

Topographical Anatomy of the Thorax

Tibor WENGER

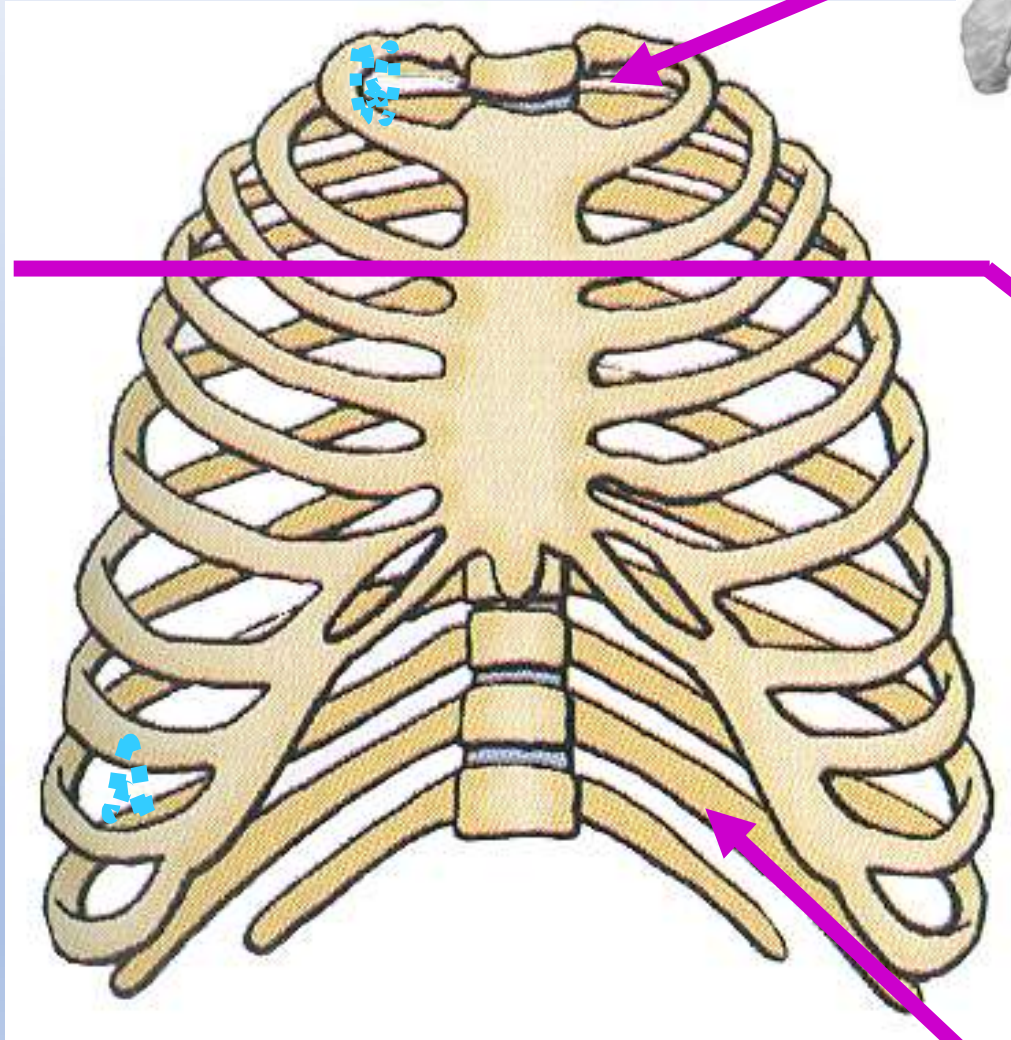
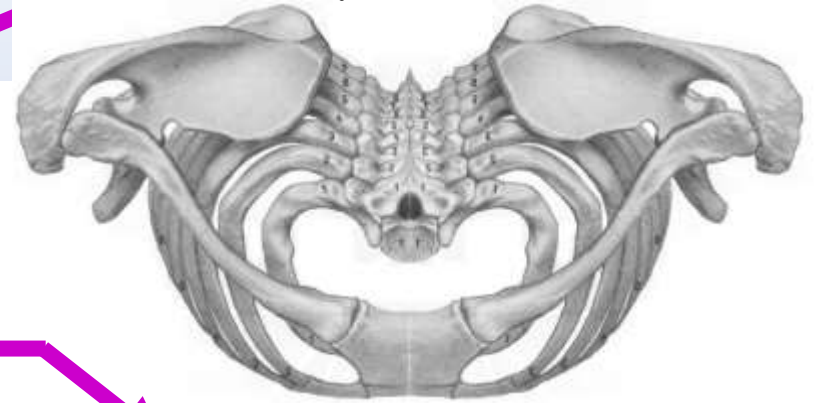
Lecture

February 3,5, 2020

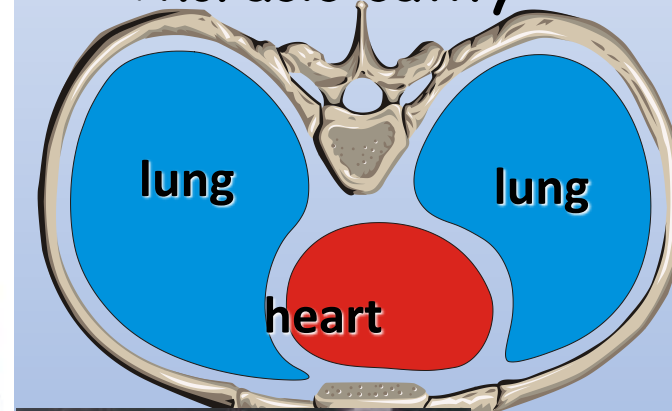
- Lungs, pleura
- Mediastinum
- Heart and blood vessels of the mediastinum
 - Blood vessels in the thorax
 - Esophagus
 - Thymus and ductus thoracicus
- Pericardial and pleural puncture

The thorax

Superior thoracic aperture



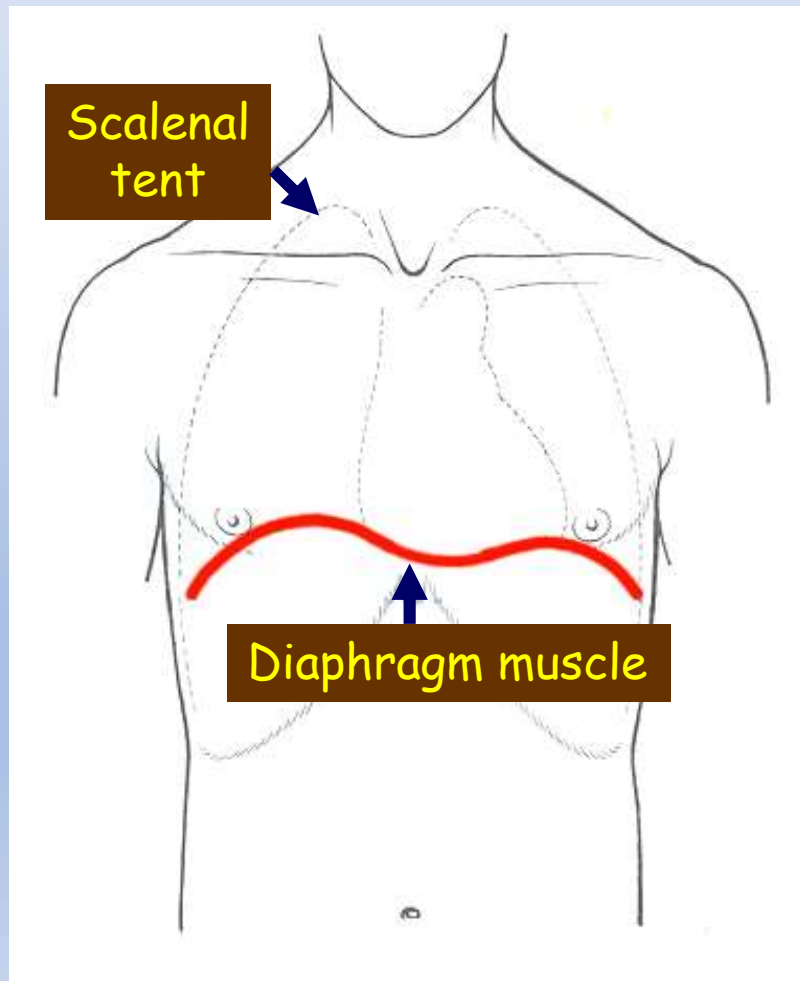
Thoracic cavity



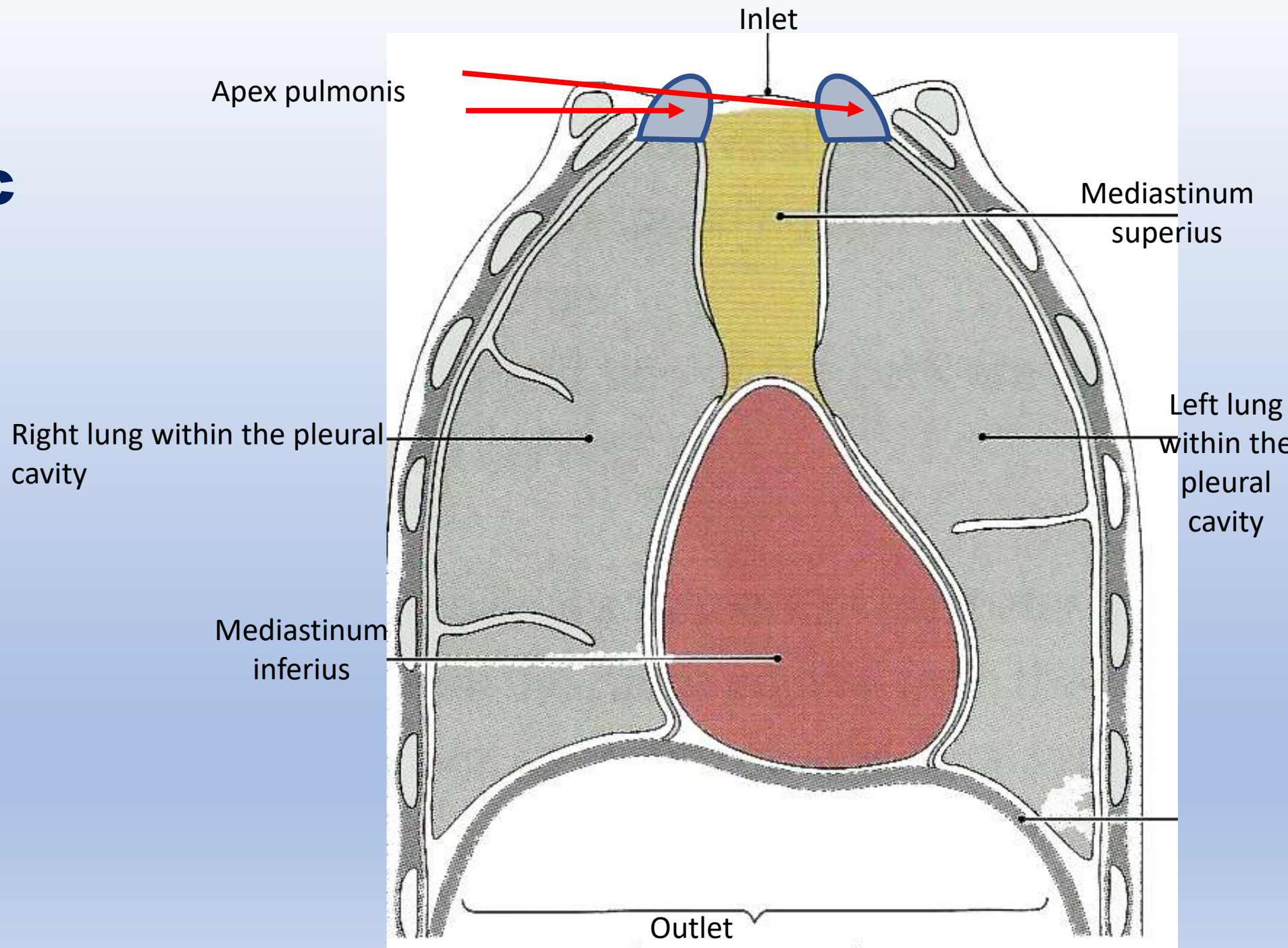
Inferior thoracic aperture

The bony (+joints) thorax is not the same as the thoracic cavity!

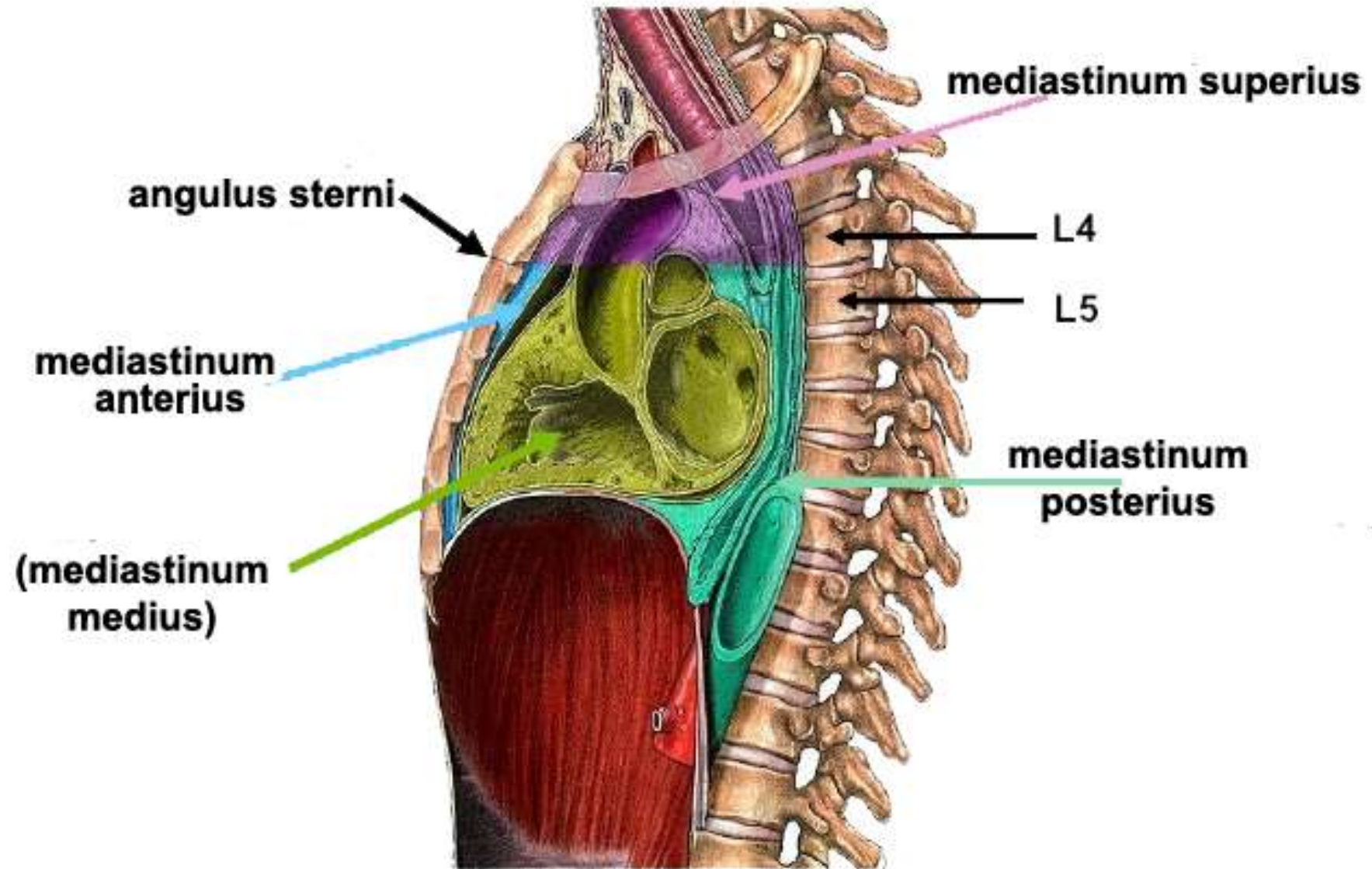
The thoracic cavity is the region of the thorax above the diaphragm, and it exceeds the level of the first rib, and extends to the scalenal tent.



Thoracic cavity

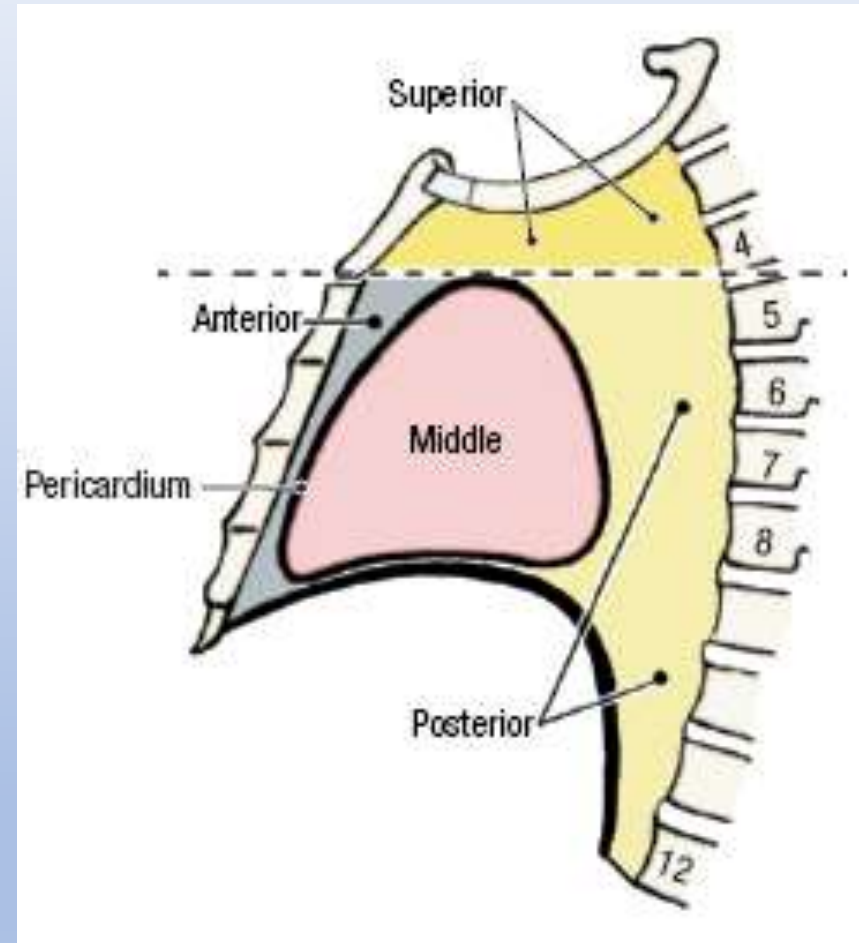


Division of the thoracic cavity



Division of the mediastinum

- **Anterior mediastinum** – the part that lies between the sternum and the pericardium. In children and adolescents, part of the thymus may be found in the anterior mediastinum.
- **Middle mediastinum** – the part that contains the pericardium, the heart, and the roots of the great vessels.
- **Posterior mediastinum** – the part that lies posterior to the pericardium and anterior to the bodies of vertebrae T5 to T12. The posterior mediastinum contains structures that pass between the neck, thorax, and abdomen (esophagus, vagus nerves, azygos system of veins, thoracic duct, thoracic aorta).



Mediastinal Anatomy

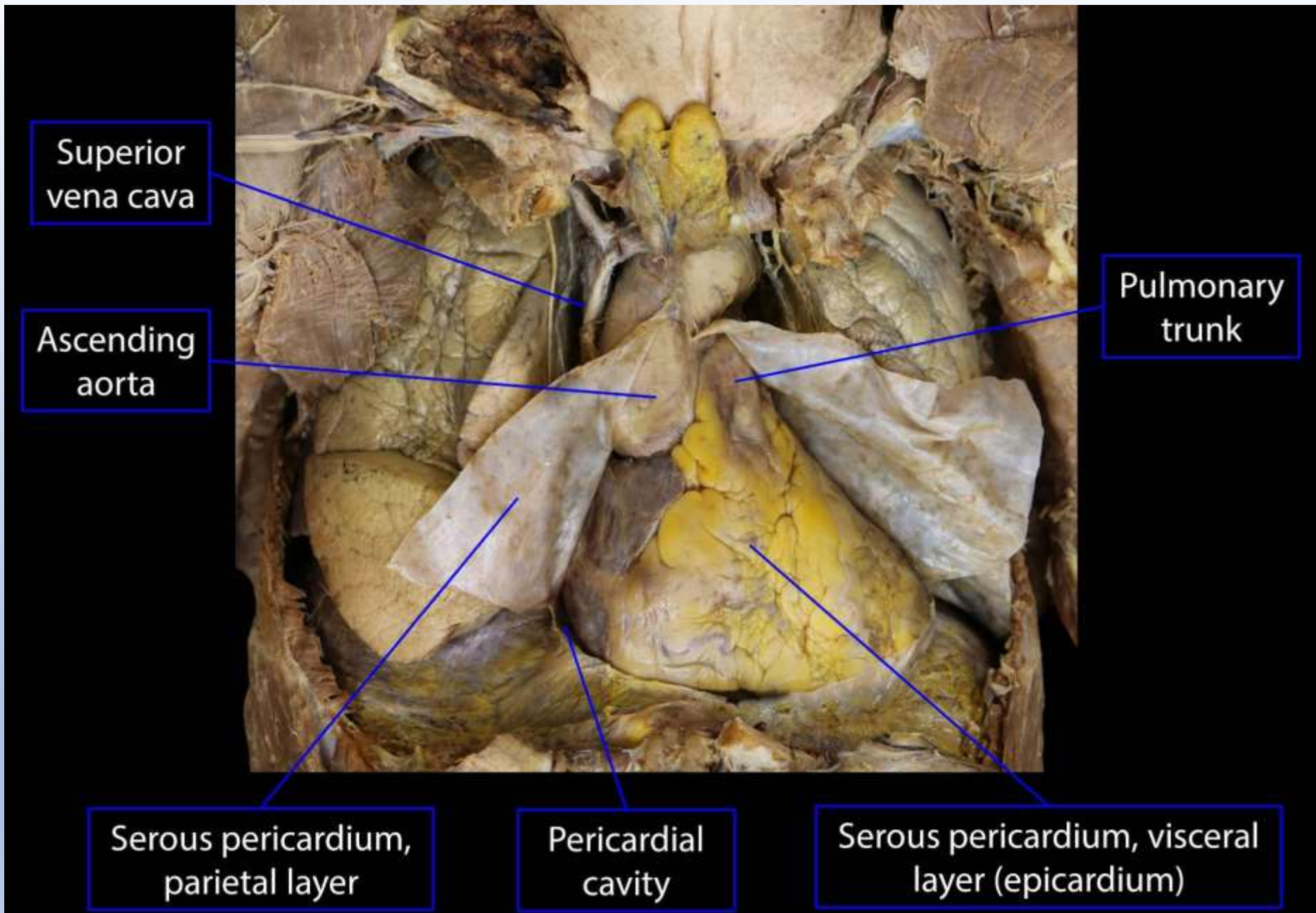
- ANTERIOR (includes “superior”)
- bordered by sternum and heart
- Contains thymus, thyroid, parathyroid, lymphatics

Mediastinal Anatomy

- **MIDDLE**
- Anterior border comprised of anterior heart border, and posteriorly by posterior heart border and trachea
- Contains heart, trachea, aortic arch, pulmonary arteries, pulmonary hila and lymph nodes

Mediastinal Anatomy

- **POSTERIOR**
- Bordered by posterior heart and trachea and vertebrae
- Contains esophagus, descending aorta, azygous and hemiazygous veins, paravertebral LN, sympathetic chain and thoracic duct



Superior vena cava

Ascending aorta

Pulmonary trunk

Serous pericardium, parietal layer

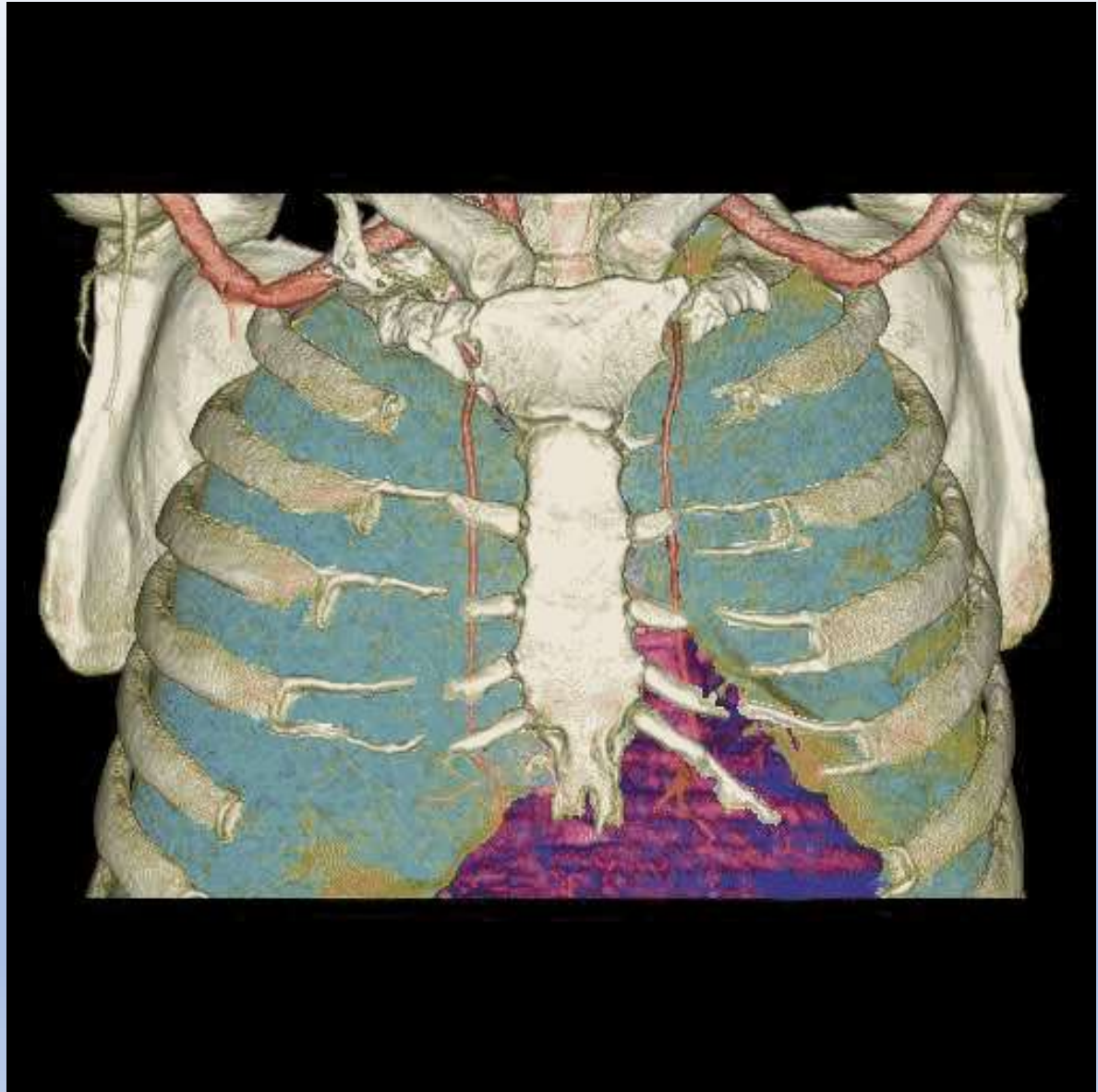
Pericardial cavity

Serous pericardium, visceral layer (epicardium)

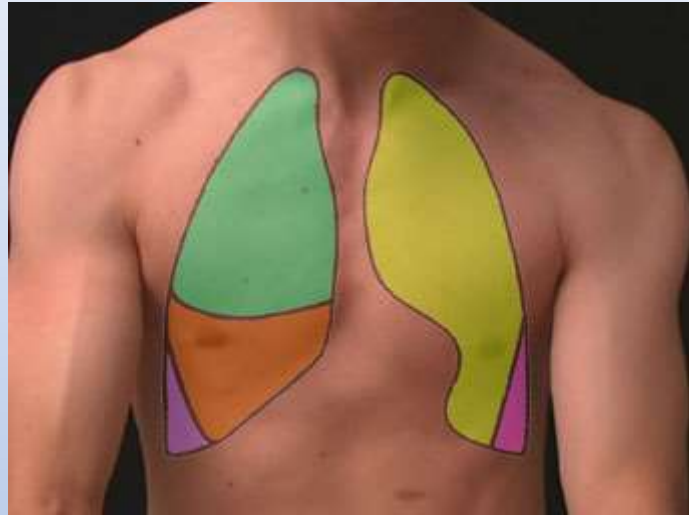
Thoracic cavity, anterior



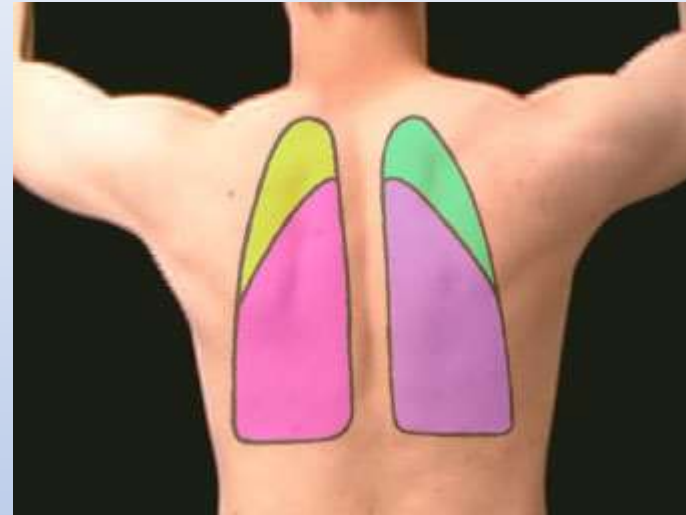
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Surface marking of lungs



anterior



posterior

right



lateral

left



lateral

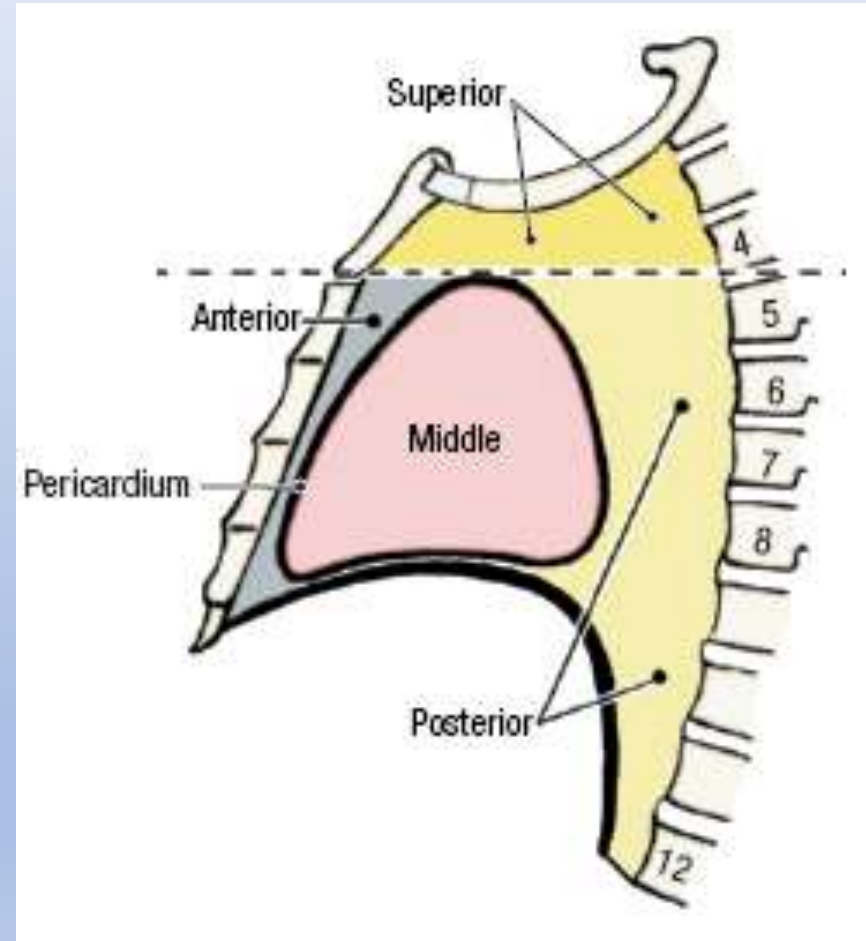
The region between the two pleural cavities is the mediastinum.

The **boundaries of the mediastinum** are:

- **Superior boundary** – superior thoracic aperture
- **Inferior boundary** – diaphragm
- **Anterior boundary** – sternum
- **Posterior boundary** – bodies of vertebrae T1 to T12
- **Lateral boundaries** – mediastinal parietal pleura (left and right)

For descriptive purposes, the mediastinum is divided into four parts.

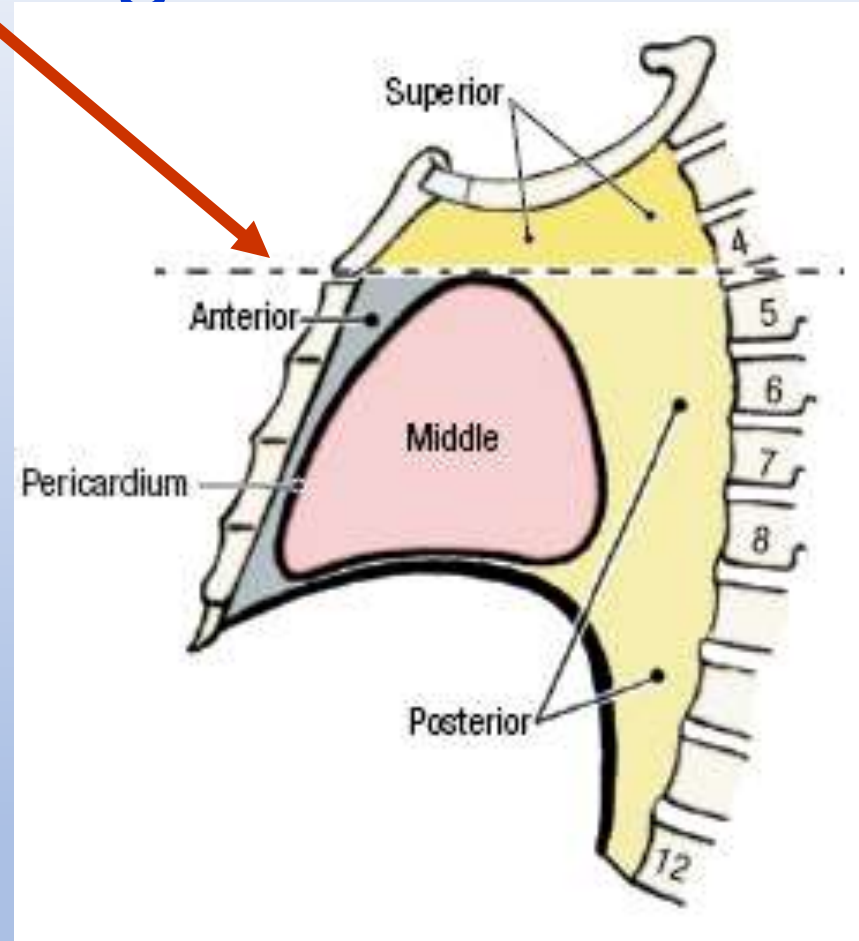
An imaginary horizontal plane at the level of the sternal angle (**plane of the sternal angle**) intersects the intervertebral disk between vertebrae T4 and T5. The plane of the sternal angle separates the **superior mediastinum (or supracardiac mediastinum)** from the **inferior mediastinum**. The pericardium divides the inferior mediastinum into three parts:



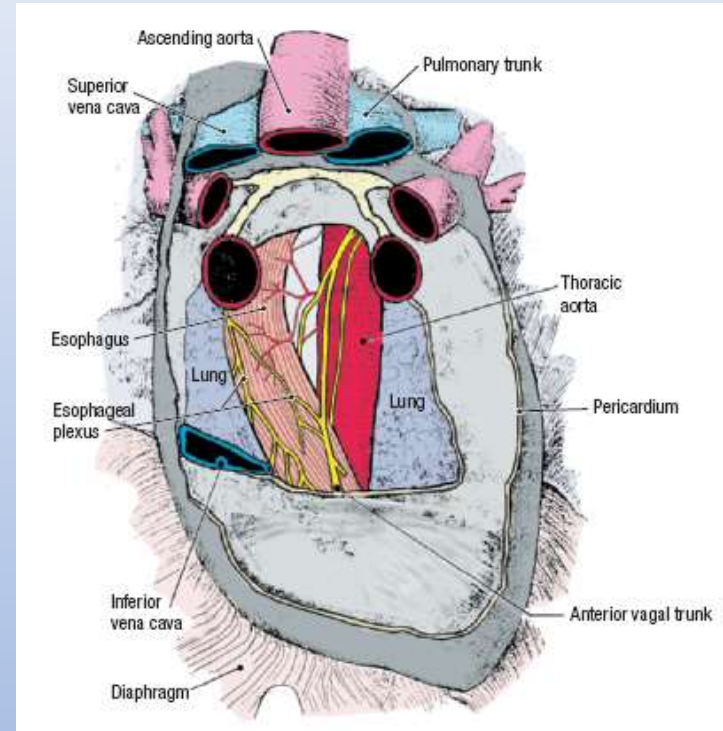
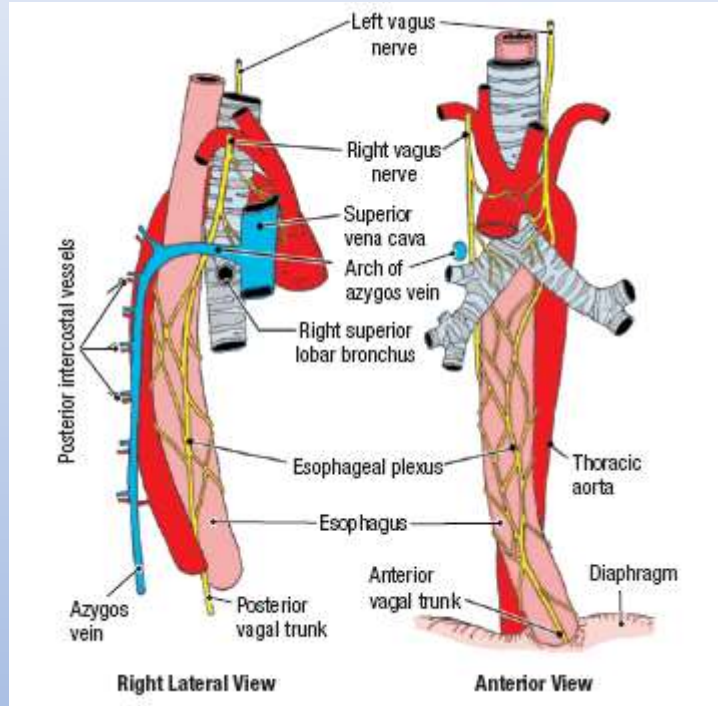
The plane of the sternal angle:

marks the level of the

- superior border of the pericardium,
- bifurcation of the trachea and the
- beginning and ending of the arch of the aorta.

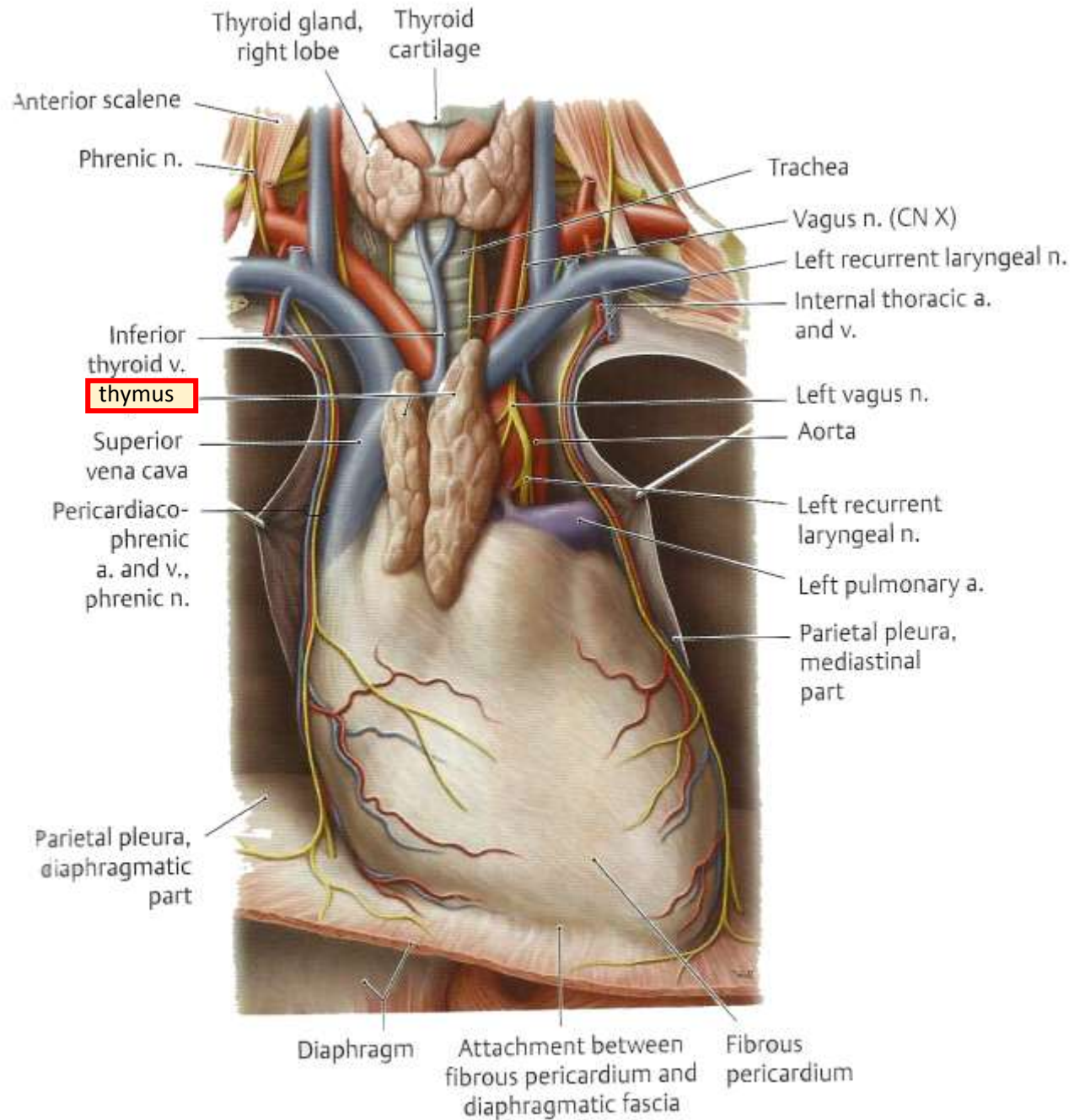


Level of the sternal angle



Some structures that course through the posterior mediastinum

Esophagus, vagus nerve, phrenic nerve, thoracic duct pass through more than one mediastinal subdivision.



Superior mediastinum with the thymus

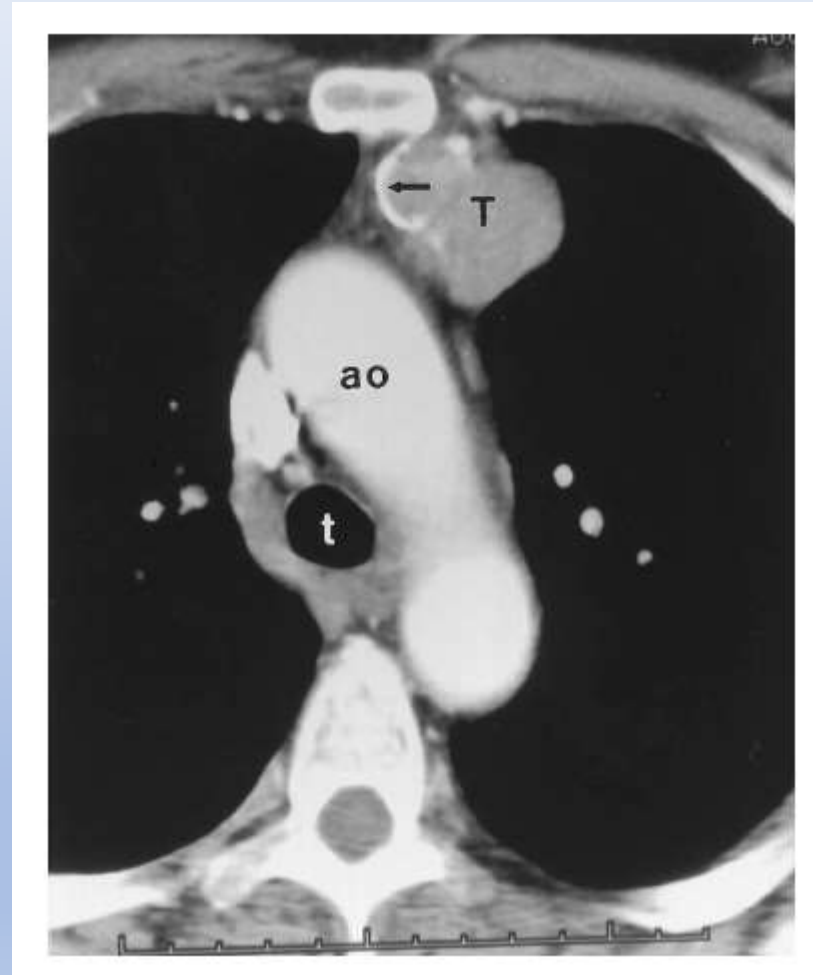


Thymus (med. supracardiacum)

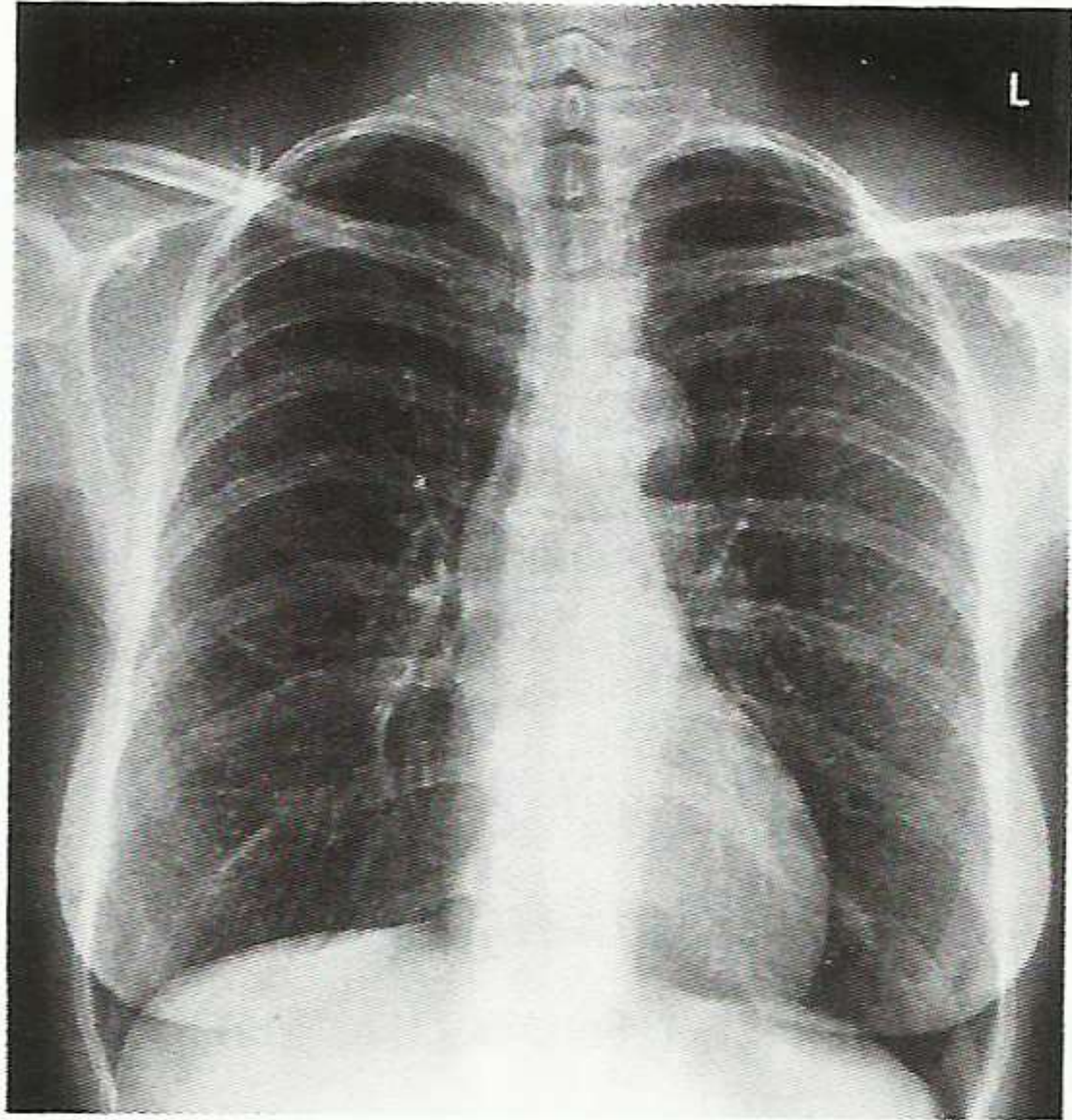
- **Thymic trigone**
- Caudally it reaches the pericardium;
- In most the cases it lies in front of the brachiocephalic v.;
- In adult: retrosternal corpus adiposum

Dissected by Sandra Schmidt (exam dissection in 2008)

Thymoma

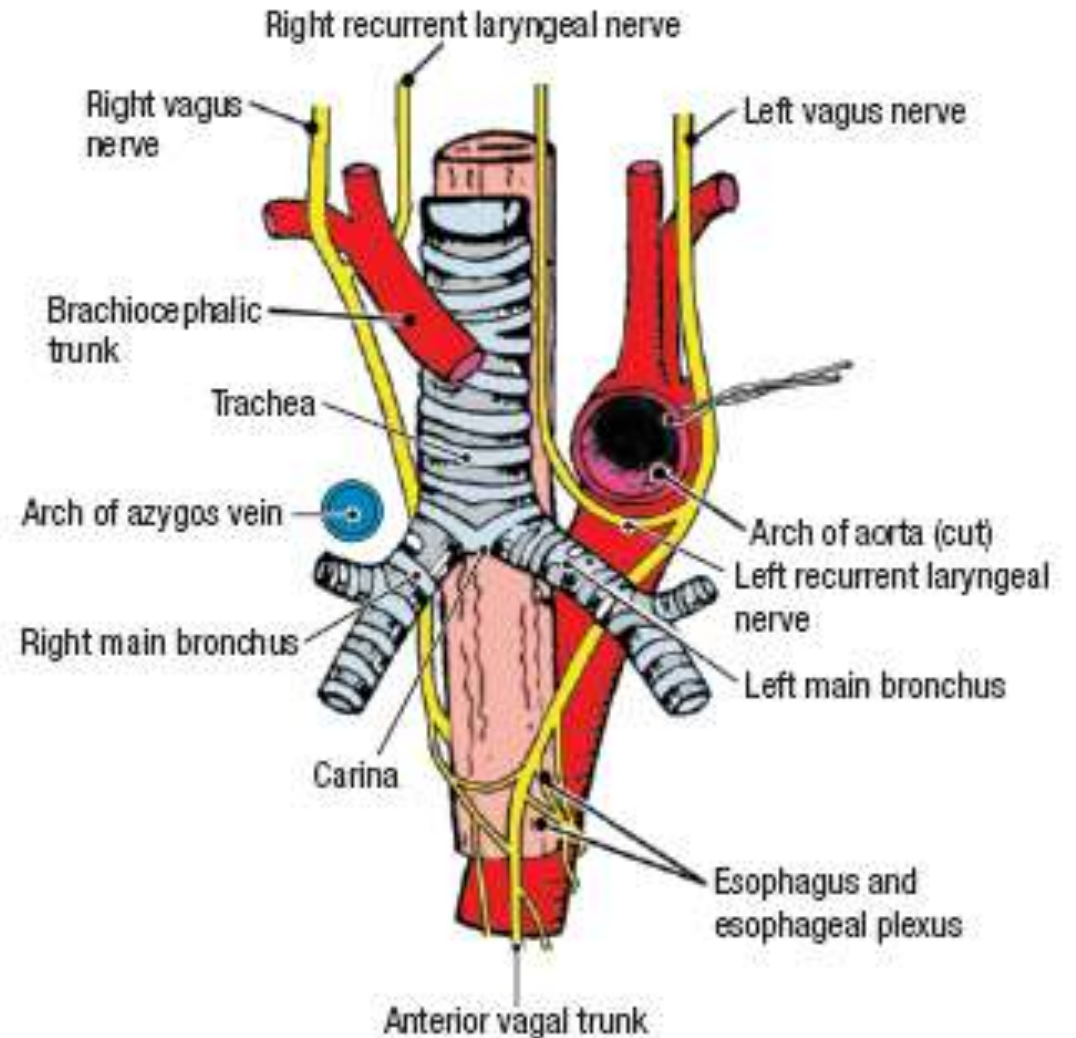
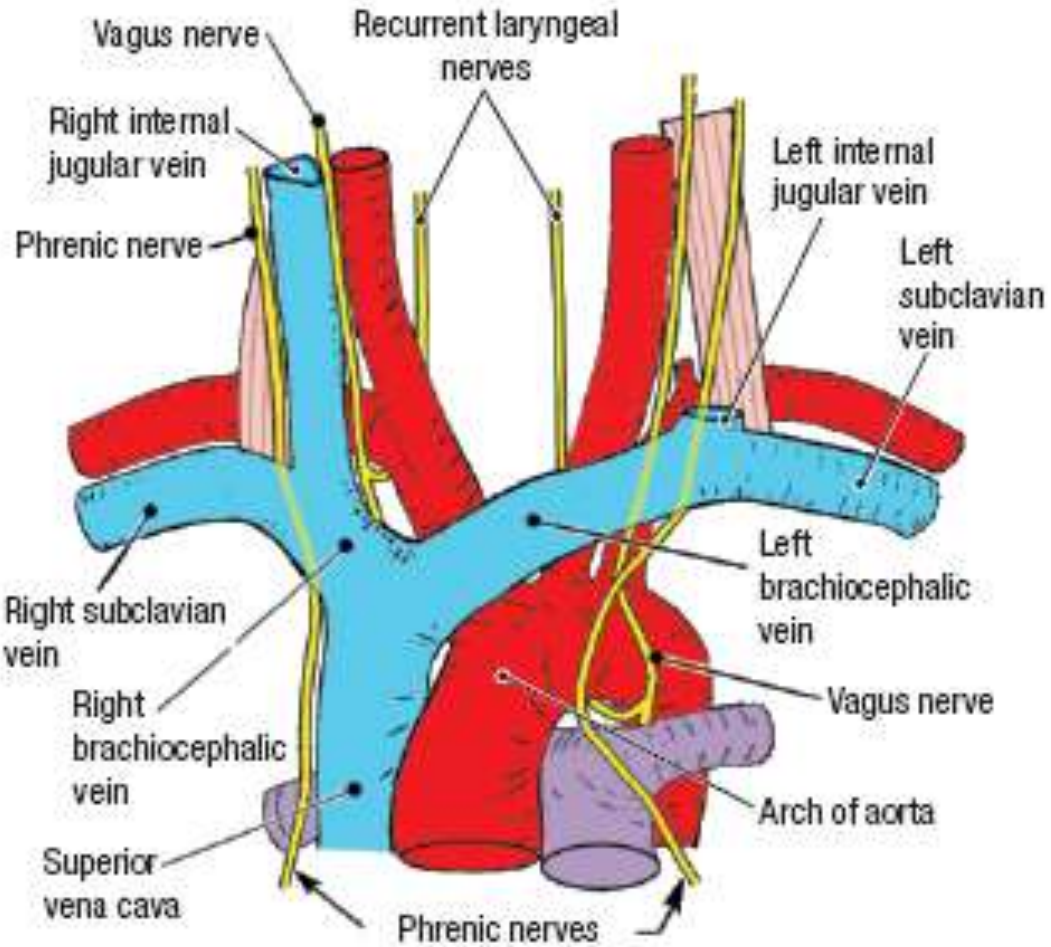


Strollo, Chest 1997; 112: 514



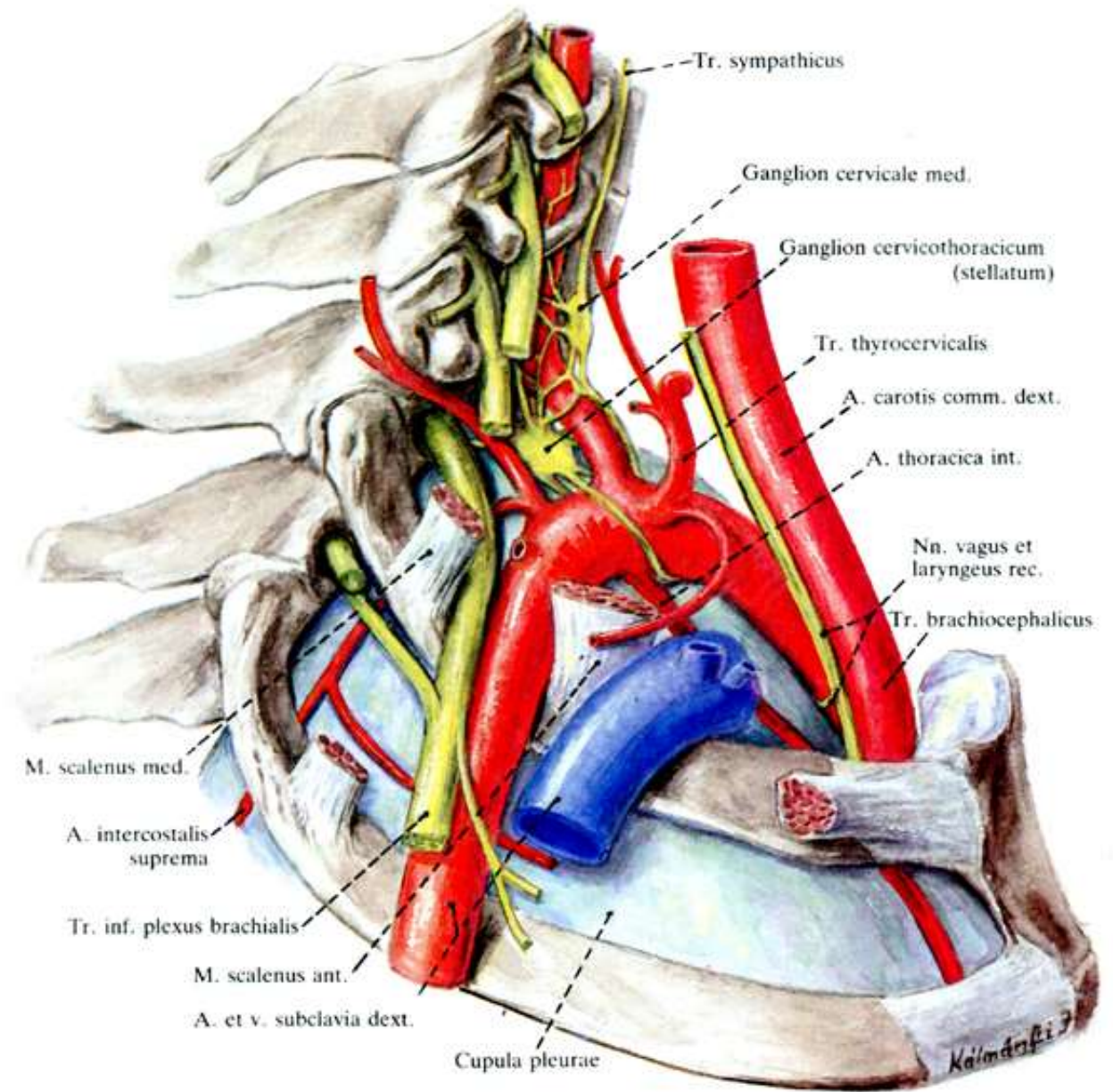
**X ray picture of
the hearth**

Main blood vessels and nerves of the superior mediastinum



Cupula pleurae

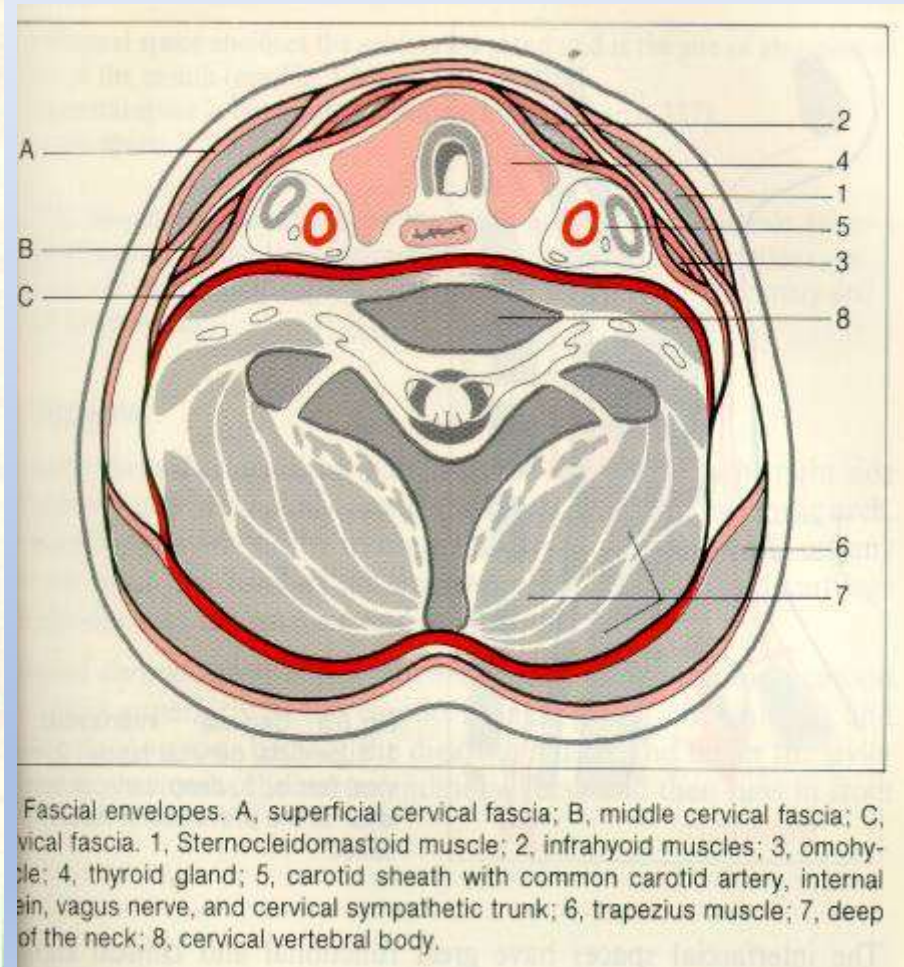
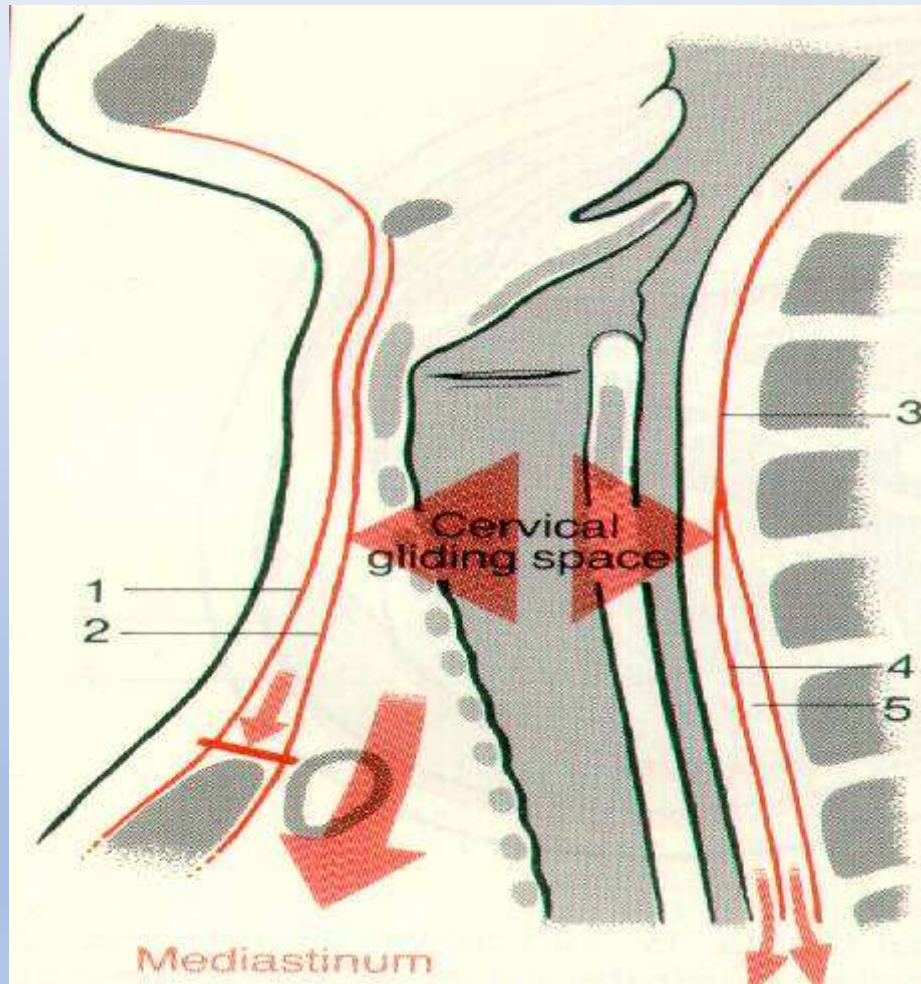
- Surrounded by mm. scaleni; m. long. colli)
- Right side: **ventral**: tr. brachioceph and subclavian a.; vagus n.; left side: left subcl. A.; in front: subclavian a. and internal thoracic a/v.; **medially**: phrenic n.; behind the subclavian a.: truncus inf. (brachial plexus); **posteriorl**: symp. trunc and stellate ganglion



CT angiography



The anatomic base of deep cervical soft tissue infections



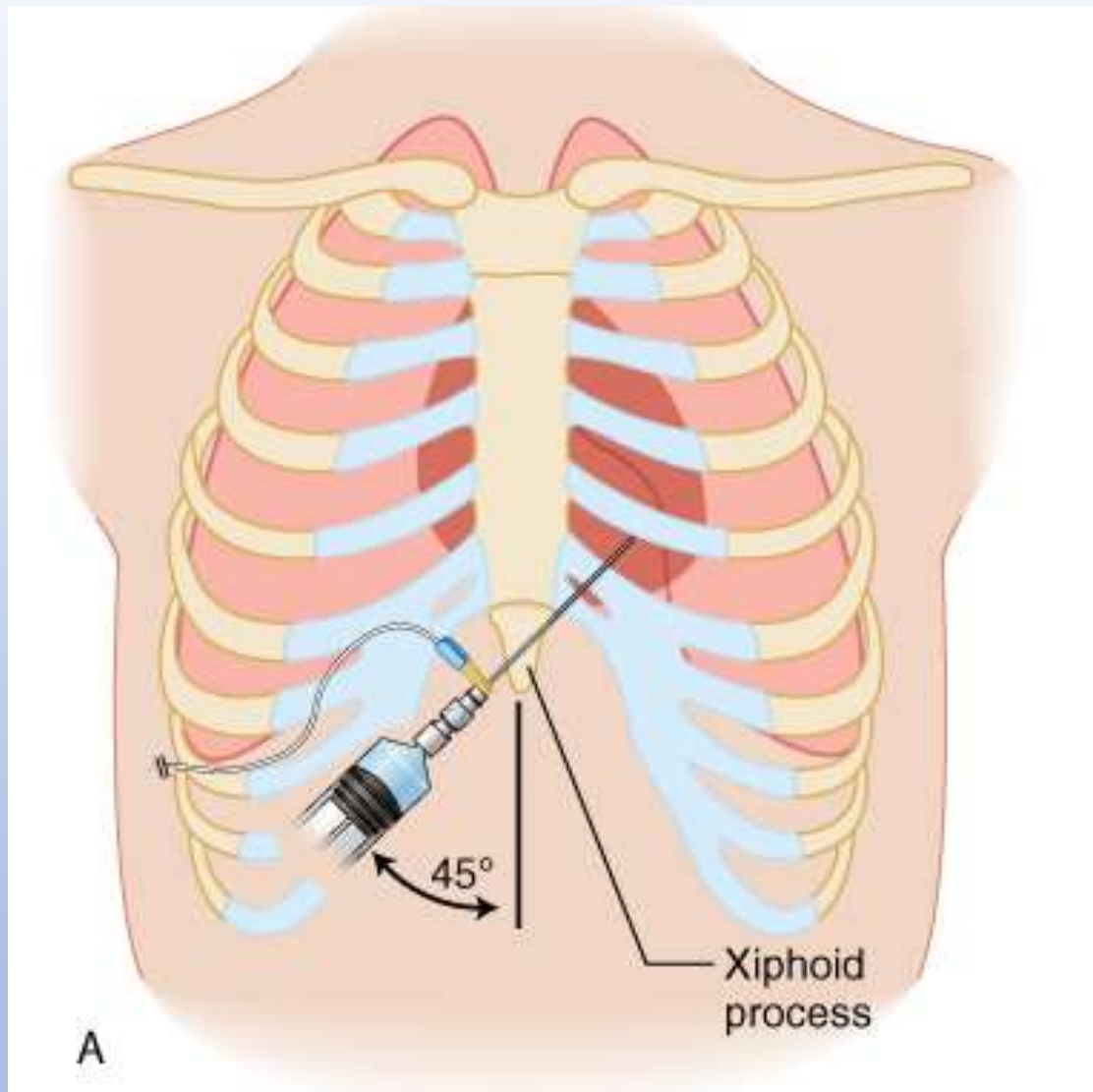
Abscess of the neck- dental origin



Pericardiocentesis

To take off any fluid from the pericardiac cavity (content:10-20 ml; in pathological cases can be as much as 250 ml)

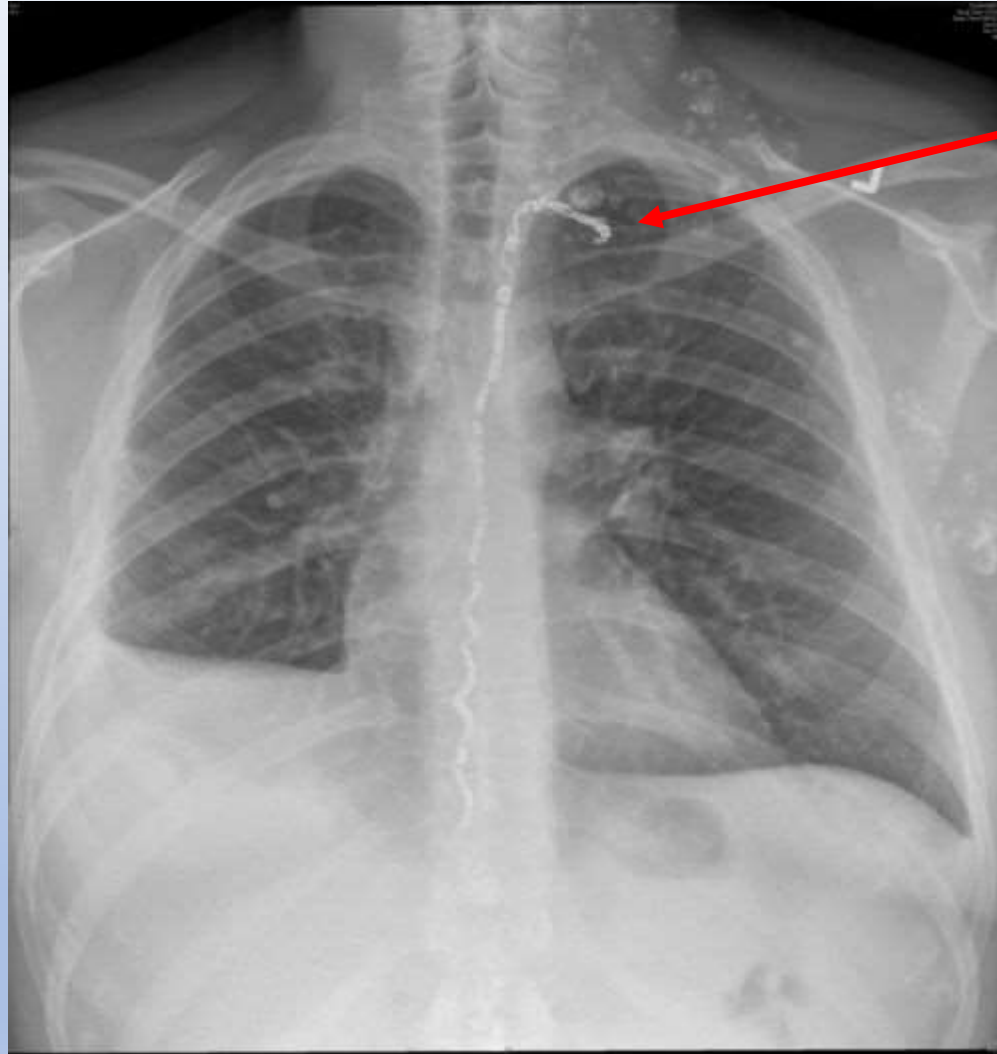
Place and position of the needle: between **xiphoid process and left costal arch**; it must be in an angle between 30-45° toward the middle part of left clavicle.



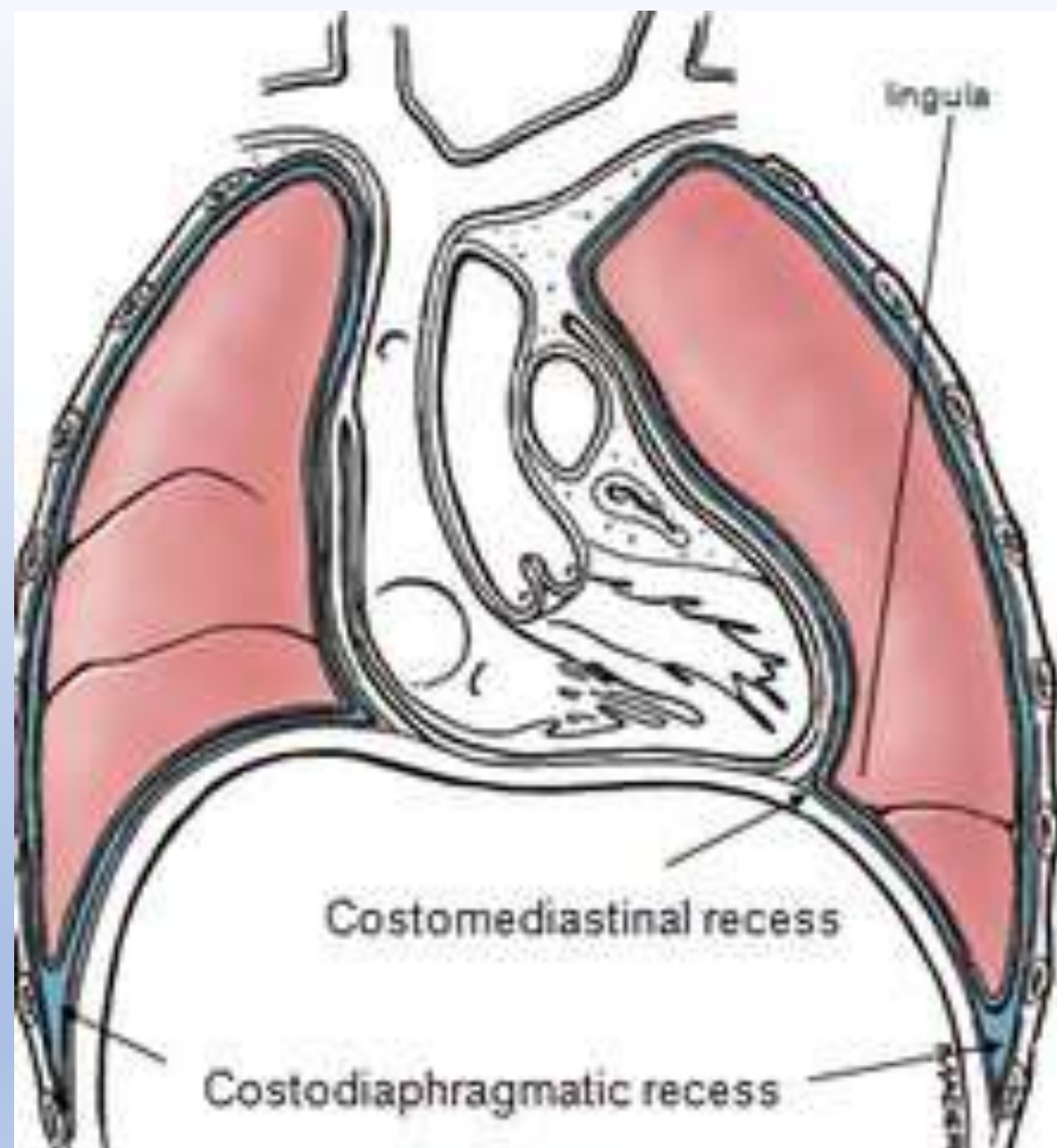
CLINICAL CORRELATION

Pericardium

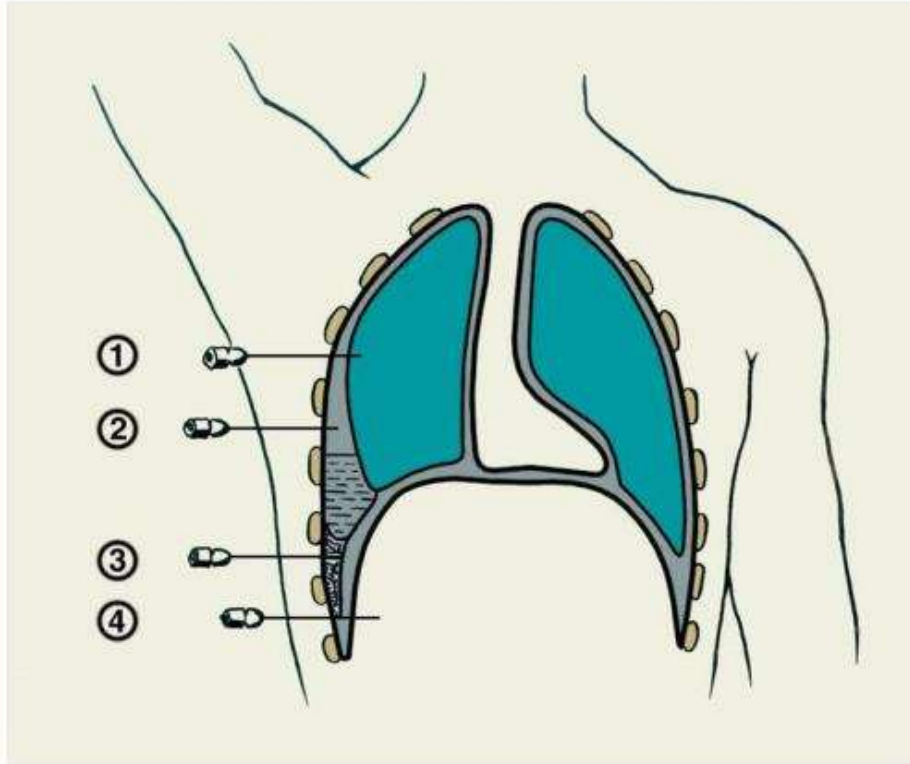
Inflammatory diseases can cause fluid to accumulate in the pericardial cavity (pericardial effusion). Bleeding into the pericardial cavity (hemopericardium) may result from penetrating heart wounds or perforation of a weakened heart muscle after myocardial infarction. Because the pericardium is composed of fibrous connective tissue, it cannot stretch, and fluids collected in the pericardial cavity compresses the heart (cardiac tamponade).



Thoracic duct



Places for pleural puncture



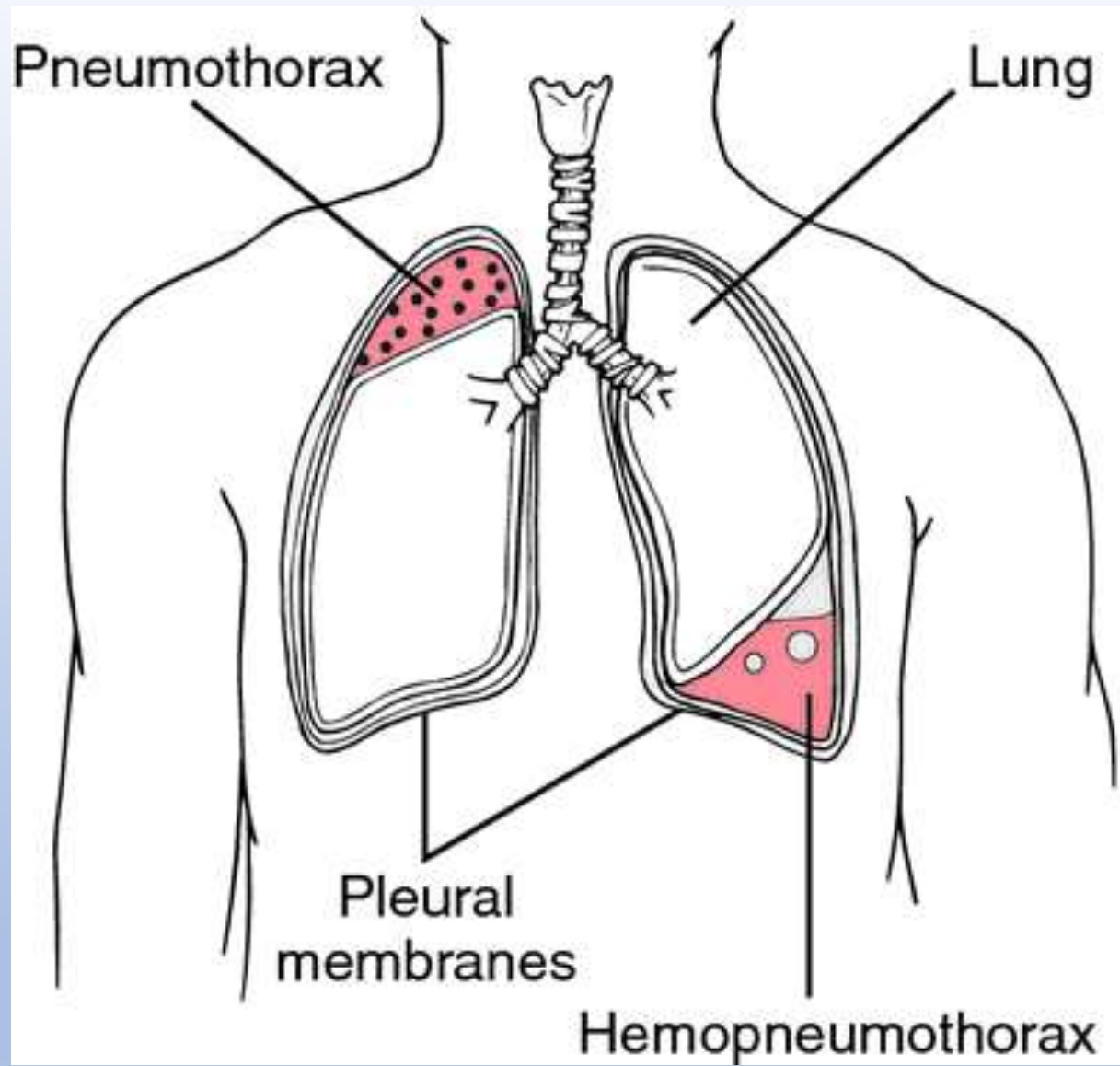
Thoracocentesis

- From Greek, thorax + centesis, puncture) also known as **pleural tap**,
- It is an invasive procedure to remove fluid or air from the pleural space for diagnostic or therapeutic purposes. A cannula, or hollow needle, is carefully introduced into the thorax, generally after administration of local anesthesia. The procedure was first described in 1852.
- The recommended location varies.
- midaxillary line, in the eighth, ninth, or tenth intercostal space.
- Whenever possible, the procedure should be performed under ultrasound guidance, which has shown to reduce complications.

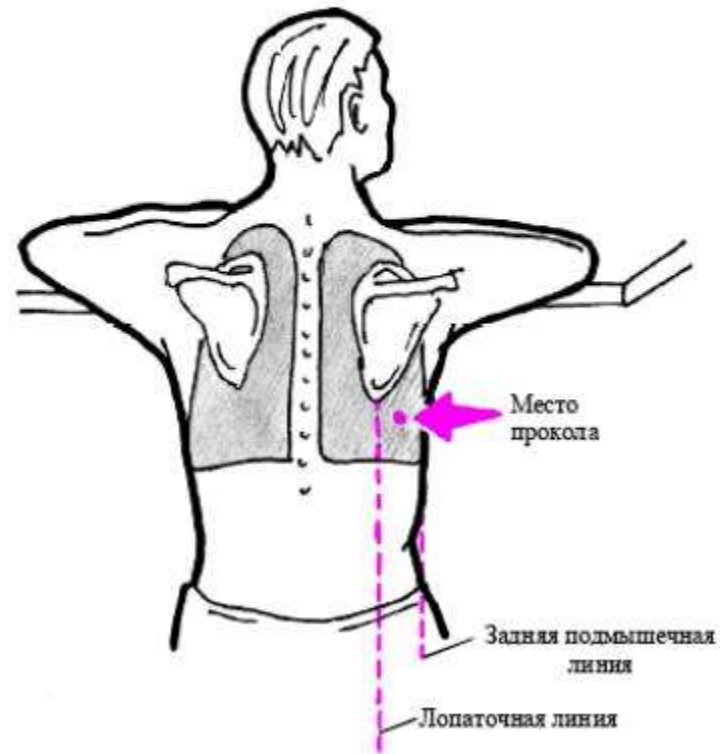
Some difficult medical

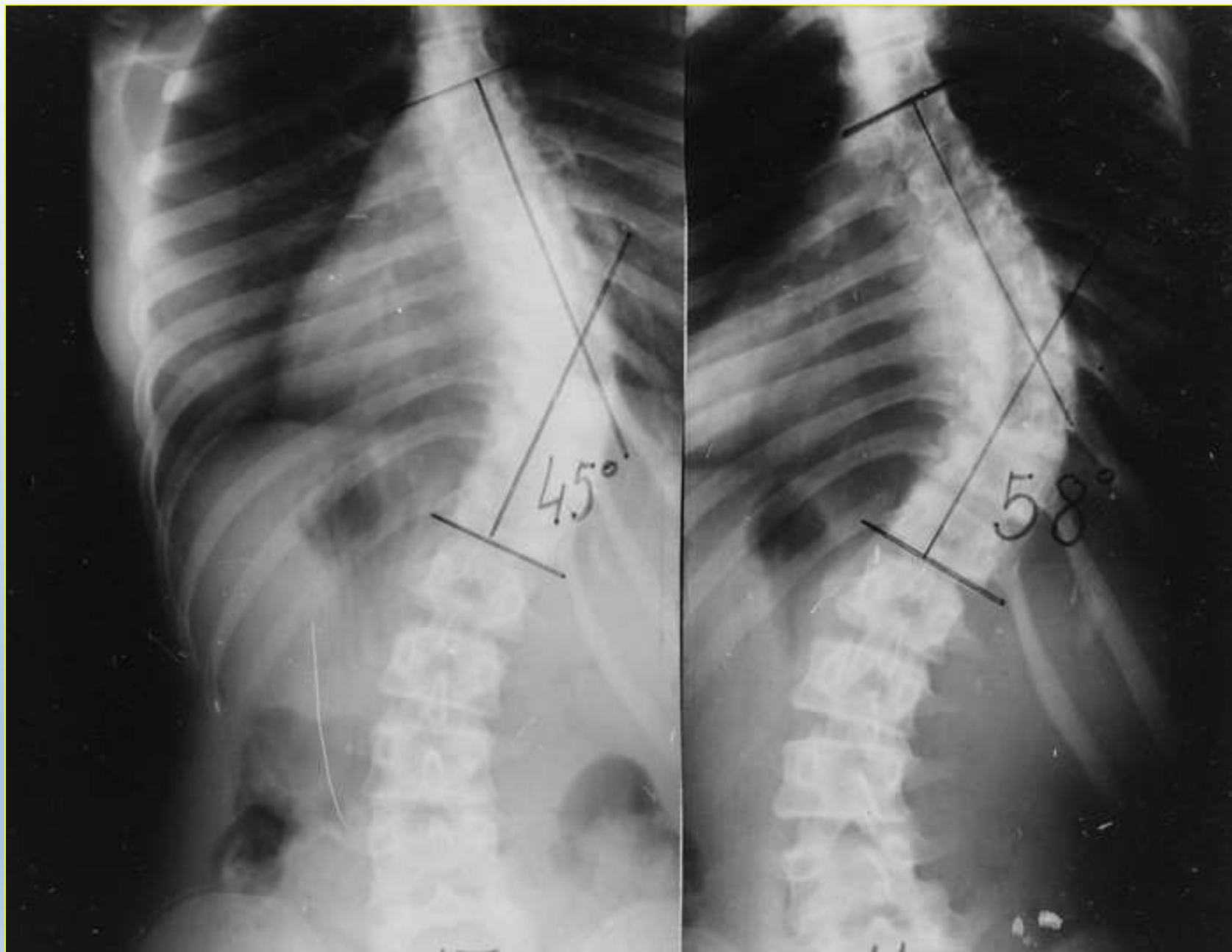
condition requires urgent and adequate rapid response a surgeon, and resident too.

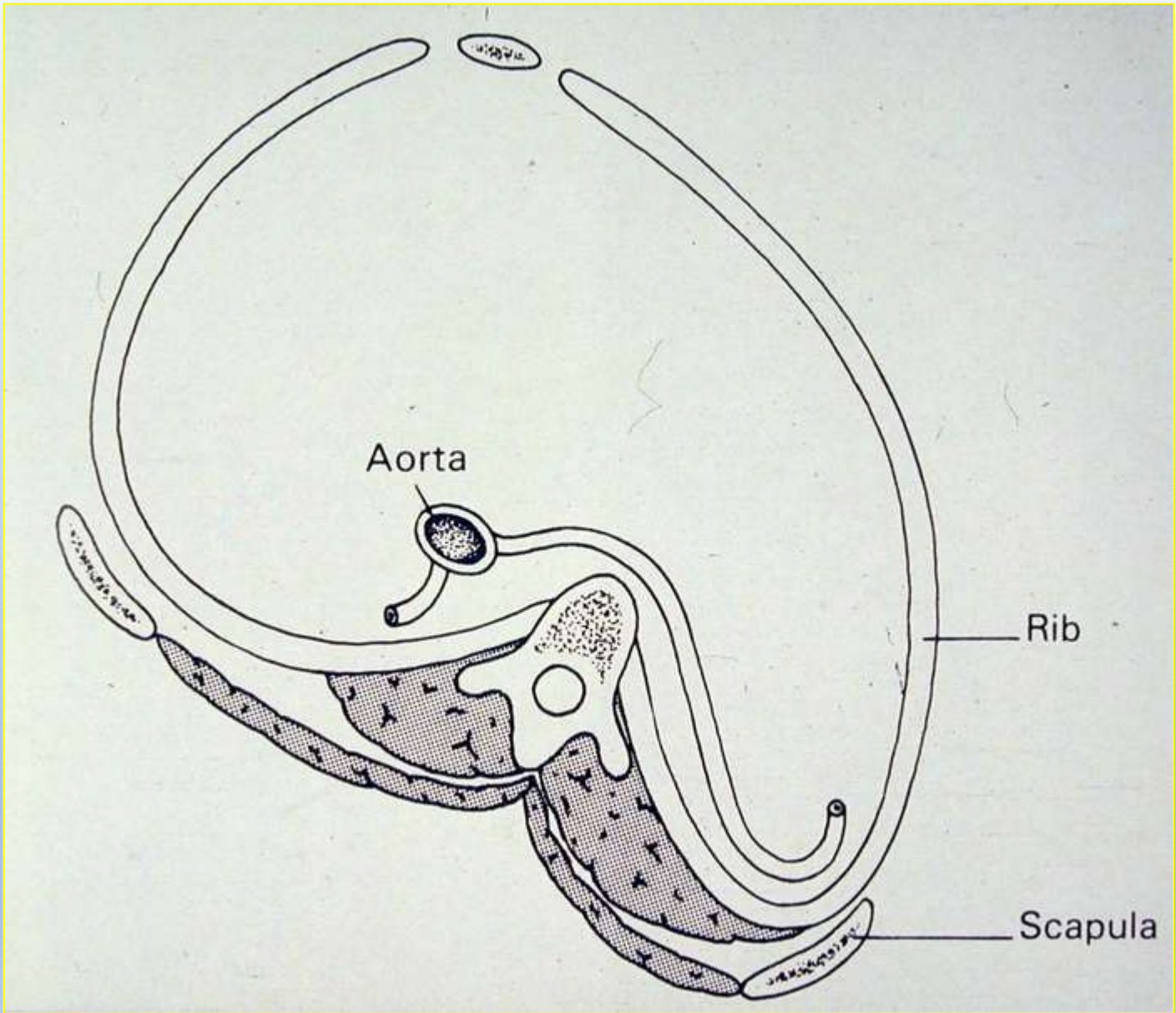
- **Pleural puncture.**
- **Drainage of the pleural cavity (thoracentesis).**
- **Drainage of the mediastinum.**
- **Puncture and drainage of the cavity of tense cyst of a lung.**
- **Therapeutic bronchoscopy and temporary occlusion of the bronchus.**
- **Urgent radical surgery.**



Anatomical landmarks for pleural puncture







Oesophagus



1.) *Cervical part*: C 6. vertebral level,
lower border of crycoid cartilage

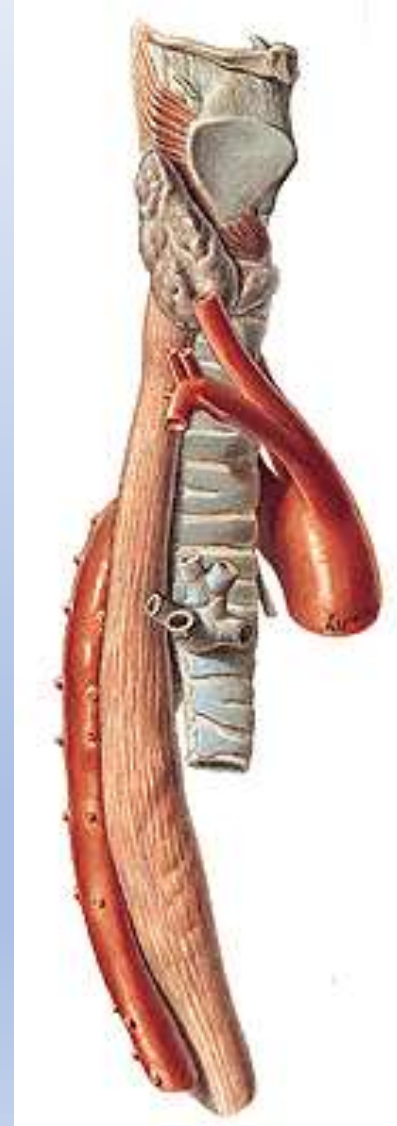
2.) *Thoracic part*: mediastinum post.
up to oesophageal hiatus of the diaphragm m.
(Th 10 vertebral level)



3.) *Abdominal part*



Relations of the oesophagus and trachea





Thank you for your attention