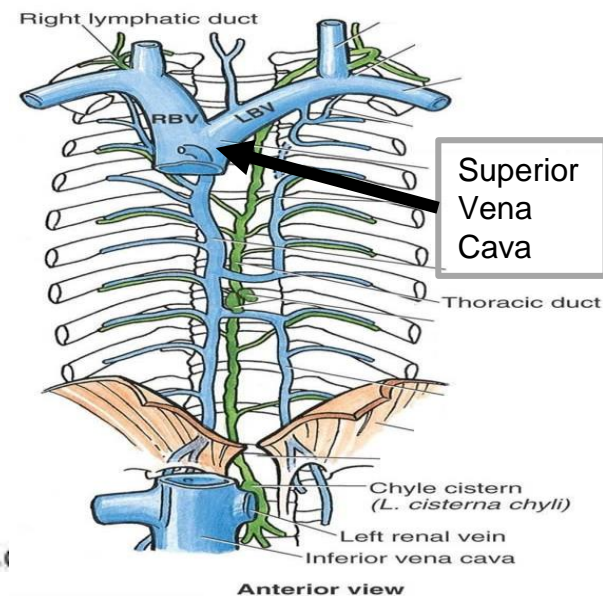


The arch of aorta gives 3 branches:

- Left common carotid
- Left subclavian
- Brachiocephalic

The brachiocephalic then further divides into:

- Right common carotid
- Right subclavian





# Superior Mediastinum Contents

Only on the boys' slides

## 4 ARTERIES:

arch of aorta,  
brachiocephalic,  
left common carotid,  
left subclavian

## 4 NERVES:

right & left vagus,  
right & left phrenic

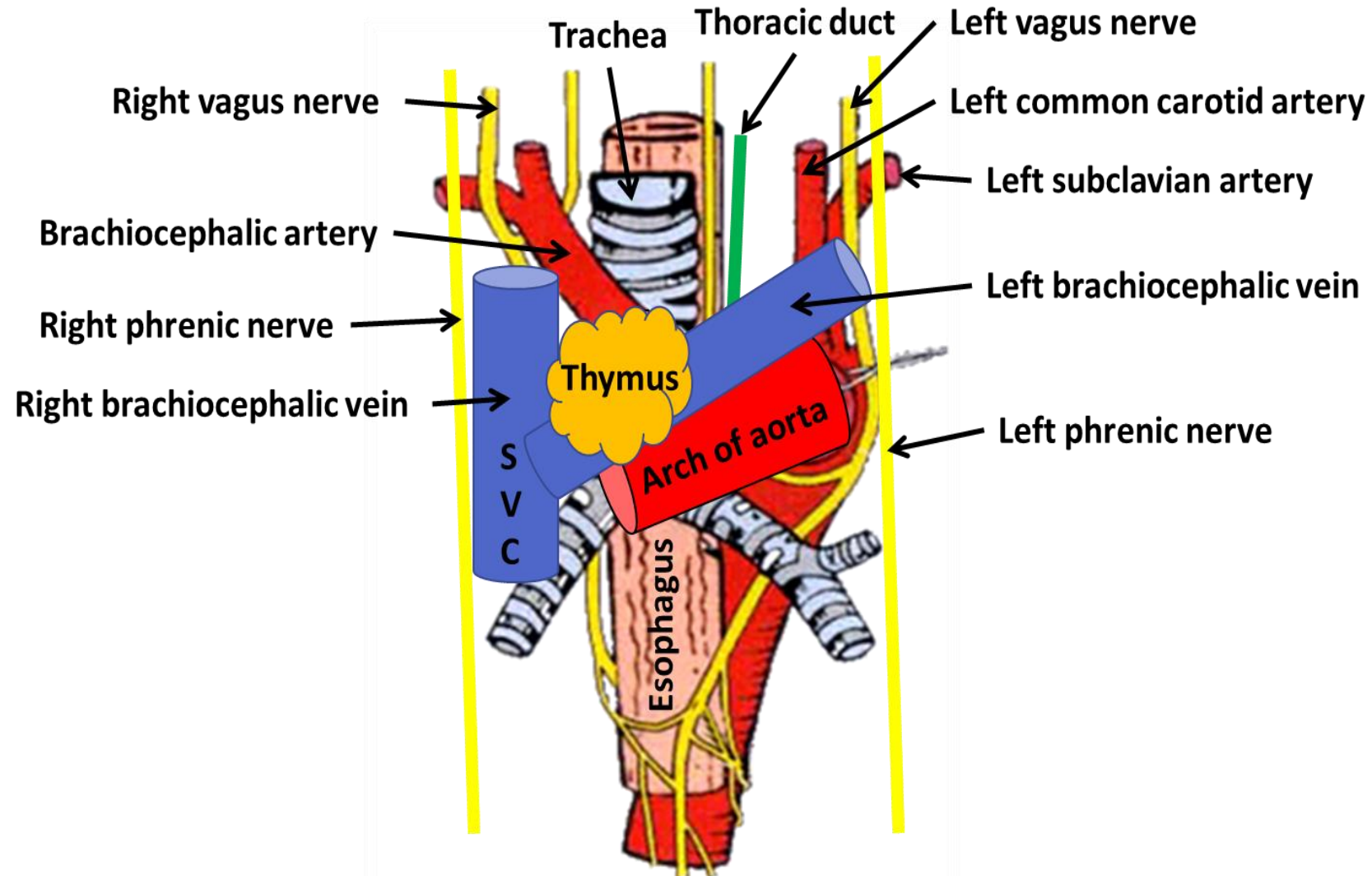
## 3 VEINS:

right & left brachiocephalic,  
SVC (superior vena cava)

2 TUBES: trachea & esophagus

1 GLAND: thymus

1 DUCT: thoracic duct



# Inferior Mediastinum

The inferior mediastinum is subdivided (according to the relation with the heart) into:

1. Anterior mediastinum (A): in front of Heart
2. Middle mediastinum (M): contains Heart
3. Posterior mediastinum (P): behind Heart

## 1- Anterior mediastinum:

### Boundaries:

*Superior:* Horizontal plane

*Inferior:* Diaphragm

*Anterior:* Body & xiphoid process of sternum

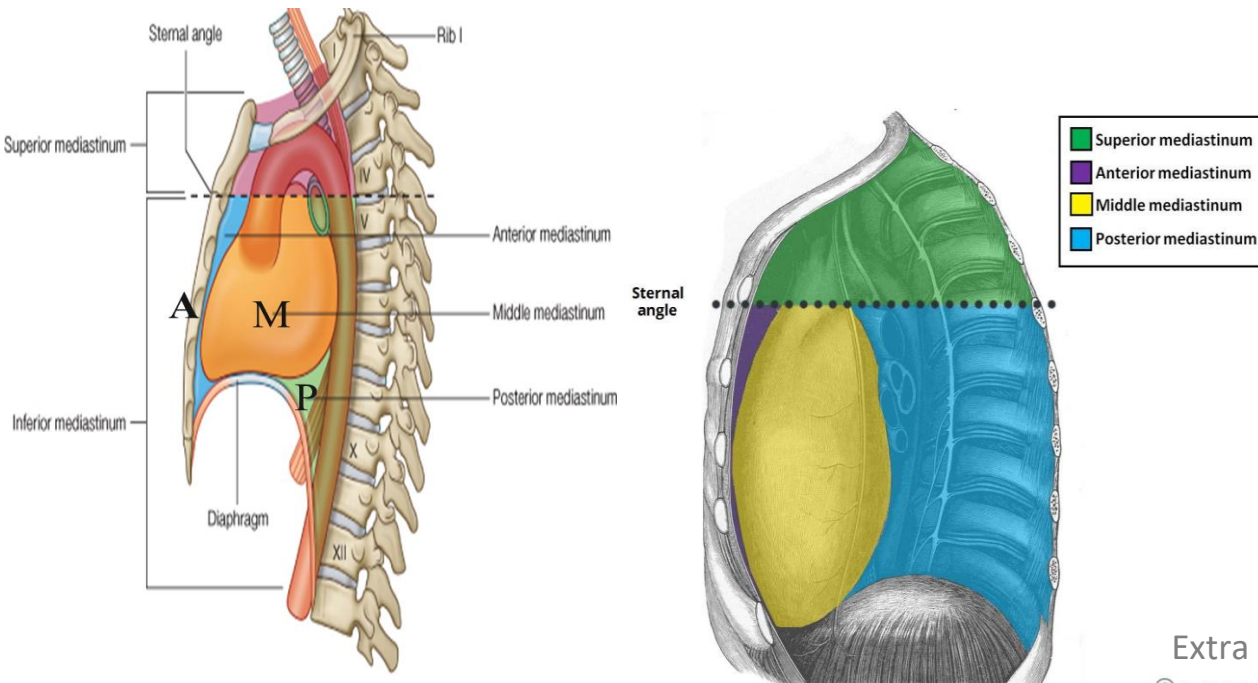
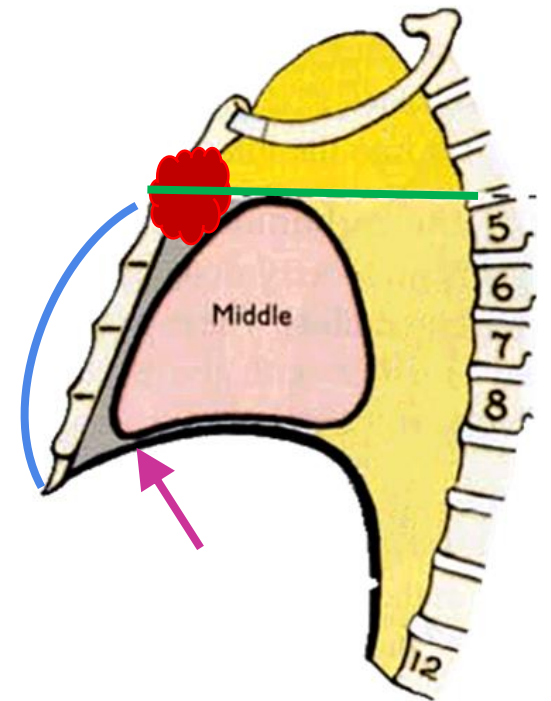
*Posterior:* Heart

*Lateral:* Lungs & pleurae

### Contents:

1. Thymus gland\*
2. Lymph nodes .

\*The thymus gland appears in BOTH the superior and anterior mediastina.



# Inferior Mediastinum

## 2- Middle mediastinum

### Site:

Between anterior & posterior mediastina.

mediastinum > singular  
mediastina > plural

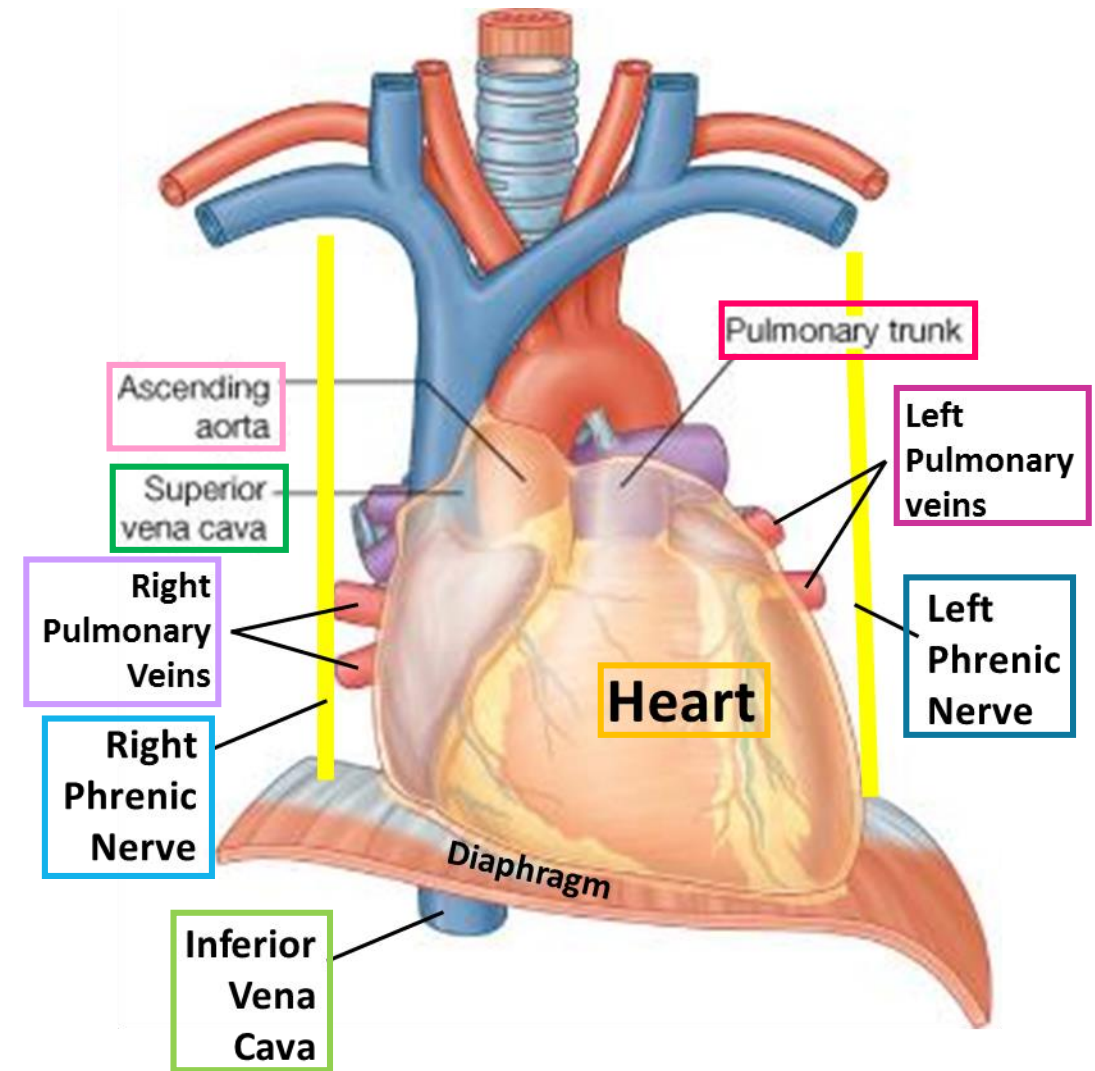
### Contents:

1. Heart & pericardium\*
2. Ascending Aorta (from left ventricle)
3. Pulmonary trunk (originates from the right ventricle. It branches into the right and left **pulmonary** arteries, which lead to the lungs)
4. Superior\*\* & Inferior vena cava (into right atrium)
5. Right & left pulmonary veins
6. Right & left phrenic nerves\*\*\*
7. Lymph nodes

\*pericardium: a fibrous sac surrounding the heart and roots of great vessels.

\*\* The superior vena cava appears in BOTH the superior (upper part of SVC) and middle (lower part SVC) mediastina.

\*\*\* The phrenic nerves pass through BOTH superior and middle mediastina.



# Inferior Mediastinum

## 3- Posterior mediastinum

### Boundaries:

*Superiorly:* Horizontal plane

*Inferiorly:* Diaphragm

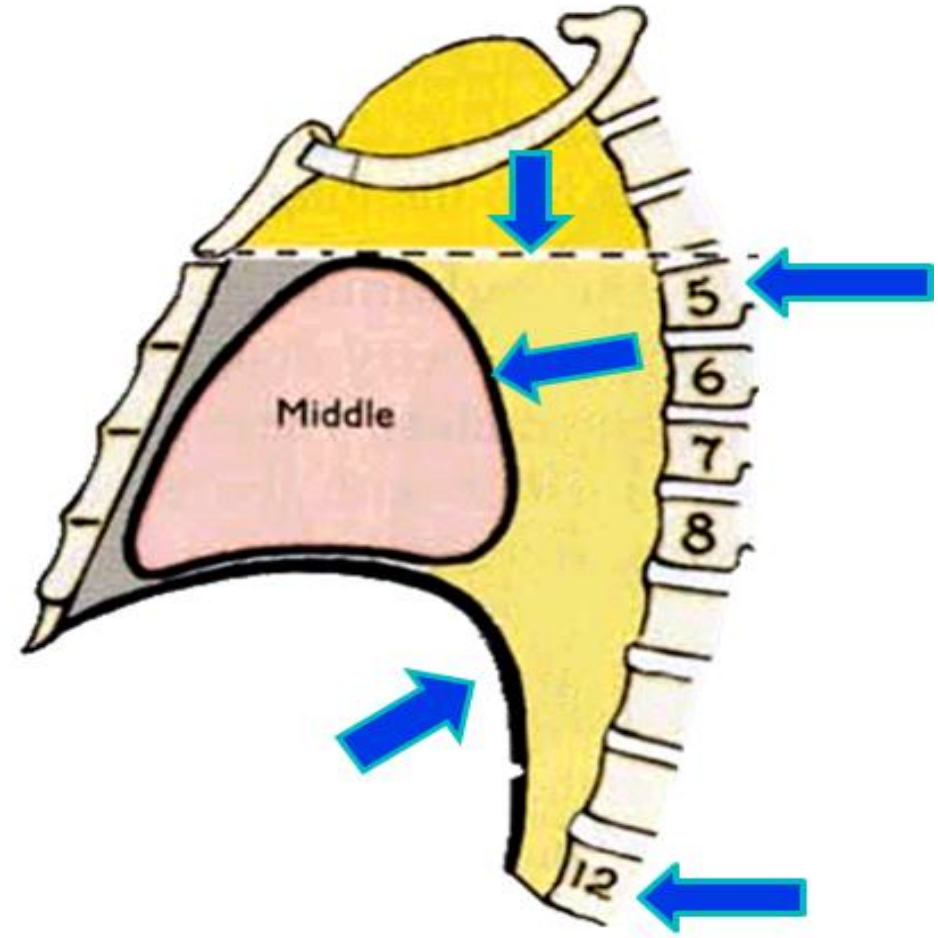
*Anteriorly:* Heart

*Posteriorly:* Thoracic vertebrae from T5 -T12

*Laterally:* Lungs & pleurae

### Content:

(next slide)



# Inferior Mediastinum

## 3- Posterior mediastinum

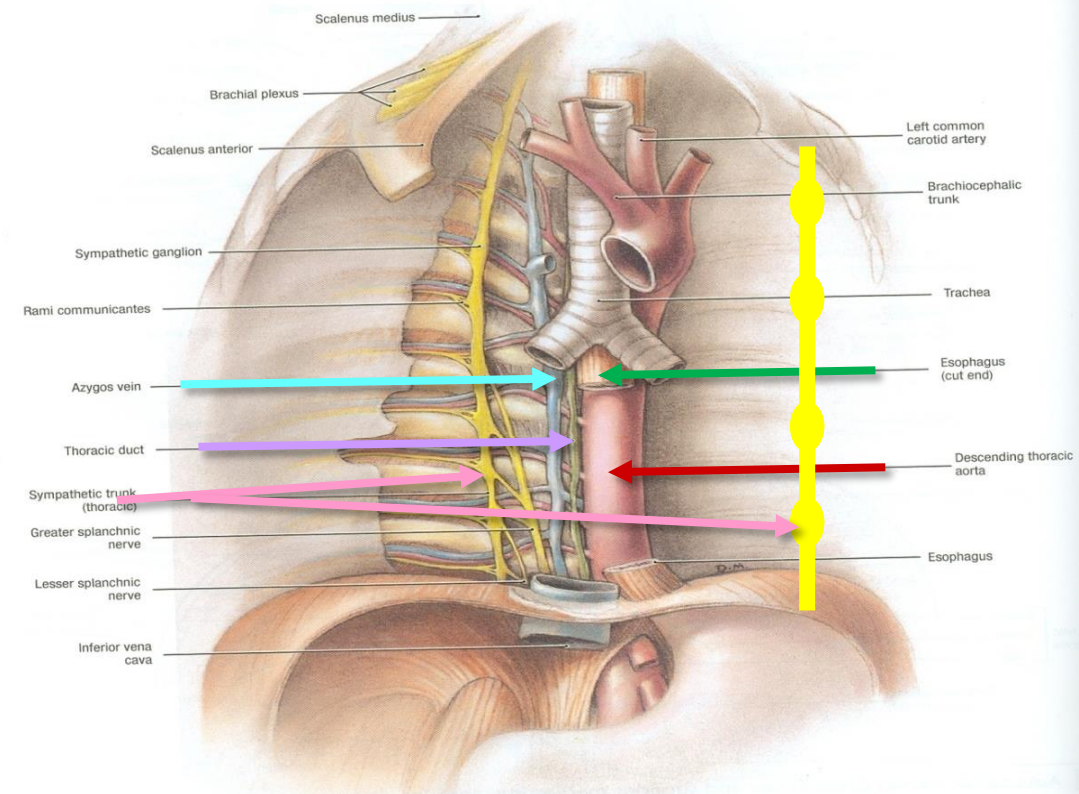
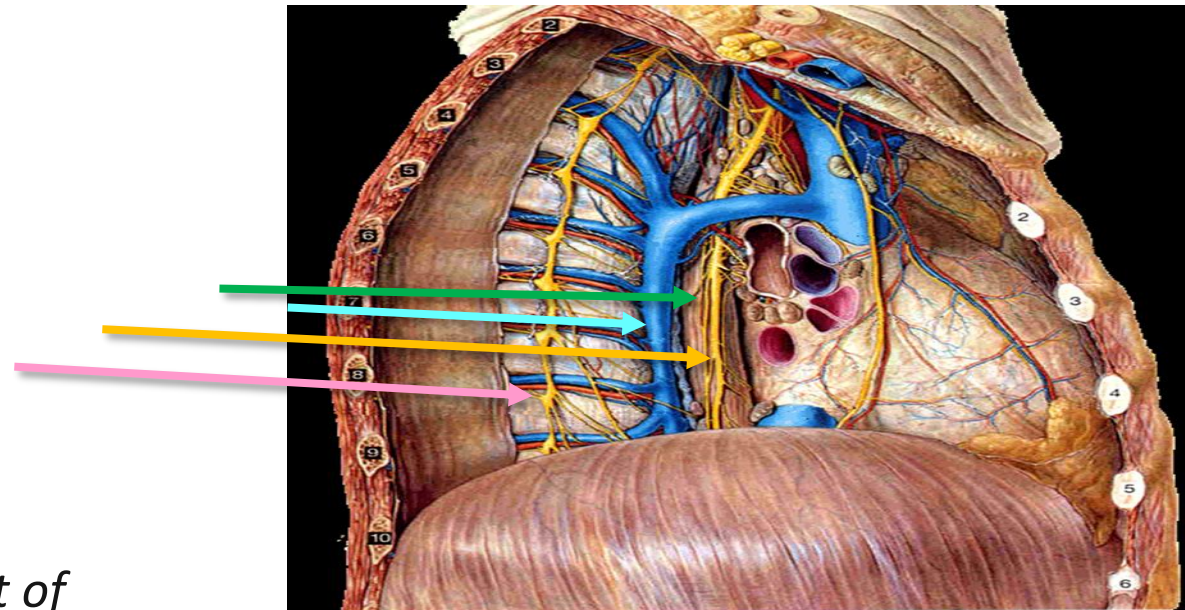
### Content:

1. Esophagus\* (descending from pharynx)
2. Azygos system of veins: *posterior & to the right of esophagus* (opens on superior vena cava)
3. Right & Left Thoracic Sympathetic trunks
4. Mediastinal lymph nodes
5. Vagus nerves\*\* : *around esophagus*
6. Thoracic duct\*\*\* : *posterior to esophagus.*
7. Descending aorta: *posterior & to the left of esophagus*

\*The esophagus passes through BOTH the superior and posterior mediastina

\*\*The vagus nerves pass through BOTH the superior and posterior mediastina

\*\*\*The thoracic duct passes through BOTH the superior and posterior mediastina



# Doctor's tips for memorizing contents of posterior mediastinum

First thing -> esophagus

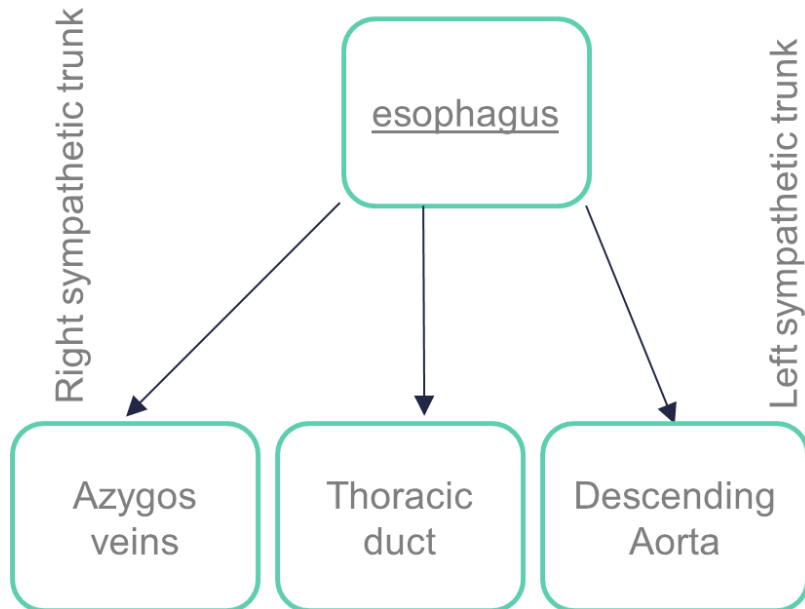
Posterior to esophagus->thoracic duct

Posterior to the right -> azygos veins

Posterior to the left -> descending Aorta

Surrounded by -> R&L thoracic sympathetic trunks

In every mediastinum -> lymph nodes

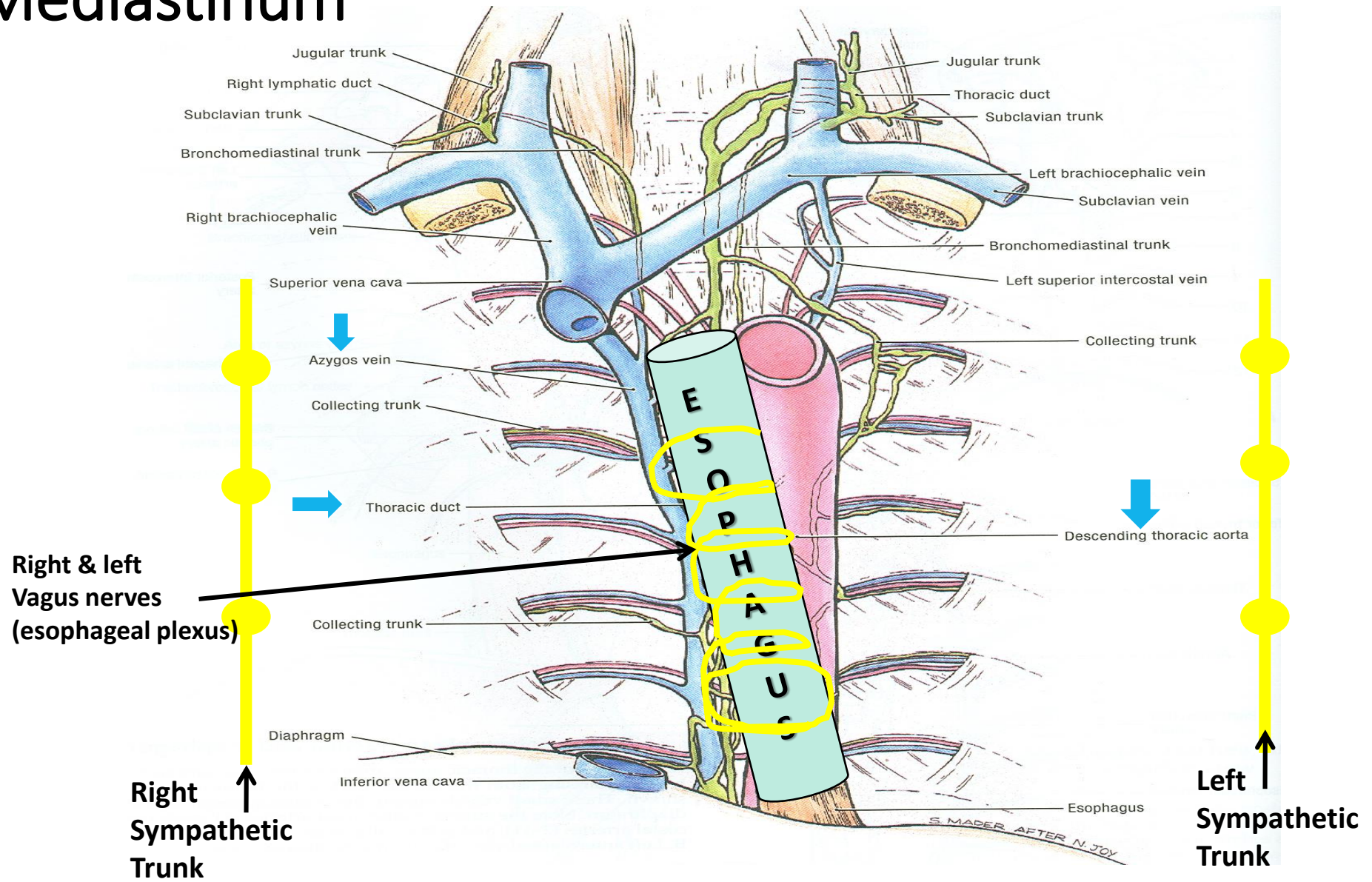


*Don't Forget!*

Structures passing through more than one mediastina

<i>Structure</i>	<i>Mediastina</i>
Thymus	Superior and Anterior
Superior vena cava	Superior and Middle
Phrenic nerves	Superior and Middle
Esophagus	Superior and Posterior
Thoracic duct	Superior and Posterior
Vagus nerves	Superior and Posterior

# Inferior Mediastinum



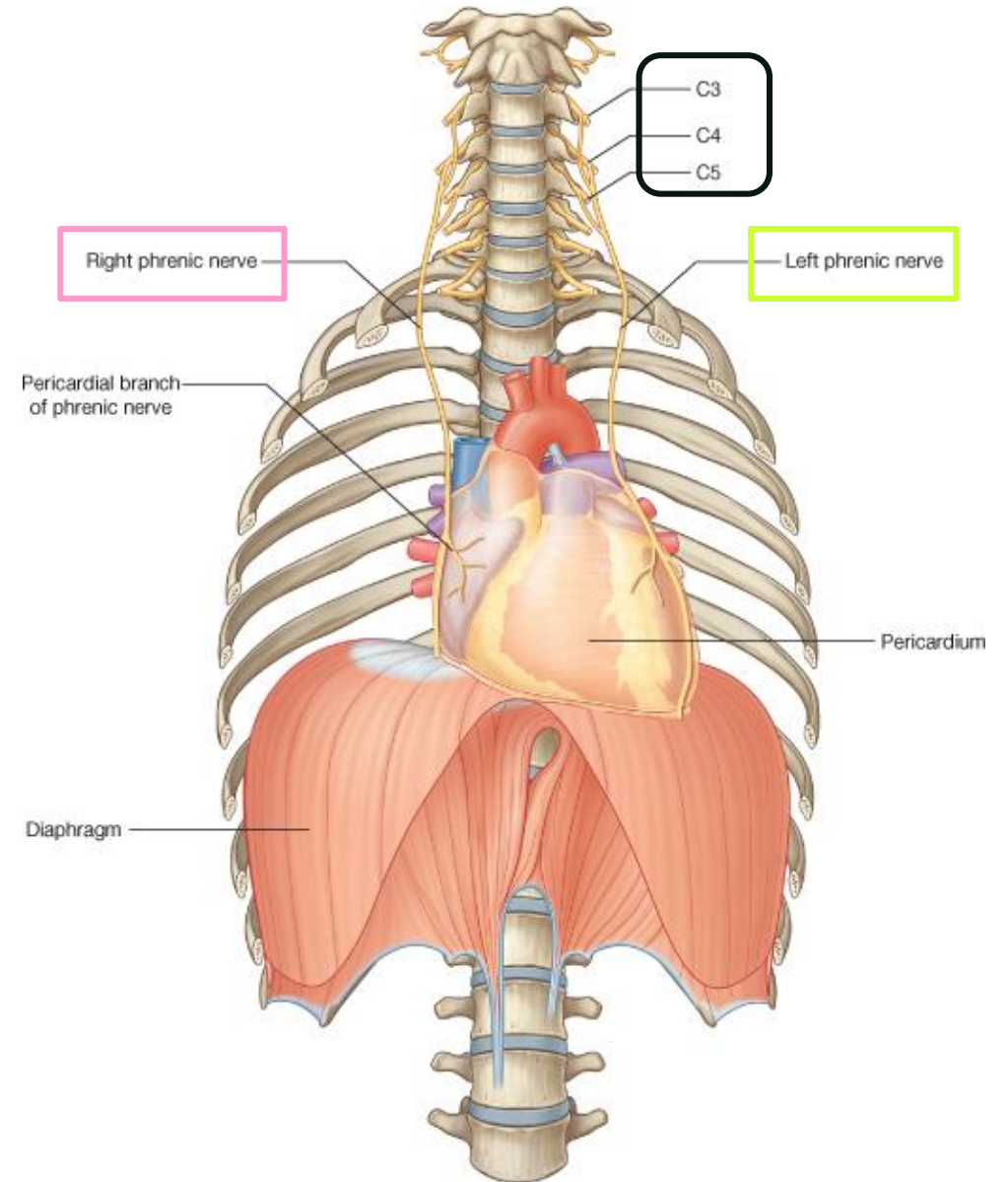
## Summary of Inferior Mediastinum

		<u>Anterior</u>	<u>Middle</u>	<u>Posterior</u>
<b>Boundaries</b>	<i>Superior</i>	Horizontal plane	Between anterior and posterior mediastina	Horizontal plane
	<i>Inferior</i>	Diaphragm		Diaphragm
	<i>Anterior</i>	Body & xiphoid process of sternum		Heart
	<i>Posterior</i>	Heart		Thoracic vertebrae (T5-T12)
	<i>Lateral</i>	Lungs & pleurae		Lungs & pleurae
<b>Content</b>		<ol style="list-style-type: none"> <li>1. Thymus gland</li> <li>2. Lymph nodes</li> </ol>	<ol style="list-style-type: none"> <li>1. Heart &amp; pericardium</li> <li>2. Ascending Aorta</li> <li>3. Pulmonary trunk</li> <li>4. Superior &amp; Inferior vena cava</li> <li>5. Right &amp; left pulmonary veins</li> <li>6. Right &amp; left phrenic nerves</li> <li>7. Lymph nodes</li> </ol>	<ol style="list-style-type: none"> <li>1. Esophagus (descending from pharynx)</li> <li>2. Azygos system of veins, : posterior &amp; to the right of esophagus (opens on superior vena cava)</li> <li>3. Right &amp; Left Thoracic Sympathetic trunks</li> <li>4. Mediastinal lymph nodes</li> <li>5. Vagus nerves</li> <li>6. Thoracic duct: (posterior to esophagus).</li> <li>7. Descending aorta: posterior &amp; to the left of esophagus</li> </ol>



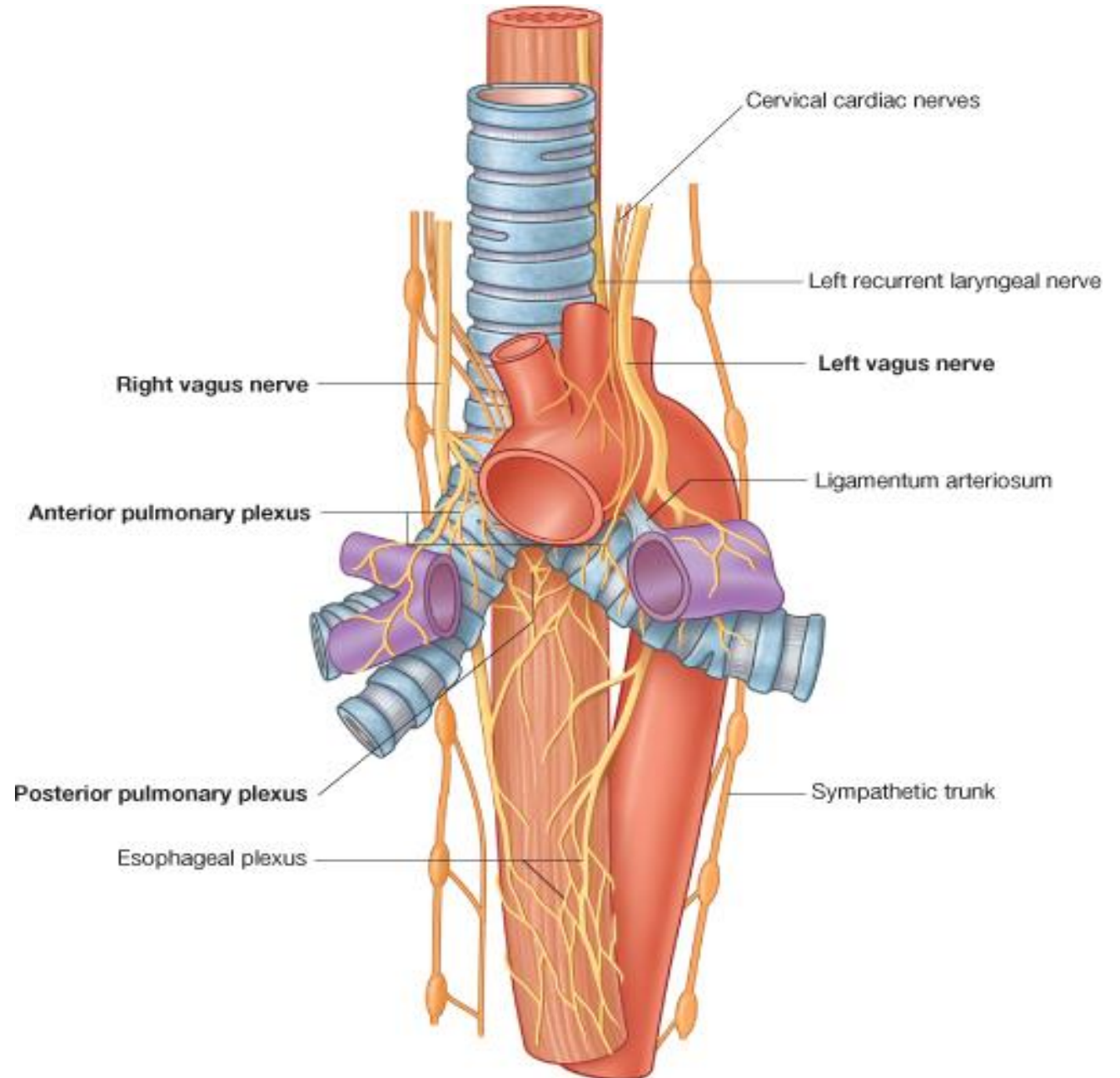
# Phrenic Nerves

- Root Value: C3,4,5
- They pass through the **Superior & Middle** mediastina
- Course in Thorax
  - The right phrenic descends on the right side of SVC & heart.
  - The left phrenic descends on the left side of heart.
  - Both nerves terminate in the diaphragm (pass through the diaphragm and innervate it)
- Branches :
  - 1) Motor & Sensory fibers to Diaphragm
  - 2) Sensory fibers to pleurae & pericardium



# Vagus Nerve

- It is the **10th** cranial nerve.
- It descends through the Superior & Posterior mediastina **close from trachea and medial to phrenic nerve.**
- The right vagus descends to the right side of trachea, forms the **posterior esophageal plexus** & continues in abdomen as **posterior gastric nerve**.
- The left vagus- **away from trachea** -descends between left common carotid & left subcalvian arteries, forms the **anterior esophageal plexus** & continues in abdomen as **anterior gastric nerve**.



# Aorta

ASCENDING AORTA: الصاعد

**Beginning:** at aortic orifice of left ventricle.

**Course:** in middle mediastinum

**End:** continues as arch of aorta (at level of T4)

ARCH OF AORTA: القوس

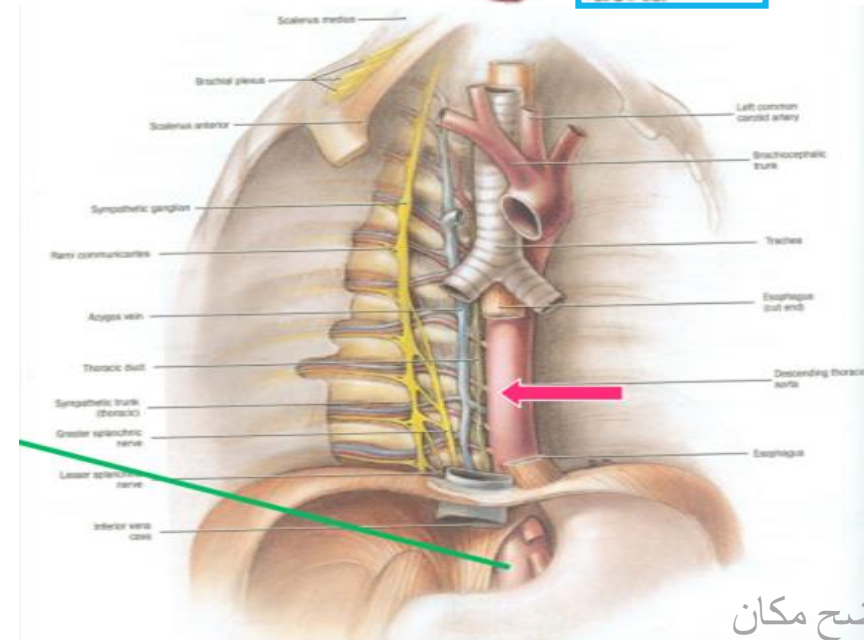
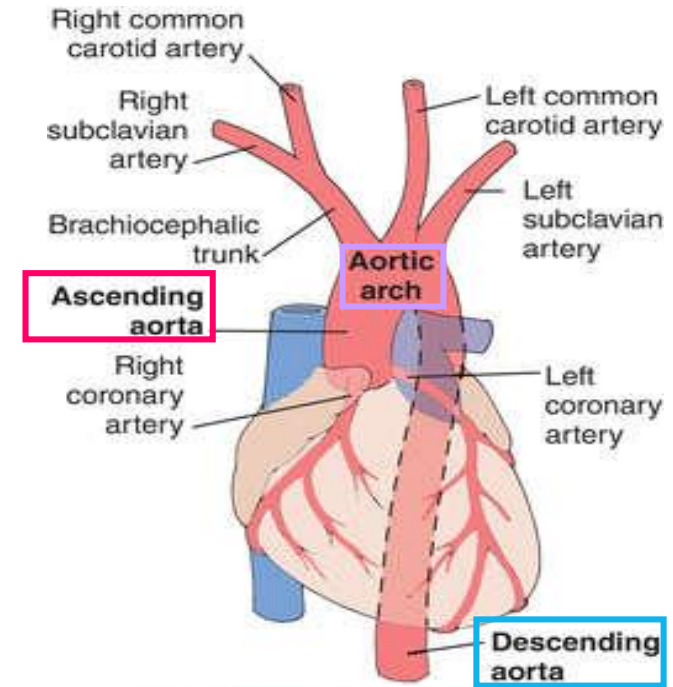
**Course:** in superior mediastinum

**End:** continues as descending thoracic aorta (at level of T4)

DESCENDING AORTA: النازل

**Course:** in posterior mediastinum

**End:** continues as abdominal aorta after it passes through diaphragm (through aortic opening at level of T12)



الصورة توضح مكان  
abdominal aorta

# Thoracic Duct

## Beginning:

- It is the continuation of Cisterna Chyli\* (at the level of L1).  
\*Cisterna chyli: a dilated sac of lymphoid tissue

## Course:

- It passes through aortic opening of diaphragm.
- It ascends in **Posterior mediastinum** (posterior to esophagus).
- It ascends in **Superior mediastinum** (to the left of esophagus).

## End:

- It opens in the left brachiocephalic vein.

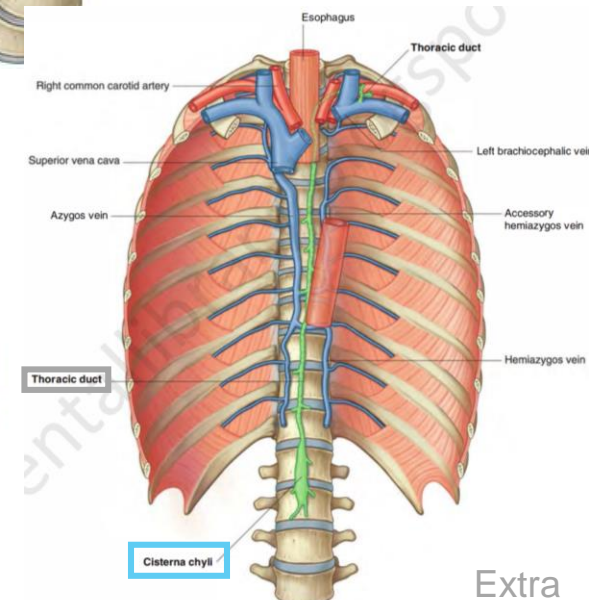
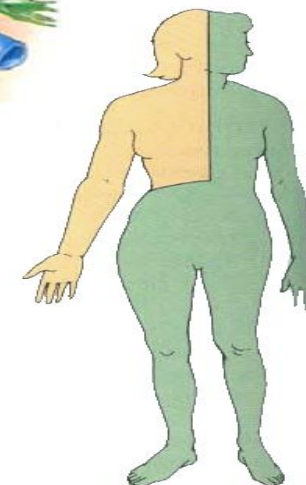
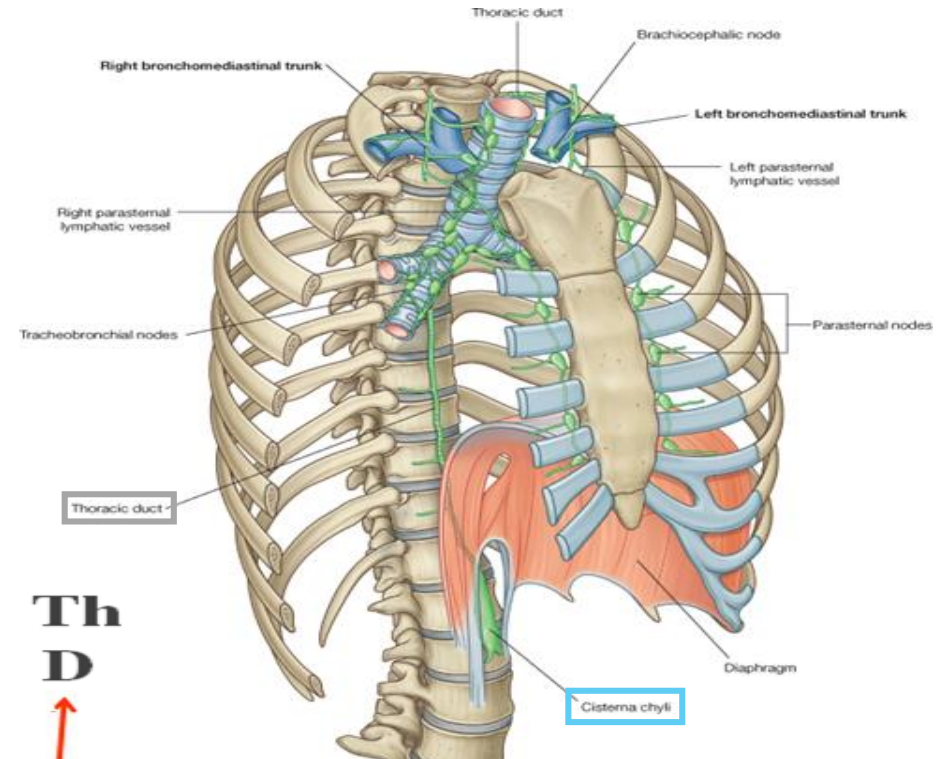
To remember that it drains into a vein:  
Thoracic duct has valves as veins do

## Tributaries:

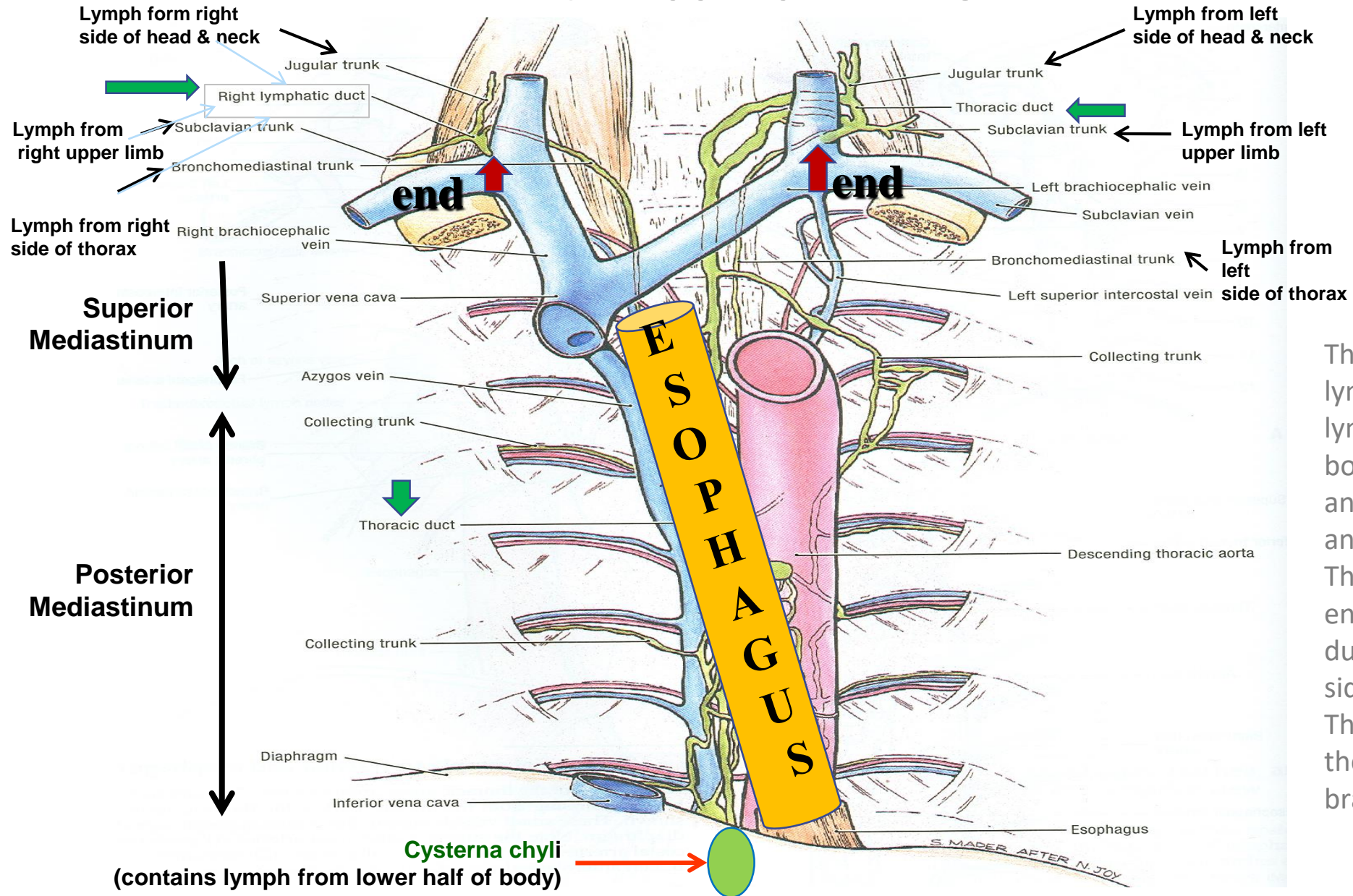
- It receives: Lymphatics from all body

## Except:

Right side of thorax, Right upper limb & Right side of head & neck.



# LYMPHATIC VESSELS IN THORAX



This slide describes the lymphatic drainage of the lymph coming from the upper body (thorax, upper limb, head and neck) from each side (right and left) and where it goes. The lymph from the right side ends up in the right lymphatic duct, while that from the left side goes into the thoracic duct. They both eventually drain into the superior vena cava via the brachiocephalic vein.

S. MADER, AFTER N. JOY

# Summary

## Mediastinum

### Boundaries

Posterior  
The 12 thoracic vertebrae:

Anterior:  
Sternum\_

Superior:  
Thoracic outlet:  
(manubrium, 1<sup>st</sup> rib & 1<sup>st</sup> thoracic v)

Inferior:  
diaphragm

### Subdivisions

#### Superior mediastinum

##### Boundaries:

Inferior:  
Horizontal plane

Posterior:  
Upper (4) thoracic vertebrae.

Anterior:  
Manubrium

Superior:  
Thoracic outlet

##### contents

##### Superficial

Thymus Gland.  
Left brachiocephalic v.  
Right brachiocephalic v.  
Superior vena cava

##### Intermediate:

- Arch of aorta & Brachiocephalic artery.  
- L common carotid artery.  
- L Subclavian artery  
Nerves: :  
Phrenic, vagus

##### Deep:

Trachea , Esophagus,  
Thoracic Duct

#### Inferior mediastinum

##### Middle mediastinum

##### Contents:

- Heart & pericardium
- Ascending Aorta
- Pulmonary trunk
- Superior & Inferior vena cava
- Right & left pulmonary veins
- Right & left phrenic nerves
- Lymph nodes

##### Anterior mediastinum

##### contents

- Thymus gland
- Lymph nodes

##### Posterior mediastinum

##### Contents,

- 1- Esophagus
- 2- Azygos system of veins, posterior & to the right of esophagus
- 3- R & L Thoracic Sympathetic trunks,
- 4- Mediastinal lymph nodes
- 6- Thoracic duct: (posterior to esophagus).
- 7- Descending aorta: posterior & to the left of esophagus

# Summary

## Mediastinum

### PHRENIC NERVES

#### Branches :

- 1) Motor & Sensory fibers to Diaphragm
- 2) Sensory fibers to pleurae & pericardium

#### Course in mediastinum

They pass through the Superior & Middle mediastina

#### Root Value:

C3,4,5

### VAGUS NERVE

It is the 10th cranial nerve.

#### Course in mediastinum

It descends through the Superior & Posterior mediastina

### AORTA

#### ASCENDING AORTA:

Beginning: at aortic orifice of left ventricle

Course: in middle mediastinum

End: continues as arch of aorta (at level of T4)

#### ARCH OF AORTA

Course: in superior mediastinum

End: continues as descending thoracic aorta (at level of T4)

#### DESCENDING AORTA:

Course: in posterior mediastinum

End: continues as abdominal aorta after it passes through diaphragm

### THORACIC DUCT

#### BEGINNING:

It is the continuation of Cisterna Chyli (at the level of L1).

#### COURSE:

It passes through aortic opening of diaphragm.

It ascends in Posterior mediastinum (posterior to esophagus).

It ascends in Superior mediastinum (to the left of esophagus).

#### TRIBUTARIES

It receives Lymphatics from all body

Except Right side of thorax, Right upper limb & Right side of head & neck

End: It opens in the left brachiocephalic vein.

# Questions

1. All of the following structure are located in the middle mediastinum except for:
  - a. Lymph nodes
  - b. Pericardium
  - c. Left subclavian artery
  - d. Left Phrenic nerve

Answer: **C**

2. The posterior mediastinum lies posterior to the:
  - a. Diaphragm
  - b. Heart
  - c. Thoracic vertebrae (T5-T12)
  - d. Lungs and pleura

Answer: **B**

3. Which of the following structures is posterior and to the left of the esophagus?
  - a. Vagus nerve
  - b. Azygos vein
  - c. Ascending aorta
  - d. Descending aorta

Answer: **D**

4. The aorta is located in which mediastinal compartment(s)?
  - a. Anterior only
  - b. Anterior and middle
  - c. Middle only
  - d. Middle and posterior

Answer: **D**

5. Which compartments of the mediastinum does the vagus nerve descend through?
  - a. Superior and anterior
  - b. Superior and posterior
  - c. Superior and middle
  - d. Middle and posterior

Answer: **B**

6. Which of the following nerves forms the anterior esophageal plexus as it descends?
  - a. Right phrenic nerve
  - b. Left phrenic nerve
  - c. Right vagus nerve
  - d. Left vagus nerve

Answer: **D**



# Questions

7. Which part of the aorta is located within the posterior mediastinum?

- a. Ascending aorta
- b. Arch of aorta
- c. Descending aorta
- d. Abdominal aorta

Answer: **C**

8. Which part of the aorta begins at the aortic orifice of the left ventricle?

- a. Ascending aorta
- b. Aortic arch
- c. Descending aorta
- d. Abdominal aorta

Answer: **A**

9. Which of the following statements is incorrect?

- a. The thoracic duct is the continuation of Cisterna Chyli.
- b. The thoracic duct ascends in the anterior mediastinum.
- c. The thoracic duct ascends in the posterior mediastinum.
- d. The thoracic duct ascends in the superior mediastinum.

Answer: **B**

10. Which of the following is true regarding the thoracic duct?

- a. It passes through aortic opening of the diaphragm.
- b. It starts at the level of T3.
- c. It receives tributaries from all over the body.
- d. All of the above

Answer: **A**

11. The Thoracic outlet composed of all these except :

- A. manubrium.
- B. B. first rib.
- C. first thoracic vertebra.
- D. diaphragm.

Answer: **D**

12. The mediastinum is subdivided by a Horizontal plane (extending from the Sternal angle to the lower A border of :

- A. T4
- B. C6
- C. T12
- D. L1

Answer: **A**

# Questions

13. Superficial compartment of Superior Mediastinum contains:

- A. vagus nerve. B. thymus gland.
- C. phrenic nerve. D. arch of aorta.

Answer: **B**

14. Arch of aorta has three branches , what is not one of them:

- A. Brachiocephalic artery. B. Left common carotid artery.
- C. Left Subclavian artery. D. superior vena cava.

Answer: **D**

15. Root Value of the phrenic nerve :

- A. c4,5,6. B.c3,4,5. C. t3,4,5. D. t4,5,6.

Answer: **B**

16. Inferior Mediastinum subdivided into :

- A. anterior Mediastinum. B. middle Mediastinum.
- C. posterior Mediastinum. D. all of them

Answer: **D**

17. Which one of the following structures is present in the superior mediastinum?

- A. Ascending aorta
- B. Arch of aorta
- C. Descending aorta
- D. Pulmonary trunk

Answer: **B**

18. Which one of the following structure is present in both superior and posterior mediastinum?

- A. Superior vena cava
- B. Pulmonary trunk
- C. Trachea
- D. Esophagus

Answer: **D**

19. Which one of the following structures lies on the left side of esophagus in the posterior mediastinum?

- A. Superior vena cava
- B. Descending aorta
- C. Azygos vein
- D. Pulmonary trunk

Answer: **B**



*Leaders:*

Nawaf AlKhudairy  
Jawaher Abanumy

*Members:*

Alanoud Abuhaimed  
Alanoud Alsaikhan  
Ameera Niazi  
Dania Alkelabi  
Deena AlNowiser  
Laila Hassan  
Lama Alfawzan  
Lara Alsaleem  
Maha Alissa  
Nada Aldakheel  
Nourah Al Hogail  
Safa Al-Osaimi  
Wejdan Alzaid



[anatomyteam436@gmail.com](mailto:anatomyteam436@gmail.com)



[@anatomy436](https://twitter.com/anatomy436)