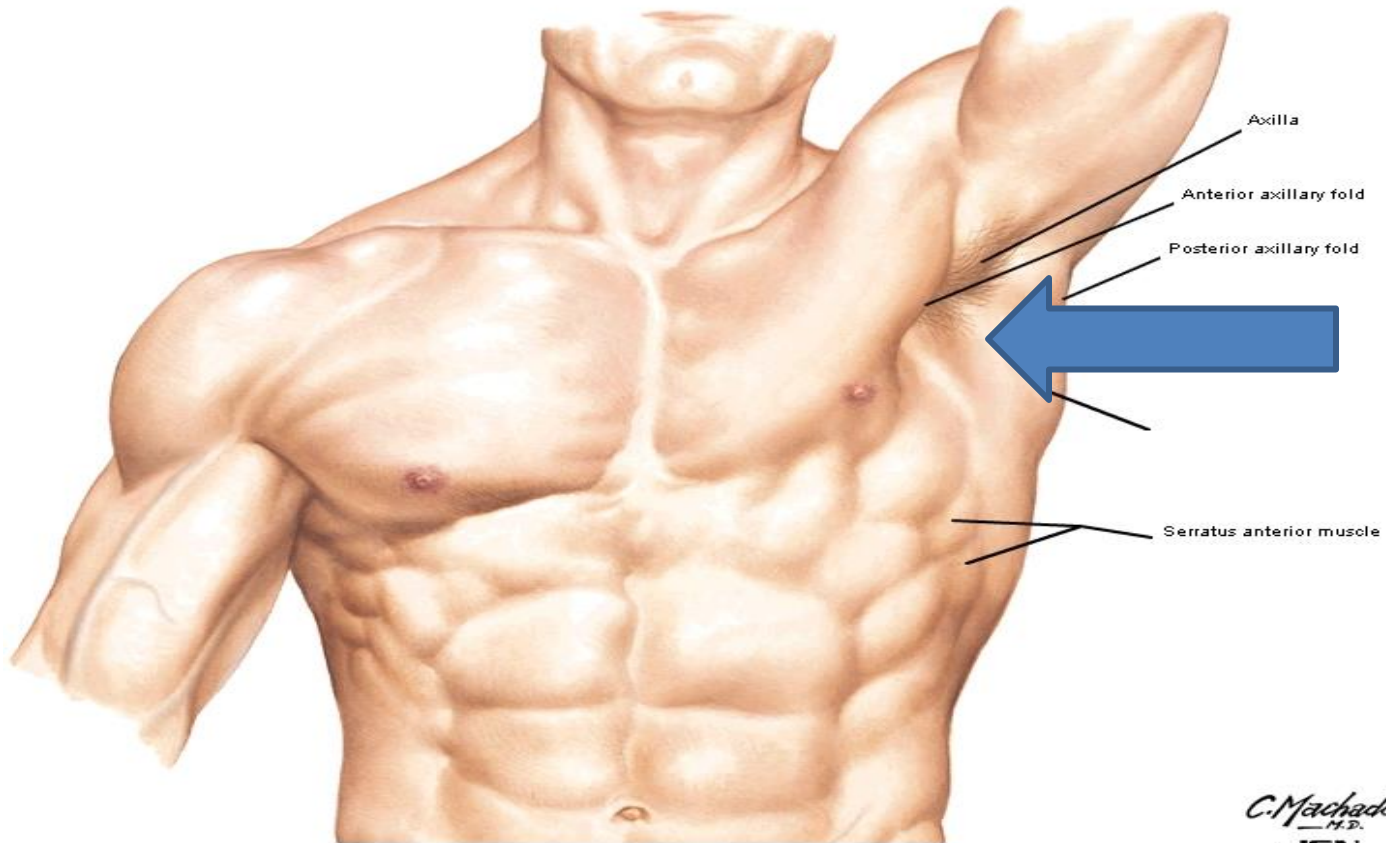


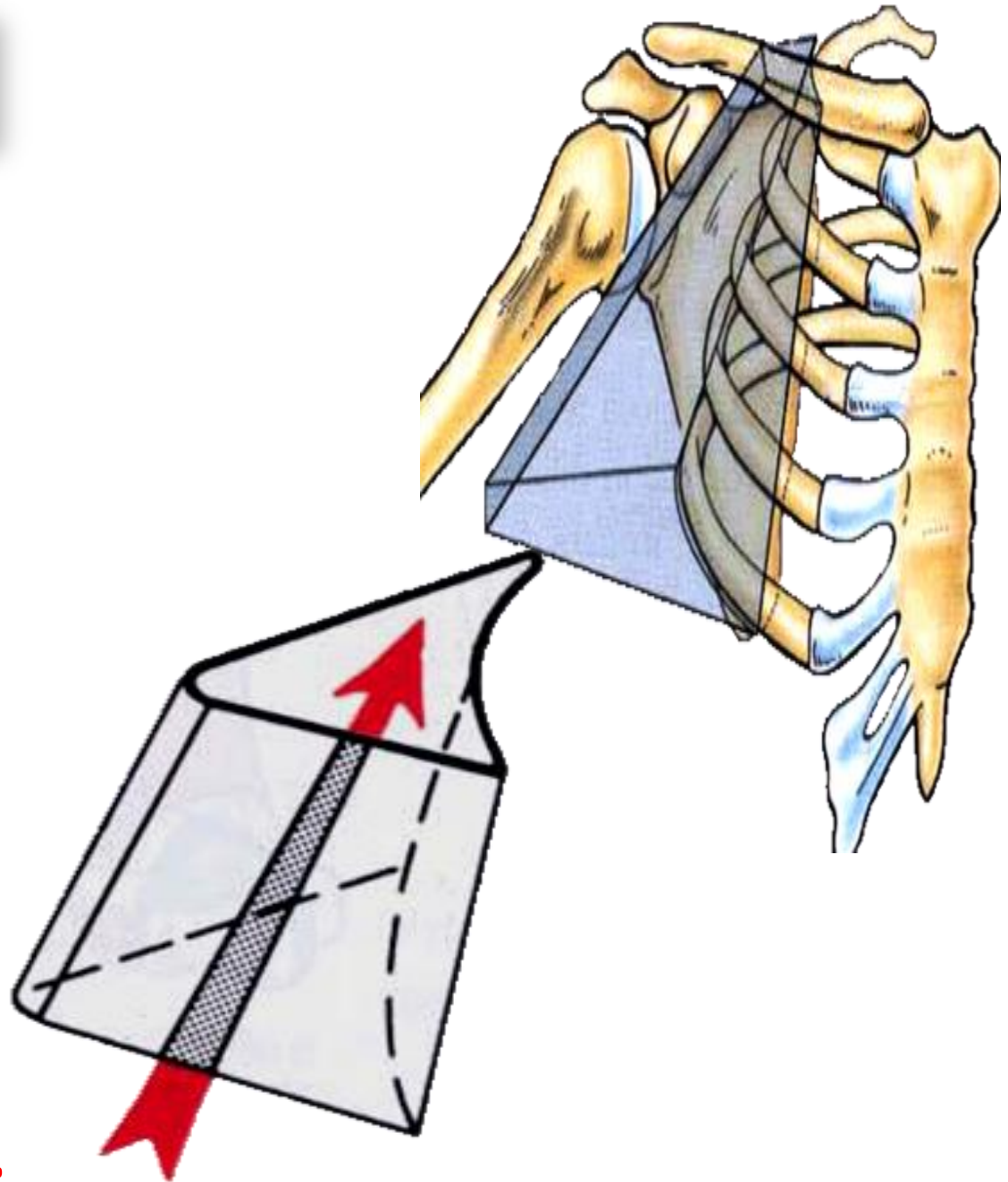
Anatomy of the Axilla

Axilla(Arm pit)



AXILLA

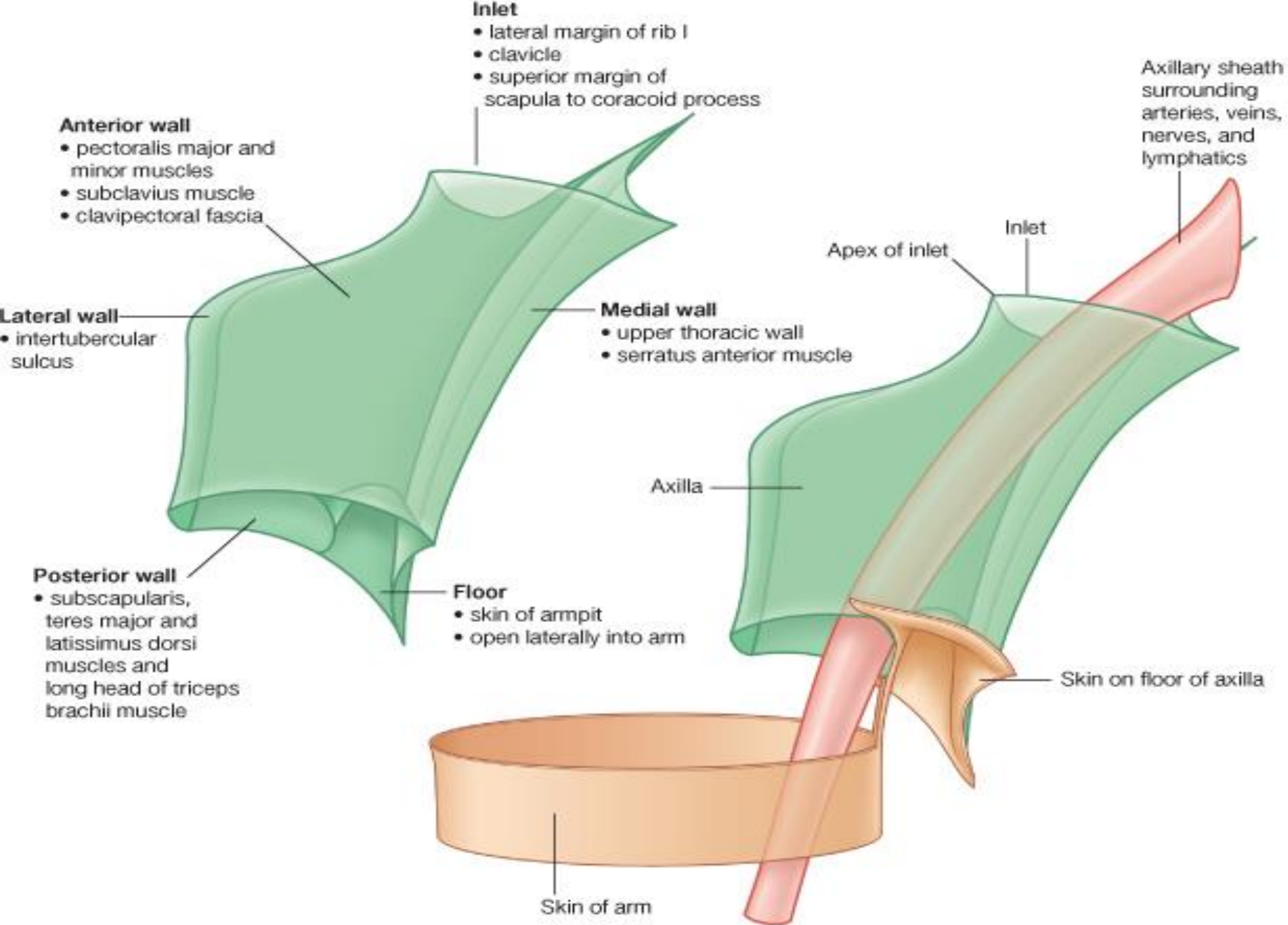
- A pyramid-shaped space between the upper part of the arm and the side of the chest through which major **neurovascular** structures pass between neck & thorax and upper limbs.
- Axilla has an **apex**, a **base** and **four walls**.



Axilla is a space

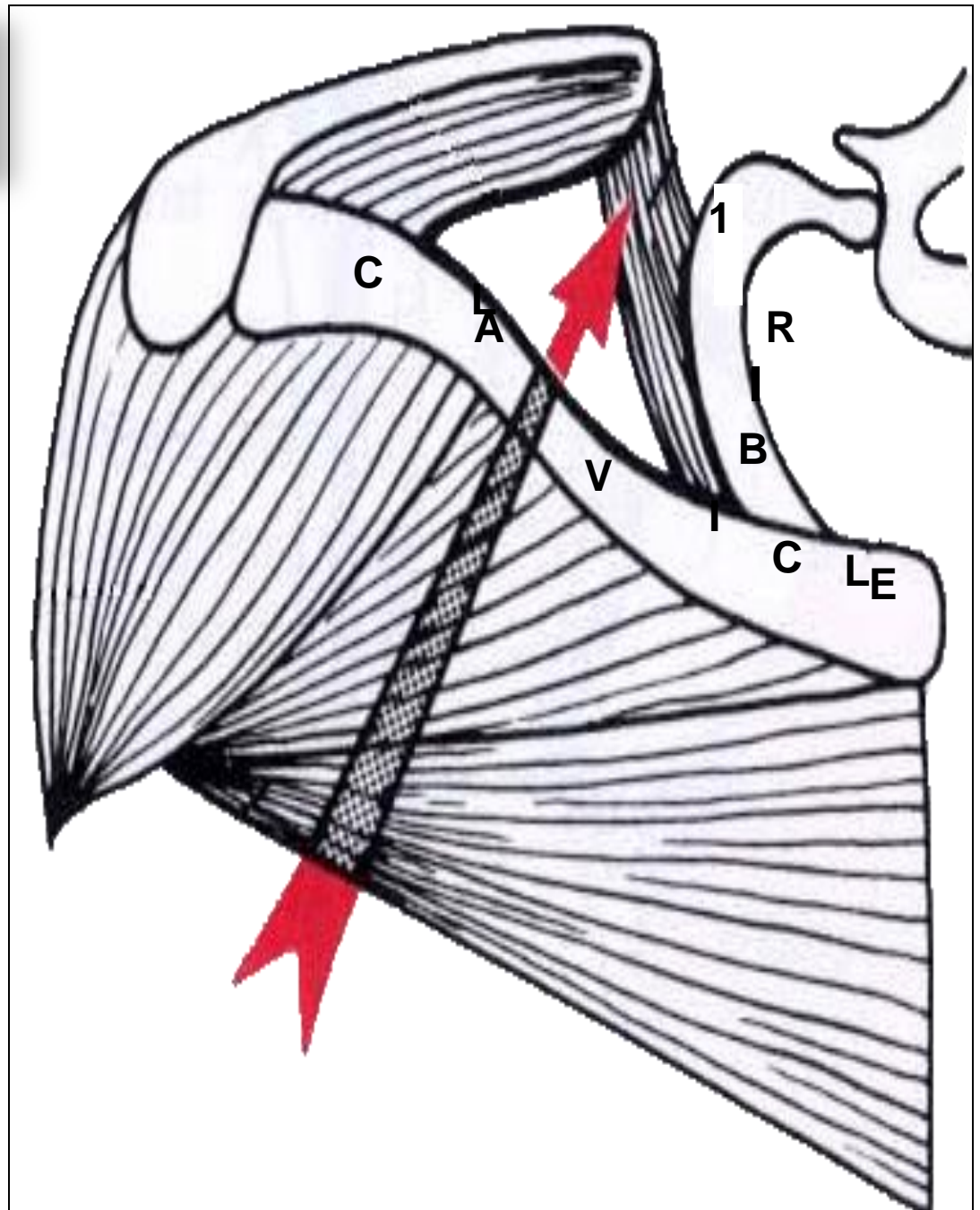
- 4 Sided pyramid
- Apex connected to the neck=Inlet
- Base Arm pit= Outlet
- Anterior wall
- Posterior wall
- Medial wall
- Lateral wall





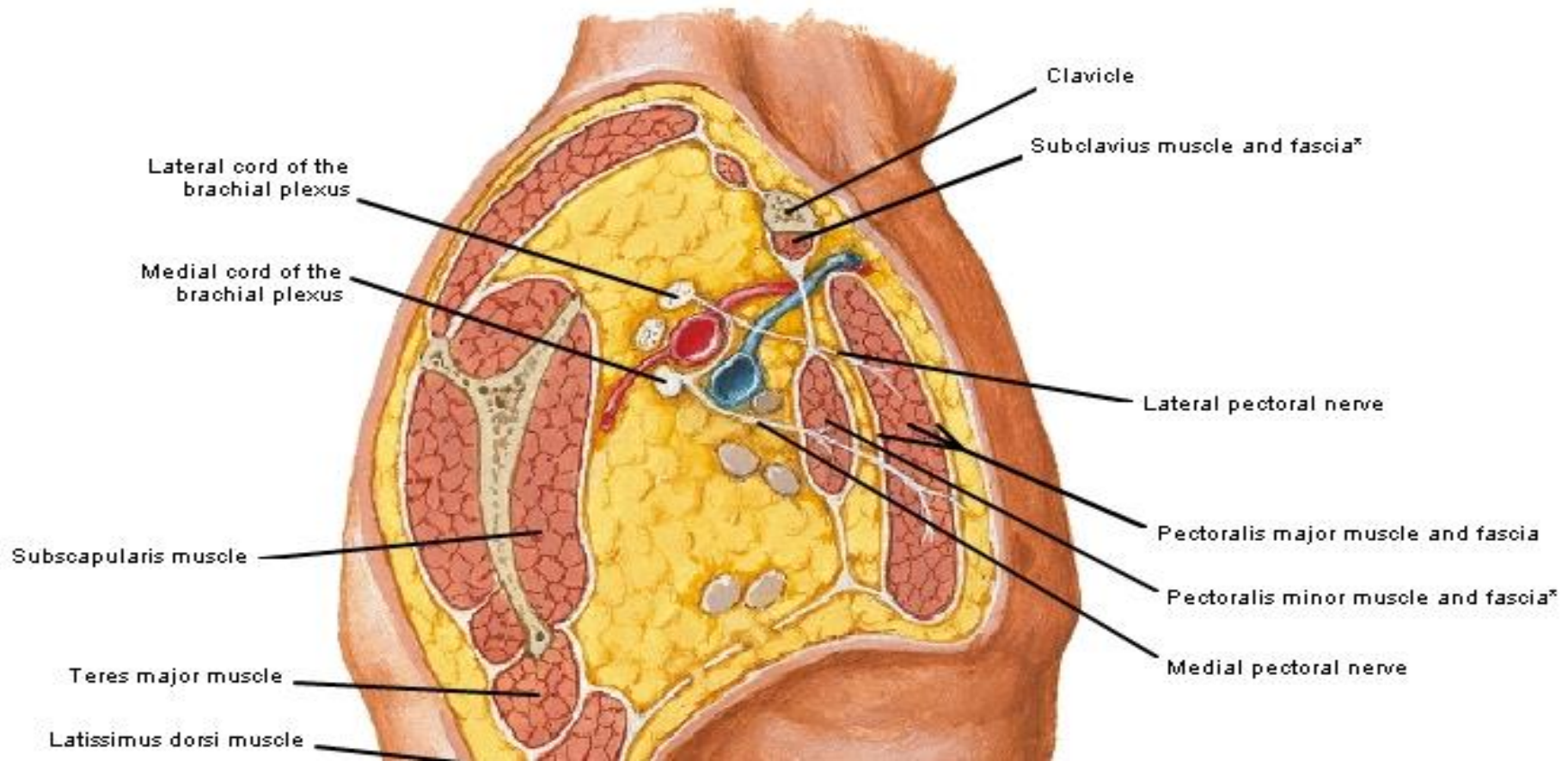
Boundaries of the Axilla

- Apex:
- Is directed upwards & medially to the root of the neck.
- It is called
 - **Cervicoaxillary canal.**
- It is bounded, by 3 bones:
 - Clavicle **anteriorly.**
 - Upper border of the scapula **posteriorly.**
 - Outer border of the first rib **medially.**



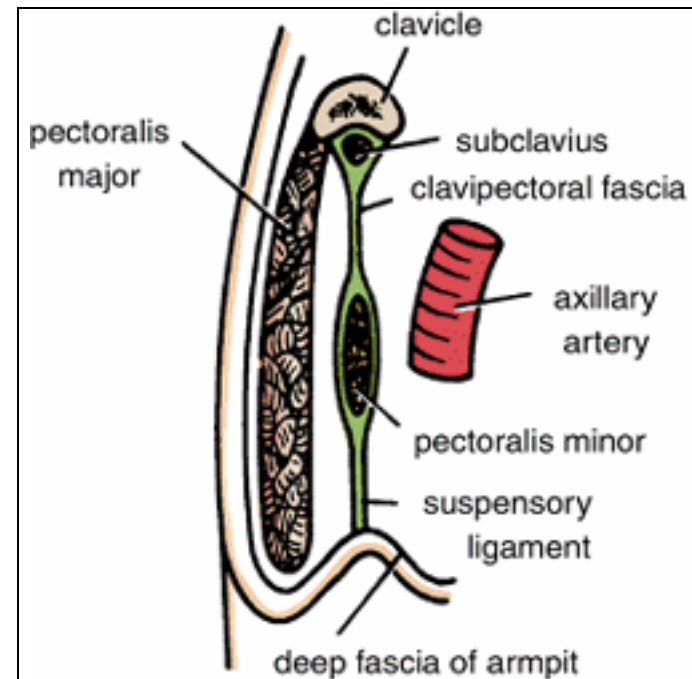
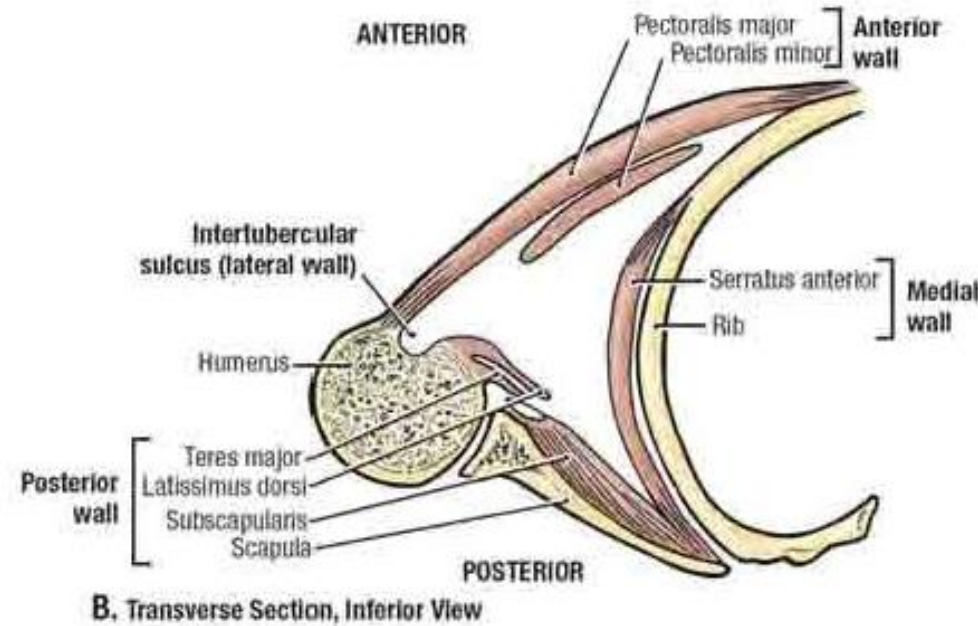
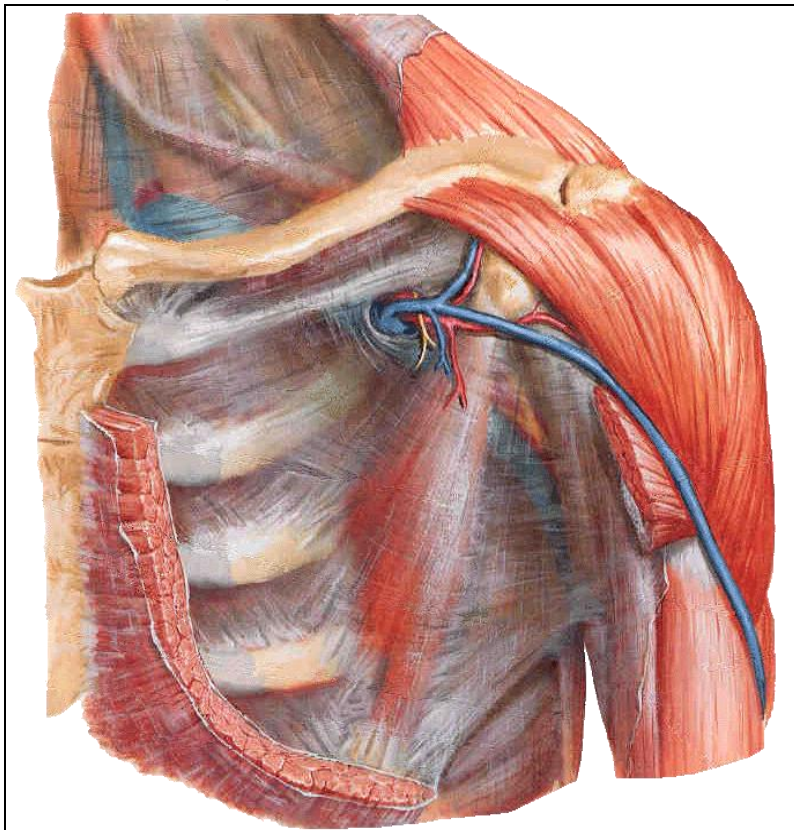
Base

- Axillary fascia and Skin of the arm pit



Anterior wall

1. Pectoralis major
2. Pectoralis minor
3. Subclavius muscles
4. Clavipectoral fascia



Pectoralis Major provides movement and support in — the front of the shoulder. The muscle has two heads; the clavicular head originates from the more midline half of the clavicle, and the sternocostal head originates from the ***manubrium and sternum*** (chest bone). This muscle inserts into the lateral lip of the intertubercular sulcus on the humerus. When the two heads of the pectoralis major act together, they flex, adduct and medially rotate the arm at the glenohumeral joint.

Clavicle

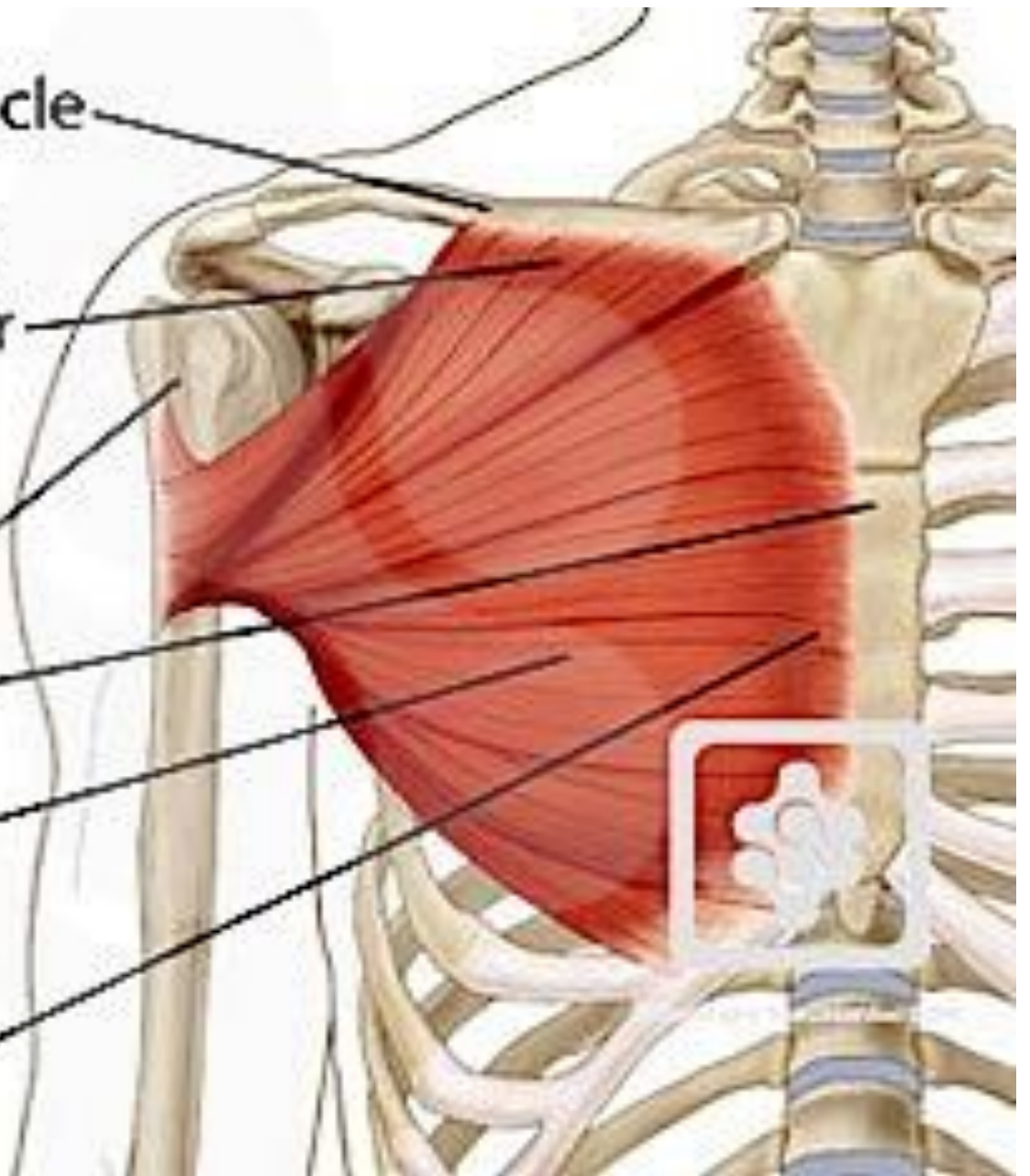
Clavicular head
of pectoralis major

Intertubercular
groove

Sternum

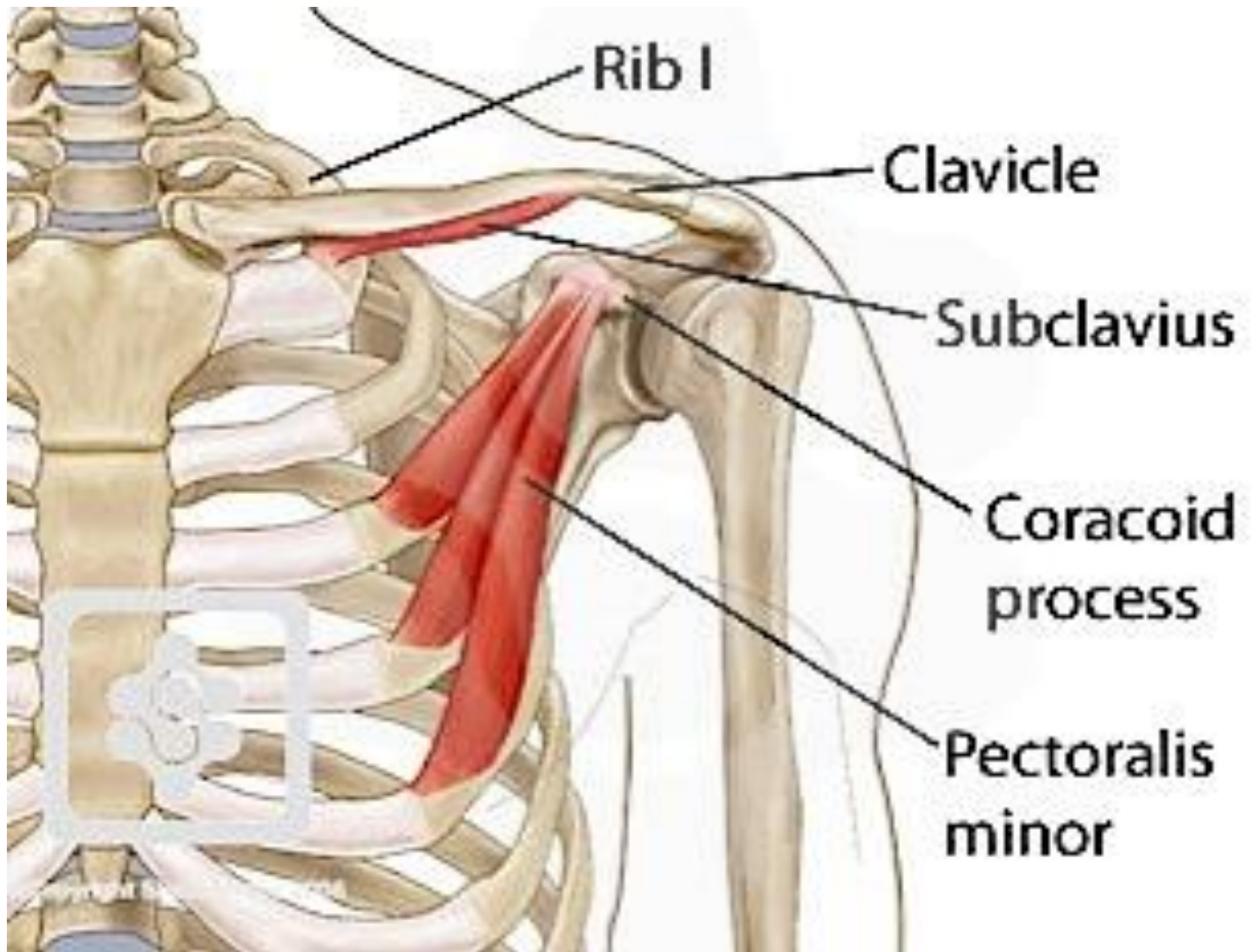
Pectoralis major

Sternal head of
pectoralis major

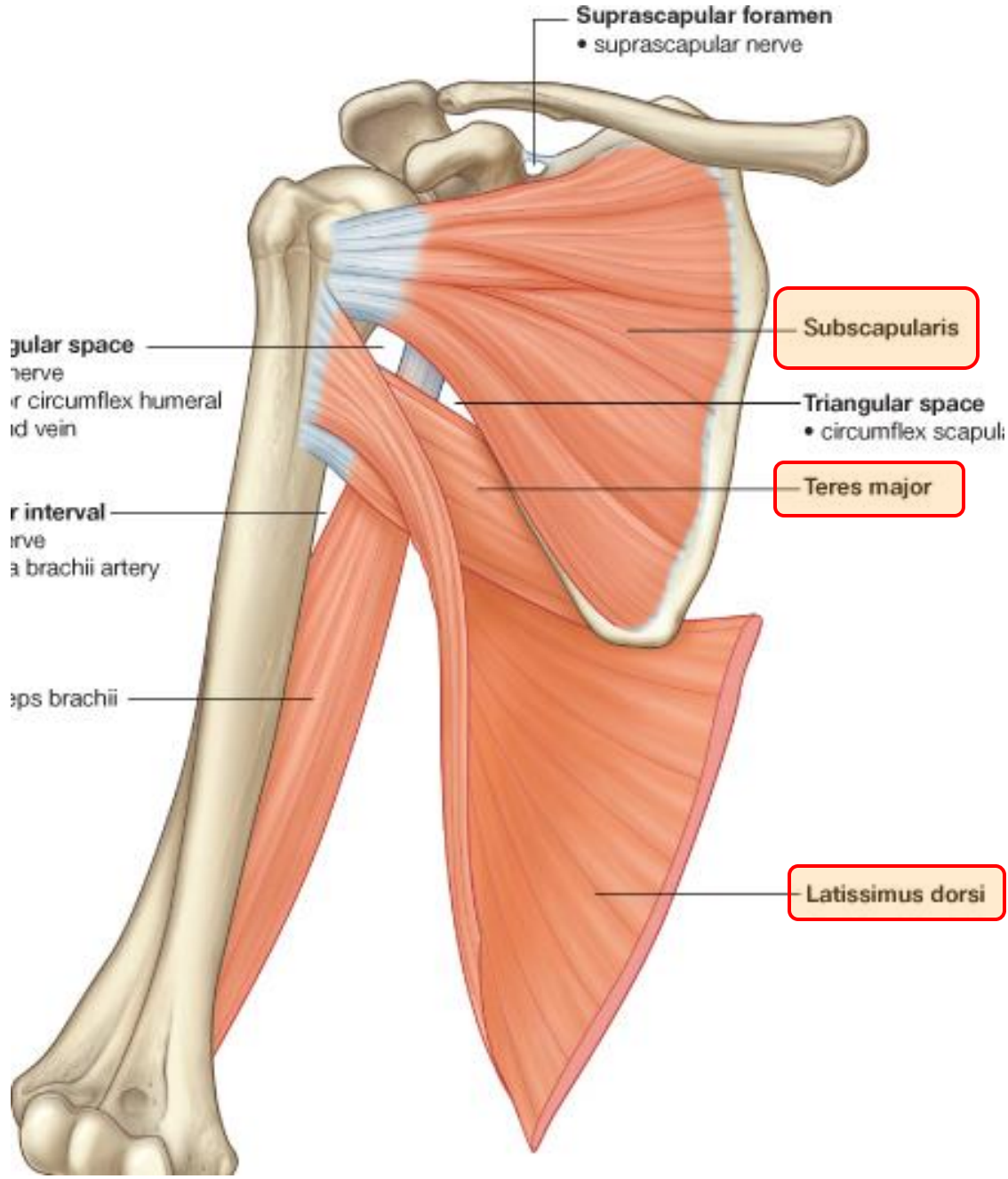


The ***pectoralis minor*** muscle is a small triangular – shaped muscle that lies deep to pectoralis major muscle and passes as three muscular slips from the thoracic wall (ribs III to V) to the coracoid process of the scapula. Pectoralis minor draws the scapula forward and downward, and raises the ribs in forced inspiration.

The ***subclavius*** muscle is a small muscle that •
lies deep to pectoralis major muscle. It passes
from rib I at the junction between the rib and
its costal cartilage to a groove on
the inferior (lower) surface of the clavicle. It
depresses the clavicle, draws the shoulder
forward and downward, and steadies the
clavicle during movements of the shoulder



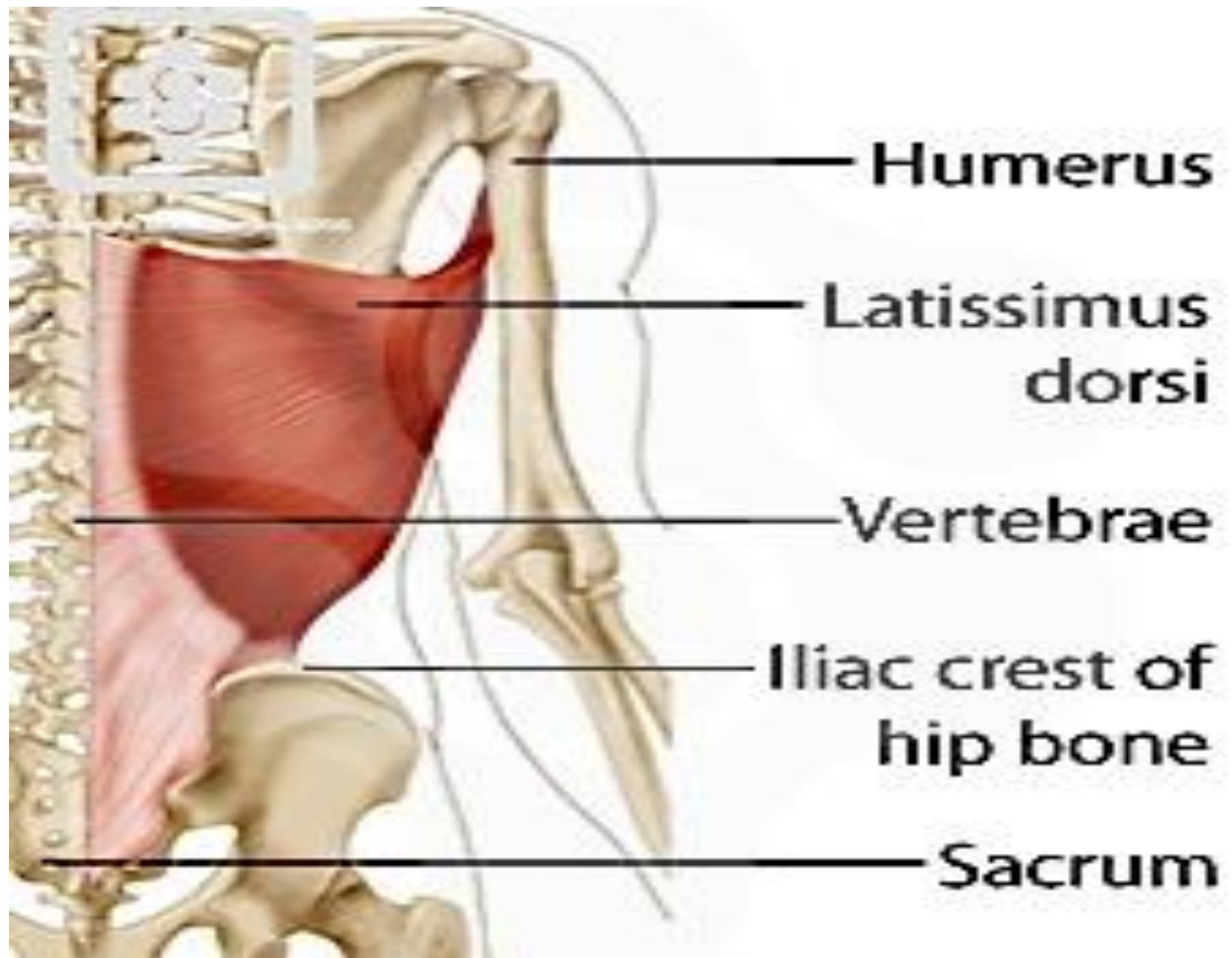
- Posterior wall:
- Is formed by:
 - **Subscapularis.**
 - **Latissimus dorsi.**
 - **Teres major muscles.**

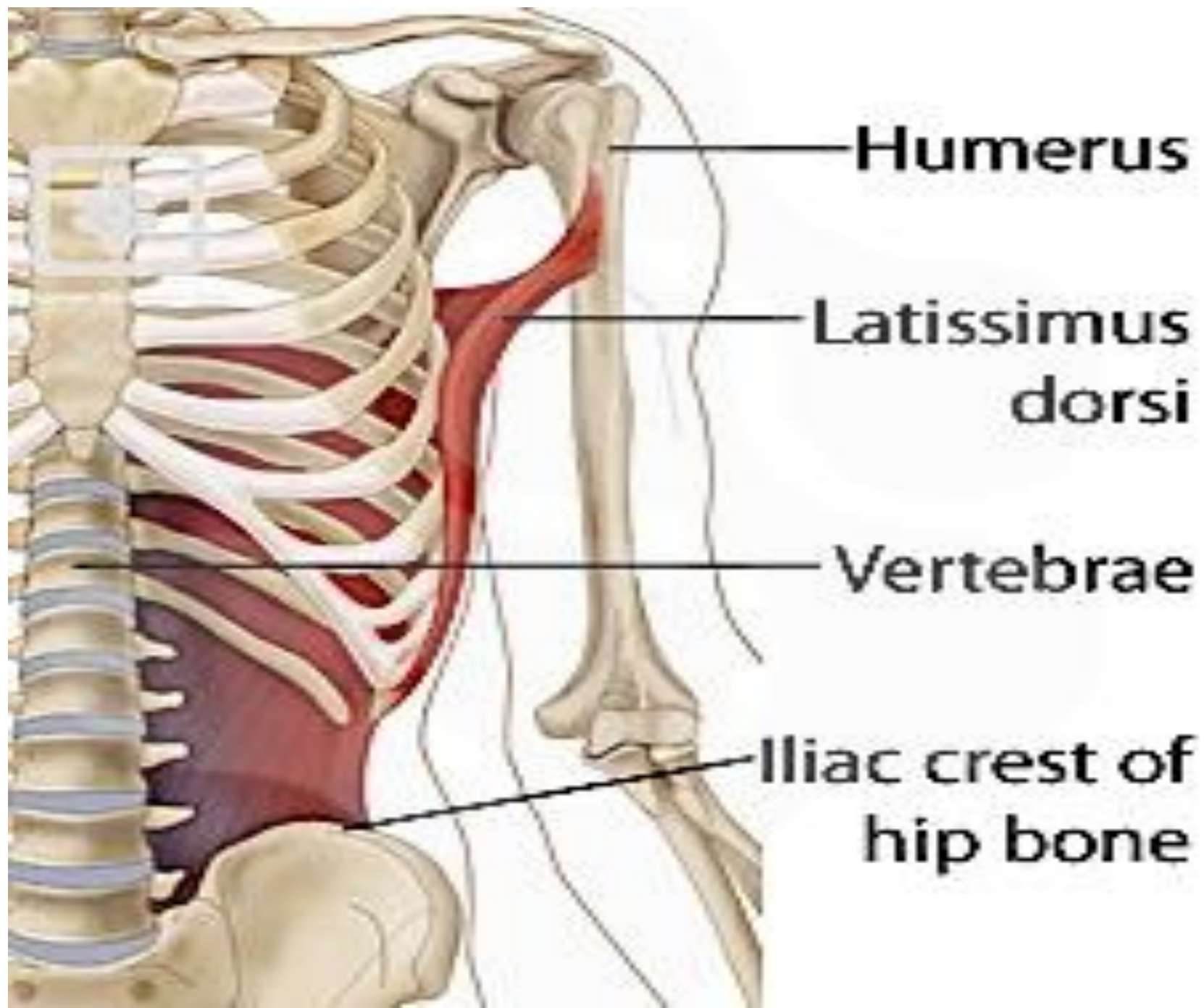


Subscapularis forms the largest component of •
the posterior wall of the axilla (area on the
body directly under the joint where the arm
connects to the shoulder). It originates from
and fills the subcapular fossa on
the anterior surface of the scapula and inserts
on the lesser tuberosity of the humerus, and
part of the capsule of the shoulder joint. This
muscle medially rotates the arm, and
stabilizes the glenohumeral joint.

Latissimus dorsi muscle originates from the •
spinous process of the lower six thoracic
vertebrae, lumbar vertebrae, sacral vertebrae,
the iliac crest of the hip bone and the lower
three or four ribs. It finally inserts on to the
bottom of the intertubercular groove.

Latissimus dorsi extends, adducts
and medially rotates the arm. It also draws the
shoulder downward and backward and keeps
the inferior angle of the scapula against the
chest wall.





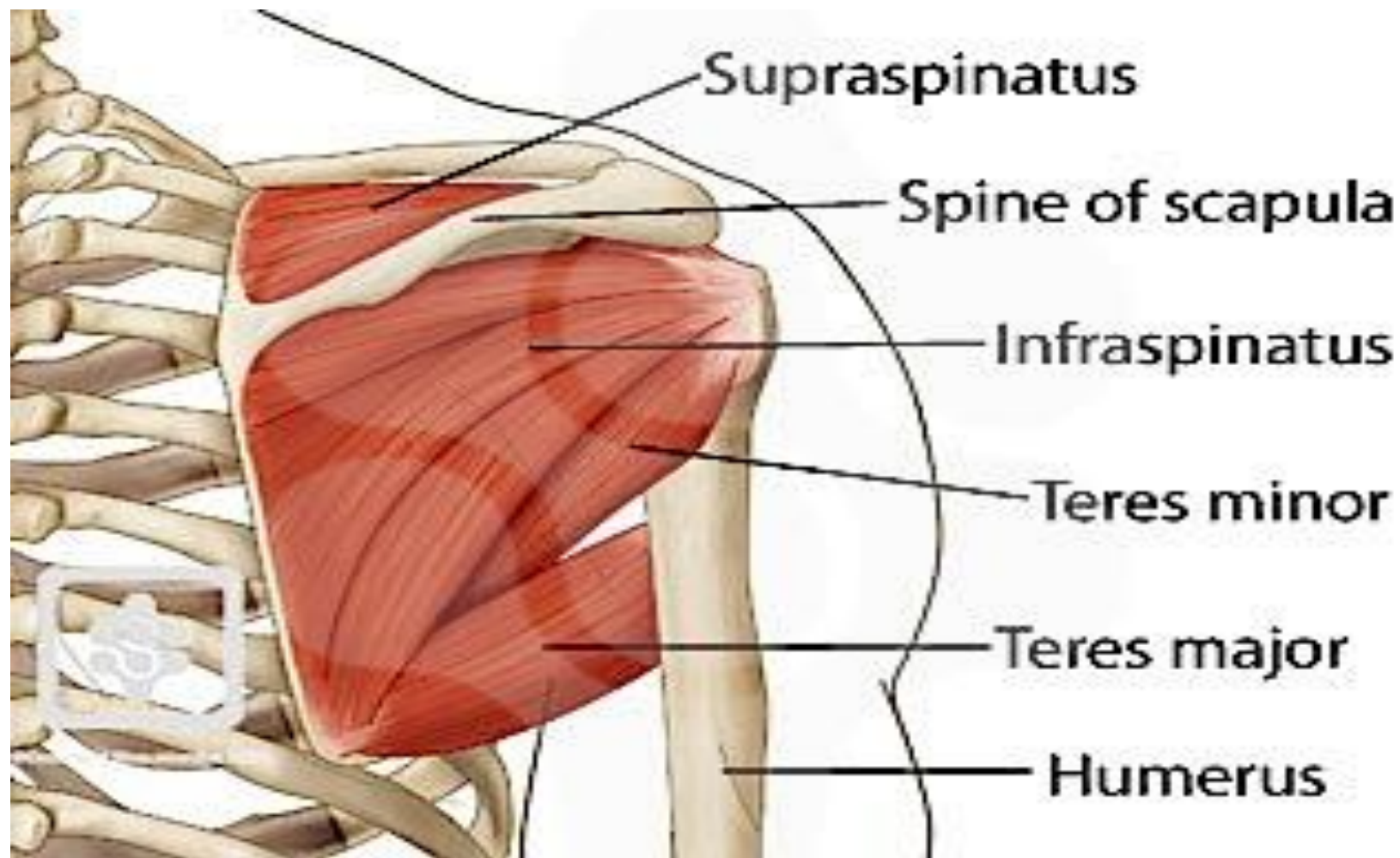
Humerus

**Latissimus
dorsi**

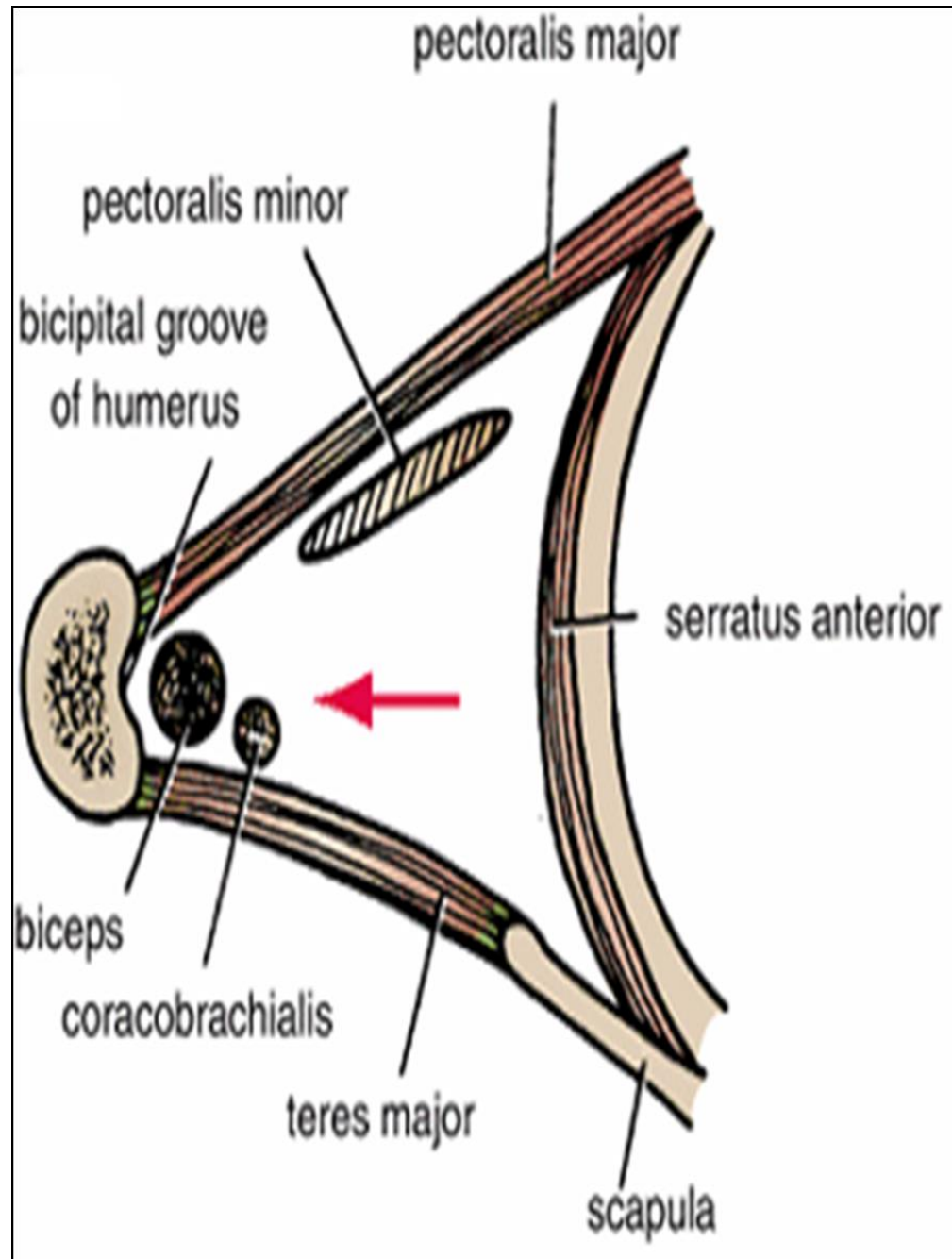
Vertebrae

**Iliac crest of
hip bone**

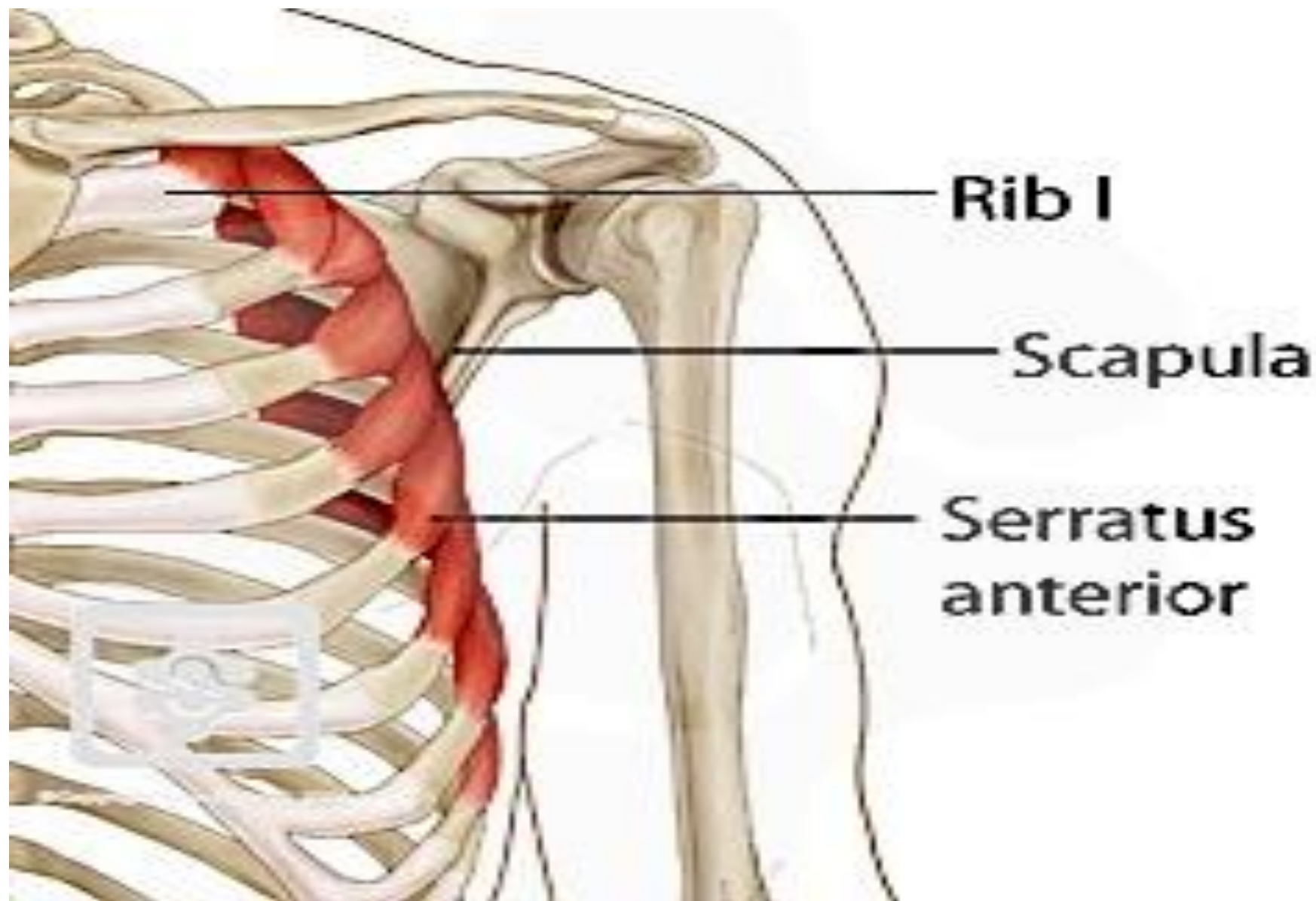
Teres major muscle originates •
from posterior surface of the inferior angle of
the scapula and attaches the medial lip of the
intertubercular sulcus which lies on
the anterior surface of the humerus. This
muscle extends and medially rotates
the humerus.

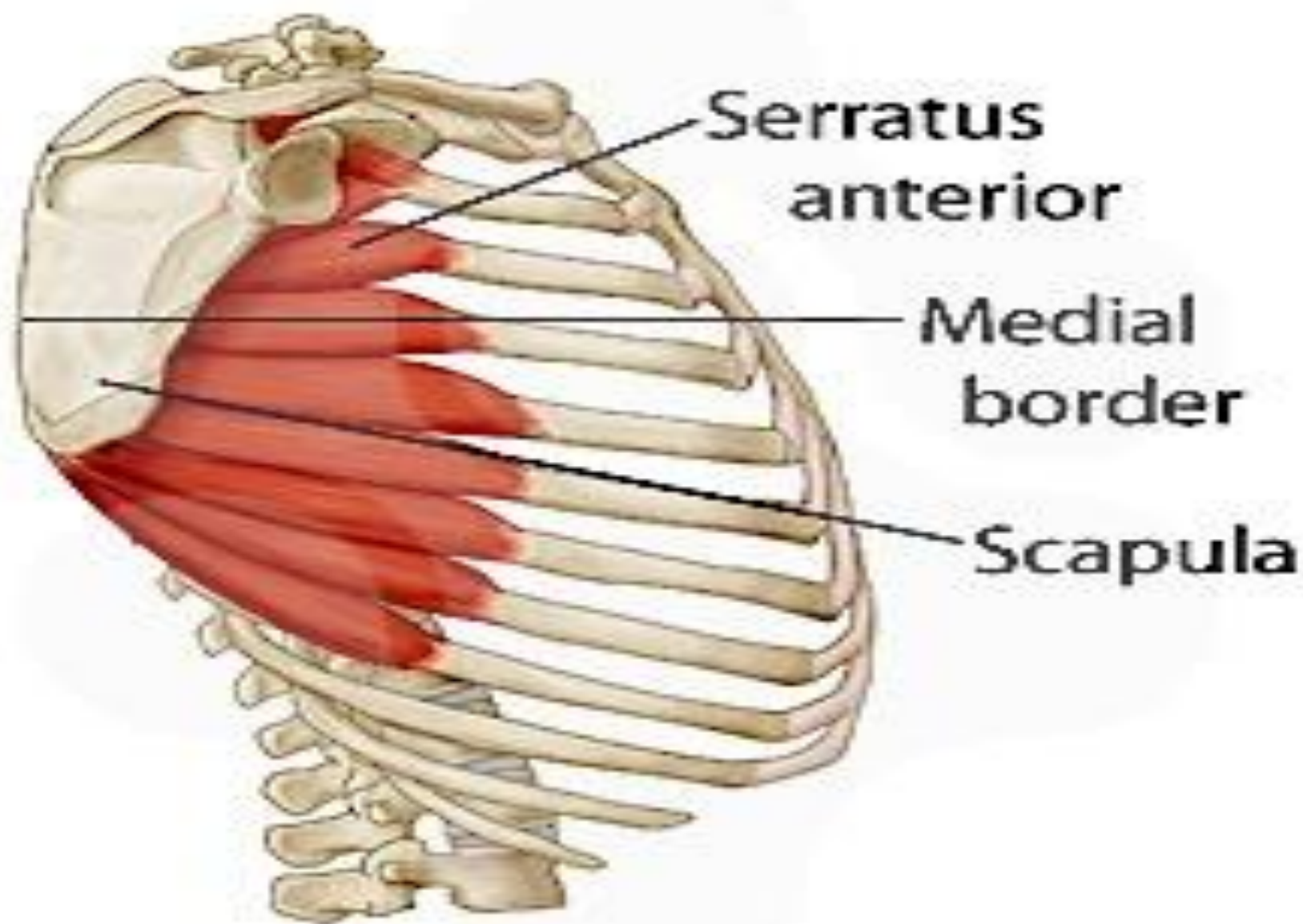


- The medial wall:
- It is wide and formed by:
 - **Serratus anterior.**
 - **Upper 4-5 ribs & Intercostal muscles .**

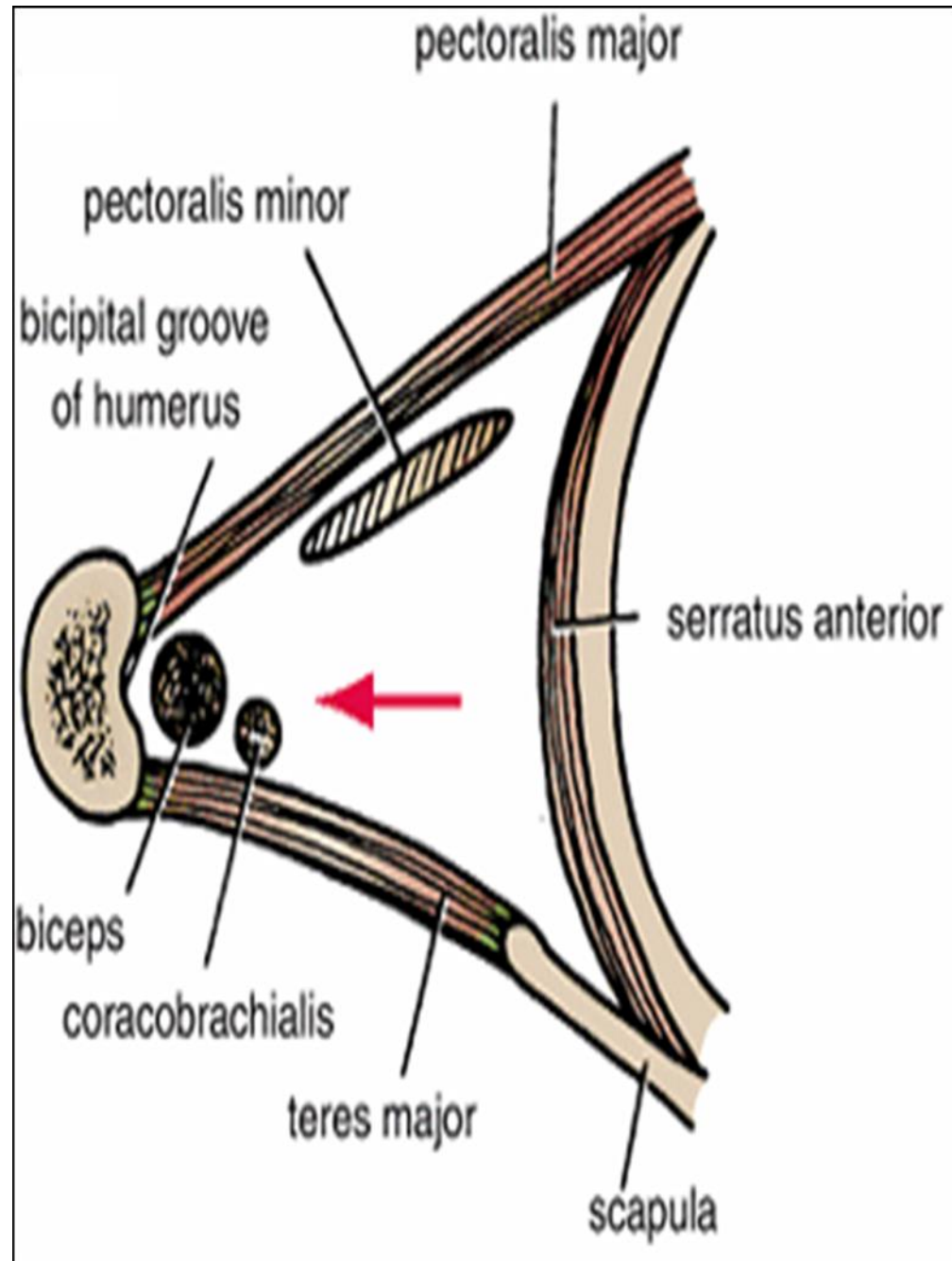


Serratus anterior muscle originates as a number — of muscular slips from the outer surfaces and superior borders of the first eight or nine ribs, and fascia covering the first intercostal spaces (spaces between each rib). They then form a flattened sheet which passes around the thoracic wall and attaches to the anterior (costal surface, that glides over the ribs) of the medial border of the scapula. The serratusanterior pulls the scapula forward of the the thoracic wall and rotates the scapula for abduction and flexion of the arm.



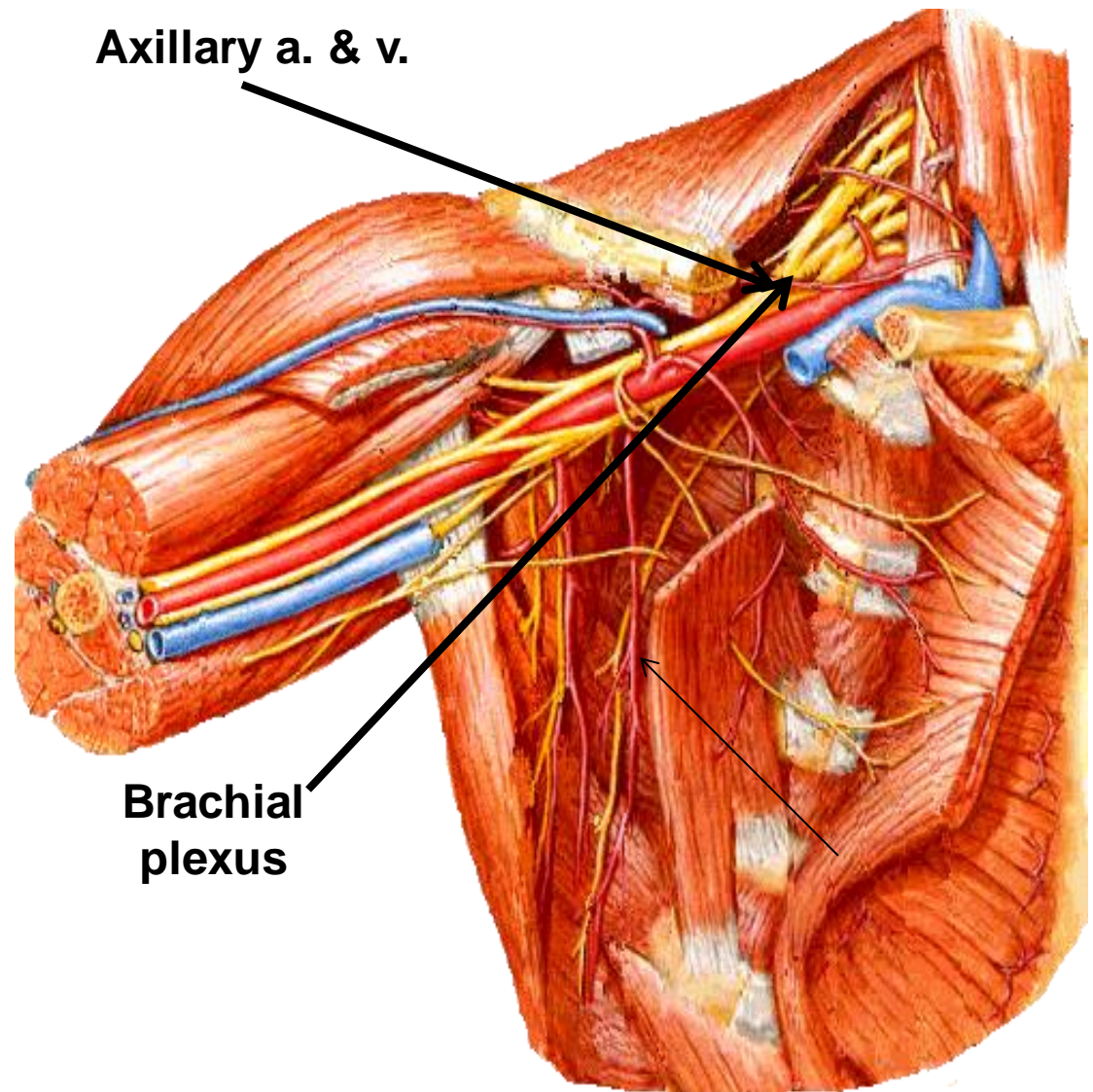


- The lateral wall:
- It is narrow and formed by:
 - **Coracobrachialis.**
 - **Biceps brachii.**
 - **Bicipital groove of the humerus.**

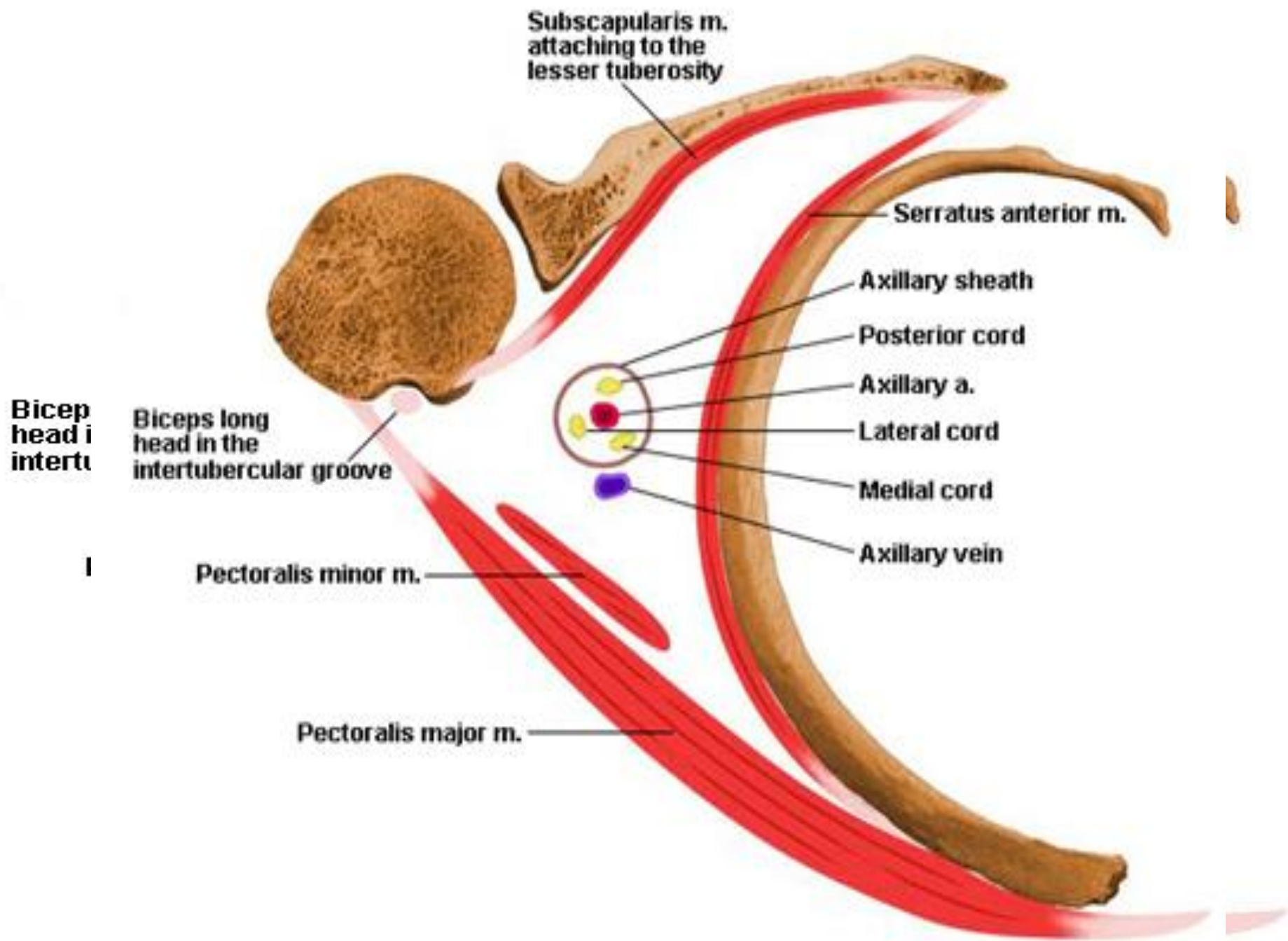


Contents of The Axilla

- Cords and branches of the brachial plexus
- Axillary artery and its branches.
- Axillary vein and its tributaries.
- Axillary lymph nodes.
- Axillary lymphatic vessels
- Axillary fat.
- Loose connective tissue.

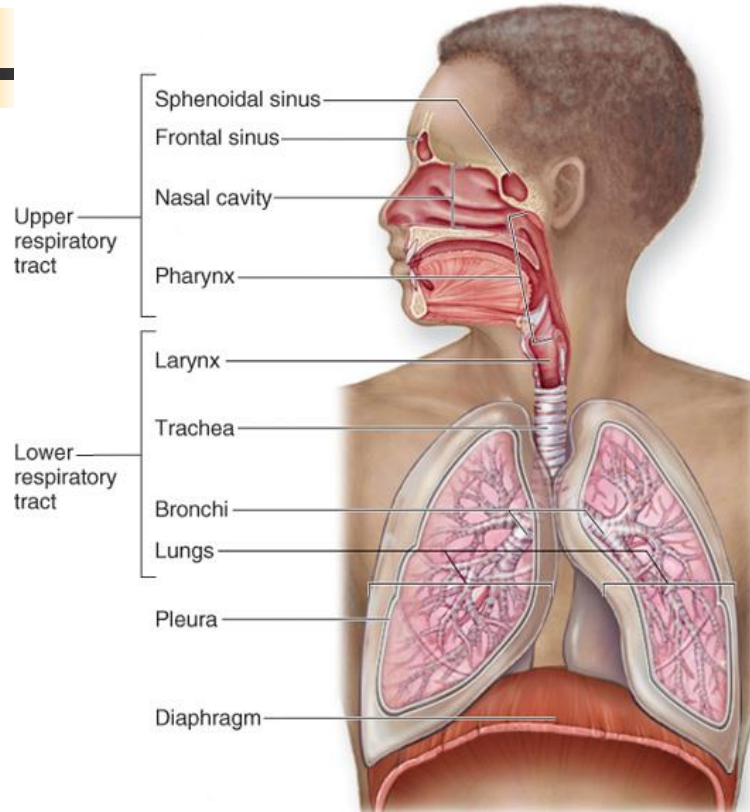


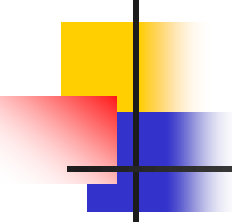
The neurovascular bundle is enclosed in connective tissue sheath, called '**axillary sheath**'



RESPIRATORY SYSTEM ANATOMY

Copyright © The McGraw-Hill Companies, Inc. Permission required for reproduction or display.





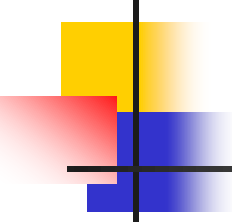
Organization and Functions of the Respiratory System

Structural classifications:

- upper respiratory tract
- lower respiratory tract.

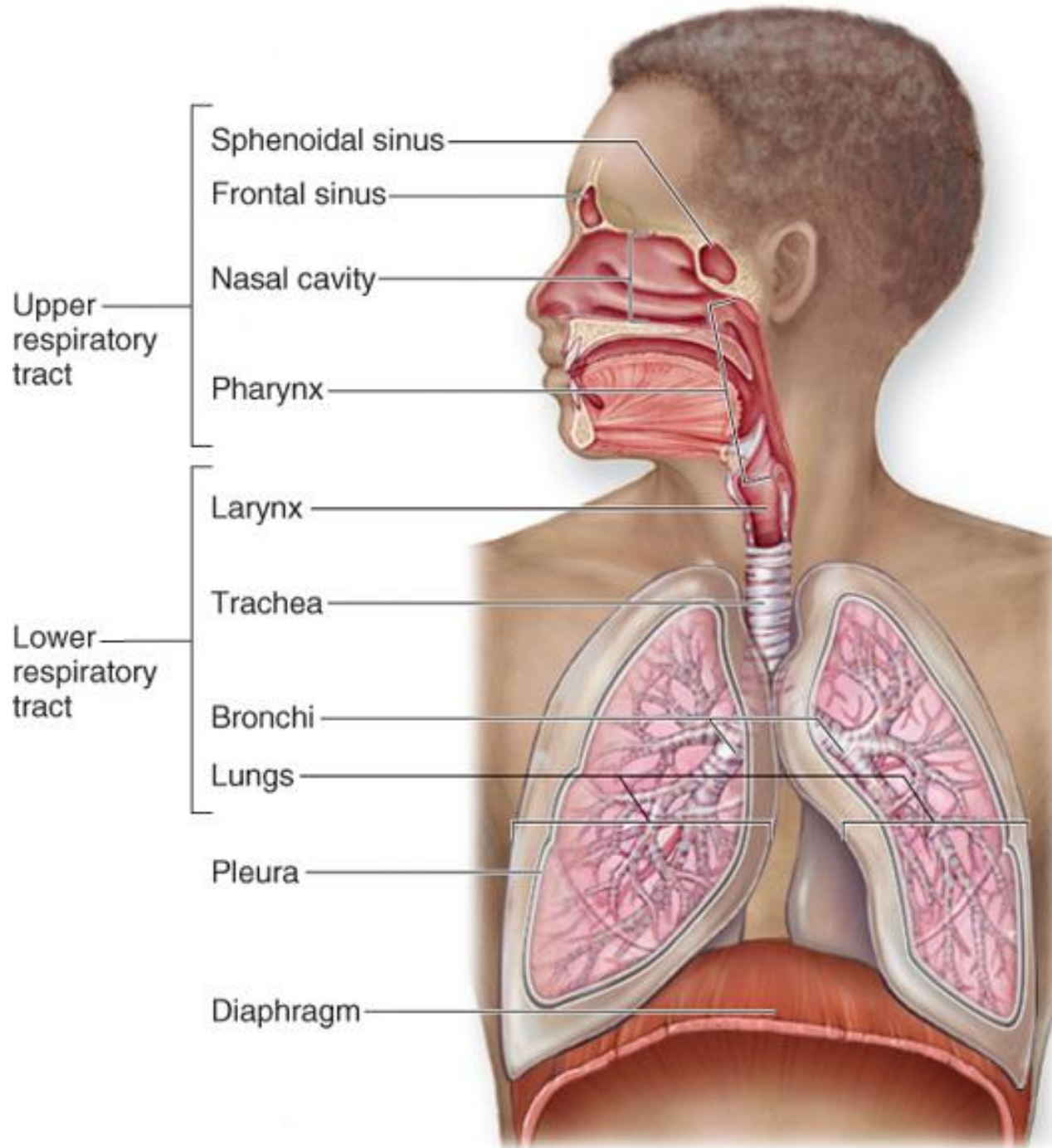
■ Functional classifications:

- **Conducting** portion: transports air.
 - Nose
 - nasal cavity
 - Pharynx
 - Larynx
 - Trachea
 - progressively smaller airways, from the primary bronchi to the bronchioles



Organization and Functions of the Respiratory System

- Functional classifications: continued
 - **Conducting** portion: transports air.
 - **Respiratory** portion: carries out gas exchange.
 - respiratory bronchioles
 - alveolar ducts
 - air sacs called alveoli
- Upper respiratory tract is all conducting
- Lower respiratory tract has both conducting and respiratory portions





Respiratory System Functions

- Breathing (pulmonary ventilation):
 - consists of two cyclic phases:
 - inhalation, also called inspiration
 - exhalation, also called expiration
 - Inhalation draws gases into the lungs.
 - Exhalation forces gases out of the lungs.
- Gas exchange: O₂ and CO₂
 - External respiration
 - External environment and blood
 - Internal respiration
 - Blood and cells



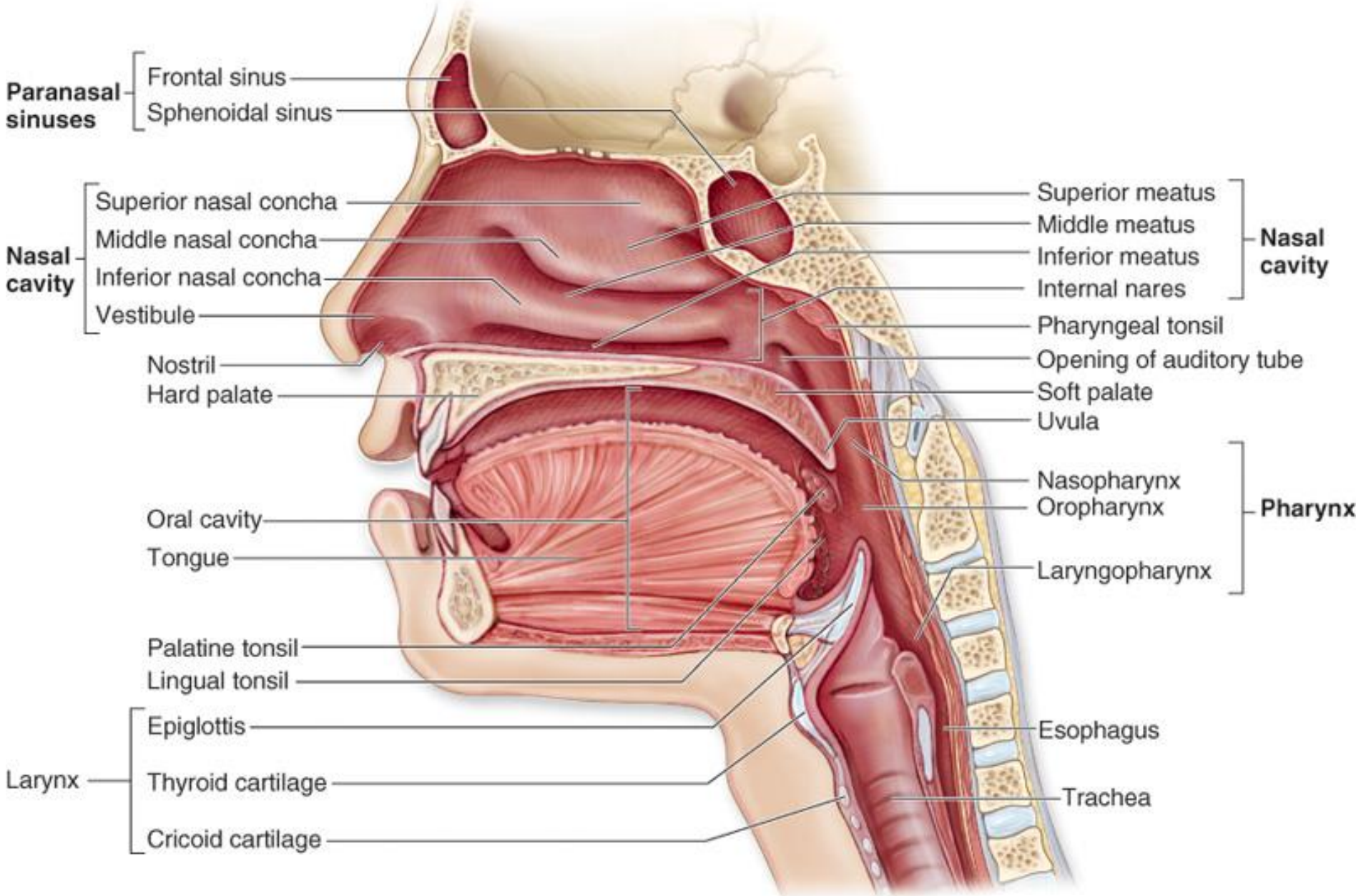
Respiratory System Functions

- Gas conditioning:
 - Warmed
 - Humidified
 - Cleaned of particulates
- Sound production:
 - Movement of air over true vocal cords
 - Also involves nose, paranasal sinuses, teeth, lips and tongue
- Olfaction:
 - Olfactory epithelium over superior nasal conchae
- Defense:
 - Course hairs, mucus, lymphoid tissue



Upper Respiratory Tract

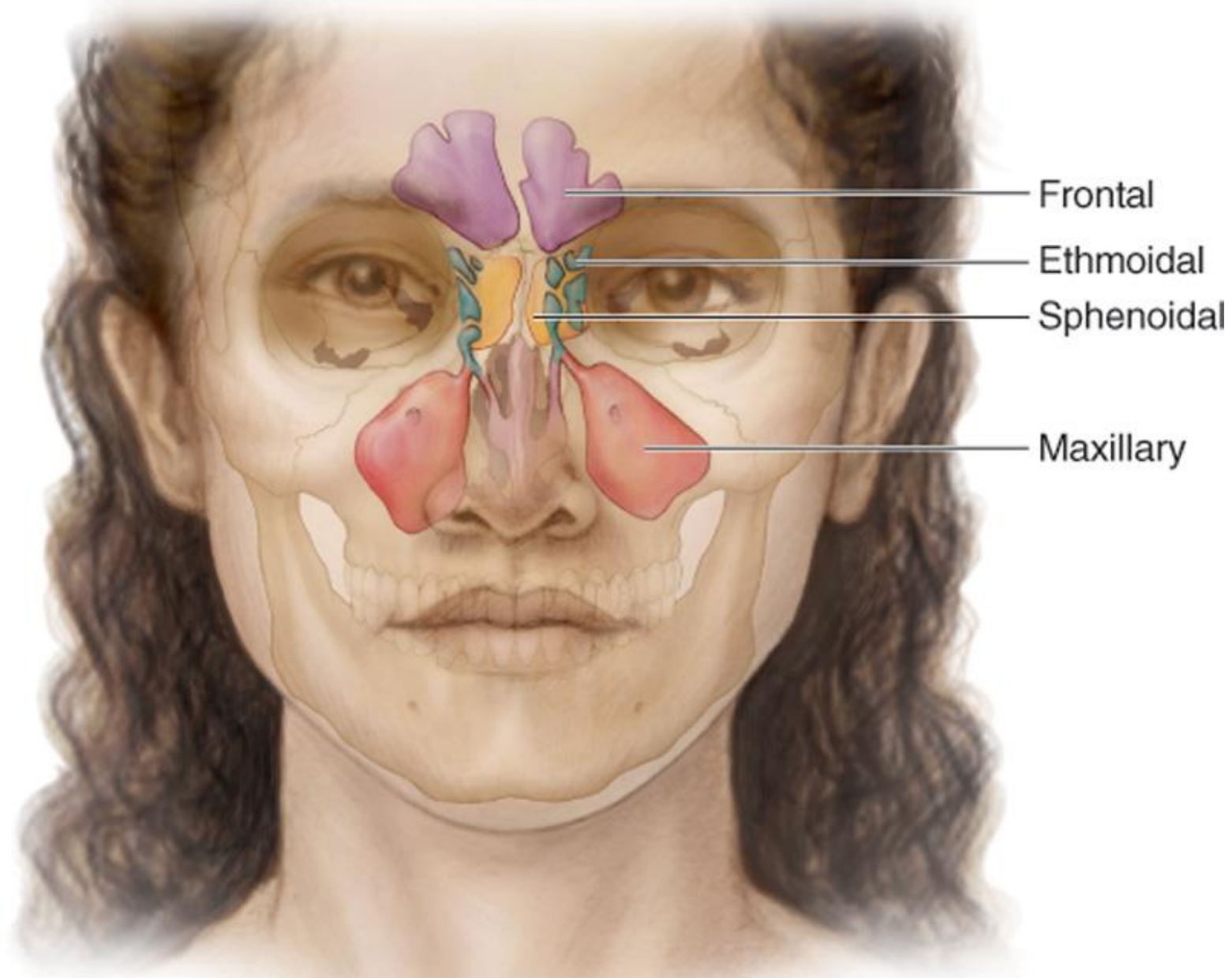
- Composed of
 - the nose
 - the nasal cavity
 - the paranasal sinuses
 - the pharynx (throat)
 - and associated structures.
- All part of the **conducting** portion of the respiratory system.





Paranasal Sinuses

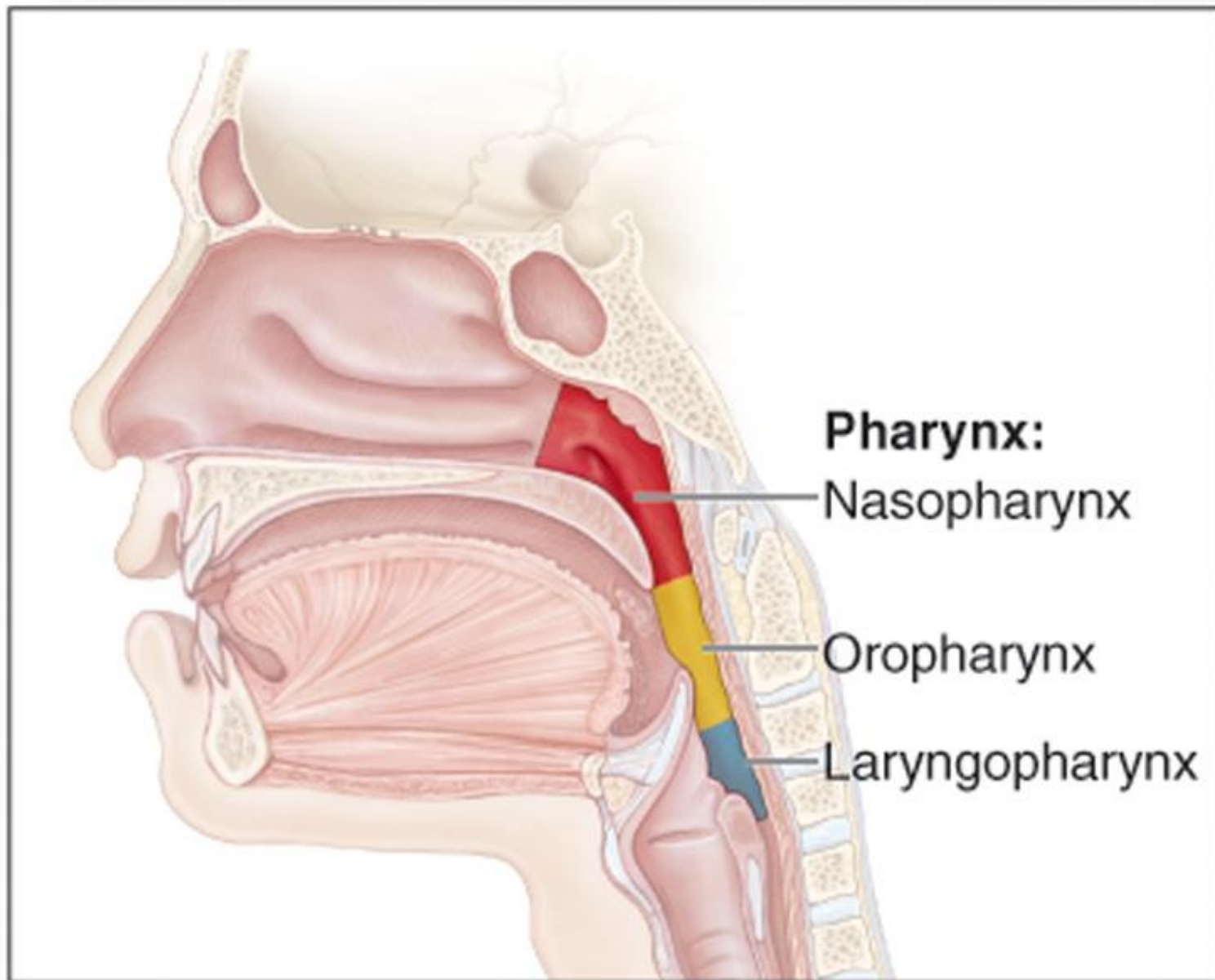
- Paranasal sinuses:
 - In four skull bones
 - paired air spaces
 - decrease skull bone weight
- Named for the bones in which they are housed.
 - frontal
 - ethmoidal
 - sphenoidal
 - maxillary
- Communicate with the nasal cavity by ducts.
- Covered with the same pseudostratified ciliated columnar epithelium as the nasal cavity.





Pharynx

- Common to both the respiratory and digestive systems.
- Commonly called the **throat**.
- Funnel-shaped
 - slightly wider superiorly and narrower inferiorly.
- Originates posterior to the nasal and oral cavities
- Extends inferiorly near the level of the bifurcation of the larynx and esophagus.
- Common pathway for both air and food.



(b) Regions of pharynx



Pharynx

- Walls:
 - lined by a mucosa
 - contain skeletal muscles primarily used for **swallowing**.
- Flexible lateral walls
 - distensible
 - to force swallowed food into the esophagus.
- Partitioned into three adjoining regions:
 - **nasopharynx**
 - **oropharynx**
 - **laryngopharynx**



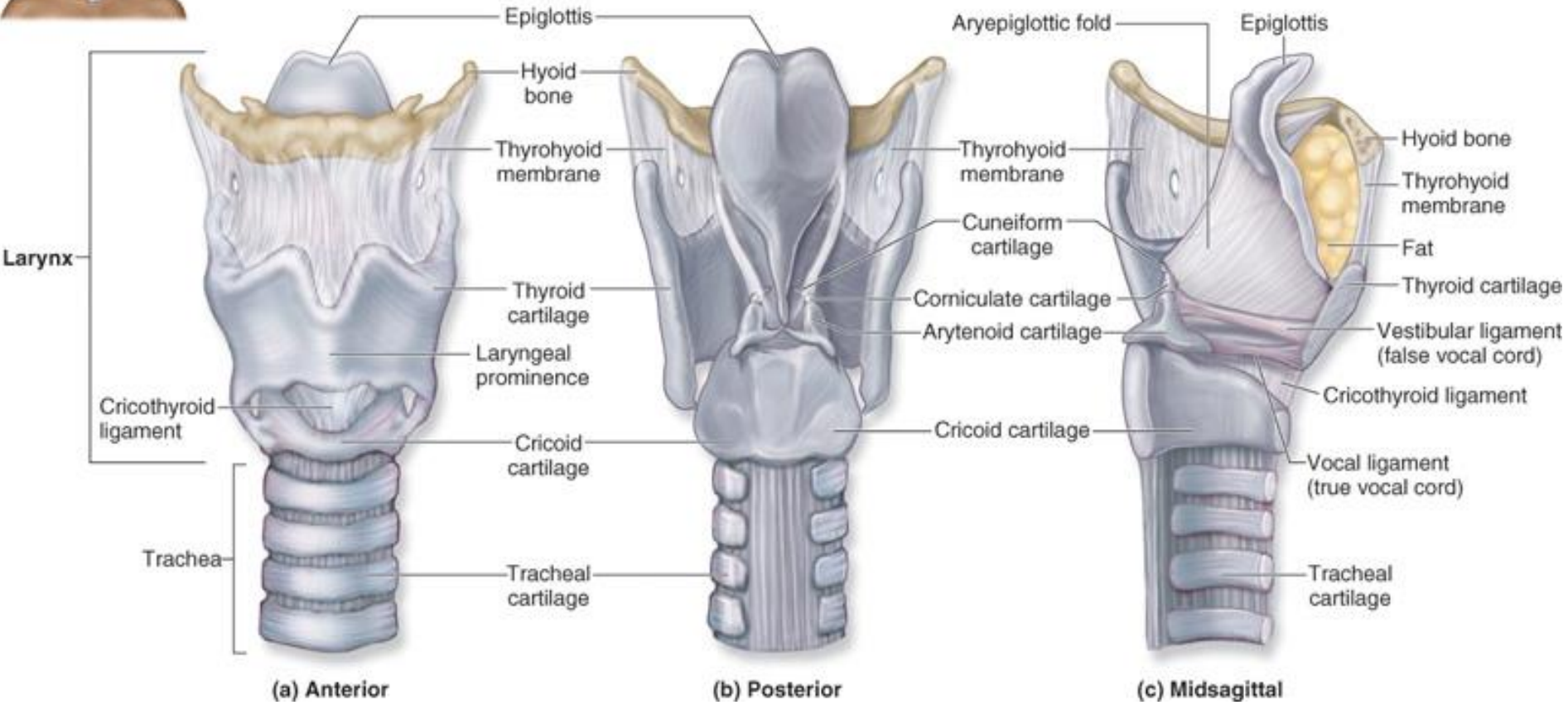
Lower Respiratory Tract

- Conducting portion
 - Larynx
 - Trachea
 - Bronchi
 - bronchioles and their associated structures
- Respiratory portion of the respiratory system
 - respiratory bronchioles
 - alveolar ducts
 - alveoli



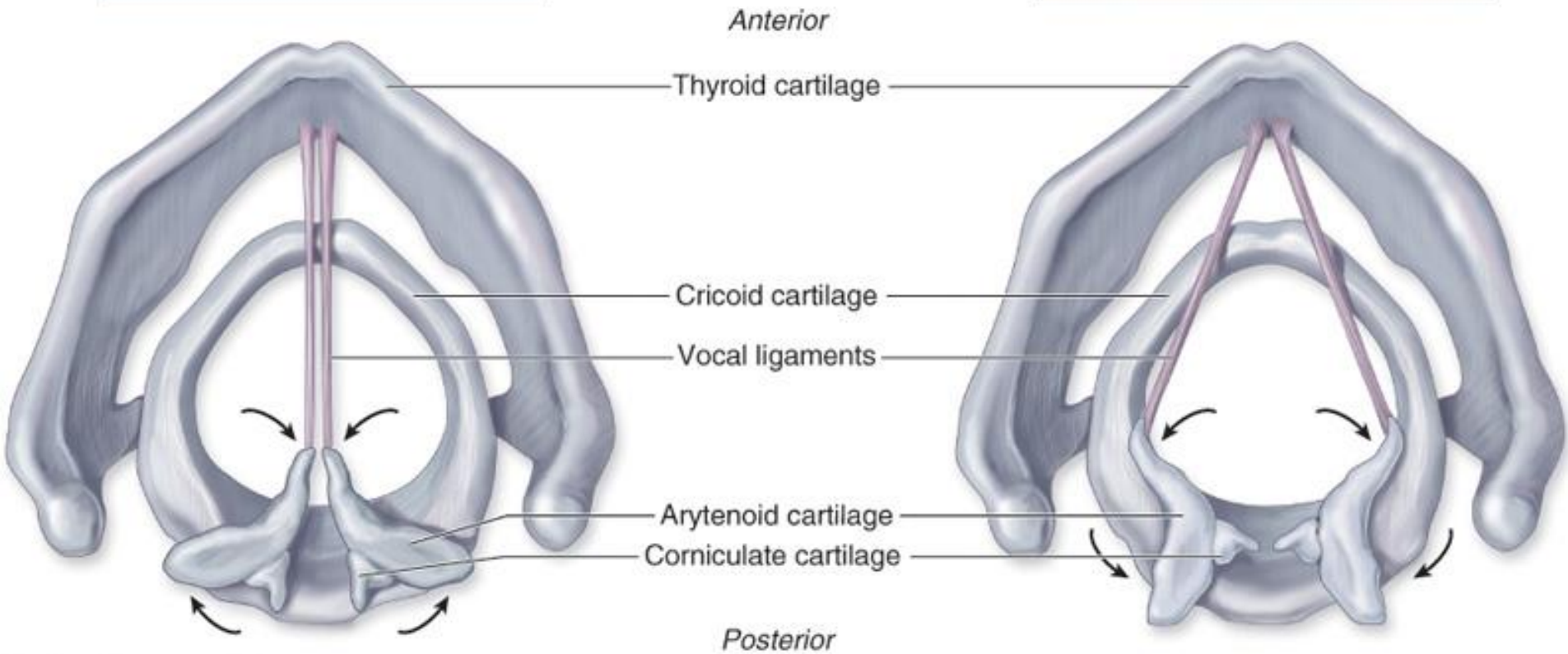
Larynx

- Short, somewhat cylindrical airway
- Location:
 - bounded posteriorly by the laryngopharynx,
 - inferiorly by the trachea.
- Prevents swallowed materials from entering the lower respiratory tract.
- Conducts air into the lower respiratory tract.
- Produces sounds.



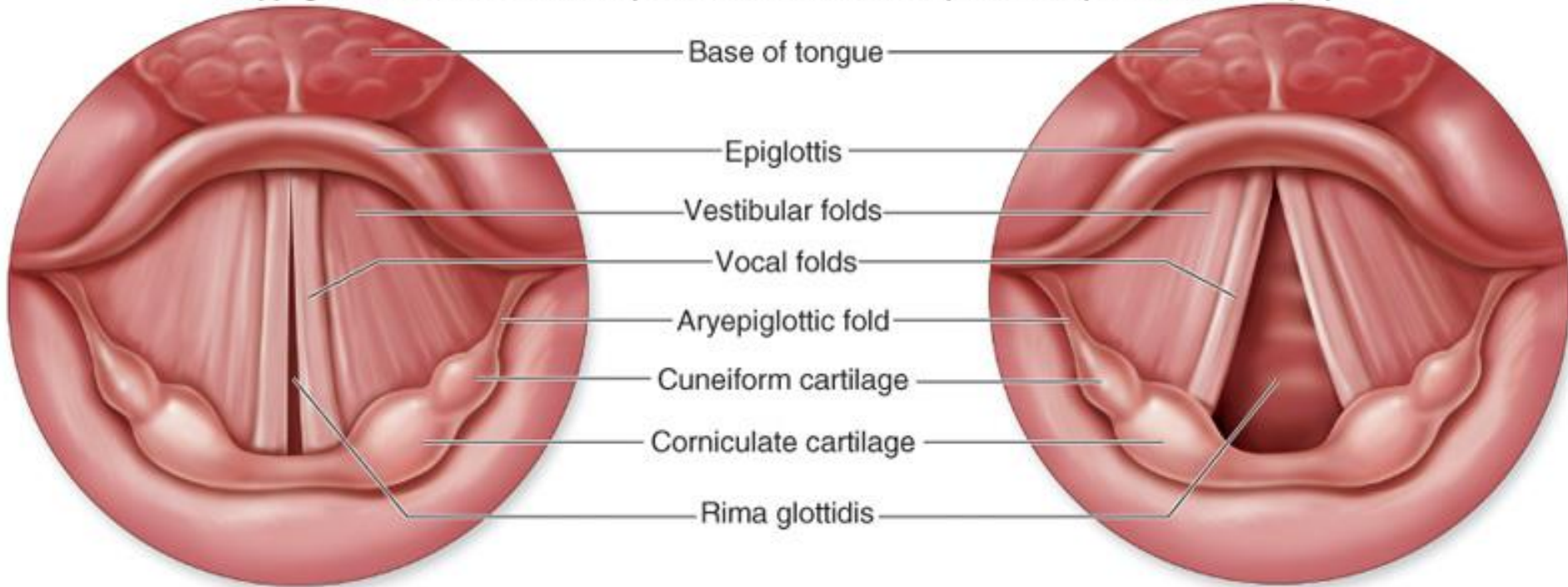
Adducted (closed) vocal folds

Abducted (open) vocal folds



(a) Cartilages and ligaments

Copyright © The McGraw-Hill Companies, Inc. Permission required for reproduction or display.



(b) Laryngoscope view

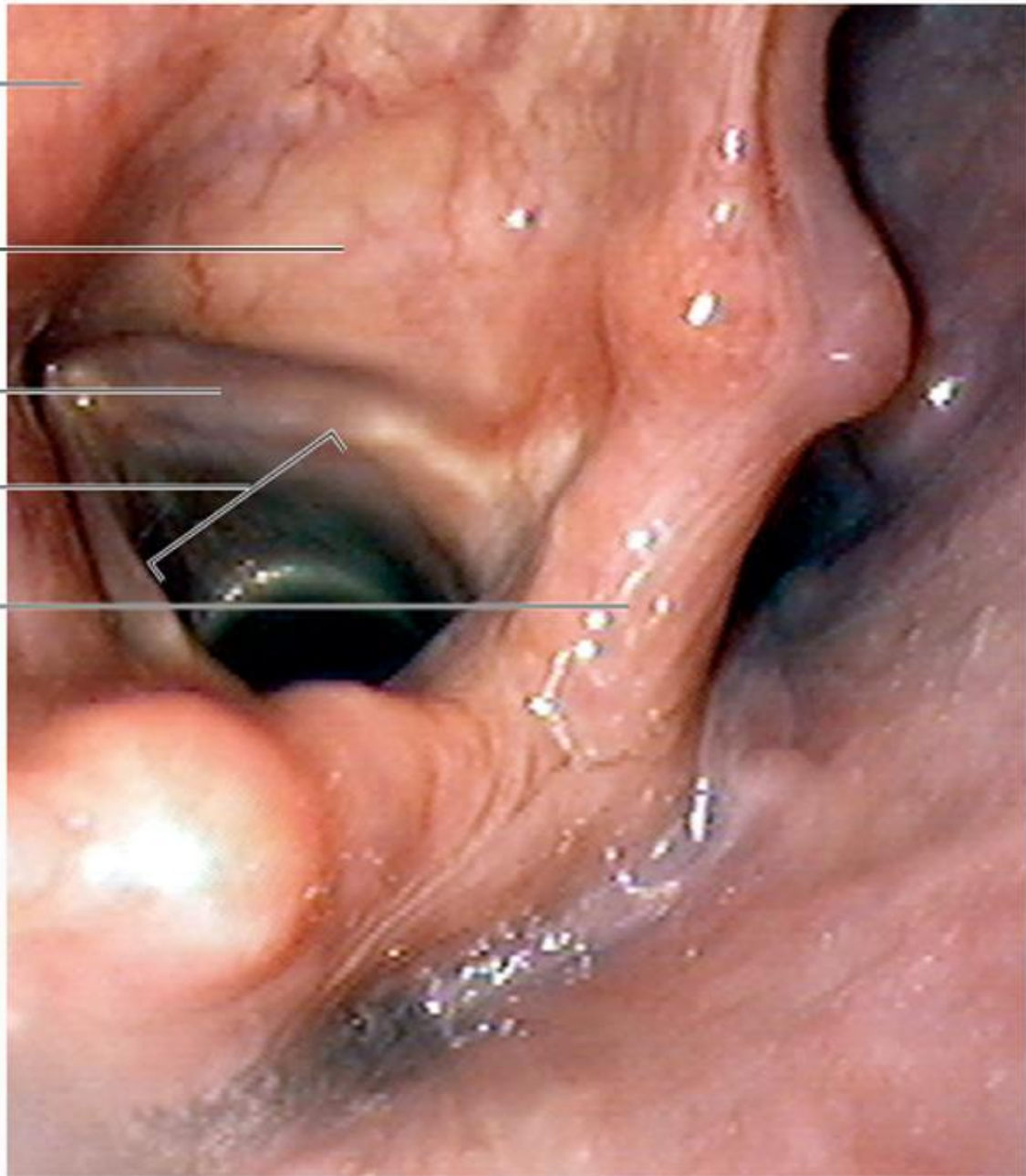
Epiglottis

Vestibular fold

Vocal fold

Rima glottidis

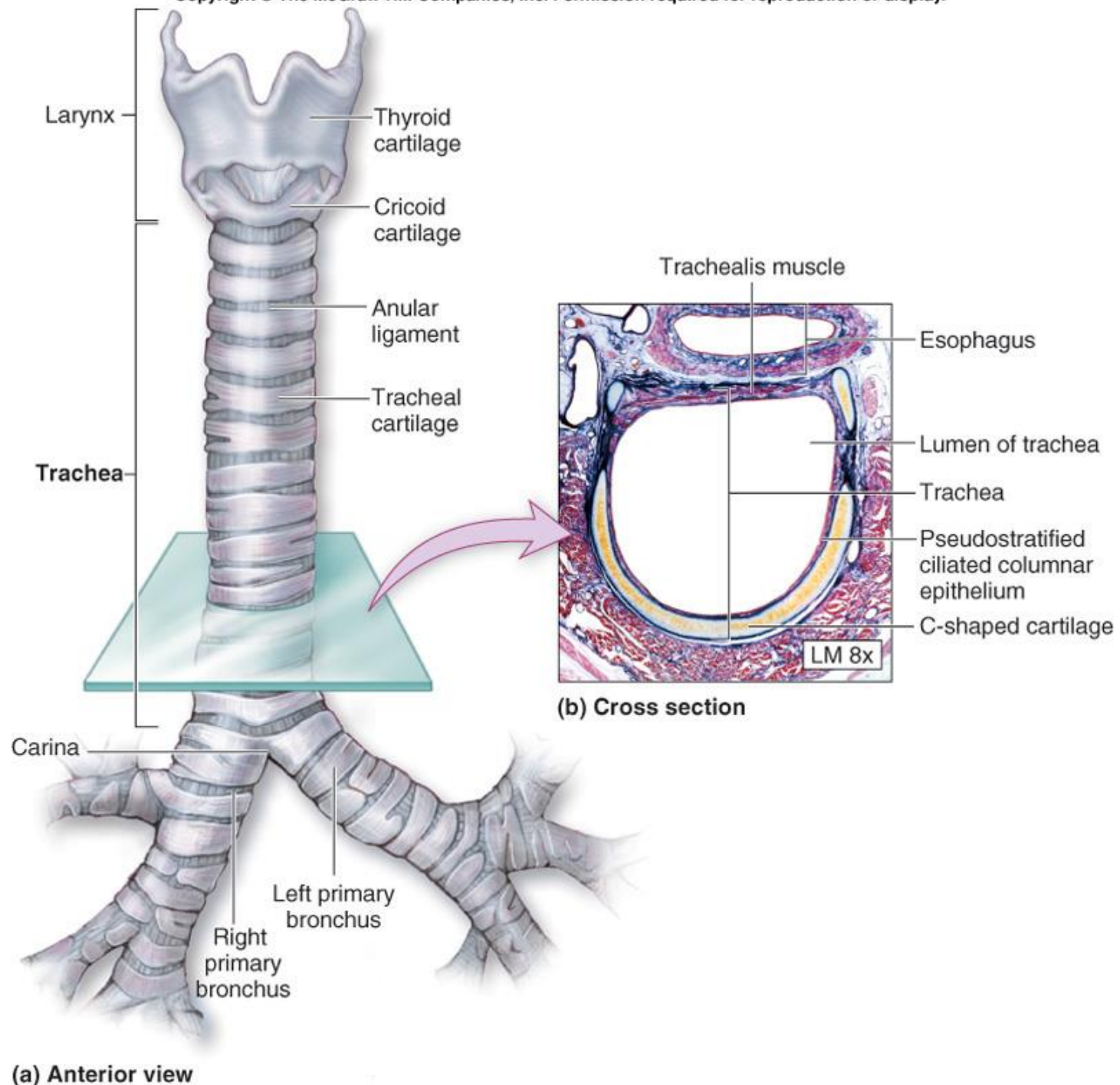
Aryepiglottic fold





Trachea

- A flexible, slightly rigid tubular organ
 - often referred to as the “windpipe.”
- Extends through the mediastinum
 - immediately anterior to the esophagus
 - inferior to the larynx
 - superior to the primary bronchi of the lungs.
- Anterior and lateral walls of the trachea are supported by 18 to 22 C-shaped tracheal cartilages.
 - cartilage rings reinforce and provide some rigidity to the tracheal wall to ensure that the trachea remains open (patent) at all times
 - cartilage rings are connected by elastic sheets called anular ligaments





Trachea

- At the level of the **sternal angle**, the trachea bifurcates into two smaller tubes, called the **right and left primary bronchi**.
- Each primary bronchus projects laterally toward each lung.
- The most inferior tracheal cartilage separates the primary bronchi at their origin and forms an internal ridge called the **carina**.

Carotid artery

Jugular vein

Trachea

Recurrent laryngeal nerve

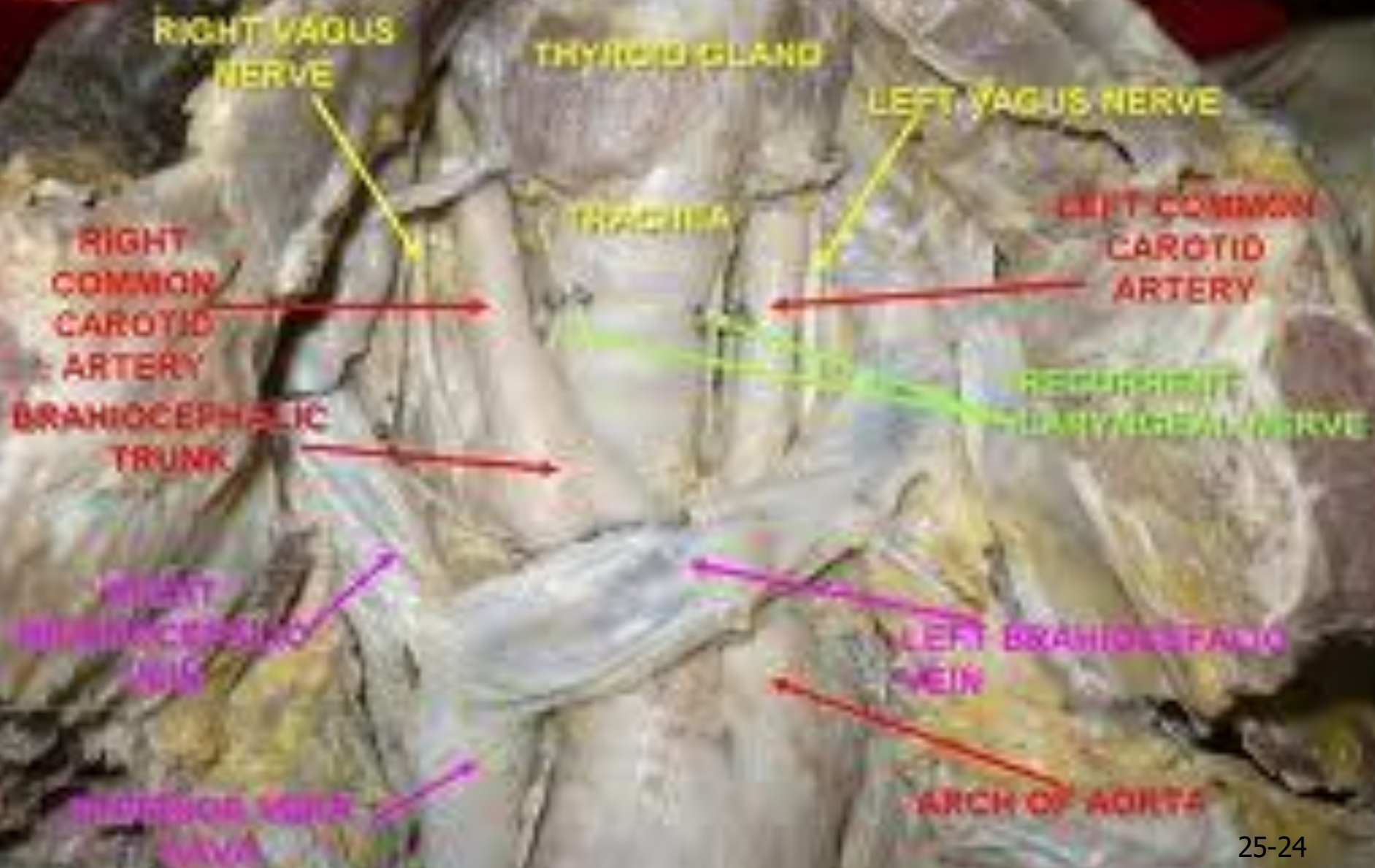
Innominate artery

Thyroid cartilage

Thyroid gland

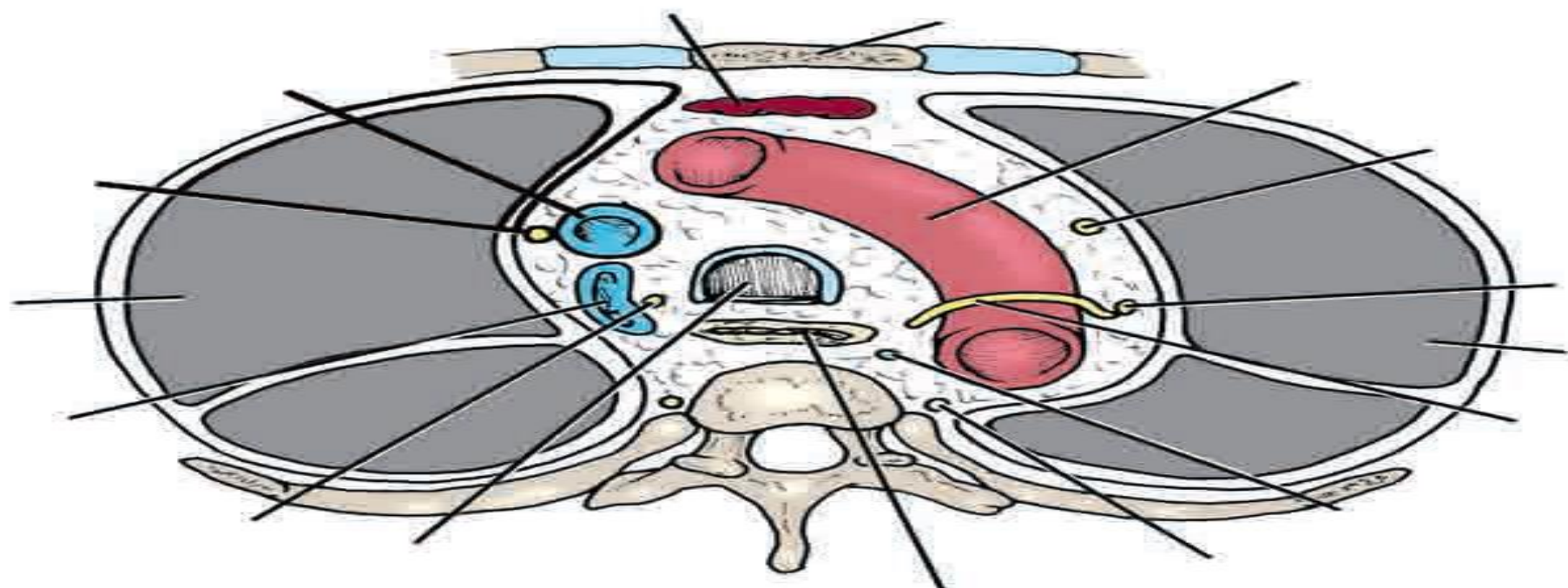
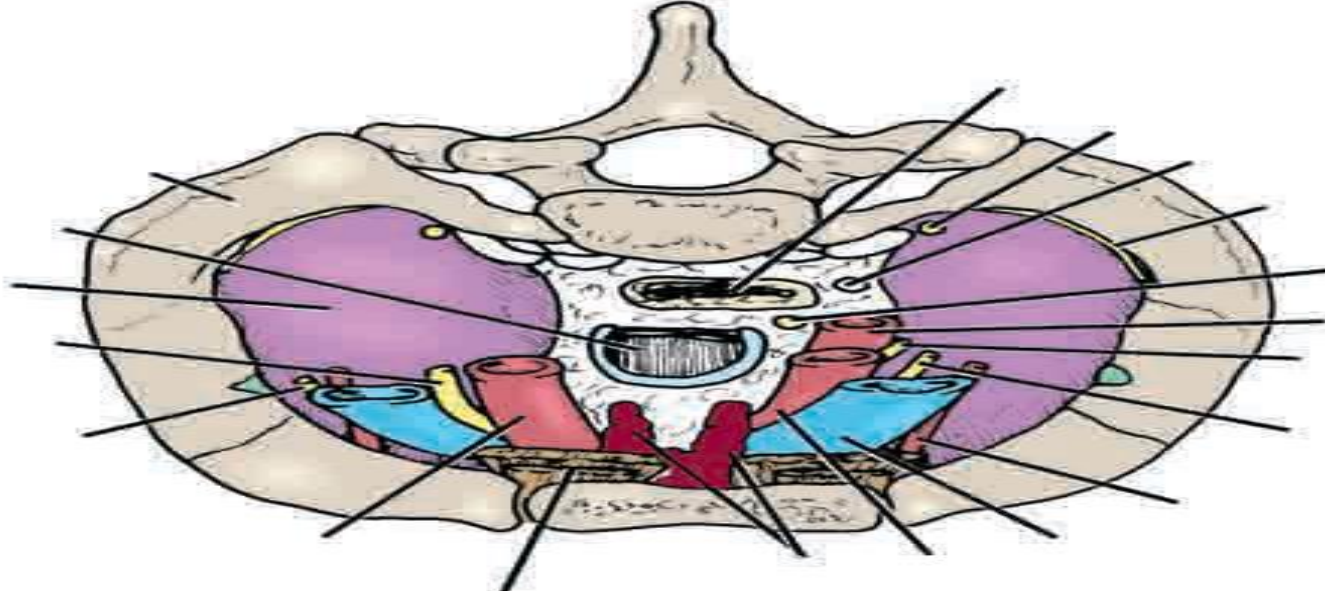
Vagus nerve





- ■ **Anteriorly: The sternum, the thymus, the left brachiocephalic vein, the origins of the brachiocephalic and left common carotid arteries, and the arch of the aorta**
- ■ **Posteriorly: The esophagus and the left recurrent laryngeal nerve (Fig. 3.6A)**

- ■ **Right side: The azygos vein, the right vagus nerve, and**
- the pleura
- ■ **Left side: The arch of the aorta, the left common**
- carotid and left subclavian arteries, the left vagus and
- left phrenic nerves, and the pleura





Anatomy of the Trachea with Proper Tracheostomy Placement

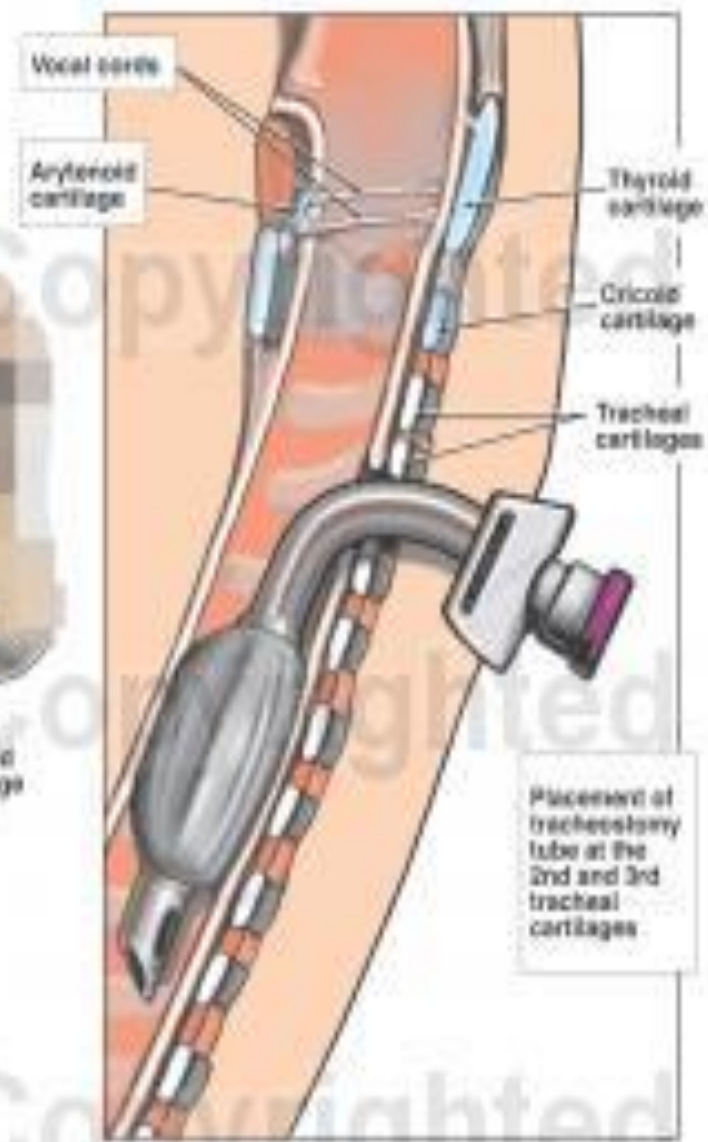
Anatomy from the Front



Anatomy from the Side



Proper Tracheostomy Placement





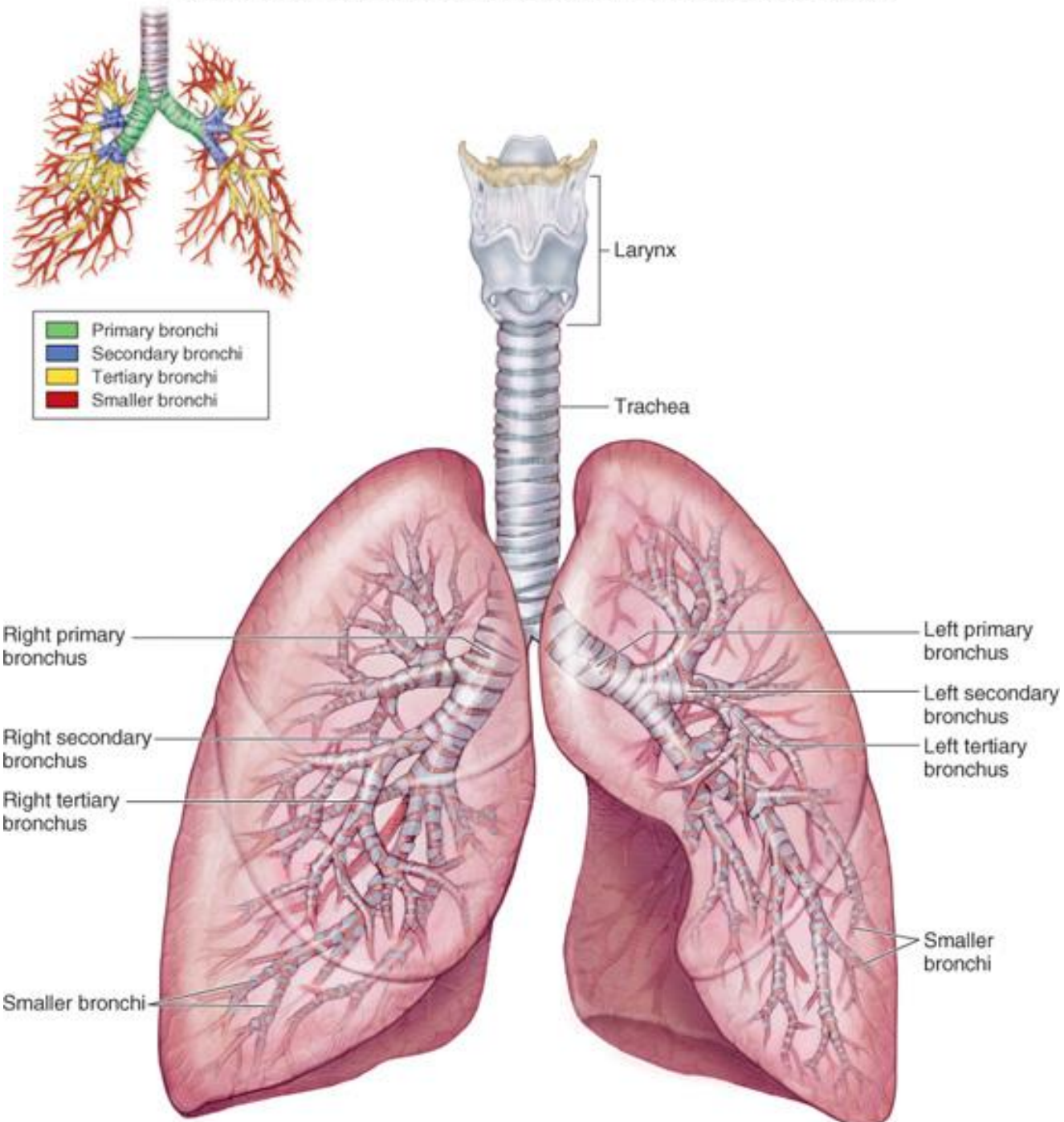
Bronchial Tree

- A highly branched system
 - air-conducting passages
 - originate from the left and right primary bronchi.
- Progressively branch into narrower tubes as they diverge throughout the lungs before terminating in terminal bronchioles.
- **Primary bronchi**
 - Incomplete rings of hyaline cartilage ensure that they remain open.
 - Right primary bronchus
 - shorter, wider, and more vertically oriented than the left primary bronchus.
 - Foreign particles are more likely to lodge in the right primary bronchus.



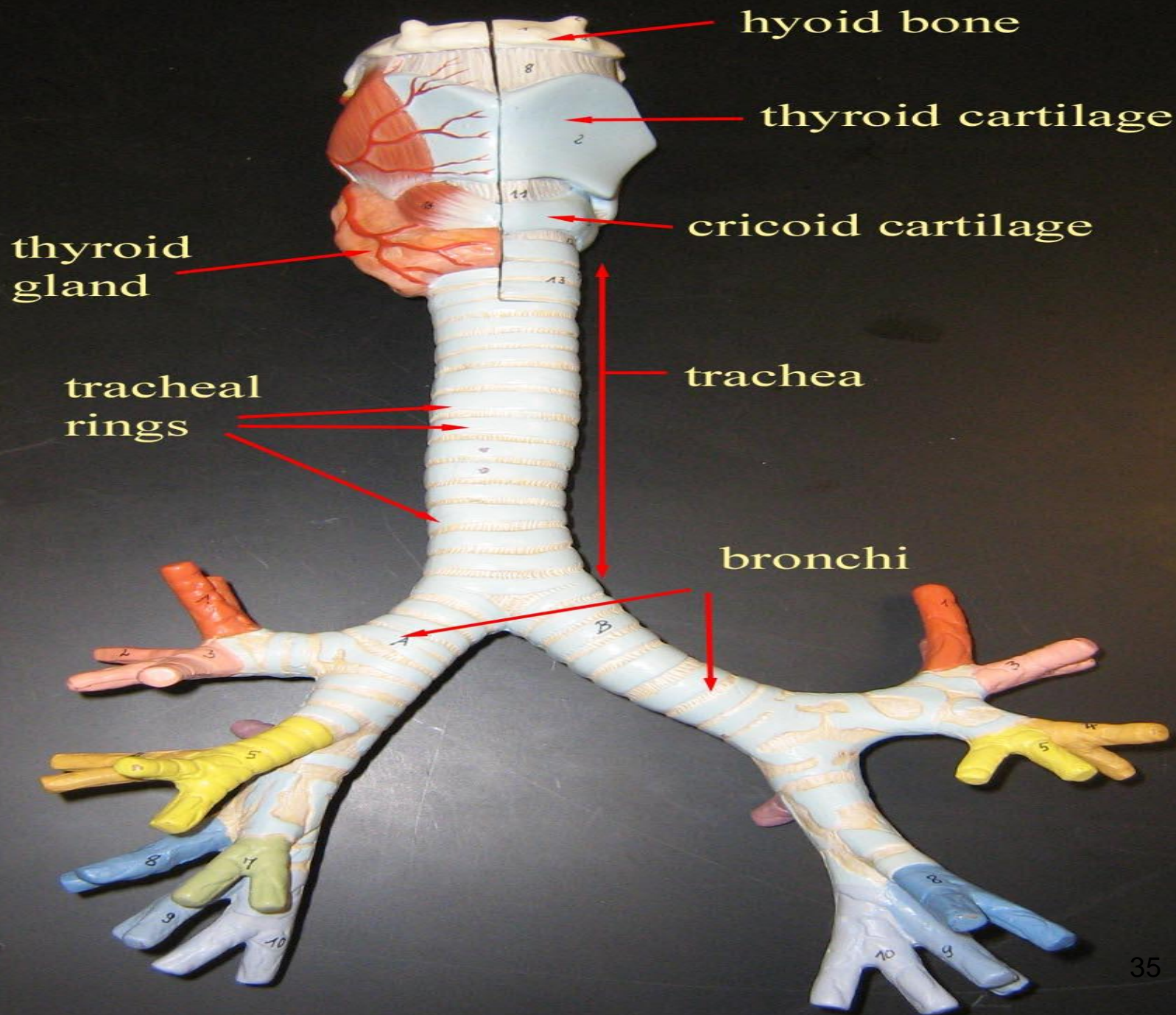
Bronchial Tree

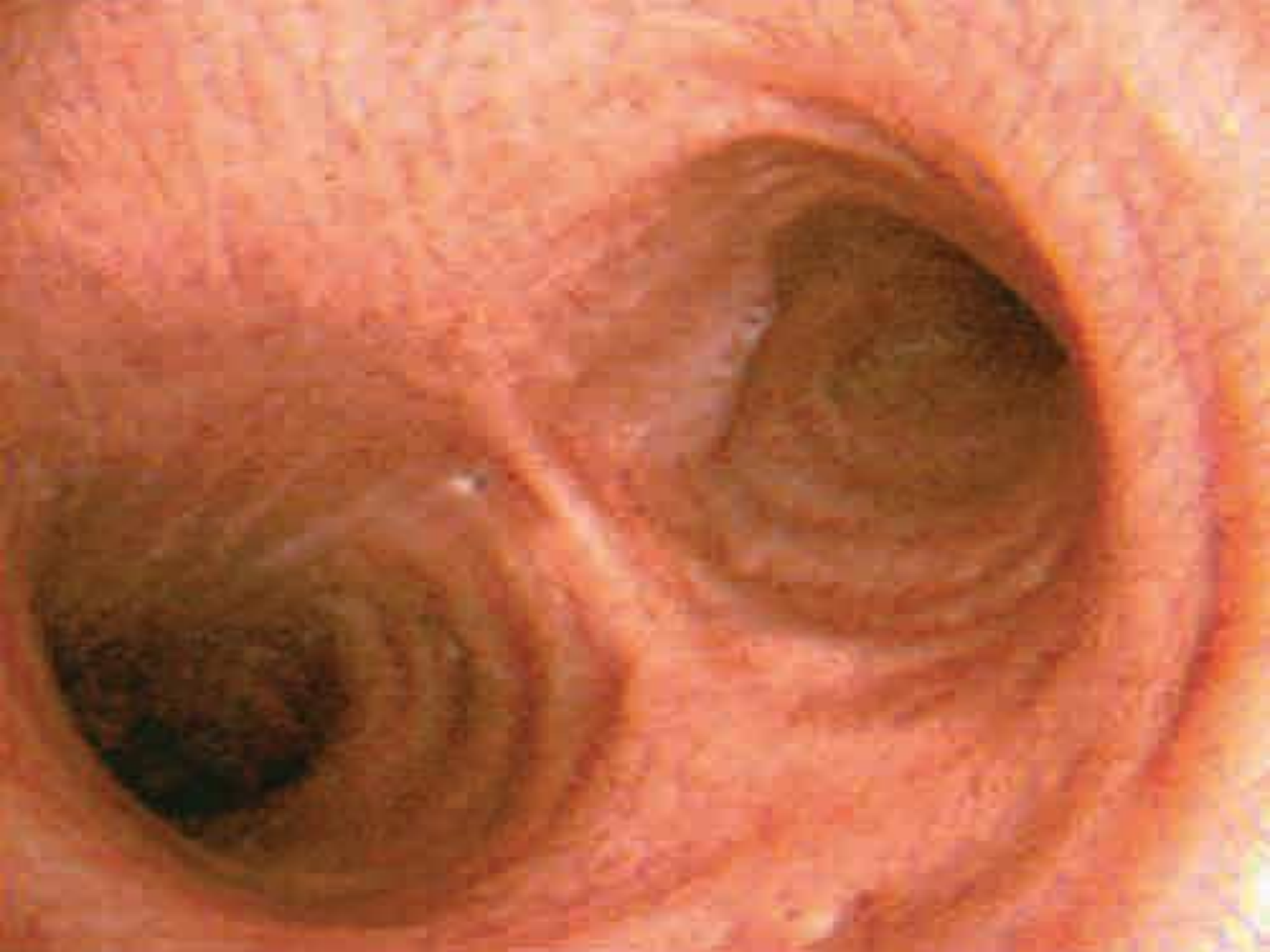
- **Primary bronchi**
 - enter the hilum of each lung
 - Also entering hilum:
 - pulmonary vessels
 - lymphatic vessels
 - nerves.
- **Secondary bronchi (or lobar bronchi)**
 - Branch of primary bronchus
 - left lung:
 - two lobes
 - two secondary bronchi
 - right lung
 - three lobes
 - three secondary bronchi.
- **Tertiary bronchi (or segmental bronchi)**
 - Branch of secondary bronchi
 - left lung is supplied by 8 to 10 tertiary bronchi.
 - right lung is supplied by 10 tertiary bronchi
 - supply a part of the lung called a **bronchopulmonary segment**.











An anatomical diagram of the left lung, showing the two lobes. The upper lobe is larger and more rounded, while the lower lobe is smaller and more wedge-shaped. Two white lines with arrows point from text labels to the respective lobes. The background is a light pinkish-red color with some faint anatomical markings.

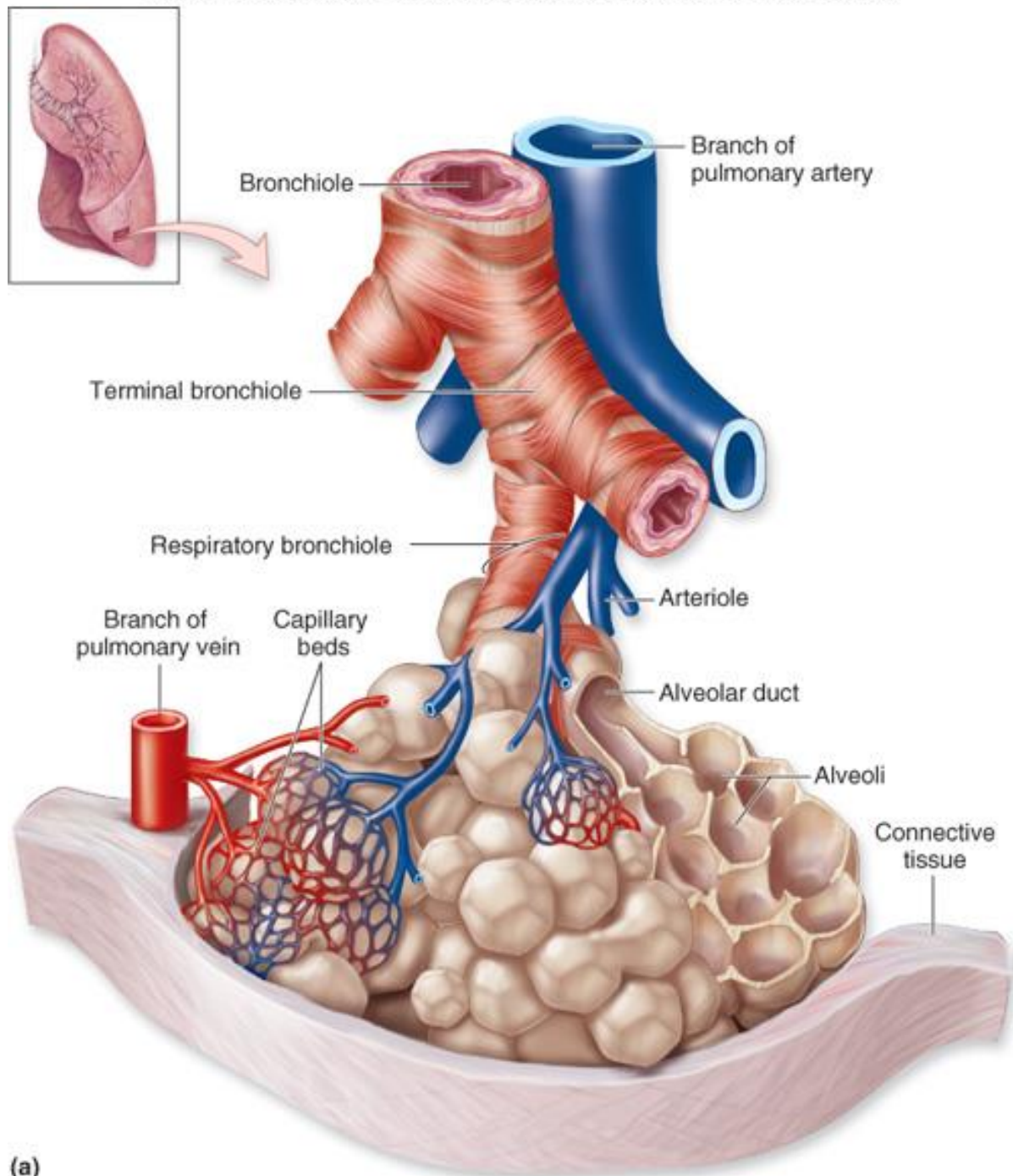
left upper lobe

left lower lobe



Respiratory Bronchioles, Alveolar Ducts, and Alveoli

- Contain small saccular outpocketings called **alveoli**.
- An alveolus is about 0.25 to 0.5 millimeter in diameter.
- Its thin wall is specialized to **promote diffusion of gases** between the alveolus and the blood in the pulmonary capillaries.
- Gas exchange can take place in the respiratory bronchioles and alveolar ducts as well as in the lungs, which contain approximately 300–400 million alveoli.
- The **spongy** nature of the lung is due to the packing of millions of alveoli together.

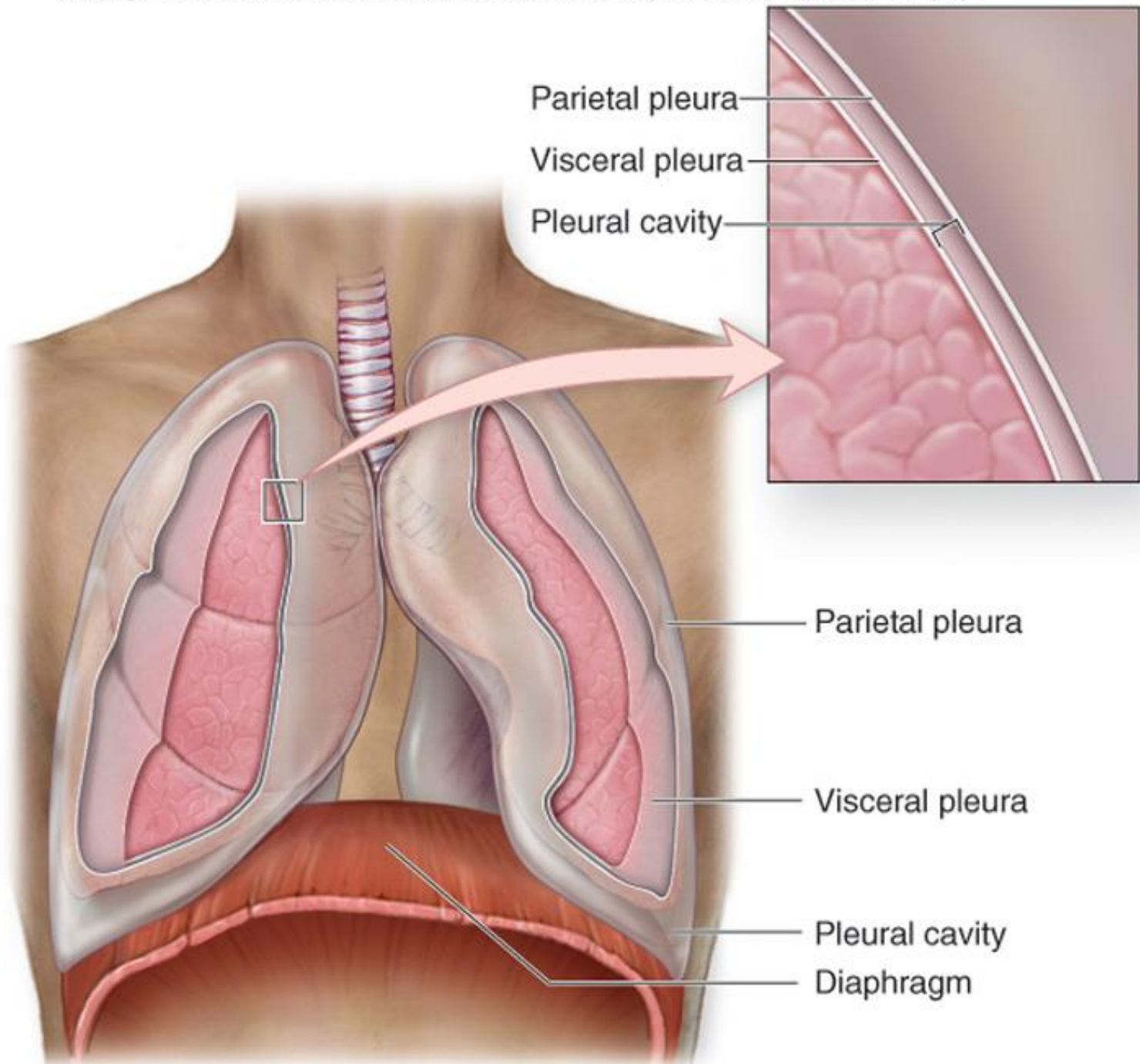


Pleura and Pleural Cavities

- The outer surface of each lung and the adjacent internal thoracic wall are lined by a serous membrane called **pleura**, which is formed from simple squamous epithelium.
- The outer surface of each lung is tightly covered by the **visceral pleura**, while the internal thoracic walls, the lateral surfaces of the mediastinum, and the superior surface of the diaphragm are lined by the **parietal pleura**.
- The parietal and visceral pleural layers are continuous at the hilum of each lung.

Pleura and Pleural Cavities

- The outer surface of each lung is tightly covered by the **visceral pleura**, while the internal thoracic walls, the lateral surfaces of the mediastinum, and the superior surface of the diaphragm are lined by the **parietal pleura**.
- The **potential space** between these serous membrane layers is a **pleural cavity**.
- The pleural membranes produce a thin, serous **fluid** that circulates in the pleural cavity and acts as a **lubricant**, ensuring minimal friction during breathing.

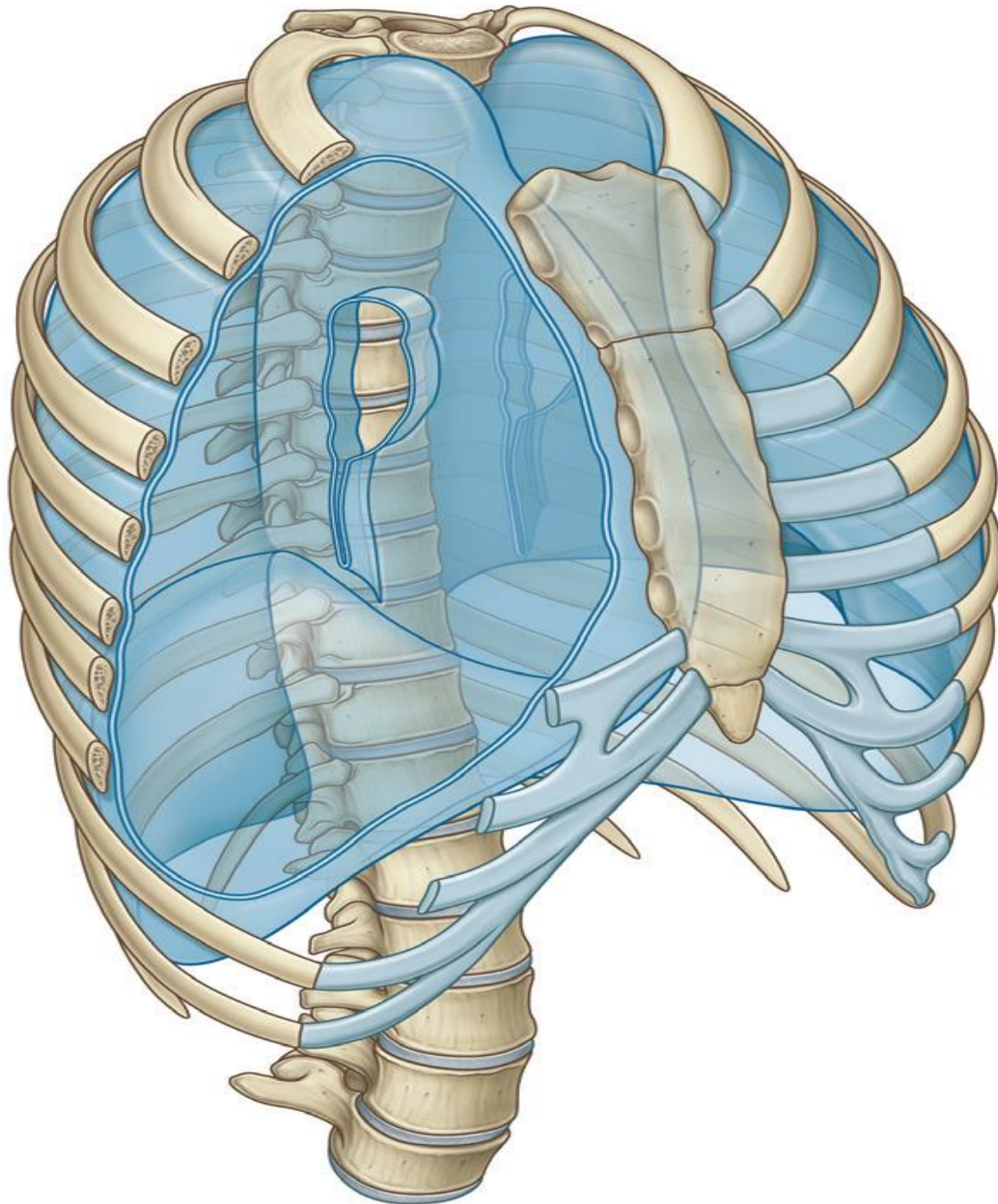


Parietal Pleura Divisions

- Costal pleura lines the ribs.
- Diaphragmatic pleura covers the diaphragm.
- Mediastinal pleura lies against the mediastinum.
- Cervical pleura extends above the level of the first rib.

Pleural Reflections

- **Costodiaphragmatic recess (space):**
Space where costal and diaphragmatic pleura meet.
- **Costomediastinal recess (space):**
Space where mediastinal and costal pleura meet.
- **Pulmonary ligament:**
Transition between visceral and parietal pleura at root of the lung.

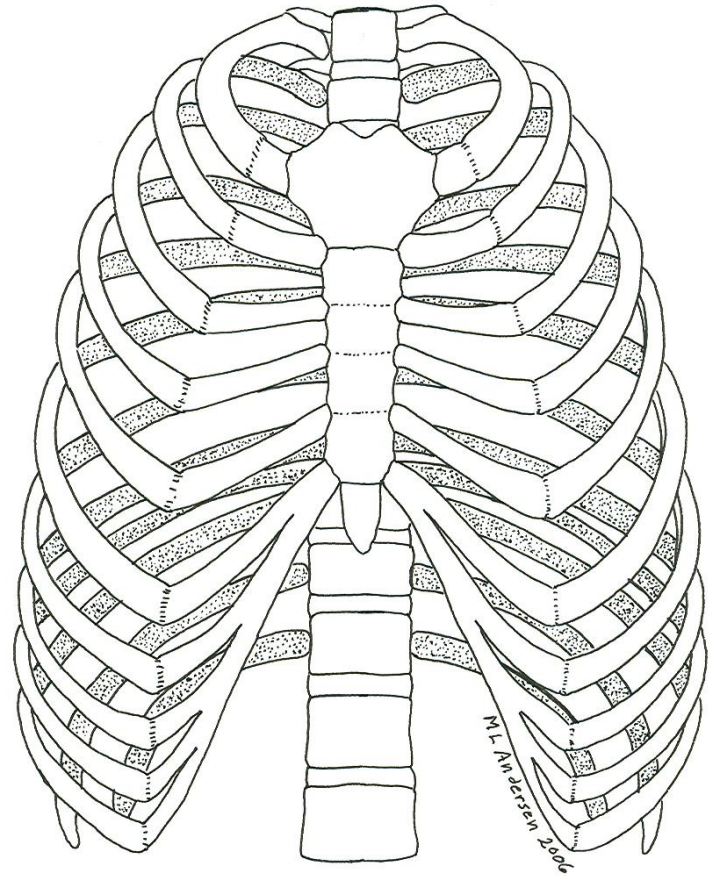


Pleural Lines of Reflection

- Cervical dome of pleura:
 - Level with neck of the first rib.
 - Anteriorly, 1.5-2.5 cm above the sternal end of the clavicle.
 - Anterior margin extends obliquely behind the sternoclavicular joint.
 - At sternal angle, the pleura is at the median line and two sides stay in contact until the fourth costal cartilage.

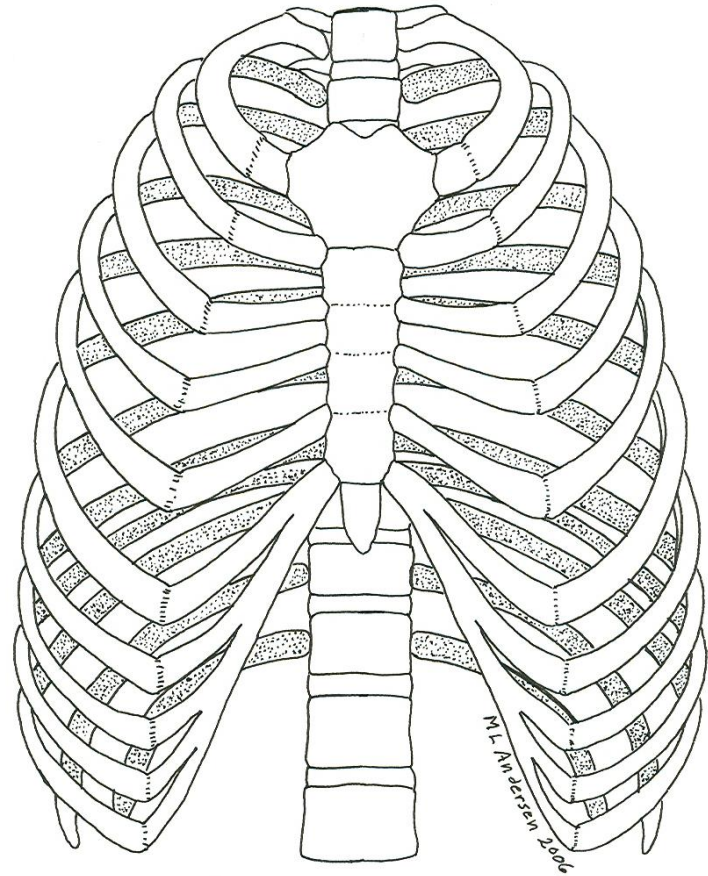
Pleural Lines of Reflection

- Right side:
 - Leaves sternum at 6th costal cartilage.
 - At 8th costal cartilage at midclavicular line.
 - At 10th rib at axillary line.
 - At 11th rib at scapular line.
 - Extends to level of body of T12 and then ascends.



Pleural Lines of Reflection

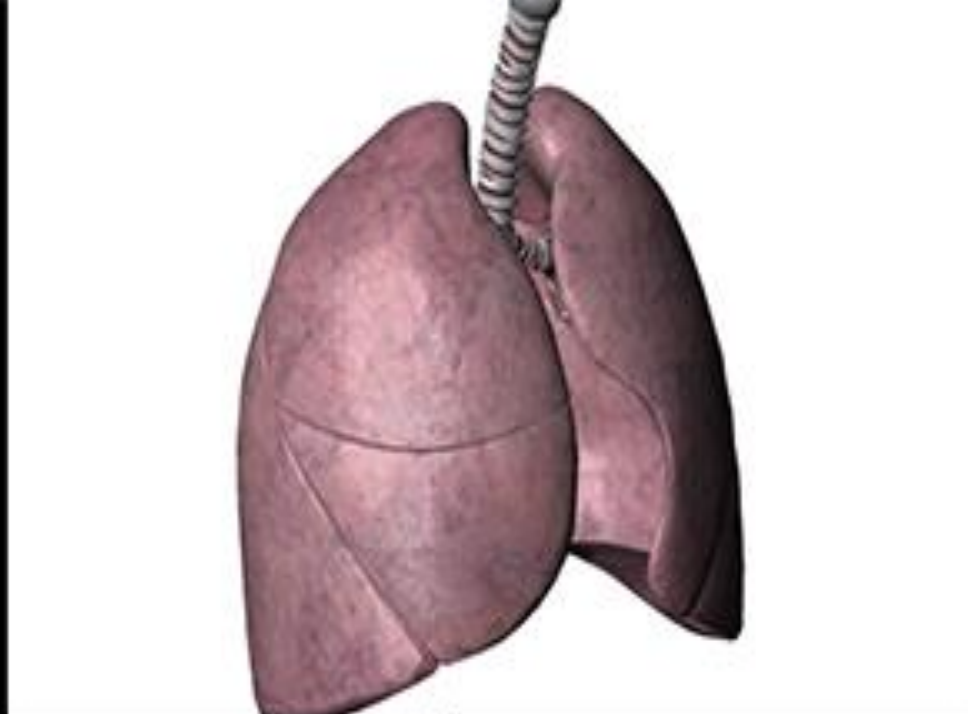
- Left side:
 - Leaves sternum at IC space 5.
 - 1.5 cm from sternal margin at 6th costal cartilage.
 - Follows same landmarks as right side from this point.





Gross Anatomy of the Lungs

- Each lung has a **conical** shape.
- Its wide, concave **base** rests upon the **muscular diaphragm**.
- Its relatively blunt superior region, called the **apex** or (cupola), projects superiorly to a point that is slightly superior and posterior to the clavicle.
- Both lungs are bordered by the thoracic wall anteriorly, laterally, and posteriorly, and supported by the **rib cage**.
- Toward the midline, the lungs are separated from each other by the **mediastinum**.
- The relatively broad, rounded surface in contact with the thoracic wall is called the **costal surface** of the lung.





Right Lung Projections

- Follows rib 1 to sternoclavicular joint.
- Located at median plane at sternal angle.
- Extends along median plane from 2nd costal cartilage to 4th costal cartilage.
- Leaves sternum at 6th costal cartilage.
- At 6th rib at midclavicular line.



Right Lung Projections

- At 8th rib at axillary line.
- At 10th rib at scapular line.
- Ends opposite T10.



Left Lung Projections

- Same as right lung except:
 - Cardiac notch begins at 4th costal cartilage.

Horizontal at parasternal line.

Medial to costochondral junction at 6th cartilage.



Right Lung Morphology

- Oblique fissure :
 - Separates superior and inferior lobes.
 - Begins at base of scapular spine.
 - At 5-6th rib at midaxillary line.
 - Ends at 6th costochondral junction.



Right Lung Morphology

- Horizontal fissure :

- Separates superior and middle lobes.

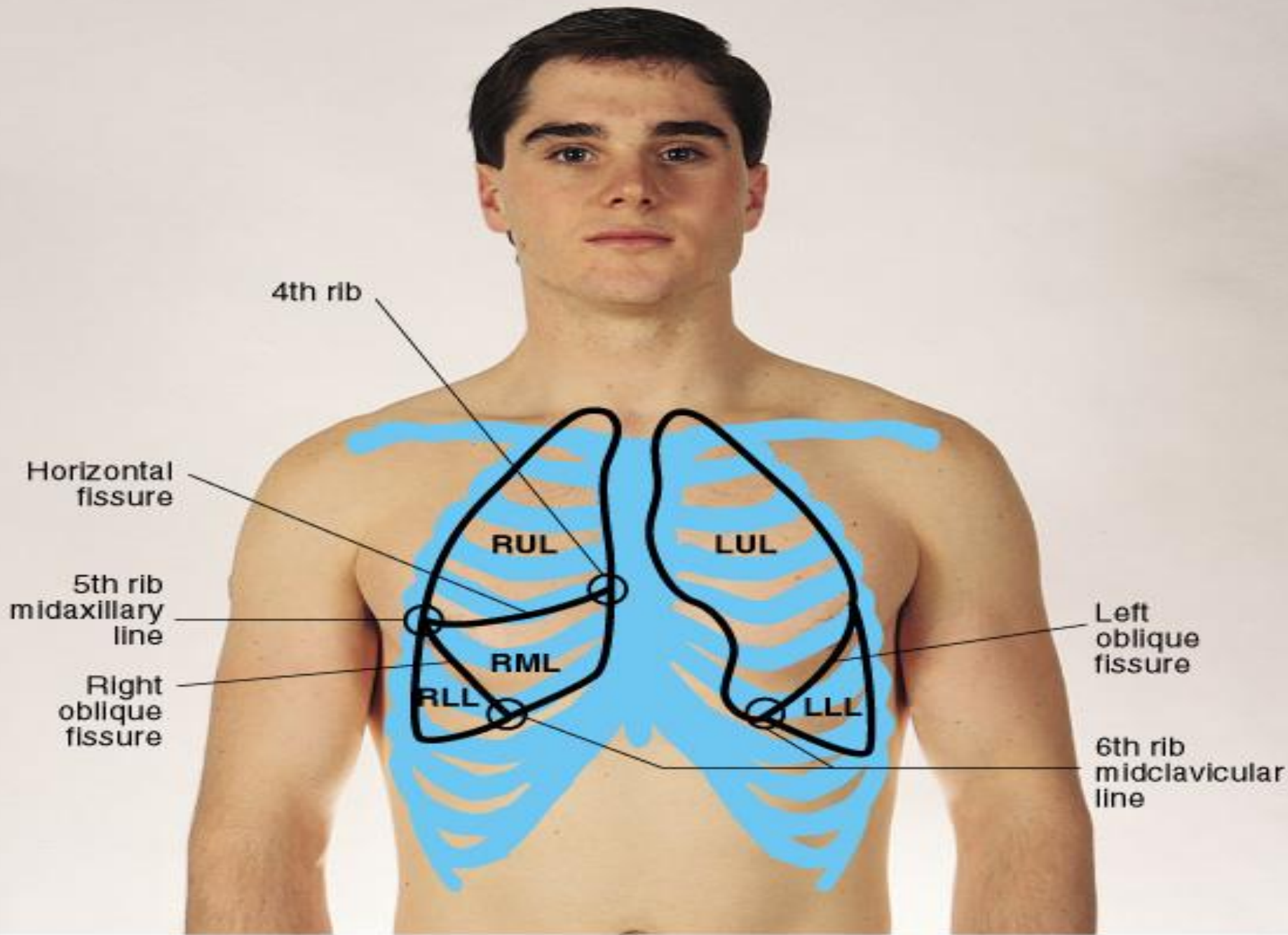
- Begins at axillary line.

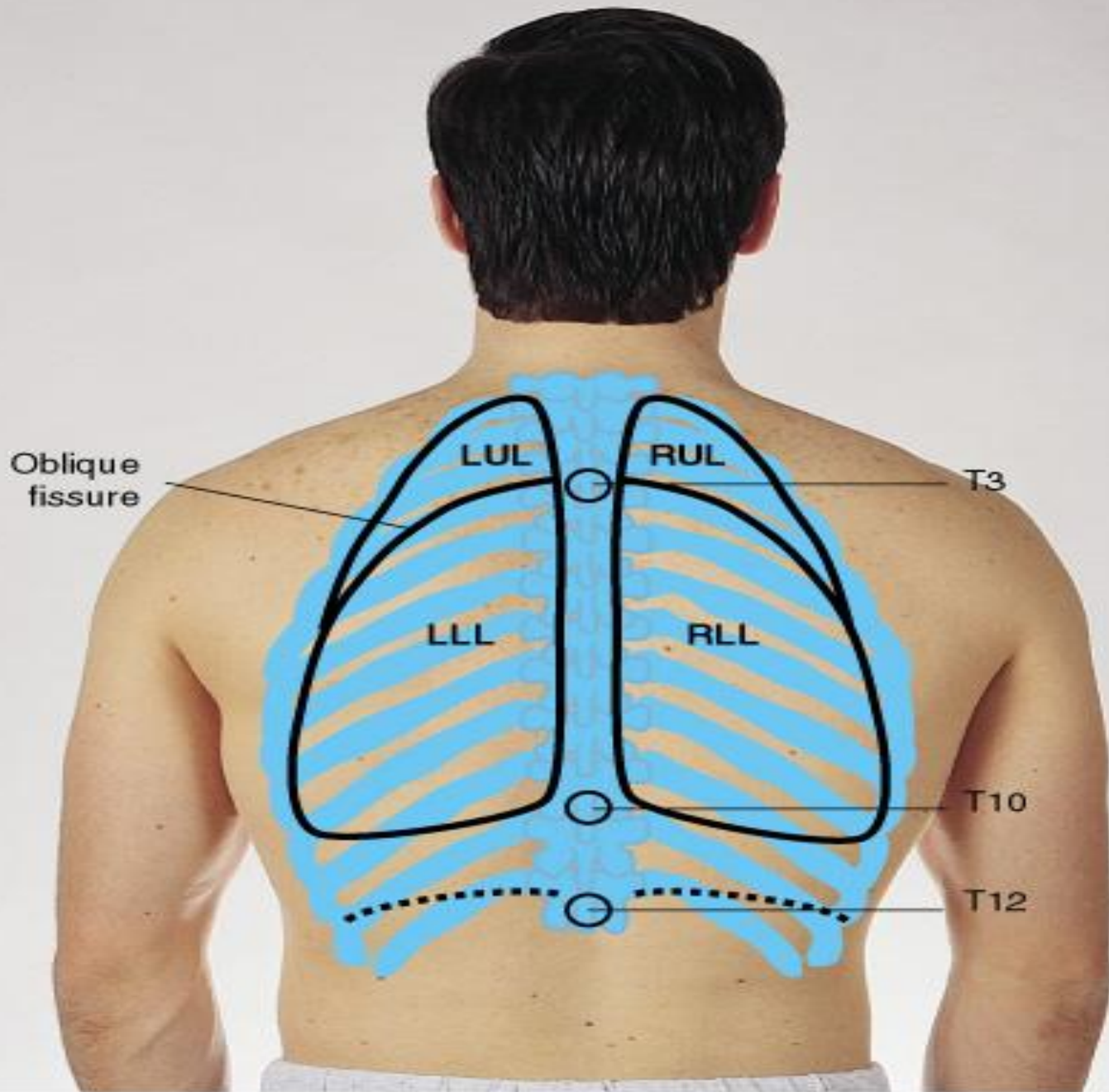
- Follows rib 4.

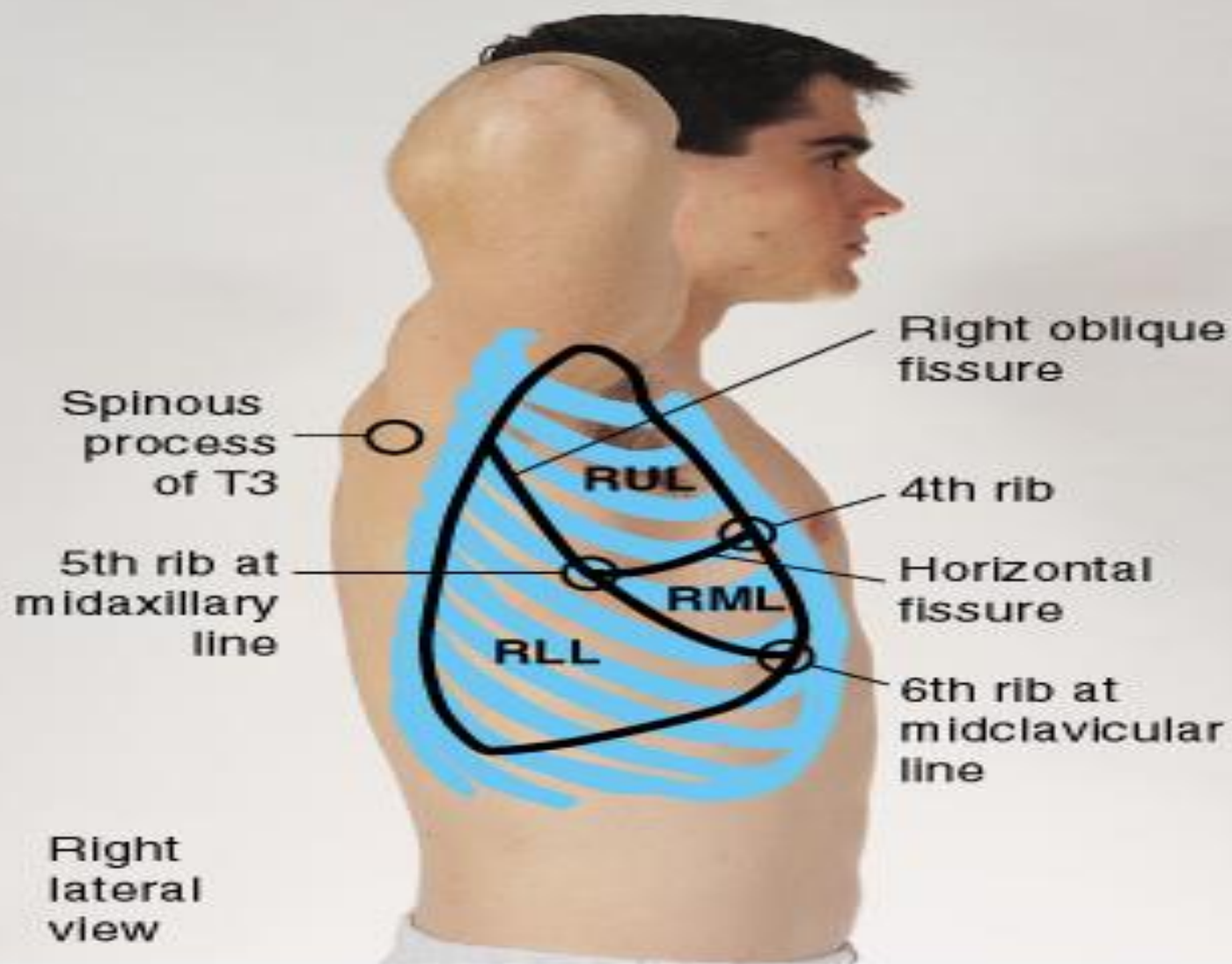


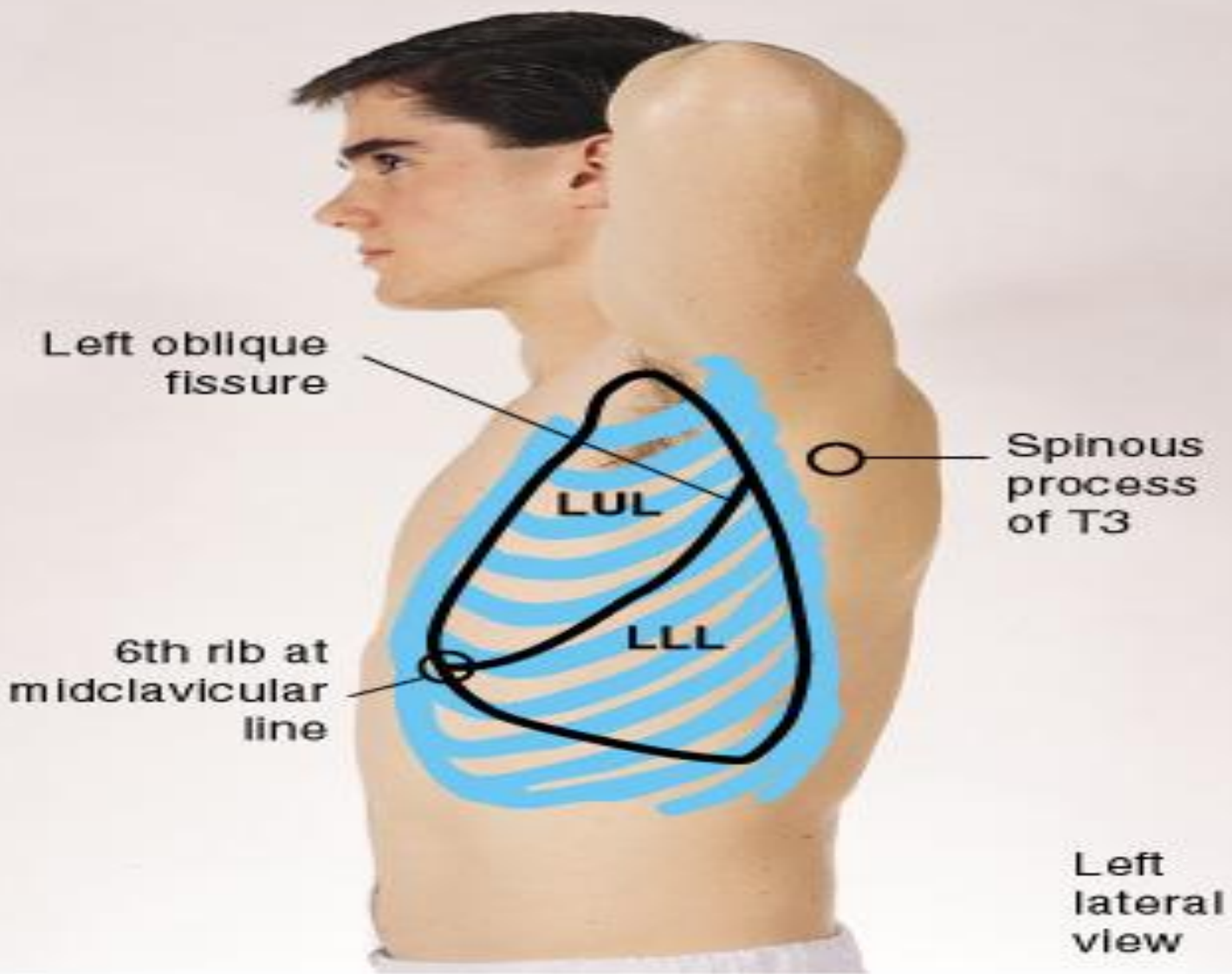
Left Lung Morphology

- Oblique fissure:
 - Same as for right lung.
- No horizontal fissure.





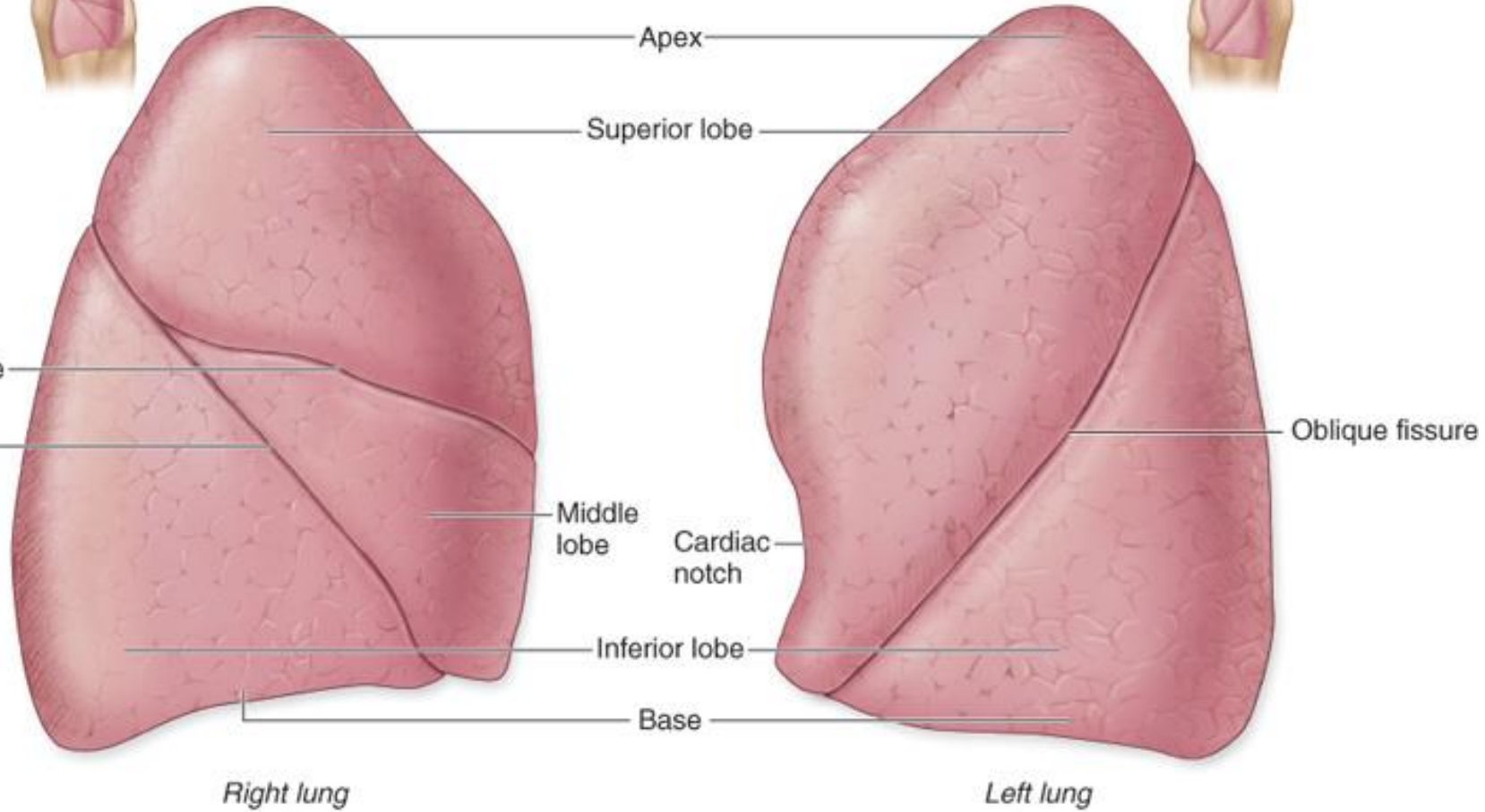




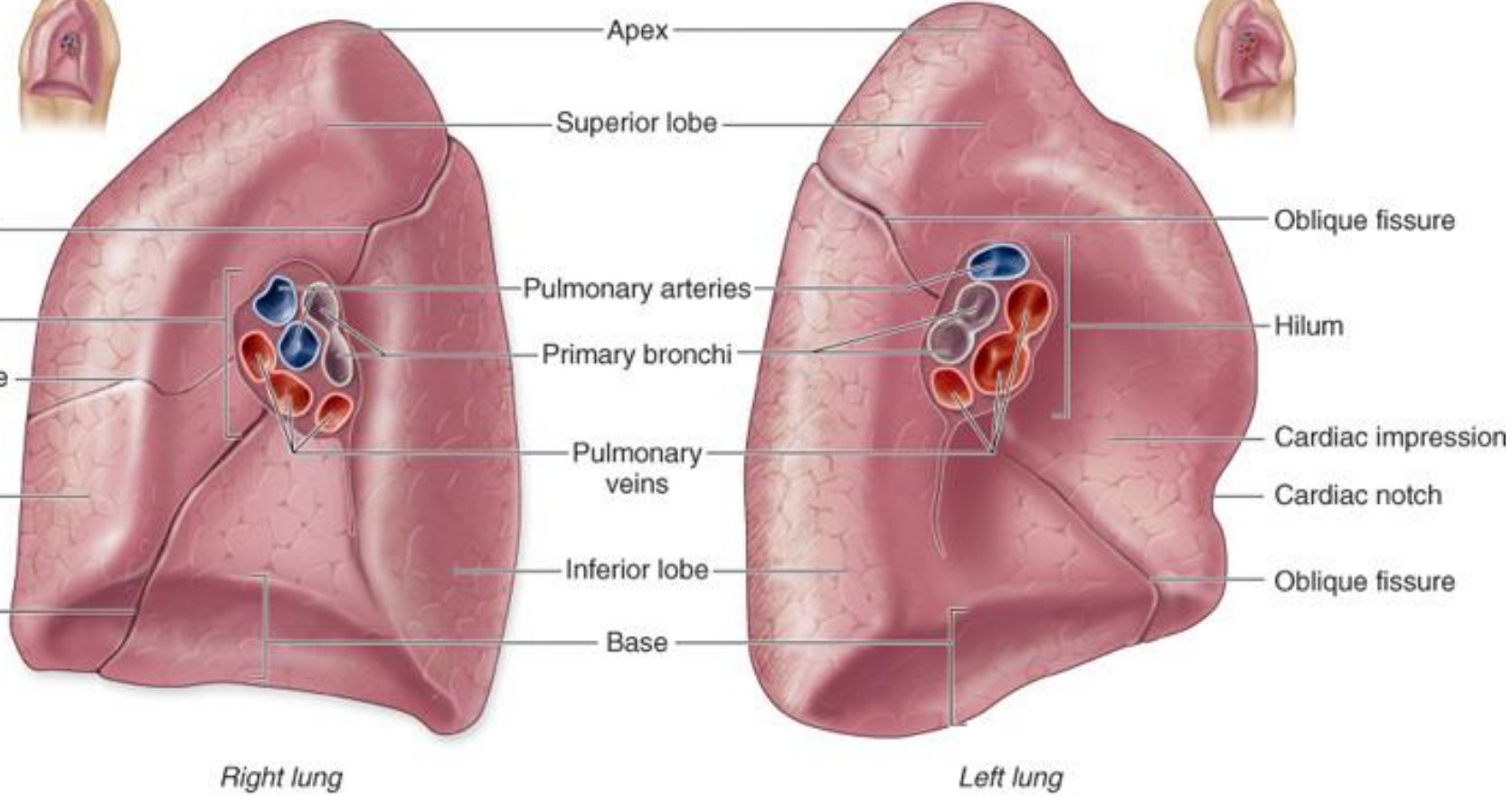


3 Important Points

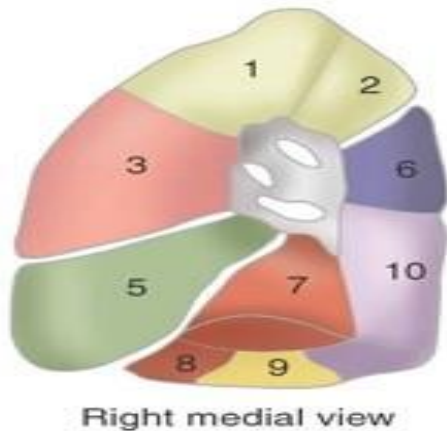
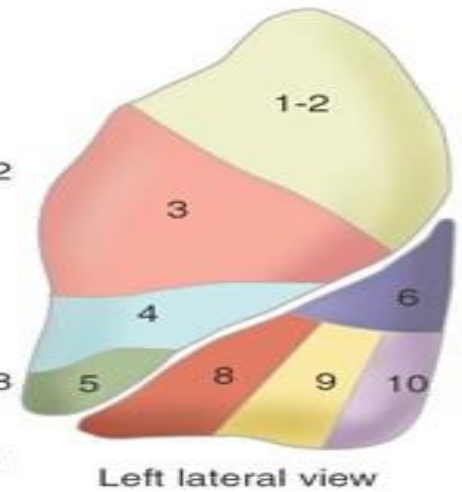
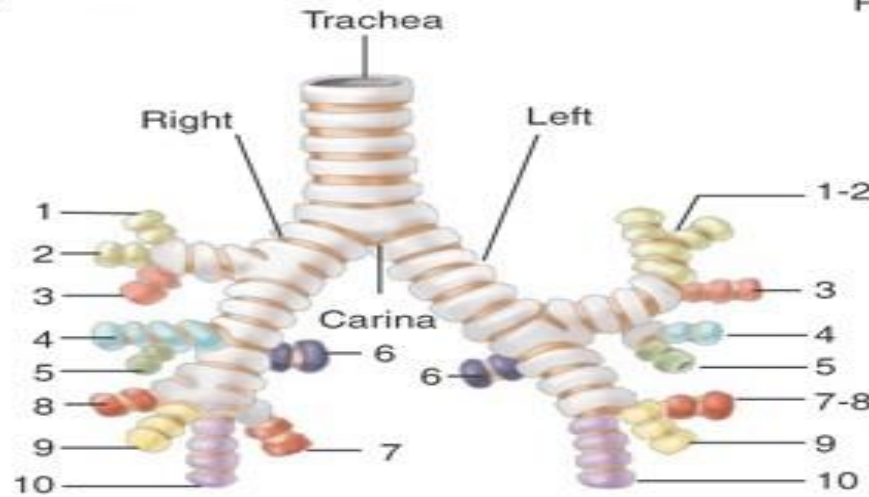
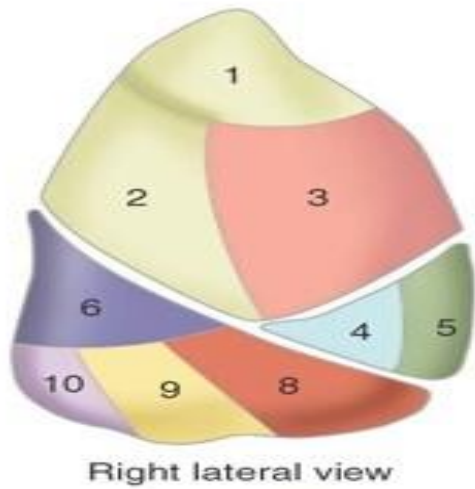
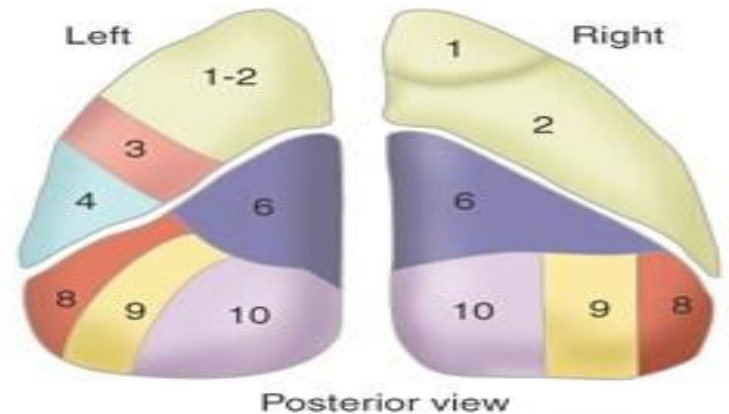
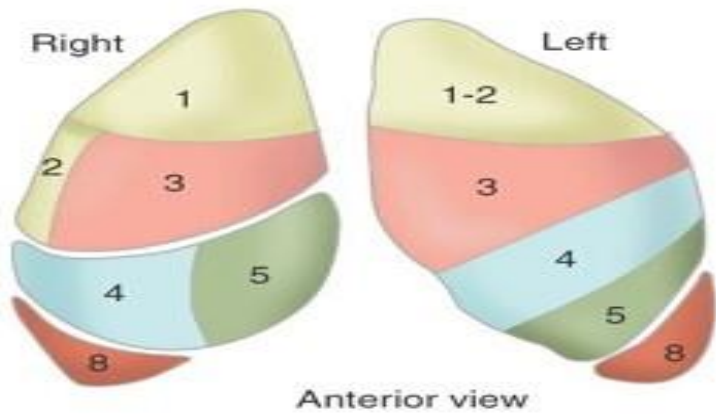
1. Left Lung – no middle lobe
2. Anterior chest contains upper & middle lobes with very little lower lobe
3. Posterior chest has almost all lower lobe. Rt middle lobe does not project into the posterior chest



(a) Lateral views

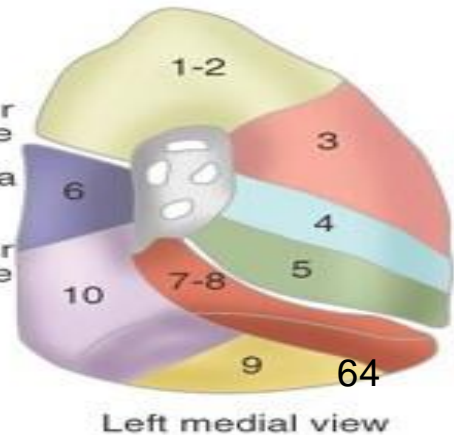


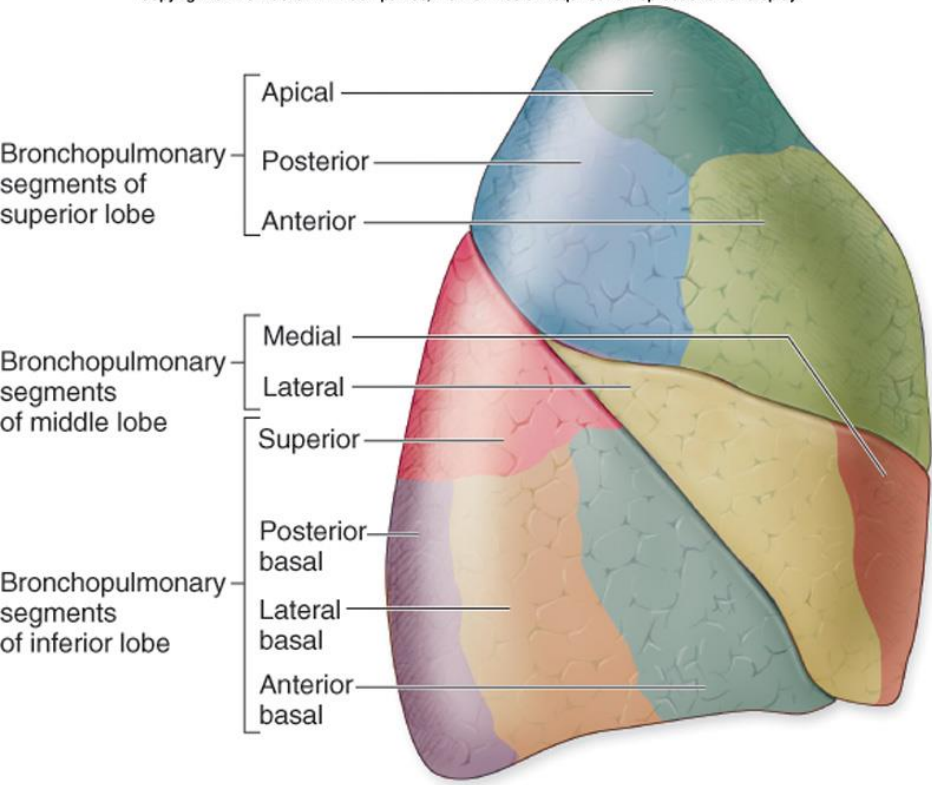
(b) Medial views



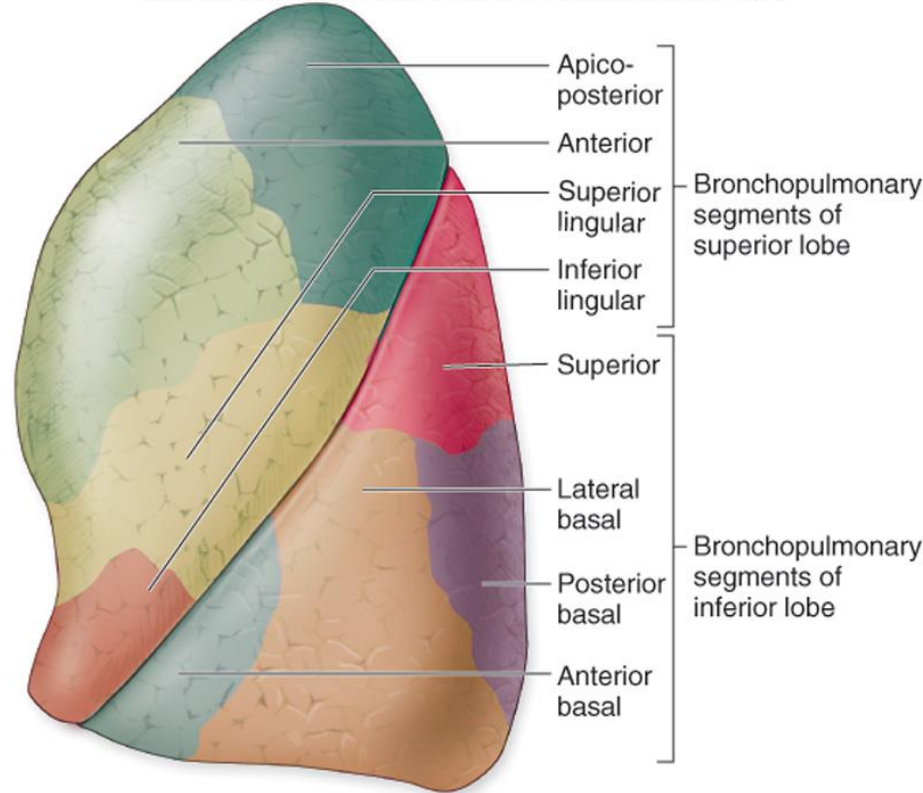
- | | |
|-------------|-----------------|
| Upper lobe | 1. Apical |
| | 2. Posterior |
| | 3. Anterior |
| Middle lobe | 4. Lateral |
| | 5. Medial |
| Lower lobe | 6. Superior |
| | 7. Med. basal |
| | 8. Lat. basal |
| | 9. Lat. basal |
| | 10. Post. basal |

- | | |
|-----------------------|------------|
| 1-2. Apical-posterior | Upper lobe |
| 3. Anterior | |
| 4. Superior | Lingula |
| 5. Inferior | |
| 6. Superior | Lower lobe |
| 7-8. Ant. basal | |
| 9. Lat. basal | |
| 10. Post. basal | |

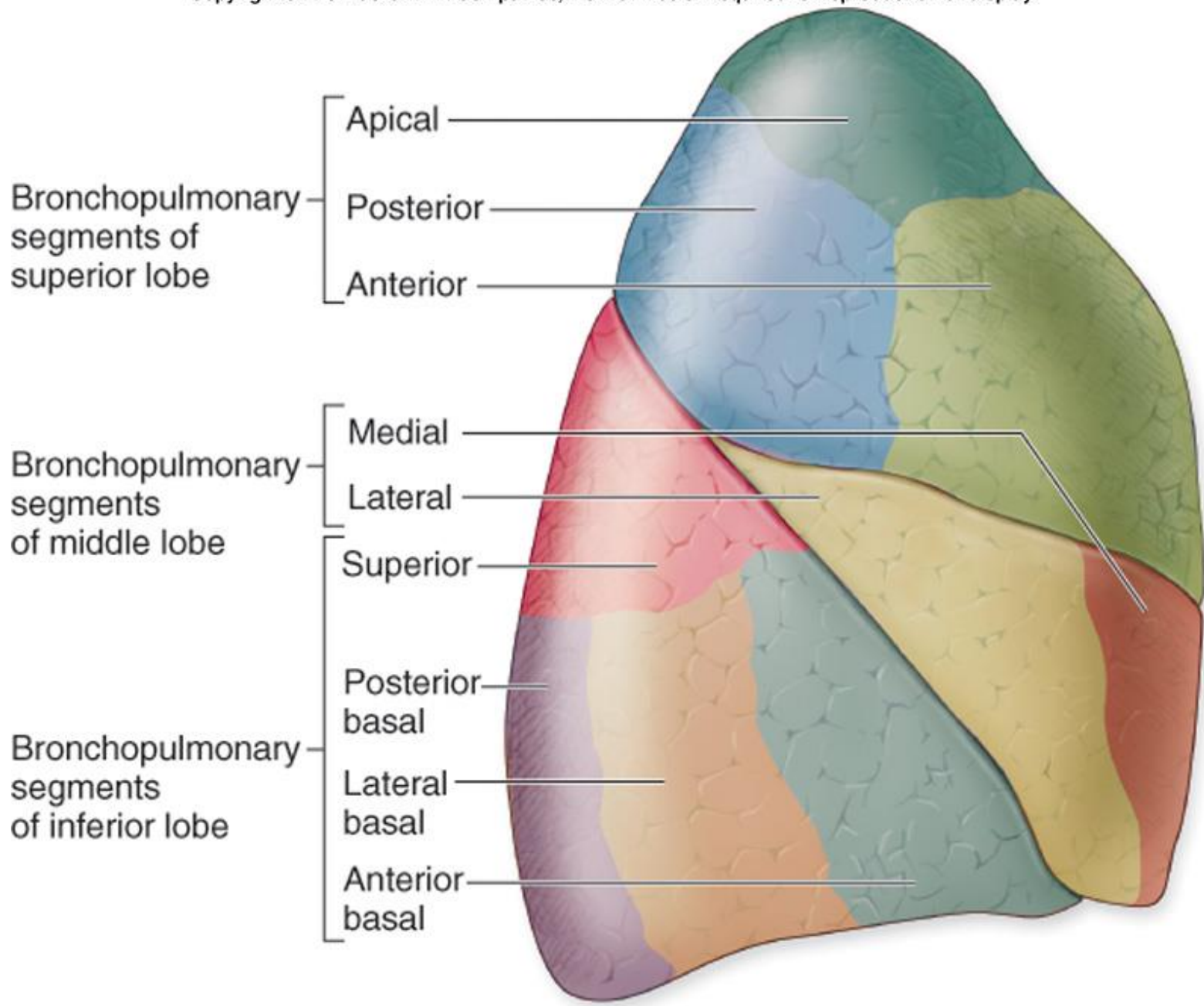




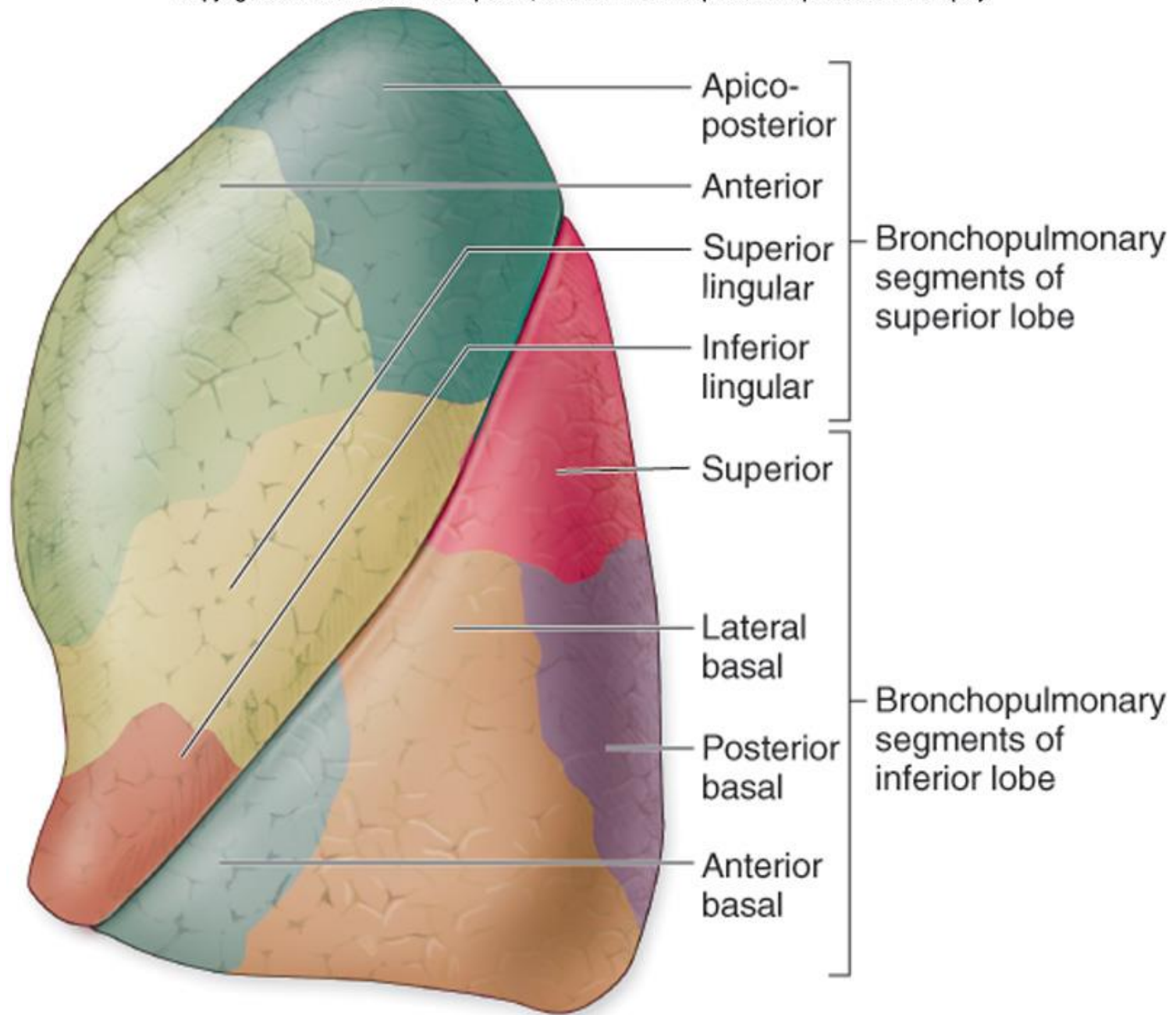
Right lung, lateral view



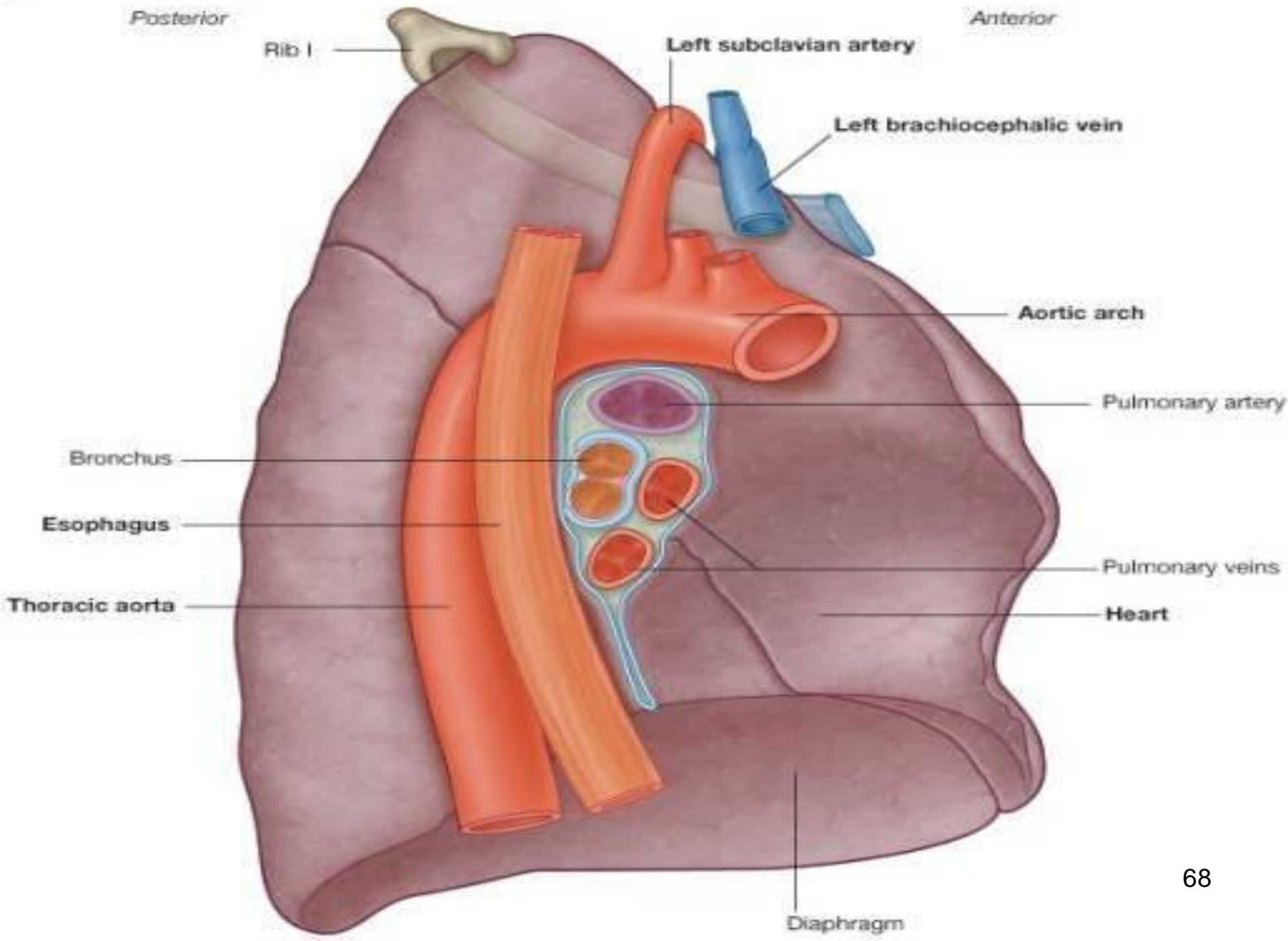
Left lung, lateral view

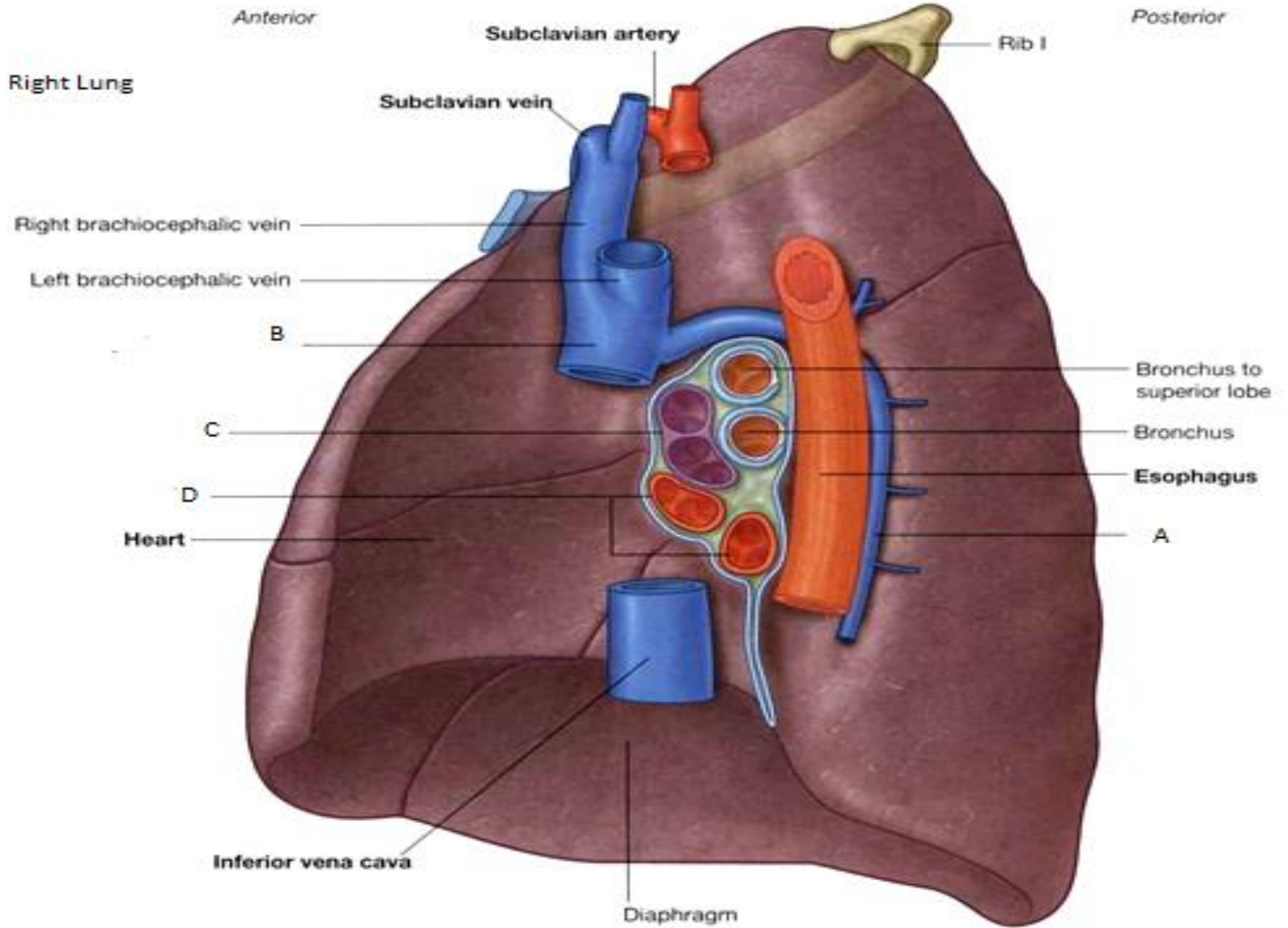


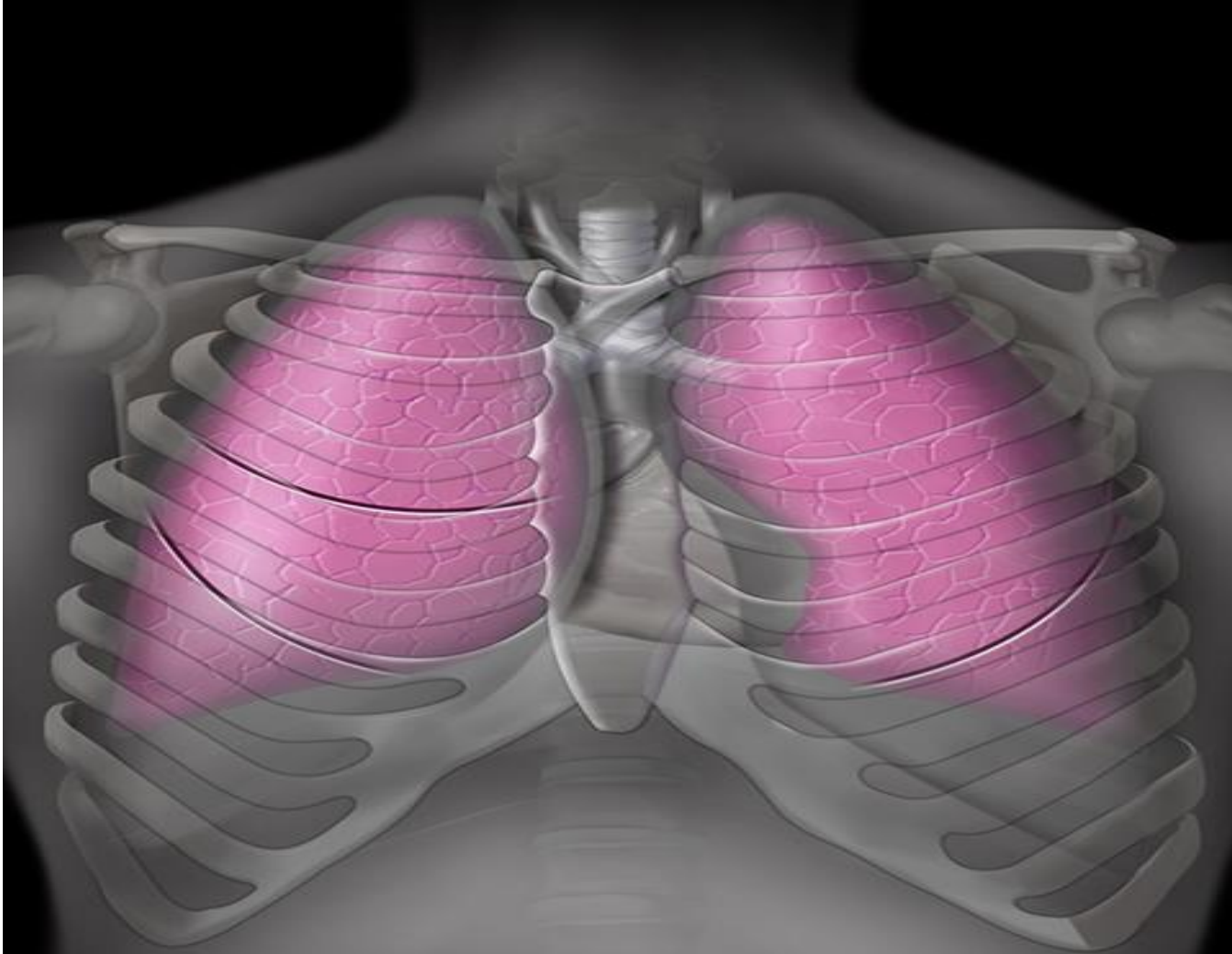
Right lung, lateral view



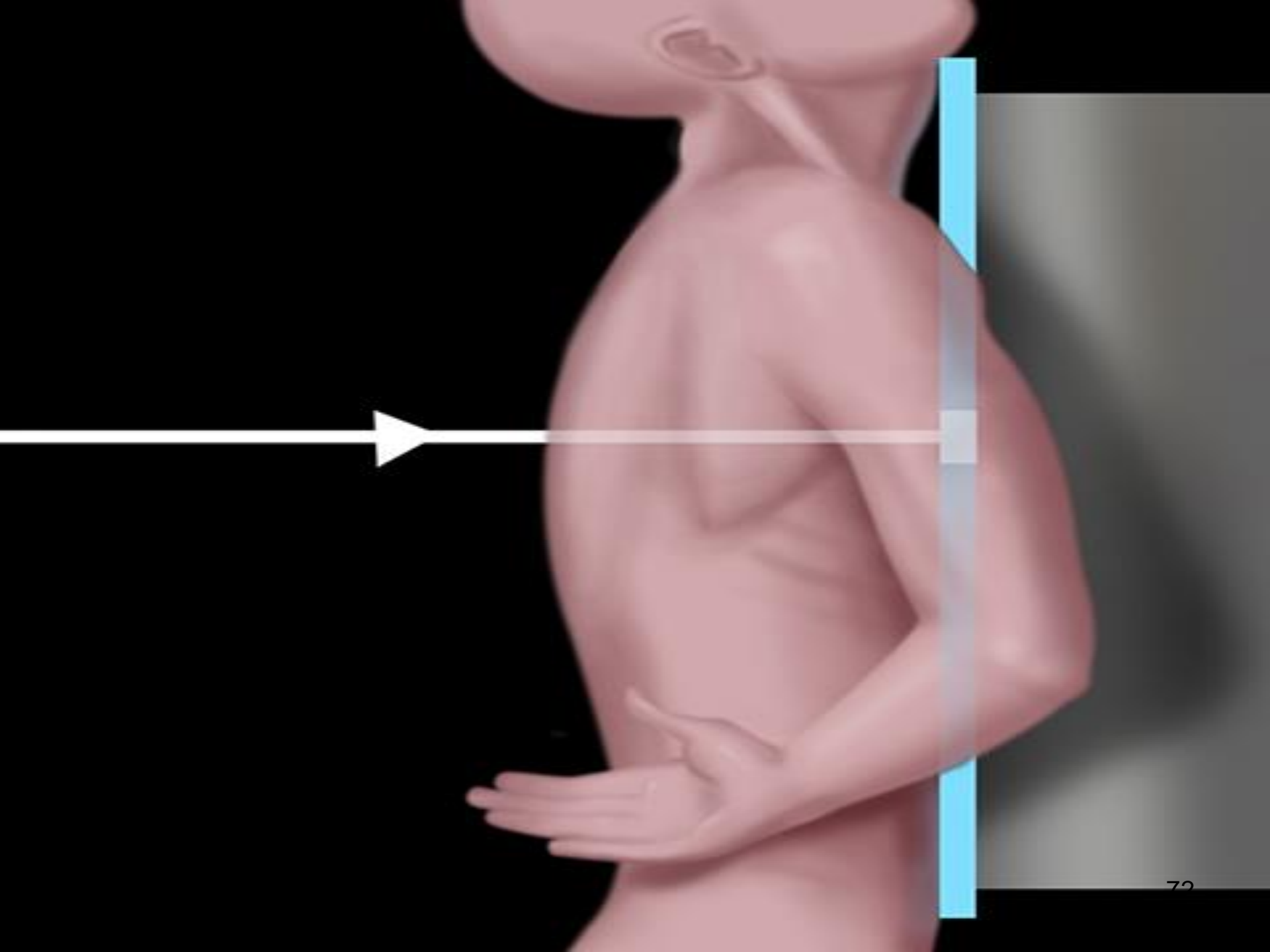
Left lung, lateral view

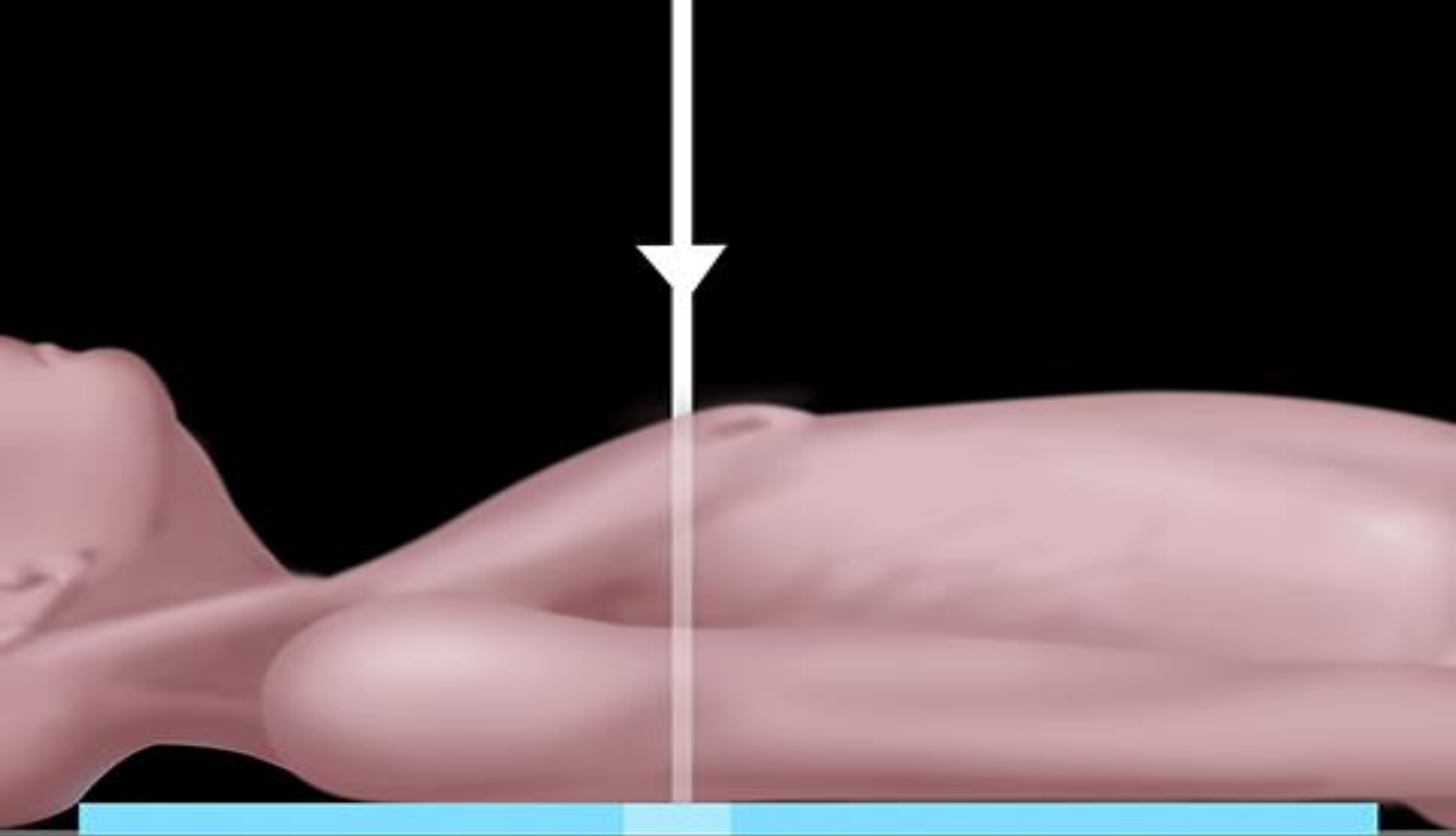
B

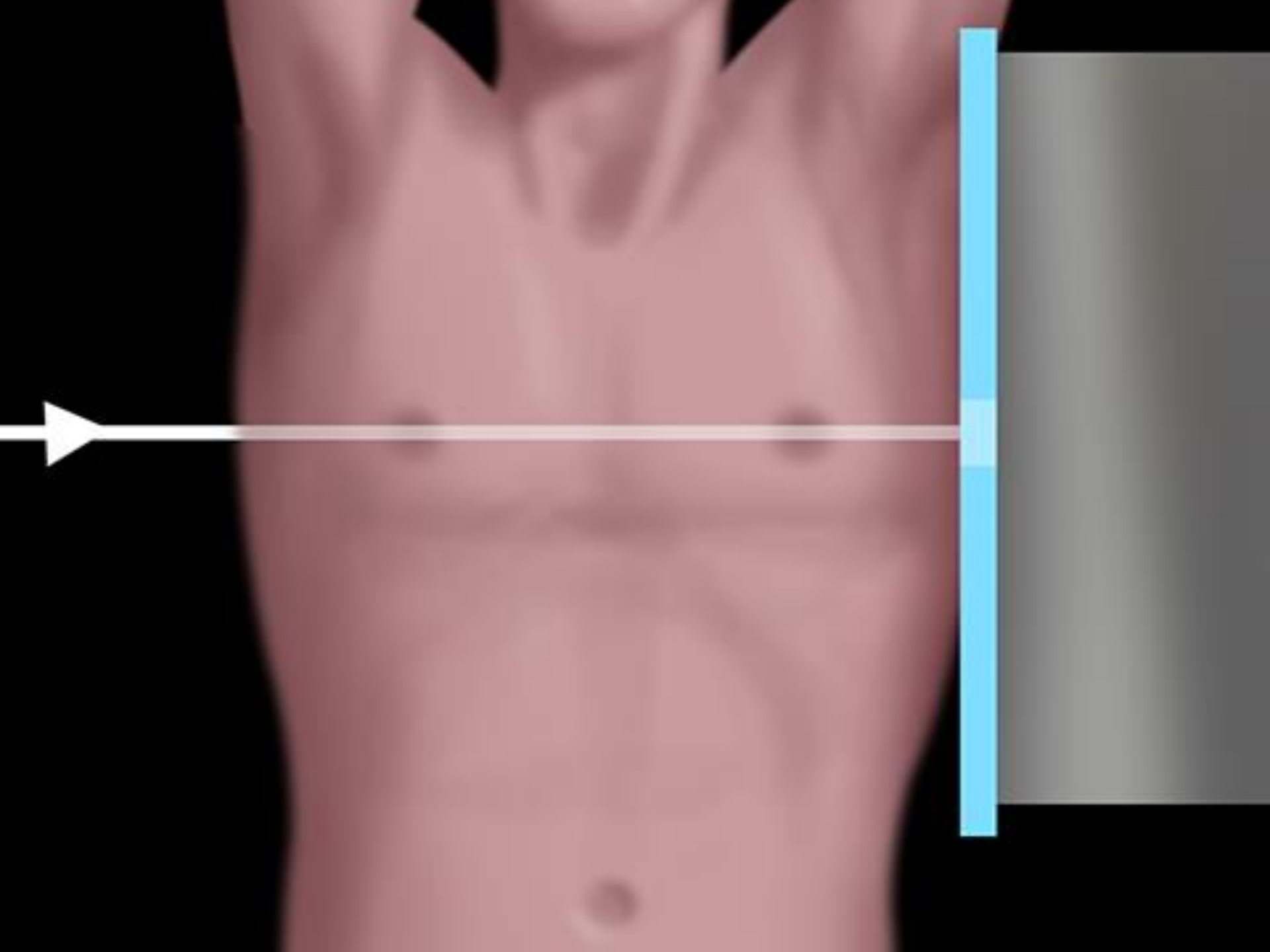














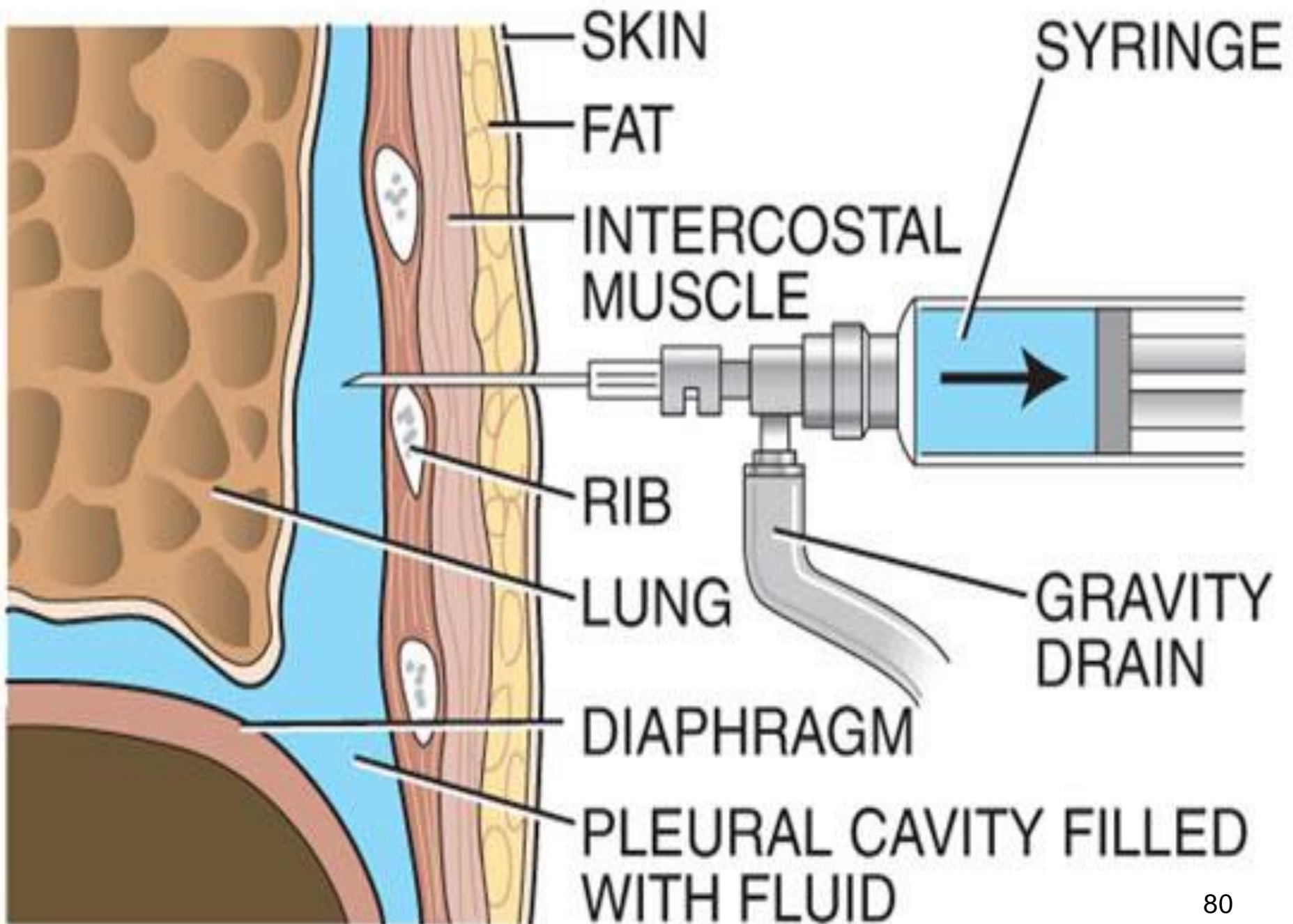


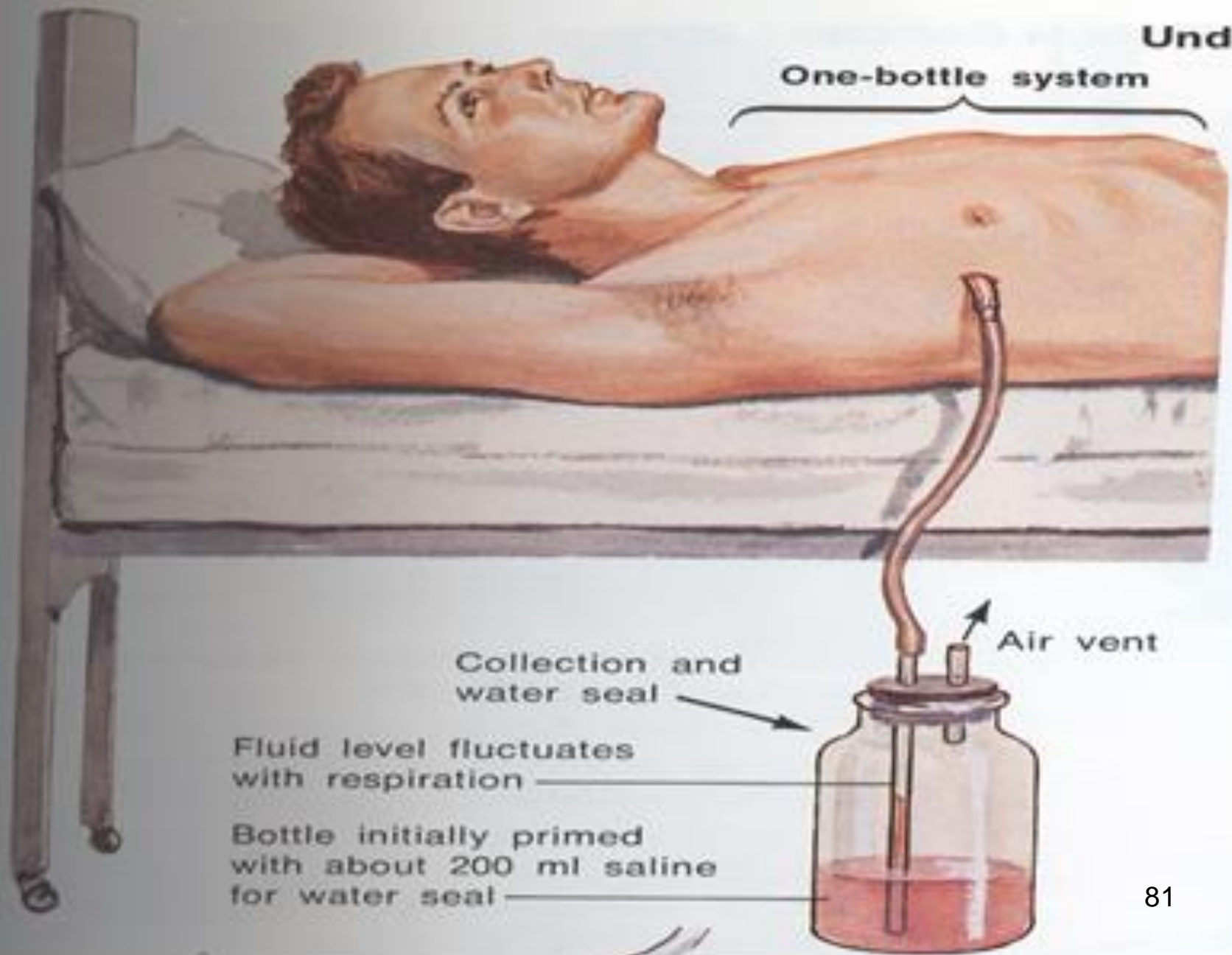
39528R
18-7-2000











Under

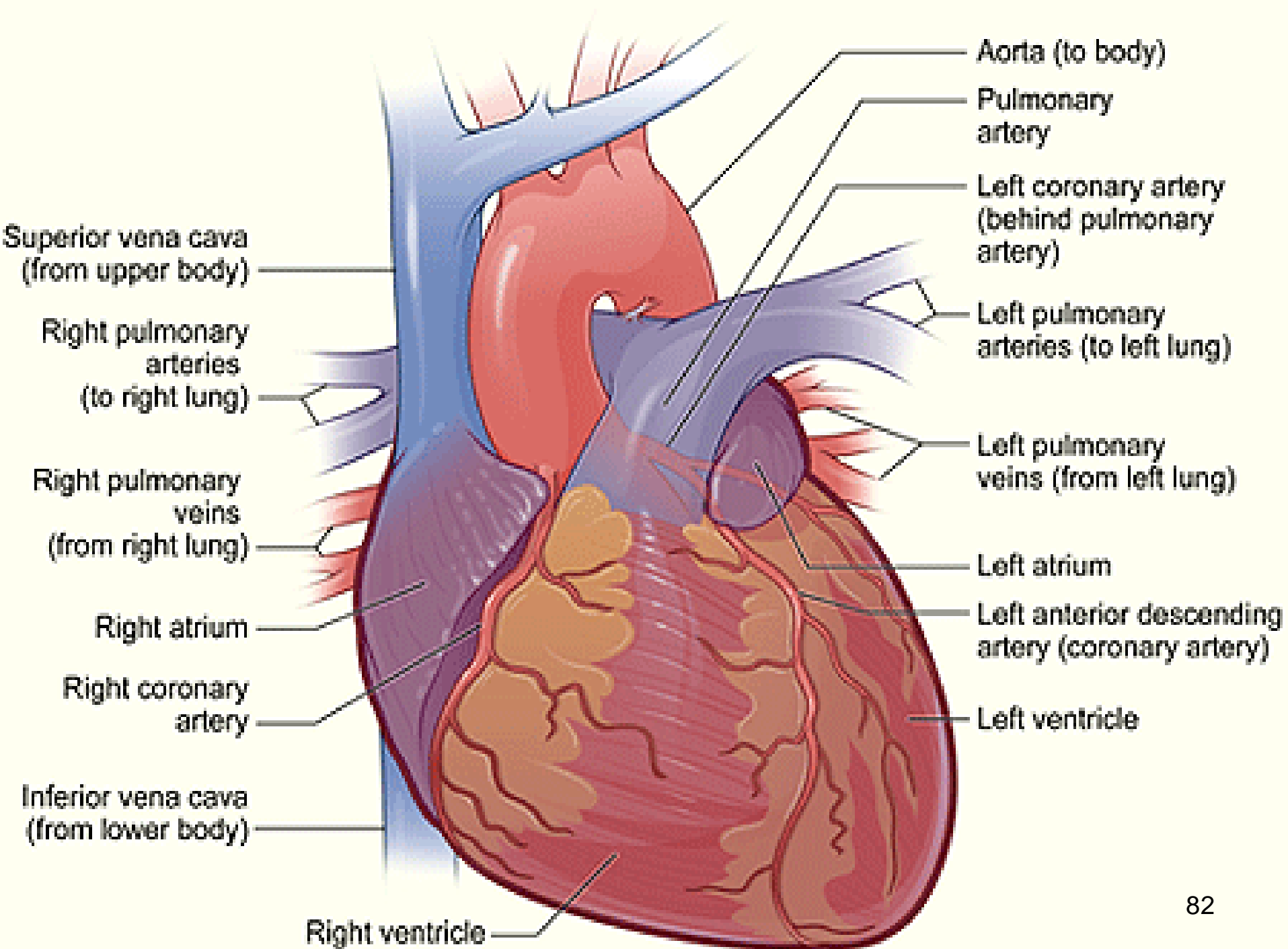
One-bottle system

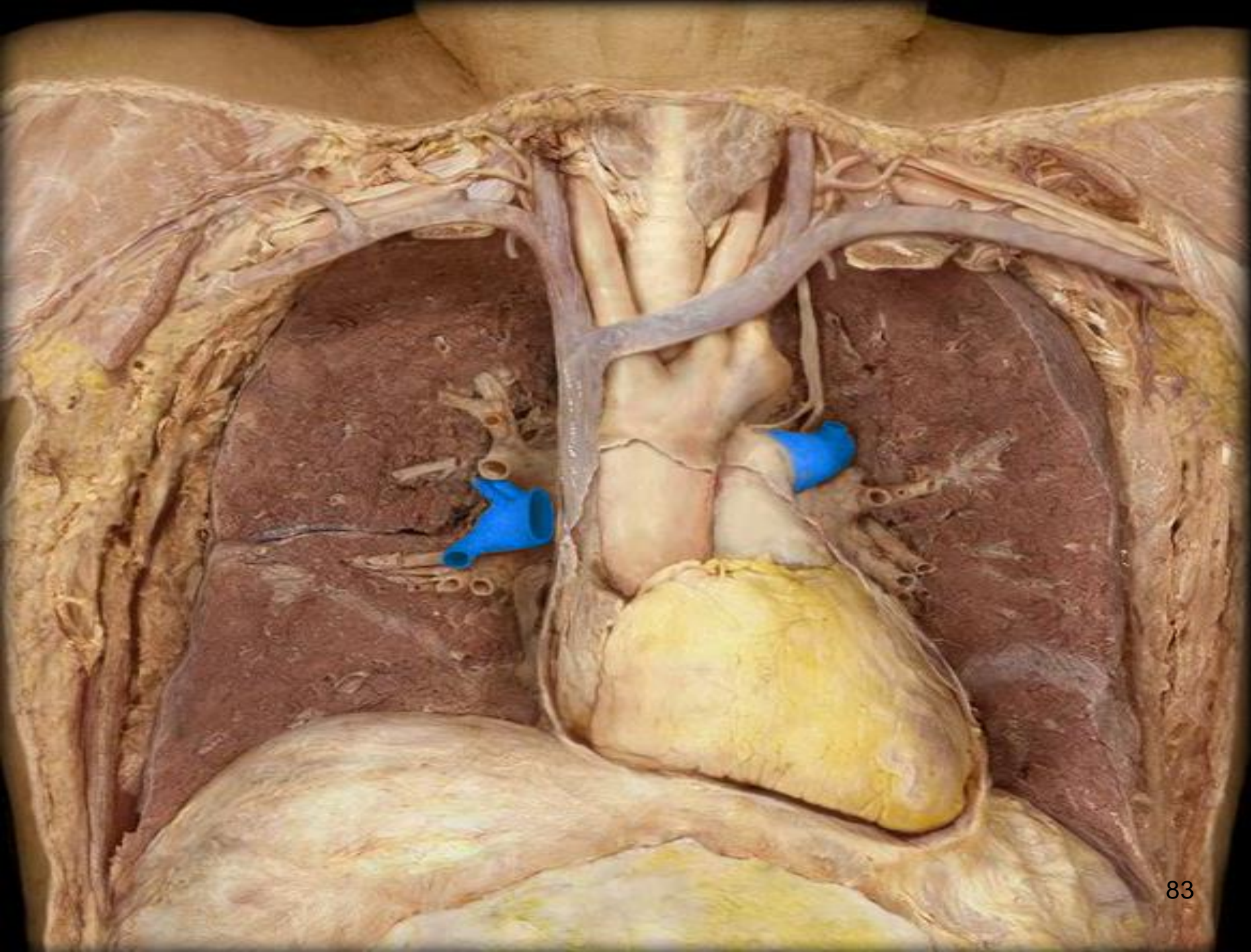
Collection and water seal

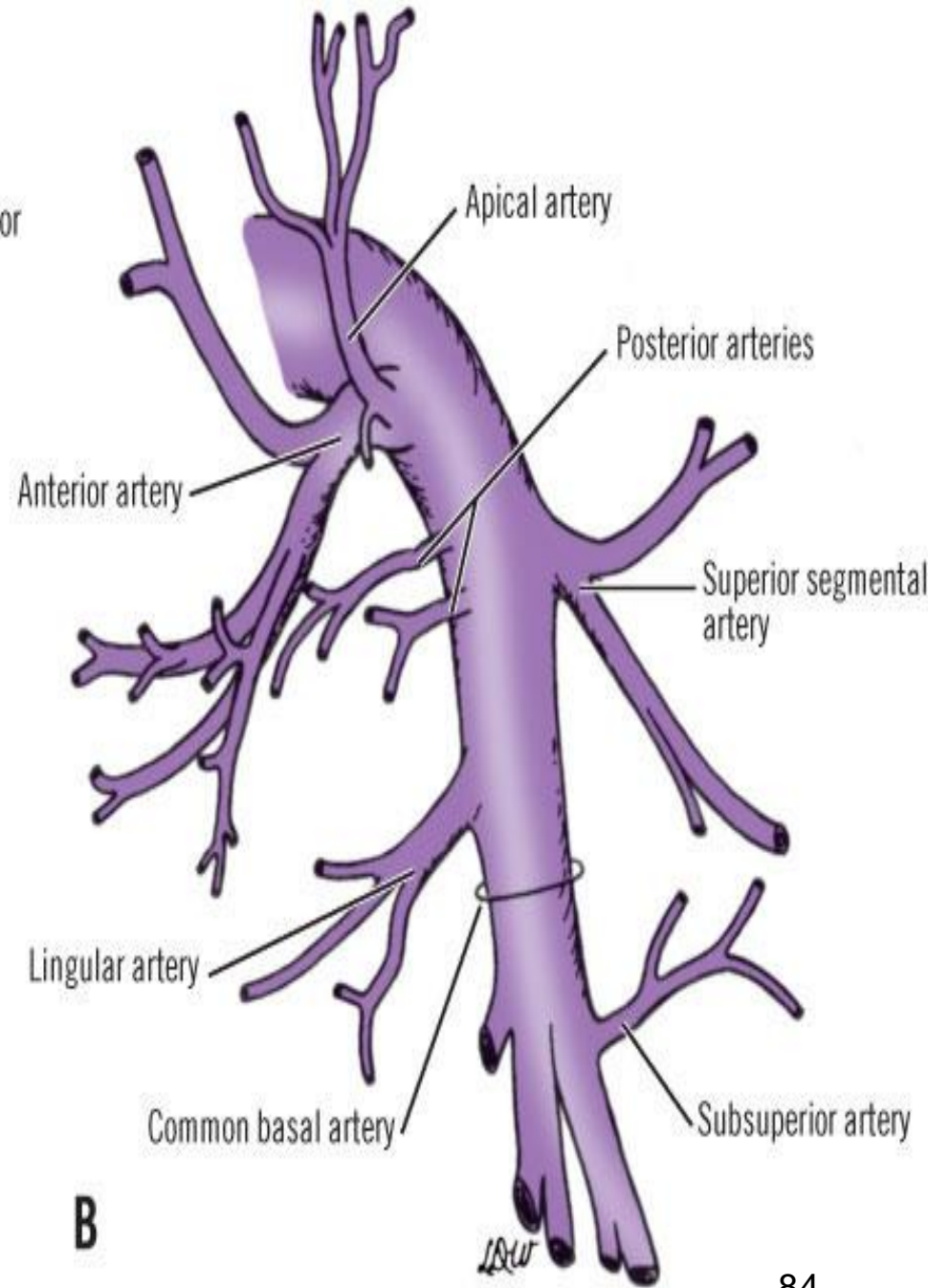
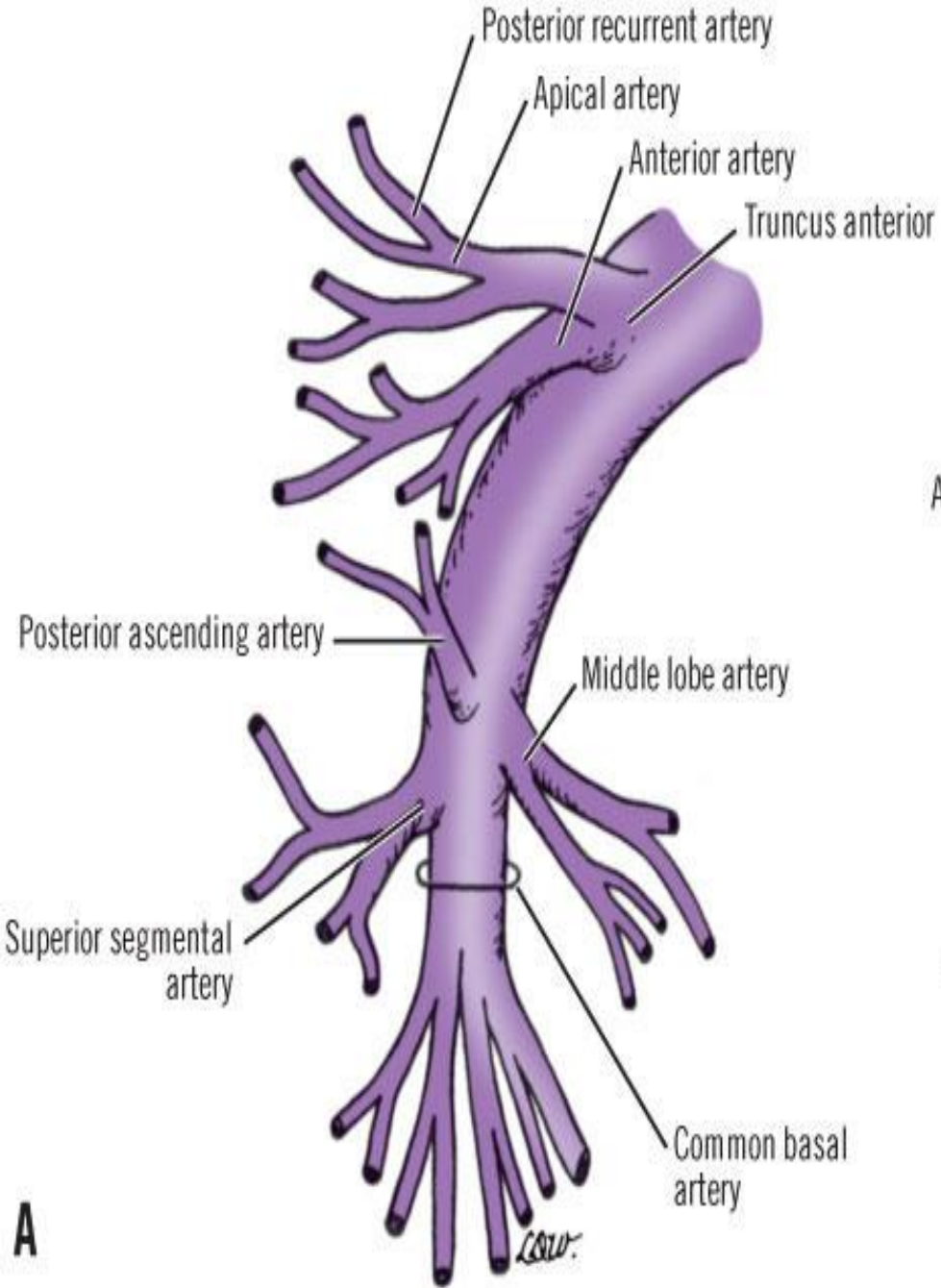
Air vent

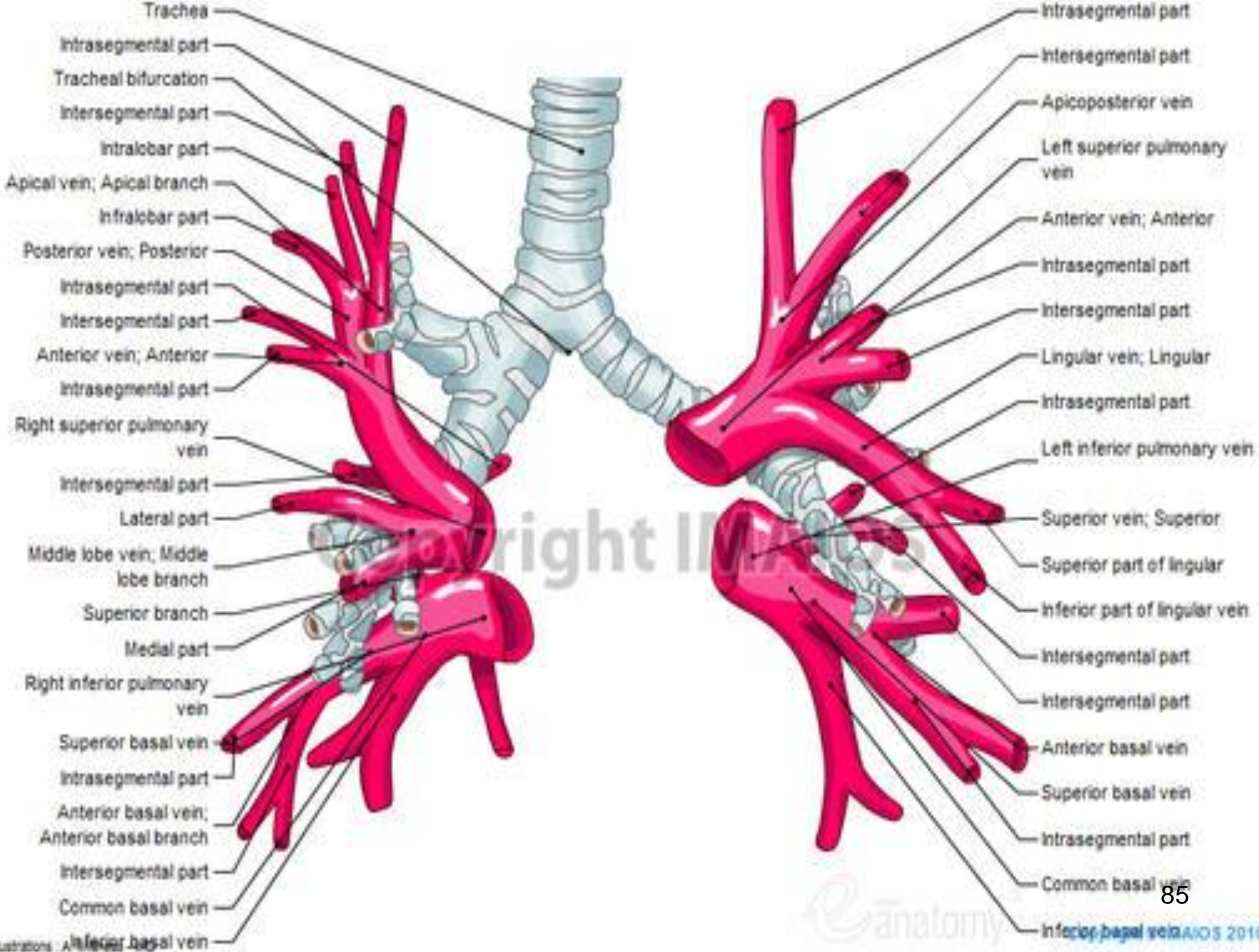
Fluid level fluctuates with respiration

Bottle initially primed with about 200 ml saline for water seal









The diaphragm

- It is a muscular and tendinous septum that separates the thoracic cavity from the abdominal cavity.

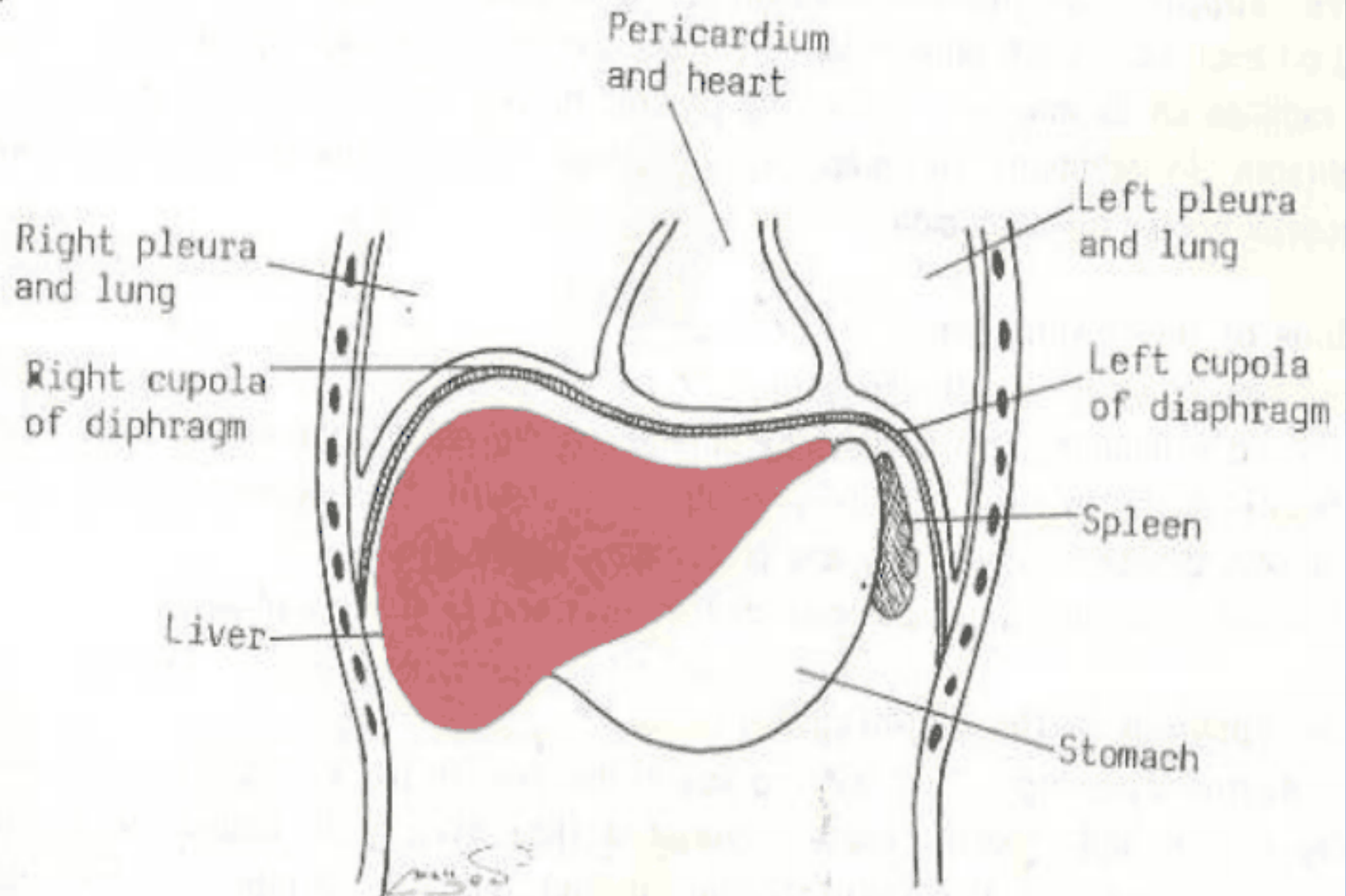
- It is the primary muscle of respiration.

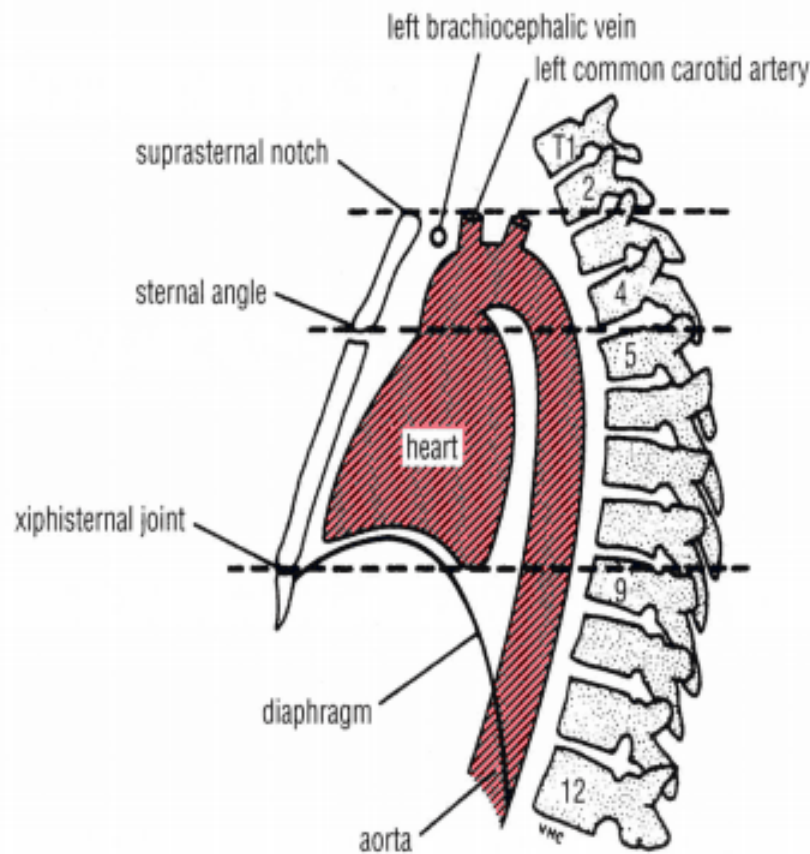
- ❖ Shape of the diaphragm :it is dome shaped, consists of a peripheral muscular part ,and a centrally tendon part.

Shape of Diaphragm

- ❖ It curves up into **right & left domes** ,or cupolae .
- ❖ **The right dome** reaches as high as the upper border of 5th rib (due to upward bulge of right lobe of liver) and **the left dome** at lower border of 5th rib.
The central tendon lies at level of xiphisternal joint.

Shape of Diaphragm :





- It is bounded **anteriorly** by xiphisternal junction (9th Th.V.).
- **Laterally** by ribs & costal cartilages.
- **Posteriorly** by 12th thoracic vertebra.

Figure Lateral view of the thorax showing the relationship of the surface markings to the vertebral

• **Origin:**

1. **Sternal origin** : by 2-slips from back of xiphoid process.
2. **Costal origin** : by 6-slips from inner surfaces of lower 6 ribs & their costal cartilages.
3. **Vertebral origin** : from the lumbar vertebrae by 2-crura (right & left), _____
3-arcuate ligaments (med./lat./, and median).

Vertebral origin (2-crura)

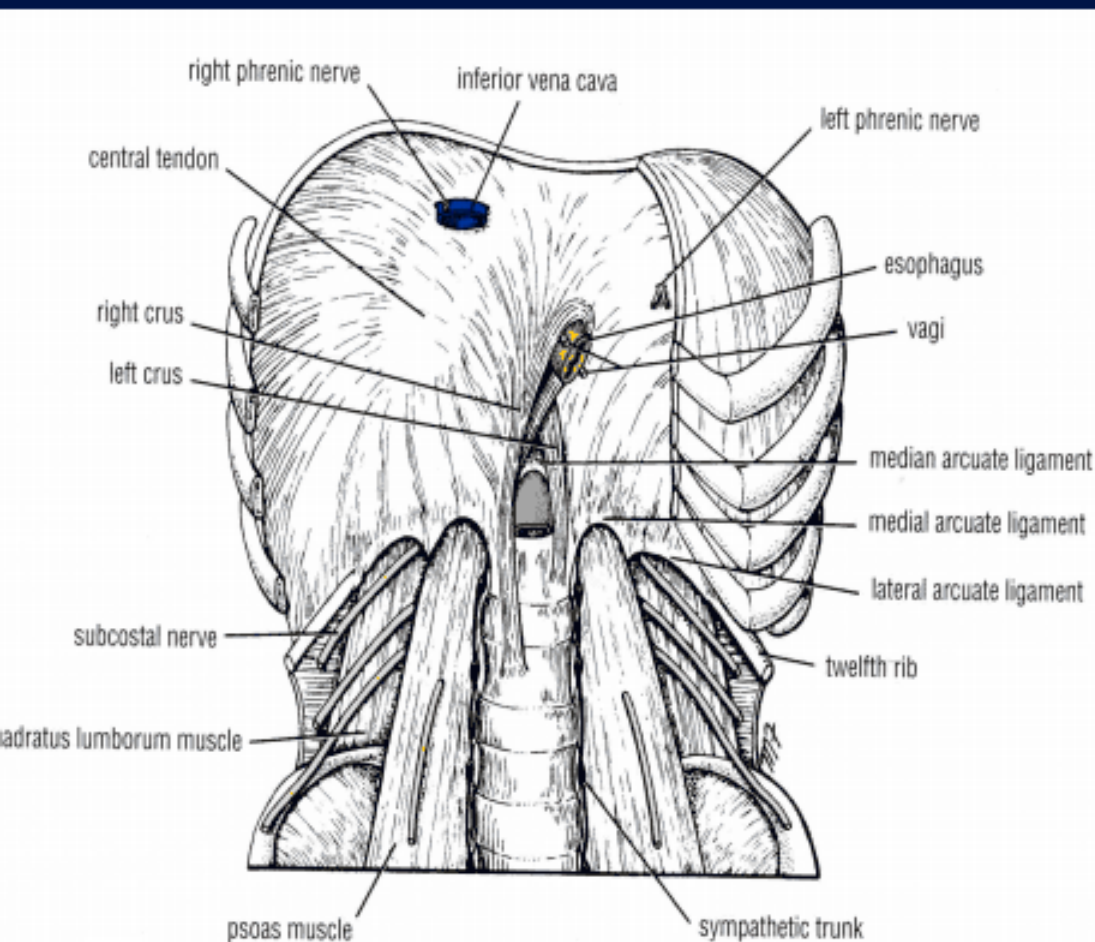
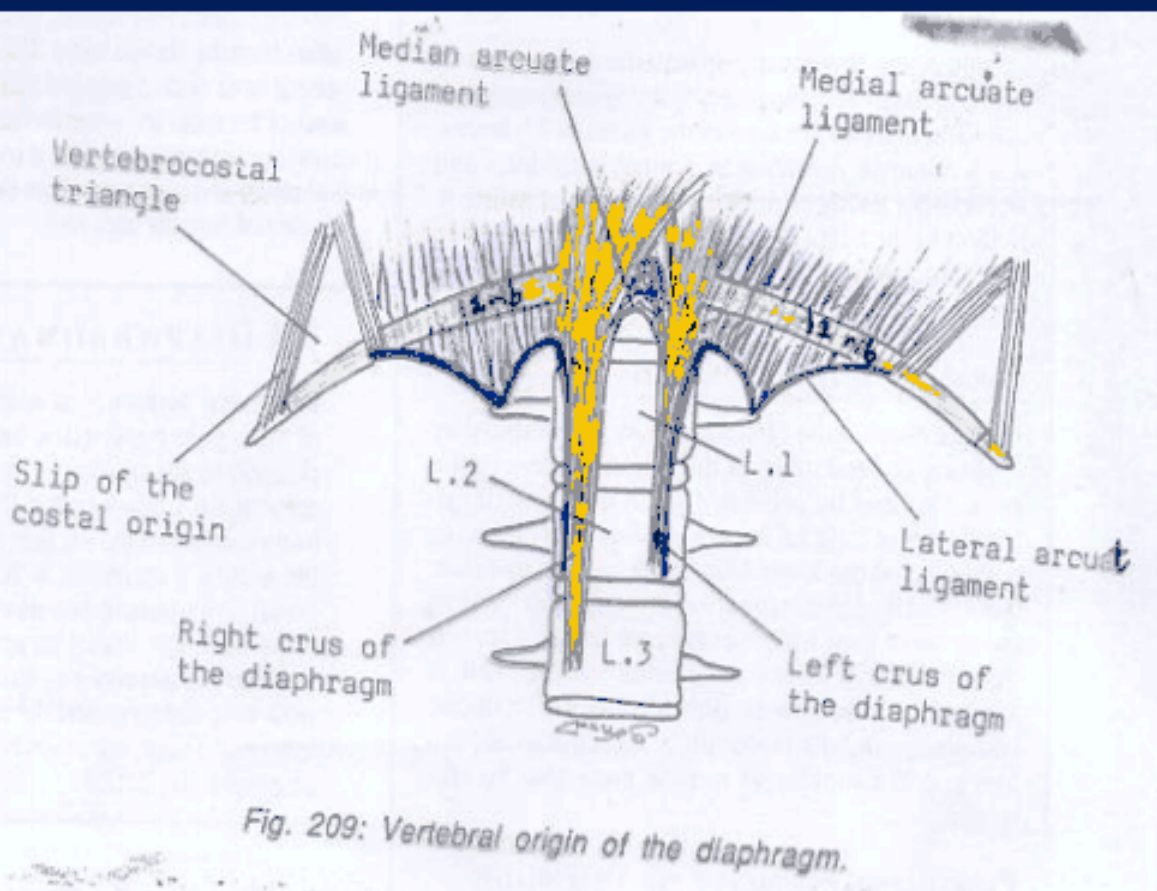


Figure 2 Diaphragm as seen from below. The anterior portion of the right side has been removed to show the sternal, costal, and vertebral origins of the muscle and the important structures that pass through it.

➤ **Right crus** : from the sides of upper 3-lumbar vertebrae & intervertebral discs. Some fibres surround the esophageal orifice in a **sling like loop**, it acts as a **sphincter** to the lower end of esophagus.

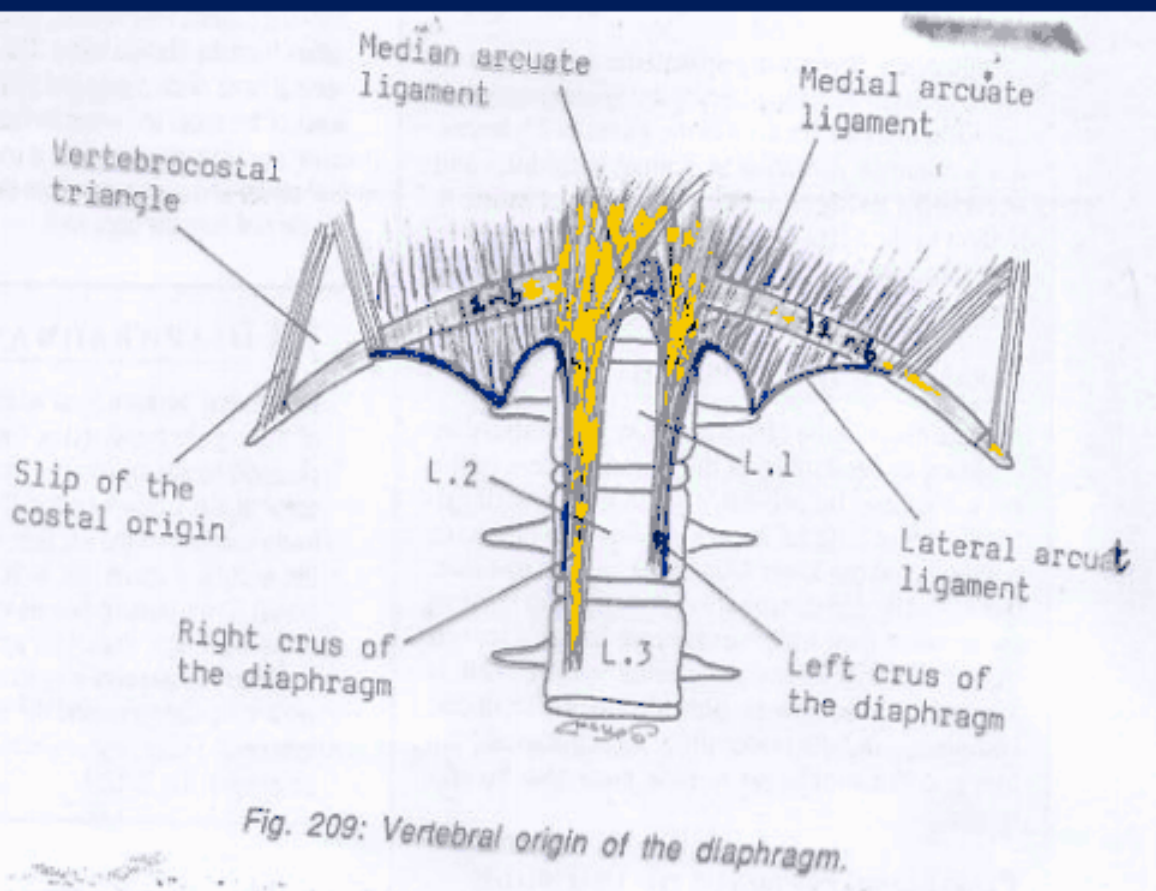
➤ **Left crus** : from sides of the upper 2-lumbar vertebrae & intervertebral discs.

Vertebral origin (3-arcuate ligaments)



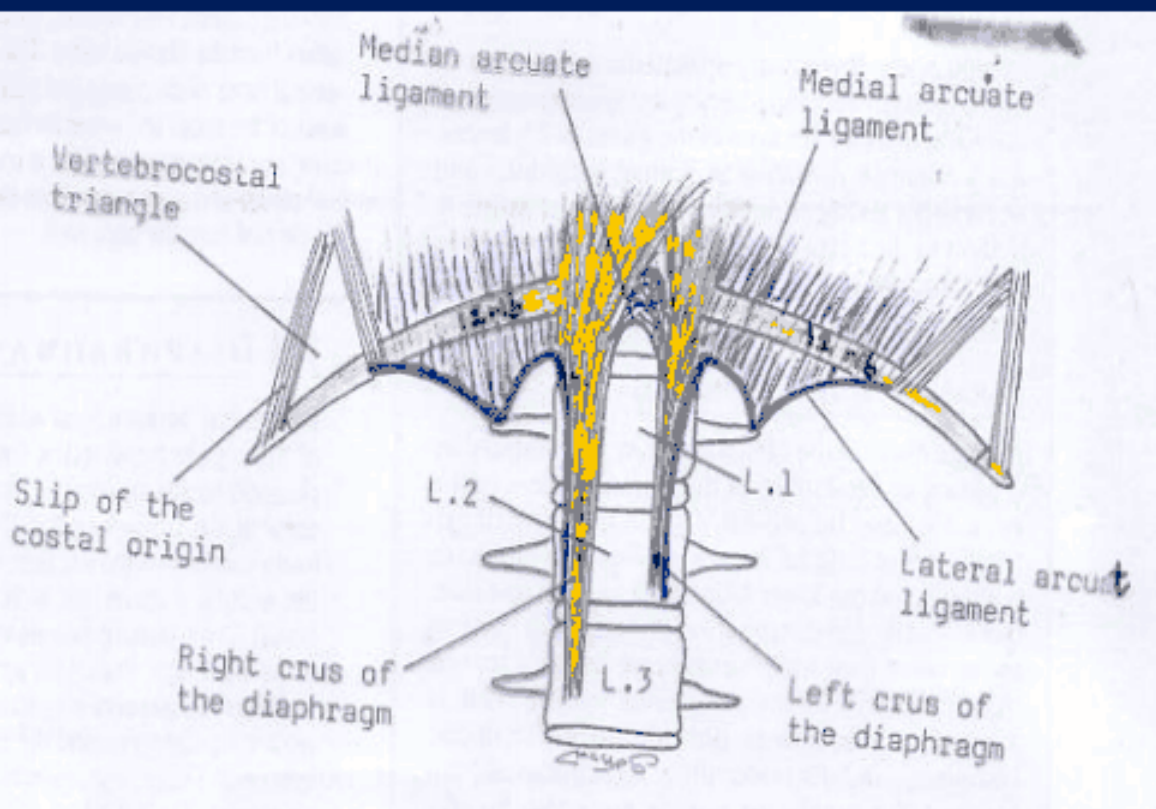
➤ **Median arcuate lig.:** it connects the fibrous medial borders of the 2-crura, and crosses over the aorta.

Vertebral origin (3-arcuate ligaments)



➤ **Lateral arcuate lig.** : it is the thickened upper margin of fascia covering the anterior surface of quadratus lumborum muscle, it extends from the tip of transverse process of 1st L.V. to the lower border of 12th rib.

Vertebral origin (3-arcuate ligaments)



➤ **Medial arcuate lig.:** it is the thickened upper margin of fascia covering ant.surface of psoas muscle, it extends from side of body of L2.vertebra to the tip of transverse process of 1st L.V.

Insertion of diaphragm

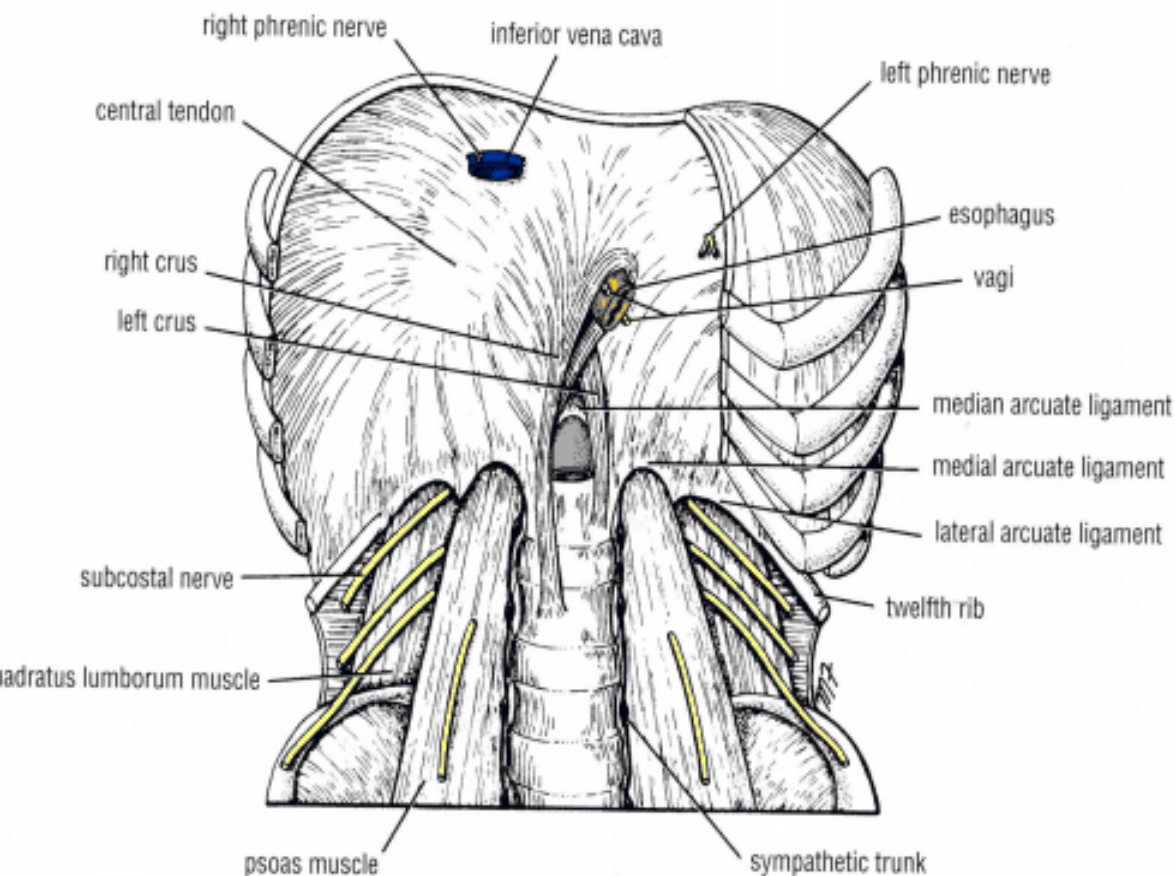


Figure 2 Diaphragm as seen from below. The anterior portion of the right side has been removed to show the sternal, costal, and vertebral origins of the muscle and the important structures that pass through it.

➤ Into the **central tendon (lies at the level of xiphisternal joint)**, which is partially fused with the inferior surface of the fibrous pericardium and supports the heart.

■ Main Openings in the diaphragm :

There are 3 main openings

1. **Aortic: at T12,- ---aorta, thoracic duct, azygos V.**
2. **Esophageal : at T10 , -- esophagus, 2 vagi, esophageal branches of left gastric vessels.**
3. **Caval : at T8 in the central tendon , --- I.V.C. , right phrenic.**

■ **Action** ■ It is the primary Ms.of respiration , on contraction, the diaphragm pulls down its central tendon & increases the vertical diameter of the thorax during inspiration.

Openings of Diaphragm

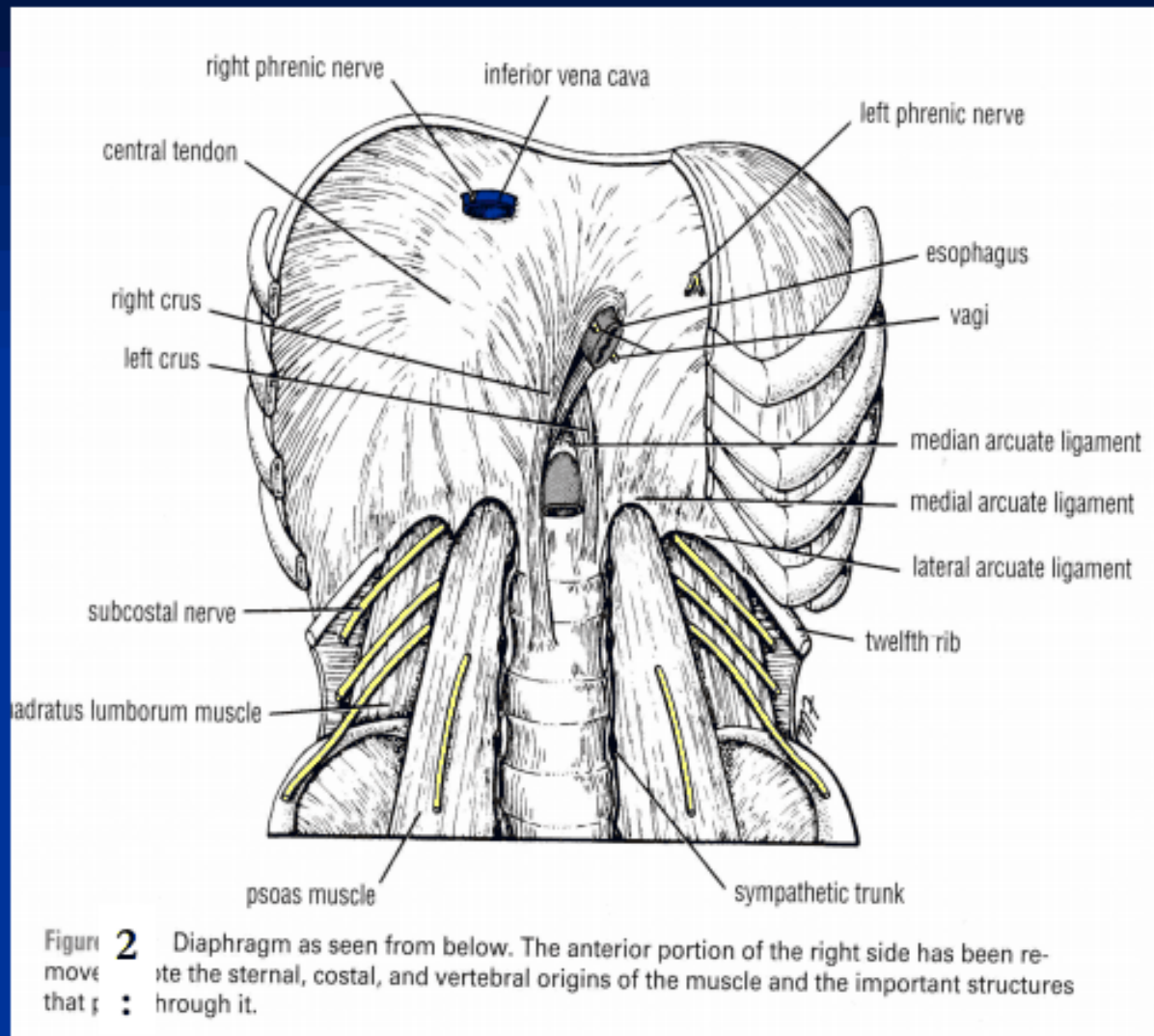
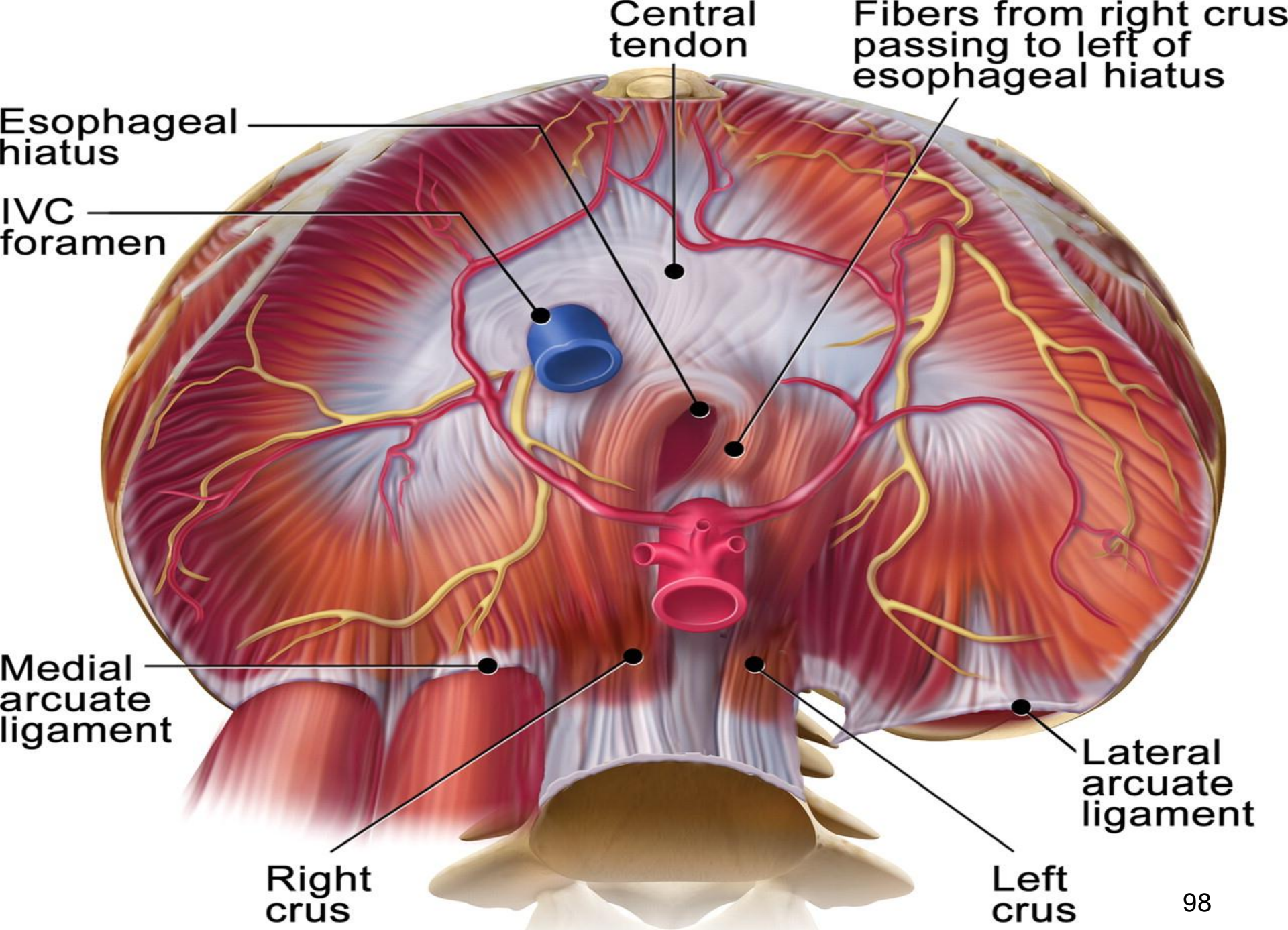


Figure 2 Diaphragm as seen from below. The anterior portion of the right side has been removed to show the sternal, costal, and vertebral origins of the muscle and the important structures that pass through it.



Nerve supply :

1. Motor supply :

Phrenic nerve (C3 ,4 ,5)only. it pierces the diaphragm & ramifies on its inferior surface.

2. Sensory supply :

- ❖ **Lower 6 intercostal nerves...to periphery of diaphragm**
- ❖ **Also, Phrenic Nerve... to parietal pleura & pericardium covering the central part.**

Clinical Notes : Acquired Hernia :

➤ **Esophageal hiatus hernia** : may occur in middle age, due to weak musculature around the esophageal opening in the diaphragm.

➤ It may be either **sliding**, or **paraesophageal** hernia (alongside the esophagus).

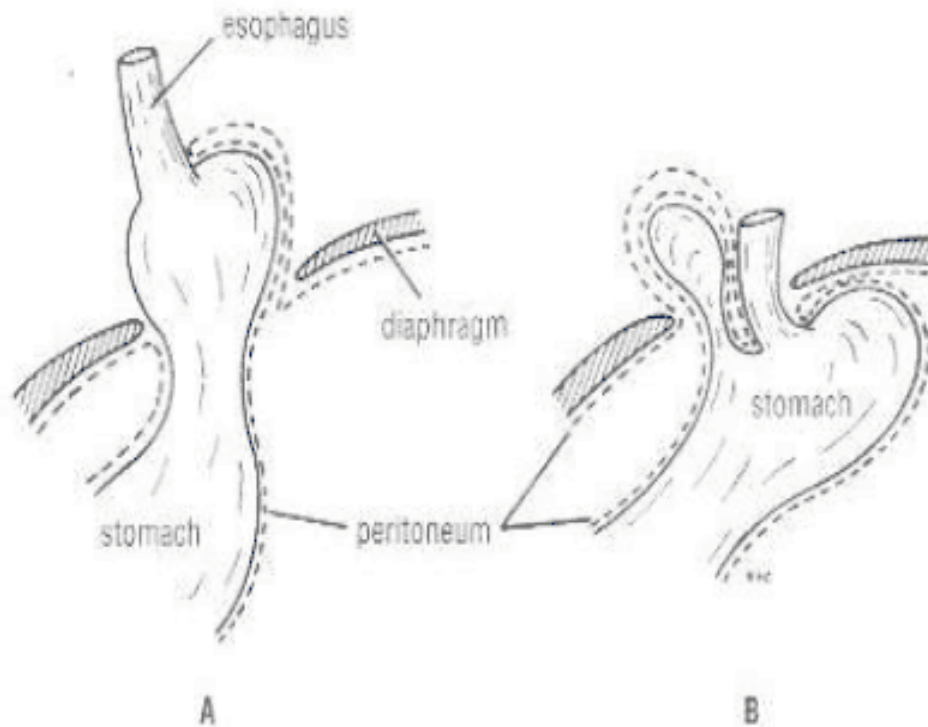


Figure 2-17 A. Sliding esophageal hernia. B. Paraesophageal hernia.

Other Clinical Notes : Hiccup

- It is involuntary spasmodic contraction of diaphragm, accompanied by approximation of vocal folds & closure of glottis of larynx.
- it is **common in normal individuals** after eating or drinking as a result of **gastric irritation of vagus nerve endings**.
- It may be due to pleurisy ,peritonitis ,or pericarditis.

Referred Pain to the Shoulder :

- The sensory innervation of the central part of diaphragm is the phrenic N(C3,4,5) .
- The sensory nerve supply to skin over the shoulder is the supraclavicular nerve(C3,4).
- So, pain due to irritation of pleura or pericardium covering the central part of diaphragm may be referred to the shoulder.

Paralysis of Diaphragm :

- As a result of injury of the phrenic nerve in the neck .
- As a result of stab wound to the chest ,It leads to inspiratory defects.

Quiet Inspiration :

- 1st rib is fixed by scaleni muscles ,the intercostal Ms.elevate the other ribs upward towards 1st rib (A).
- The diaphragm descends, and the liver provides the platform that enables the diaphragm to assist the intercostal Ms.in raising the lower ribs (fig.C).
- So,increase the capacity & volumn of thoracic cavity leads to decrease the pressure in thorax & lungs than in the atmospheric pressure, which sucks air into the lungs till becomes equal each other.
- It is an active process.

Quiet Expiration :

- It is a **passive process** due to elastic recoil of lungs and relaxation of intercostal Ms.& diaphragm. So, the **ribs depressed** and the **diaphragm elevated** to its normal position.
- So, the lungs become recoil & reduced in size ,so the **pressure is increased** inside the lungs enough to **flow out of air outside** till the pressure equal to the atmospheric pressure.



Thoracic Wall Dimensional Changes During Respiration

- Lateral dimensional changes occur with rib movements.
- **Elevation** of the ribs increases the lateral dimensions of the thoracic cavity, while **depression** of the ribs decreases the lateral dimensions of the thoracic cavity.



Muscles that Move the Ribs

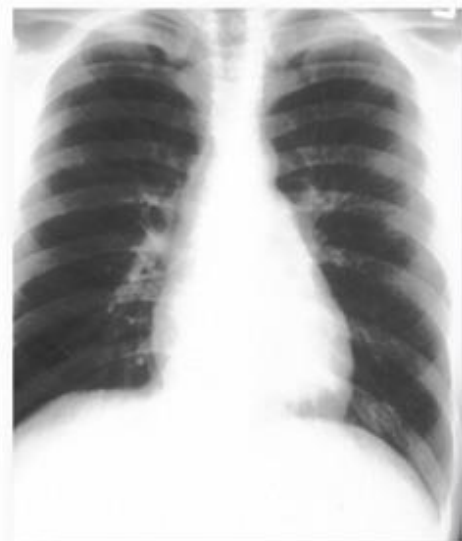
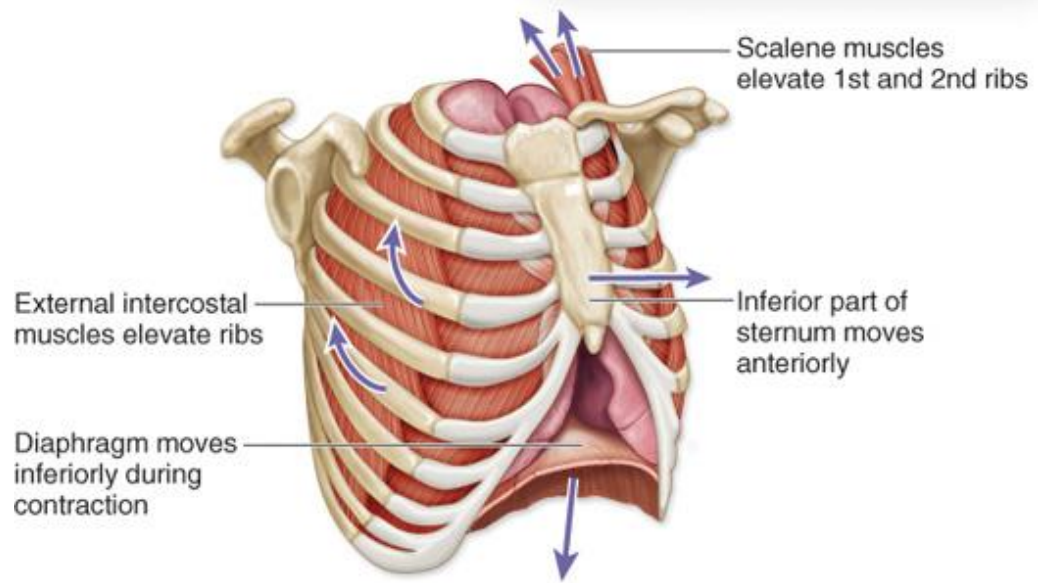
- The **scalenes** help increase thoracic cavity dimensions by elevating the first and second ribs during forced inhalation.
- The ribs **elevate** upon contraction of the external intercostals, thereby increasing the transverse dimensions of the thoracic cavity during inhalation.
- Contraction of the internal intercostals **depresses** the ribs, but this only occurs during **forced** exhalation.
- **Normal** exhalation requires no active muscular effort.
- A small **transversus thoracis** extends across the inner surface of the thoracic cage and attaches to ribs 2–6. It helps depress the ribs.



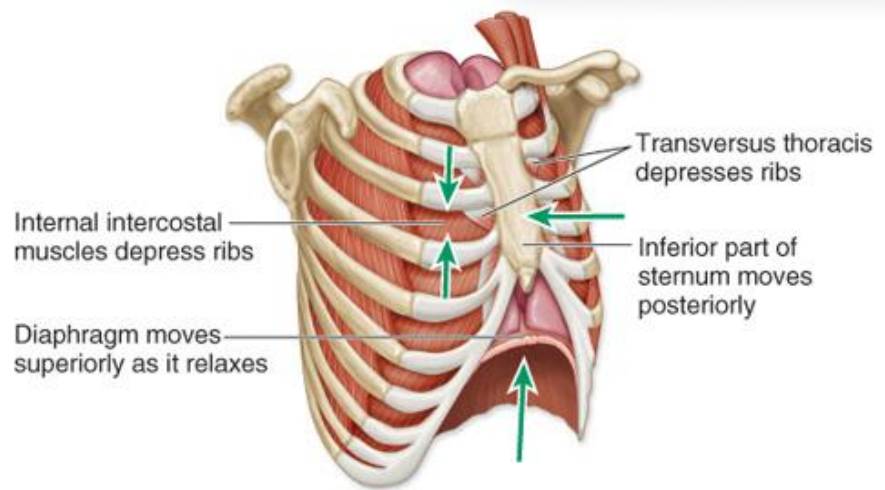
Muscles that Move the Ribs

- Two posterior thorax muscles also assist with respiration. These muscles are located deep to the trapezius and latissimus dorsi, but superficial to the erector spinae muscles.
- The **serratus posterior superior** elevates ribs 2–5 during inhalation, and the **serratus posterior inferior** depresses ribs 8–12 during exhalation.
- In addition, some **accessory muscles** assist with respiratory activities.
- The **pectoralis minor**, **serratus anterior**, and **sternocleidomastoid** help with forced inhalation, while the **abdominal muscles** (external and internal obliques, transversus abdominis, and rectus abdominis) assist in active exhalation.

Inhalation

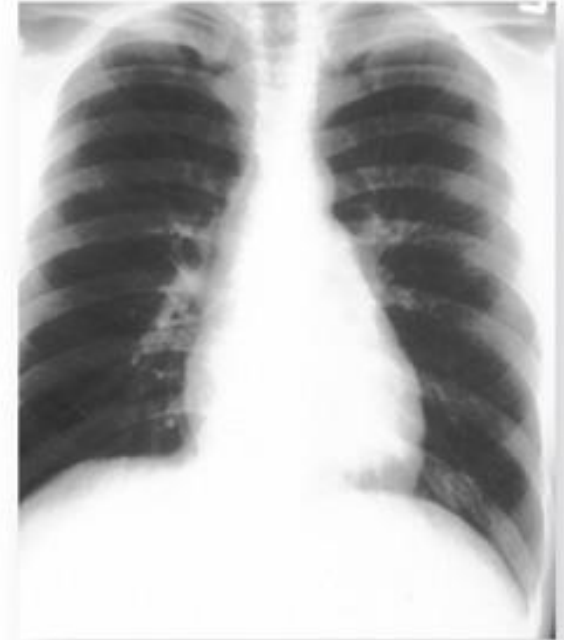
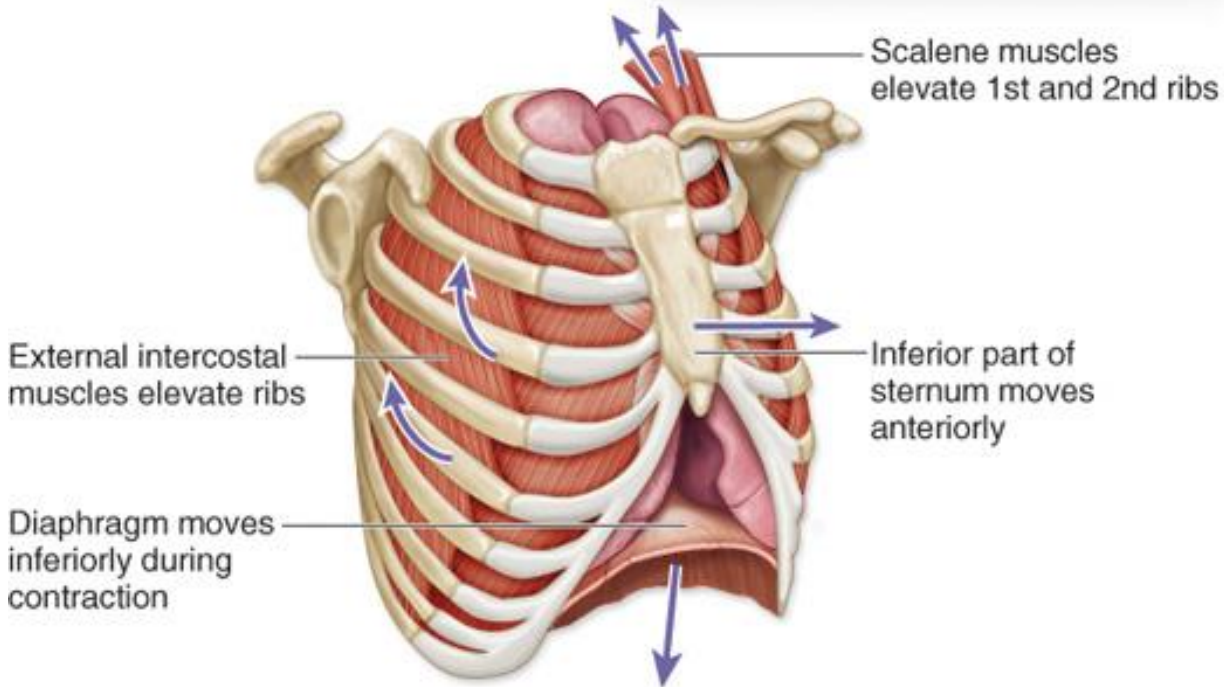


Exhalation



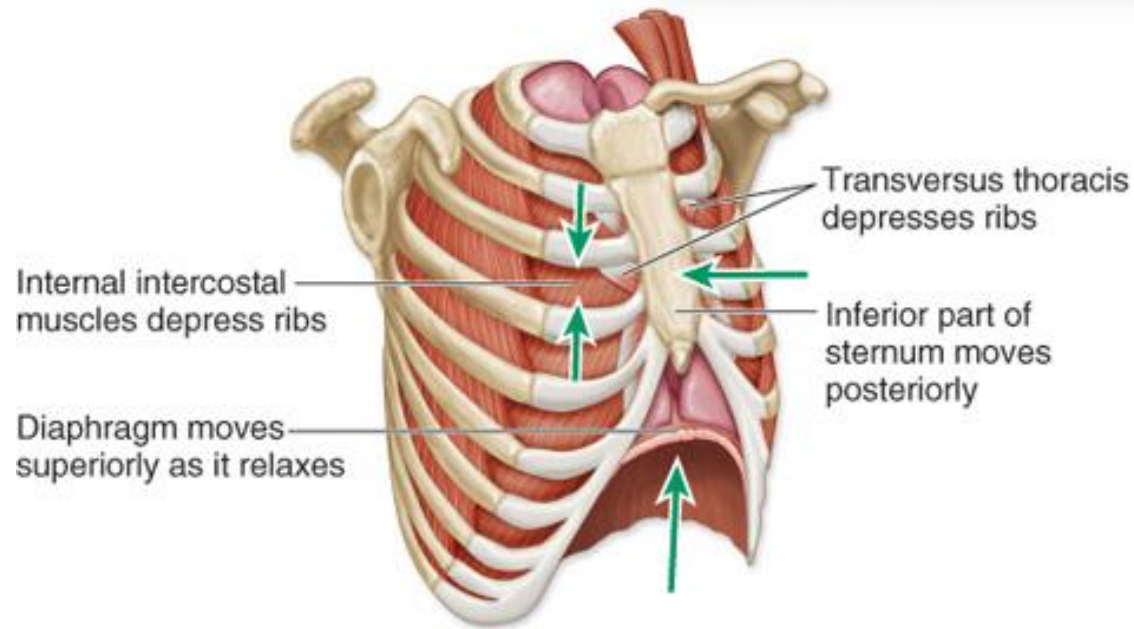
Copyright © The McGraw-Hill Companies, Inc. Permission required for reproduction or display.

Inhalation

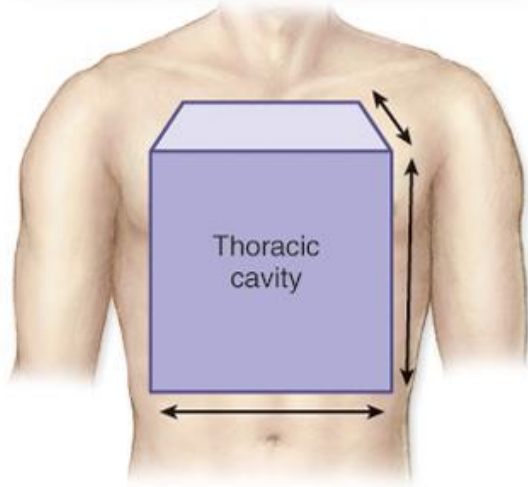


Copyright © The McGraw-Hill Companies, Inc. Permission required for reproduction or display.

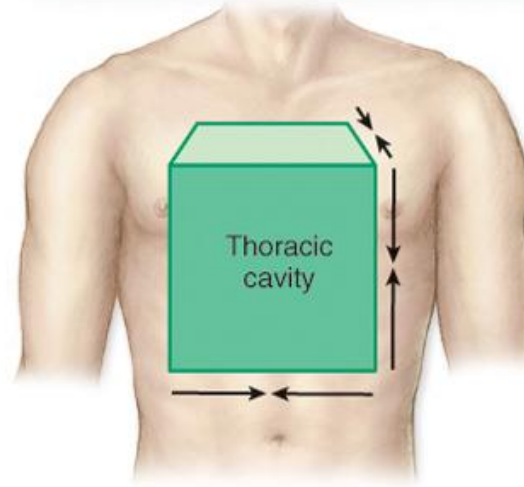
Exhalation



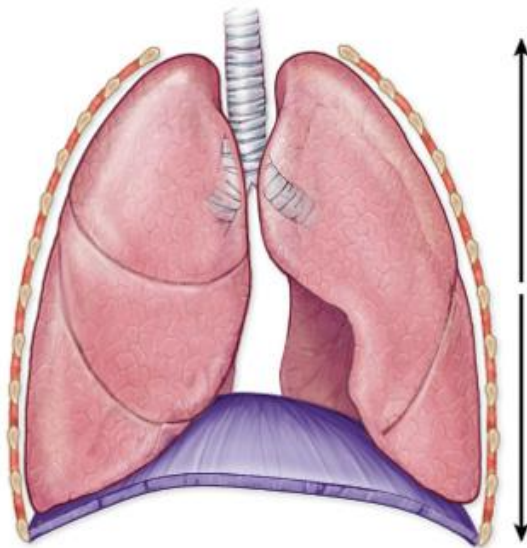
Inhalation



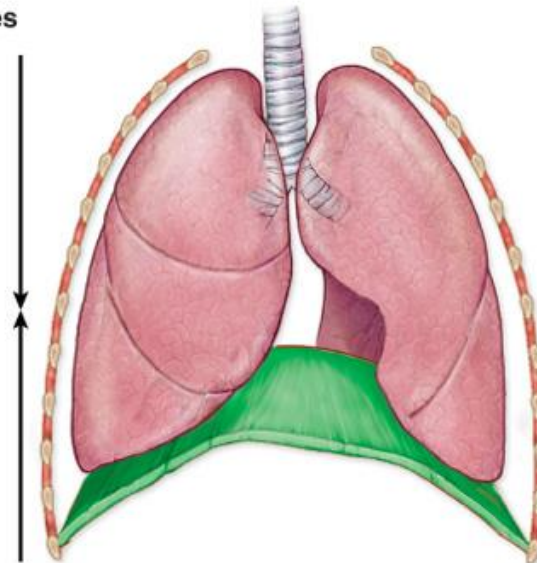
Exhalation



Vertical changes

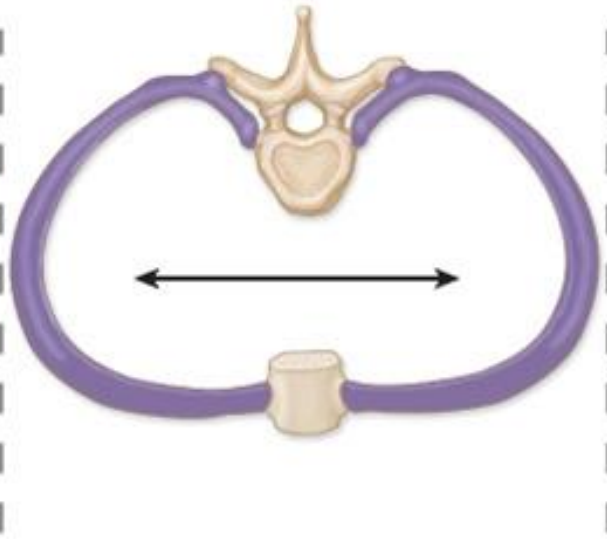


Diaphragm contracts; vertical dimensions of thoracic cavity increase.

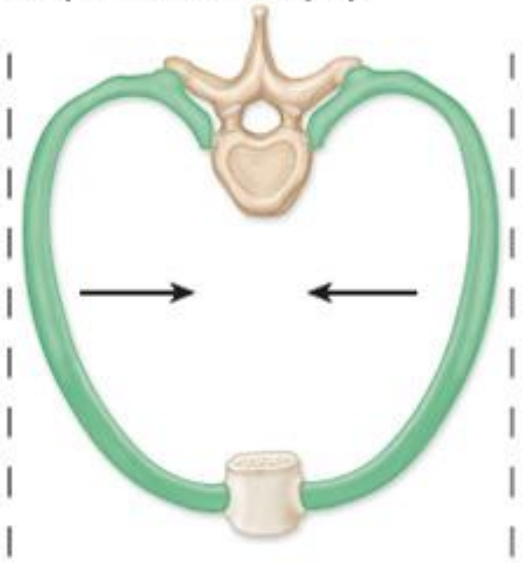


Diaphragm relaxes; vertical dimensions of thoracic cavity narrow.

Lateral changes

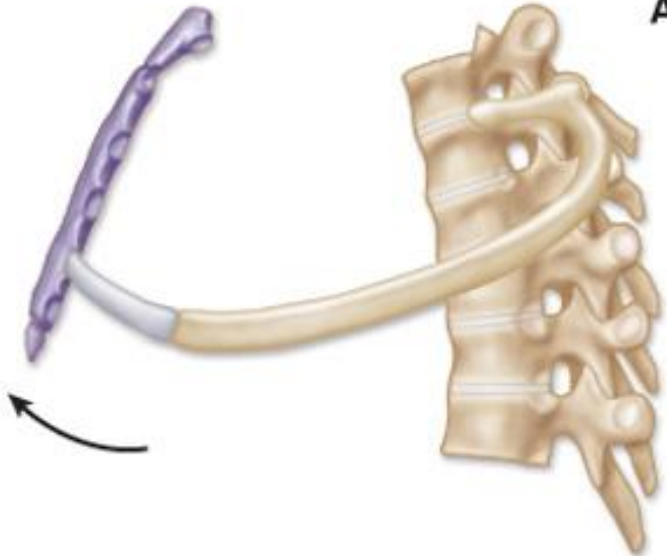


Ribs elevated and thoracic cavity widens.

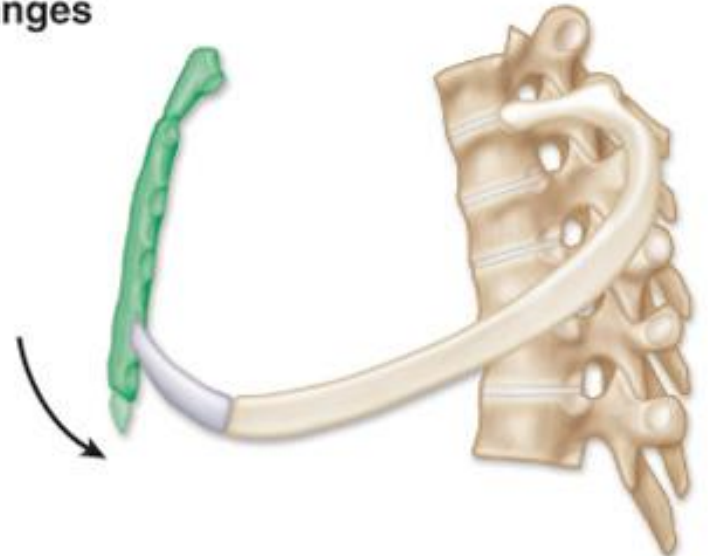


Ribs depressed and thoracic cavity narrows.

Anterior-posterior changes



Inferior portion of sternum moves anteriorly.



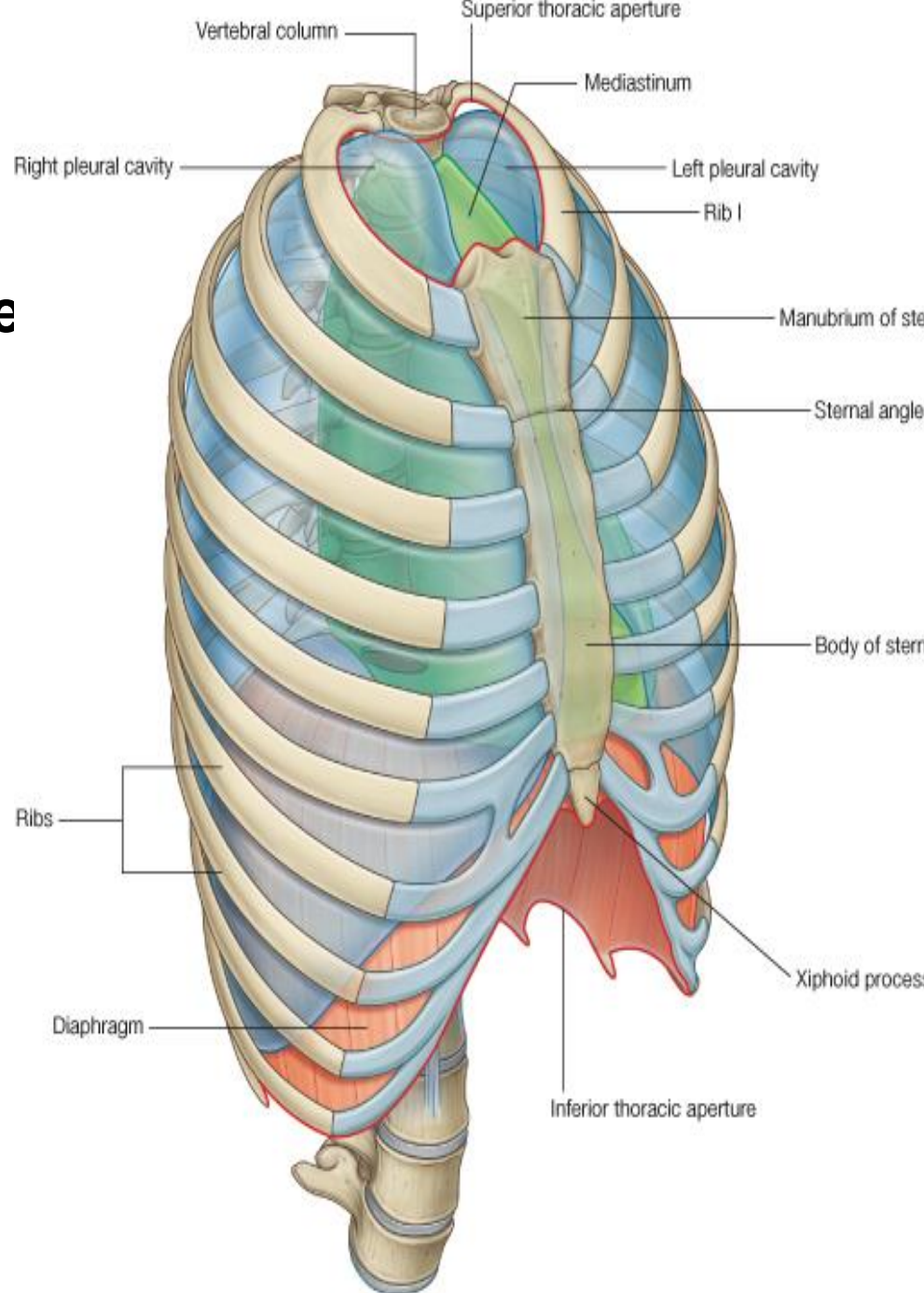
Inferior portion of sternum moves posteriorly.

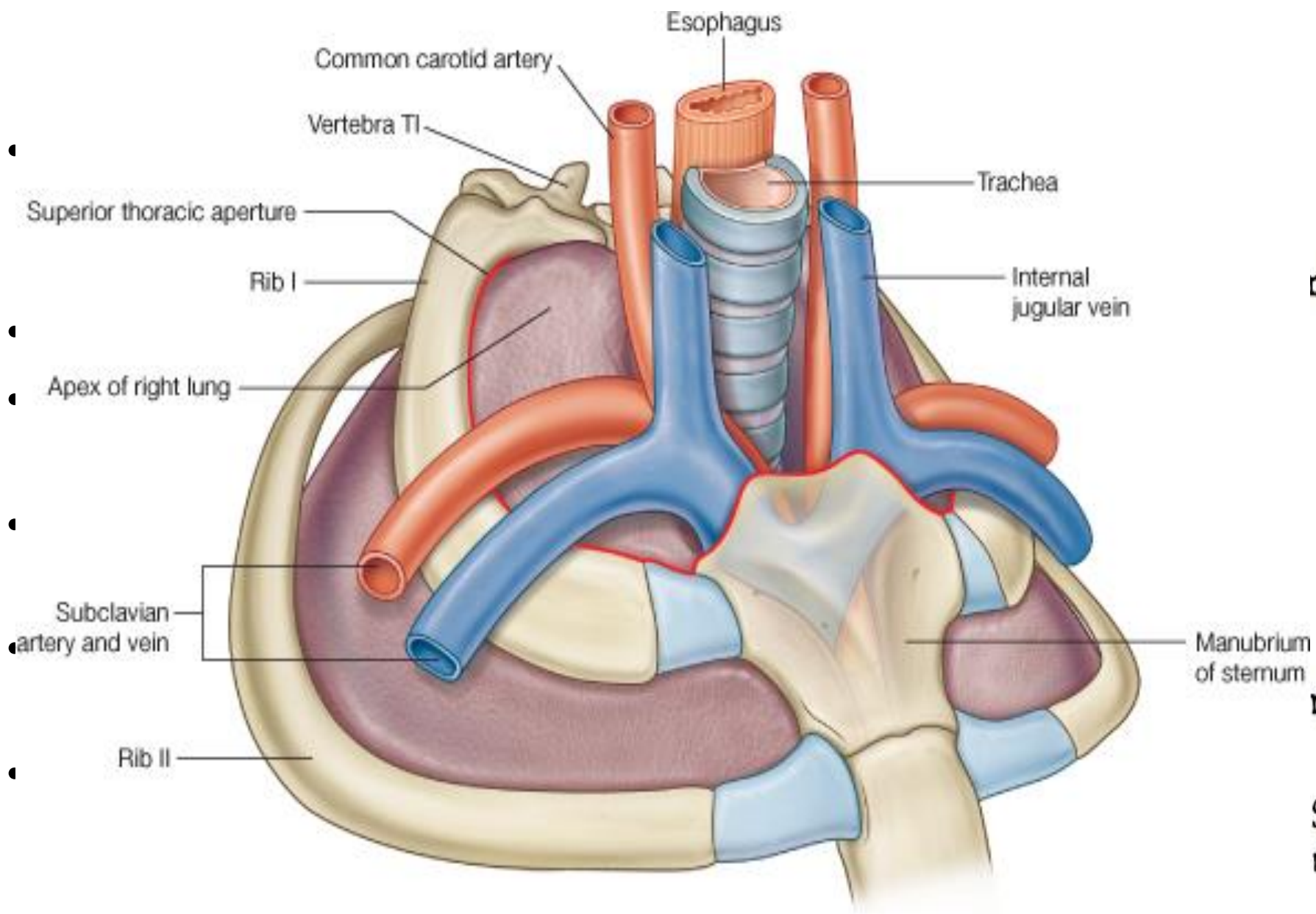
THORACIC WALL

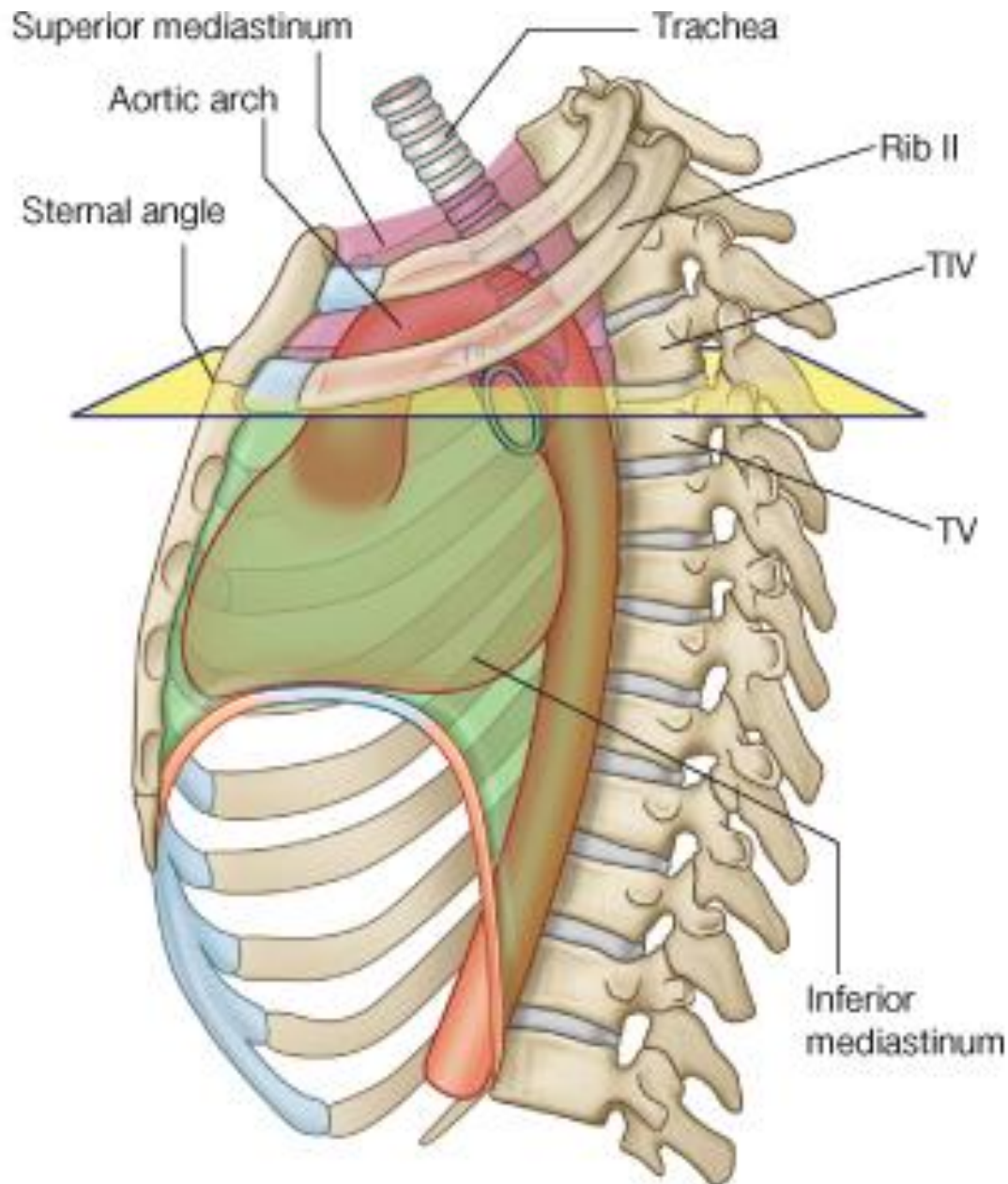
د تھمیر محمد الرزاق

أنطائي جراحة صدر

- Thoracic cage is an osteo-cartilagenous conical cage which has a narrow inlet & a wide outlet ?
- **Boundaries of thoracic cage**
- **Ant:** Sternum, Costal cartilages and ribs.
- **Post:** Thoracic vertebrae and ribs.
- **Lat:** Ribs.
 - **Thoracic Inlet (or outlet)**
- **Ant:** Upper border of manubrium sterni.
- **Post:** 1st thoracic vertebra.
- **On each side:** 1st rib & 1st costal cartilage.
- It is sloping downwards & forward.



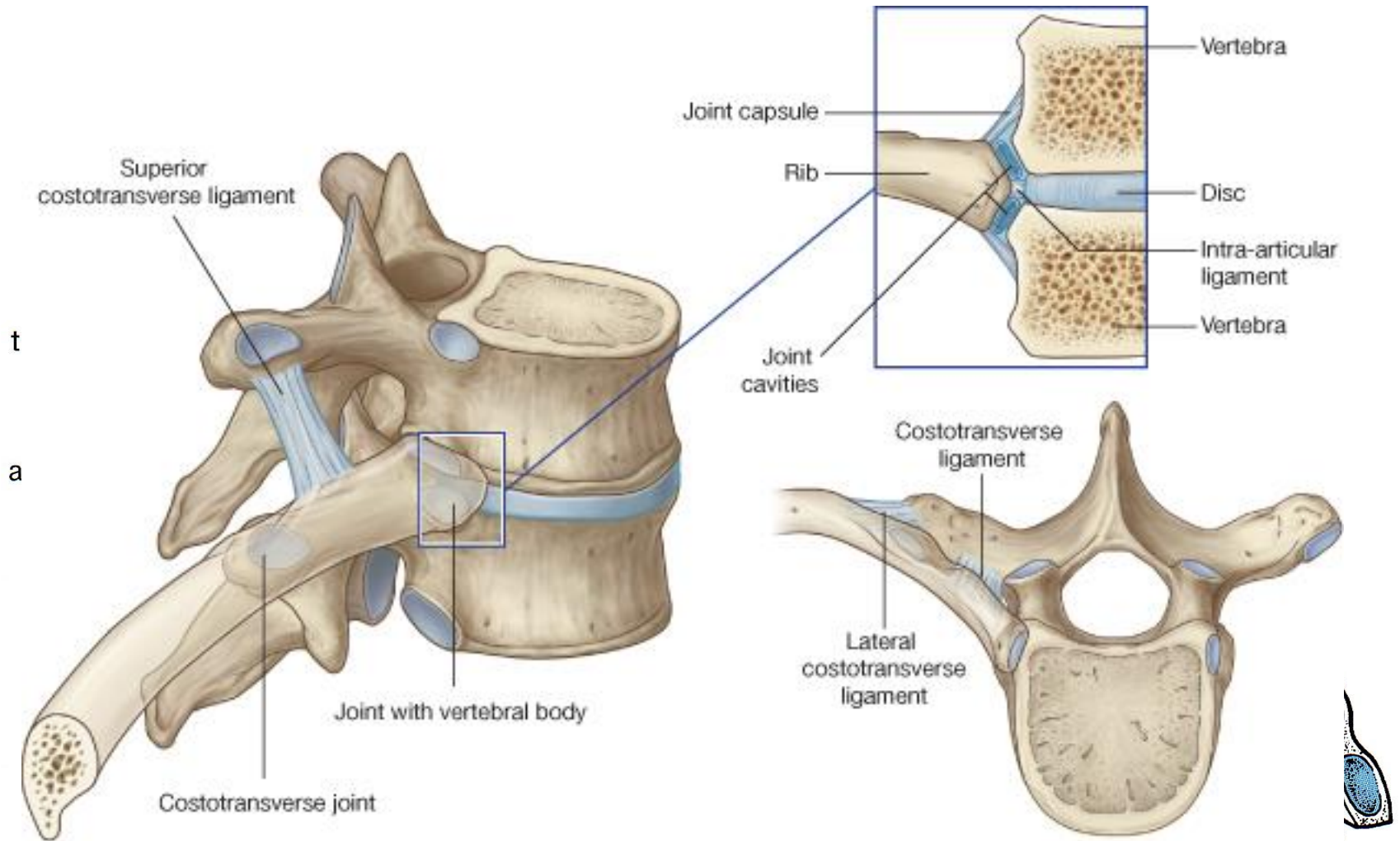




cess
 tubercle
 ir process
 rib head

• T
 • F
 • E
 • C
 • S
 • T
 • S
 • C
 • R
 • V
 • S

Articulation between Thoracic

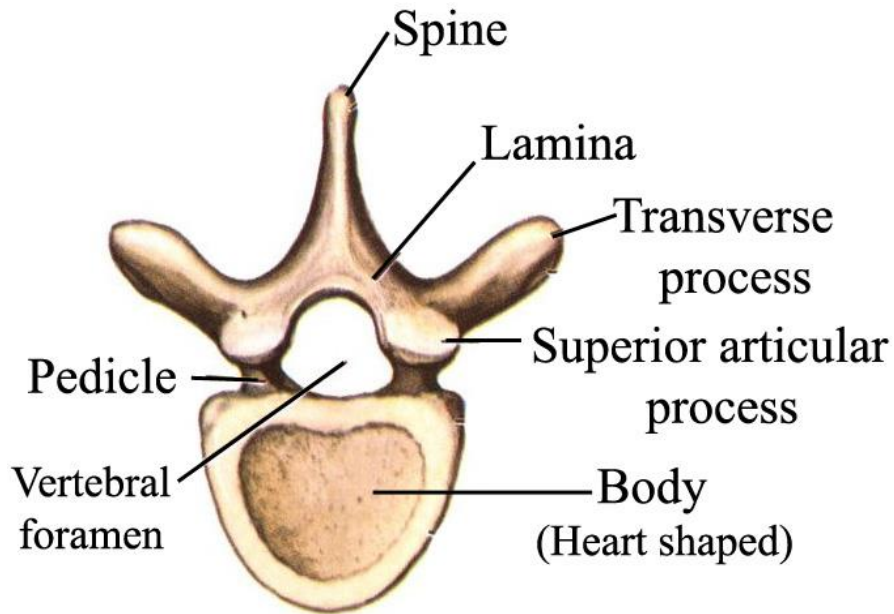


© Elsevier, Drake et al: Gray's Anatomy for Students - www.studentconsult.com

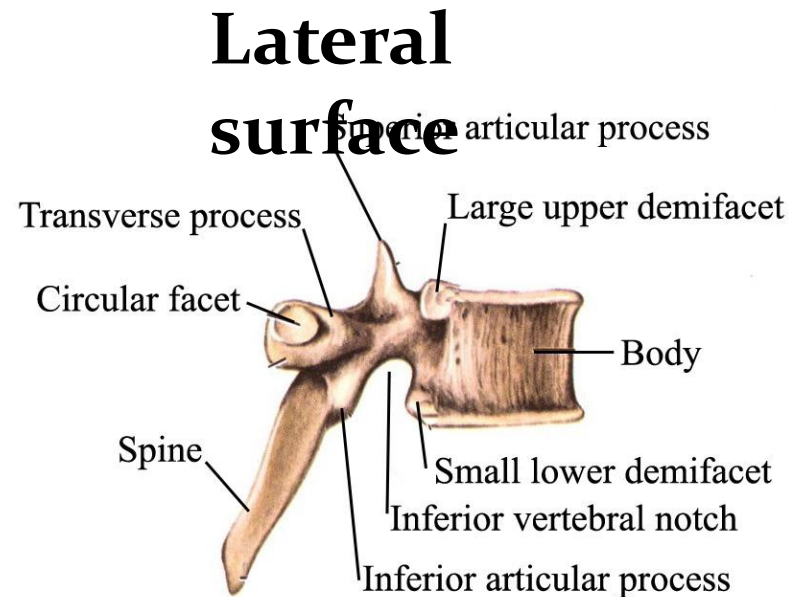
CROSS SECTION OF T10 ← costal groove

costal cartilage

Typical thoracic vertebra



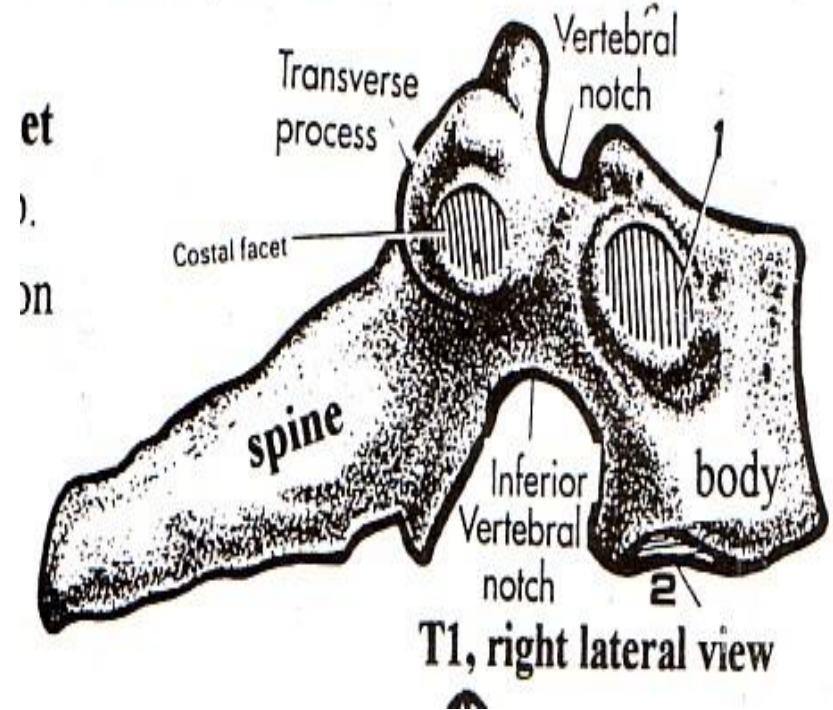
Superior surface



- **Atypical (Non typical)** thoracic vertebrae.
- **1st, 10th, 11th and 12th**
 - **T1:**
- Has a complete facet.
- One very small inferior demifacet.
- Spine nearly horizontal
- Has costal facet in transverse process for the tubercle of first rib.
- It has a small body, looks like a cervical vertebra.

1st Thoracic Vertebra

Vertebrae (1st, 10th, 11th & 12th)



- **T10**

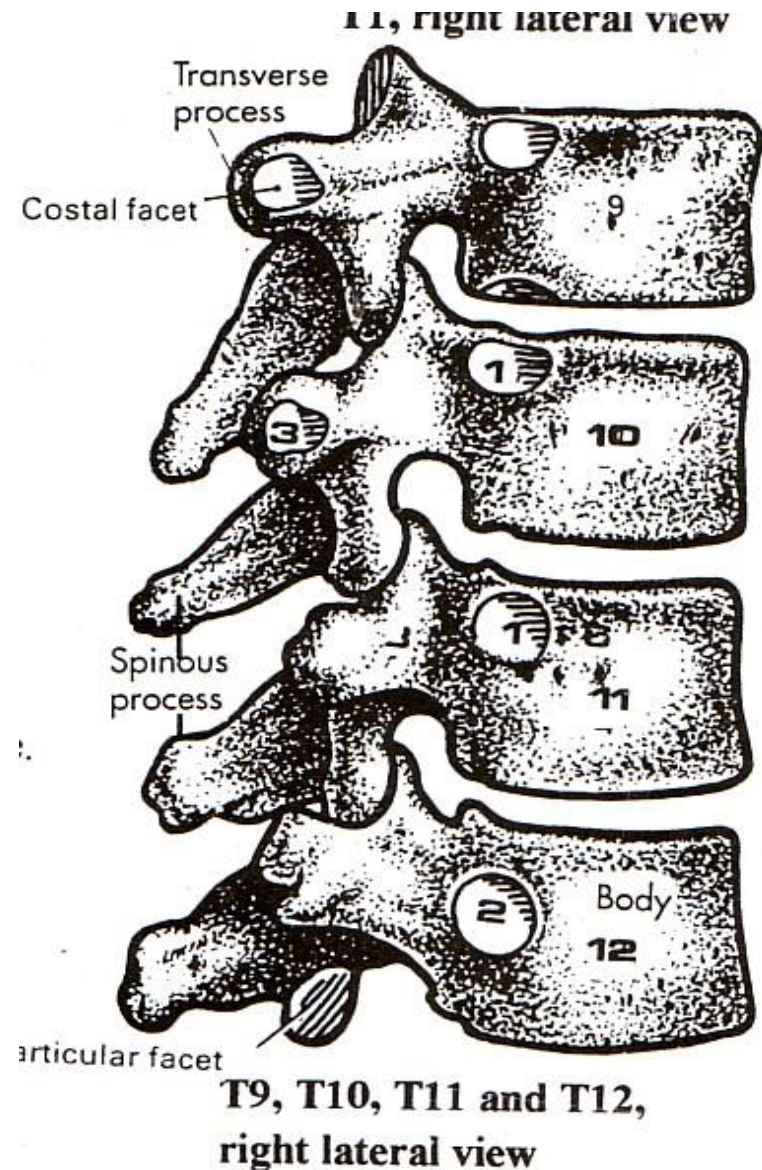
- **One** complete facet tangential with the upper border
- Small costal facet on transverse process.

- **T11**

- **One** complete circular facet away from upper border.
- **No costal facet**

- **T12**

- Broad body & short, oblong spine.
- **One** complete facet midway between upper & lower borders.
- **No costal facet**



Ribs

Classification of ribs according to their attachments to the sternum:

- There are **twelve** ribs on each side classified as:

A: True ribs ----- Upper **seven** ribs (their anterior end is *attached to* the sternum).

B: False ribs ----- Lower **three** ribs (they are *not attached* anteriorly to the sternum).

- The lower **two** ribs are called the **floating ribs** because they are *free* anteriorly.

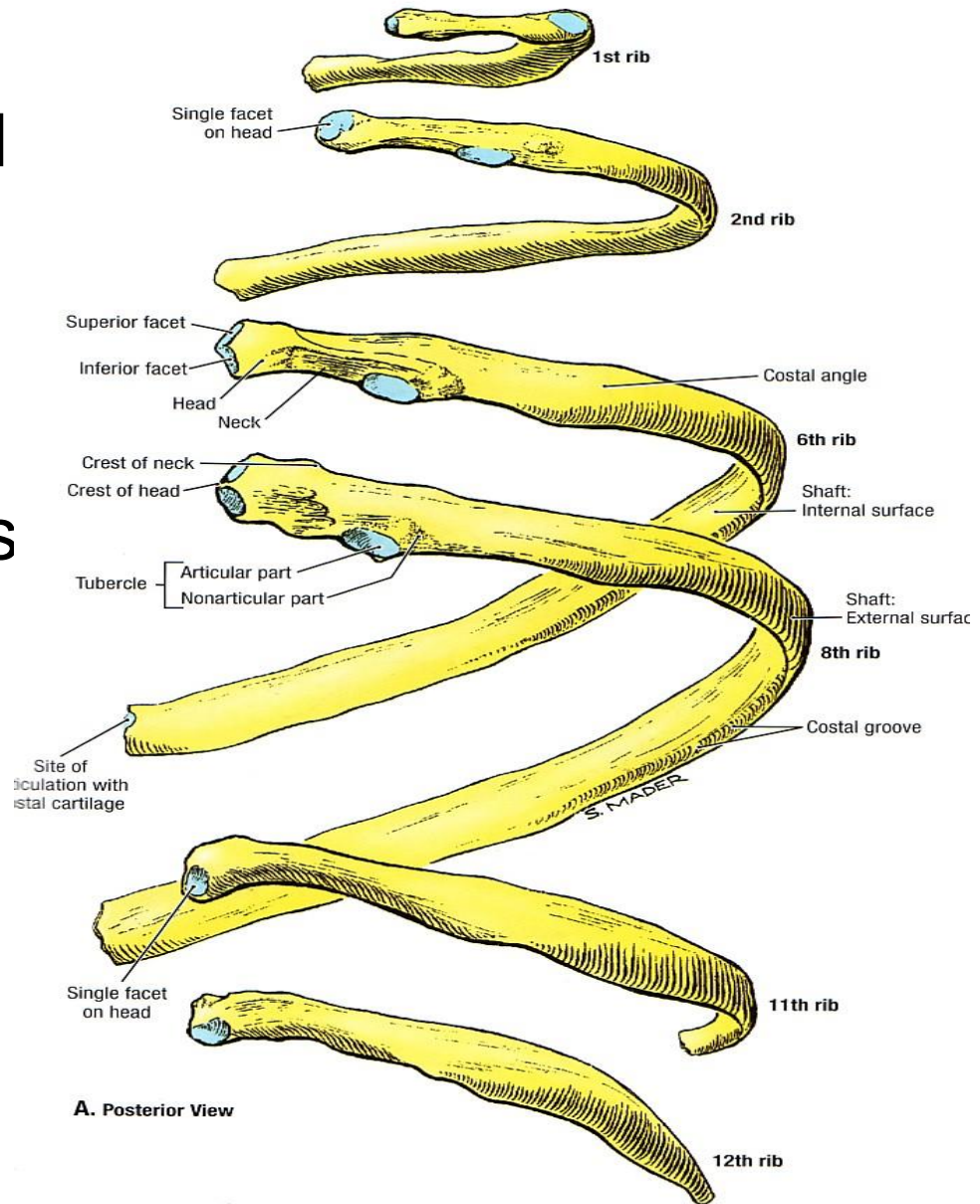
Classification of ribs according to their structure:

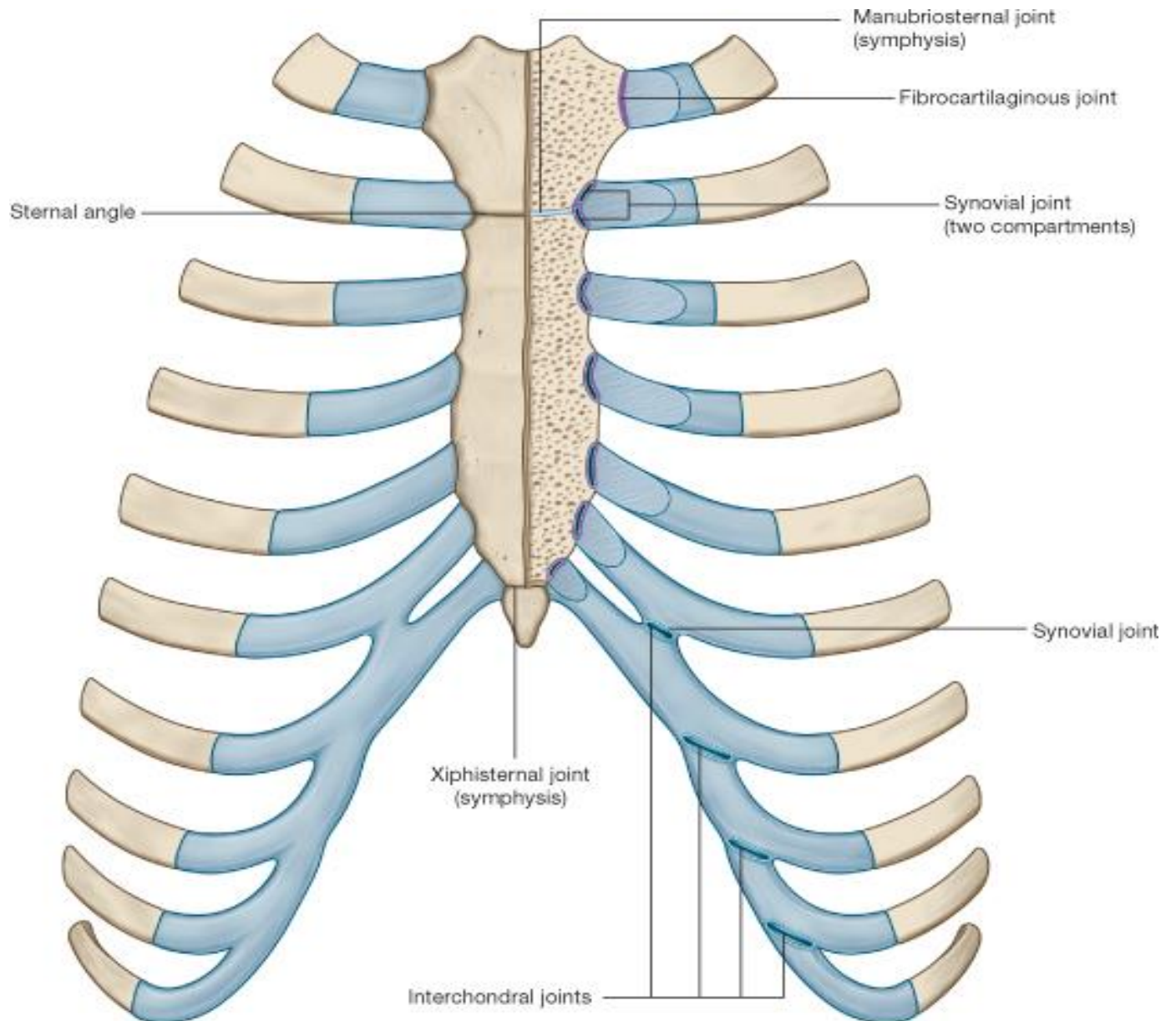
A: Typical ----- 3rd - 9th ribs.

B: Atypical ----- 1st, 2nd, 10th, 11th, and 12th ribs. (**first two and last 3) ribs**)

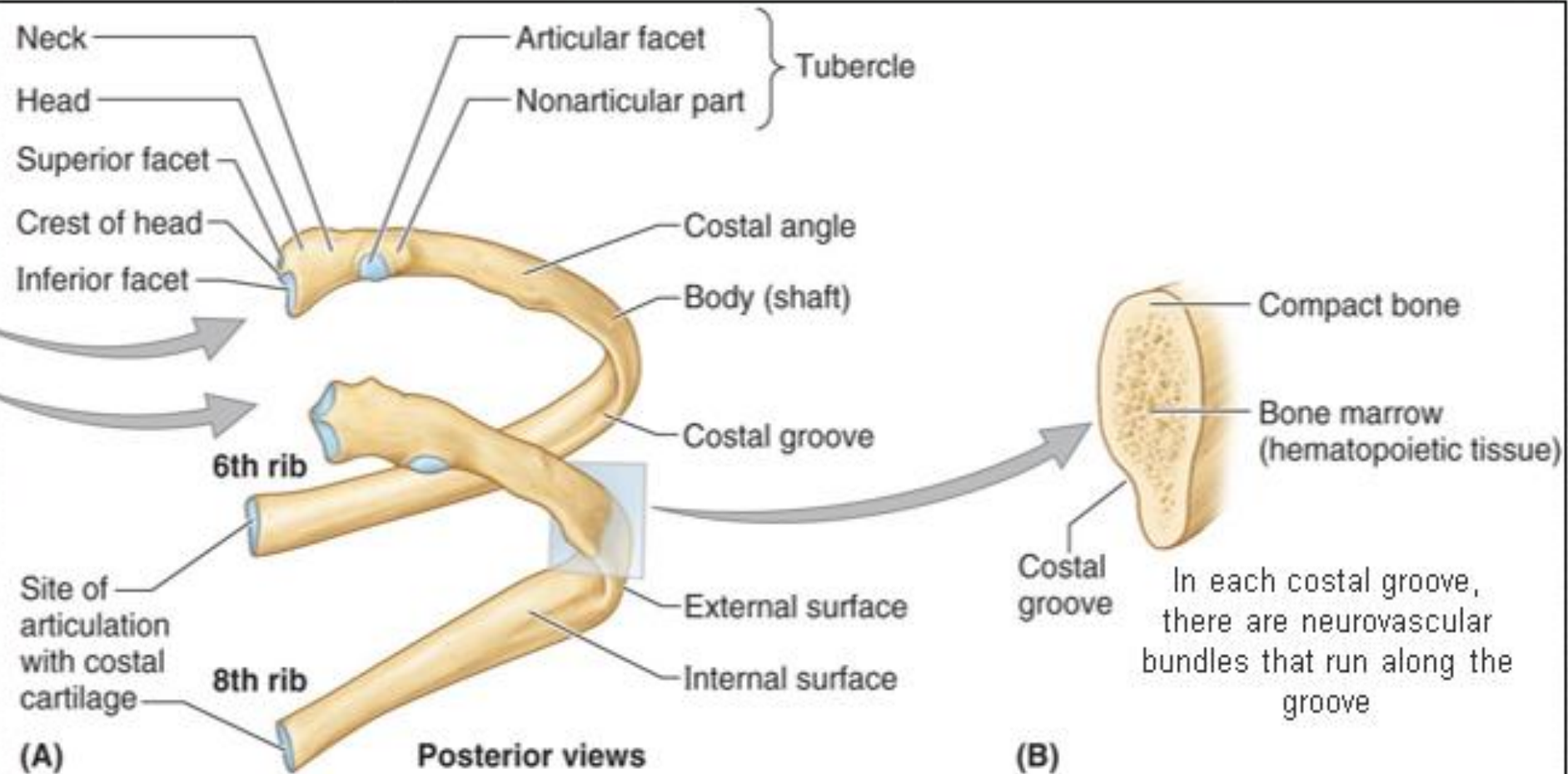
- **Ribs**

- 12 pairs, all are attached posteriorly to thoracic vertebrae.
- True: upper 7 pairs.
- False: 8th, 9th & 10th pairs
- Floating ribs: 11th & 12th
- The ribs from 3rd to 9th are called **Typical ribs.**
- Atypical (Non Typical) are 1st, 2nd, 10th, 11th & 12th.

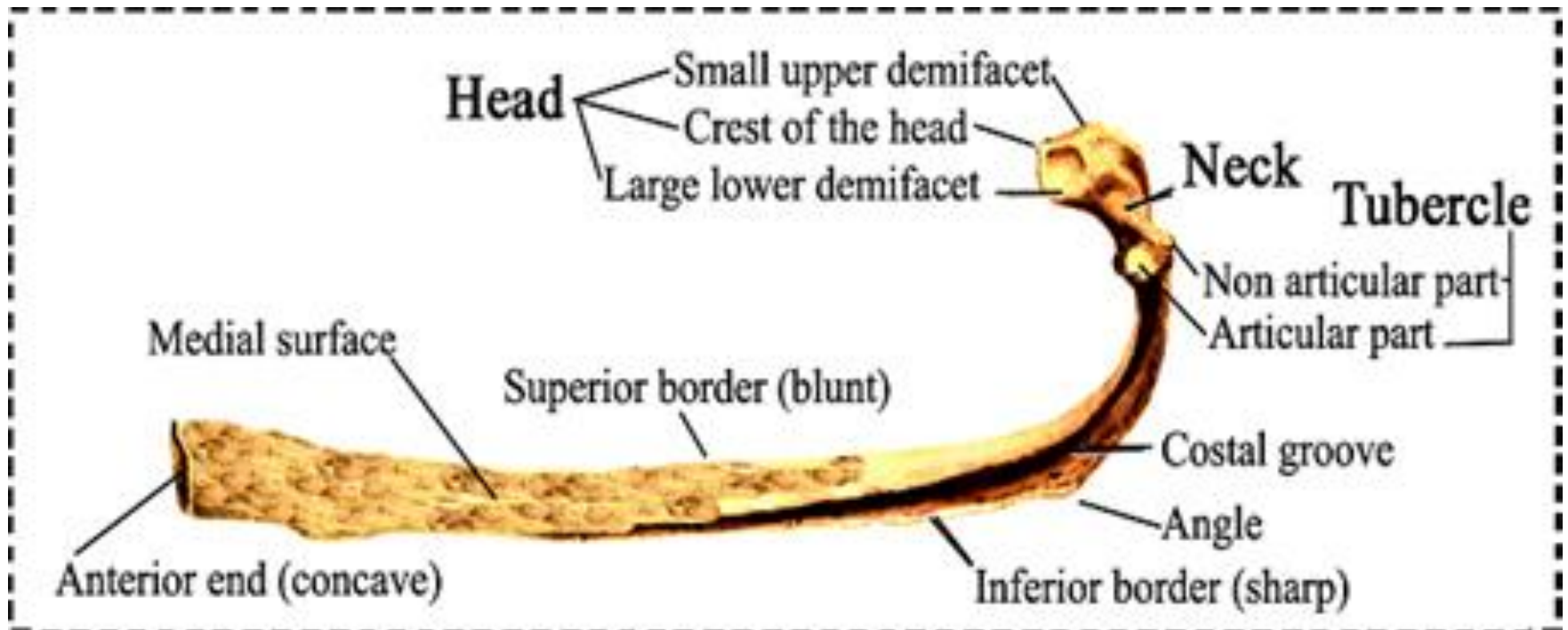




Ribs articulate with vertebrae behind and are oriented **DOWNWARD** when they go anterior



Typical rib

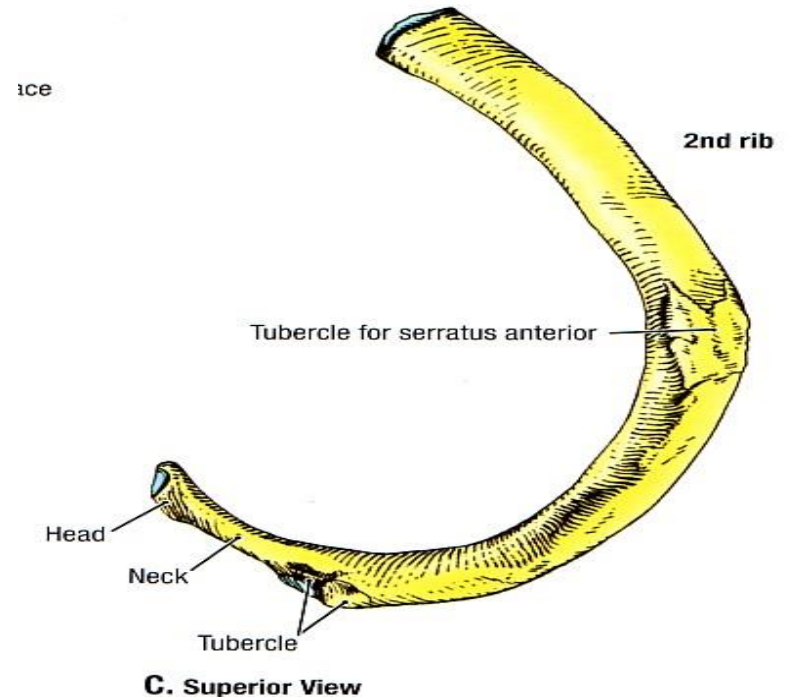
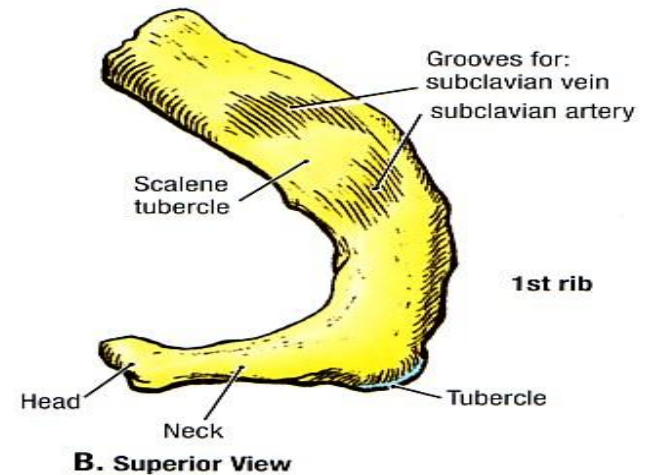


- **1st rib**

- Shortest C- Shaped
- Ant end: cup shape.
- Post end: It has Head, neck and tubercle.
- Head: One facet
- Surfaces: Sup. & Inferior
- Borders: Outer (lateral) & Inner (media).

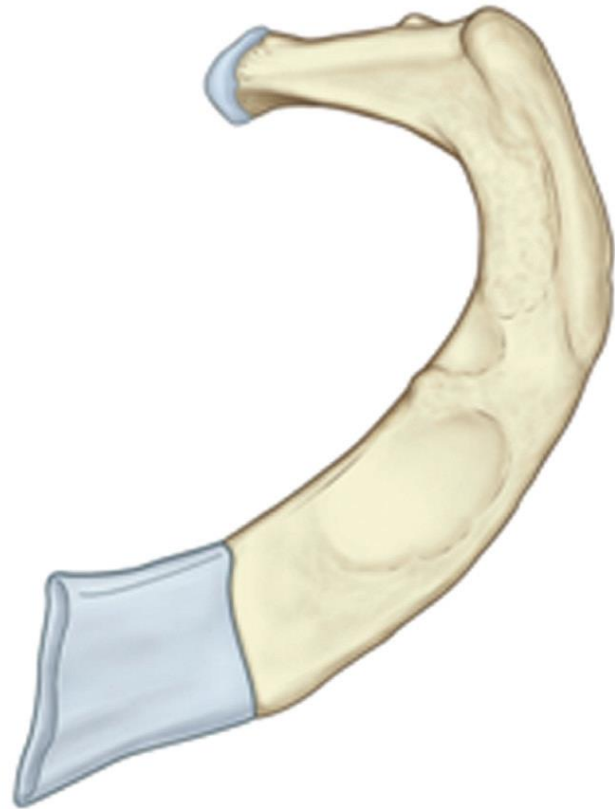
- **2nd rib**

- Twice the length of 1st
- Head has 2 facet
- Surfaces of shaft are in between that of 1st & typical

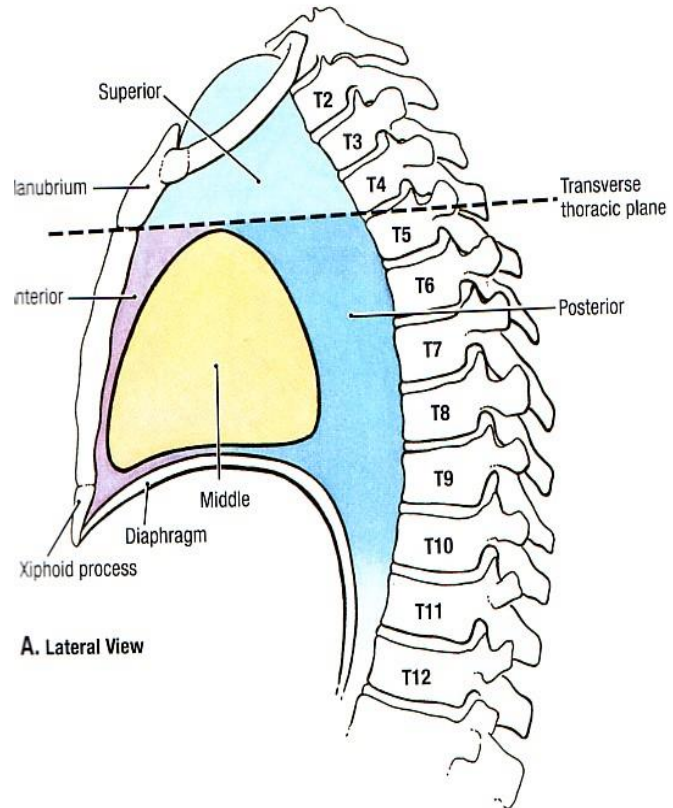


First rib

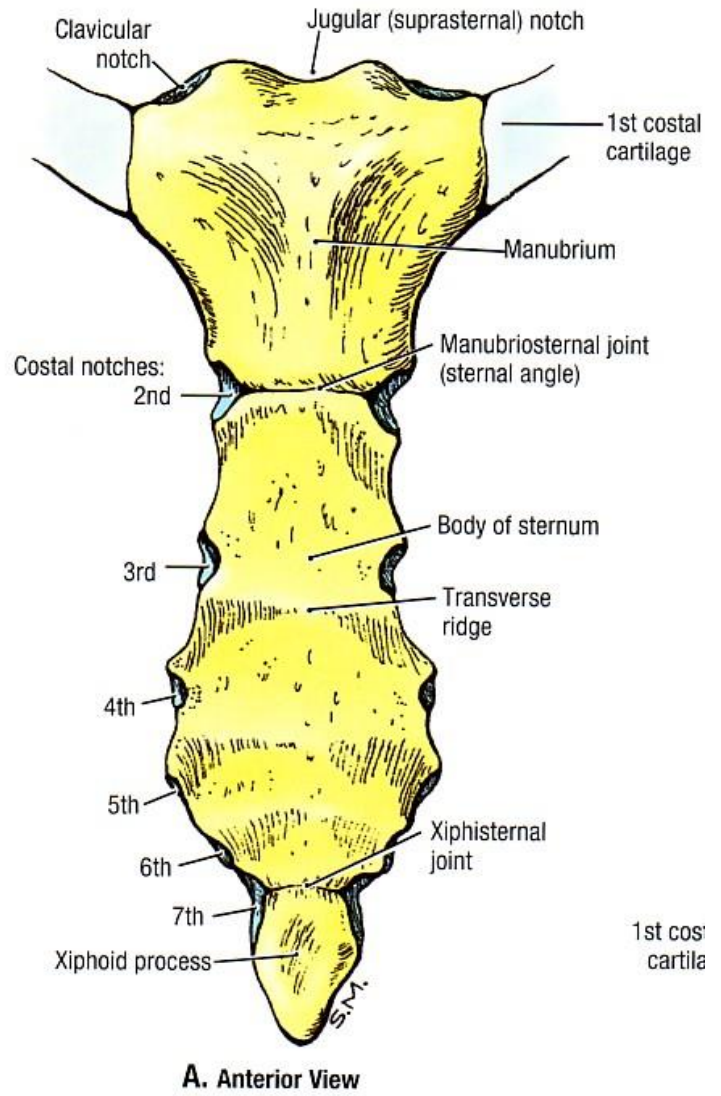
- 1. Neck
- 2. Tubercle
- 3. Area for attachment of serratus anterior
- 4. Costal cartilage
- 5. Groove for subclavian vein
- 6. Scalene tubercle (attachment of anterior scalene)
- 7. Groove for subclavian artery
- 8. Area for attachment of middle scalene
- 9. Head with articular **facet**



- 3 parts: Manubrium, Body *
Xiphoid process.
- **Manubrium:** Lies opposite T3,4. **Body:** T5 to T8
- **Xiphoid** T9



Sternum





Intercostal Spaces

It contains:

- 1- Intercostal muscles.
- 2- Intercostal nerves.
- 3- Intercostal arteries.
- 4- Intercostal veins.

Intercostal muscles

I. Outer layer ----- External intercostal muscle

II. Intermediate layer ----- Internal intercostal muscle

III. Inner layer ----- Transversus thoracis group,
subdivided into:

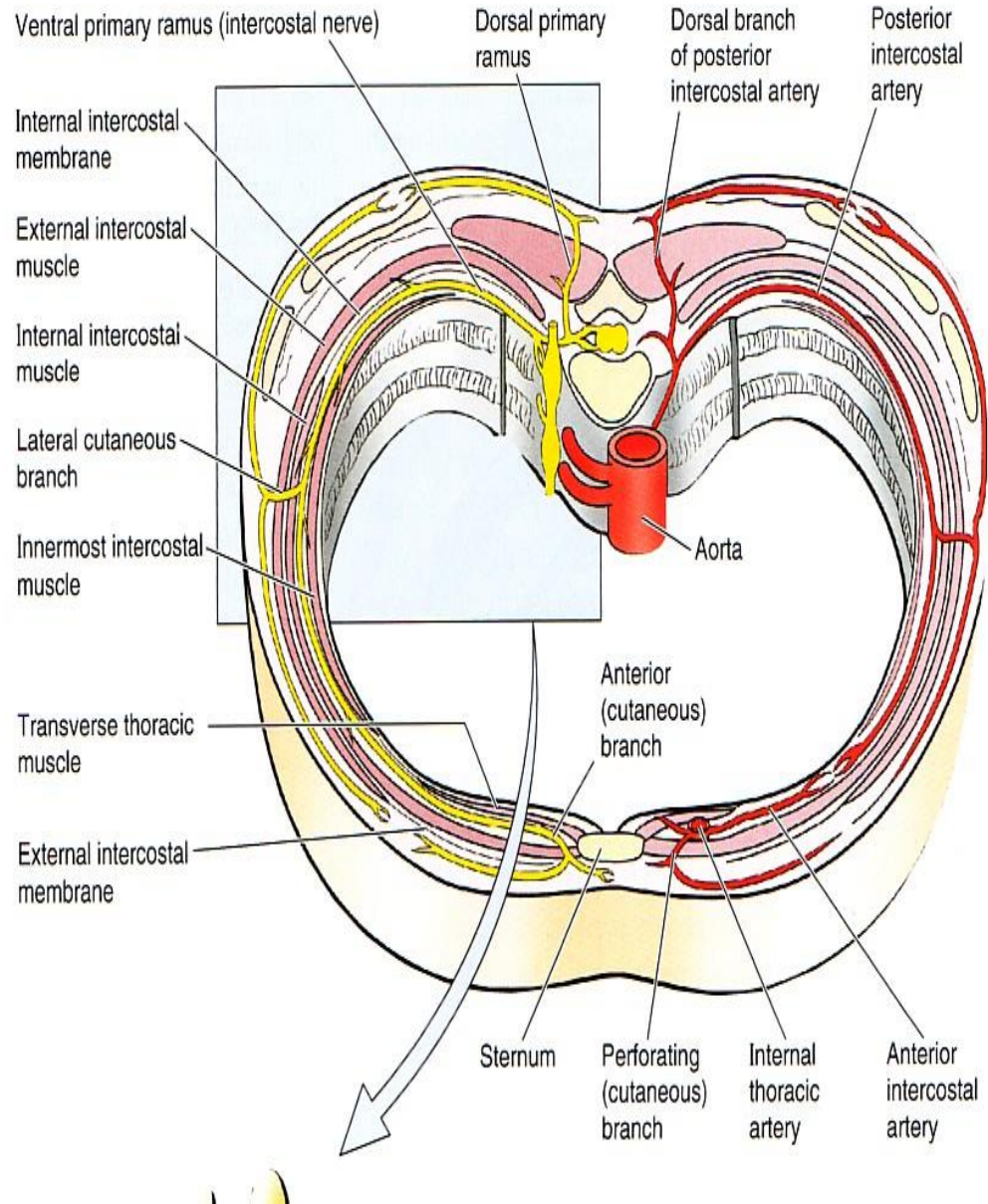
1. Innermost inter-costalis

2. Sterno-costalis

3. Sub-costalis

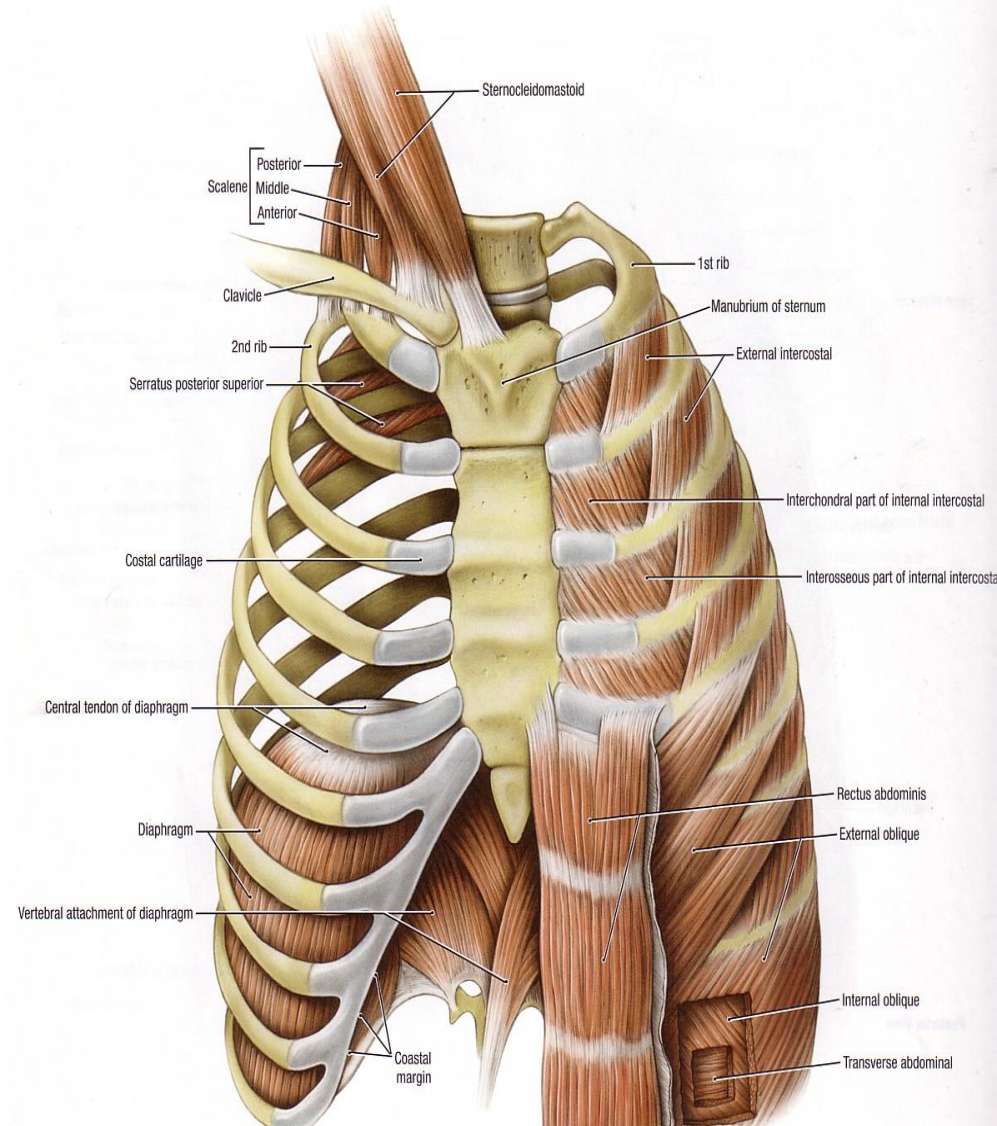
• Intercostal Spaces

- There are **9** anterior and **11** posterior
- Each space contains:
- **1- Intercostal muscles:**
(External, Internal and transversus thoracicus)
- **2- An Intercostal nerve.**
- **3- Intercostal vessels:**
- **a. Intercostal arteries**
(Anterior & Posterior)
- **b. Intercostal veins**
(Anterior & Posterior).



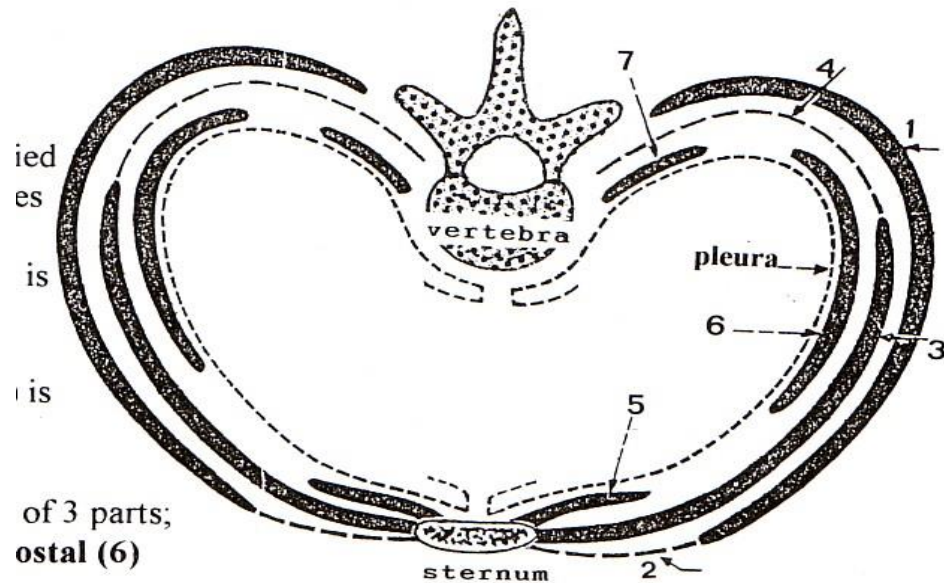
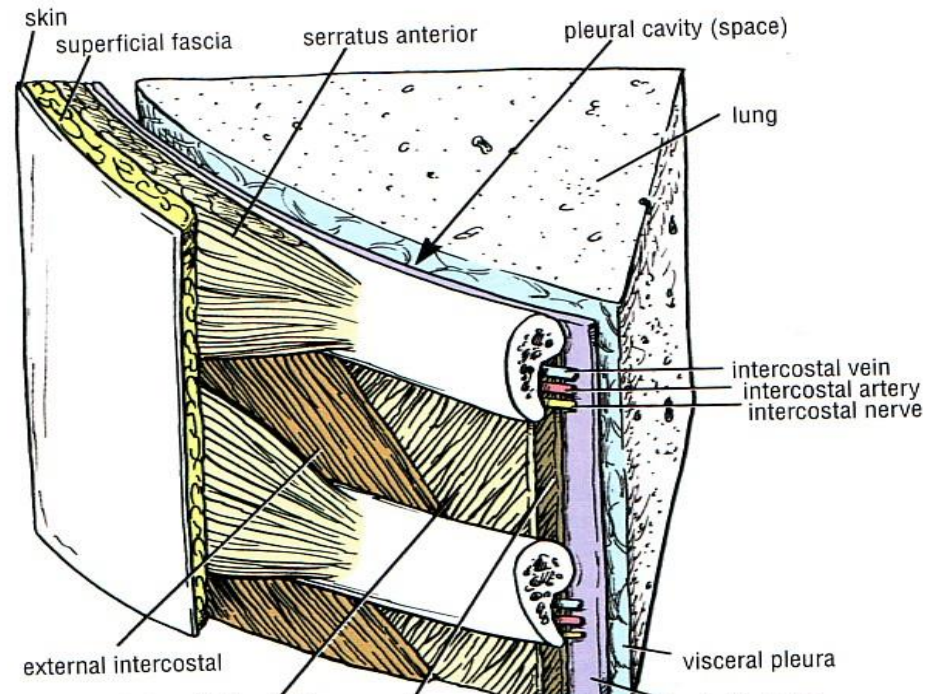
- **EXTERNAL INTERCOSTAL**

- **Origin:** From the lower border of the rib above
- **Insertion:** Into outer lip of upper border of rib below
- Fibers are **directed** from above **downward** and **forwards**
- **Begins** from **post. end** of Intercostal space close to the tubercle of the rib.
- **Ends** at the **costochondral junction** where it is replaced by **external** or **anterior** Intercostal membrane.
- It **elevates** the rib during inspiration



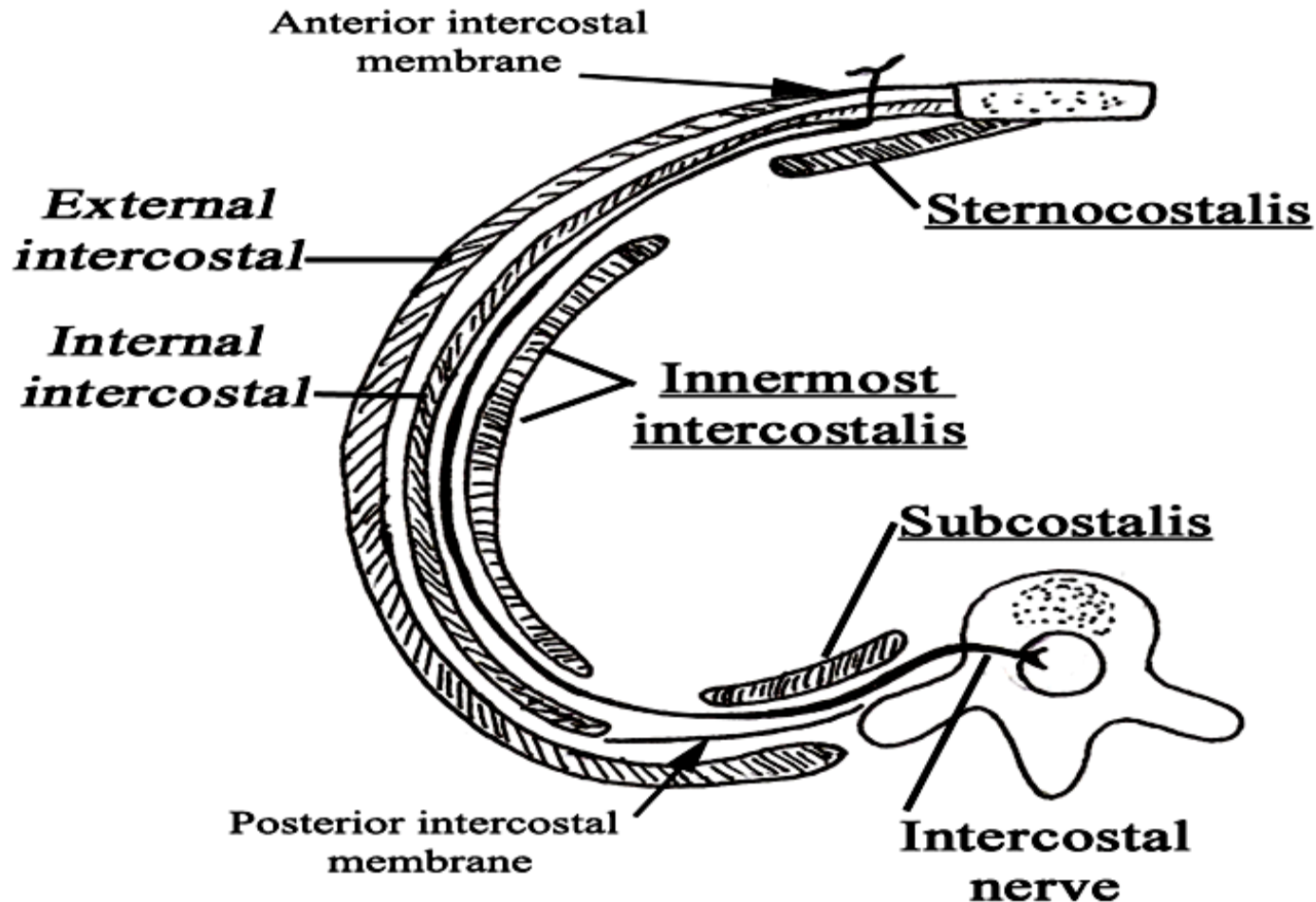
- **INTERNAL INTERCOSTAL**

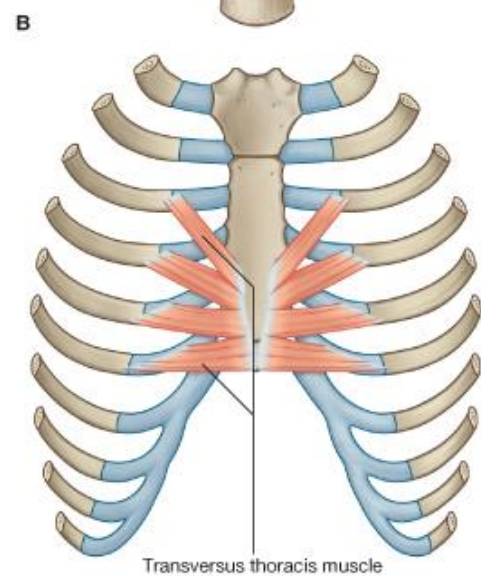
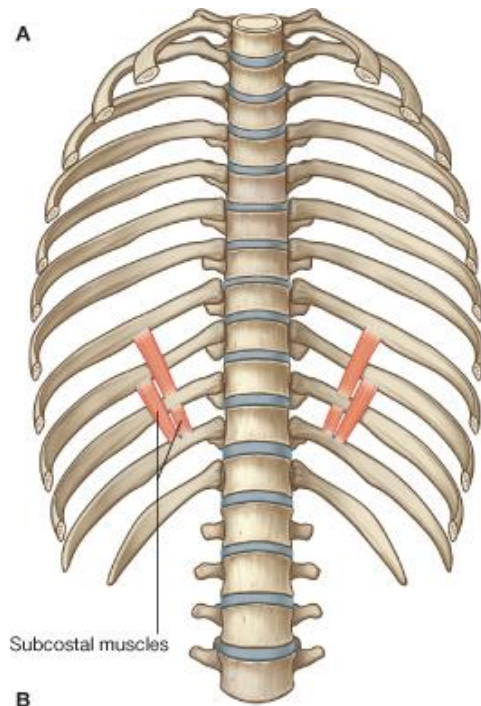
- Origin: Floor of costal groove
- Insertion: Inner lip of upper border of rib below
- Fibers are directed from above downwards & backward
- Begins from anterior end of space close to the sternum.
- Ends at the angle of the rib, where it is replaced by post. Or internal Intercostal membrane.
- Action: Depresses the rib downwards during expiration

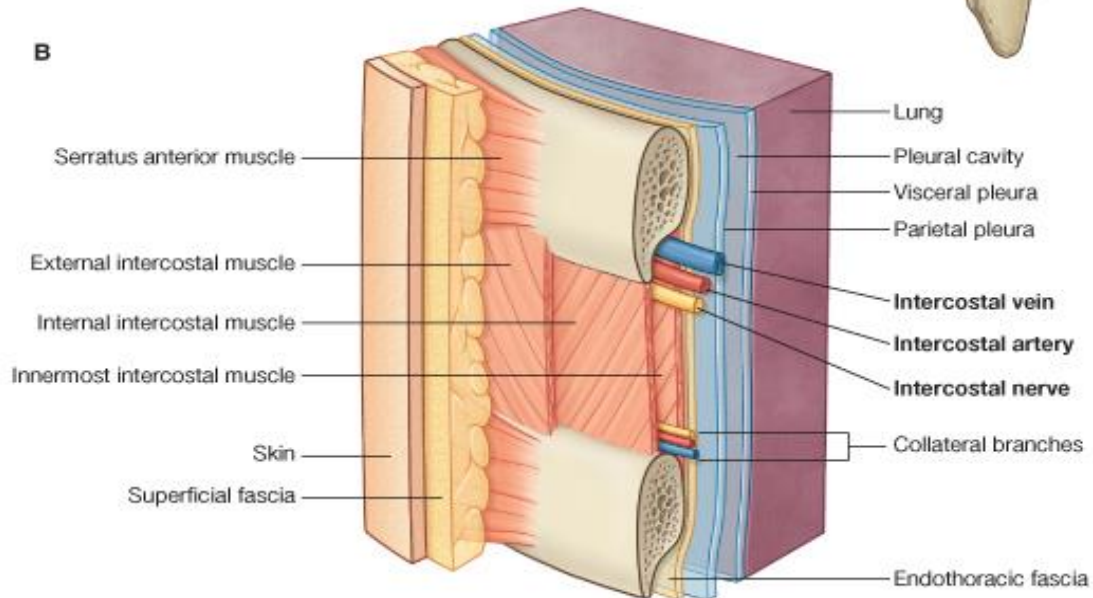
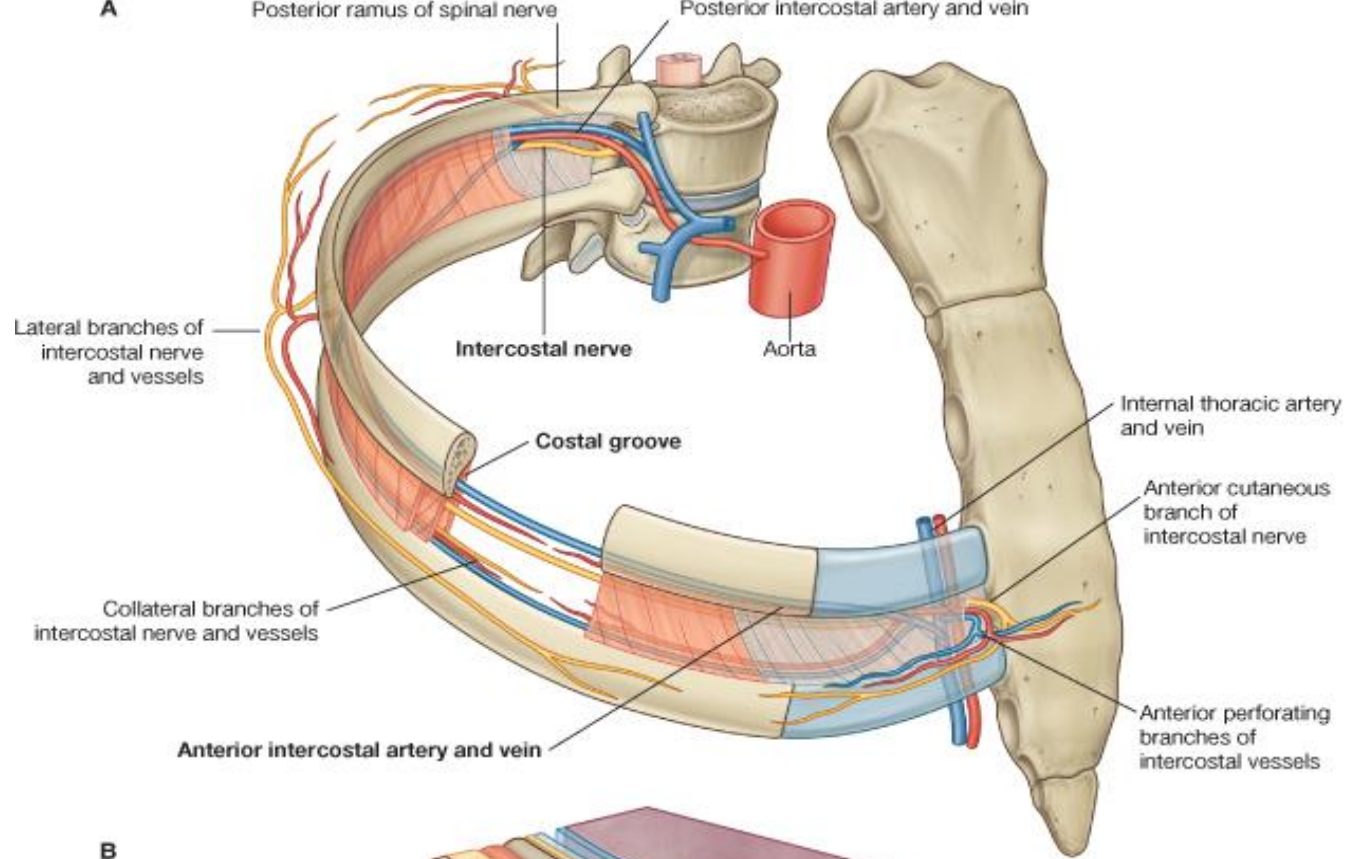


Transversus thoracis group

Arrangements and extension of the muscles







• **Sternocostalis**

- 4 to 5 slips which arise from inner surface of lower part of body of sternum and costal cartilages
- Inserted into inner surface of costal cartilages from 2 to 6.

- **Subcostalis muscle**

- Thin bands of muscle fibers.
- Mainly in lower 6 spaces.
- Only in post. part of spaces.
- **Origin:** Inner surface & lower border of rib above.
- **Insertion:** Upper border of 2nd or 3rd rib below.

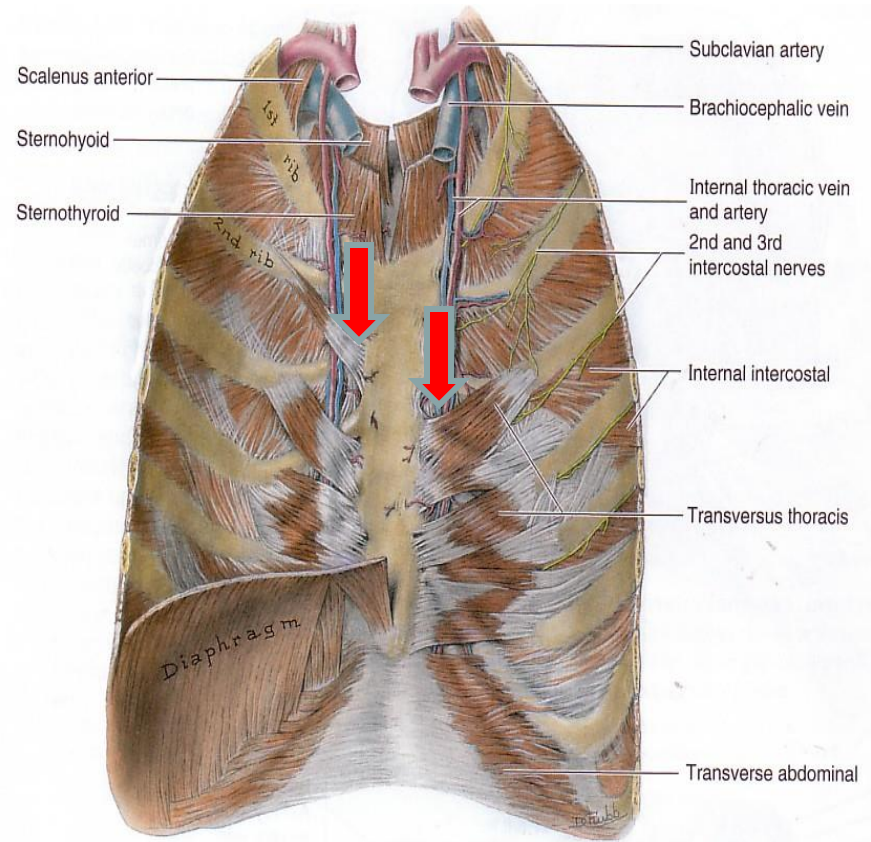


Figure 1.17 Dissection of the anterior view of the thoracic wall muscles.

CHEST WALL MUSCLES

External intercostals

From sharp edge of rib above - downwards/forwards to rounded edge of rib below, from superior costotransverse ligament posteriorly to costochondral junction anteriorly. Then anterior intercostal membrane beyond this

Internal intercostals

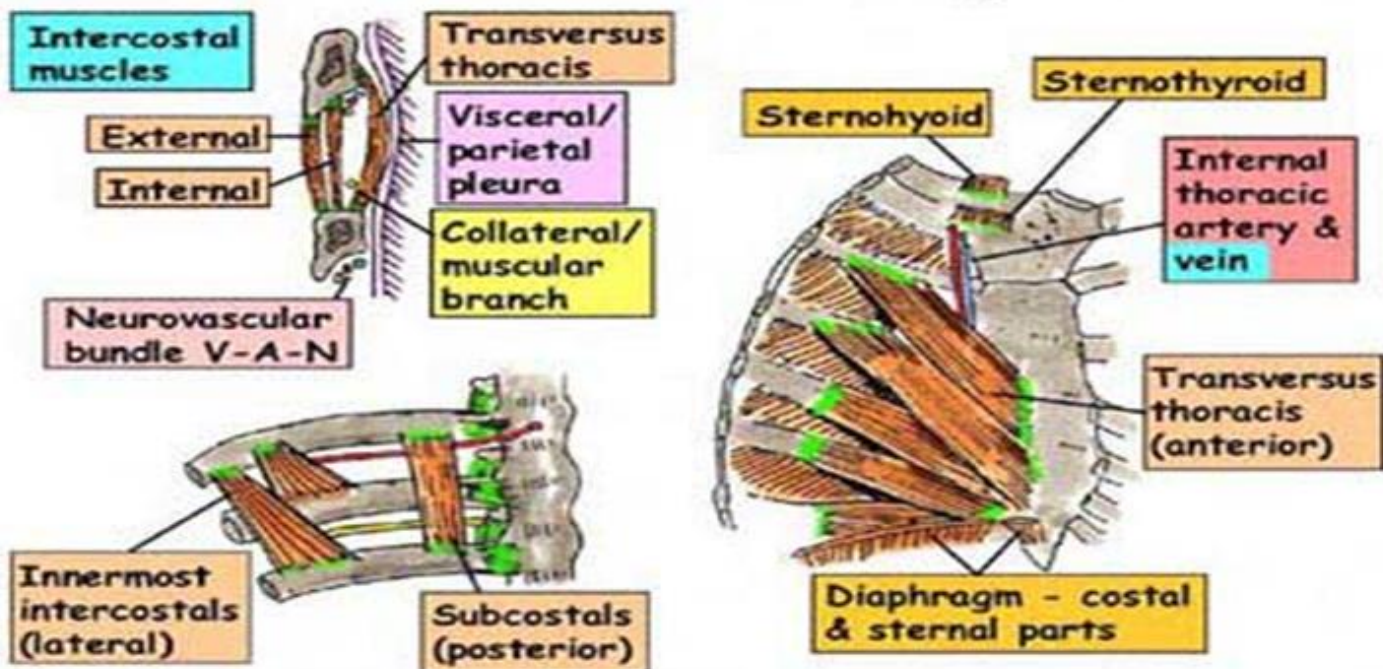
From costal groove above - downwards/backwards to upper border of rib below, from sternal edge to angle of rib. The posterior intercostal membrane beyond this

Transversus thoracis

At back: Subcostals. In lower chest. Wider below

At side: Innermost intercostals. Extend for more than one space

At front: Transversus thoracis (previously Sternocostalis)
from lower sternum to costal cartilages 2-6



Intercostal Arteries

Intercostal Arteries:

1- Anterior Intercostal Arteries.

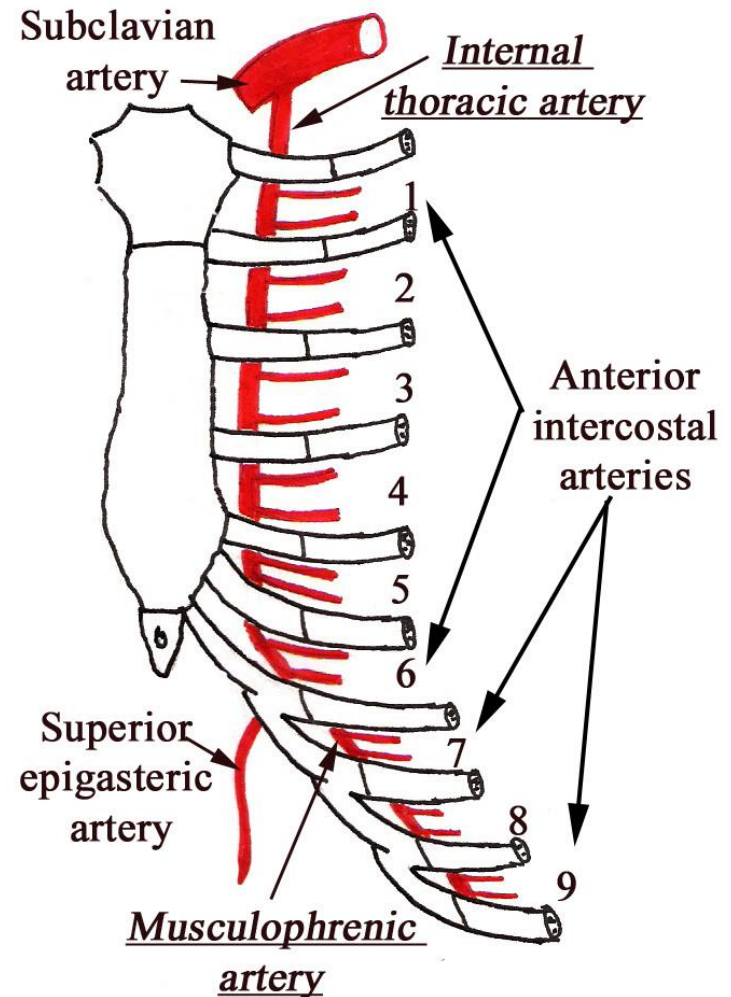
2- Posterior Intercostal Arteries.

Anterior Intercostal Arteries

Each anterior intercostal space contains **two** anterior intercostal arteries (except in the lower two inter-costal spaces).

a. The upper 6 pairs arise from the internal thoracic artery.

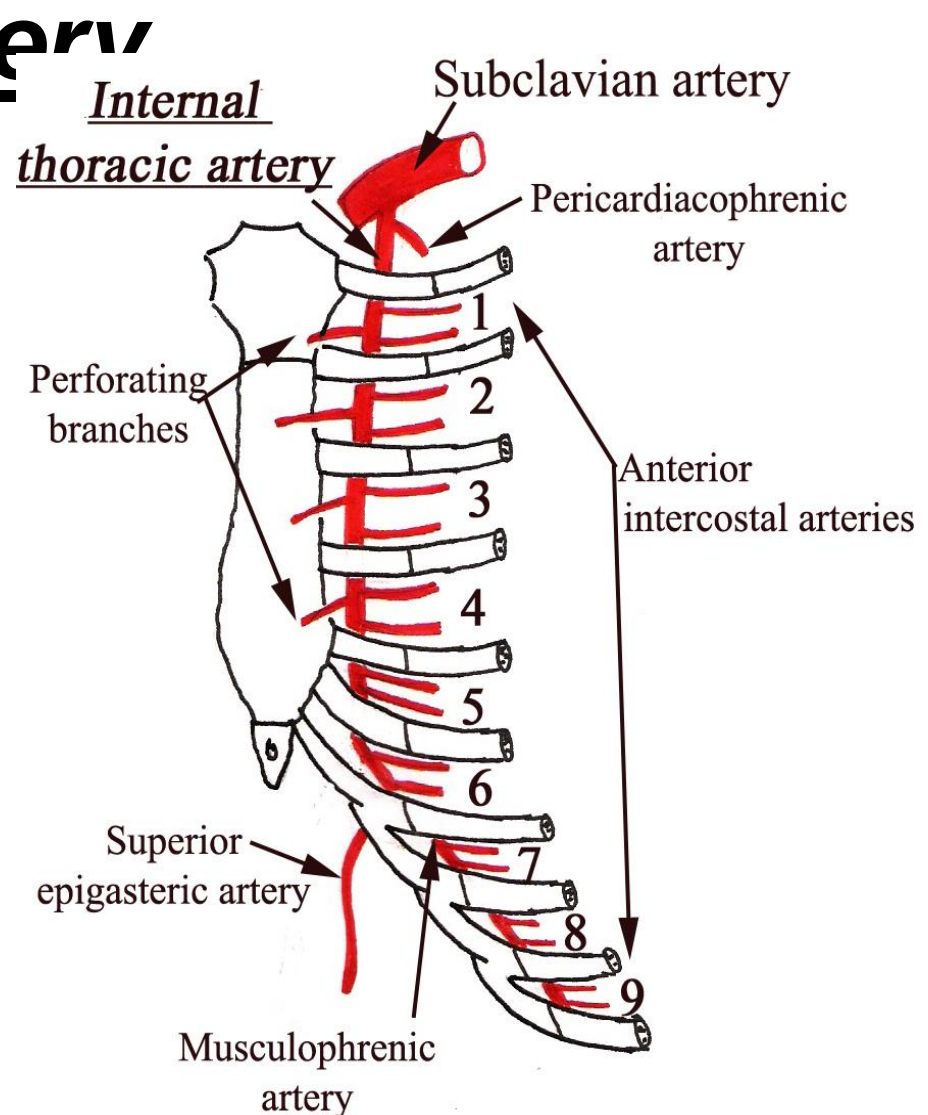
b. The 7th, 8th, and 9th pairs arise from the musculo-phrenic artery.



Internal thoracic (mammary) artery

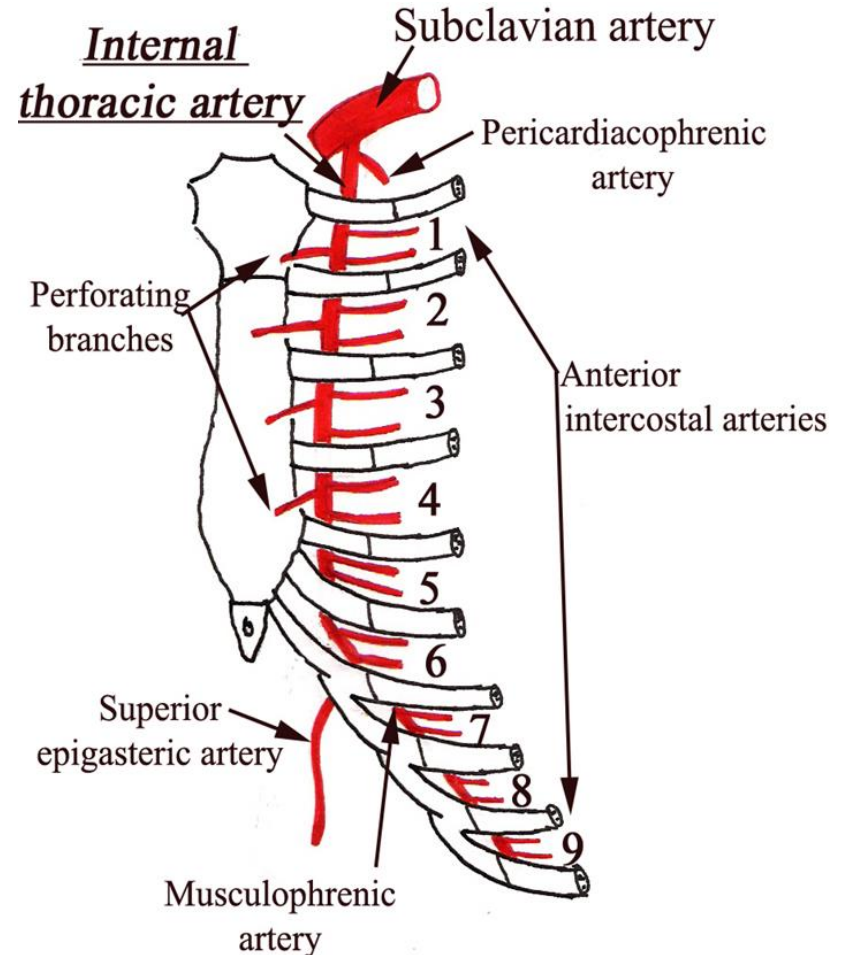
Origin: From the *first part of the subclavian artery*.

Termination: opposite the sixth intercostal space by dividing into *superior epigastric and musculo-phrenic arteries*.



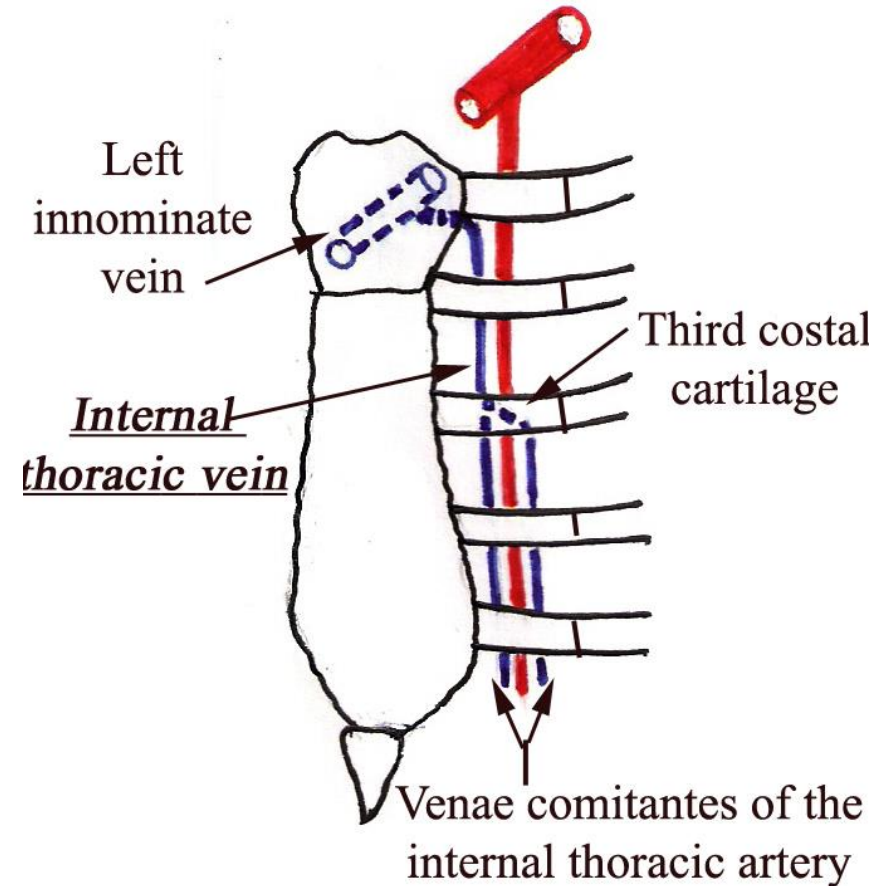
Branches:

1. Pericardial branches.
2. Pericardio-phrenic ar
3. Mediastinal branches.
4. Sternal branches.
5. Perforating branches for the mammary gland.
6. Anterior intercostal arteries (upper 6 spaces).
7. Superior epigastric artery.
8. Musculo-phrenic artery



Internal thoracic (mammary) vein

- It is formed by the union of the ***two venae comitantes*** of the internal thoracic artery behind the **third** costal cartilage.
- It ascends close to the artery to terminate in the corresponding **innominate vein**.

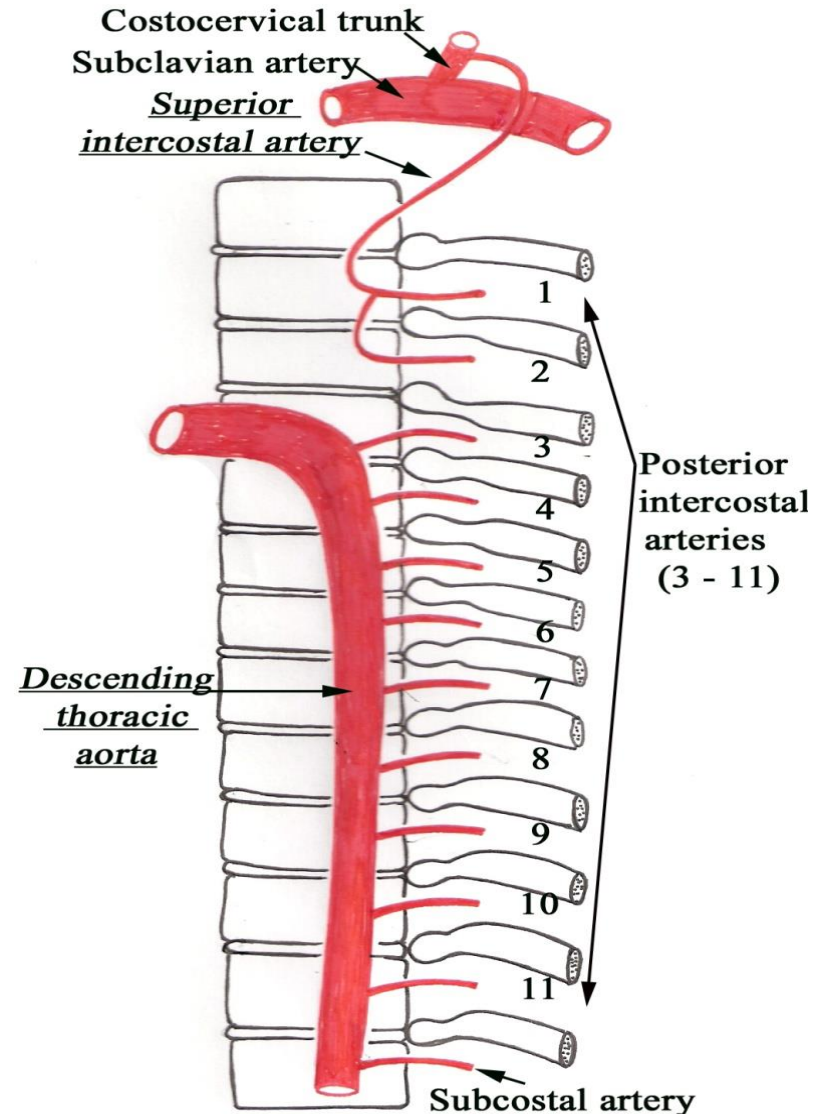


Posterior Intercostal Arteries

- Each posterior intercostal space contains **one** posterior intercostal artery which runs in the costal groove .
- Each artery gives a **collateral branch** which runs over the upper border of the rib *below*.

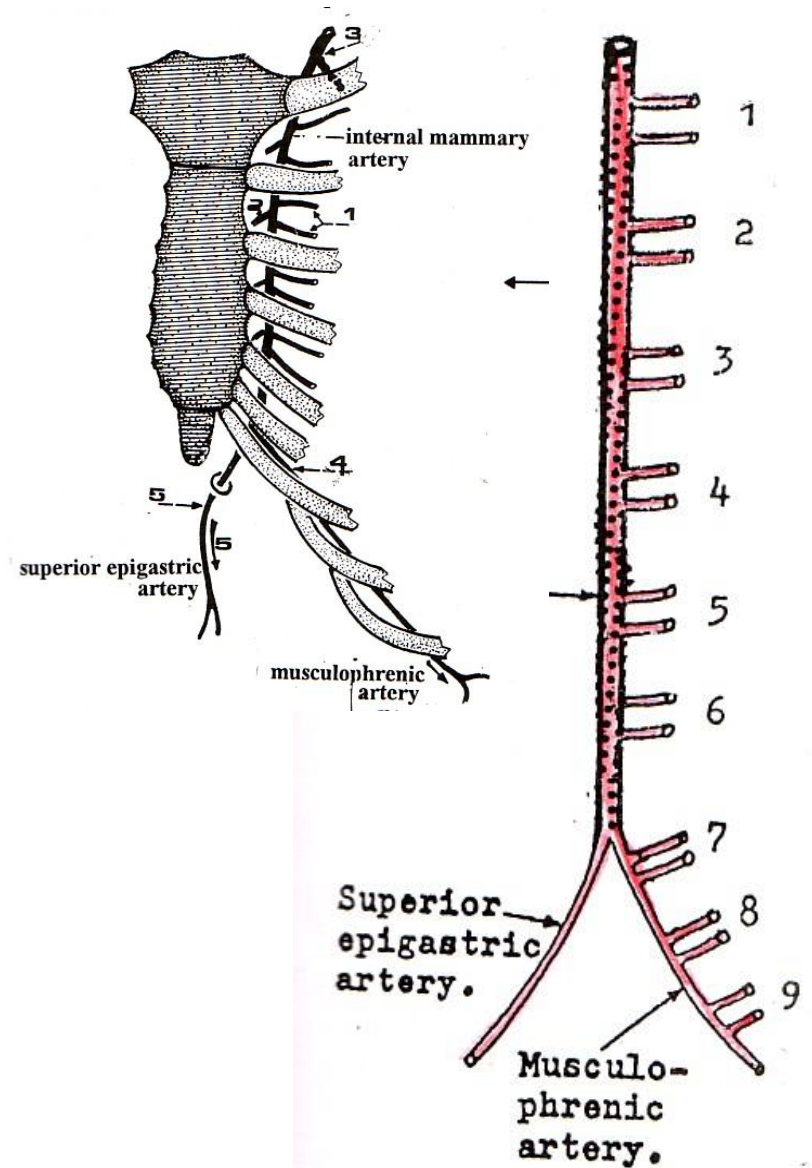
*The upper two posterior intercostal arteries → superior intercostal artery (from the costo-cervical trunk) → 2nd part of subclavian artery.

* From 3 - 11 posterior intercostal arteries and subcostal artery →



- **Anterior Intercostal arteries**

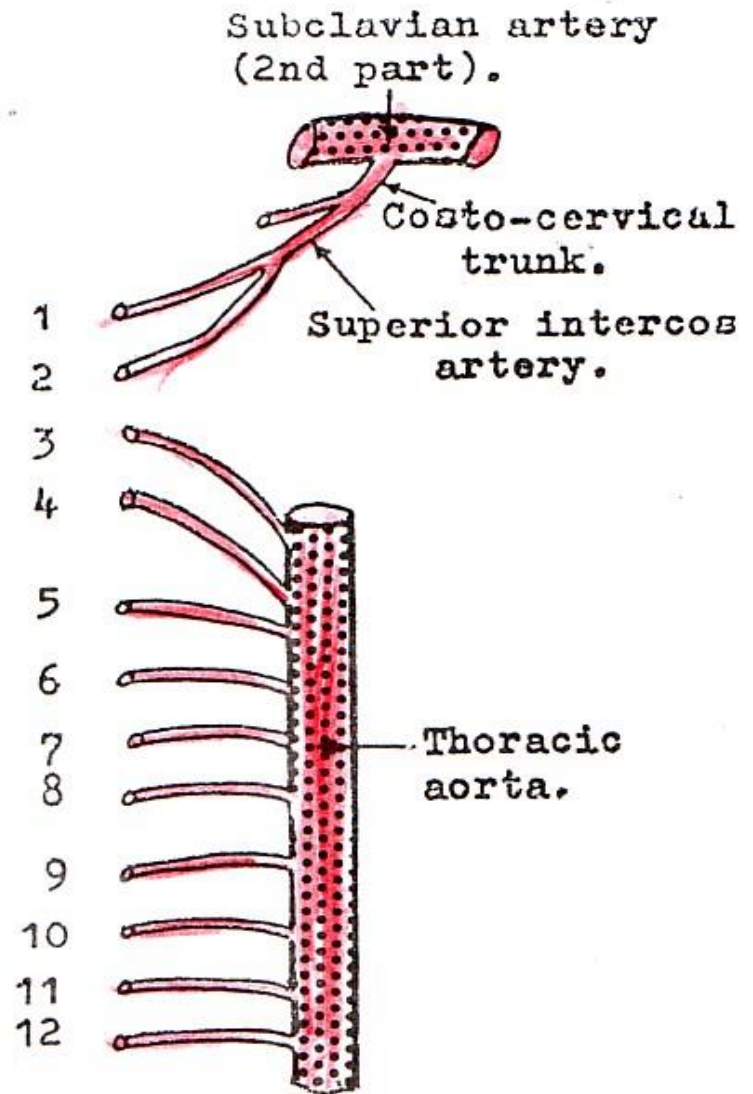
- 2 small arteries in each of the 9 spaces.
- The upper 6 from internal mammary artery
- The lower 3 from musculo-phrenic artery
- NB. Internal mammary or internal thoracic artery is a branch from 1st part of subclavian artery



Origin of the anterior intercostal arteries

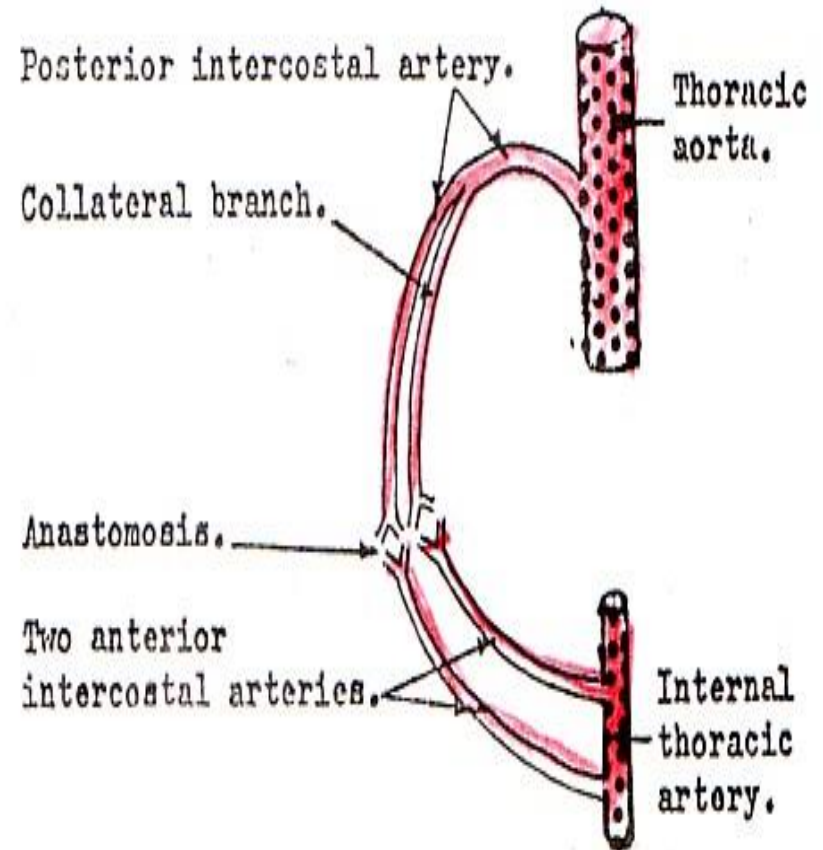
- **Posterior Intercostal arteries**

- One in each of the 11 spaces
- 1st & 2nd arise from superior Intercostal artery of costocervical trunk of 2nd part of subclavian artery
- The lower 9 arteries & subcostal artery arise from descending thoracic aorta.



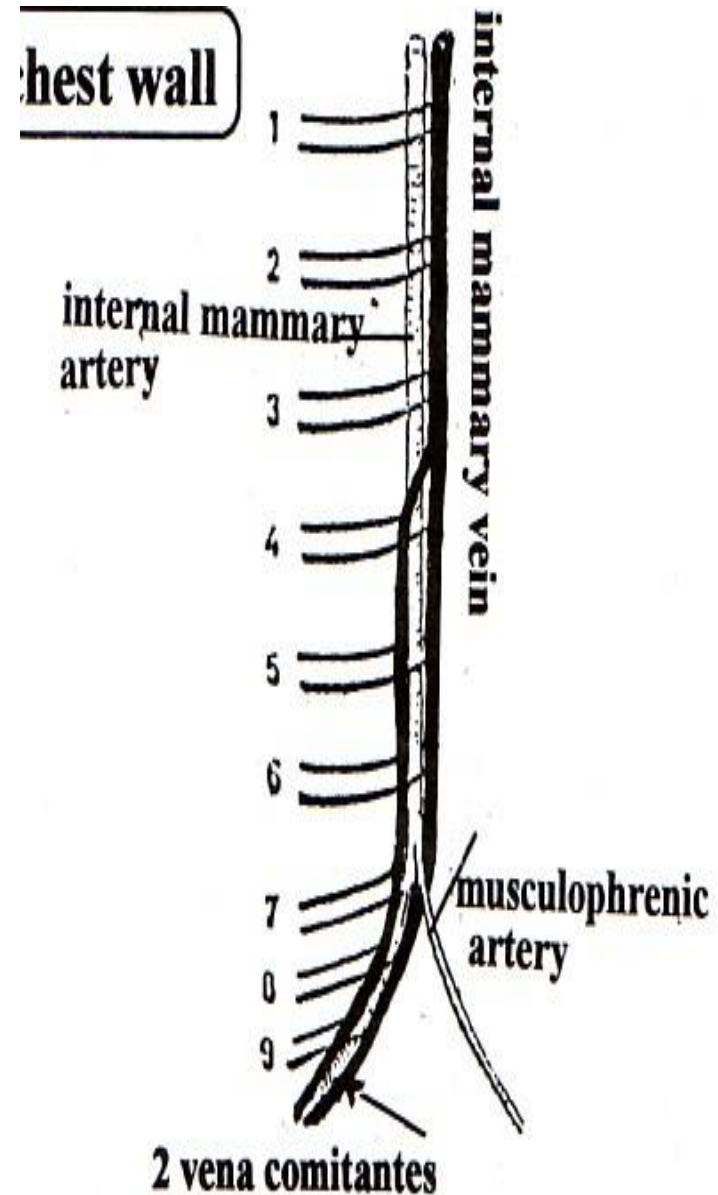
Origin of the posterior intercostal arteries

- In each space the posterior Intercostal artery and its collateral branch anastomose with the 2 anterior Intercostal arteries



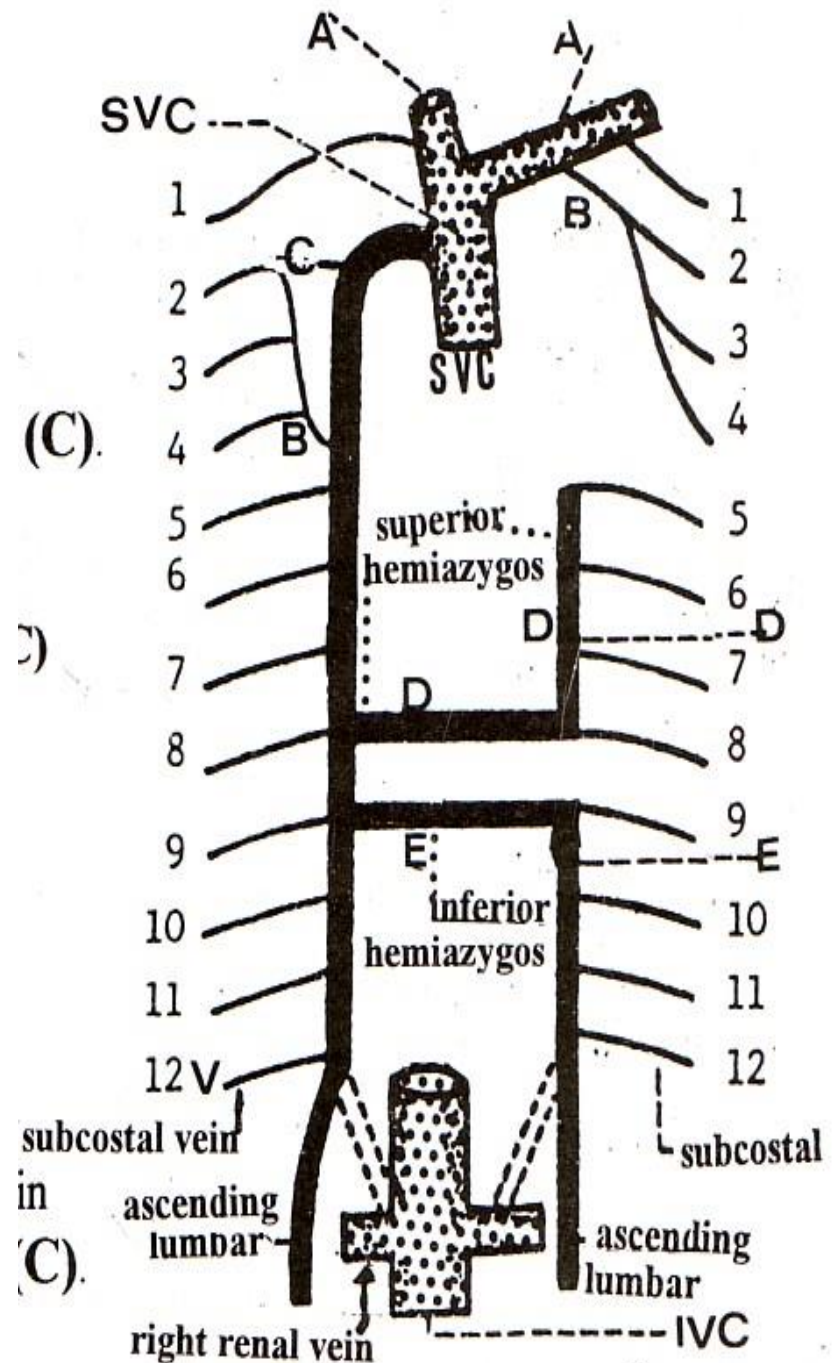
Anterior Intercostal veins

- 2 in each space.
- 9th, 8th & 7th join the venae comitantes of musculo-phrenic artery
- 6th, 5th & 4th join venae comitantes of internal mammary artery
- 3rd, 2nd & 1st join internal mammary vein
- Internal mammary vein drains into innominate (Brachiocephalic vein)



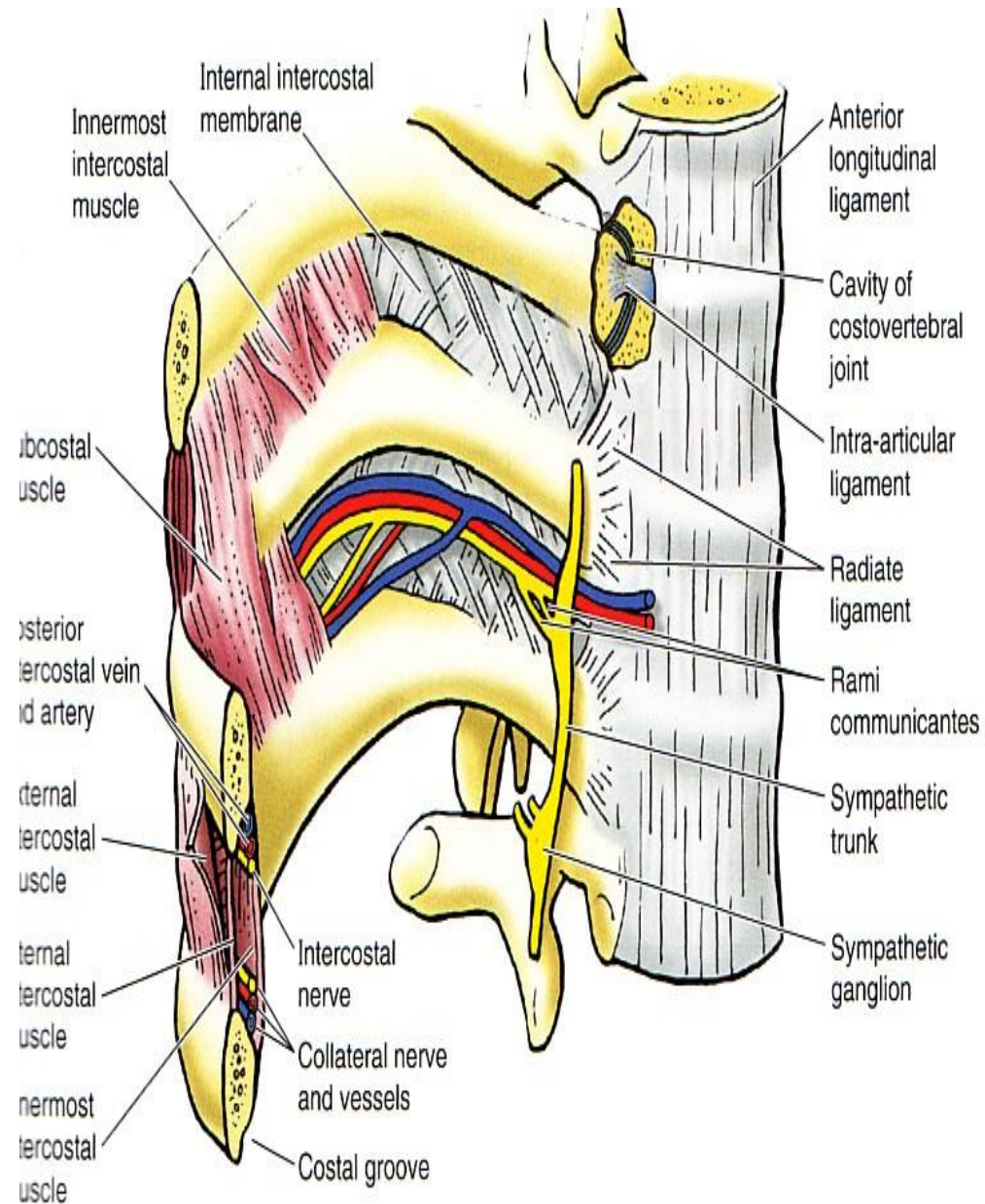
Posterior Intercostal veins

- One in each of the 11 spaces.
- **On the right:**
- 1st drains into Rt. Innominate v.
- 2nd, 3rd & sometimes the 4th unite to form Rt. Superior Intercostal vein (B) which drains into **azygos vein**.
- From 5th to 11th & subcostal veins drain into **azygos vein** ©.
- **On the Left:**
- 1st drains into Lt. innominate V.
- 2nd, 3rd & sometimes the 4th join to form Lt. Superior Intercostal vein which drains into Lt innominate vein.
- 5th, 6th, 7th, & 8th form **superior hemiazygos vein** to **azygos vein**
- 9th, 10th, 11th & Subcostal form **inferior hemiazygos vein** to **azygos vein**.



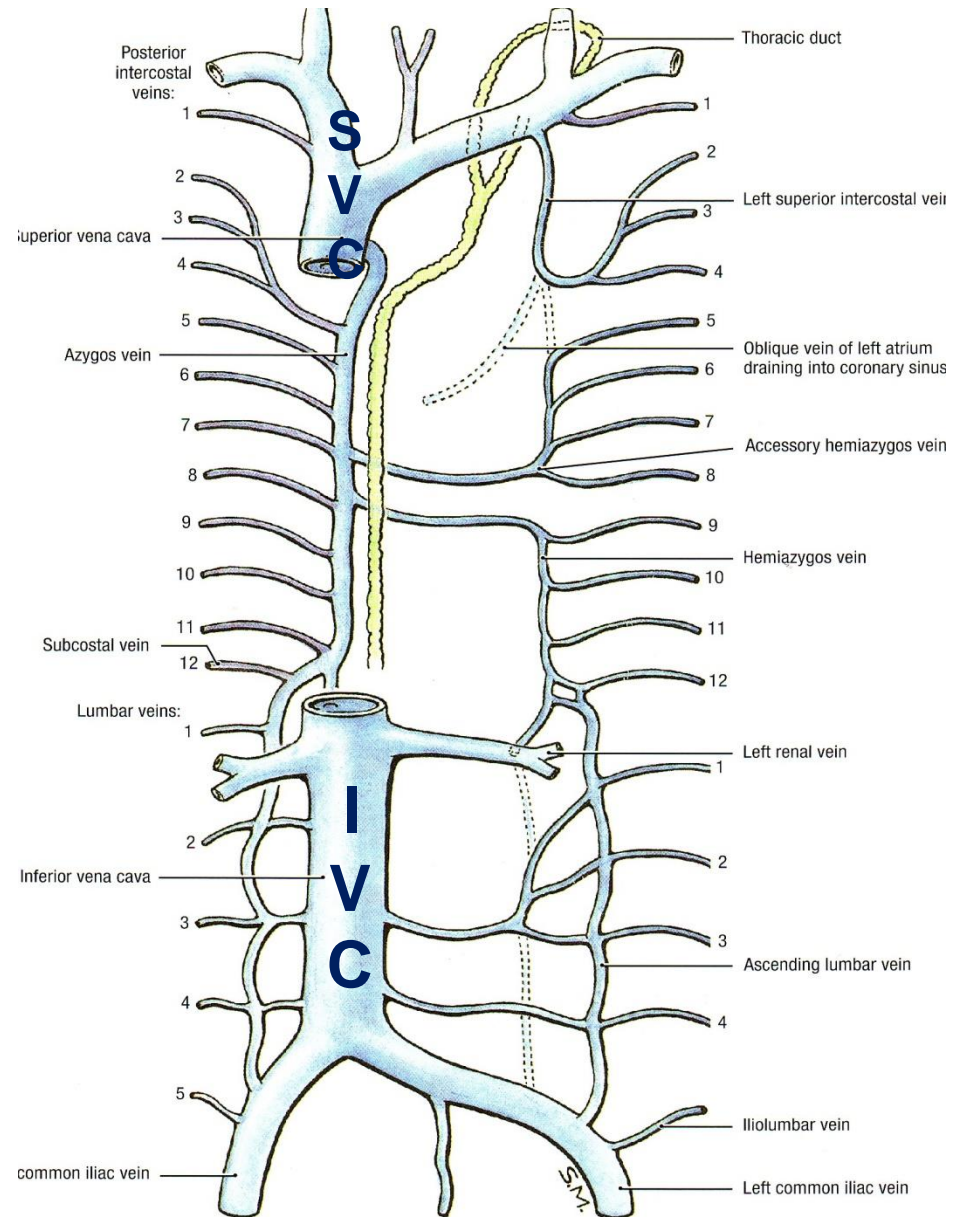
Intercostal Nerves

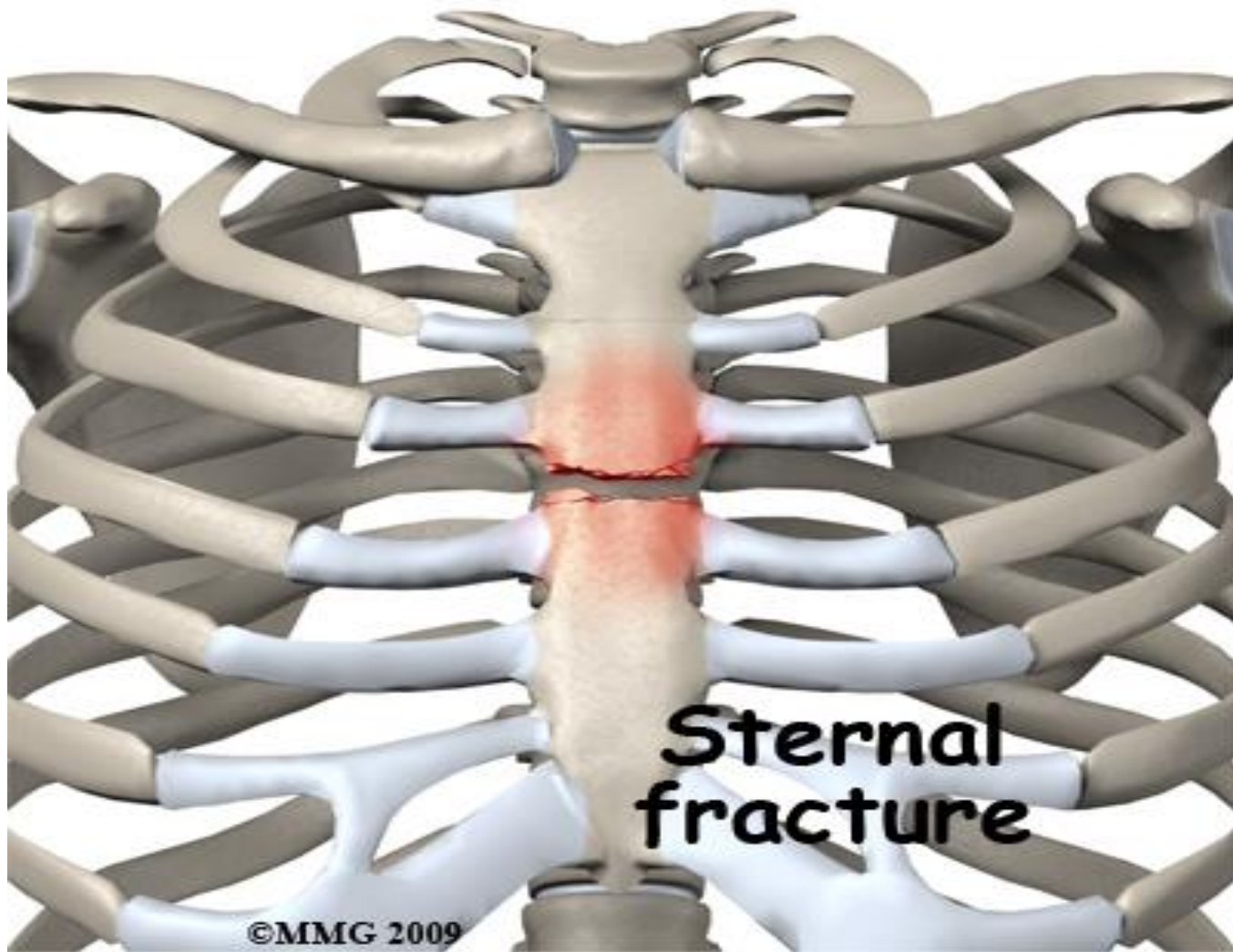
- They are the anterior primary rami of spinal thoracic nerves from T1 to T11
- T3 to T6 are Typical
- T12 is called Subcostal
- The remaining nerves are called atypical (non-typical)
- Each nerve runs in the Intercostal space inferior to the Intercostal vessels



Azygos Vein

- Connects IVC with SVC
 - Begins in abdomen from back of IVC at level of L2
 - Enters thorax through Aortic opening of diaphragm on Rt. side of thoracic duct & aorta.
 - In post. Mediastinum it passes behind Rt. Border of esophagus & root of rt. Lung
 - In sup. Mediastinum (L4) it crosses above the root of rt. lung
- Enters the middle of the back of the SVC.



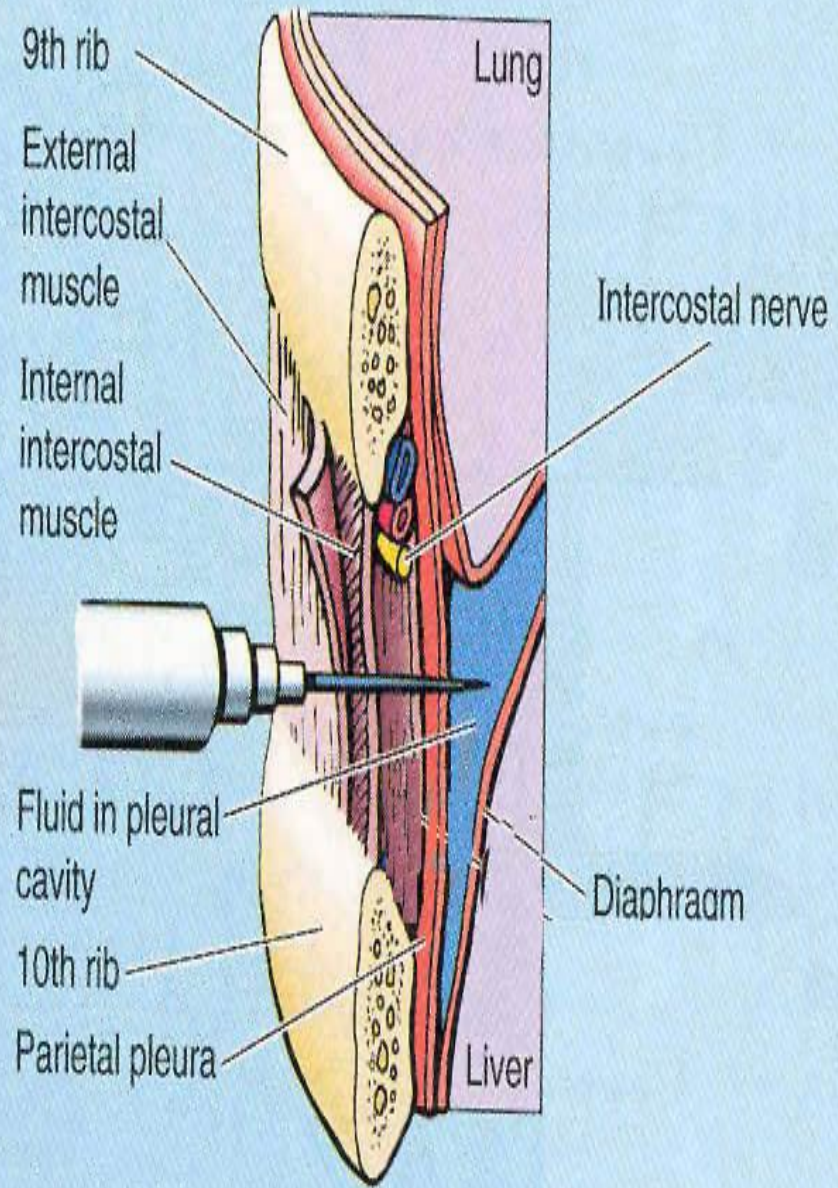
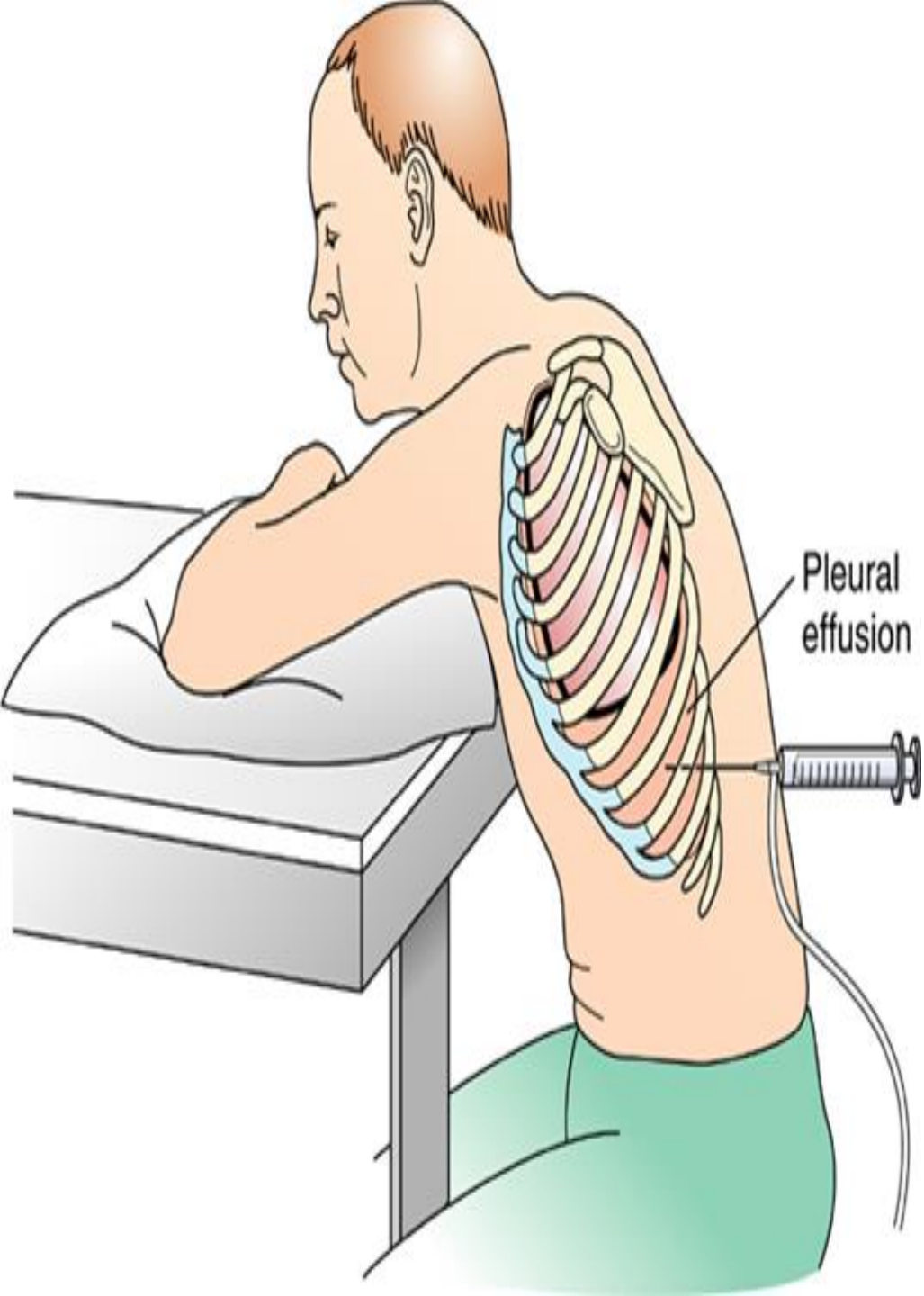


**Sternal
fracture**

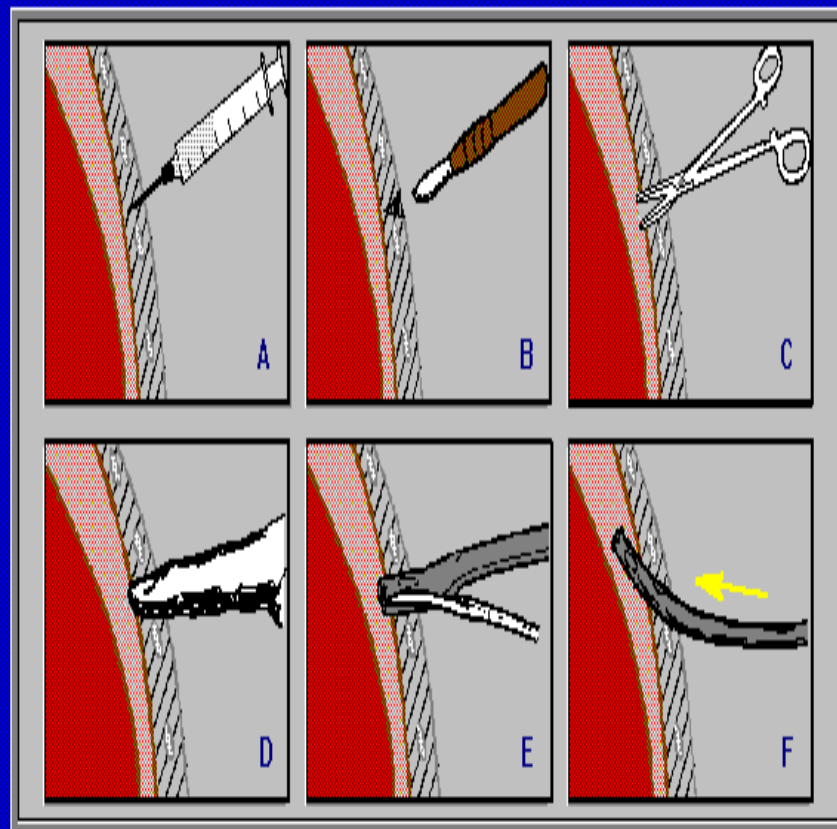
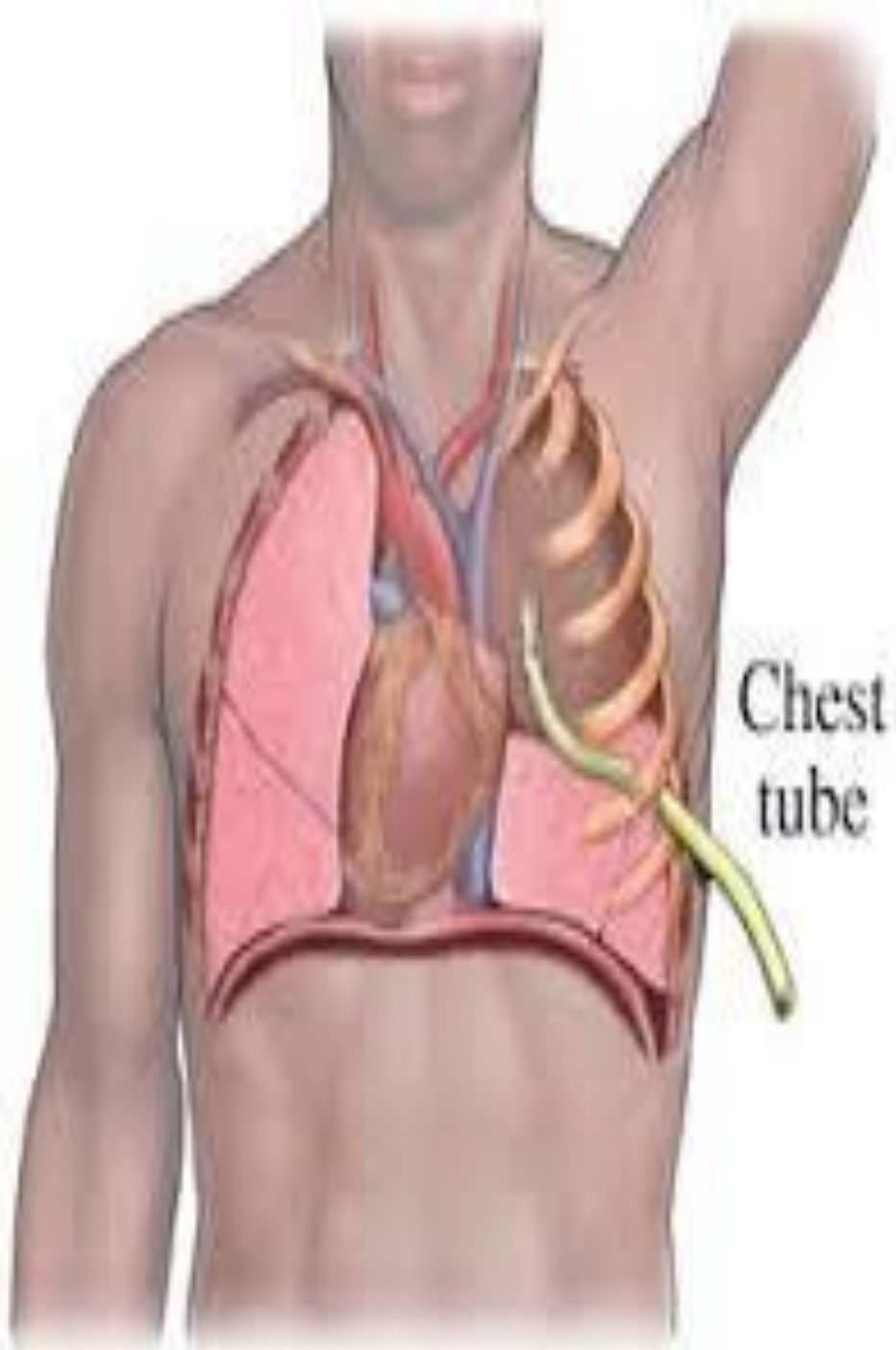
©MMG 2009

RIGHT





Technique for thoracentesis (in midaxillary line)



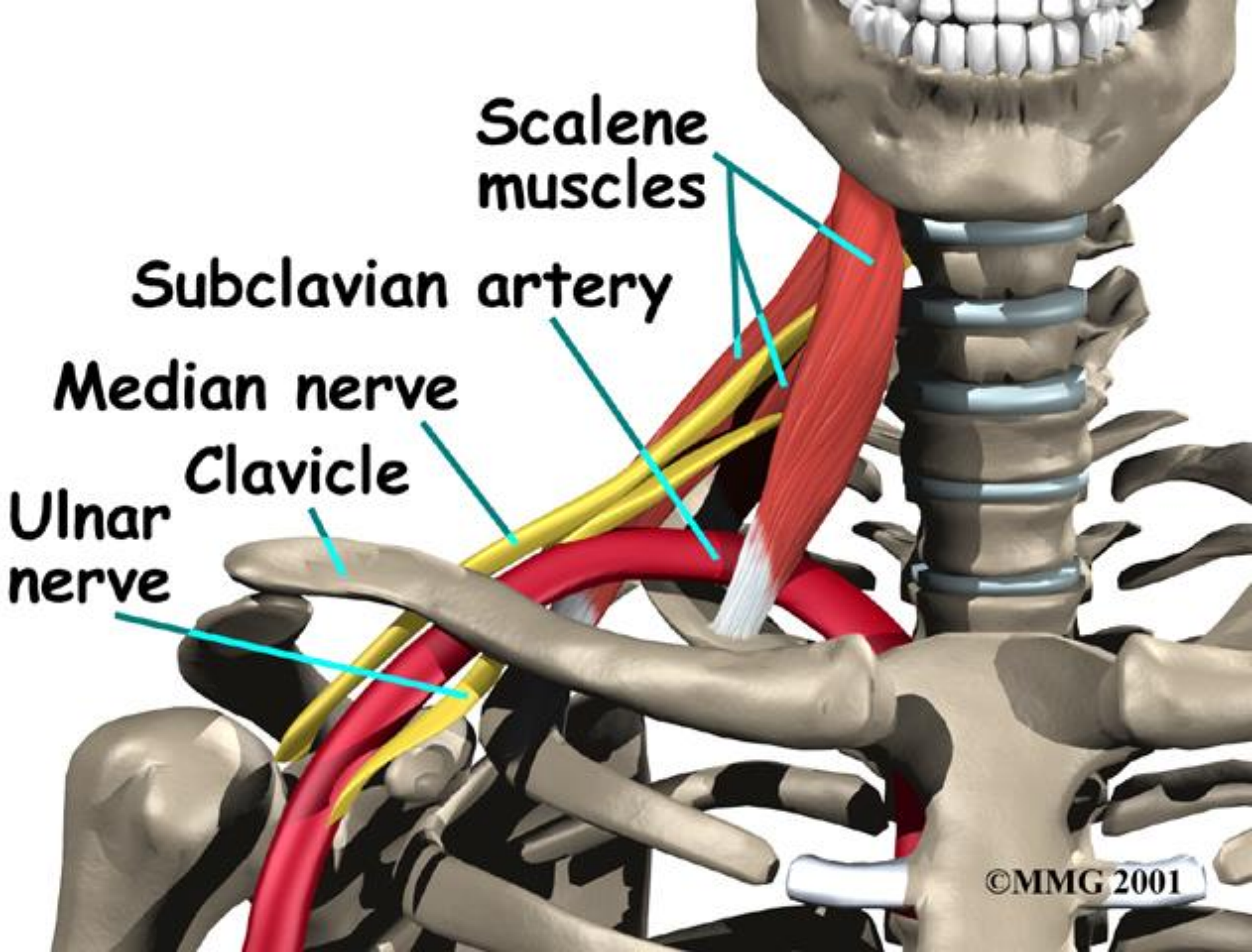
CHEST TUBE INSERTION PROCEDURE

The distal end of the chest tube is clamped and, using the clamp as a guide, inserted into the incisional site [E above]. At this time, the patient should be encouraged to take a deep breath; this will displace the diaphragm downward, minimizing the risk of its injury. The clamp is removed and the tube is then advanced into the pleural space and directed anteriorly or posteriorly depending on the material being drained [F above].

[Return to Main Menu](#)

[Previous](#)

[Continue](#)



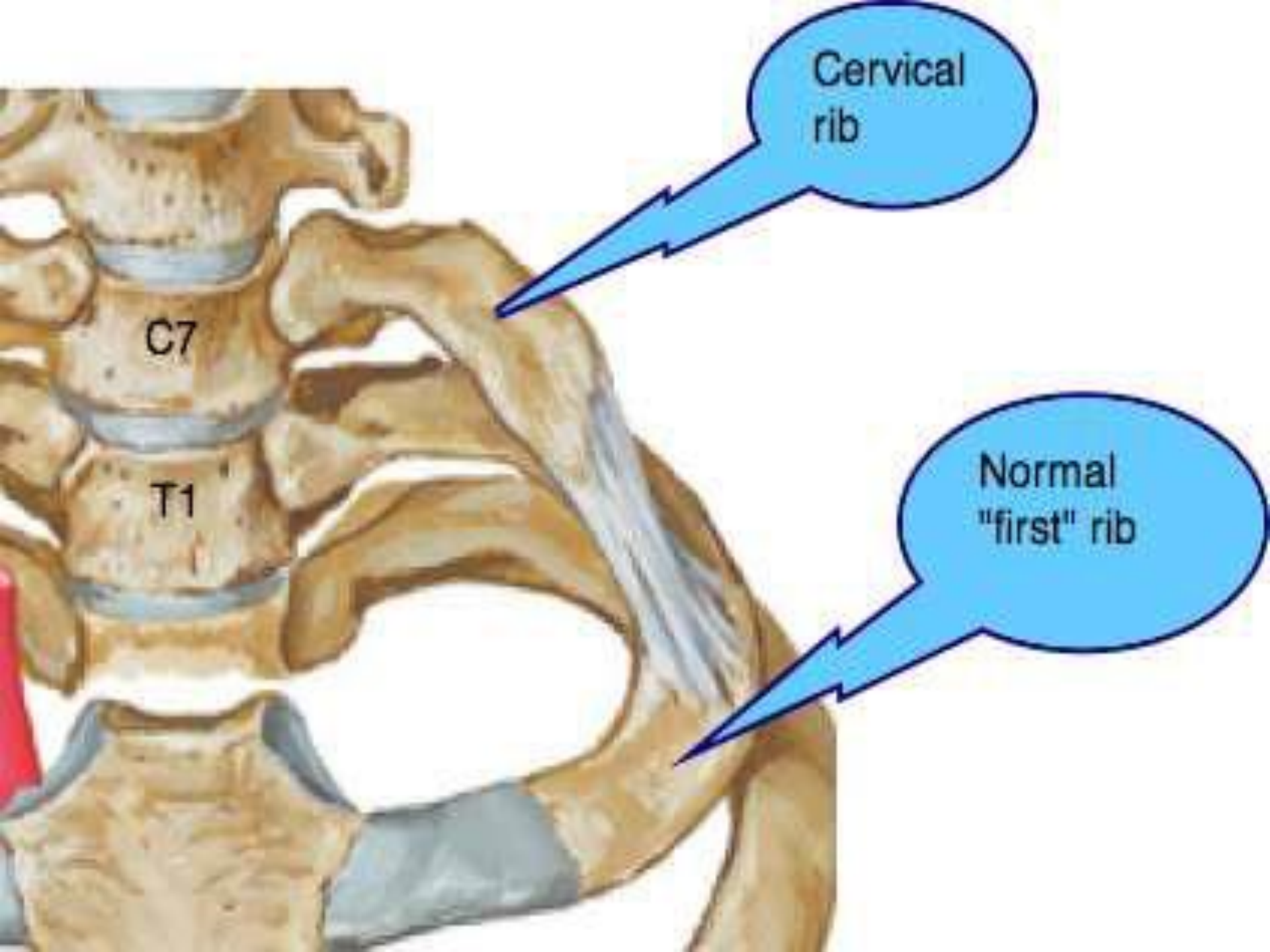
**Scalene
muscles**

Subclavian artery

Median nerve

Clavicle

**Ulnar
nerve**



Cervical rib

Normal "first" rib

C7

T1

Thank You

Abdominal Wall and Cavity

Dr. ALSHIKH YOUSSEF Haiyan

BOUNDARIES

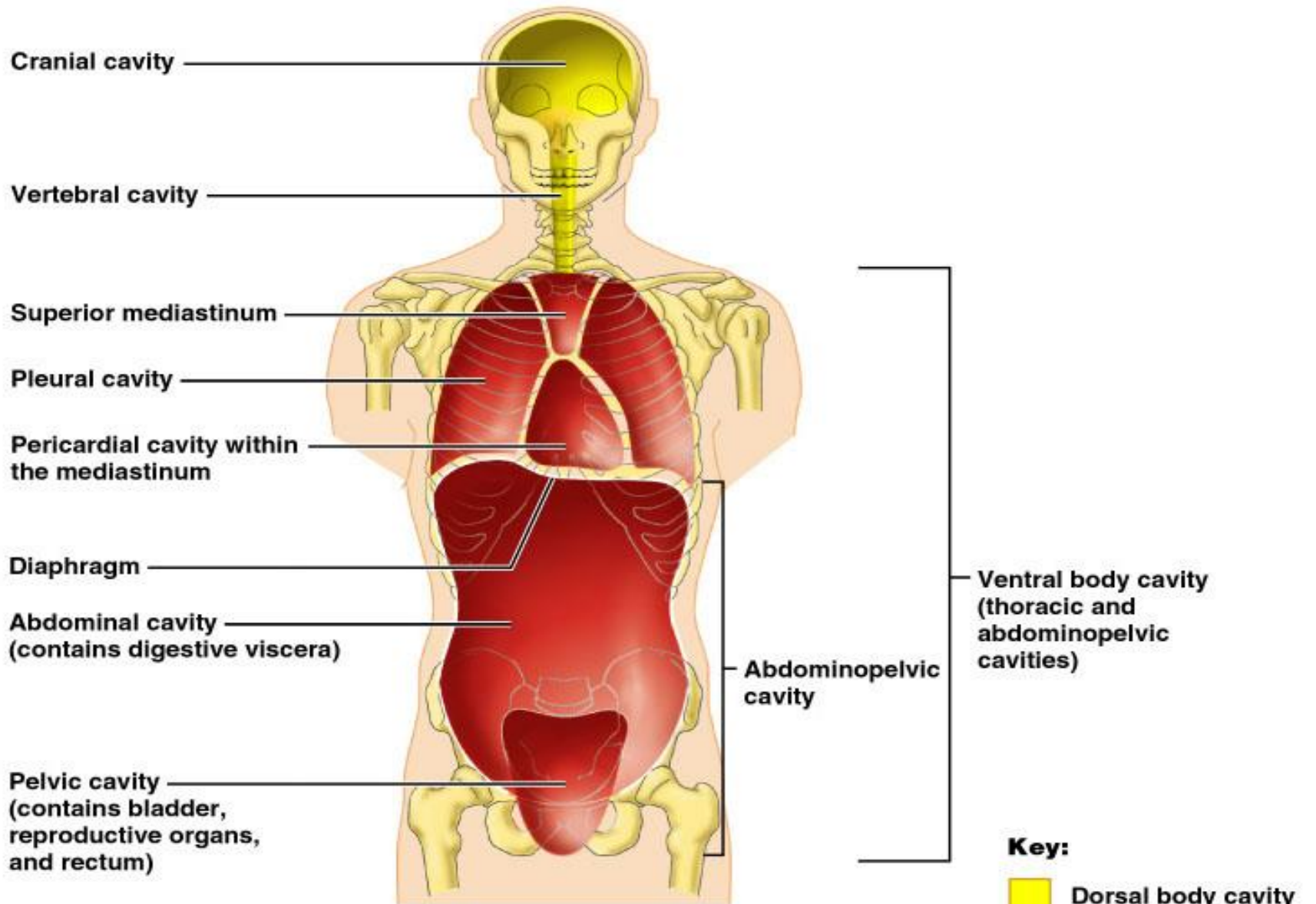


Bony Landmarks around Abdomen

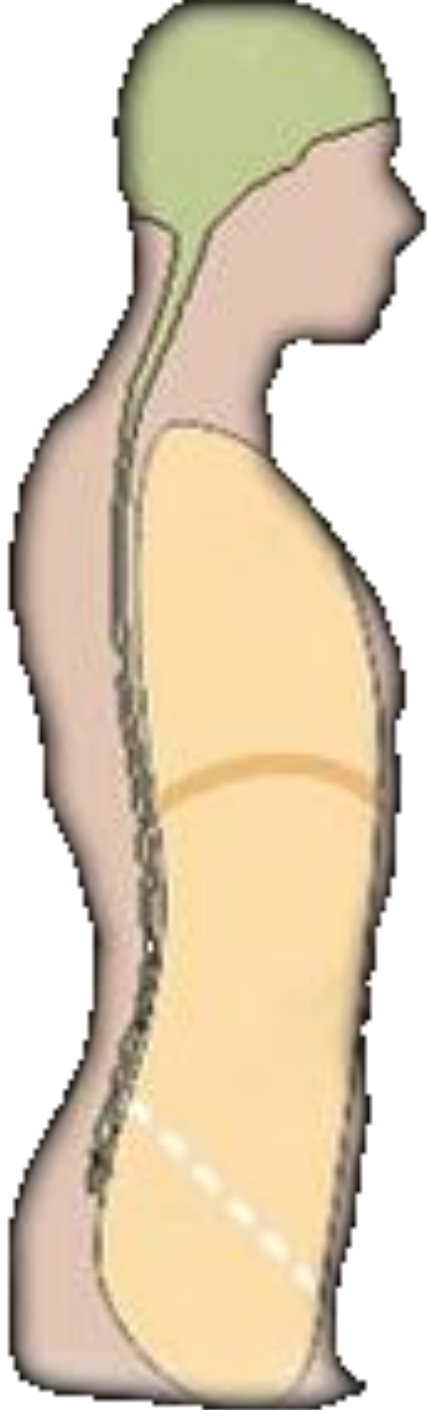
- Iliac crest •
- Anterior superior iliac spine (ASIS) •
- Pubic crest •
- Inguinal ligament •
- Costal margin •
- Xiphoid process •



Body Cavities



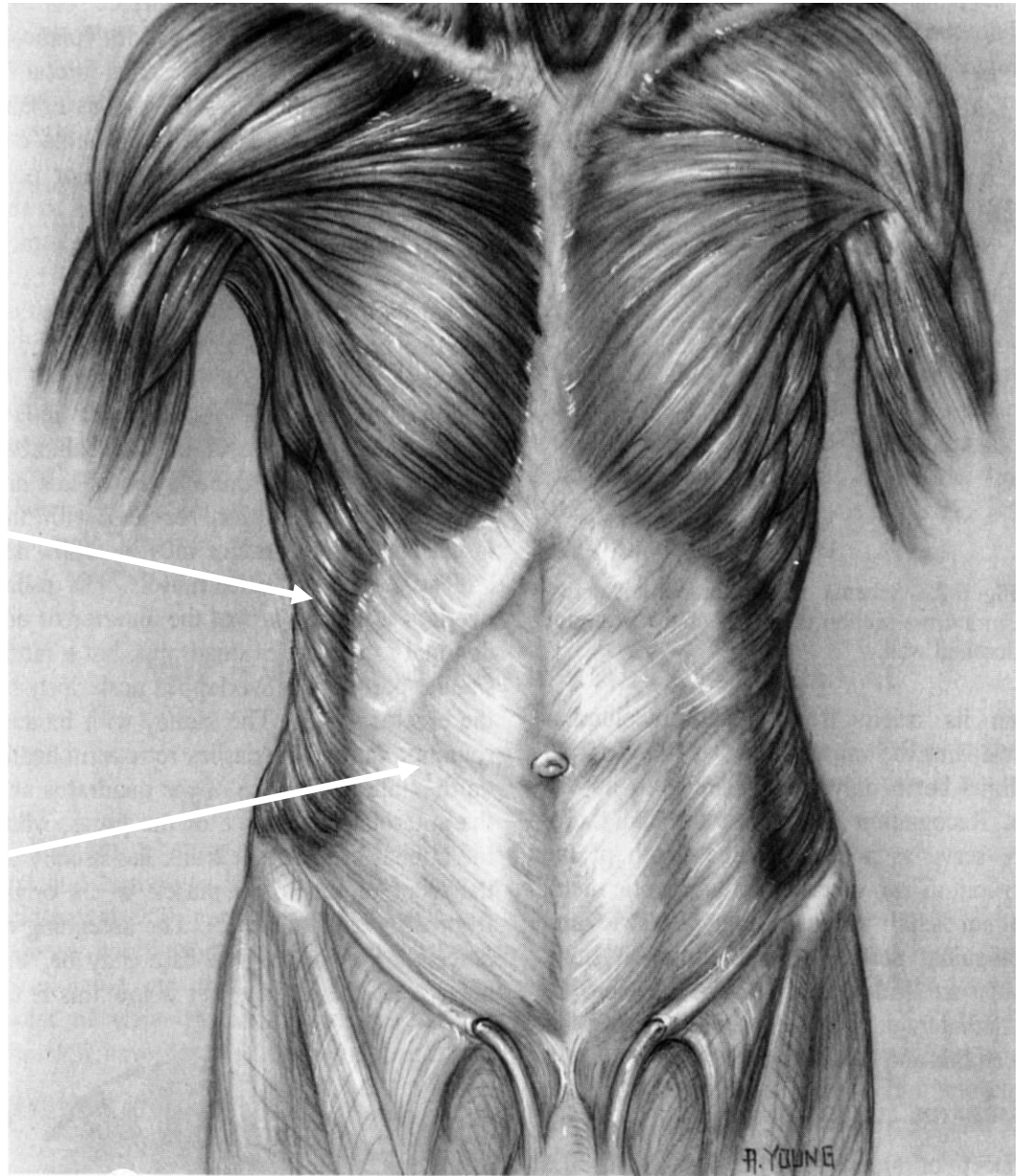
(b) Anterior view



Abdominopelvic Cavity

Abdominal Cavity —

Pelvic Cavity —



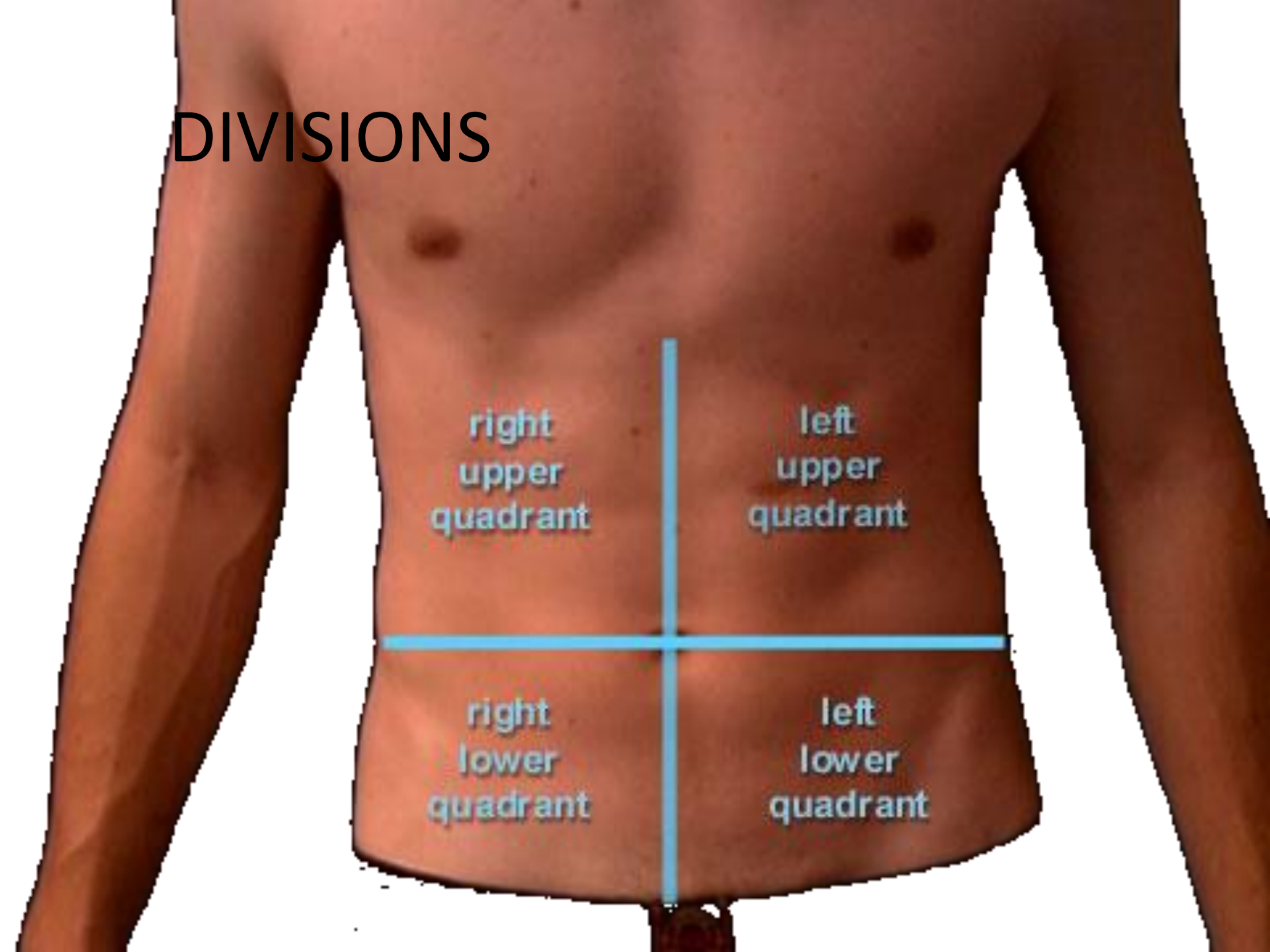
DIVISIONS

right
upper
quadrant

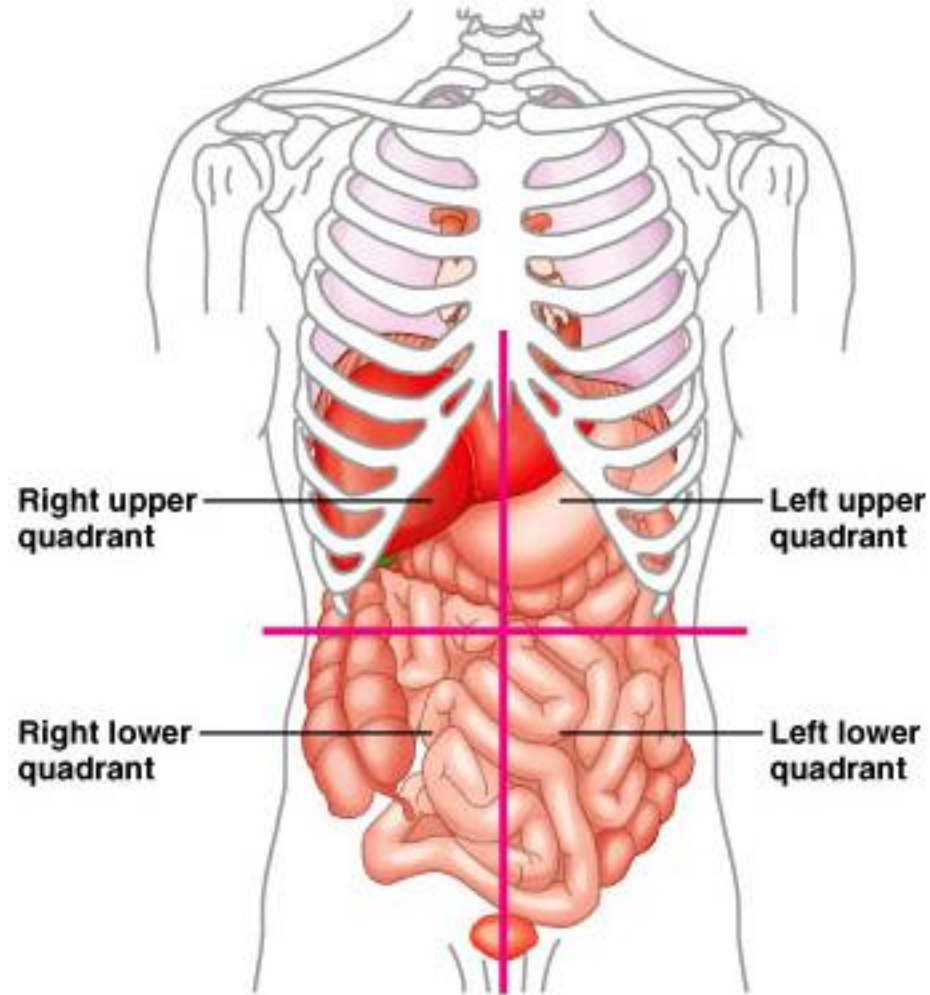
left
upper
quadrant

right
lower
quadrant

left
lower
quadrant



Abdominal Quadrants



Applied Anatomy

Abdomen is divided into 9 regions via four •
planes:

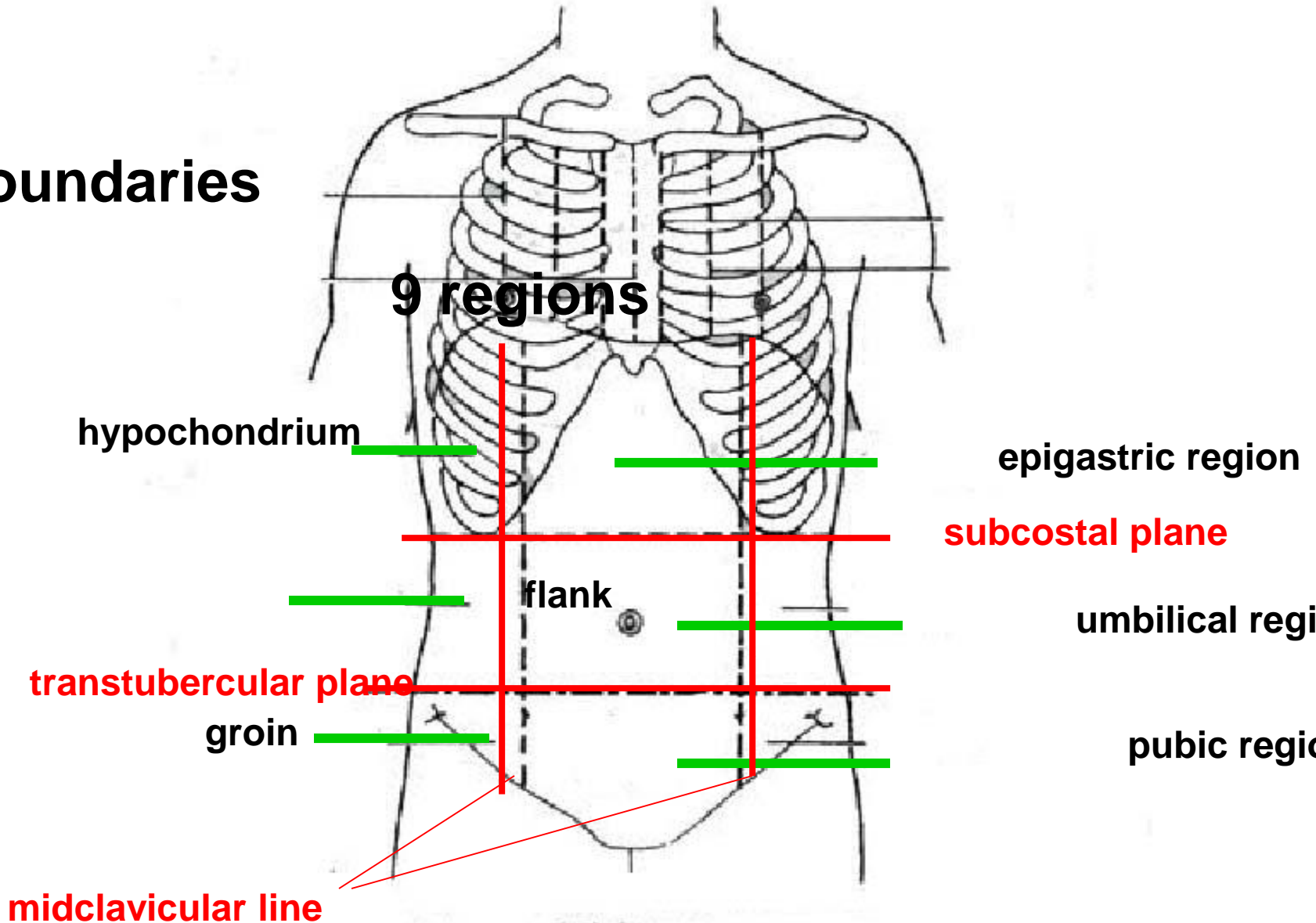
Two horizontal [sub-costal (10th) and trans –
tubercules plane] (L5).

Two vertical (midclavicular planes). –

They help in localization of abdominal signs •
and symptoms

Abdomen

Boundaries



right
hypochondriac
region

epigastric
region

left
hypochondriac
region

right
lumbar
region

umbilical
region

left
lumbar
region

right
iliac
region

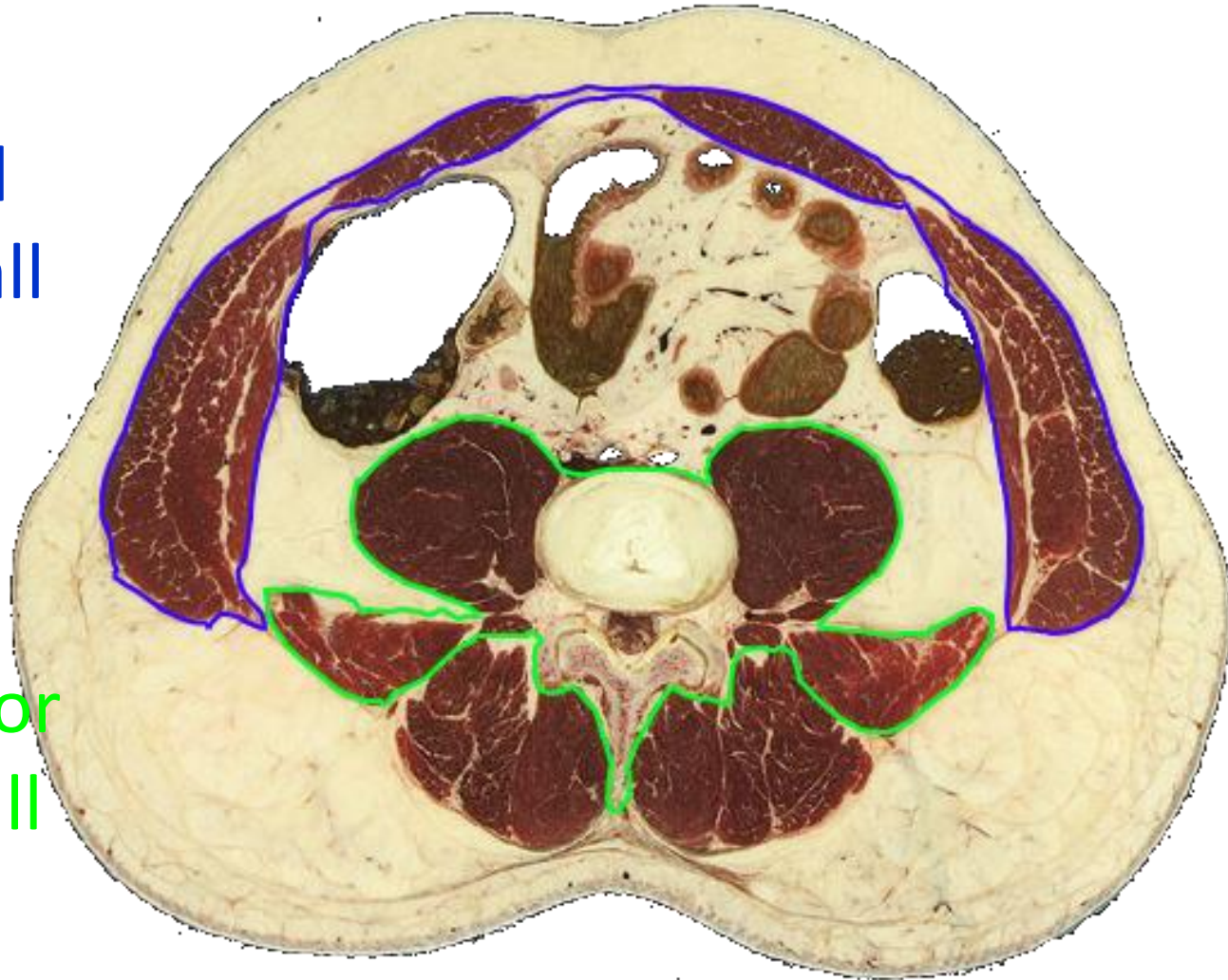
hypogastric
region

left
iliac
region

Abdominal wall

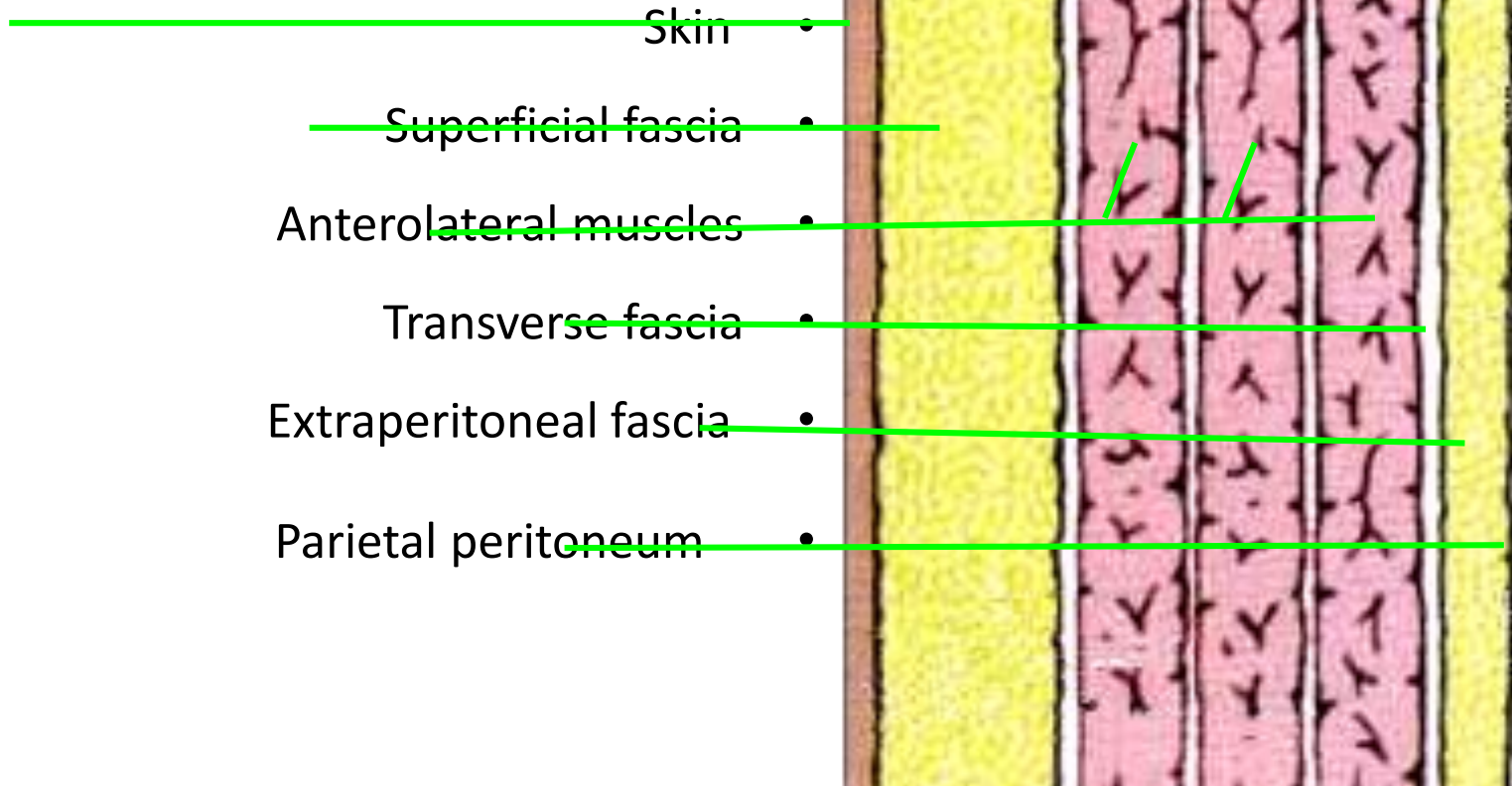
Anterolateral
abdominal wall

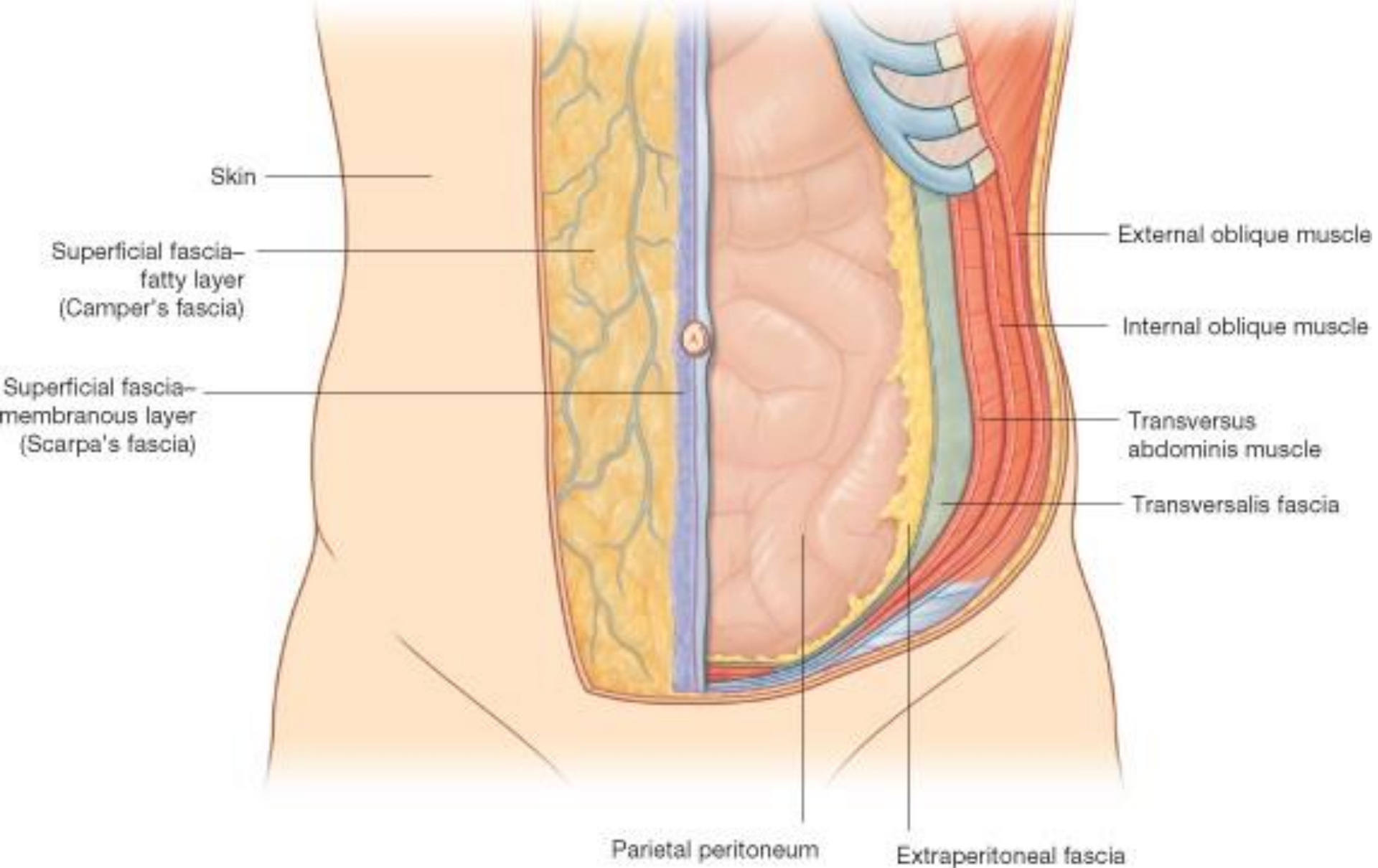
Posterior
abdominal wall

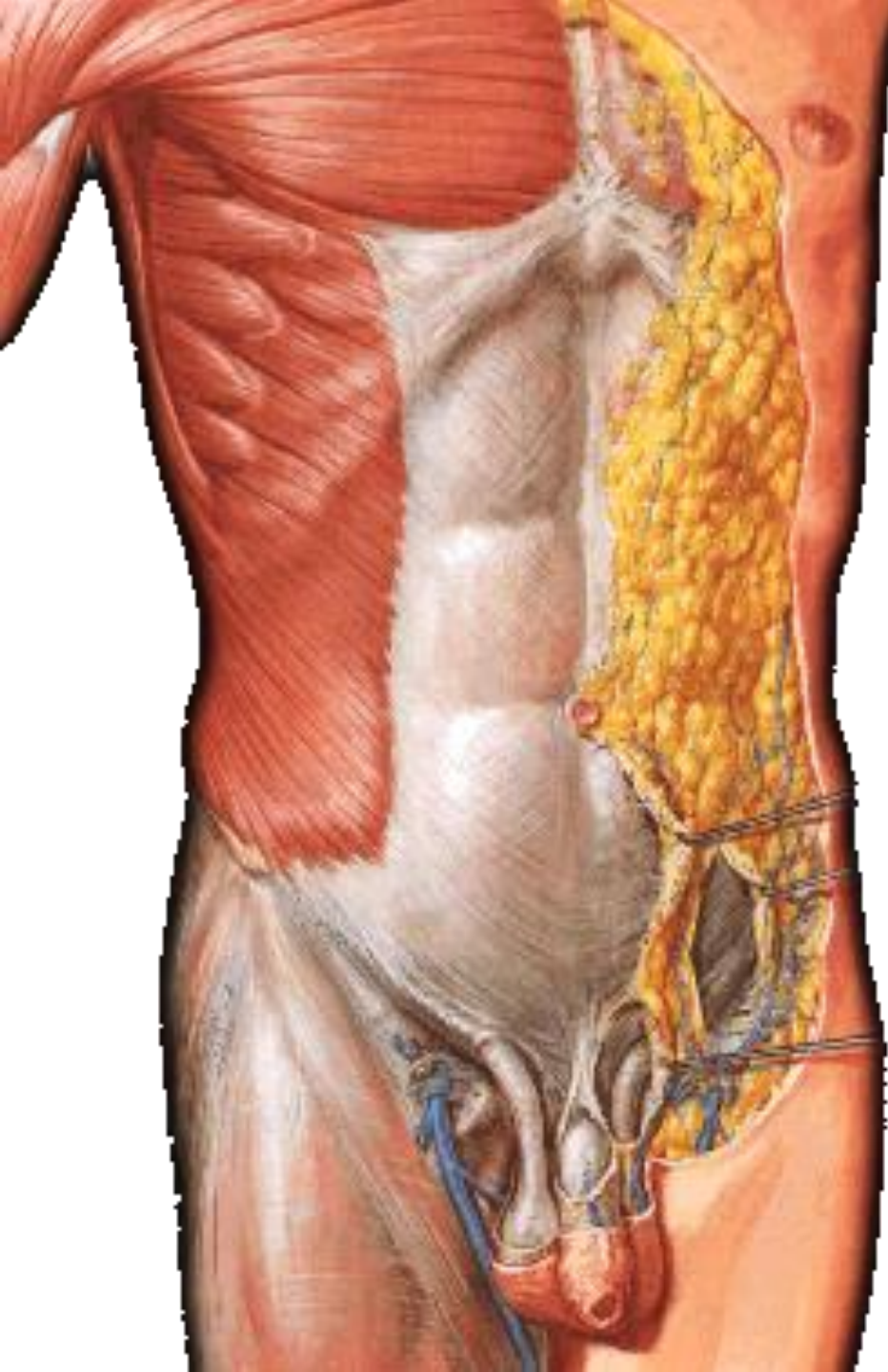


Anterolateral abdominal wall

Layers (from superficial to deep)







Superficial fascia

- Camper's fascia
- Scarpa's fascia

Anterolateral abdominal wall

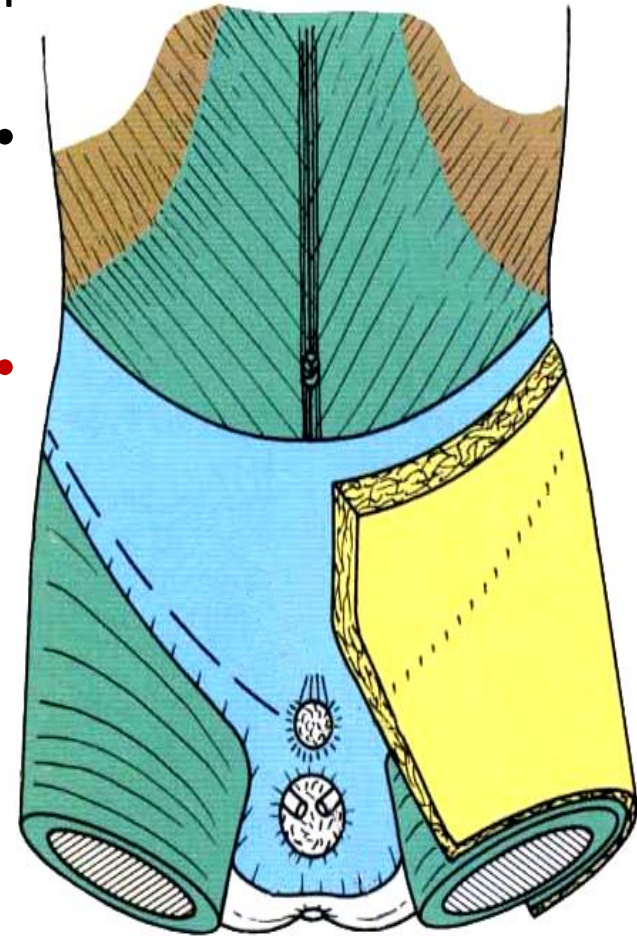
Superficial fascia : — division

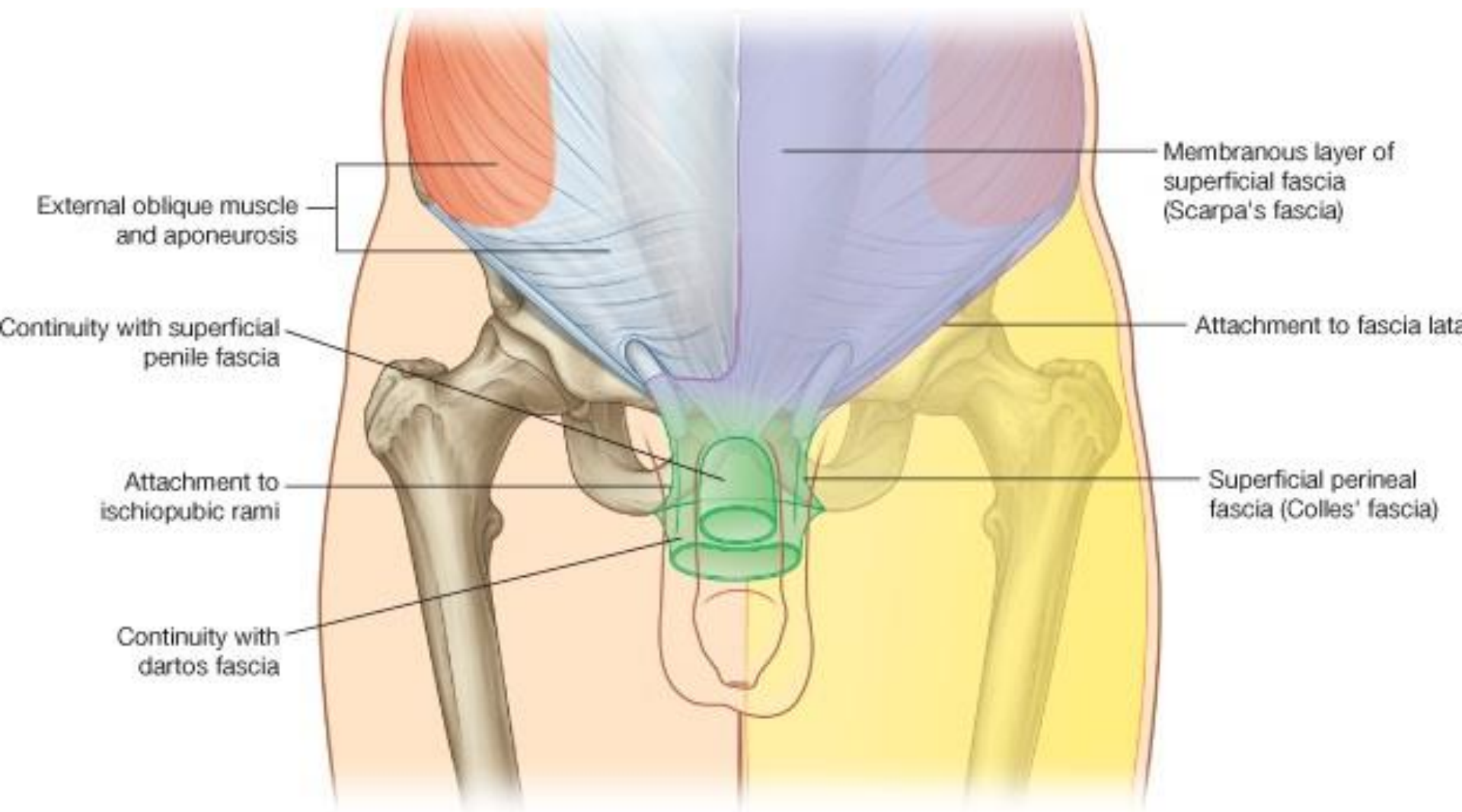
below umbilicus

= Fatty layer (**Camper's fascia**) continuous with the superficial fascia over the rest of the (Thigh –thorax)body.

= **Membranous layer (Scarpa's fascia)** passes over the inguinal ligament to fuse the deep fascia of the thigh (fascia lata) approximately one fingerbreadth below the inguinal ligament. In the midline, it is not attached to the pubis but instead from a tubular sheath for the penis (clitoris). In the perineum, it attaches on each side to the margins of the pubic arch and is known as Colles' fascia.

deep fascia : thin layer covering abdominal muscles .





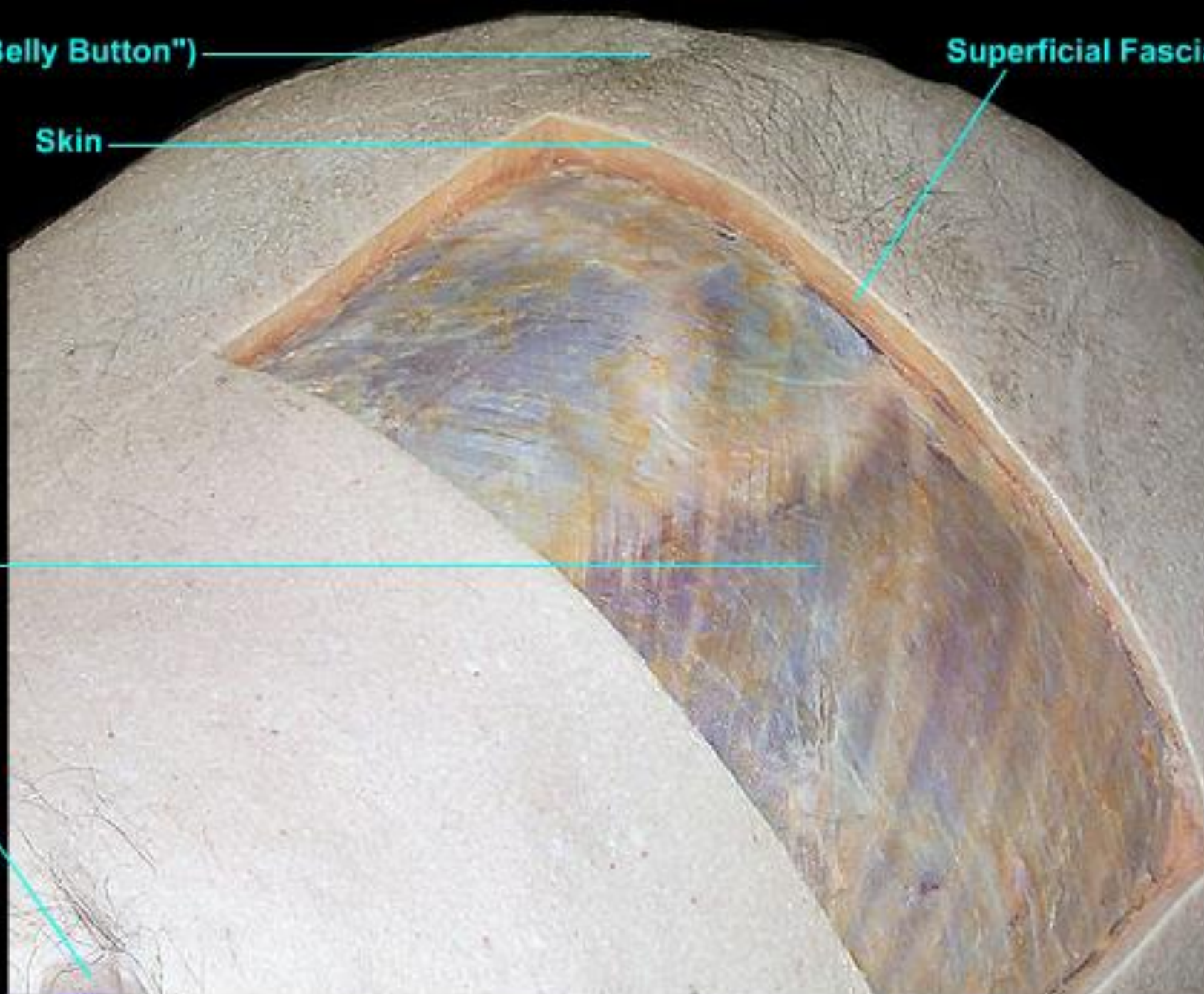
Umbilicus ("Belly Button")

Superficial Fascia

Skin

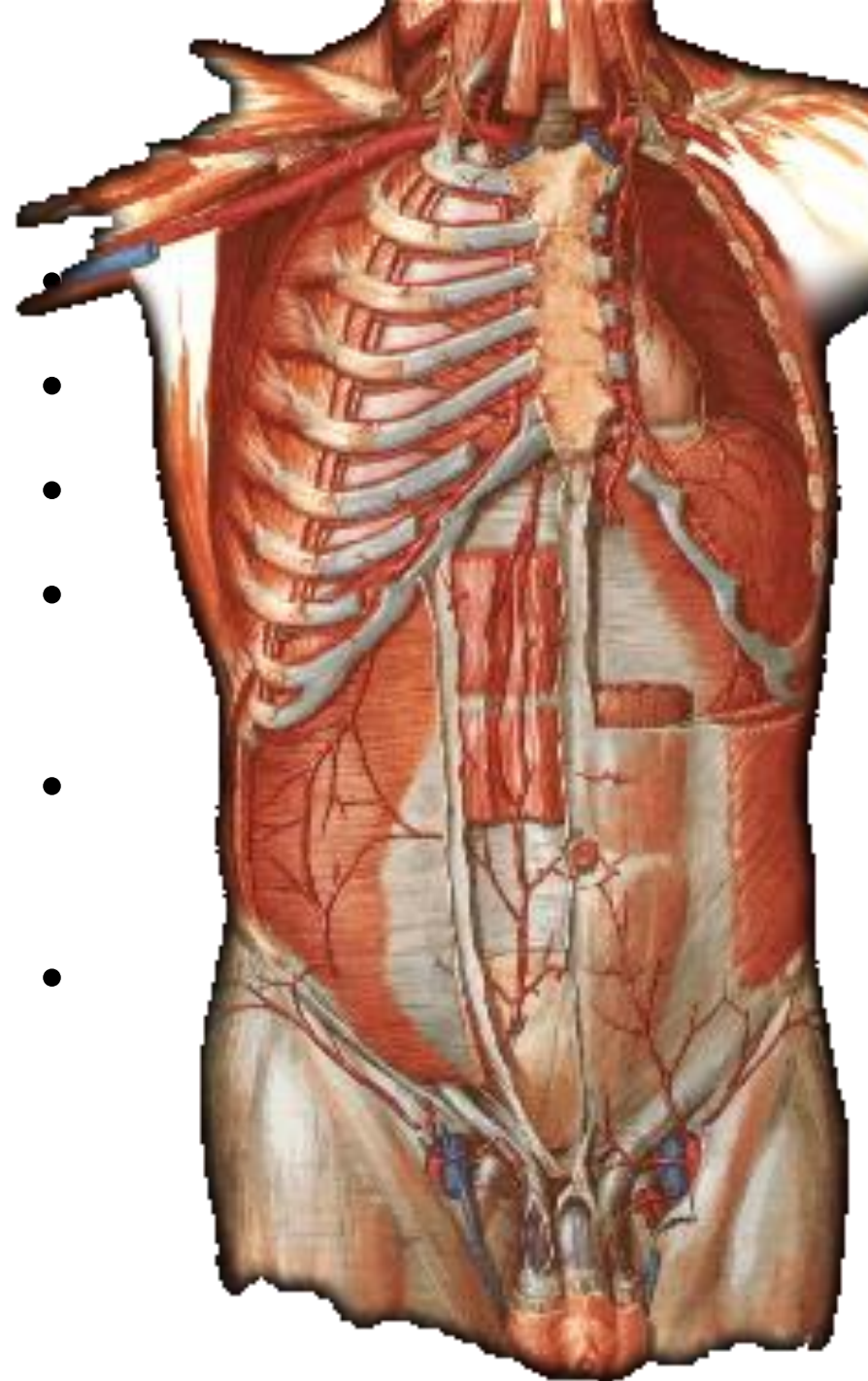
Deep Fascia

Right Nipple



Arteries

- 5 intercostal arteries
- subcostal arteries
- 4 lumbar arteries
- Superior epigastric artery—
internal thoracic artery
- Inferior epigastric artery -
external iliac artery
- Deep iliac circumflex artery-
external iliac artery



SUPERFICIAL ARTERIES

Lateral

Posterior intercostal a. –

Subcostal a. –

Lumbar a. –

Median

Epigastric a. –

hypogastric a. –

Inferior

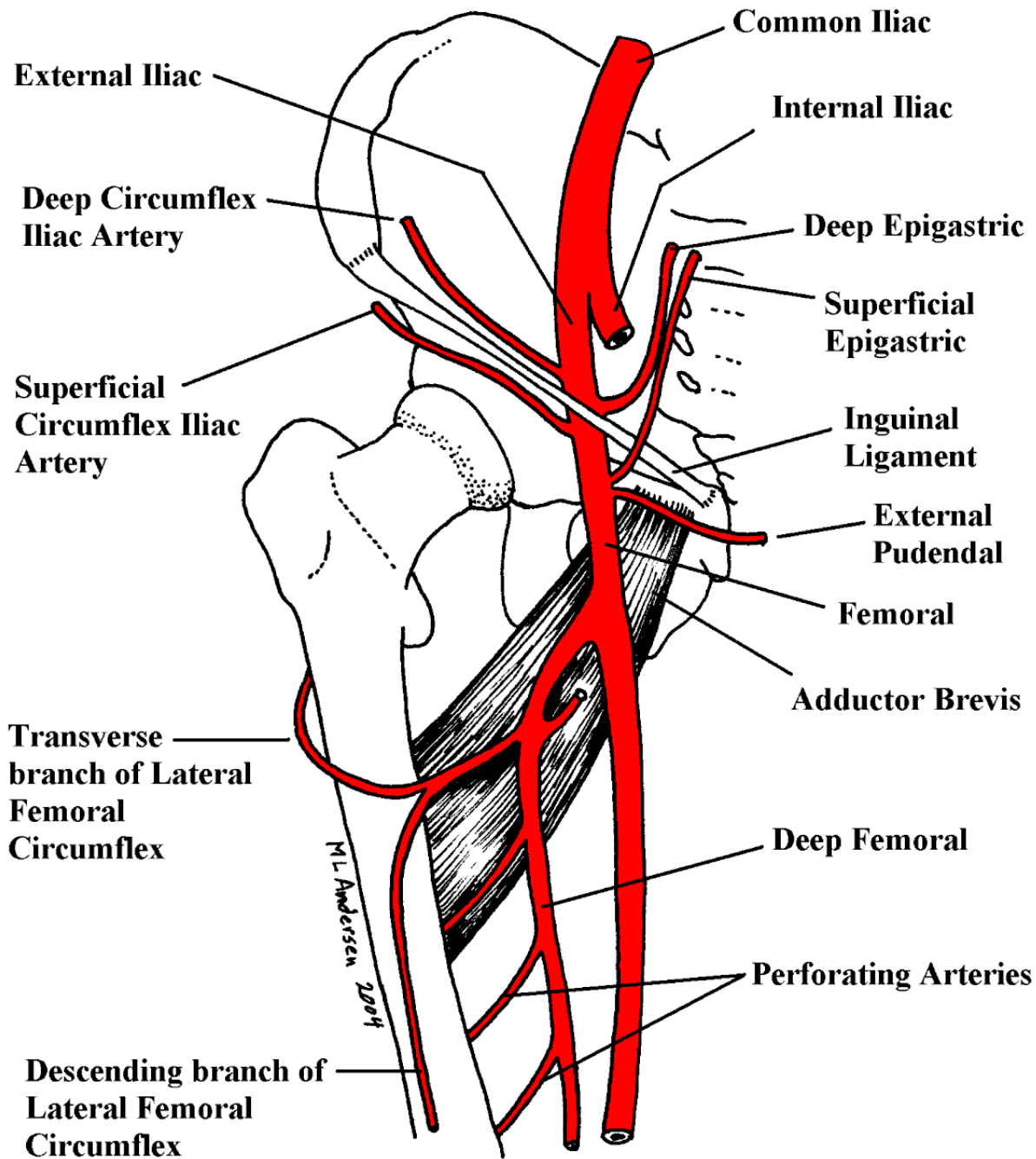
Superficial epigastric a. –

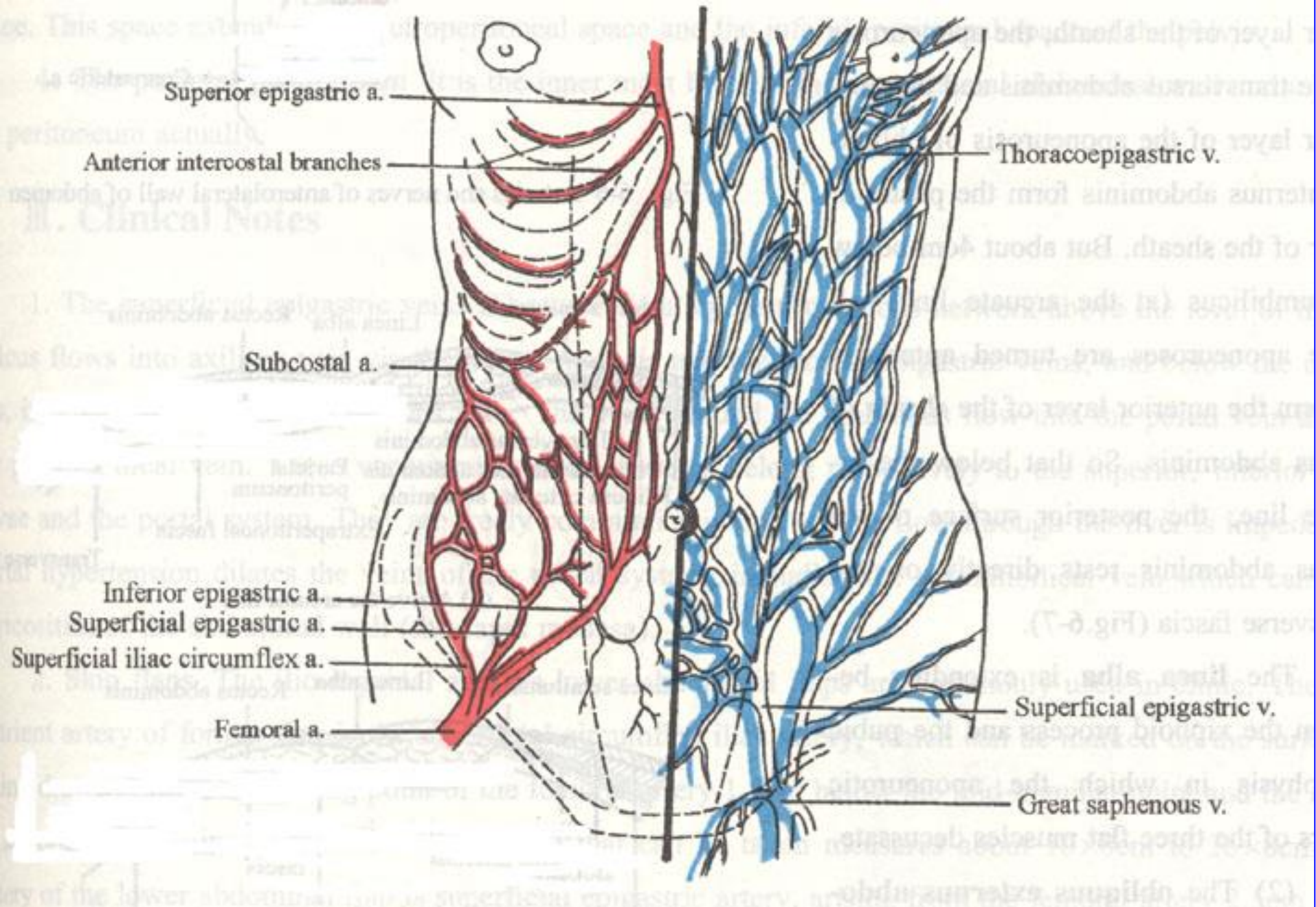
Superficial iliac a. –



Arterial Supply Below Umbilicus

- Superficial epigastric arteries (femoral artery)
- Superficial circumflex iliac arteries (femoral artery)
- Deep circumflex iliac artery (external iliac)
- Superficial external pudendal arteries (femoral artrey)
- Inferior epigastric ; arises from external iliac artery, and enters rectus sheath at arcuate line ,
branches: gremasteric artery
-





Venous Drainage

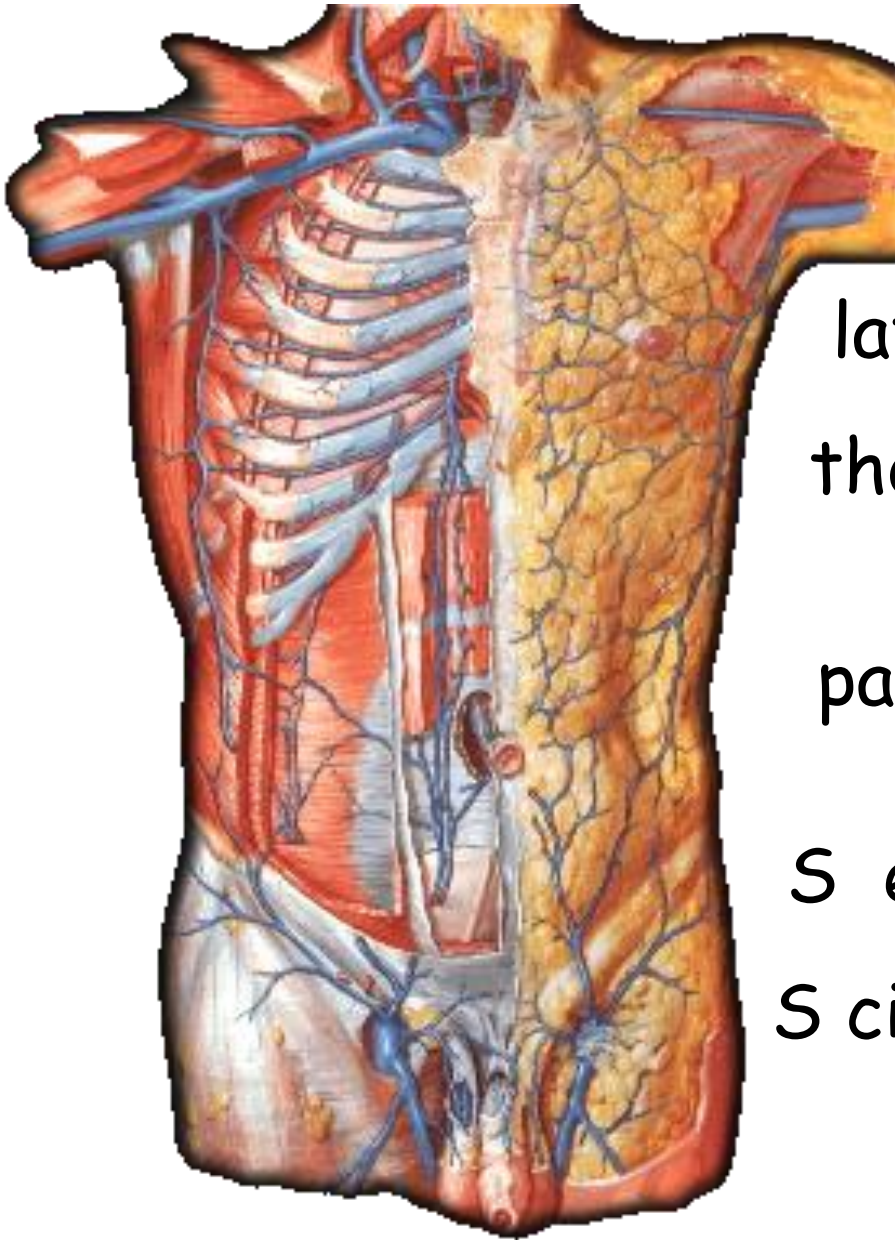
Superficial veins are paired with arteries. •

Above the umbilicus: •

Drain into the azygos venous system.

Below the umbilicus: •

Drain into the femoral system (via great saphenous).

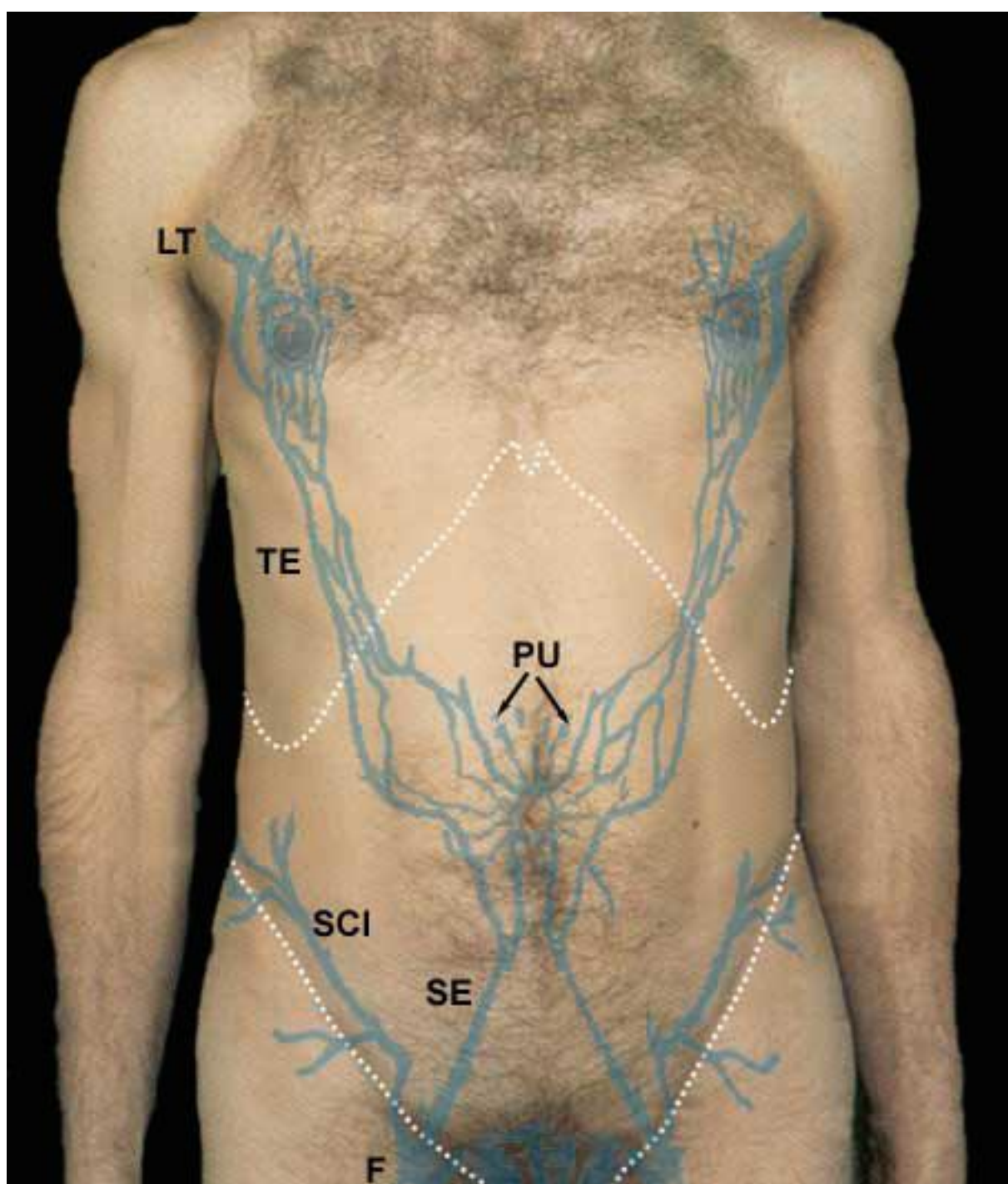


Superficial veins

lateral thoracic }
thoracoepigastric } subclavian

paraumbilical — portal

S epigastric }
S circumflex iliac } femoral

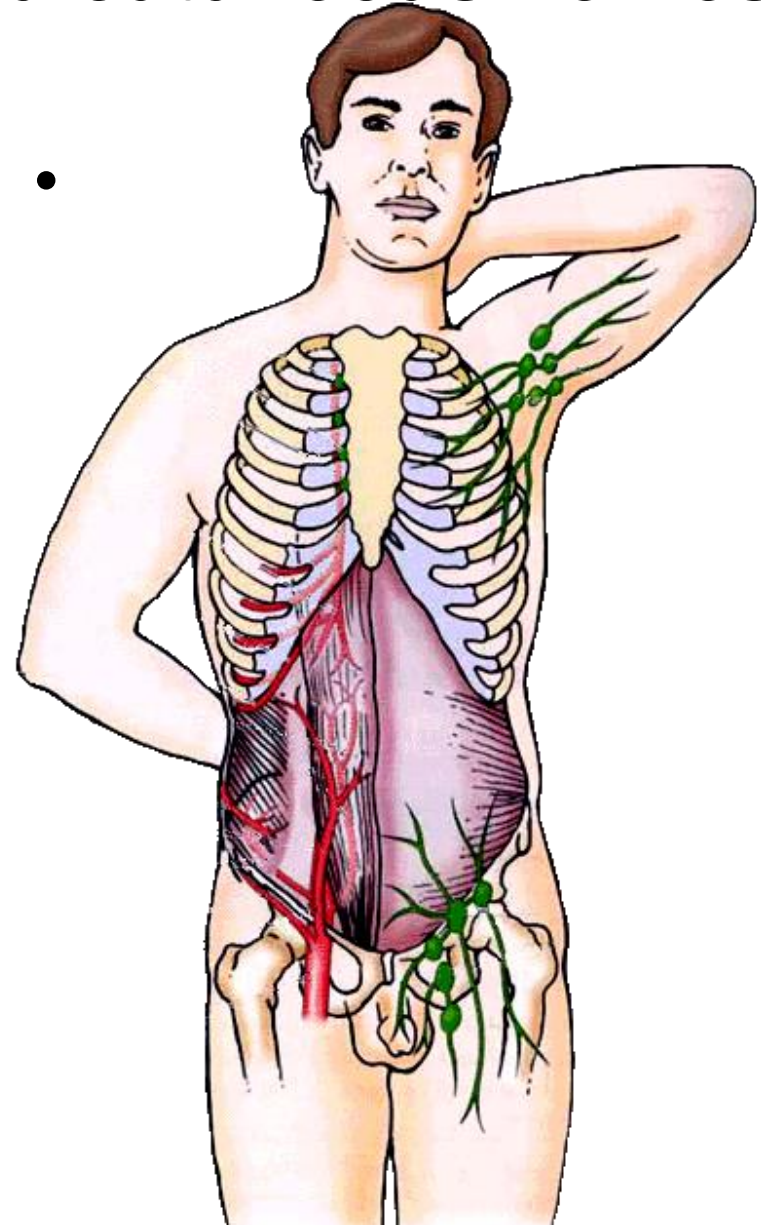


Superficial vessels and cutaneous nerves

Lymph drainage •

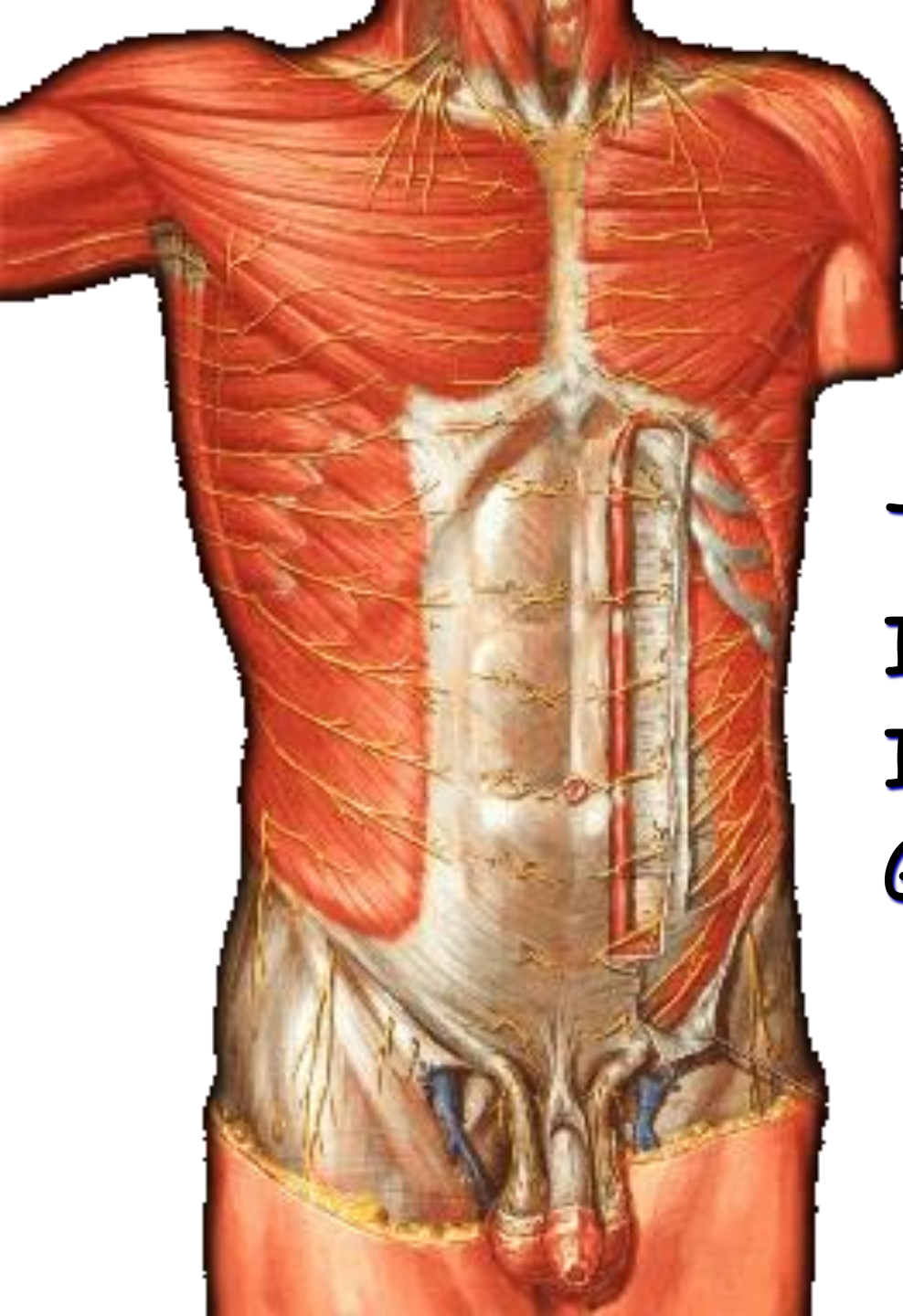
Superficial lymph vessels —
above the level of the
umbilicus drain upward
into the pectoral Ln.

The vessels below this —
level drain downward into
the superficial inguinal Ln.

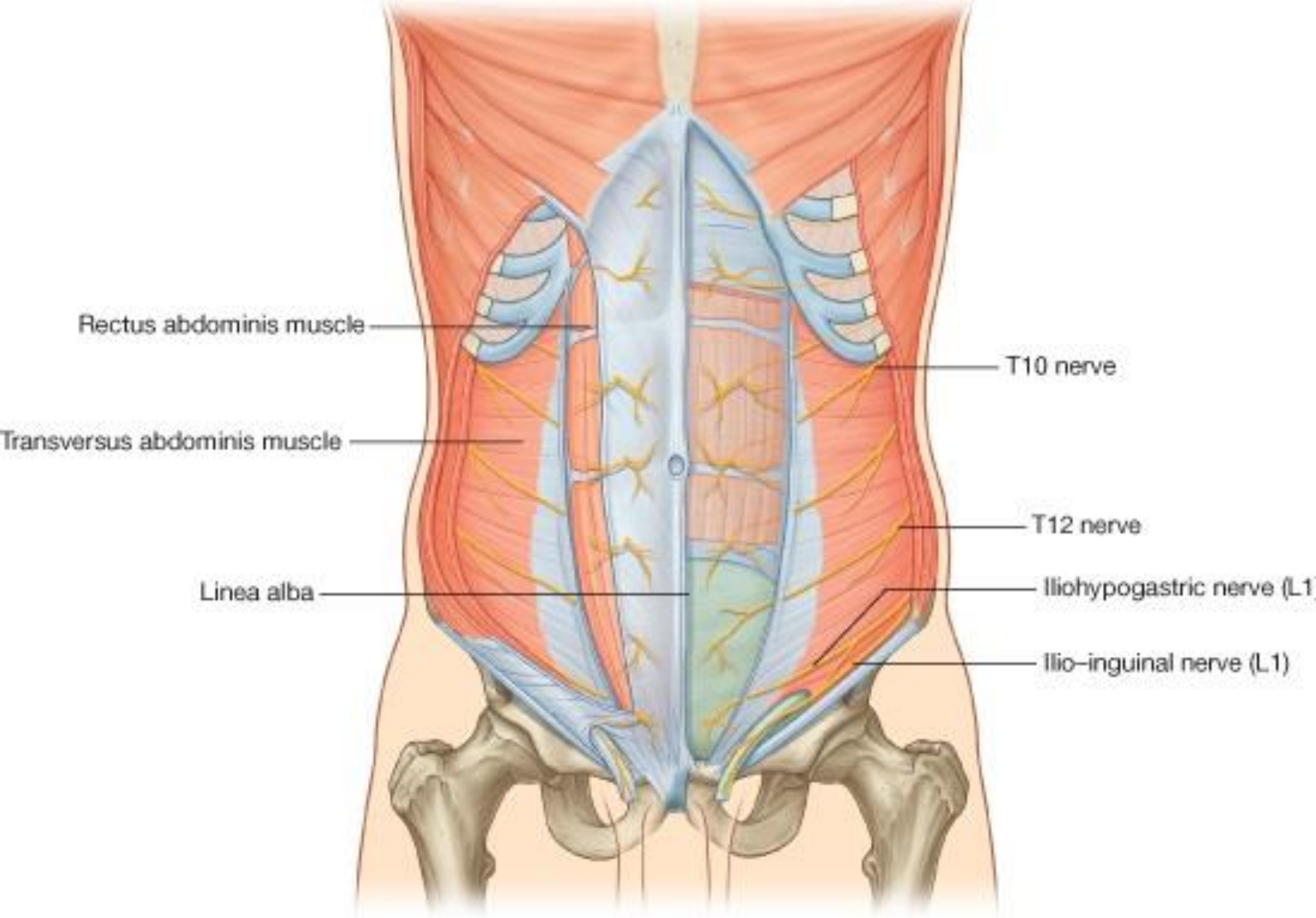


Lymphatic Drainage

- Anterior** → Intercostal Lymphatic Nodes
Parasternal Lymphatic Nodes
- Middle** → Lumbar Lymphatic Nodes
- Lower** → External Iliac Lymphatic Nodes



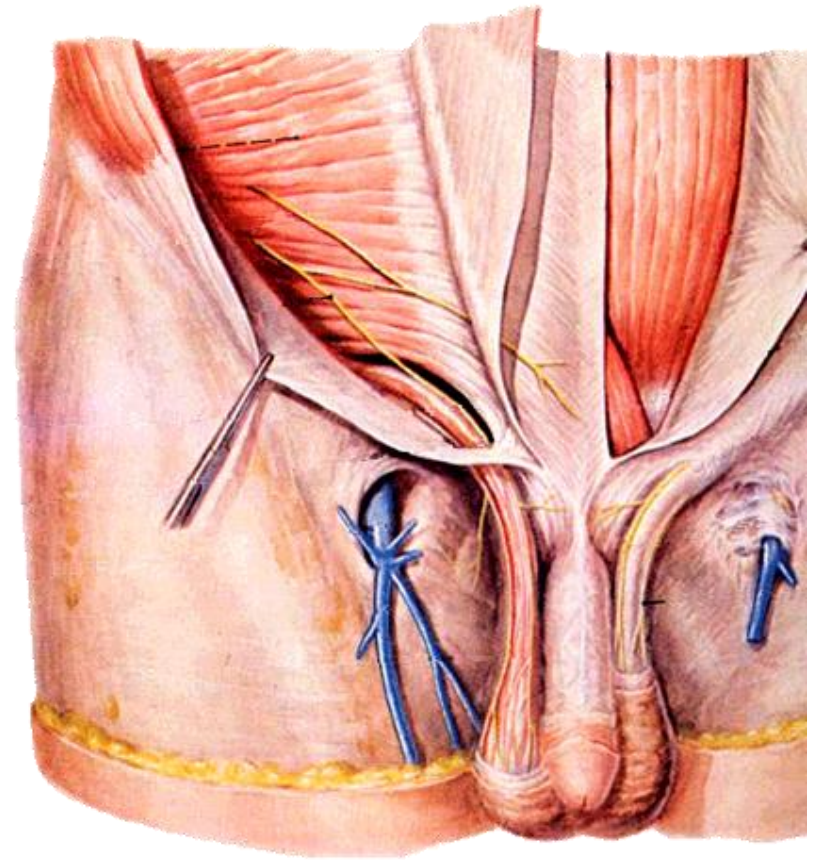
- T7-12 thoracic n. ●
- Iliohypogastric n. ●
- Ilioinguinal n. ●
- Genitofemoral n. ●



Deep nerves of abdomen

Iliohypogastric n.

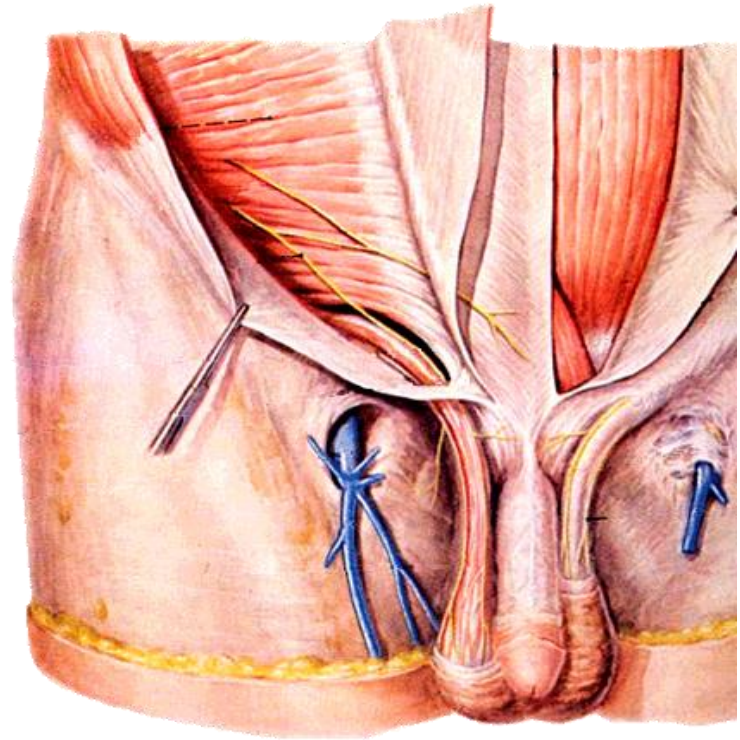
- Arises from lumbar plexus
- Passes forward in the interval between obliquus internus and tranversus abdominis
- Pierces obliquus internus abdominis 2.5 cm medial to anterior superior iliac spine
- Pierces aponeurosis of obliquus externus abdominis about 2.5 cm above superficial inguinal ring



Deep nerves of abdomen

Ilioinguinal n.

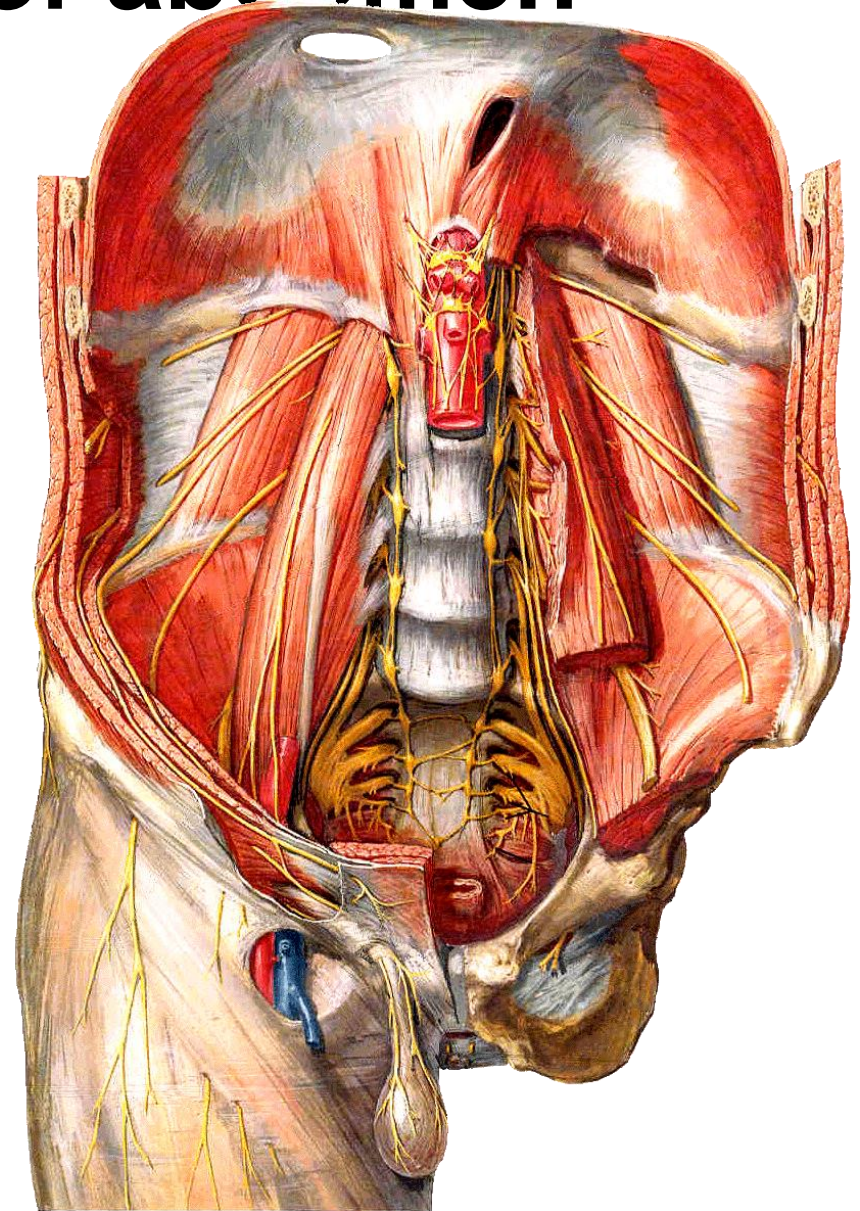
- Arises from lumbar plexus
- Runs parallel with iliohypogastric n. at a lower level
- Enters inguinal canal and exits through superficial inguinal ring
- Supplies the transversus abdominis, obliquus internus, and obliquus externus abdominis. It also supplies the skin just above the symphysis pubis and the scrotum or greater lip of pudendum.



Deep nerves of abdomen

Genitofemoral n.

- Arises from lumbar plexus
- Emerges through superficial inguinal ring and supplies the **cremaster muscle**



Abdominal Wall

The muscles of the abdomen may be divided into •
two groups:

(1) the **anterolateral muscles** •

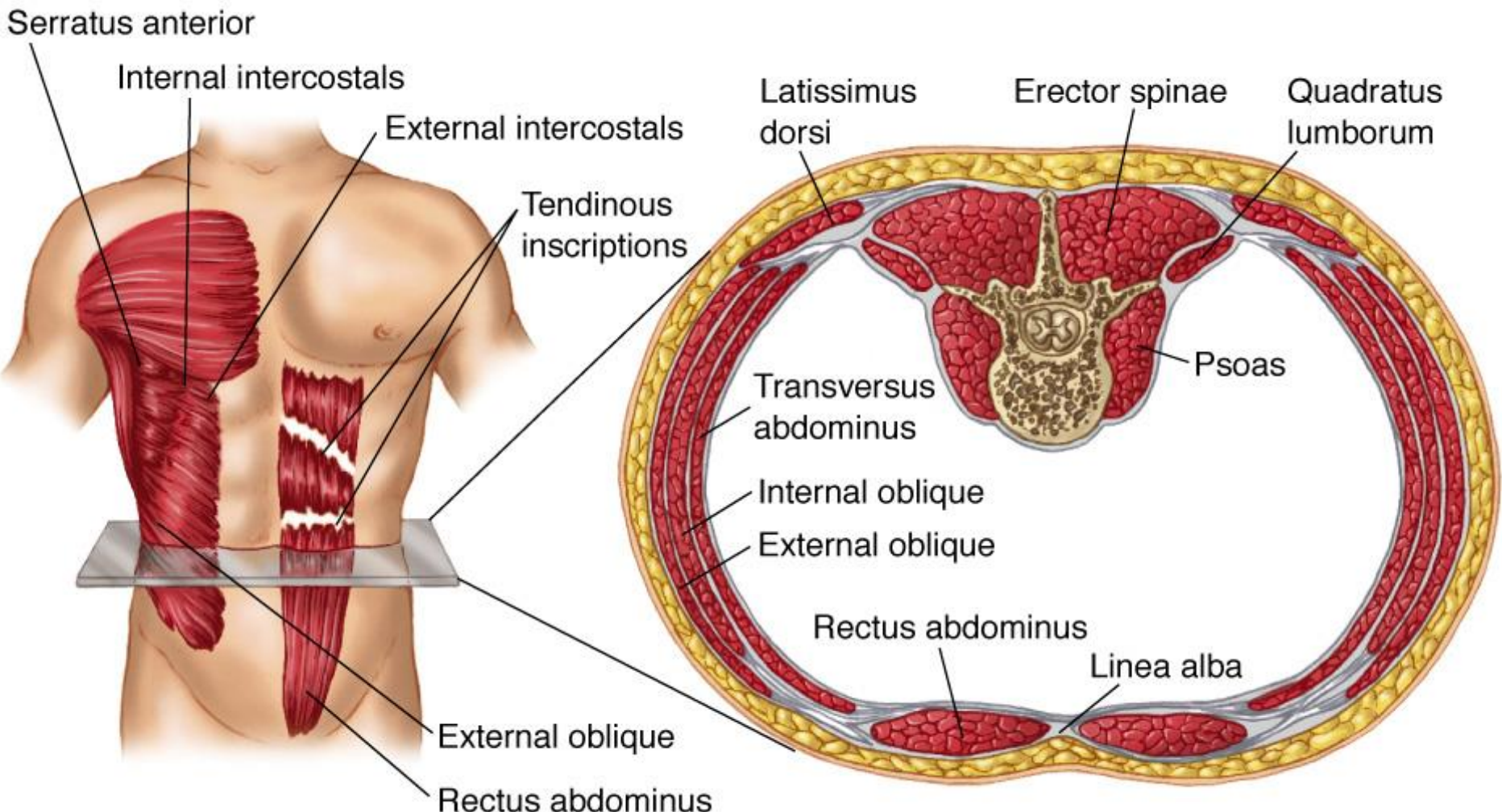
(2) the **posterior muscles.** •

Antero-lateral Muscles of the Abdomen—The •
muscles of this group are:

*Rectus. *Obliquus externus.

*Obliquus internus. *Transversus.

*Pyramidalis.



a. Anterior view of the trunk, showing superficial and deep members of the oblique and rectus groups.

b. Diagrammatic sectional view through the abdominal region.

MUSCLES

Anterior Group



Rectus Abdominis •
Pyramidalis •

Lateral Group



External Oblique •
Internal Oblique •
Transversus •

Sheath of rectus abdominis•

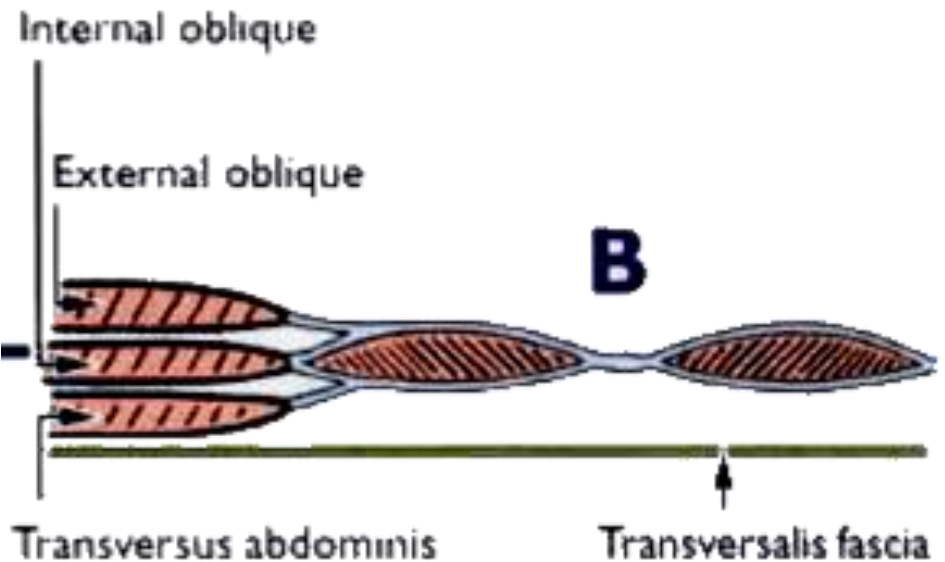
Ant layer—formed by fusion of aponeurosis of obliquus externus abdominis and anterior leaf of aponeurosis of obliquus internus abdominis

Post layer

Formed by fusion of posterior leaf of aponeurosis of obliquus internus abdominis and aponeurosis of transverses abdominis

Absent in about 4-5cm below the umbilicus

Below this line rectus abdominis in contact with transverse fascia





RECTUS ABDOMINIS

- Tendinous Intersection (3)
- Linea Semilunaris

Surface Features

Linea semilunaris: •

Along lateral margin of rectus abdominus.
Crosses costal margin near tip of 9th costal cartilage.

Arcuate line: •

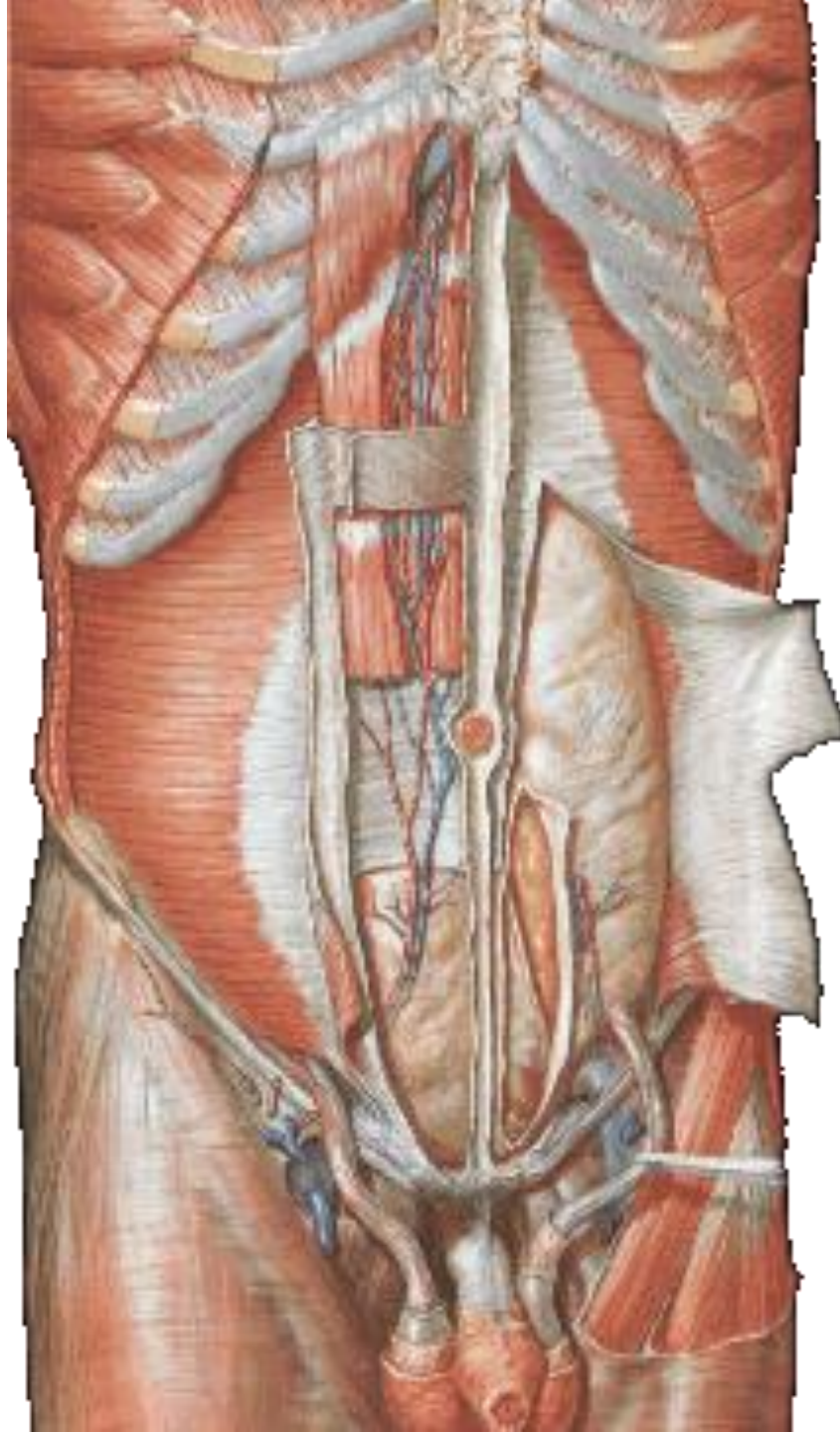
Lower free edge of posterior lamina.
Lies midway between umbilicus and pubis.

Linea Alba

- Median raphe
- Extends from xiphoid to pubic symphysis.
- Lies between paired rectus abdominus muscles.
- = fusion of aponeuroses of transversus abdominus, internal oblique, and external oblique.

LINEA ALBA





Arcuate
line

External oblique Muscle

Origin: outer surface of The lower eight ribs
(5-12)

insertion: ➤

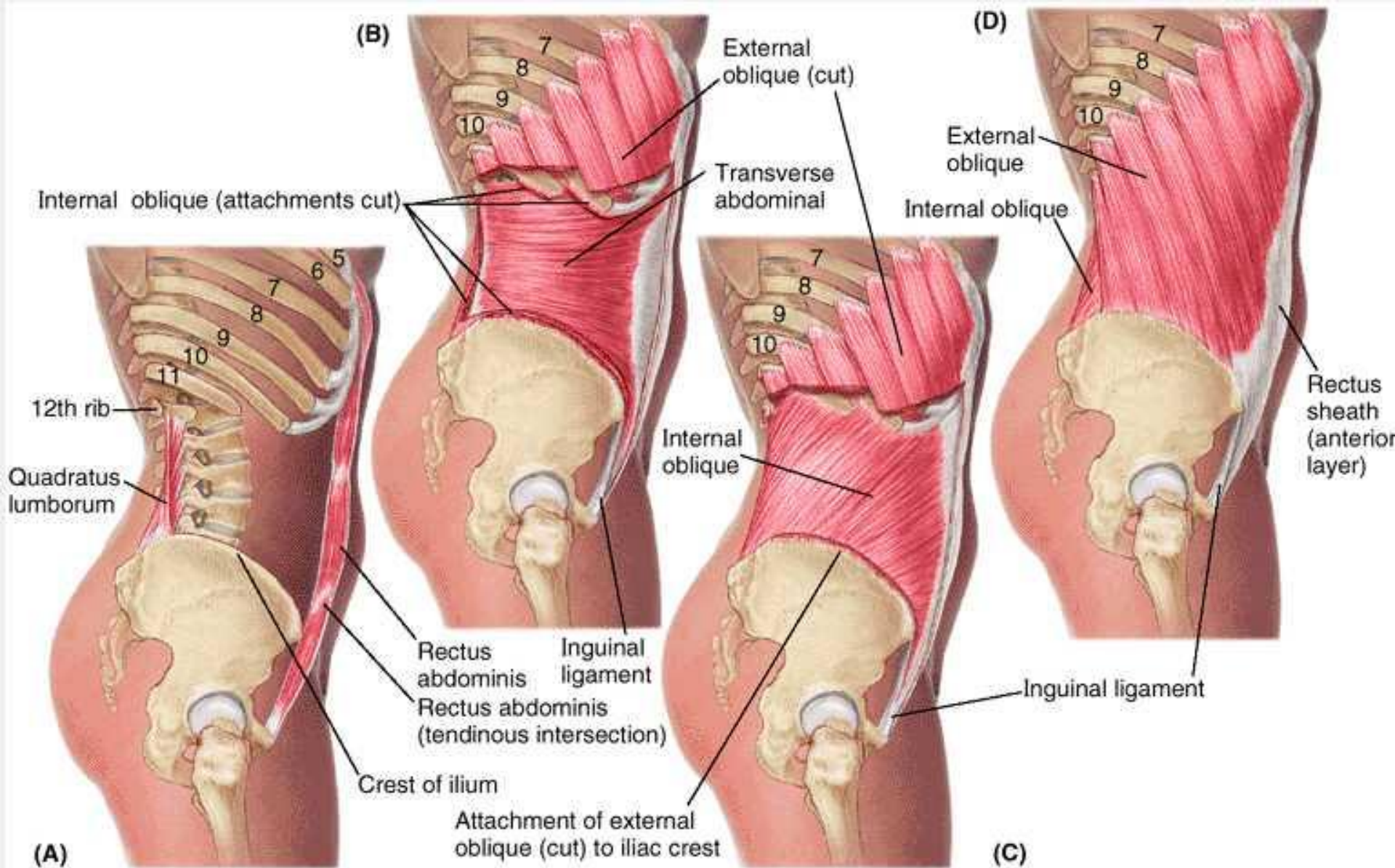
Xiphoid process, linea alba, pubic crest, pubic tubercle, anterior half of iliac crest.

Nerve Supply: ➤

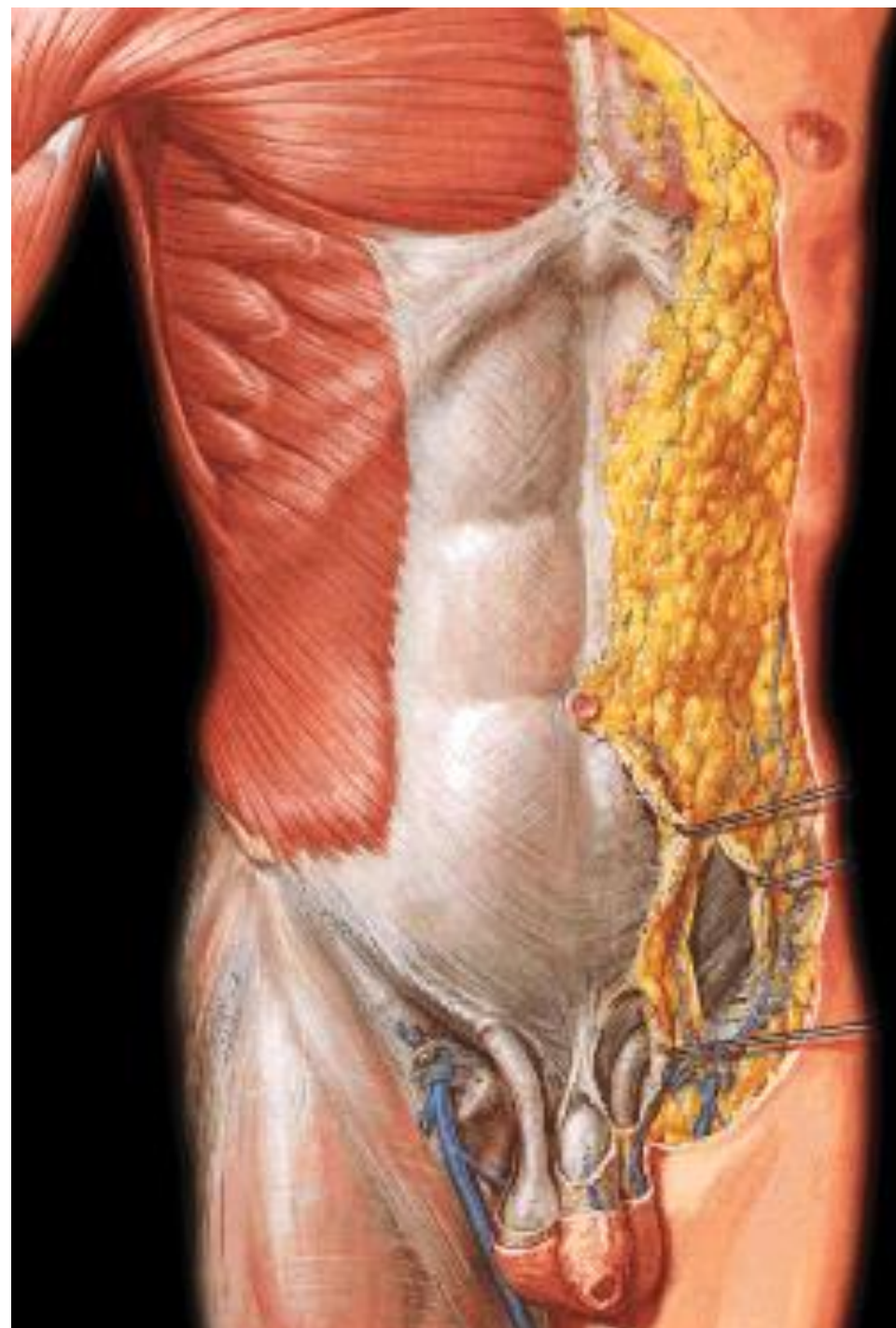
Intercostal nerves (anterior rami of T7- T 12 .

Action: ➤

Increase the intra-abdominal pressure - flex trunk.



External Oblique Abdominis

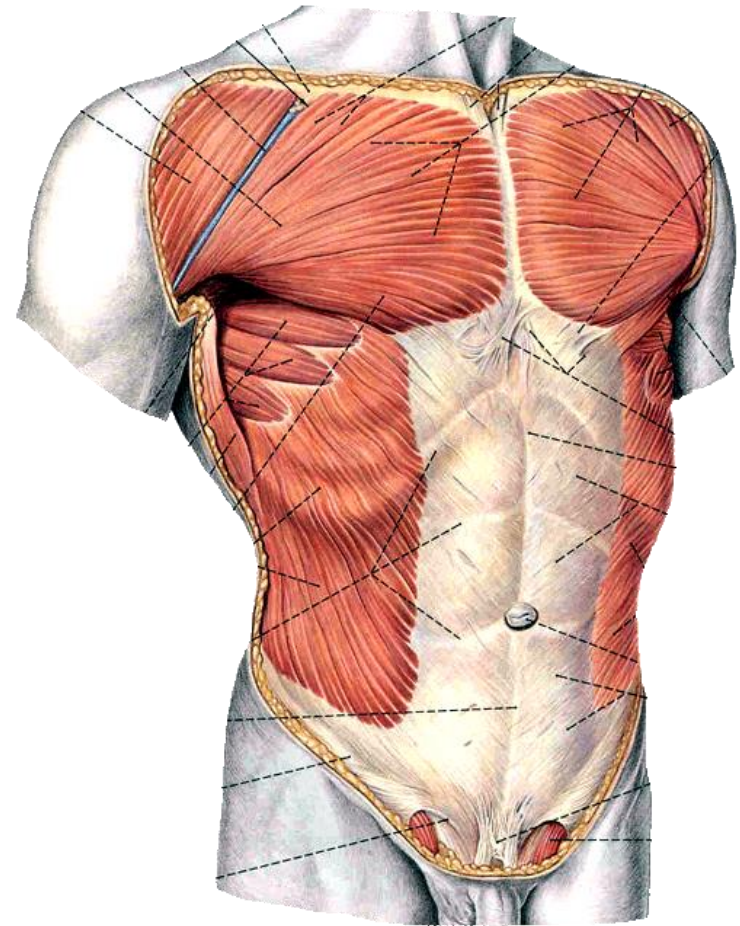


Obliquus externus abdominis

General direction of fibers:
downward, forward and
medially (run down and
inward)

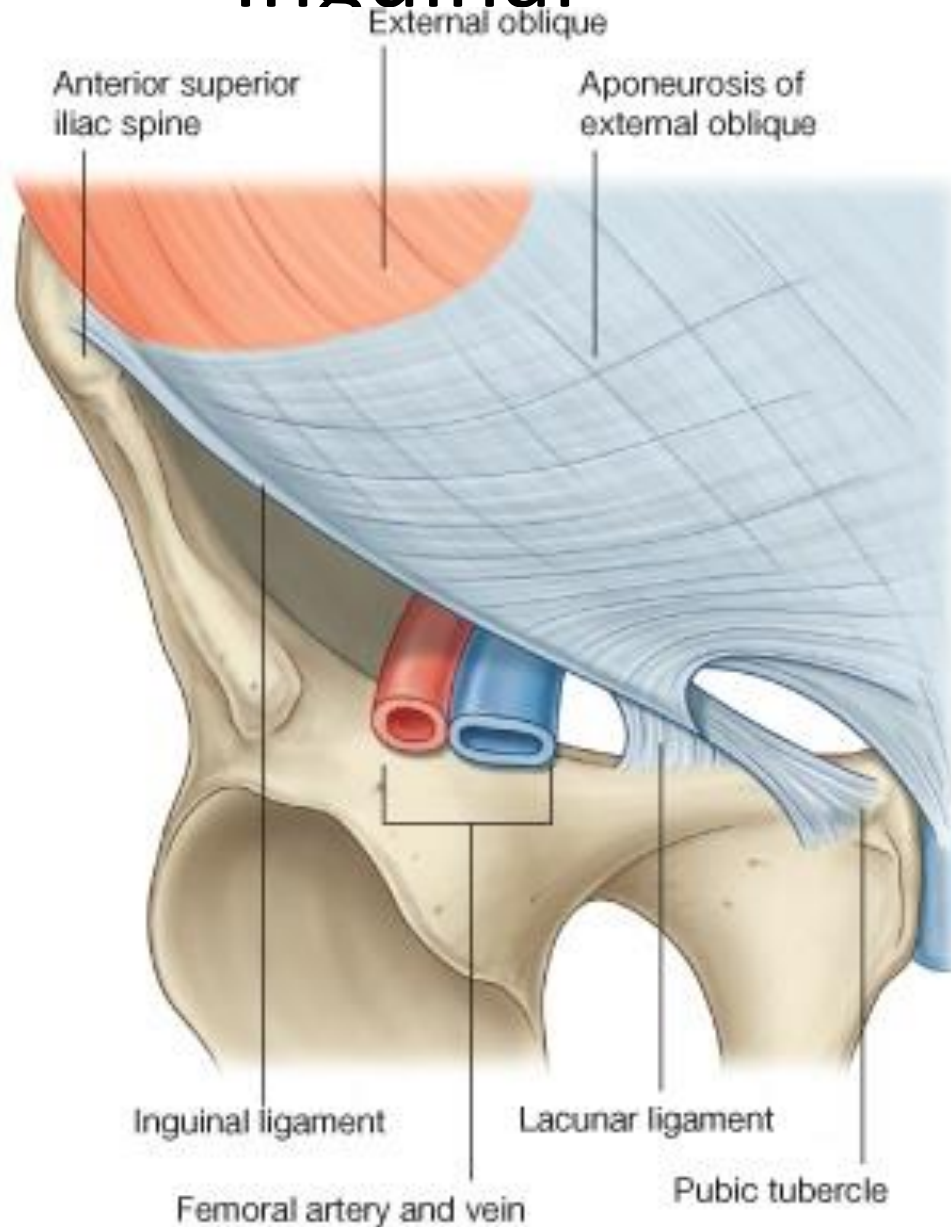
Structures

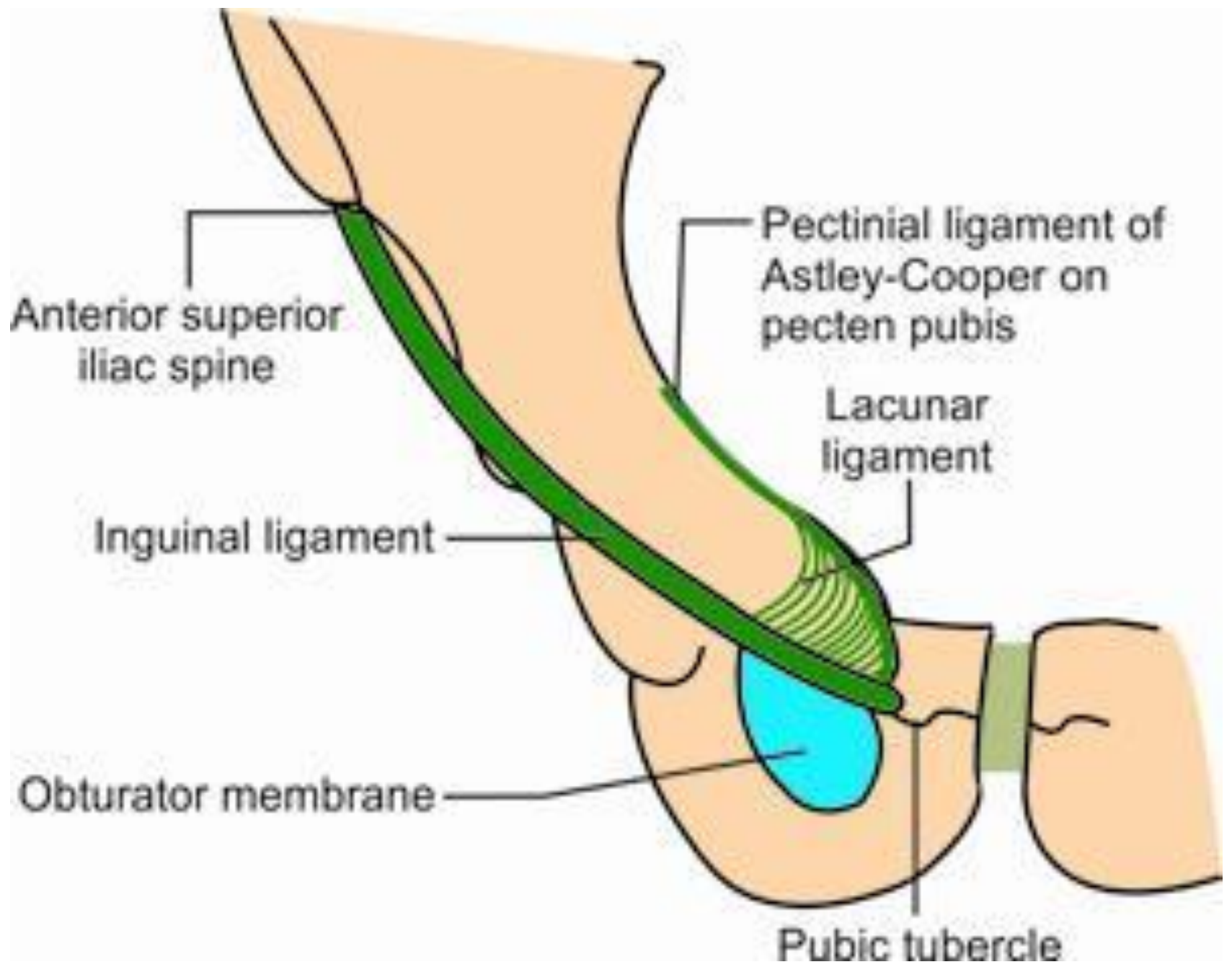
- Inguinal ligament** •
- Lacunar ligament** •
- Superficial inguinal ring** •

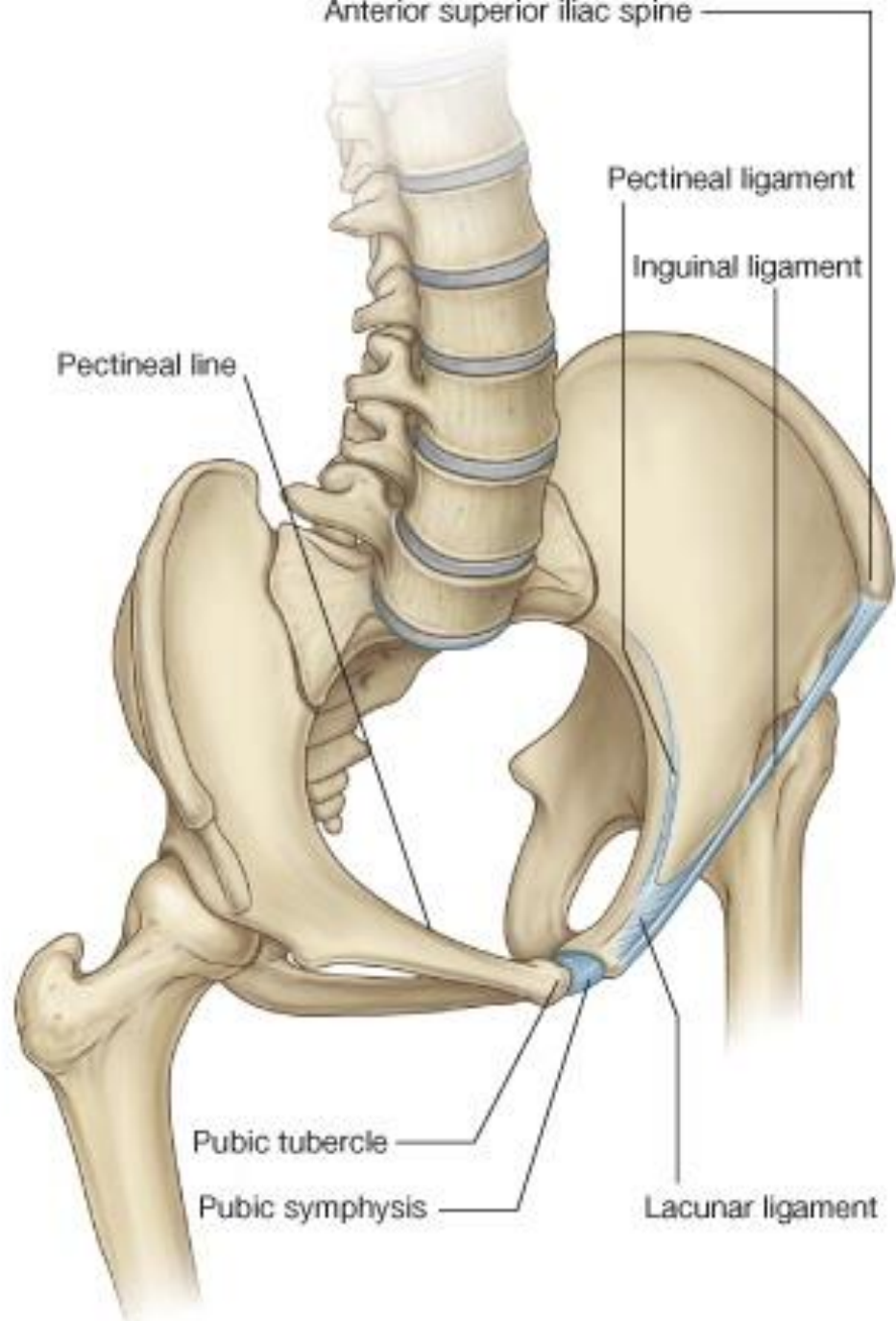


Inguinal

li







Internal oblique Muscle

Origin:

The lumbar fascia, anterior 2/3 of iliac crest, lateral 2/3 of inguinal ligament.

Insertion:

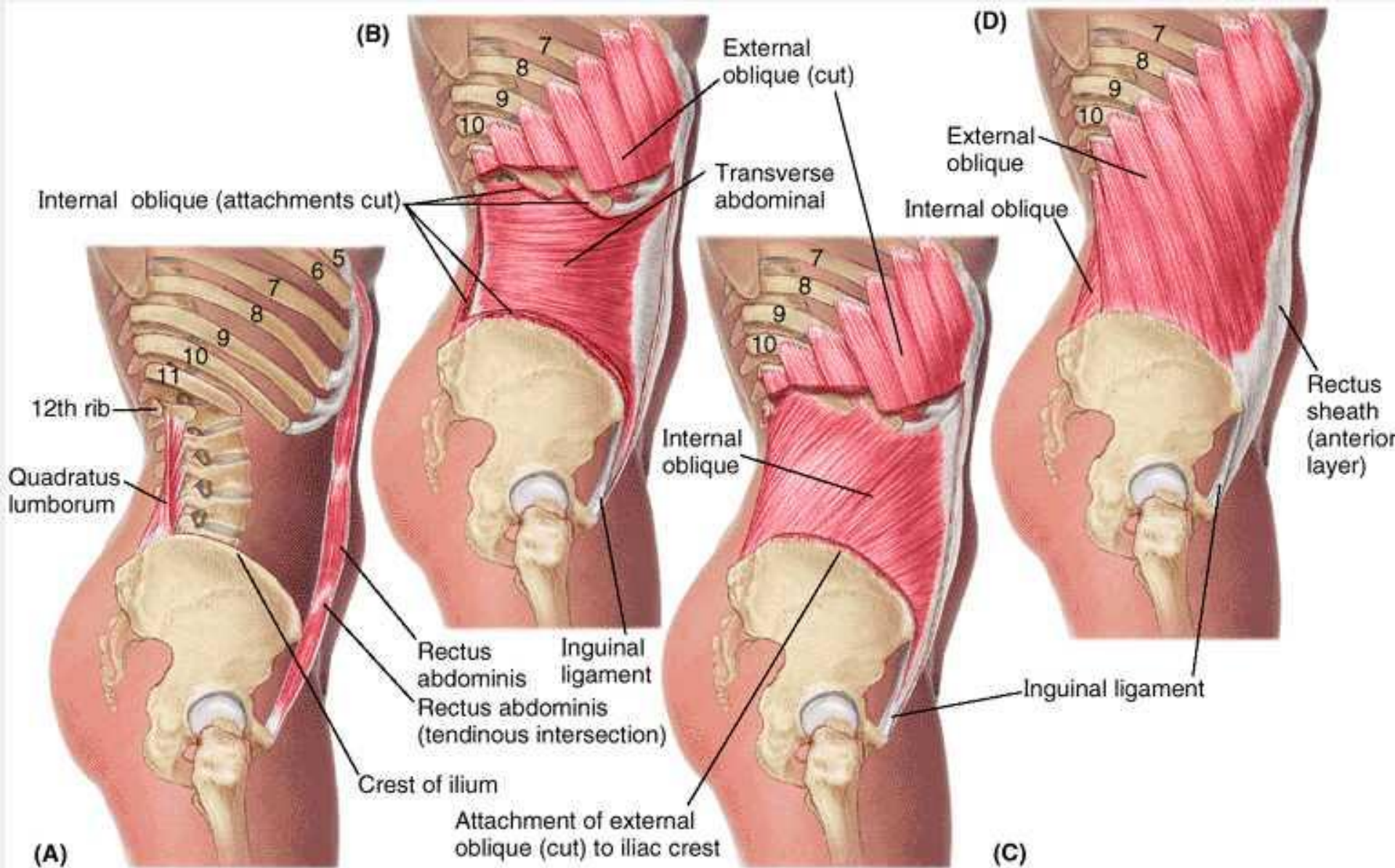
Inferior border of Lower 3 ribs or 4. and costal cartilage, xiphoid process, linea alba, pubic crest and pectineal line.

Nerve Supply:

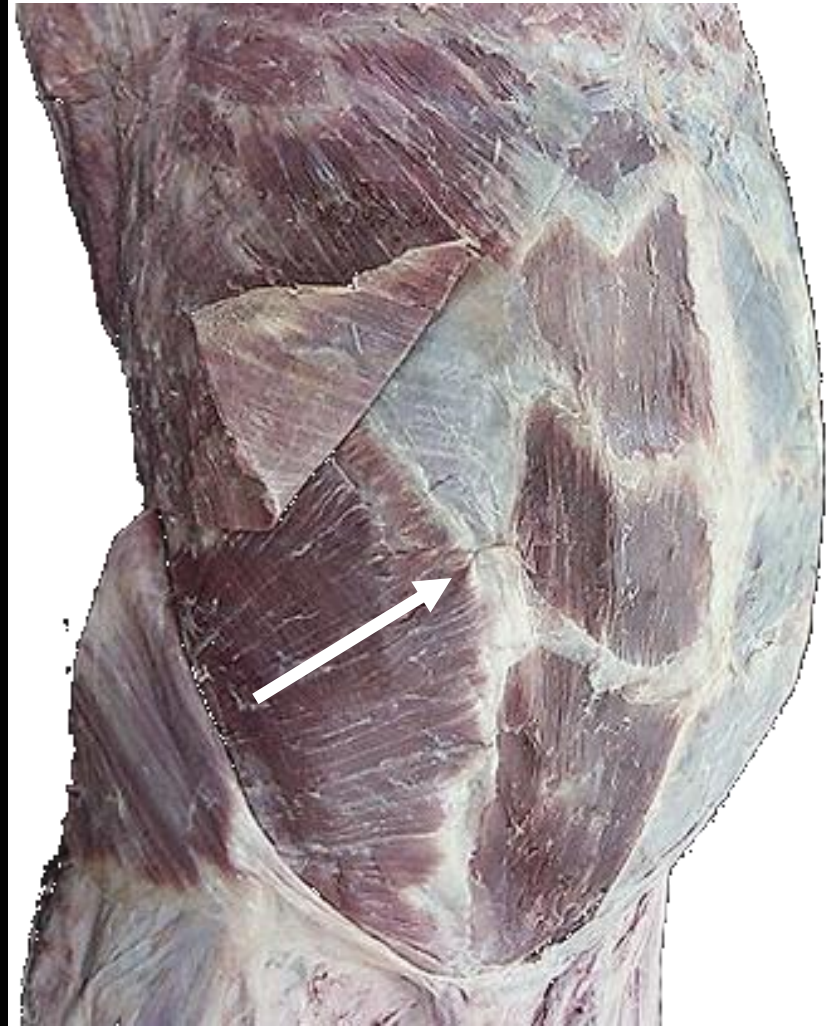
Intercostal nerves (anterior rami of T7-T12) and L 1.

Action:

Increase the intra-abdominal pressure.



Oblique Internal Abdominis



Transversus Abdominis Muscle

Origin: ➤

The lower 6 costal cartilage(rib 7 -12), lumbar fascia, anterior 2/3 of iliac crest, lateral 1/3 of inguinal canal.

Insertion: ➤

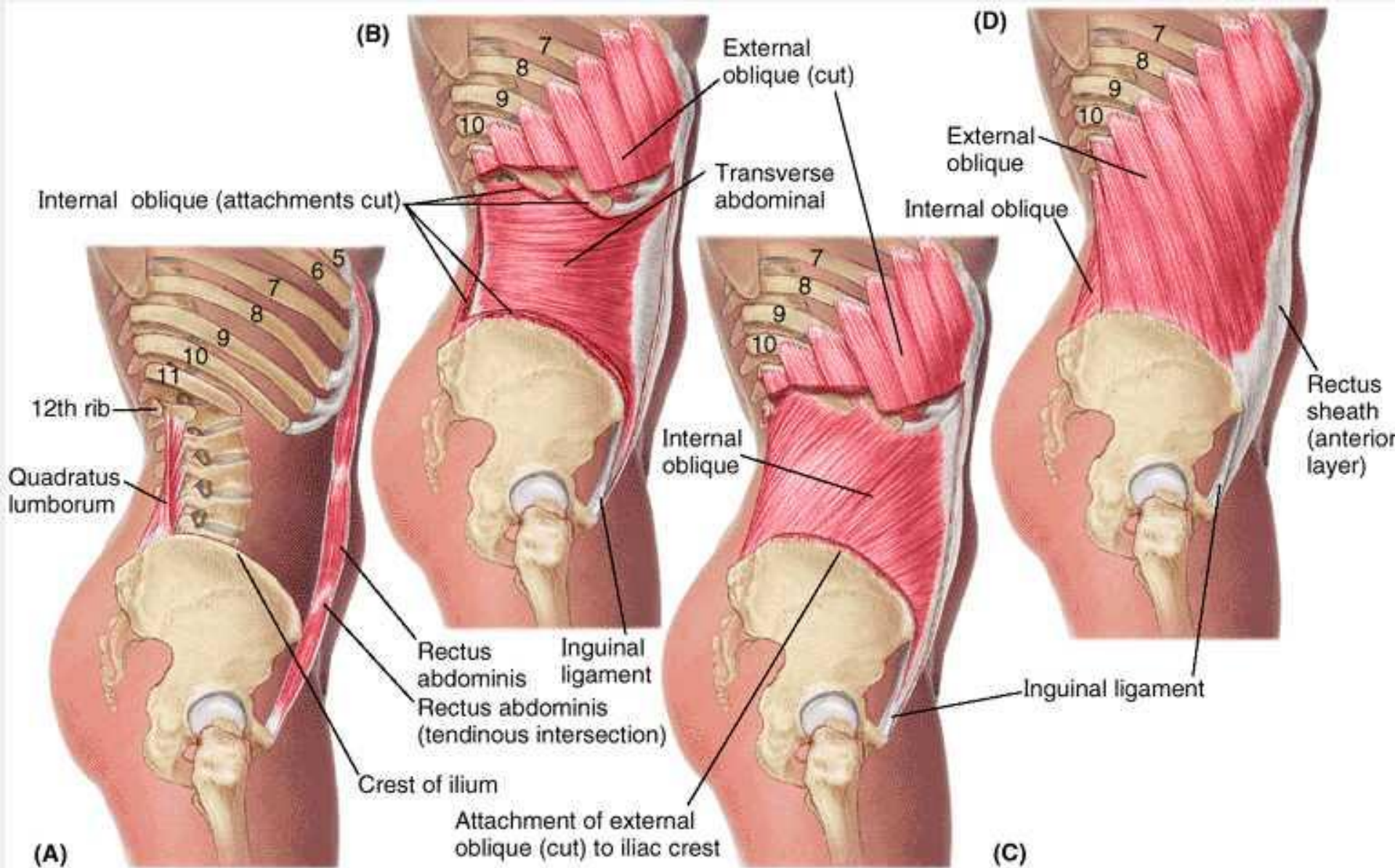
The xiphoid process, linea alba, pubic crest and pectineal line.

Nerve Supply: ➤

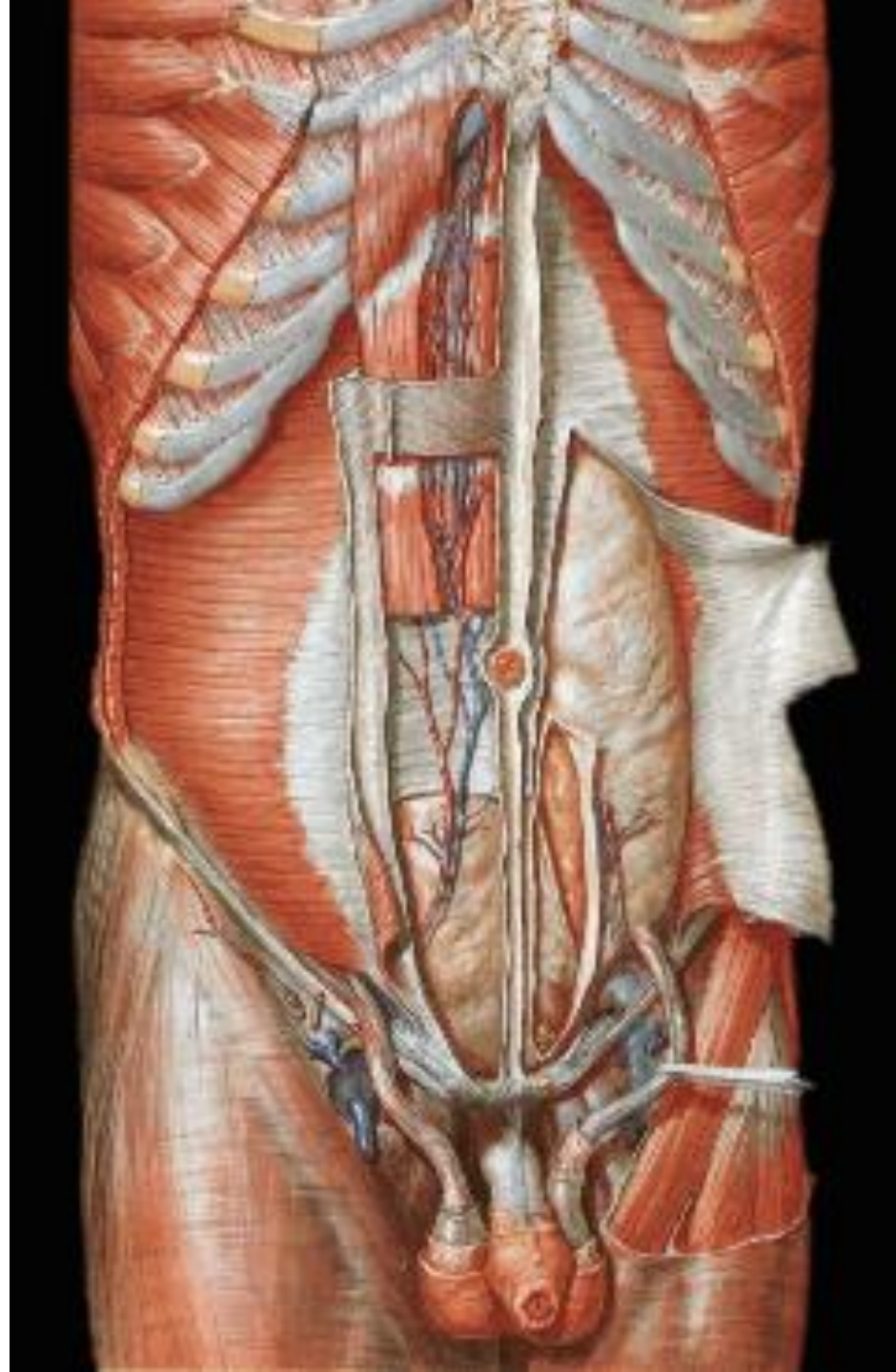
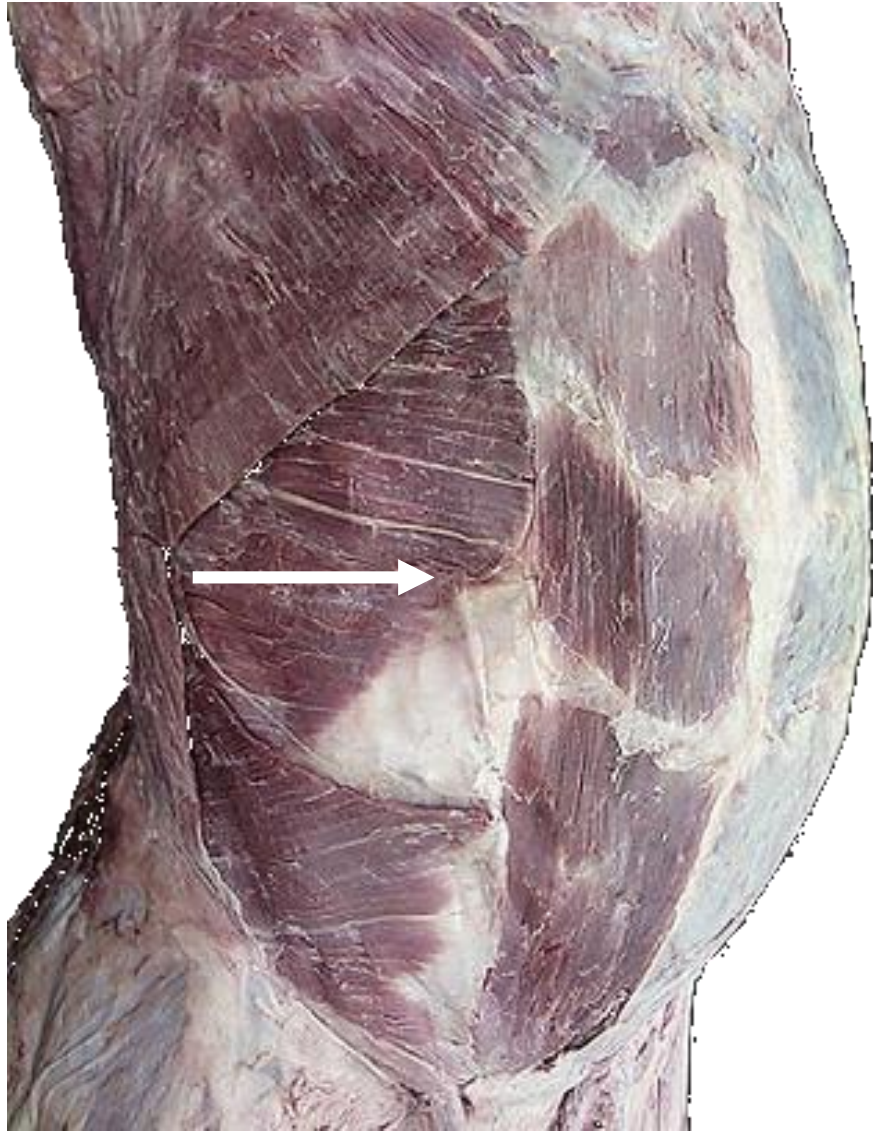
Intercostal nerves (T7-T12) and L1.

Action: ➤

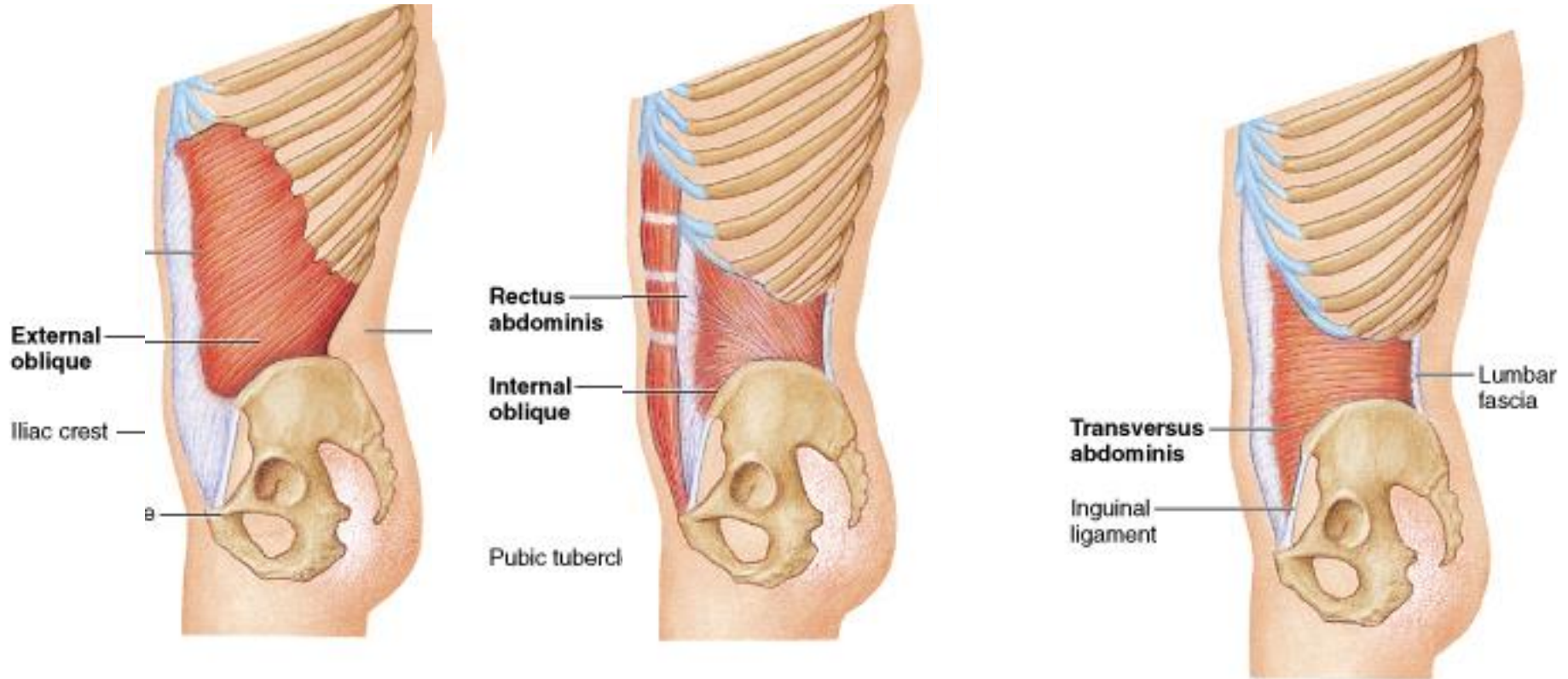
Increase the intra-abdominal pressure.



Transversus Abdominis



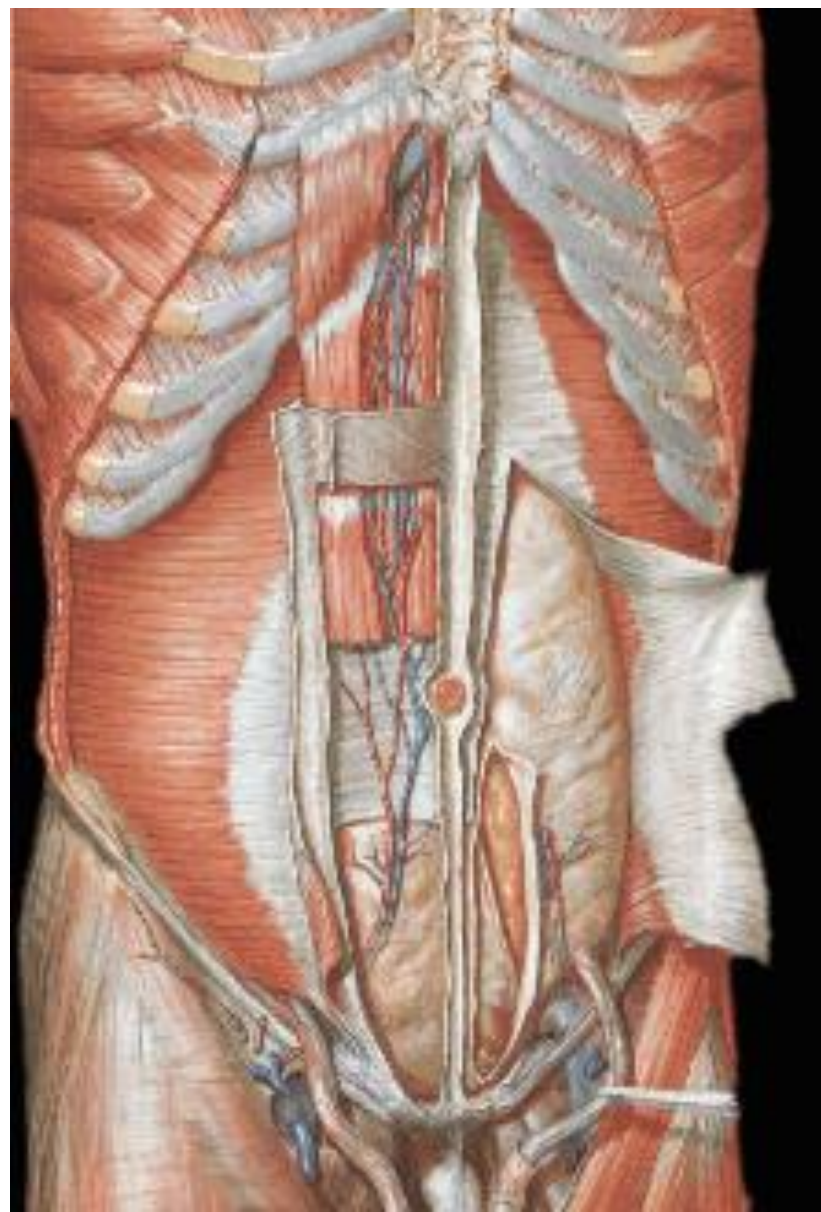
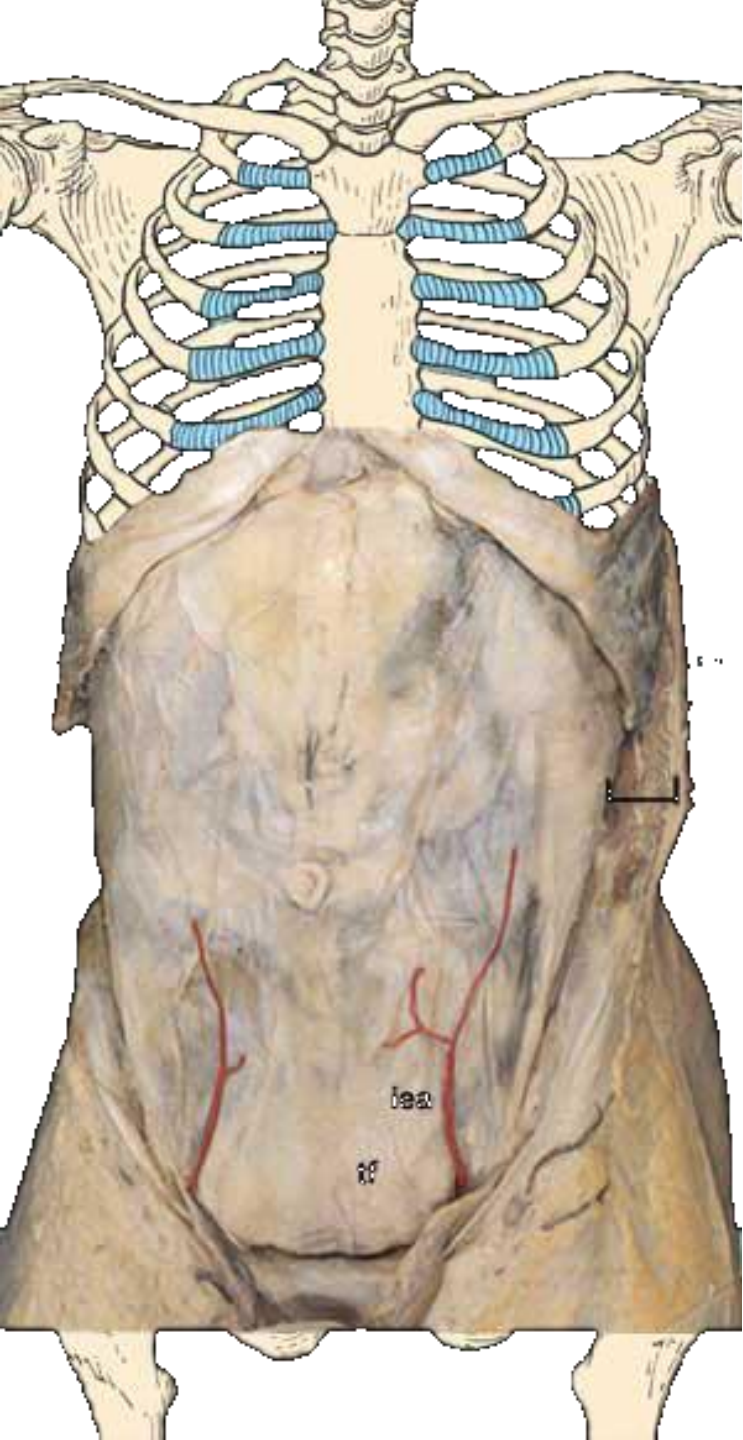
Muscles of abdominal wall--details



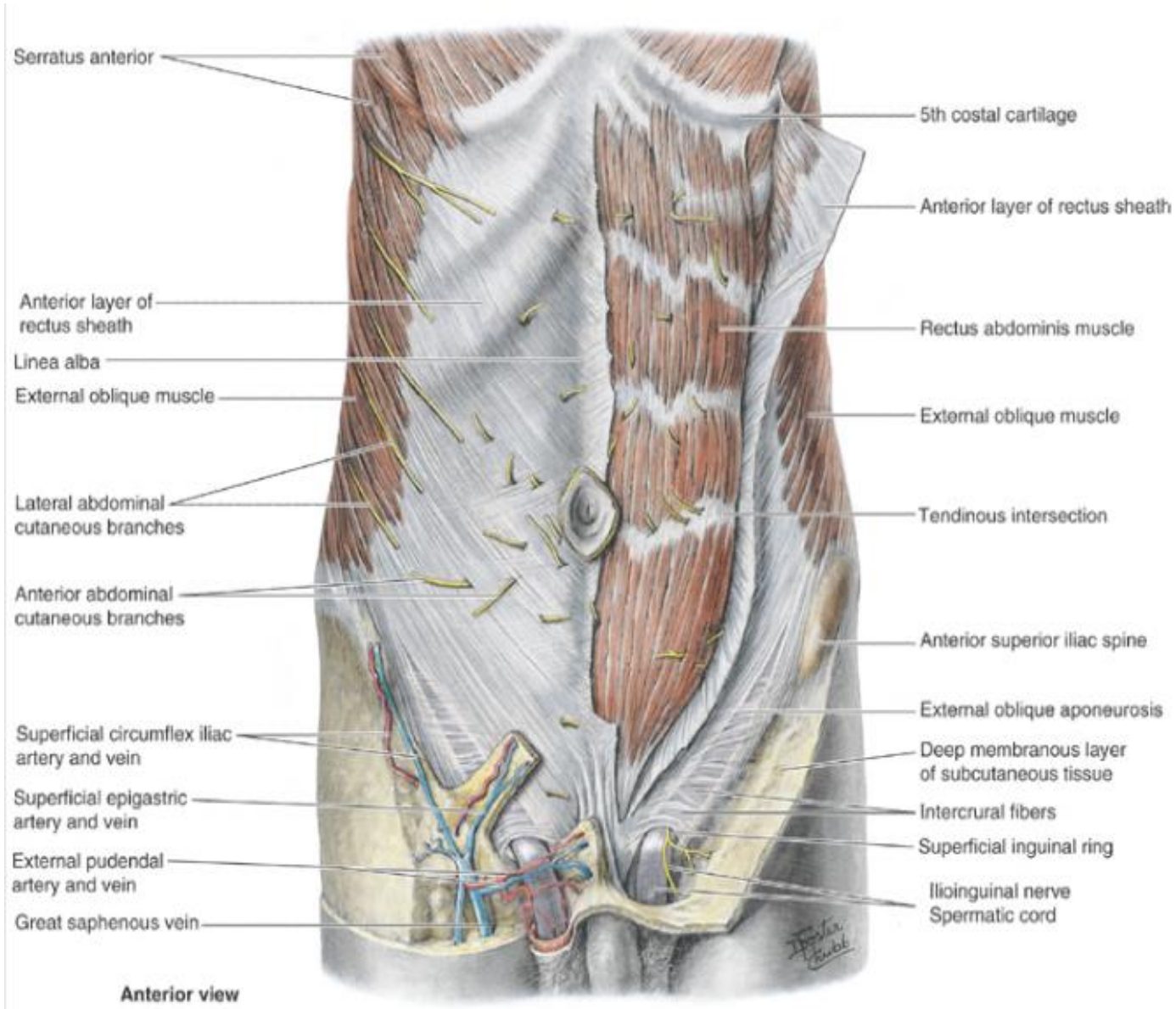
(c)
Copyright © Pearson Education, Inc., publishing as Benjamin Cummings.

Please see Fi.

Transversalis Fascia



Rectus sheath



Rectus Abdominis Muscle

Origin: ➤

The symphysis pubis and pubic crest, pubic tubercle.

Insertion: ➤

5th, 6th, 7th costal cartilage and xiphoid process.

Nerve Supply: ➤

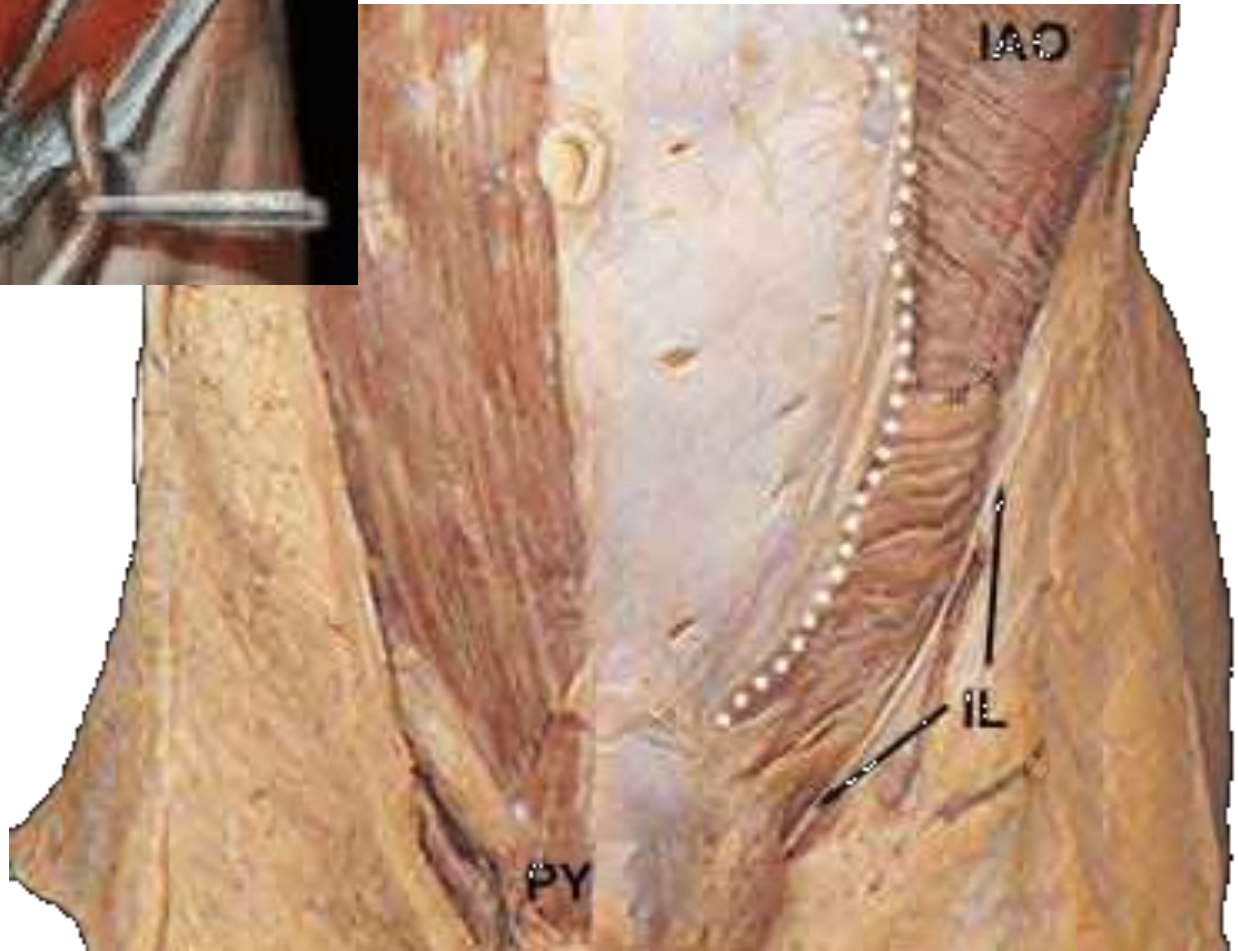
Intercostal nerves anterior rami of T7 T 12.

Action: ➤

Increase the intra-abdominal pressure. .1

Flexion of the trunk. .2

PYRAMIDALIS



Rectus sheath

Anterior layer composed of external oblique •
aponeurosis as well as part of the internal
oblique aponeurosis

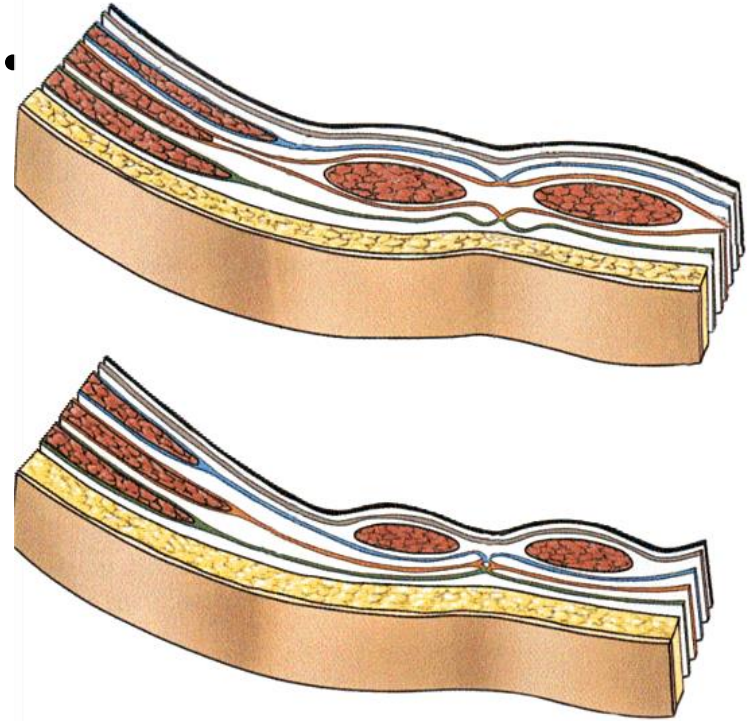
Posterior layer composed of portion of •
internal oblique aponeurosis and transverse
abdominal aponeurosis

Arcuate line – limit of aponeurotic post rectus •
sheath, only transversalis fascia covers the
posterior Rectus below this level

Sheath of rectus abdominis

Anterior layer

Formed by fusion of aponeurosis of obliquus externus abdominis and anterior leaf of aponeurosis of obliquus internus abdominis



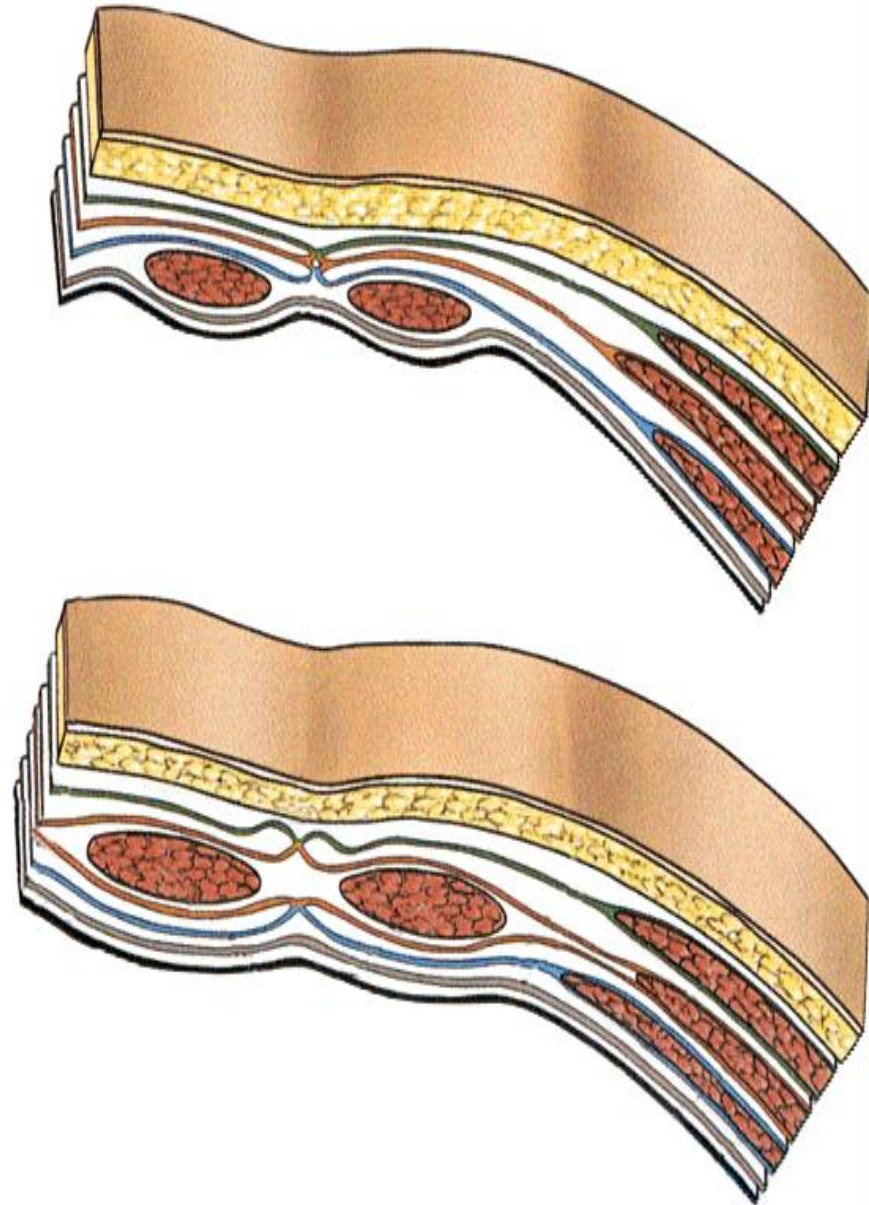
Sheath of rectus abdominis

Posterior layer

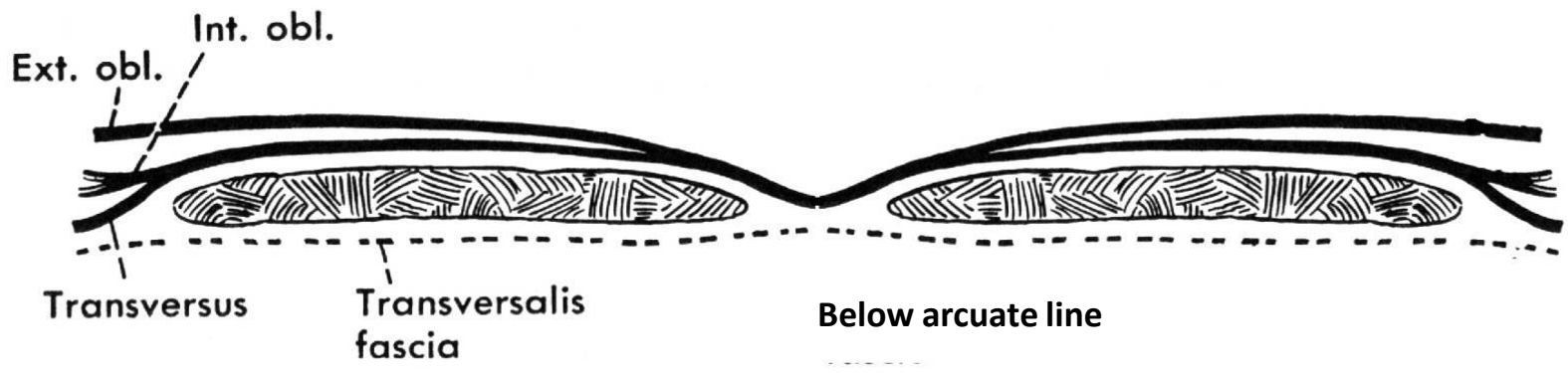
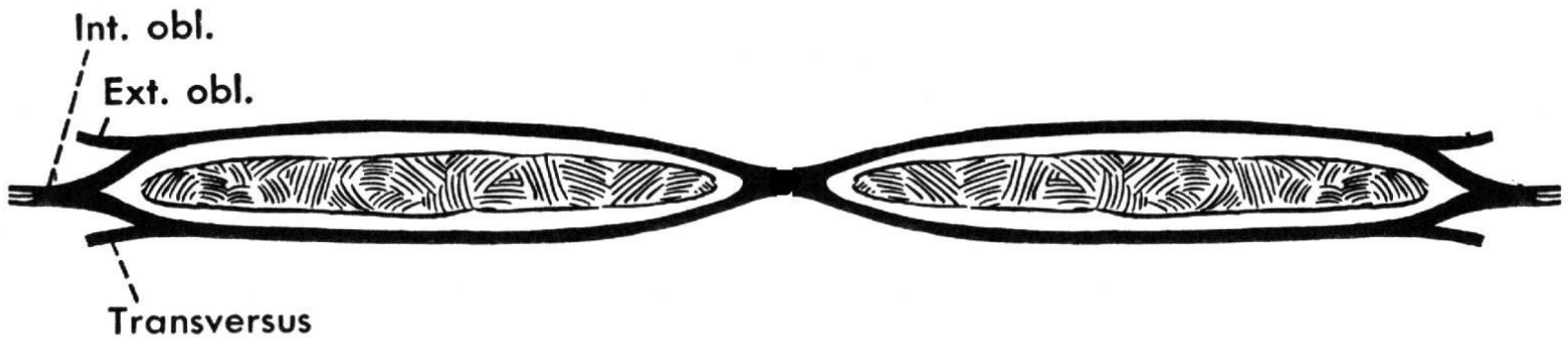
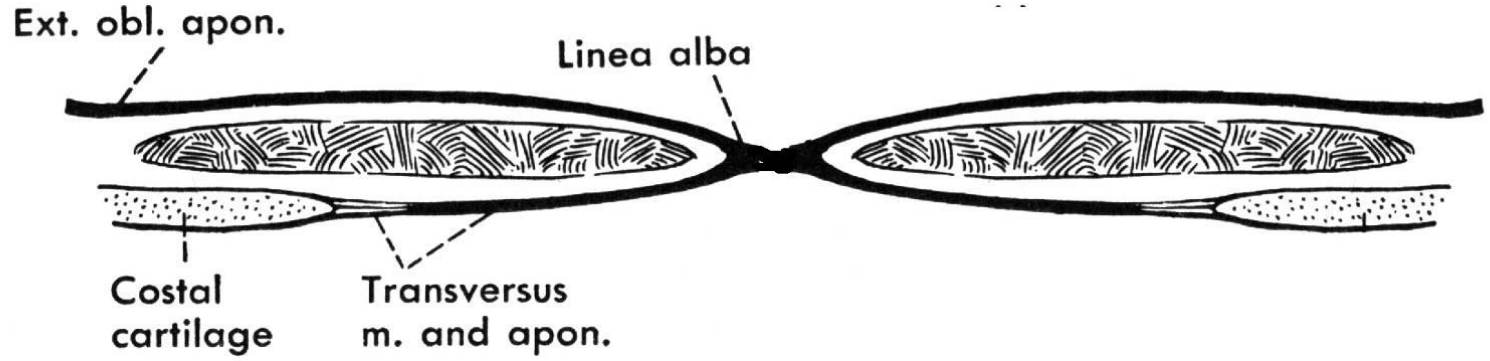
Formed by fusion of posterior leaf of aponeurosis of obliquus internus abdominis and aponeurosis of transversus abdominis

Absent in about 4-5cm below the umbilicus, where aponeuroses of all three muscles form anterior layer the lower free border named **arcuate line**

Below this line rectus abdominis in contact with transverse fascia



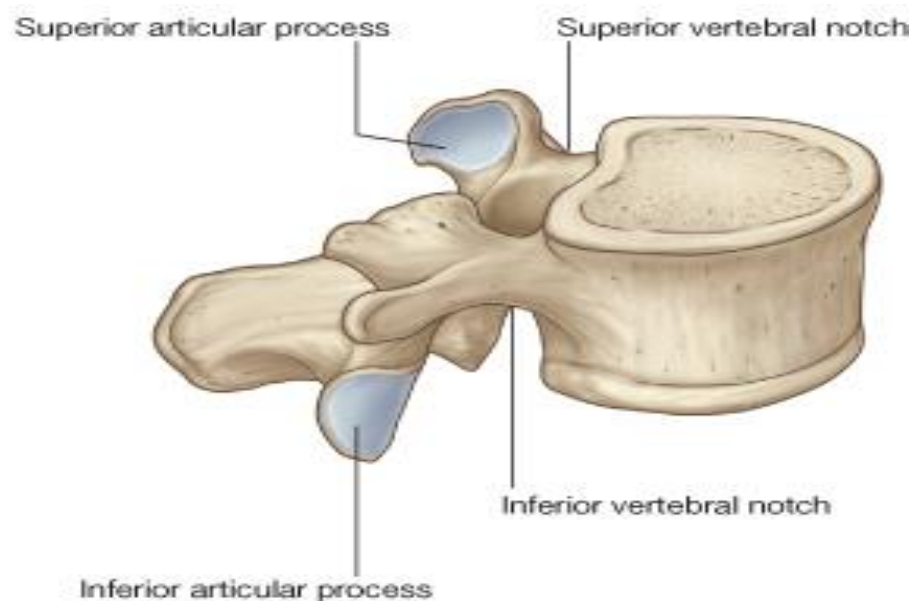
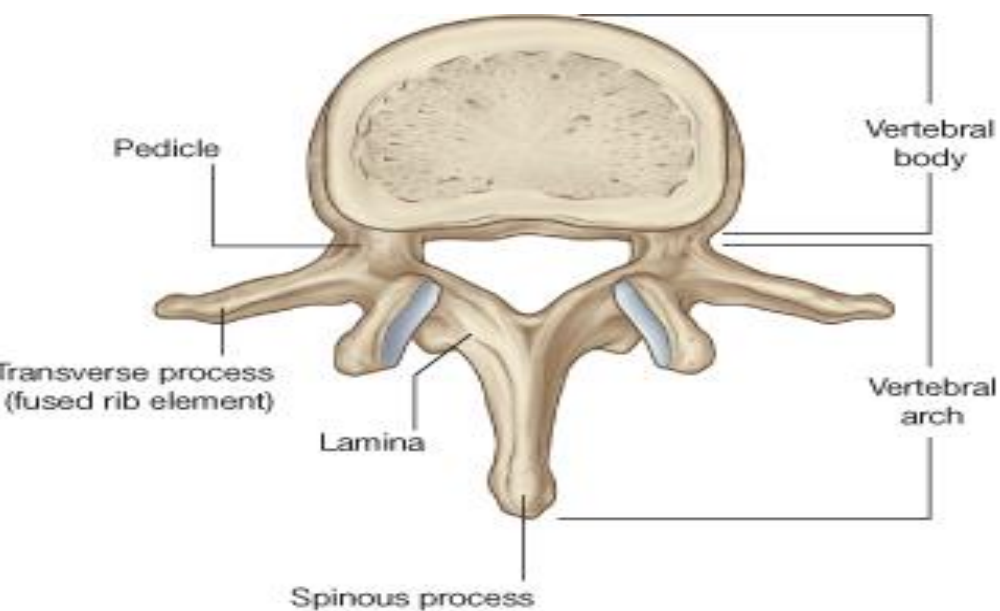
Formation of rectus sheath



Posterior abdominal wall

The posterior abdominal wall is mainly composed:

- ① Five lumbar vertebrae and associated IV discs.
- ② Post abdominal wall muscles – psoas, quadratus lumborum, iliacus, transverse, abdominal wall oblique muscles.
- ③ Lumbar plexus, composed of the ventral rami of lumbar spinal nerves.
- ④ Fascia including thoracolumbar fascia.
- ⑤ Diaphragm contributing to the superior part of the posterior wall
- ⑥ Fat, nerves, vessels (IVC, aorta) and lymph nodes.



© Elsevier. Drake et al: Gray's Anatomy for Students - www.studentconsult.com

Fascia of the posterior abdominal wall

The fascia lies between the parital peritoneum and the muscles: it is customizing to name the fascia according to the structure it covers.

the psoas fascia or psoas sheath. ☆

the quadratus lumborum fascia. ☆

the thoracolumbar fascia. ☆

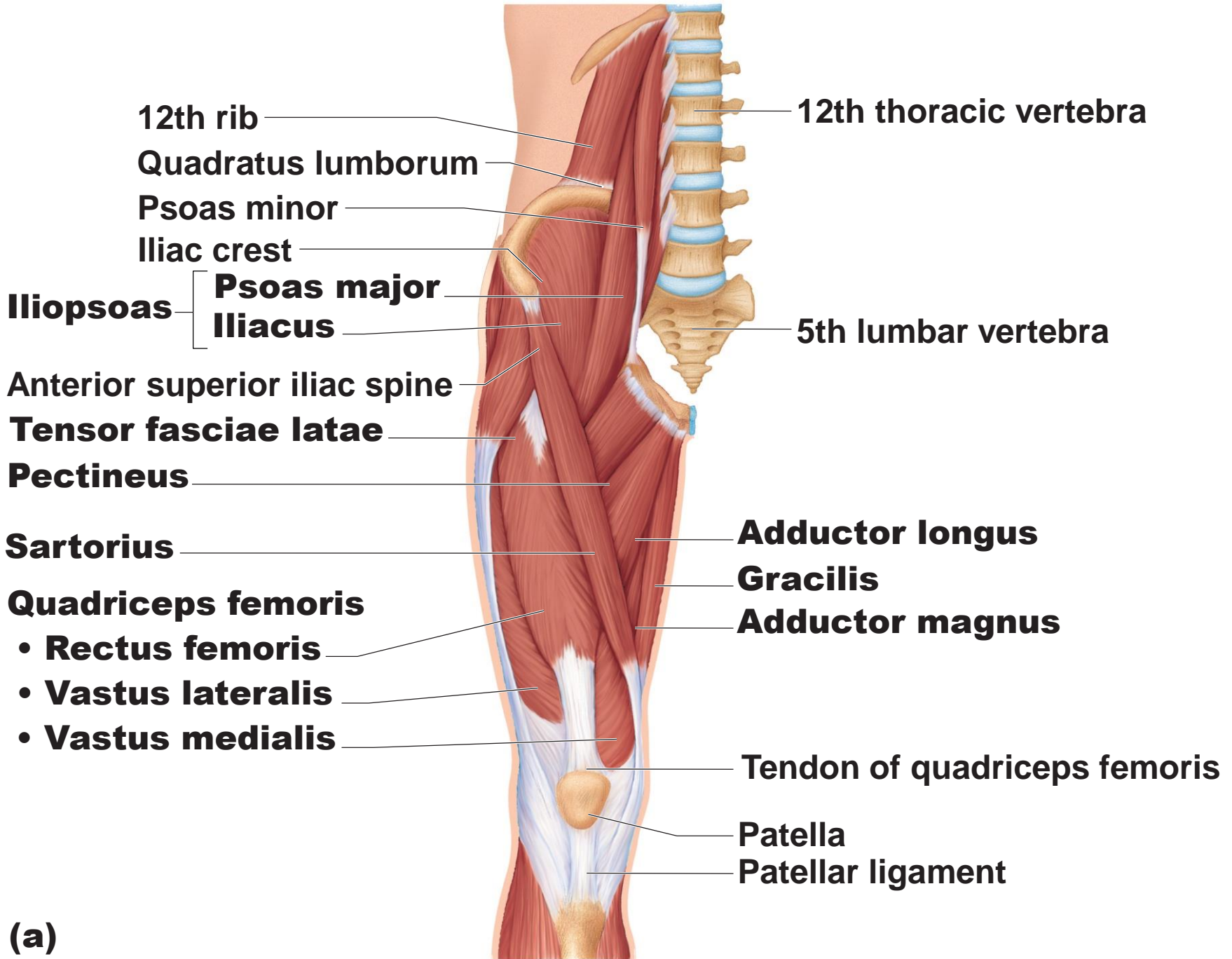
Muscles of the posterior
abdominal wall:

The main paired muscles in the posterior abdominal wall are:-

Psoas major 

Iliacus 

Quadratus lumborum 

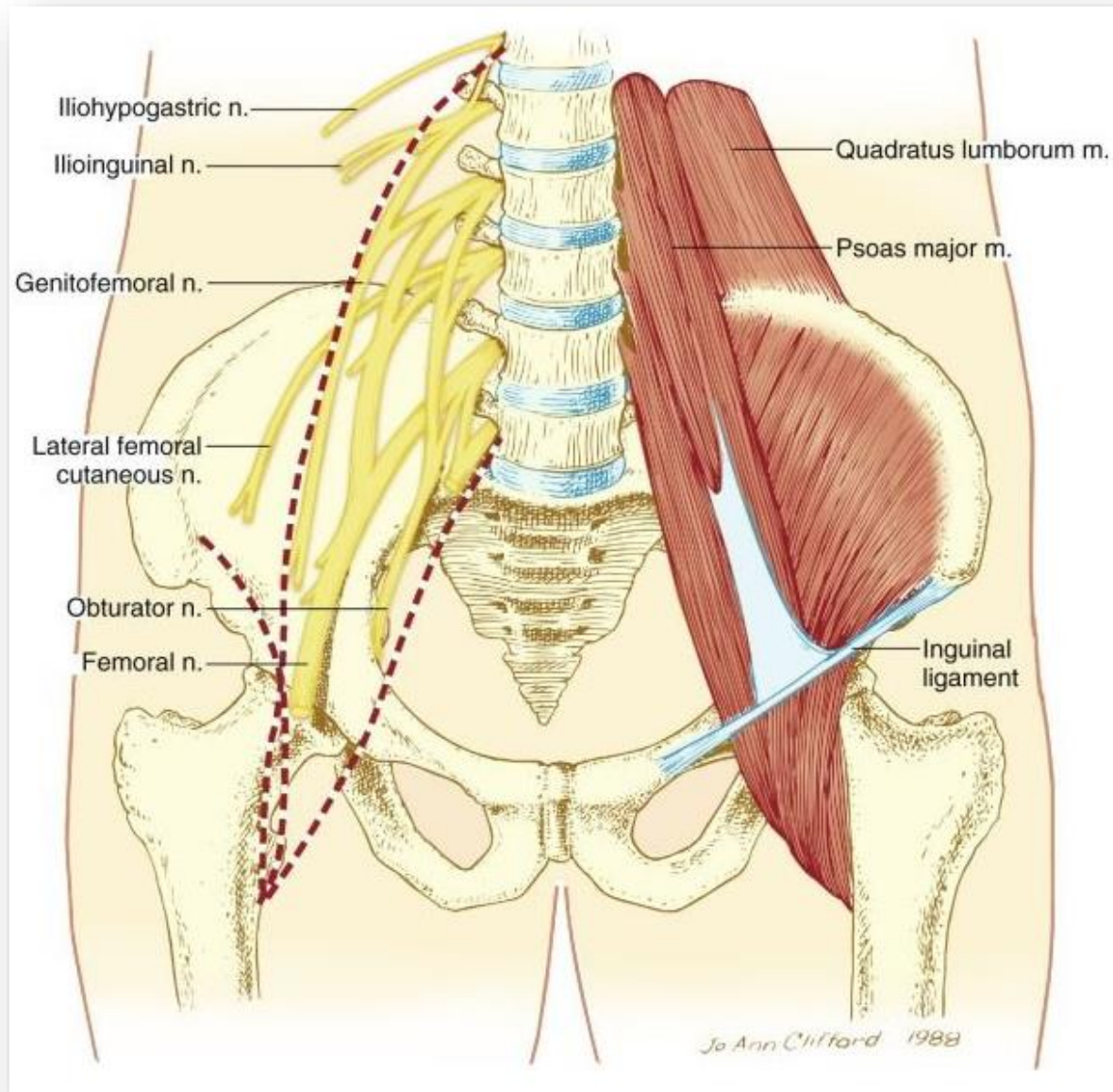


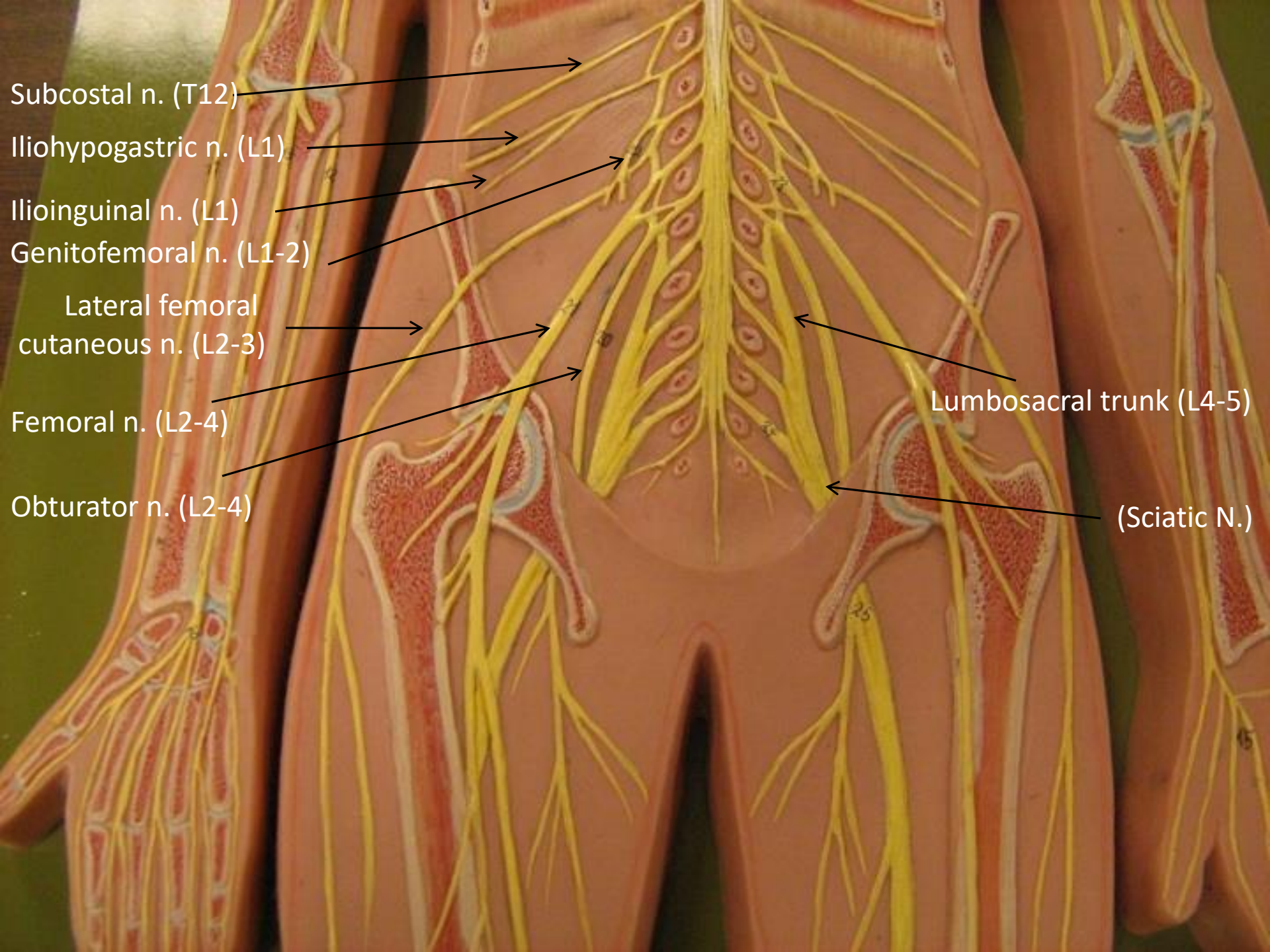
(a)

Anatomy of Lumbar Plexus

The lumbar plexus is • formed by the anterior rami of the *first four lumbar nerves*; it frequently includes a branch from T12 and occasionally from L5.

The plexus lies • between the psoas major and quadratus lumborum muscles in the so-called *psoas compartment*.





Subcostal n. (T12)

Iliohypogastric n. (L1)

Ilioinguinal n. (L1)

Genitofemoral n. (L1-2)

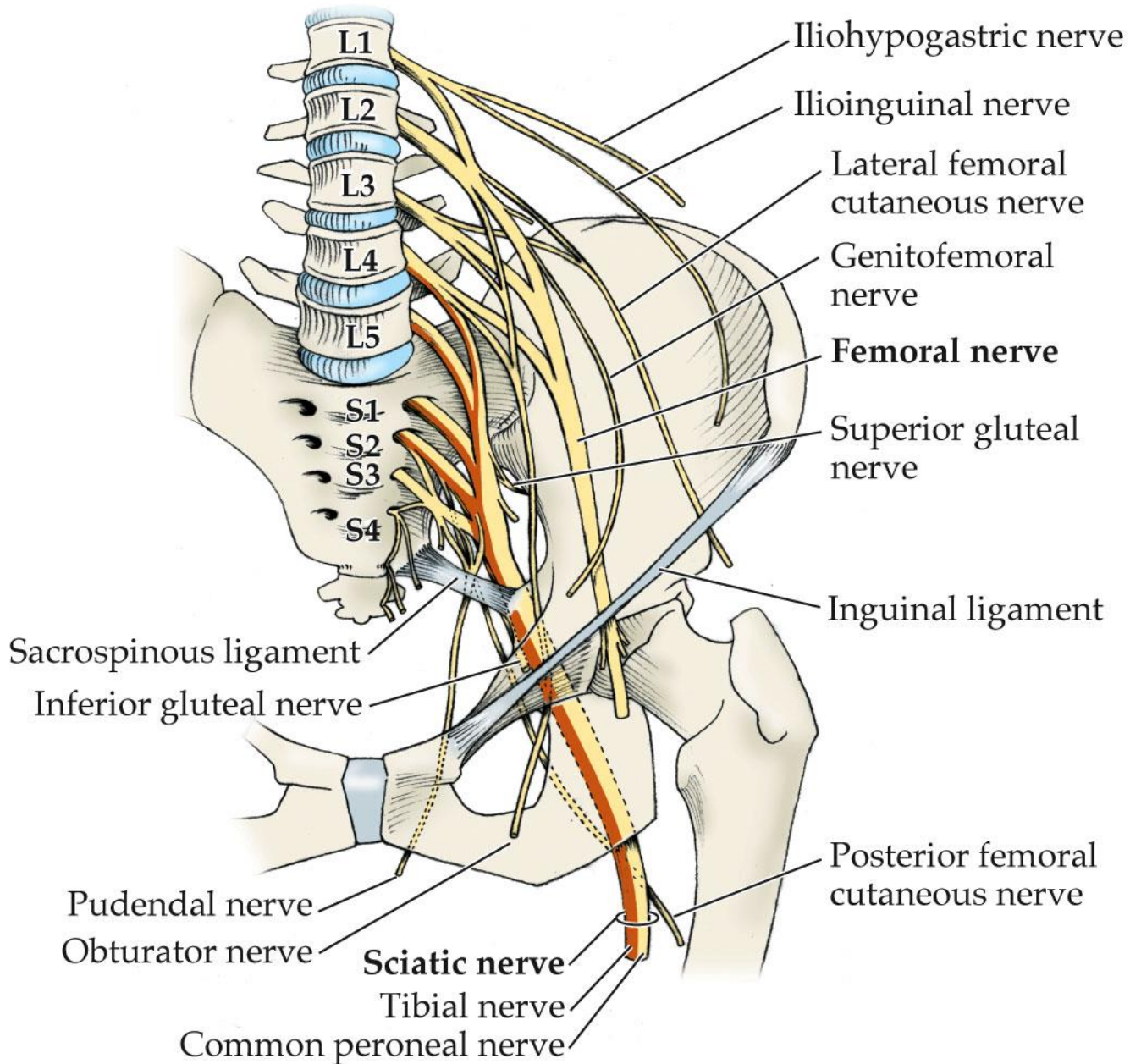
Lateral femoral cutaneous n. (L2-3)

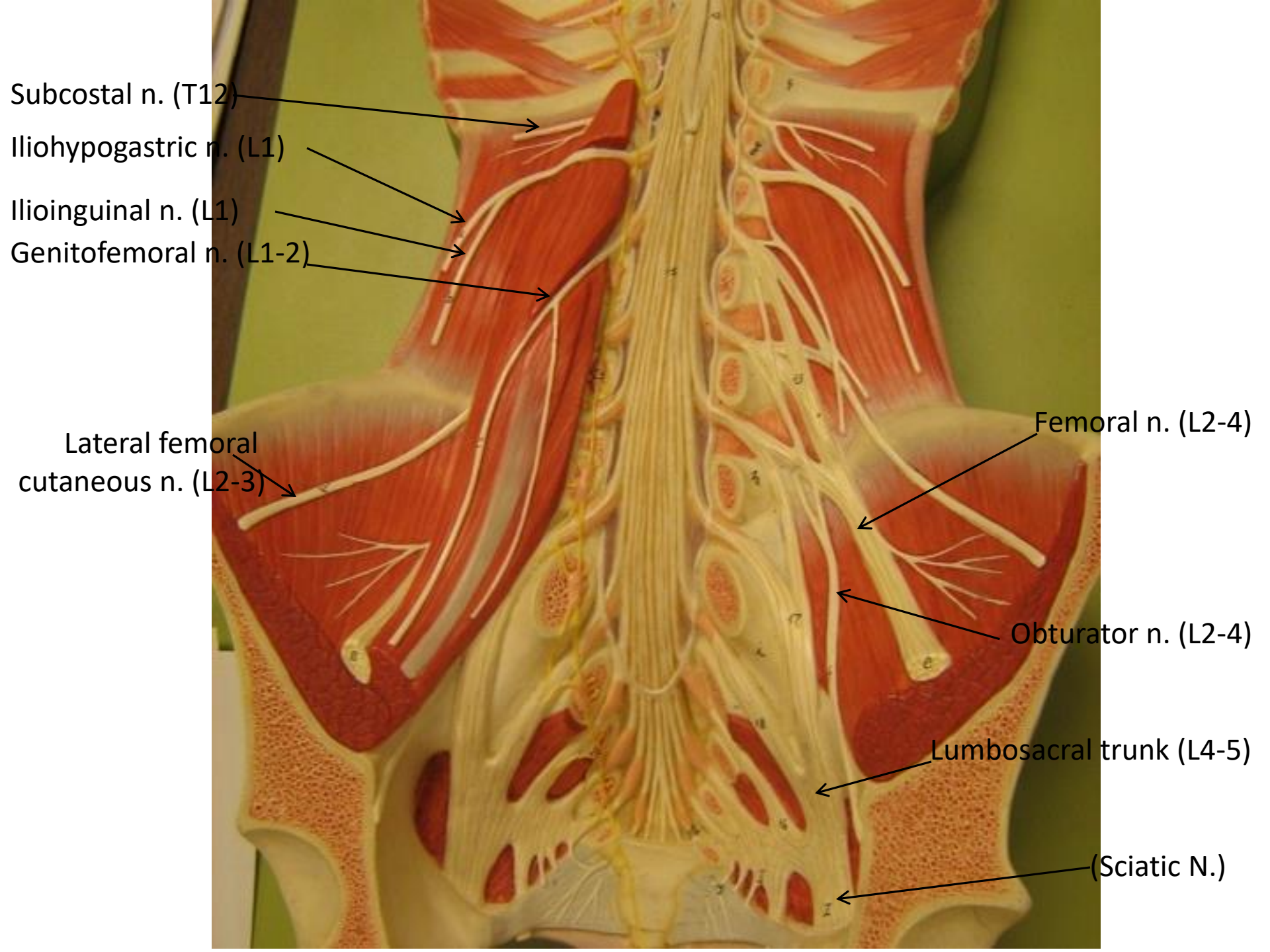
Femoral n. (L2-4)

Obturator n. (L2-4)

Lumbosacral trunk (L4-5)

(Sciatic N.)





Subcostal n. (T12)

Iliohypogastric n. (L1)

Ilioinguinal n. (L1)

Genitofemoral n. (L1-2)

Lateral femoral cutaneous n. (L2-3)

Femoral n. (L2-4)

Obturator n. (L2-4)

Lumbosacral trunk (L4-5)

(Sciatic N.)

Muscles of the Lx & abdomen

Name	Origin	Insertion	Action	Innervation
Psoas minor	Sides of T12 & L1 vertebrae & T12L1 disc	Long tendon lying on psoas major	Weak flexor of lumbar spine	L1 nerve
Psoas major	T12-L5 vertebral bodies, transverse processes & discs	Lesser trochanter of the femur	Flexion of Lx spine and hip flexor	L1-3/4 nerves
Iliacus	Posterior 2/3 of iliac fossa	Lesser trochanter of femur	Trunk flexion & hip flexion	Femoral nerve L2-3

Psoas Major Muscle

Origin: ➤

The transverse processes and sides of vertebral bodies and their intervertebral discs from T12 till L5 vertebrae.

Insertion: ➤

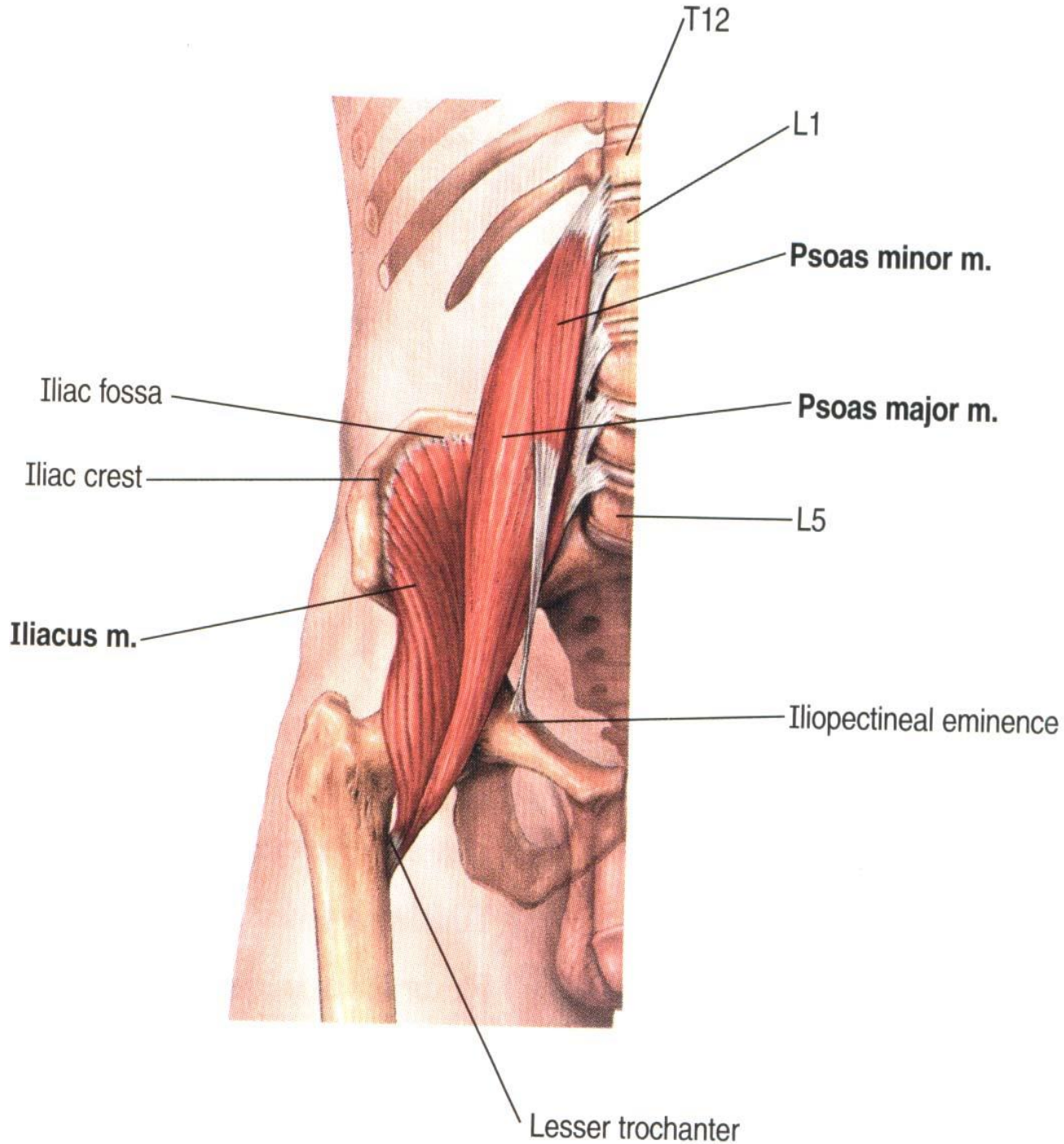
Lesser trochanter of the femur.

Nerve Supply: ➤

Lumbar spinal nerves (lumbar plexus < anterior rami of L1 to L3).

Action: ➤

Flexion of the hip joint.



Psoas minor

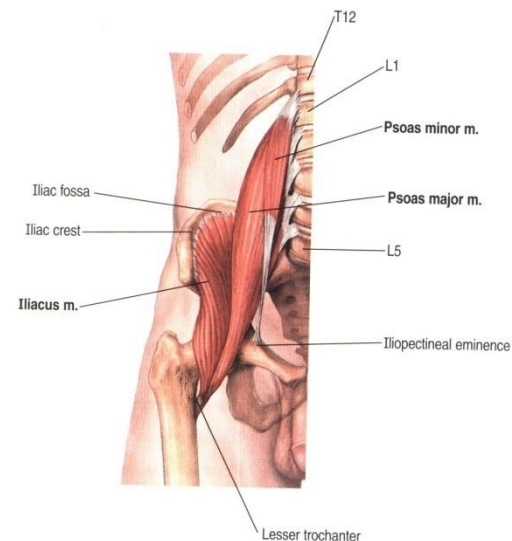
Sometimes absent •

Origin: lateral surface of bodies of T12 and L1 vertebrae and the intervertebral disc •

Insertion : pectineal line of the pelvic brim and the iliopubic eminence . •

Inervation : anterior rami of L1

action : Weak flexion



Quadratus Lumborum Muscle

Origin: ➤

The ilio-lumbar ligament, iliac crest and transverse processes of the lower lumbar vertebrae.

Insertion: ➤

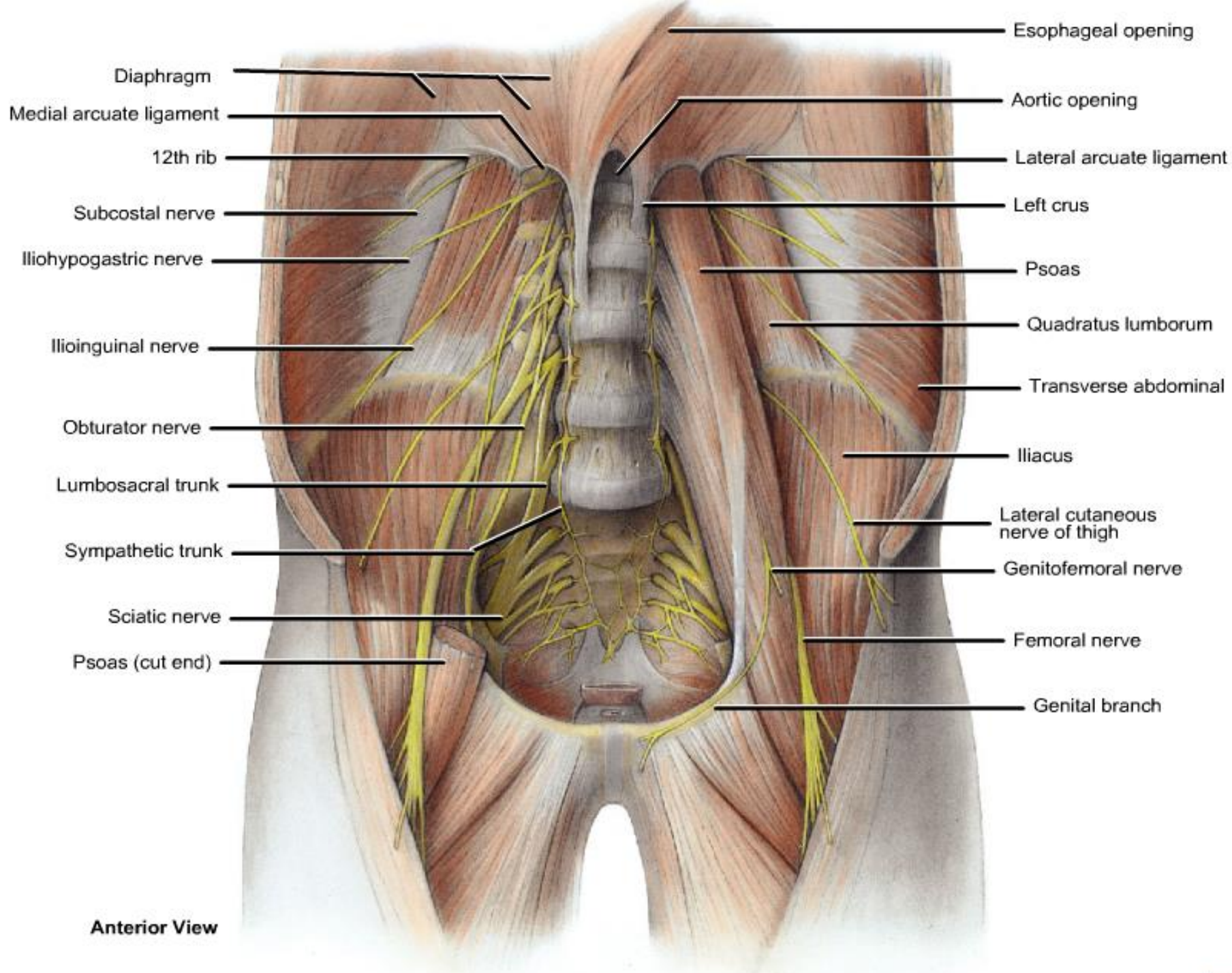
Last rib, the inferior border and transverse processes of upper lumbar vertebrae. L1-L4

Nerve Supply: ➤

Lumbar spinal nerves (lumbar plexus anterior rami of T12 and L1 to L4).

Action: ➤

Lateral flexion of the vertebral column. .1
Fixation of the last rib during expiration. .2



Anterior View

Iliacus

Origin: ➤

anterior sacro –iliac and iliolumbar ligaments , and upper lateral surface of sacrum

- upper 2/3 of Iliac fossa

Insertion: ➤

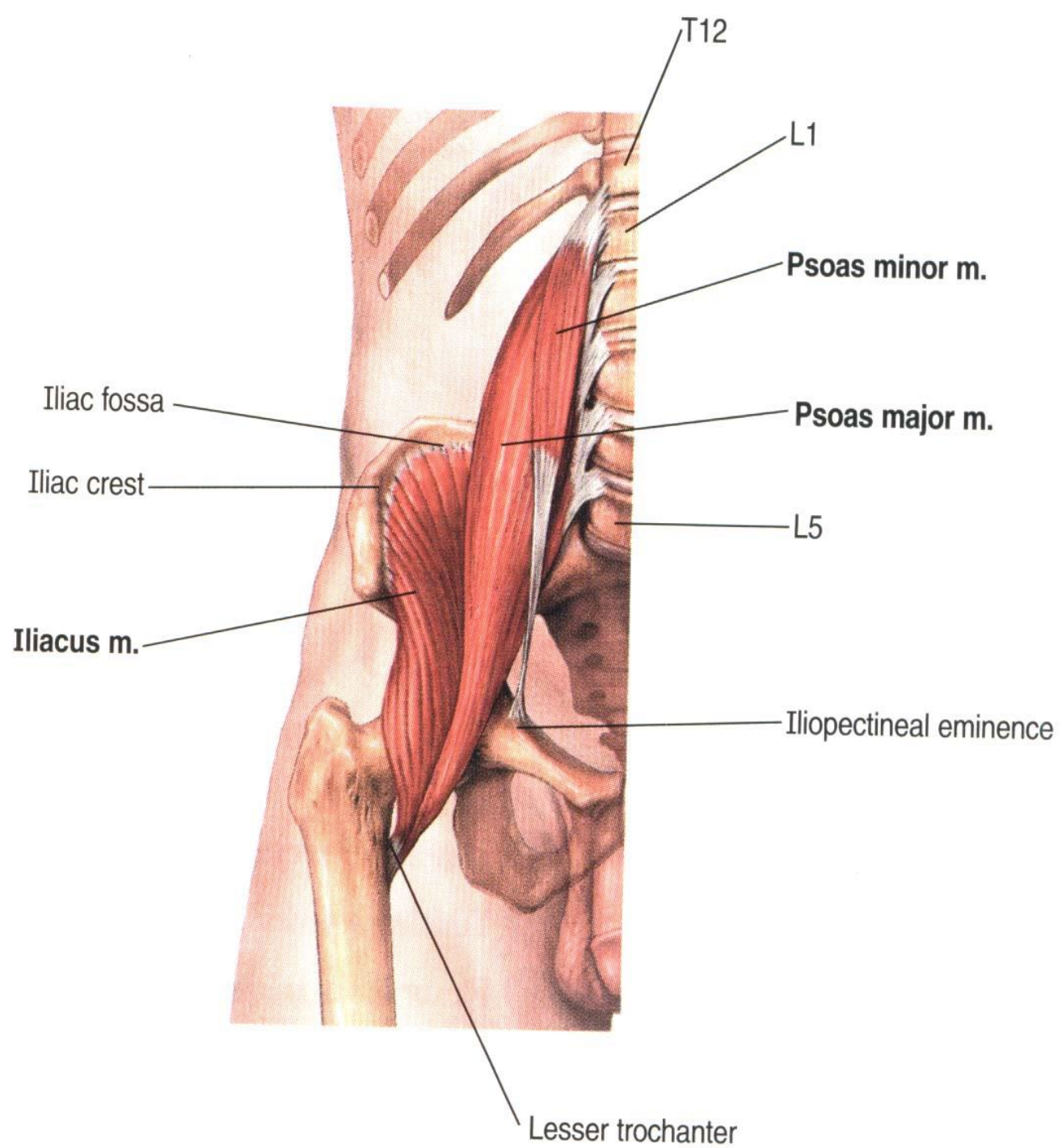
Lesser trochanter of the femur.

Nerve Supply: ➤

Femoral nerve(L2-L4).

Action: ➤

Flexion of the hip joint.



Muscles of the Lx & abdomen

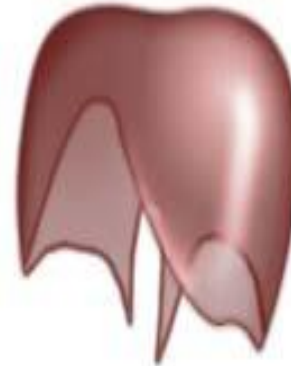
Name	Origin	Insertion	Action	Innervation
Quadratuslumborum	Iliac crest	Inferior surface of 12 th rib	Ipsilateral lateral flexion, trunk extension	Subcostal nerve & T12-L3-4 nerves
Multifidus	Back of sacrum, Lx vertebrae, transverse processes of Tx	Spines of all vertebrae from L5 to axis	Rotation, extension & lateral flexion	Adjacent spinal nerves
Transversusabdominis	Lateral 1/3 of inguinal ligament & anterior 2/3 of iliac crest	Aponeurotic sheath into linea alba & conjoint tendon into pubic crest	Increasing intra-abdominal pressure & acting as a muscular corset	Anterior primary rami of T7-12 & L1

Clinical Anatomy

Muscles of Inspiration: •

Diaphragm: –

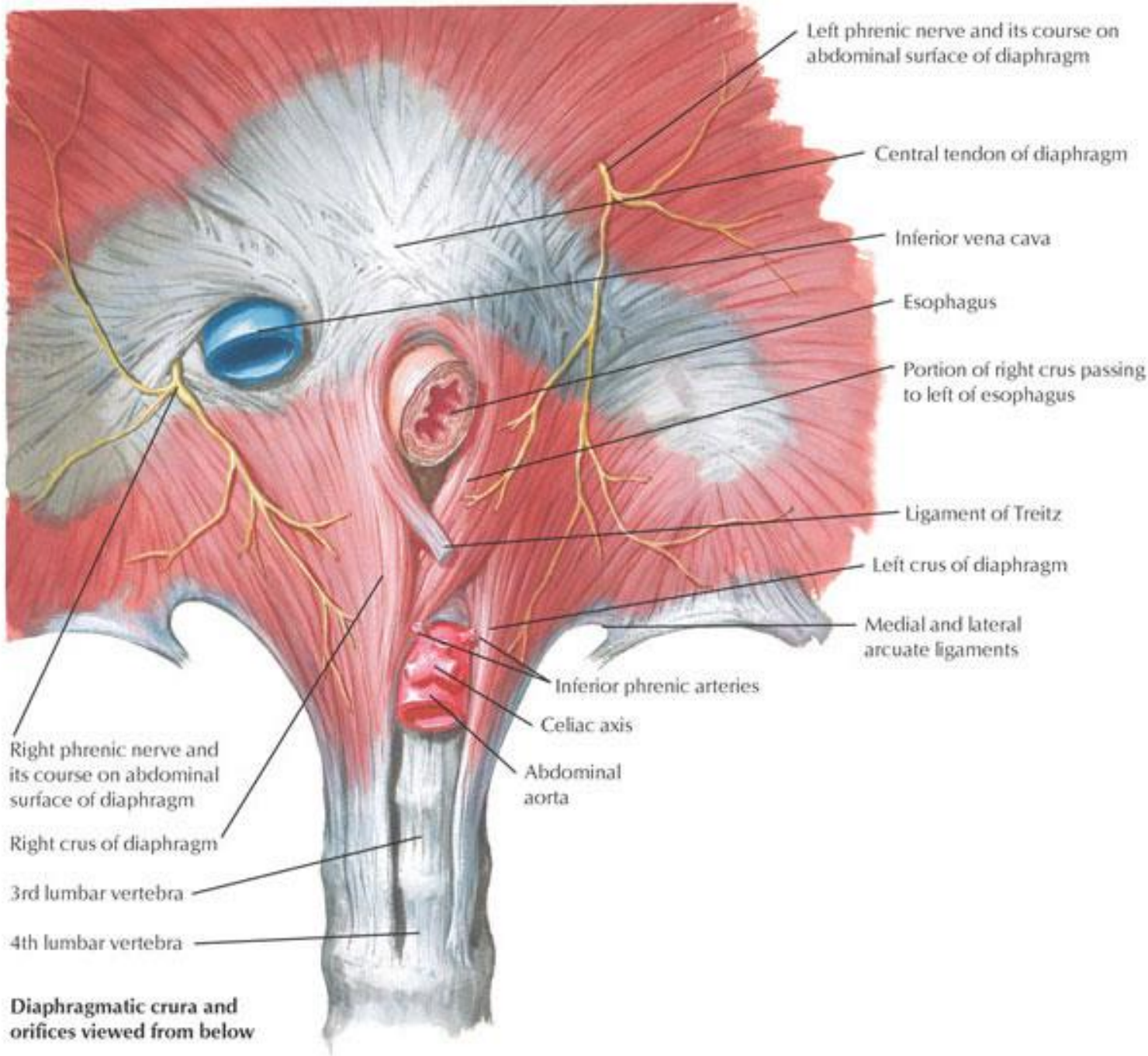
- Separates thoracic and abdominal activities
- Innervation: phrenic nerve
- Inhalation – diaphragm contracts enlarging the thoracic cavity and reducing intra-thoracic pressure (air drawn into lungs)
- Exhalation – diaphragm relaxes and air is exhaled by elastic recoil of the lungs



The diaphragm is shaped like an upside-down bowl



b



a

- Right phrenic nerve and its course on abdominal surface of diaphragm
- Right crus of diaphragm
- 3rd lumbar vertebra
- 4th lumbar vertebra

- Left phrenic nerve and its course on abdominal surface of diaphragm
- Central tendon of diaphragm
- Inferior vena cava
- Esophagus
- Portion of right crus passing to left of esophagus
- Ligament of Treitz
- Left crus of diaphragm
- Medial and lateral arcuate ligaments
- Inferior phrenic arteries
- Celiac axis
- Abdominal aorta

Diaphragmatic crura and orifices viewed from below

Portion of right crus pa
 Portion of right crus pas

F. Netter M.D.

Diaphragm

Origin:



Sternal head: from xiphoid process. . ١

Costal head: lower six ribs and costal cartilage. . ٢

Vertebral head: right and left crura from the first, second and third lumbar vertebrae and arcuate ligaments. . ٣

Insertion:



Central tendon of the diaphragm.

Nerve Supply:



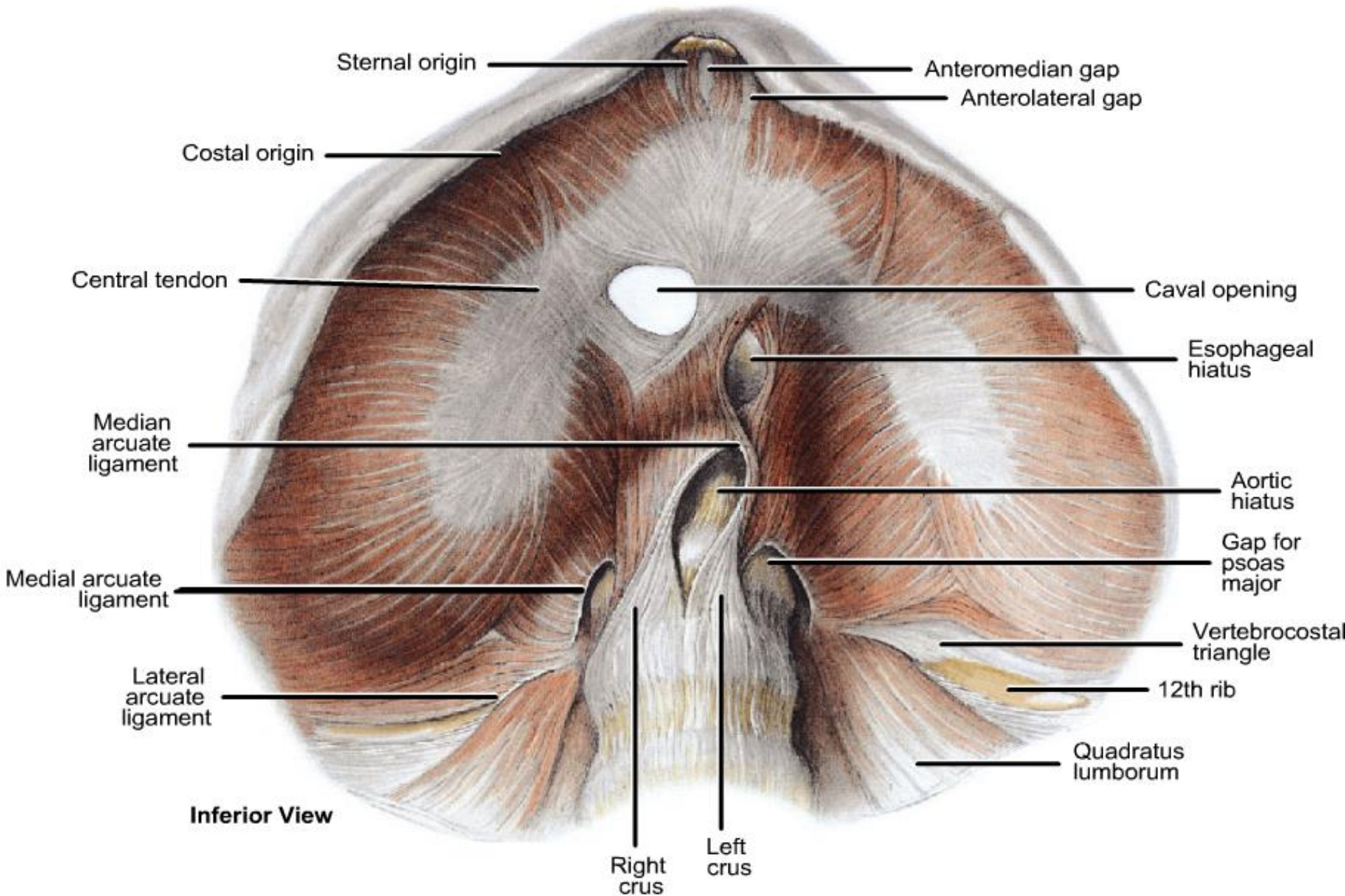
Motor: phrenic nerve.

Sensory: phrenic and Intercostal nerves.

Action:

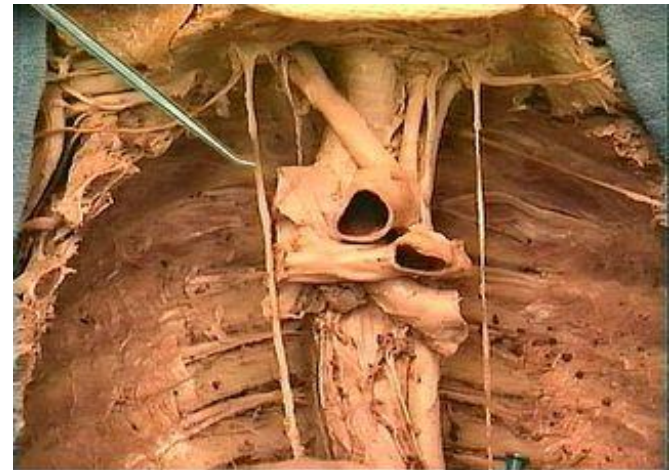


Increase the vertebral diameter of the thoracic cavity (muscle of inspiration).



Phrenic Nerve Anatomy

- Originates from C3-C5
 - Primarily C4
- Motor innervation to diaphragm
- Sensory fibers
 - Pleura
 - Pericardium
 - Abdominal components



Phrenic Nerve Anatomy

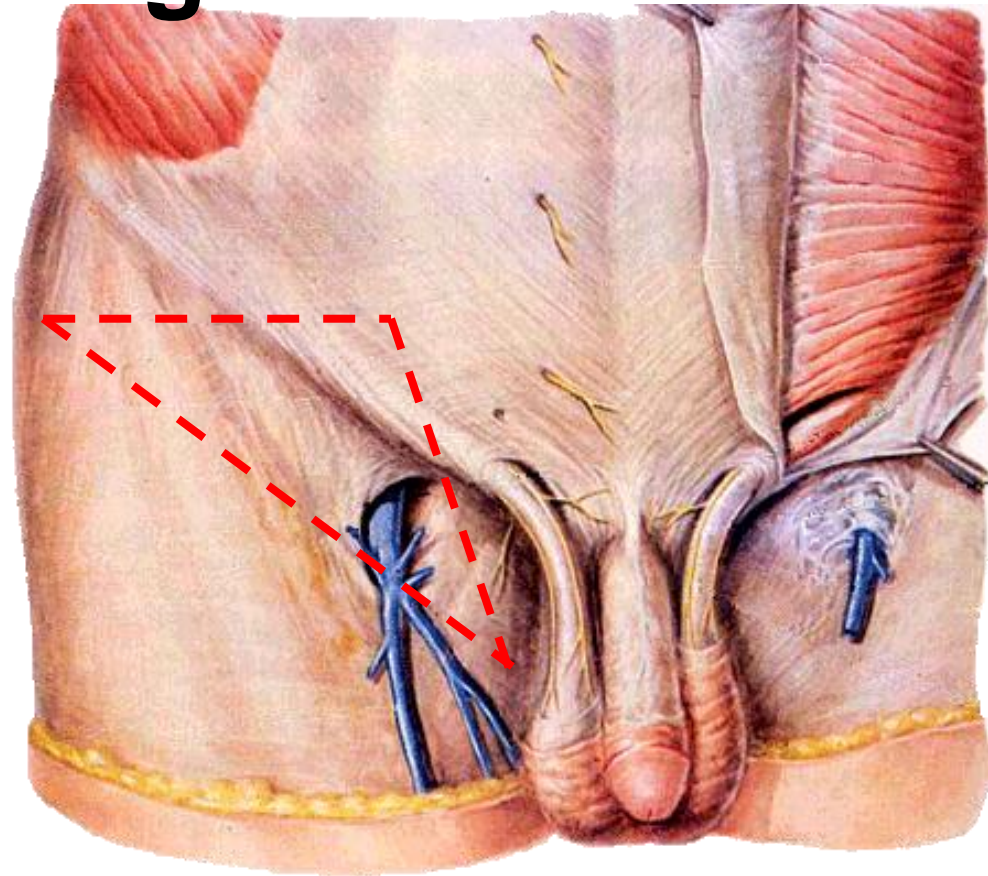
Accessory Phrenic Nerve

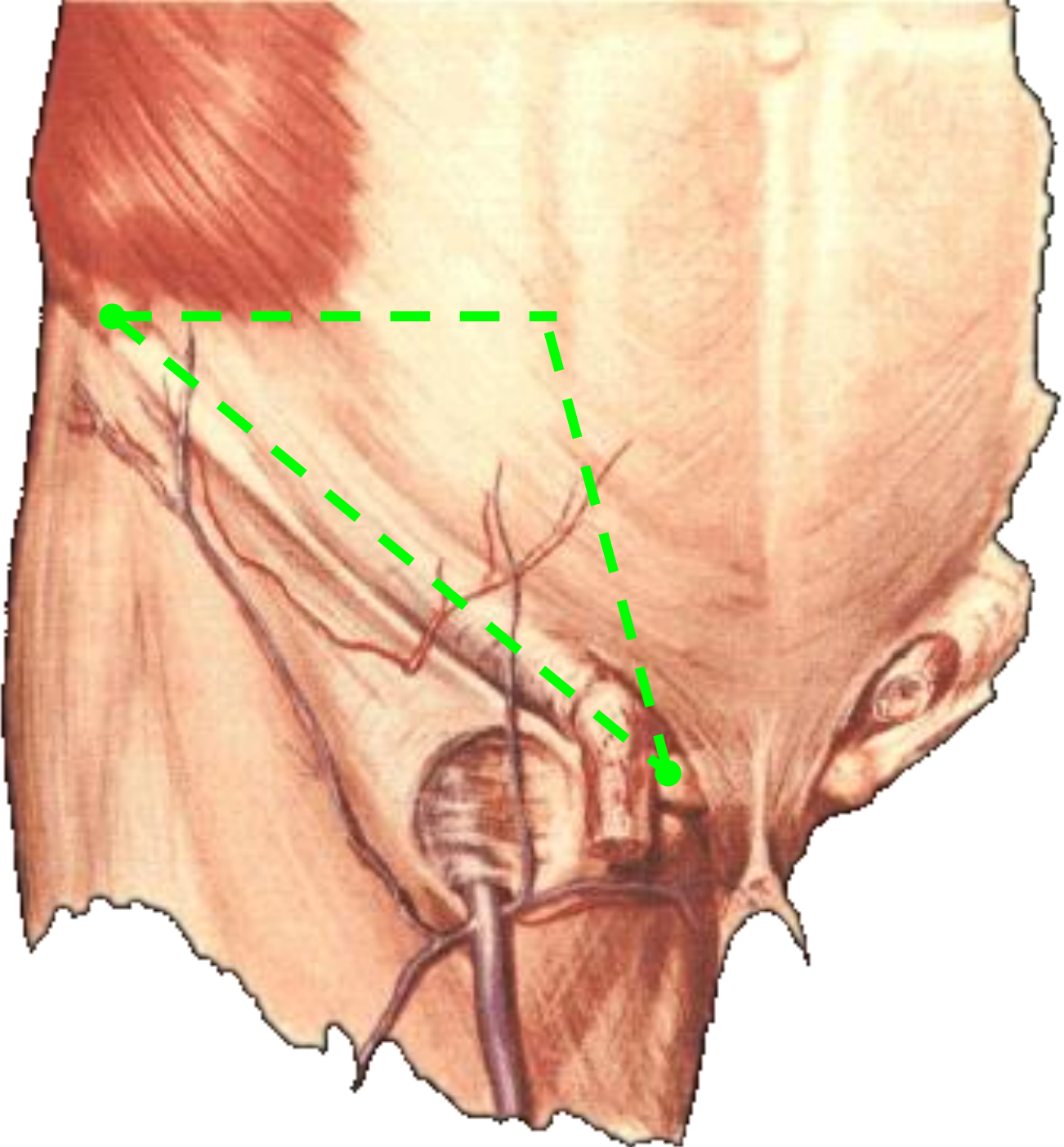
- Occurs in 15-25% of people
- A branch of C5 which would otherwise pass to subclavius
- Begins lateral to the phrenic nerve in the neck
- Obliquely traverses scalenus anterior
- Joins the phrenic nerve at the root of the neck
- Also supplies diaphragm with efferent fibers

Inguinal regional

Boundarie

- Inguinal ligament
- Lateral margin of rectus abdominis
- A horizontal line stretching from anterior iliac spine to lateral margin of rectus abdominis





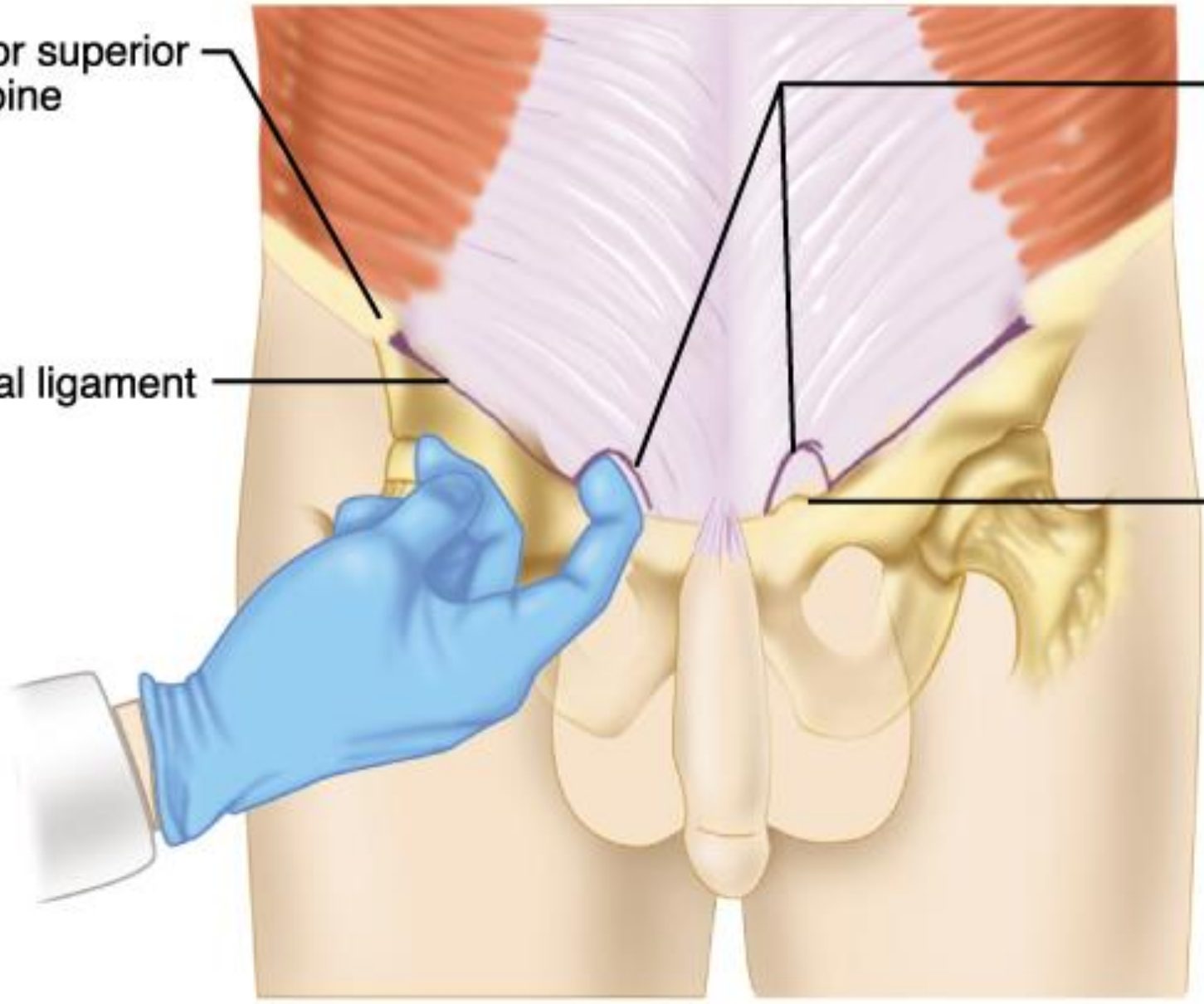
Boundaries

Anterior superior iliac spine

Superficial inguinal ring

Inguinal ligament

Pubic tubercle

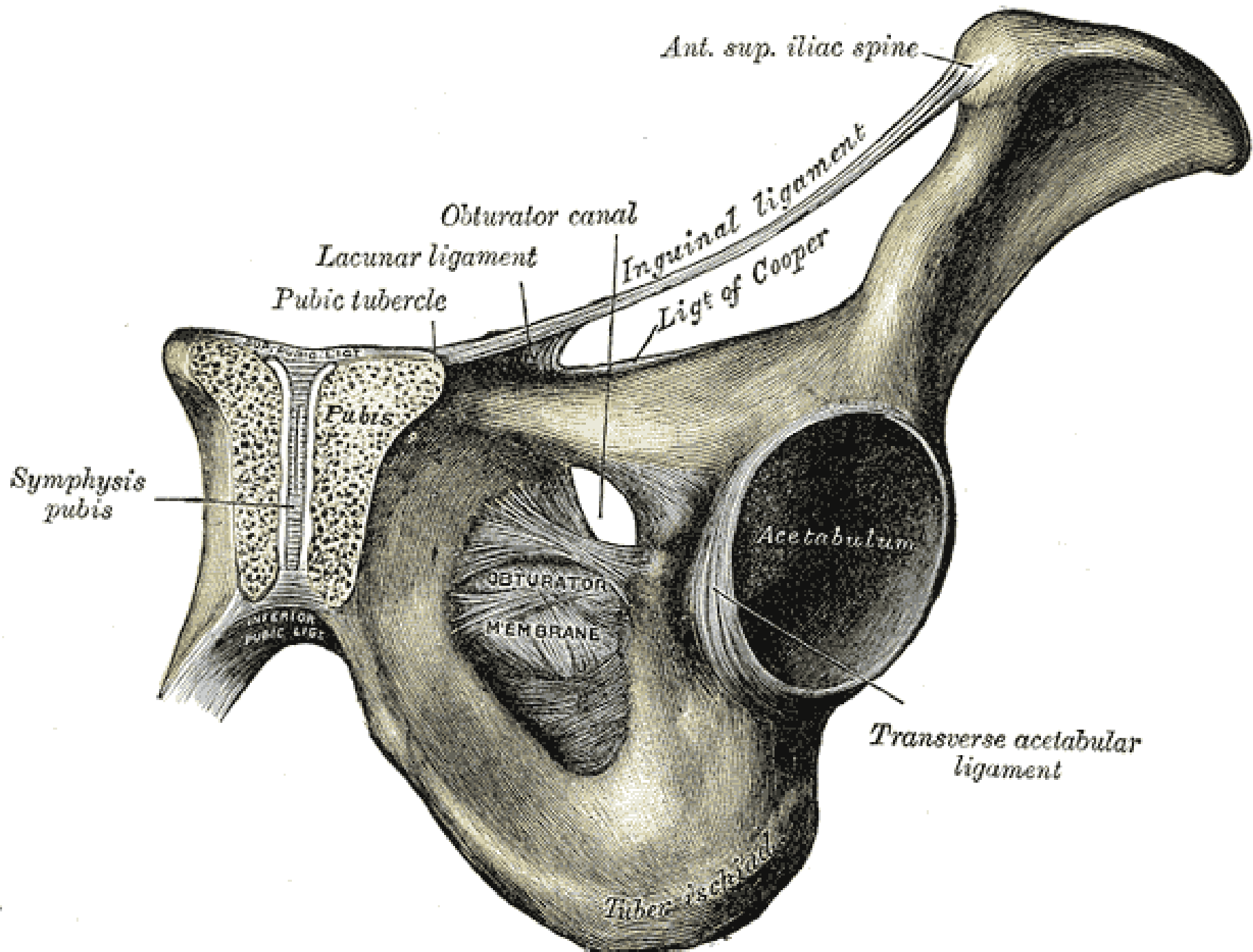


Inguinal Ligament

Inguinal ligament: •

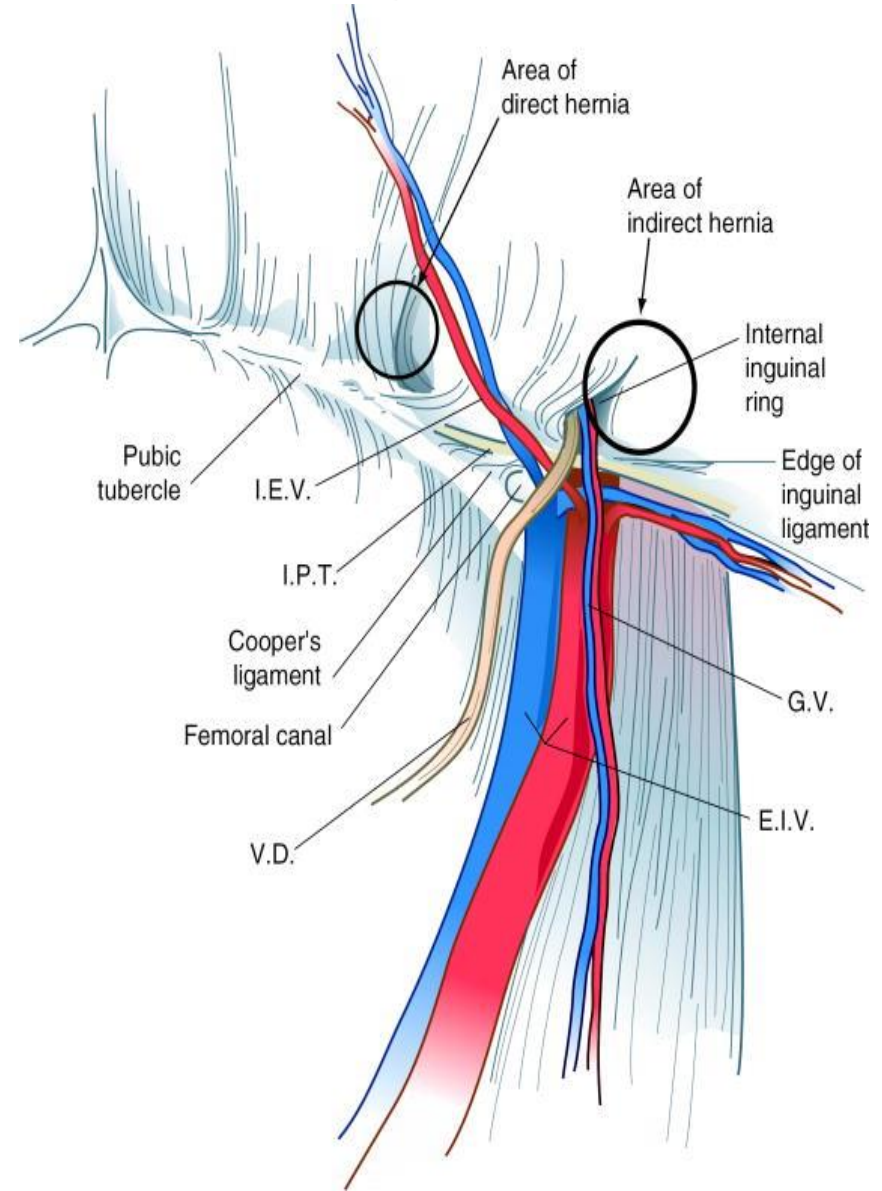
Thickened lower border of external oblique
aponeurosis.

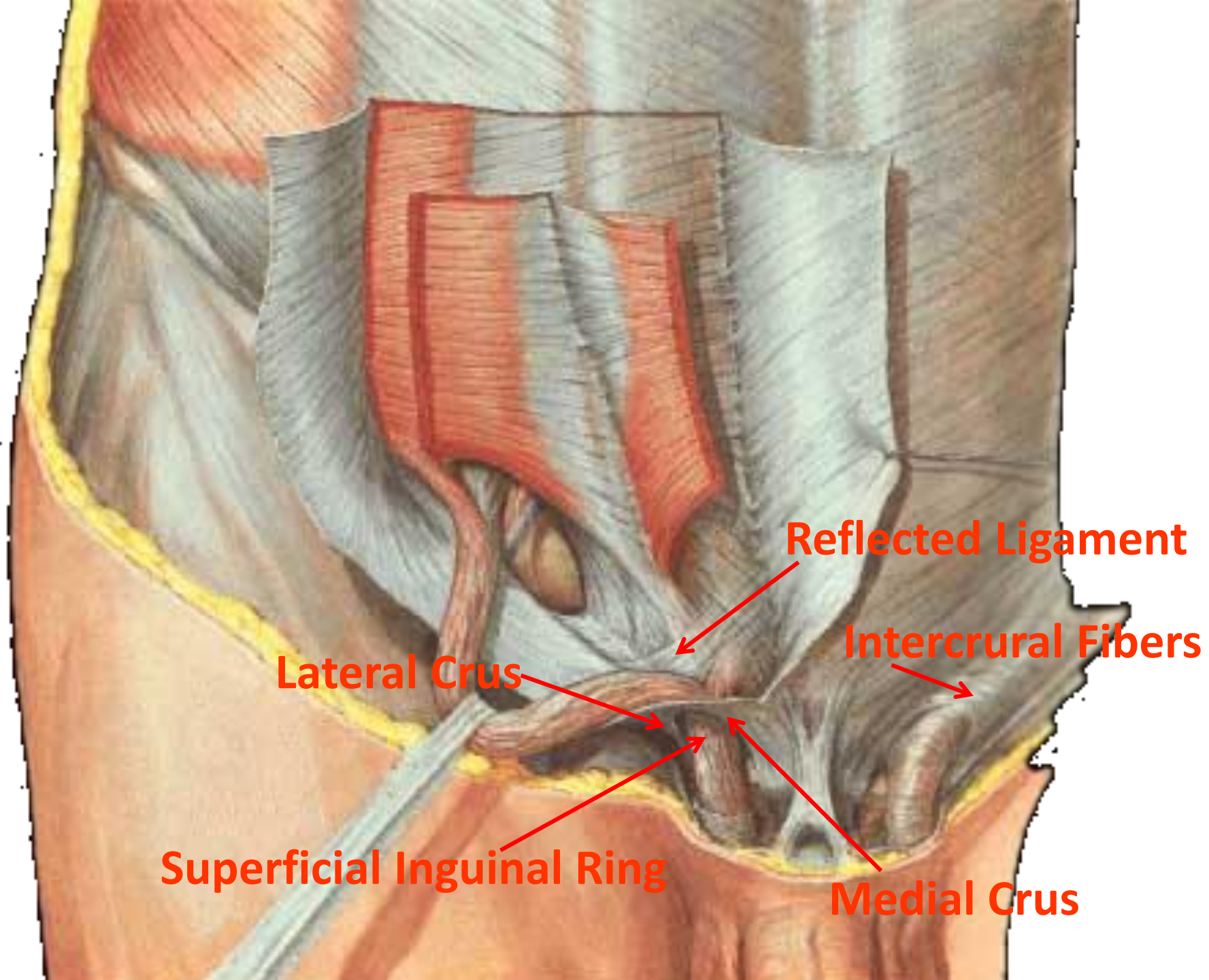
From anterior superior iliac spine to pubic
tubercle.



The *Hesselbach triangle*

The ***inferior epigastric vessels*** serve as its superolateral border, the ***rectus sheath*** as medial border, and the ***inguinal ligament*** as the inferior border. Direct hernias occur within the Hesselbach triangle, whereas indirect inguinal hernias arise lateral to the triangle





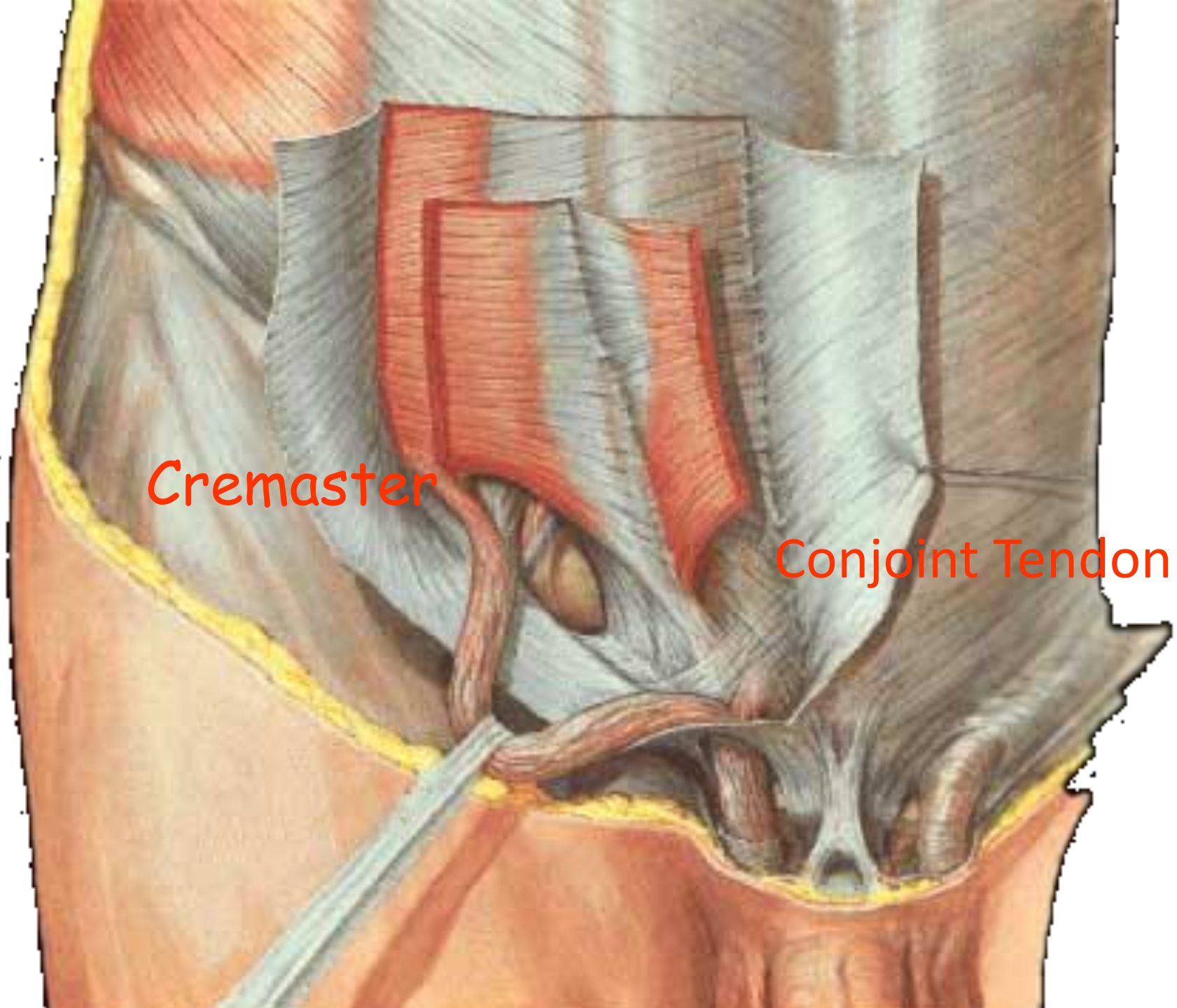
Reflected Ligament

Intercrural Fibers

Lateral Crus

Superficial Inguinal Ring

Medial Crus



Cremaster

Conjoint Tendon

Inguinal Canal

Roof •

internal oblique abdominis –

transversus abdominis –

Floor •

inguinal ligament –

lacunar ligament –

anterior wall •

external abdominal oblique aponeurosis –

internal abdominal oblique aponeurosis –

posterior wall •

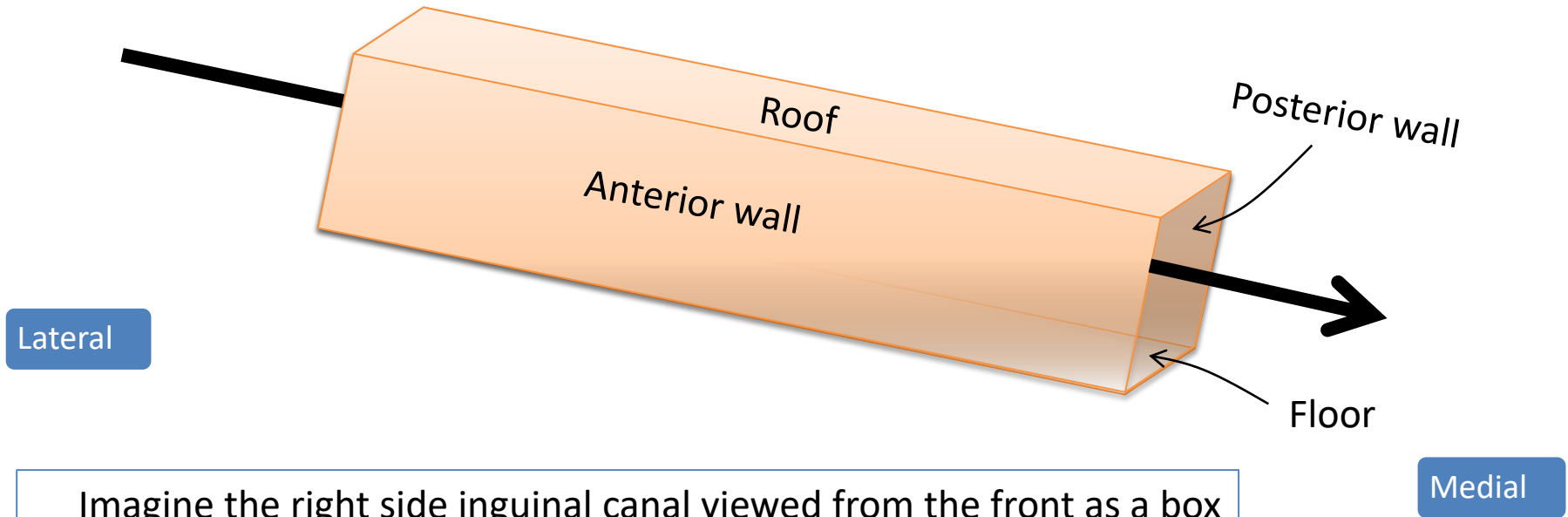
transversalis fascia –

conjunct tendon (falx inguinalis) –

BOUNDARIES OF INGUINAL CANAL

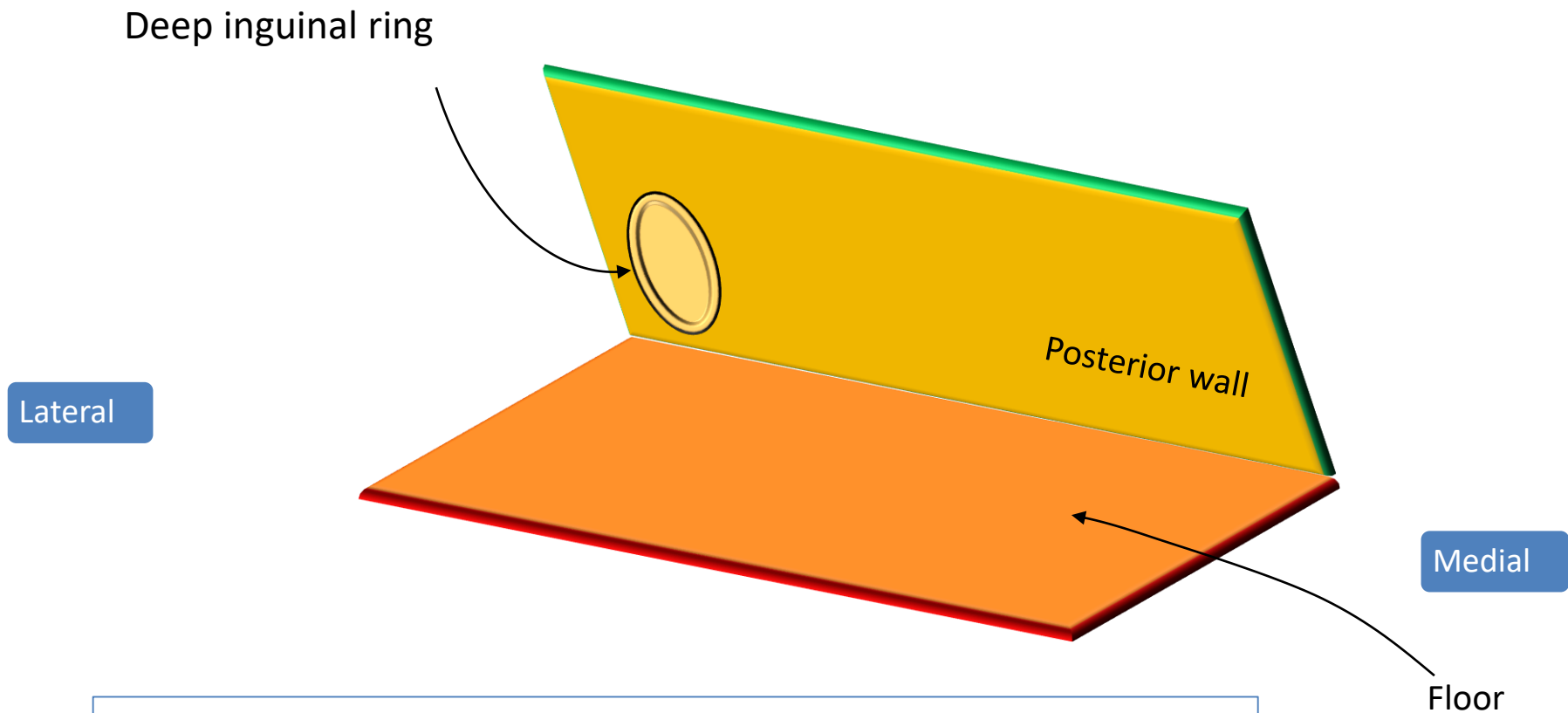
- FLOOR: Inguinal ligament •
- ANTERIOR WALL: External Oblique •
- POSTERIOR WALL: Transversalis fascia •
- MEDIAL-POSTERIOR WALL: Internal oblique •
and transversalis (when they fuse become
conjoint tendon.)

A Box?



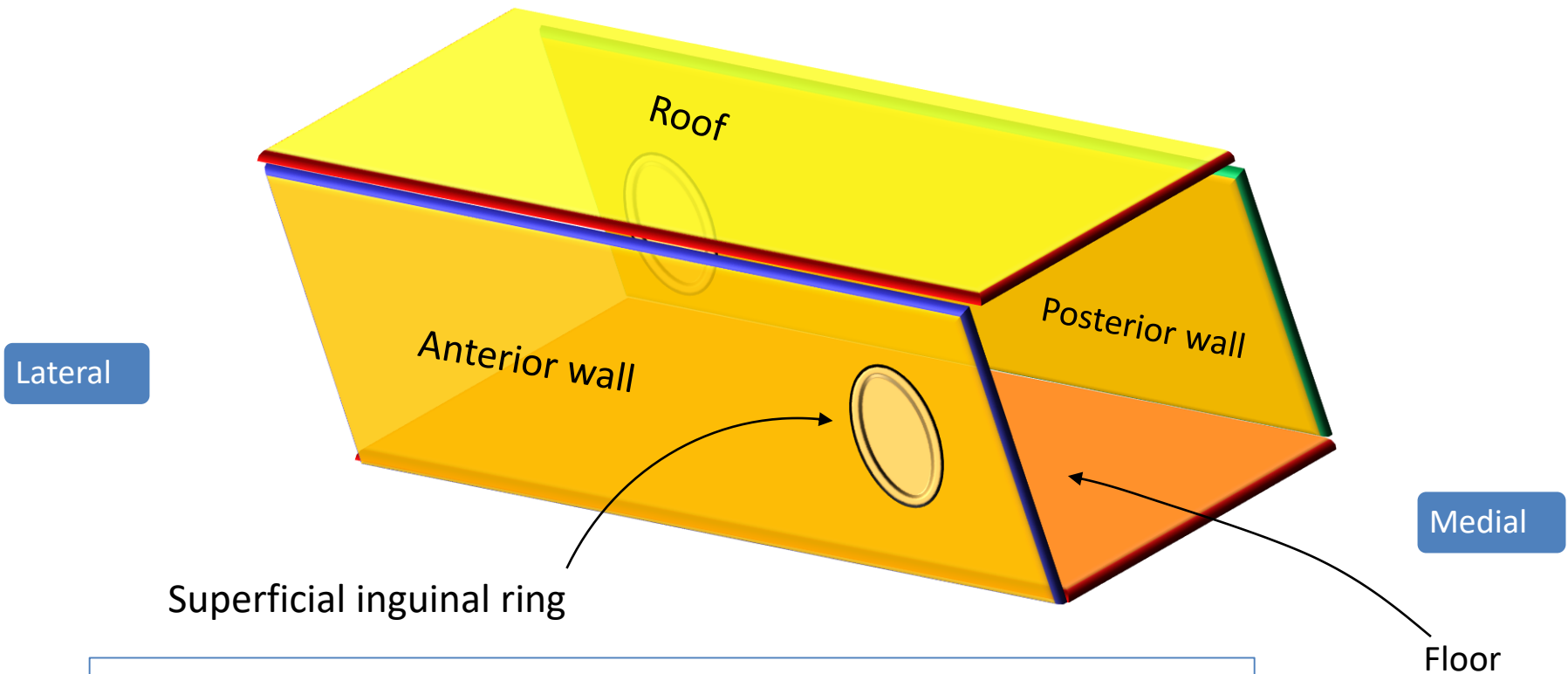
Imagine the right side inguinal canal viewed from the front as a box with anterior & posterior walls, a roof & floor. The arrow indicates that structures can run through it from lateral to medial – e.g. in males it transmits the spermatic cord, and in females, the round ligament of the uterus.

Inguinal canal



Here are the posterior wall, which has the DEEP inguinal ring situated laterally, and the floor. (Roof and anterior wall removed).

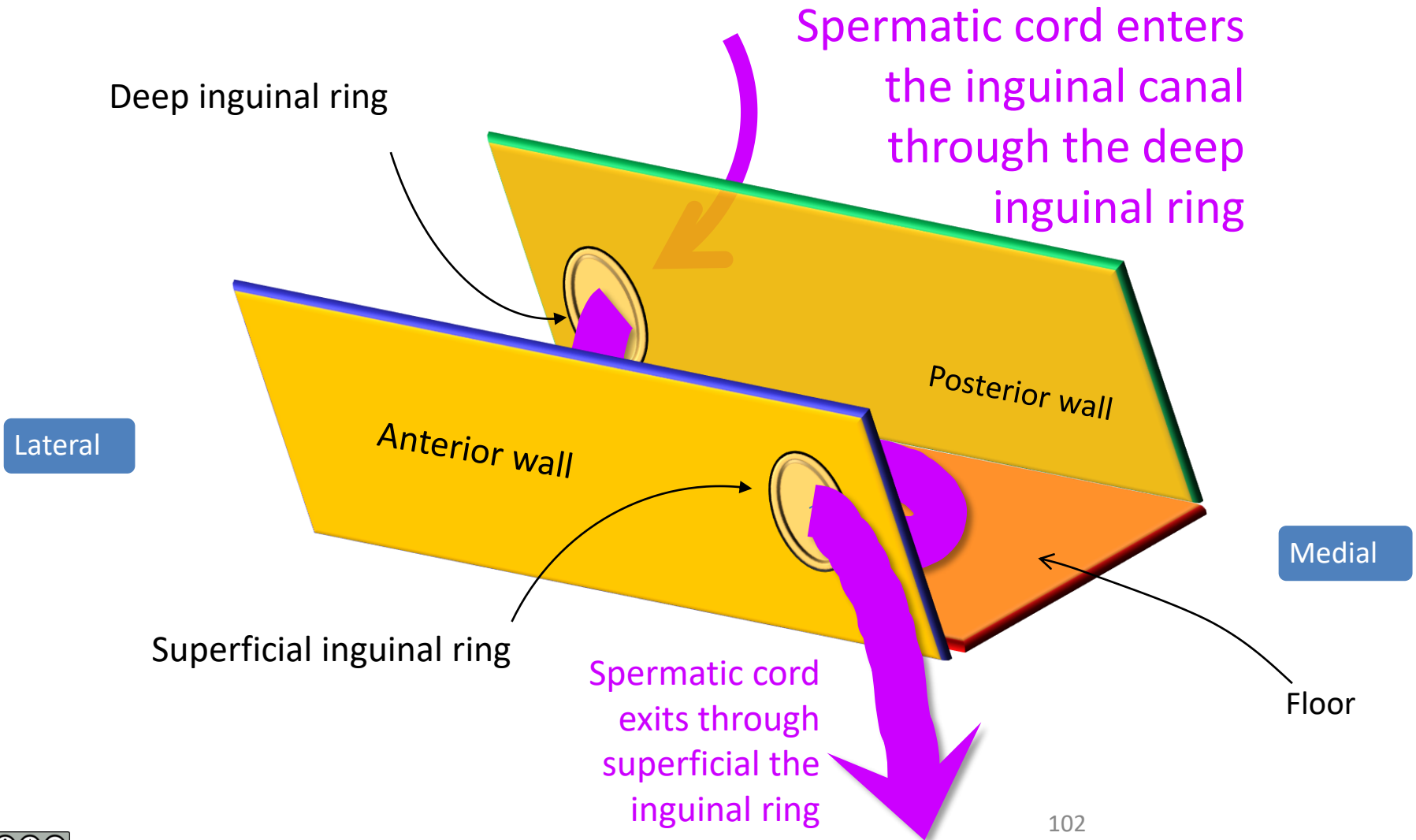
Inguinal canal



Here are the anterior wall (which has the SUPERFICIAL inguinal ring situated medially), and the roof.

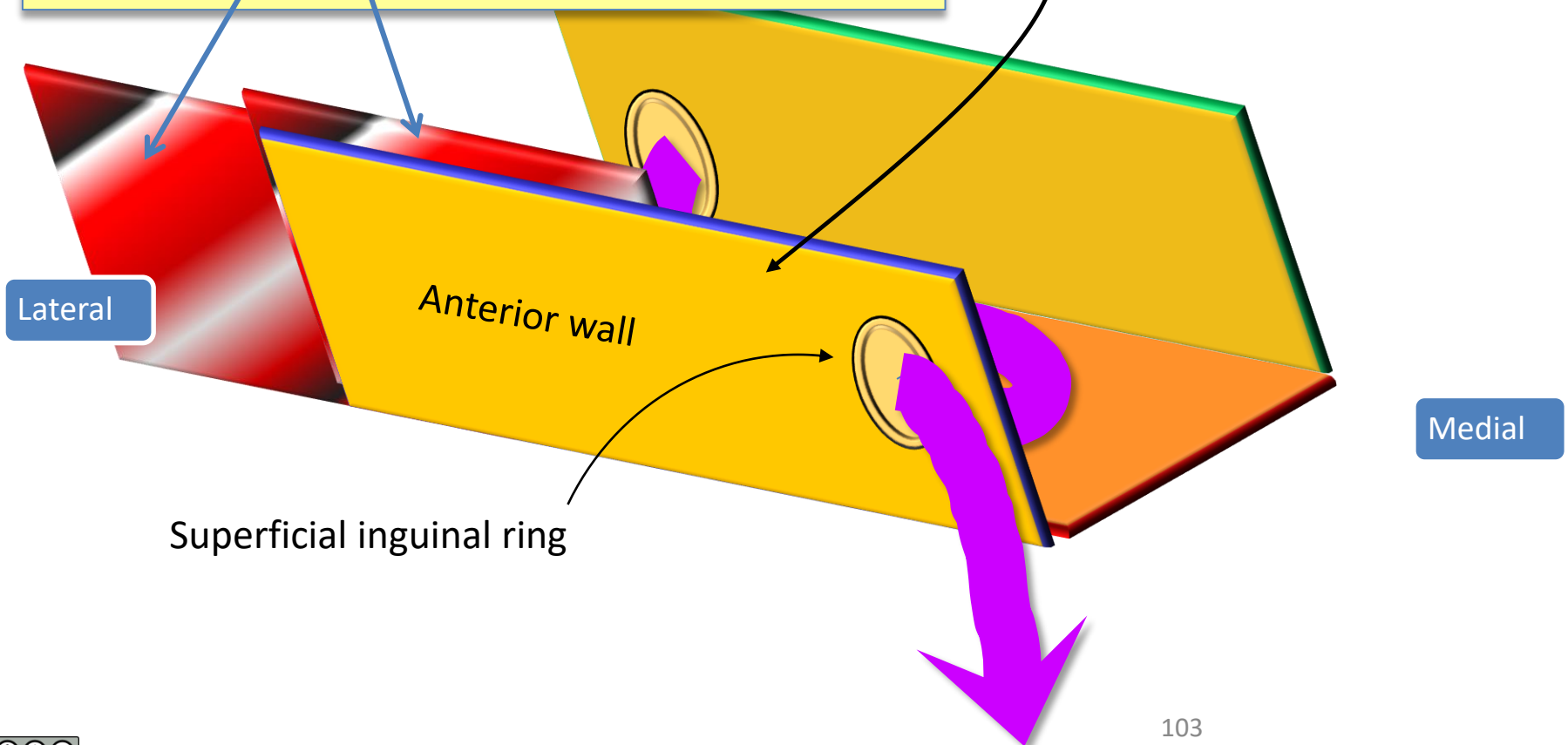


Inguinal canal



Inguinal canal

The anterior wall is made up of the **external oblique** muscle throughout, and is reinforced by the **internal oblique m.** laterally. The **transversus abdominus m.** lies even more laterally as part of the anterior abdominal wall.



Inguinal canal

Conjoint tendon

The conjoint tendon attaches to the pubic crest, reinforces the posterior canal wall medially and also forms the ROOF of the canal

Lateral

Anterior wall

Medial

Floor

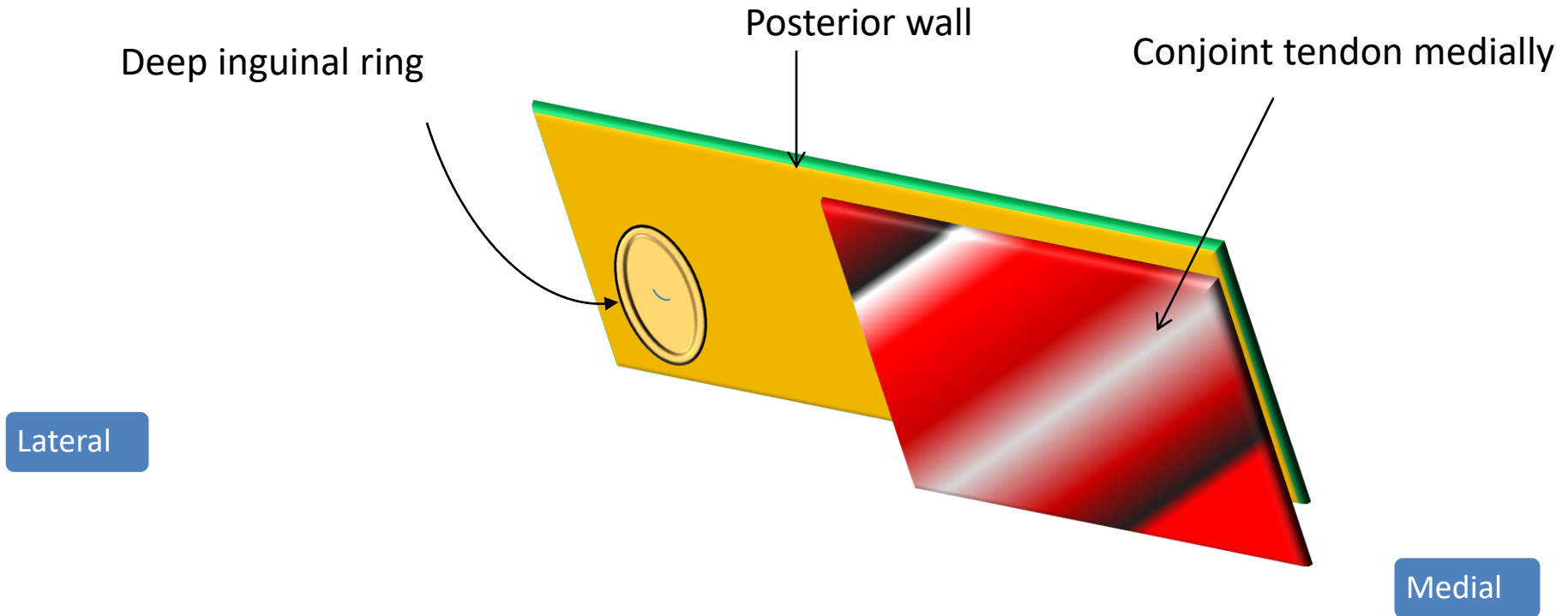
The transversus abdominis and internal oblique mm. combine to form the CONJOINT tendon that arches over the contents of the inguinal canal



Spermatic cord



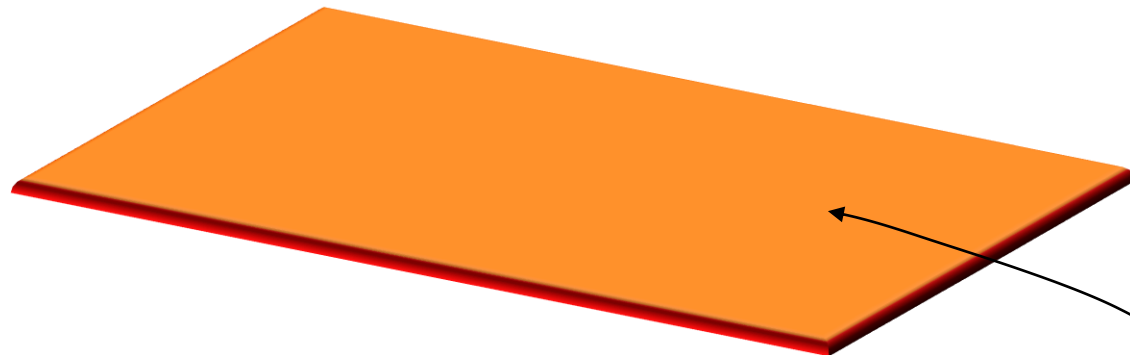
Posterior wall of the inguinal canal



The posterior wall is formed by transversalis fascia (orange) throughout and the conjoint tendon (red) medially. The wall is particularly weak over the deep inguinal ring

Floor of the inguinal canal

Lateral

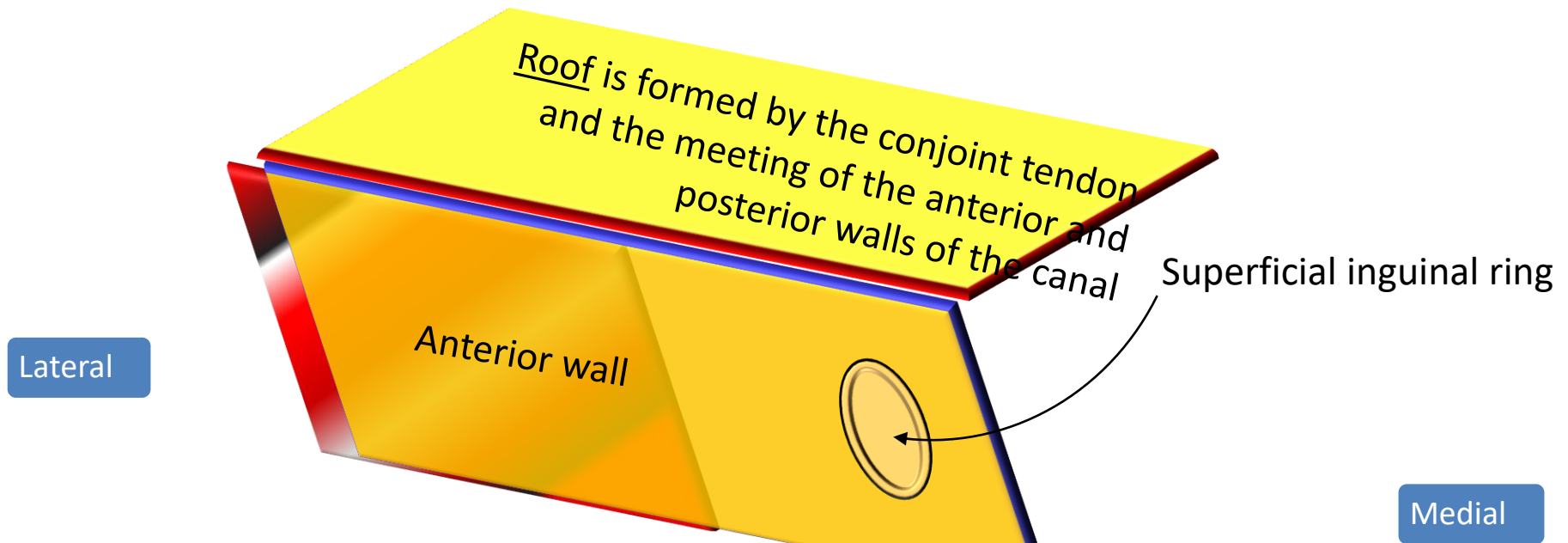


Medial

Floor

The floor is formed by an incurving of the inguinal ligament, which is part of the external oblique muscle, forming a gutter. (Medially it forms the lacunar ligament which is not illustrated).

Roof and anterior wall of the inguinal canal



The anterior wall of the canal is formed by external oblique muscle (orange) throughout and by internal oblique muscles (red/black/white) laterally. This wall is weak medially because of the "hole" in the external oblique muscle (= superficial inguinal ring).

Inguinal hernias

The posterior wall of the canal is particularly •
weak laterally because of the deep inguinal ring

The anterior wall opposite the deep ring is •
reinforced laterally by the internal oblique m.

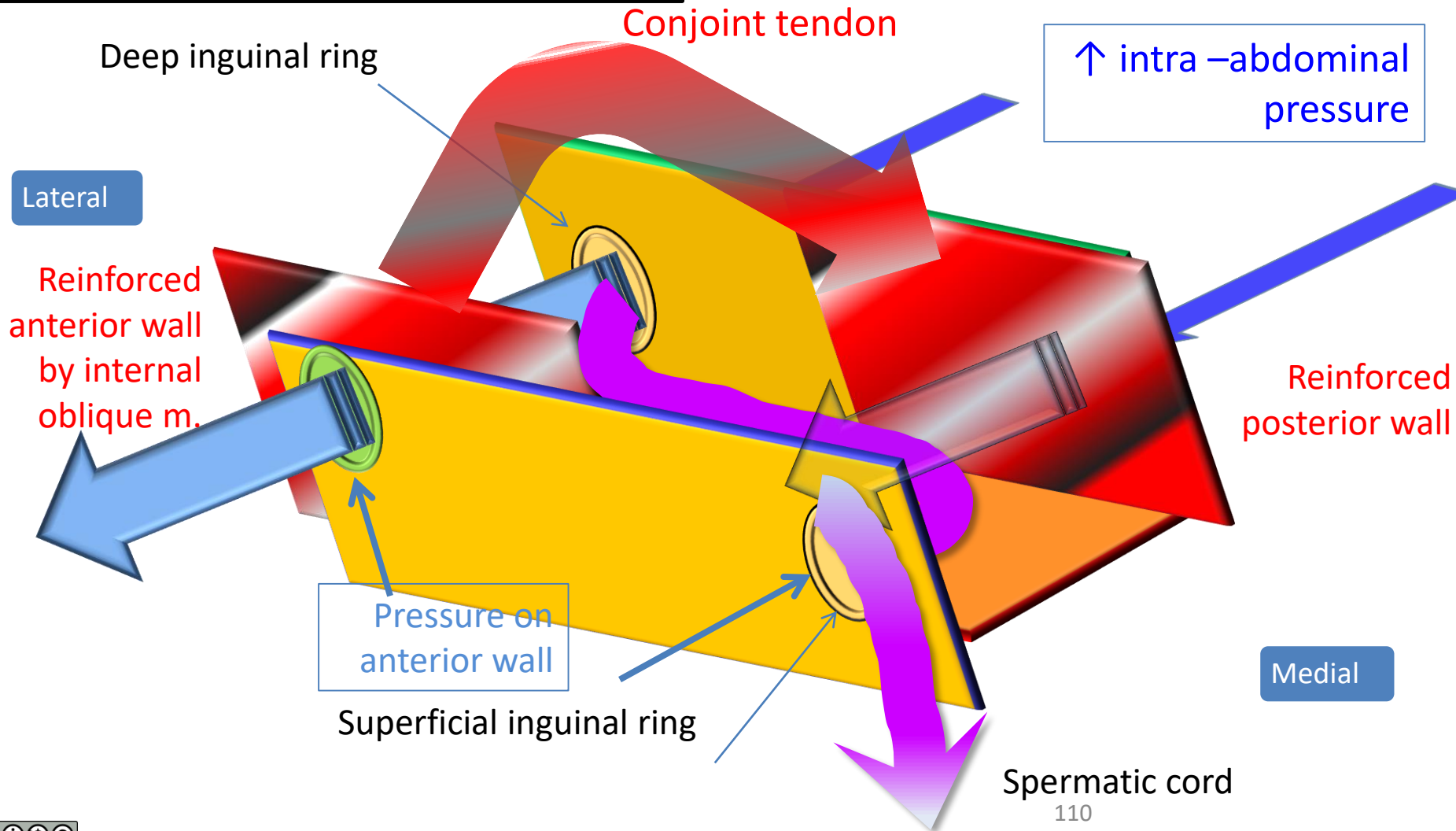
A hernia (e.g. of small bowel) that comes through •
the deep inguinal ring will have to travel along
the inguinal canal as it cannot push into the
reinforced layers of muscle in the anterior wall of
the canal directly opposite the deep inguinal ring

Inguinal hernias

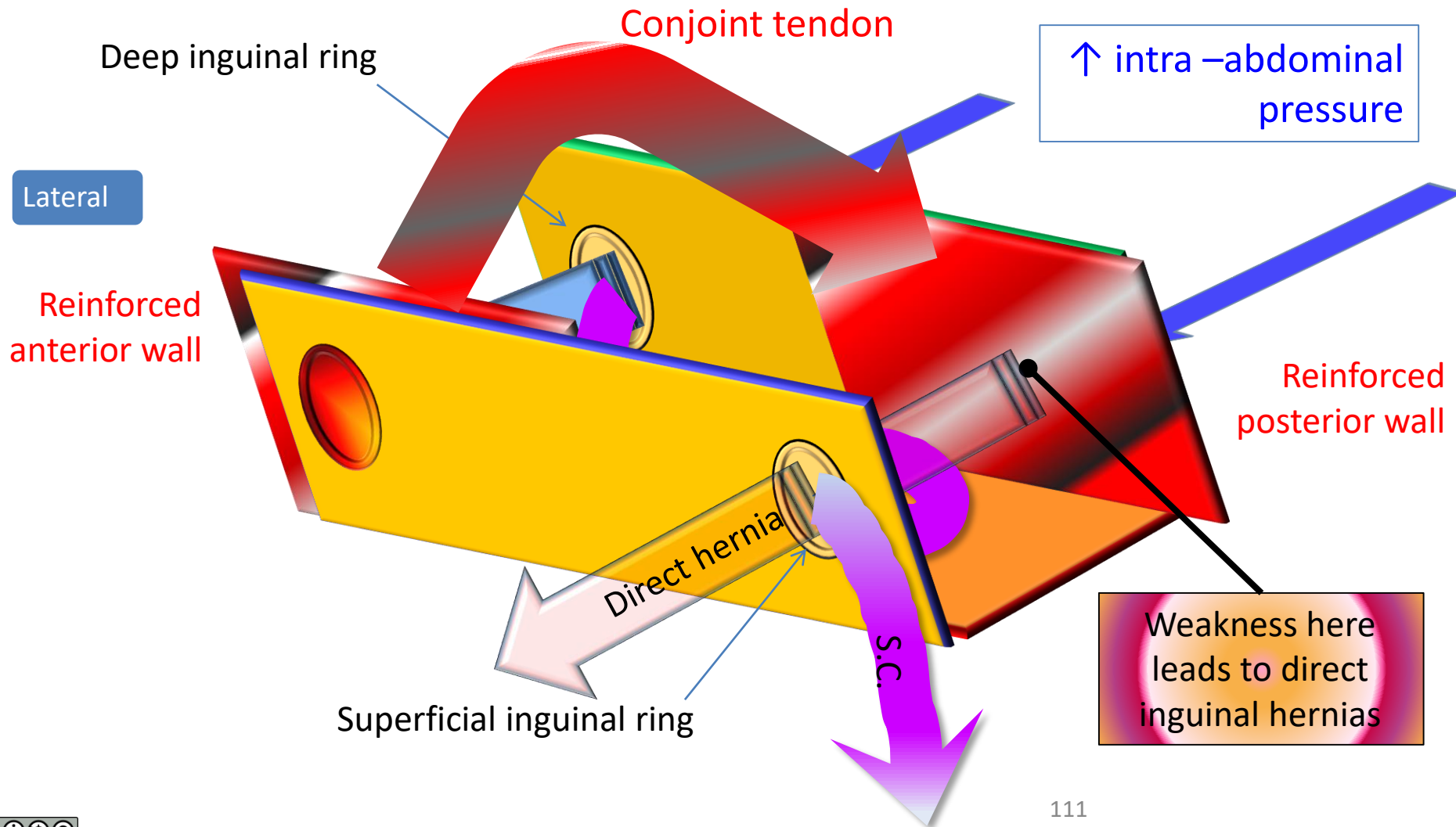
- The anterior wall of the canal is weak medially where the superficial inguinal ring is situated
- The posterior wall, opposite the superficial ring, is reinforced medially by the conjoint tendon that is formed by fibres of the internal oblique and transversus abdominis muscles
- Abdominal contents cannot normally force themselves through the superficial ring directly because of the reinforced posterior wall medially

Pressures on the inguinal canal

 = areas where reinforcement is present



Pressures in the inguinal canal



Indirect inguinal hernias

- Pass through the deep ring
- Travel along the canal
- Exit the superficial ring above and medial to the pubic tubercle (remember the inguinal ligament attaches to the tubercle). Since the incurved inguinal ligament forms the floor of the canal, the contents of the canal could not emerge below or lateral to the pubic tubercle (useful in surgical diagnosis). An example is congenital inguinal hernia.

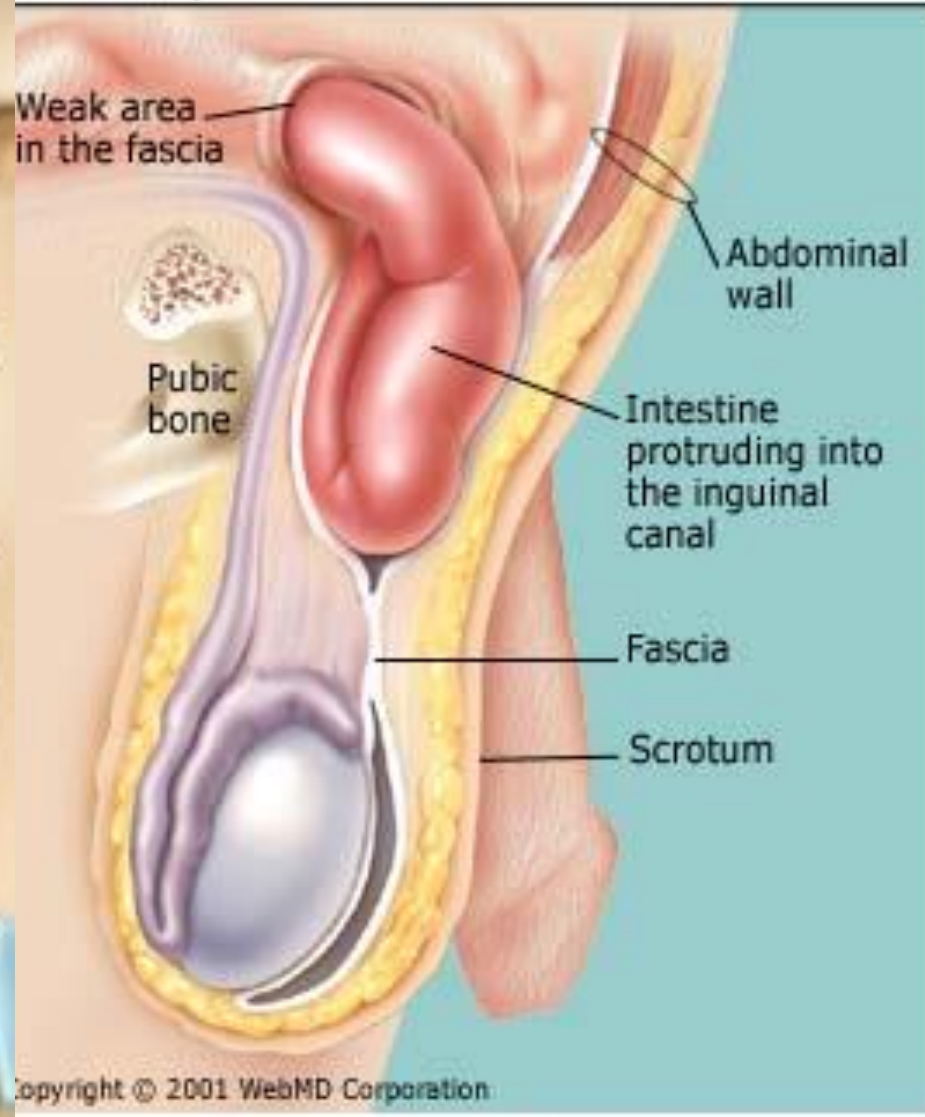
Direct inguinal hernias

- If the posterior wall of the canal is weakened medially (e.g. by chronically increased intra-abdominal pressure), it can stretch and bulge out through the superficial ring
- The contents of the hernia do not travel along the length of the canal but push directly on the stretched posterior inguinal canal wall and through the superficial ring.

Anatomy of a Hernia



Anatomy of a Hernia



CONTENTS OF CANAL

3 ARTERIES:

- Testicular Artery
- Artery to Vas
- Artery to cremaster

3 LAYERS OF FASCIA:

- External spermatic fascia
- Cremasteric fascia
- Internal spermatic fascia.

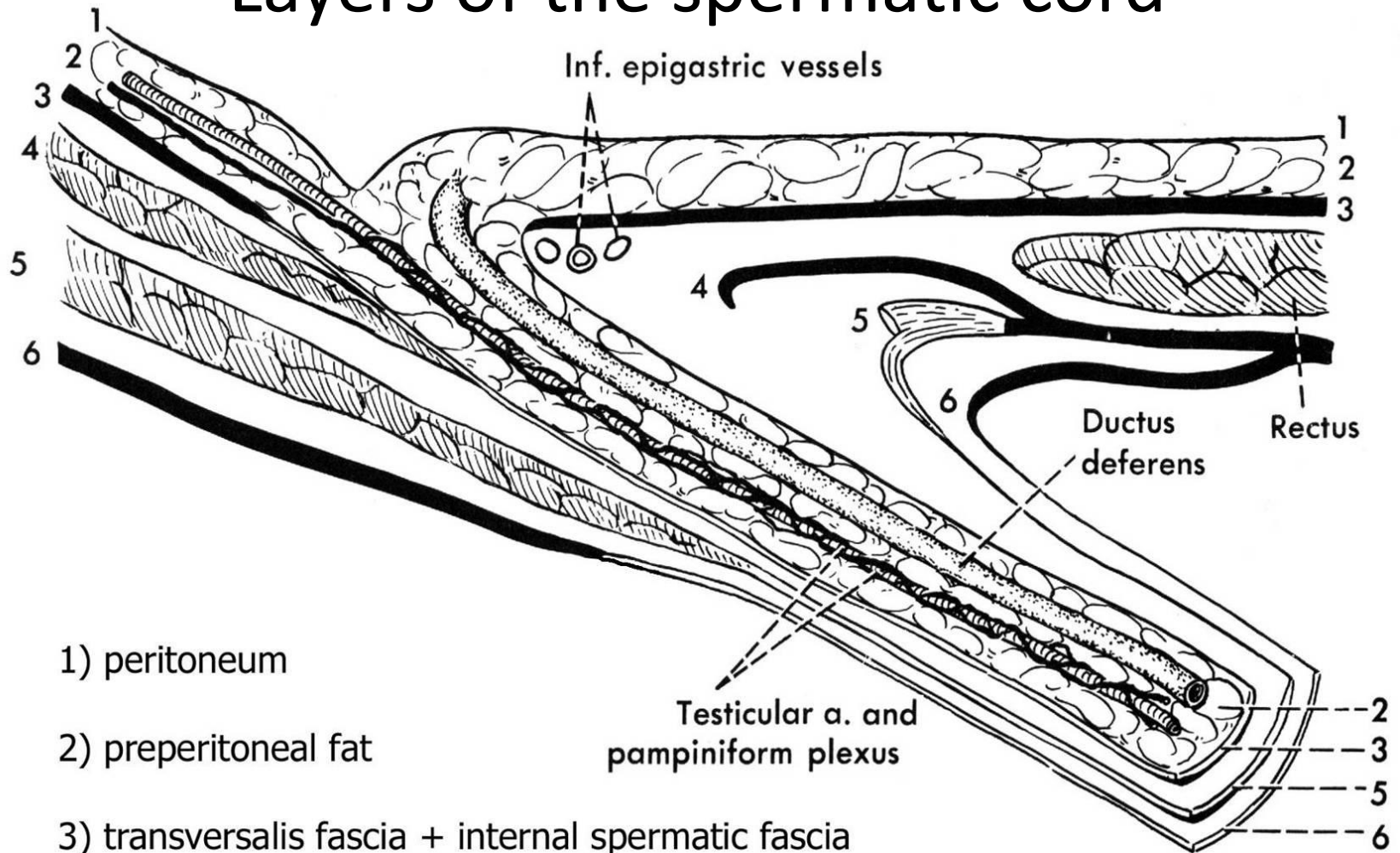
3 NERVES:

- Genital branch of genitofemoral nerve
- Sympathetic fibres
- Ilioinguinal nerve

3 OTHERS:

- Vas deferens
- Panpiniform plexus
- Lymphatics

Layers of the spermatic cord



1) peritoneum

2) preperitoneal fat

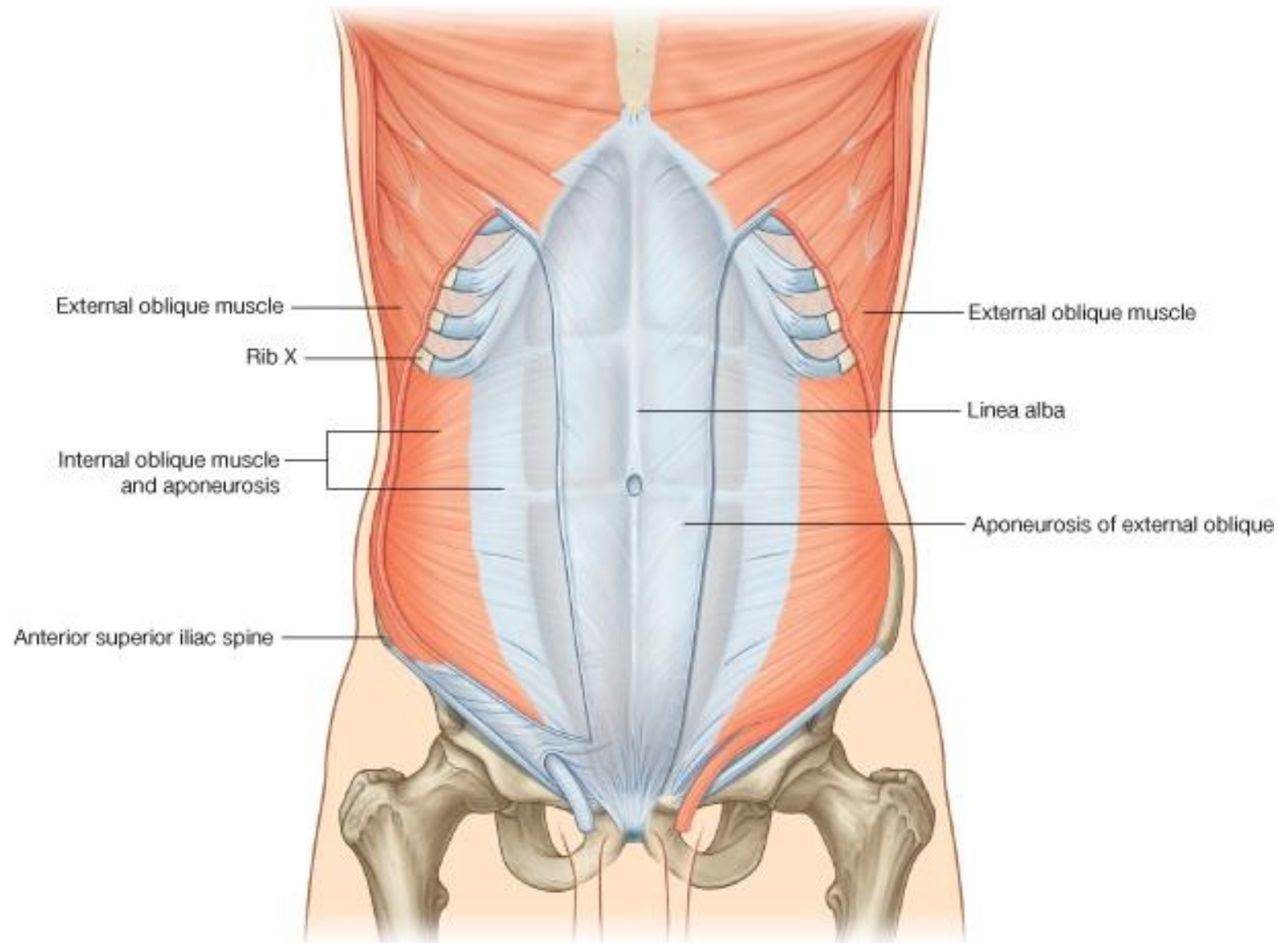
3) transversalis fascia + internal spermatic fascia

4) transversus abdominus muscle + transversus abdominus aponeurosis

5) internal oblique muscle + cremaster muscle

6) external oblique aponeurosis + external spermatic fascia

Cremaster muscle



Contents (male)

spermatic cord •

arteries: testicular artery, deferential artery, –
cremasteric artery

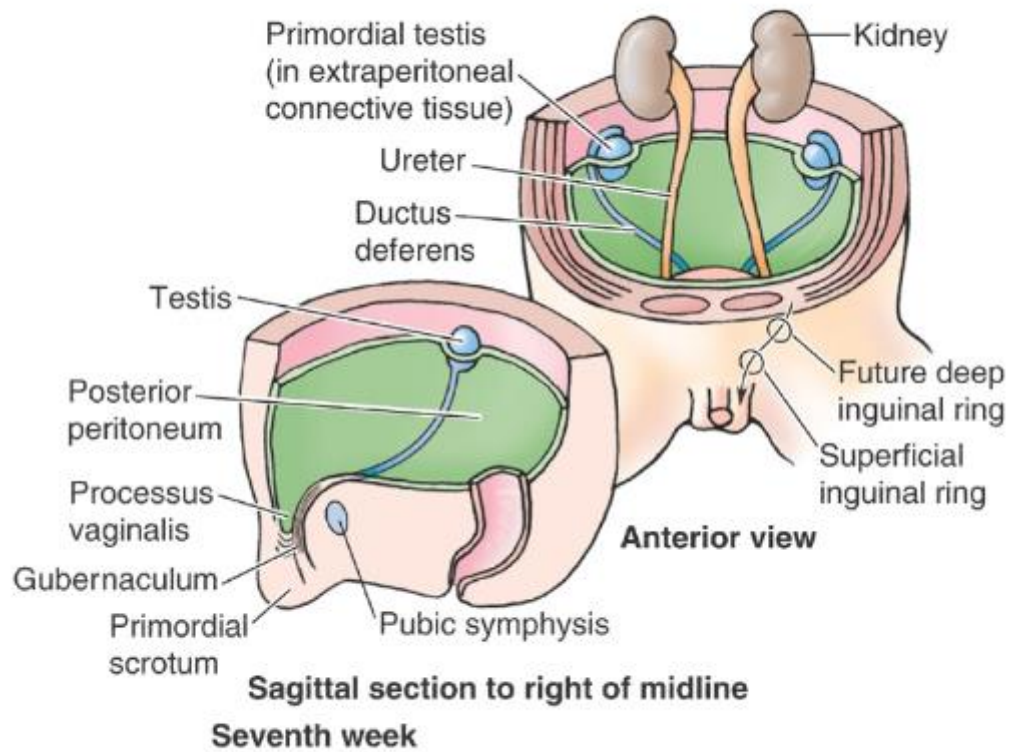
nerves: genital branch of the genitofemoral nerve, –
nerve to cremaster, sympathetic nerves

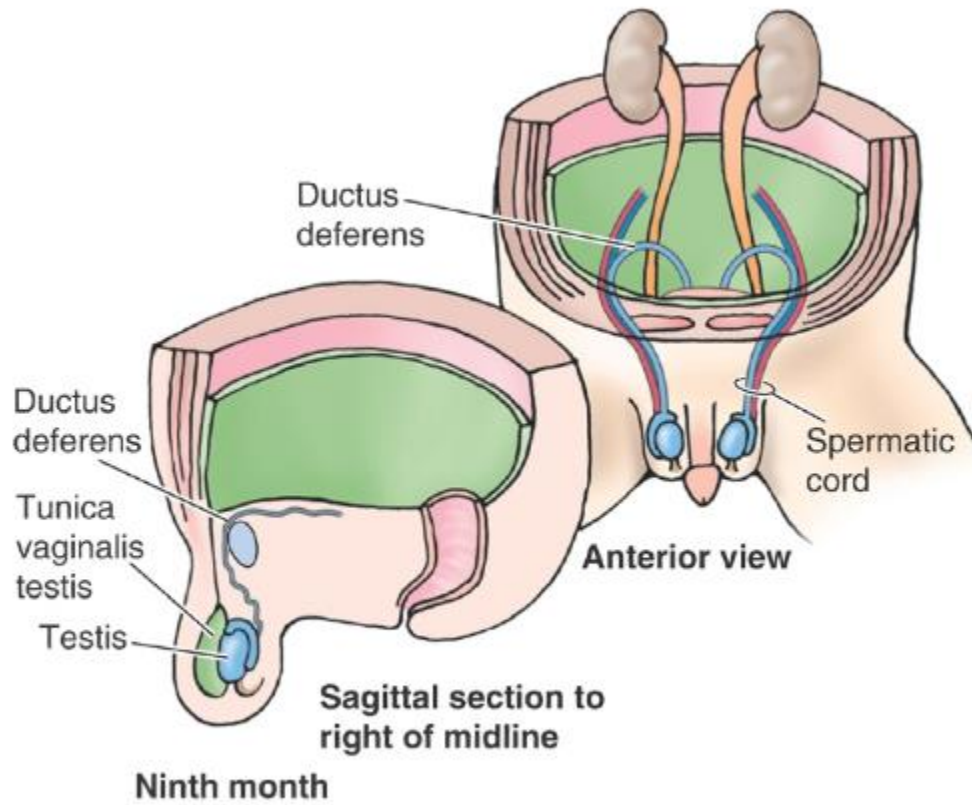
vas deferens –

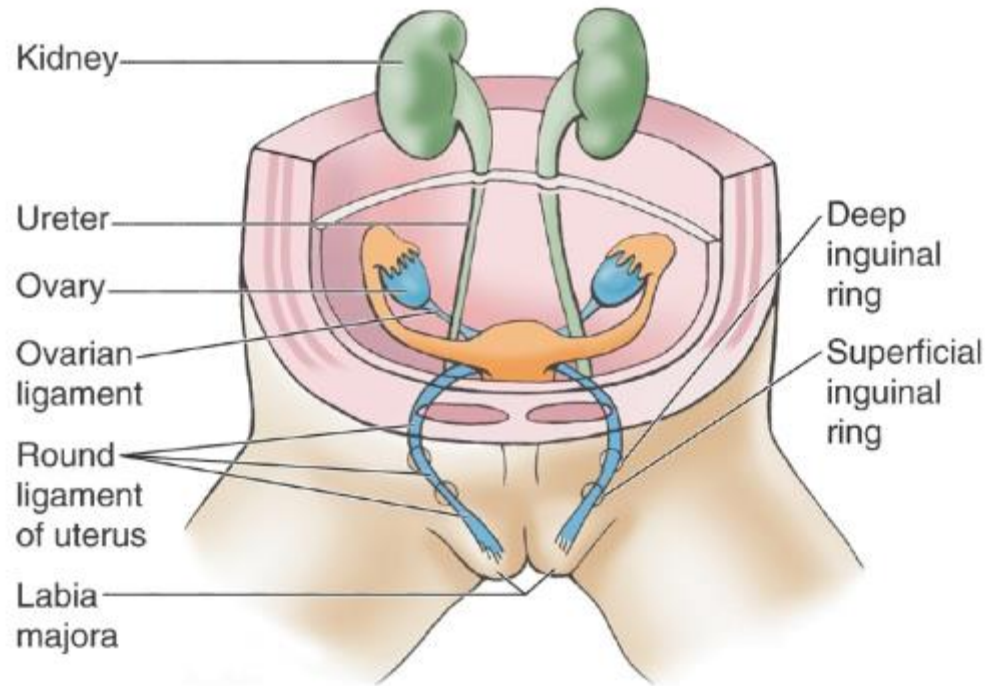
pampiniform plexus –

lymphatic vessels –

ilioinguinal nerve •





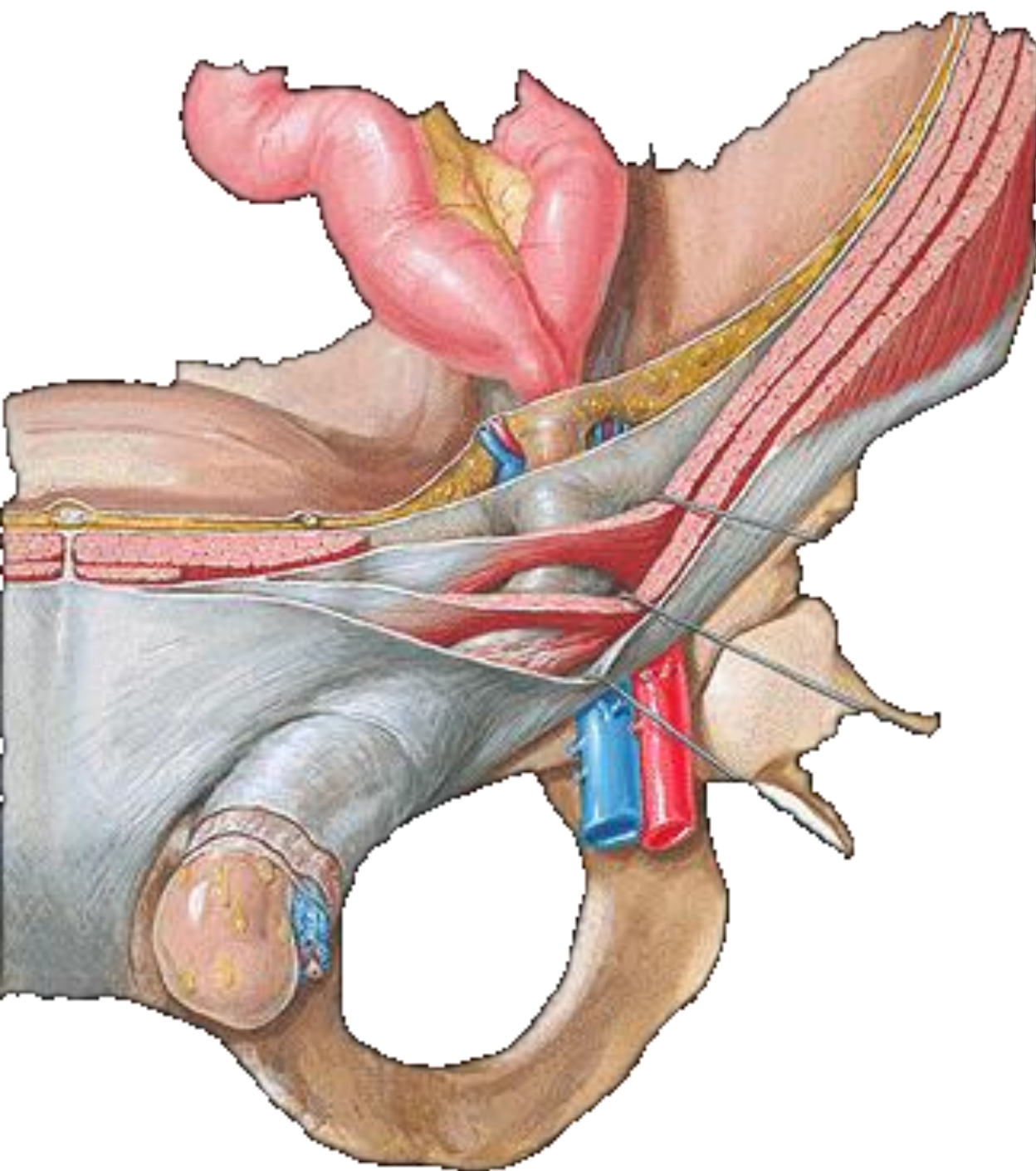


15 weeks

Anterior view

Contents (female)

- round ligament of the uterus •
- ilioinguinal nerve •



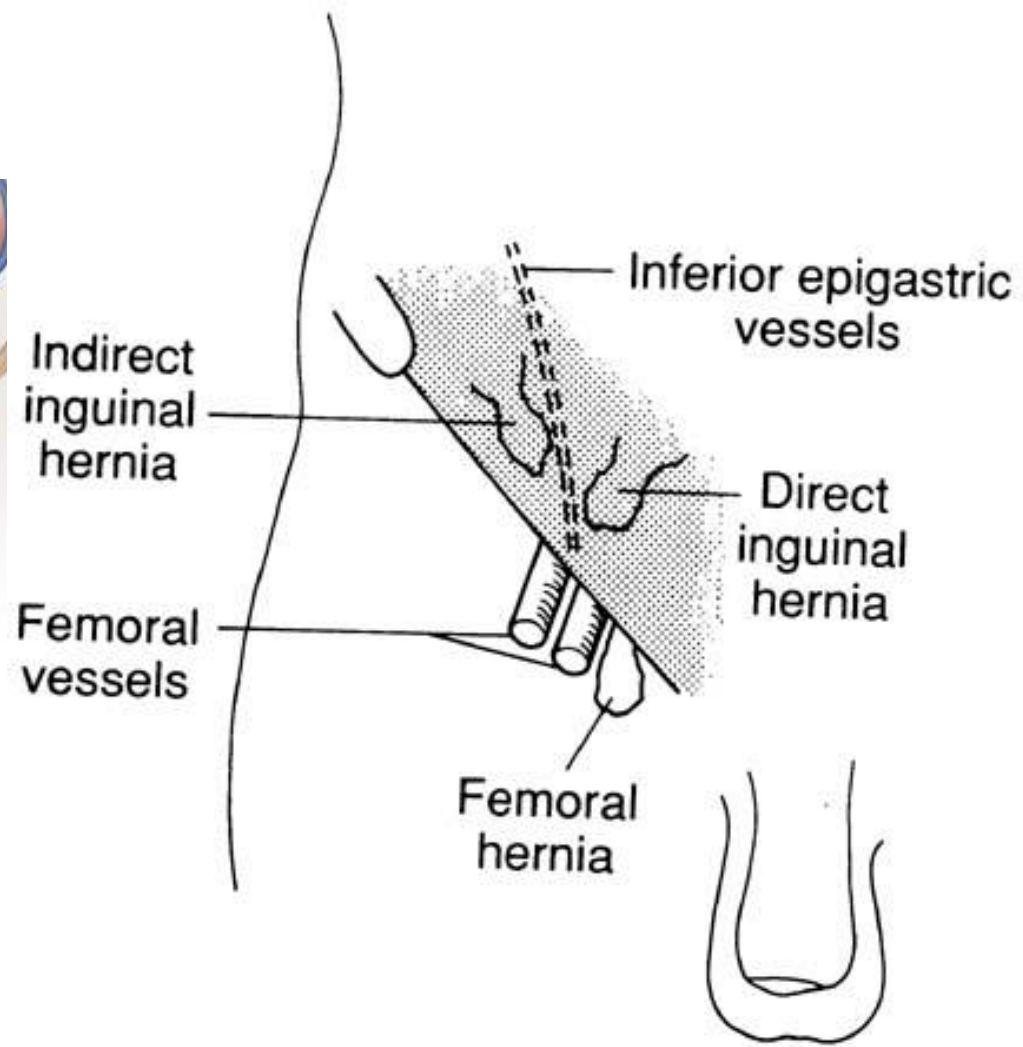
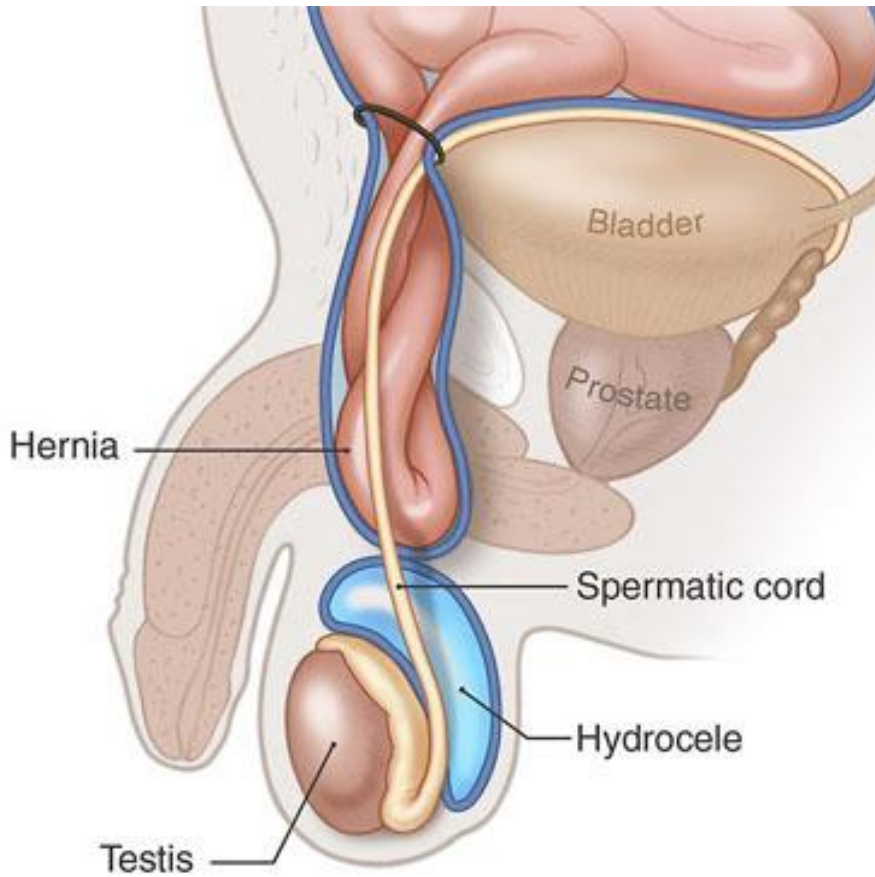
HERNIA

Inguinal hernia •

Indirect —

Direct —

Anatomy

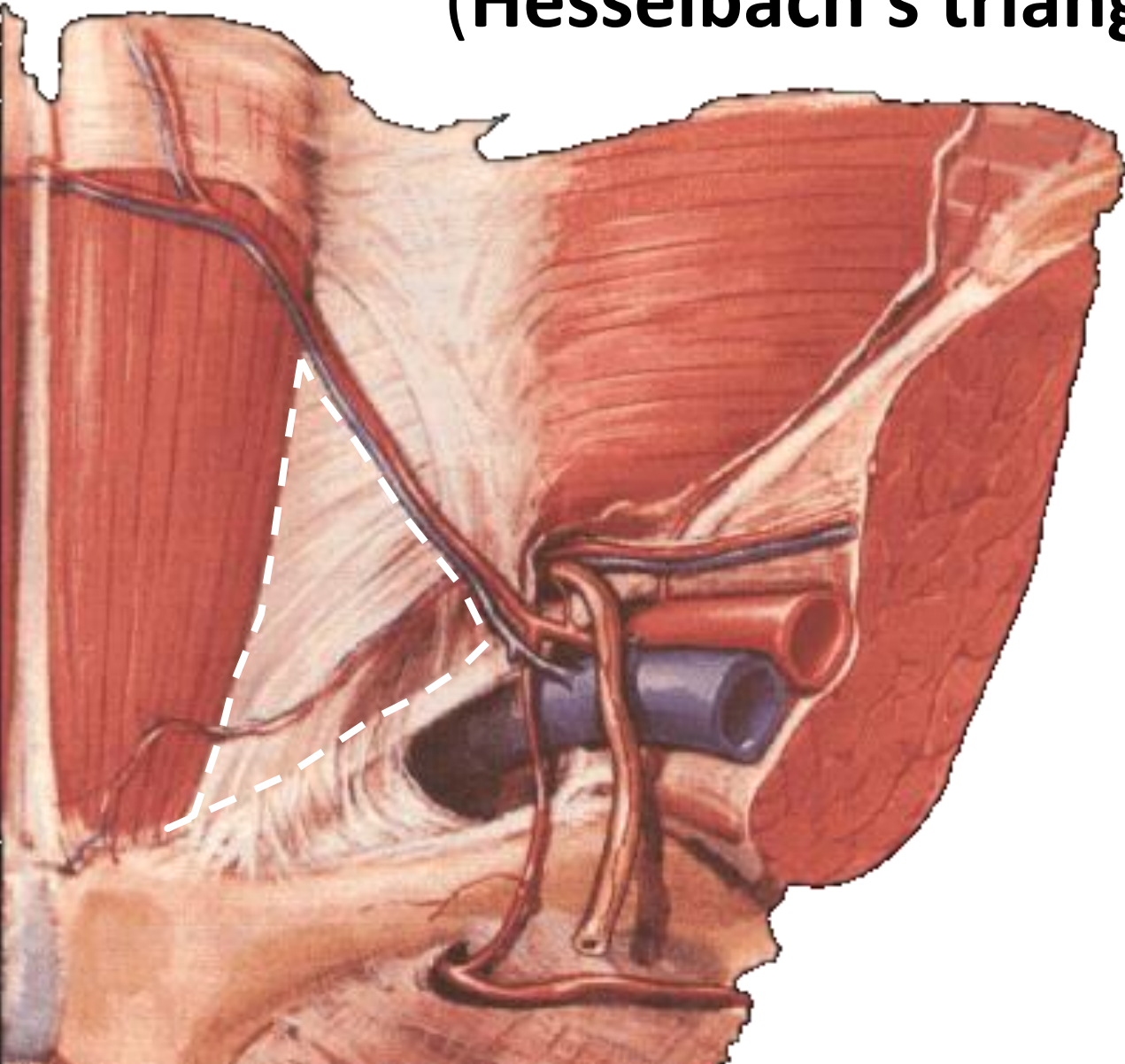


Incarcerated Inguinal Hernia





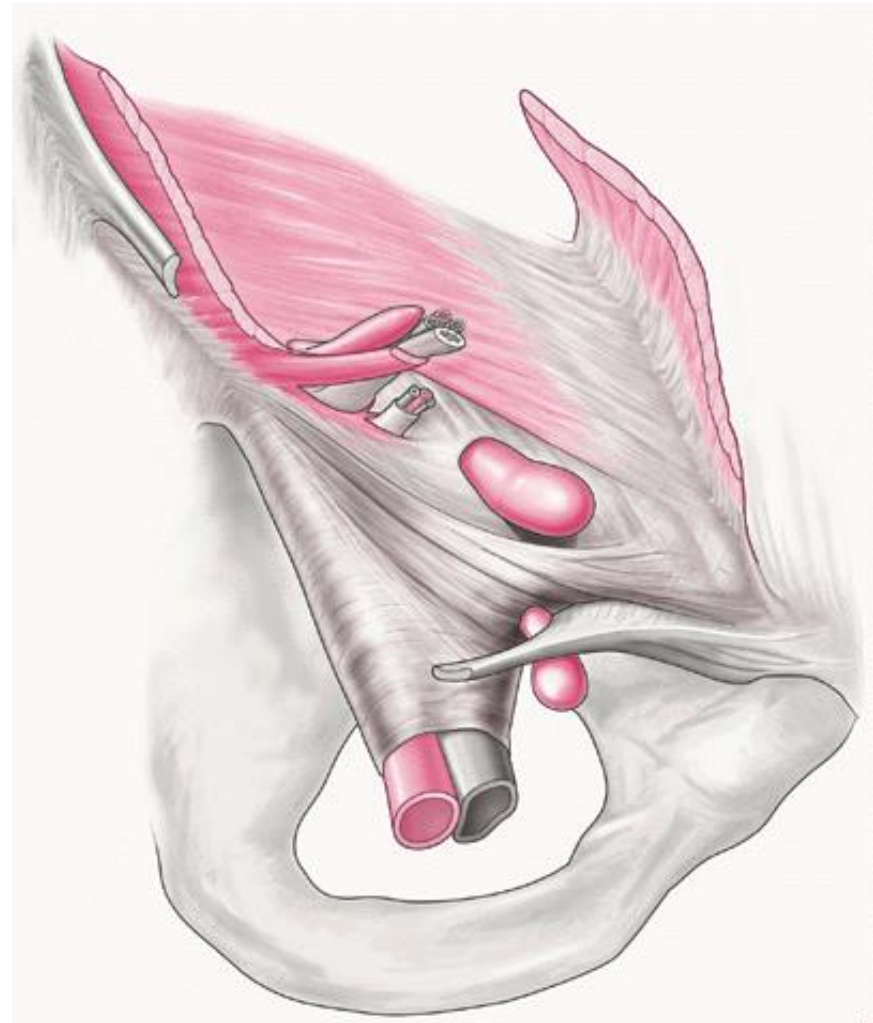
Inguinal Triangle (Hesselbach's triangle)

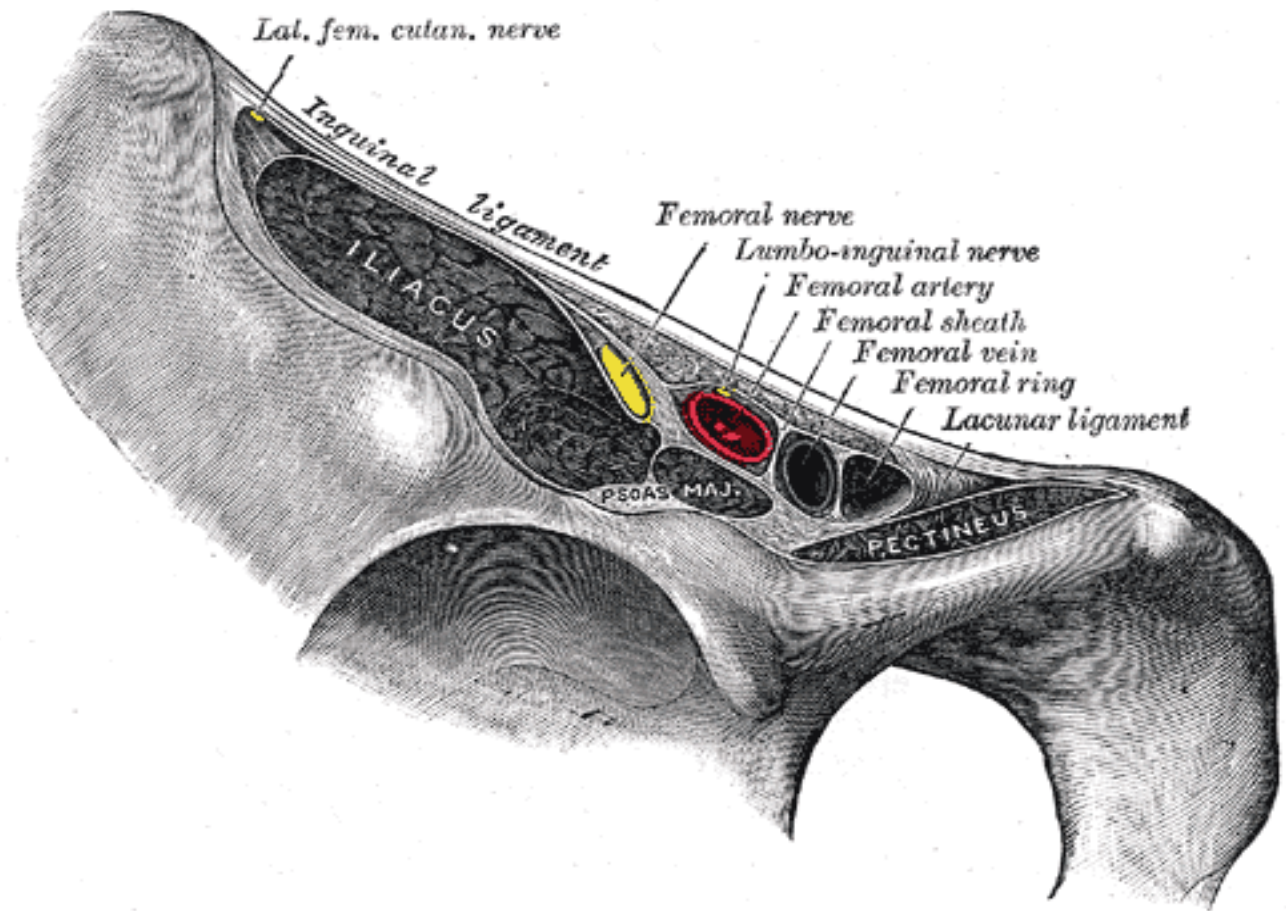


Direct Hernia

Groin Hernia

- Indirect Inguinal •
 - Congenital –
 - Patent processus –
vaginalis
- Direct Inguinal •
 - Acquired –
 - Inguinal floor defect –
- Femoral •
 - Below inguinal ligament –





Through the femoral ring in the triangle of Scarpa •

Femoral ring: •

- Inguinal ligament (ant) —
- pectineal fascia and ligament of Cooper (post) —
- lig Gimbernat (internal) —
- ileo-pectineal ligament (ext) —

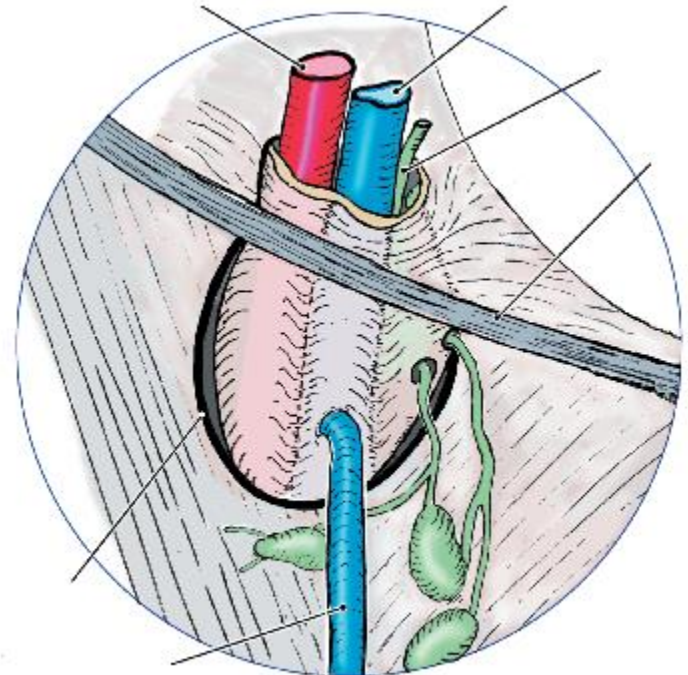
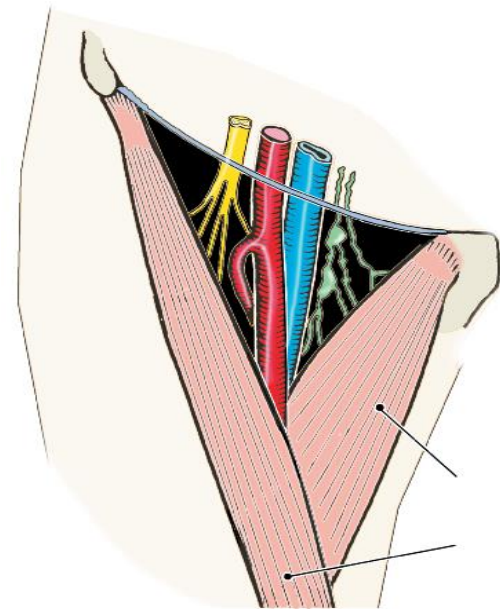
Anatomy

Femoral Canal

The boundaries of the femoral ring are

- anteriorly by the inguinal ligament;
- posteriorly by Astley Cooper's (iliopectineal) ligament, the pubic bone and the fascia over the pectineus muscle;
- medially by the concave knife-like edge of Gimbernat's (lacunar) ligament, which is also prolonged along the iliopectineal line, as Astley Cooper's ligament;
- laterally by a thin septum separating it from the femoral vein.

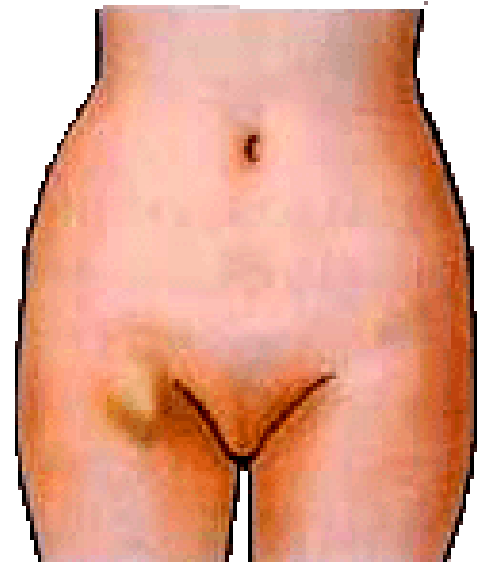
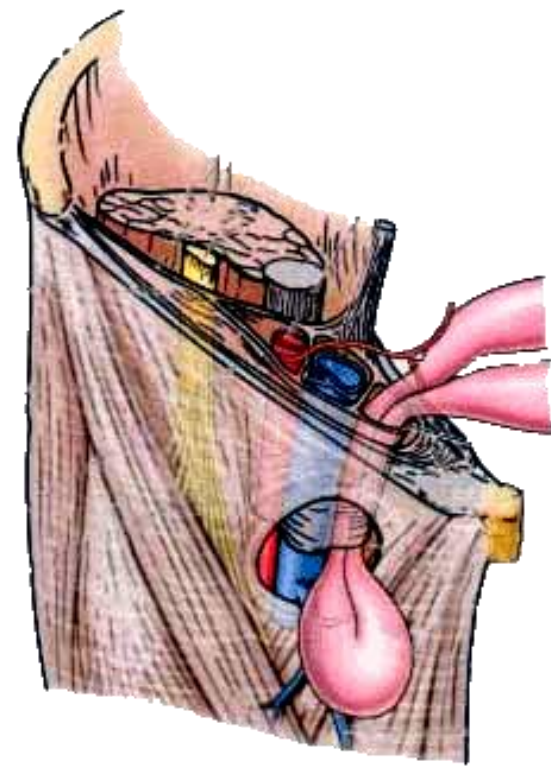
A femoral hernia occurs through this space and is medial to the femoral vessels



Femoral hernia

If a loop of intestine is forced into the femoral ring, it expands to form a swelling in the upper part of the thigh. Such a condition is known as a **femoral hernia**.

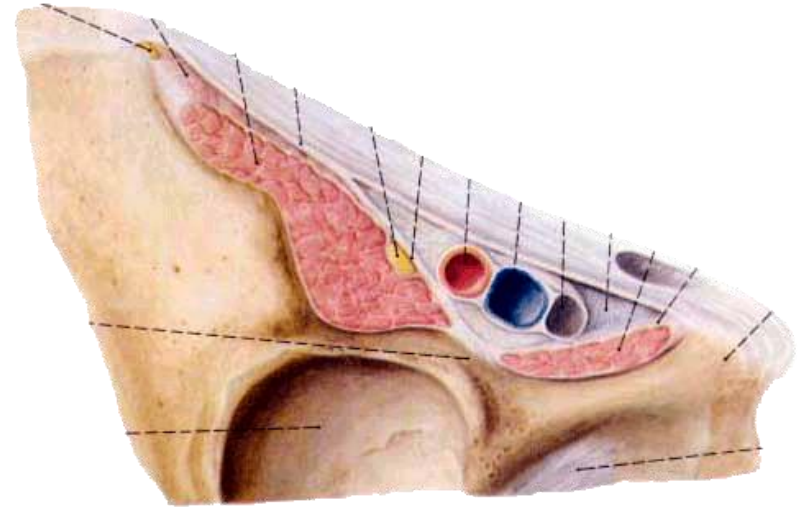
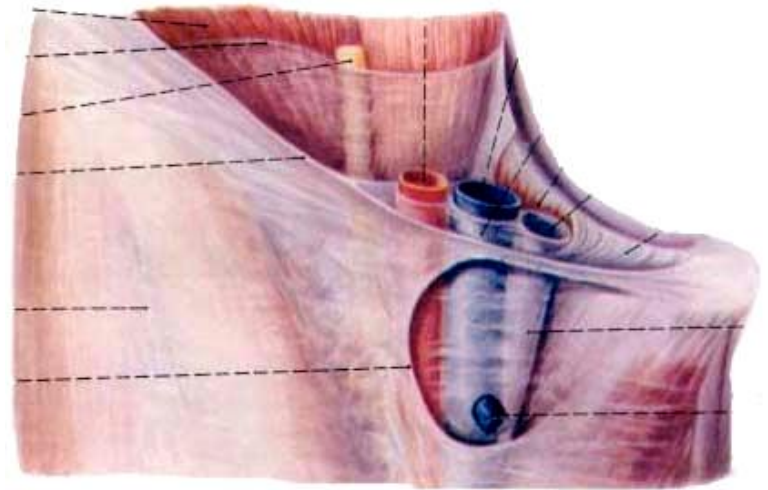
A femoral hernia is more common in women than in men (possibly because their wider pelvis and femoral canal).

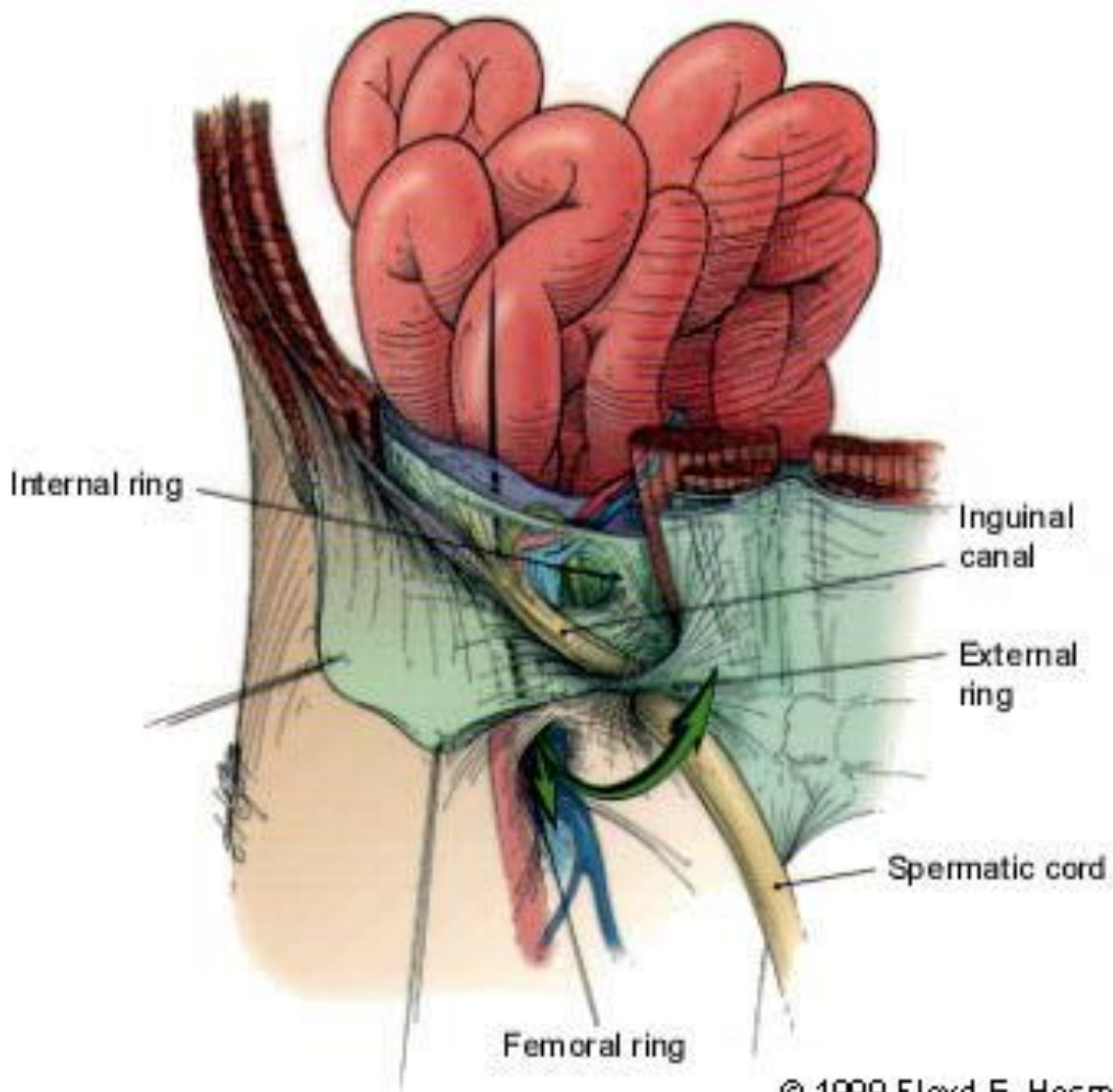


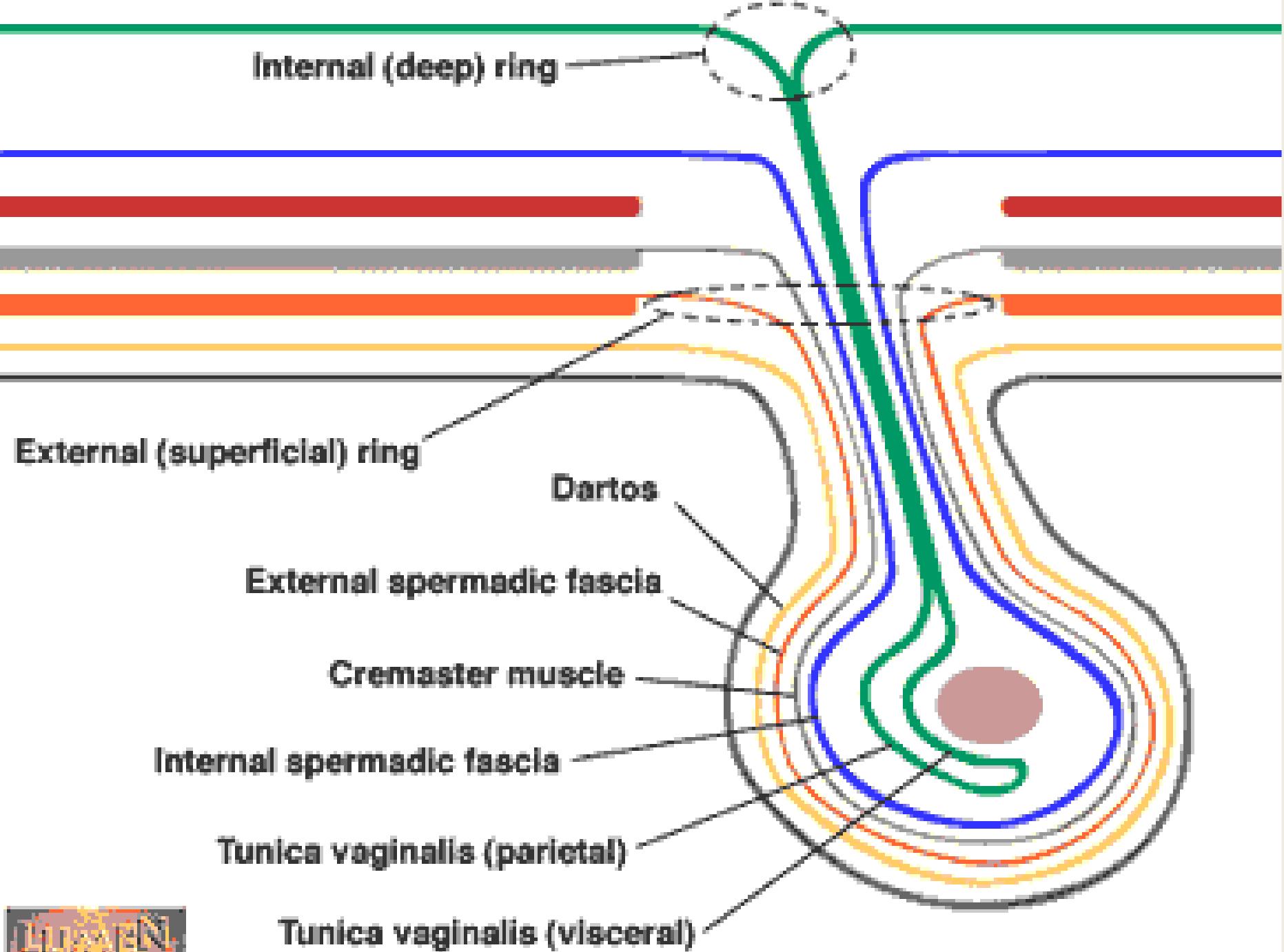
It is about 1.3cm long , and its upper opening is called the **femoral ring** .

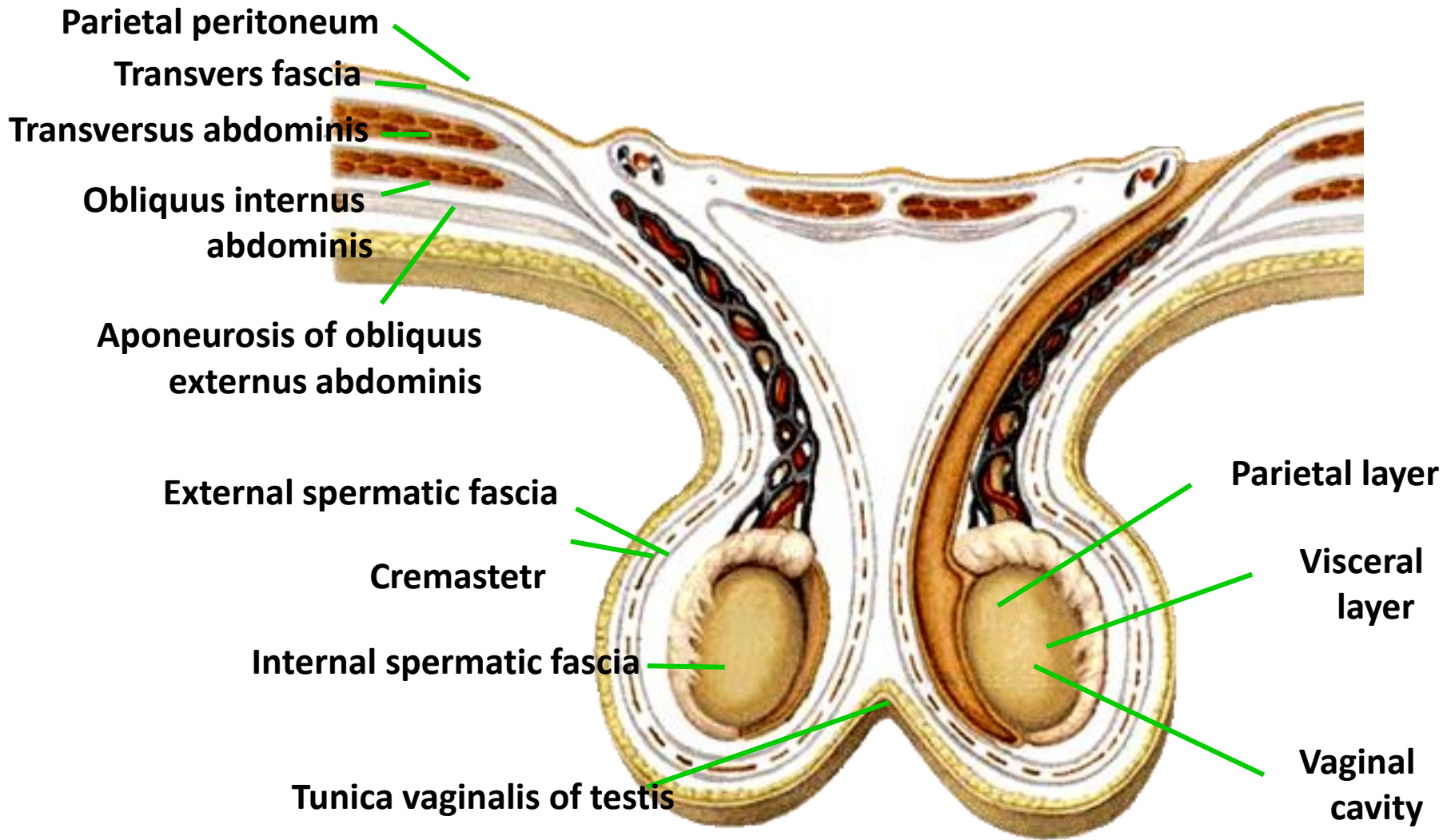
The **boundaries of the femoral ring** are: the inguinal ligament, anteriorly; the lacunar ligament medially; the pecten of pubis, posteriorly; the femoral vein, laterally. covered by femoral septum superiorly.

The canal contains a little loose fatty tissue, a small lymph node, and some lymph vessels.









Internal structures of the scrotum

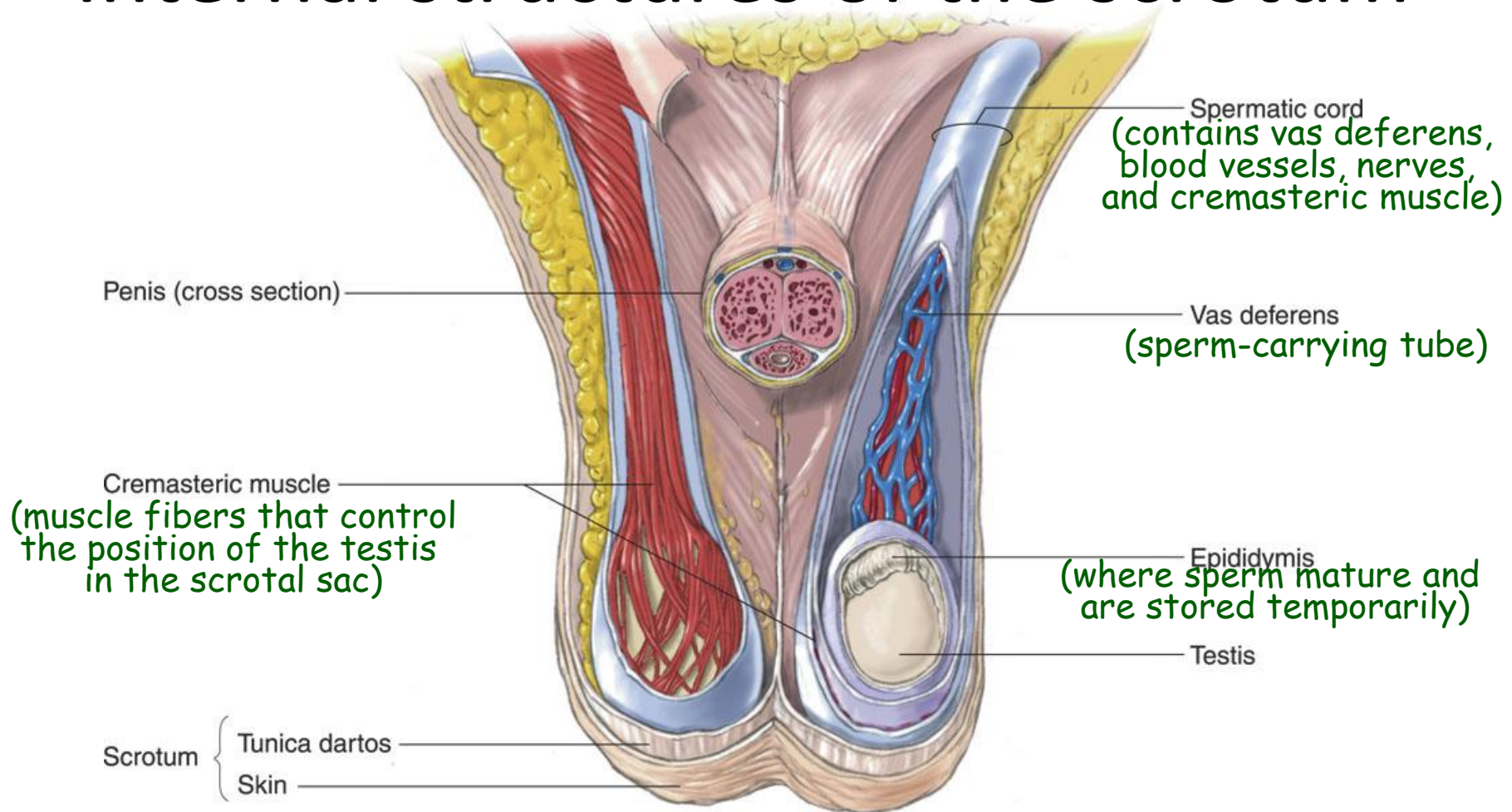
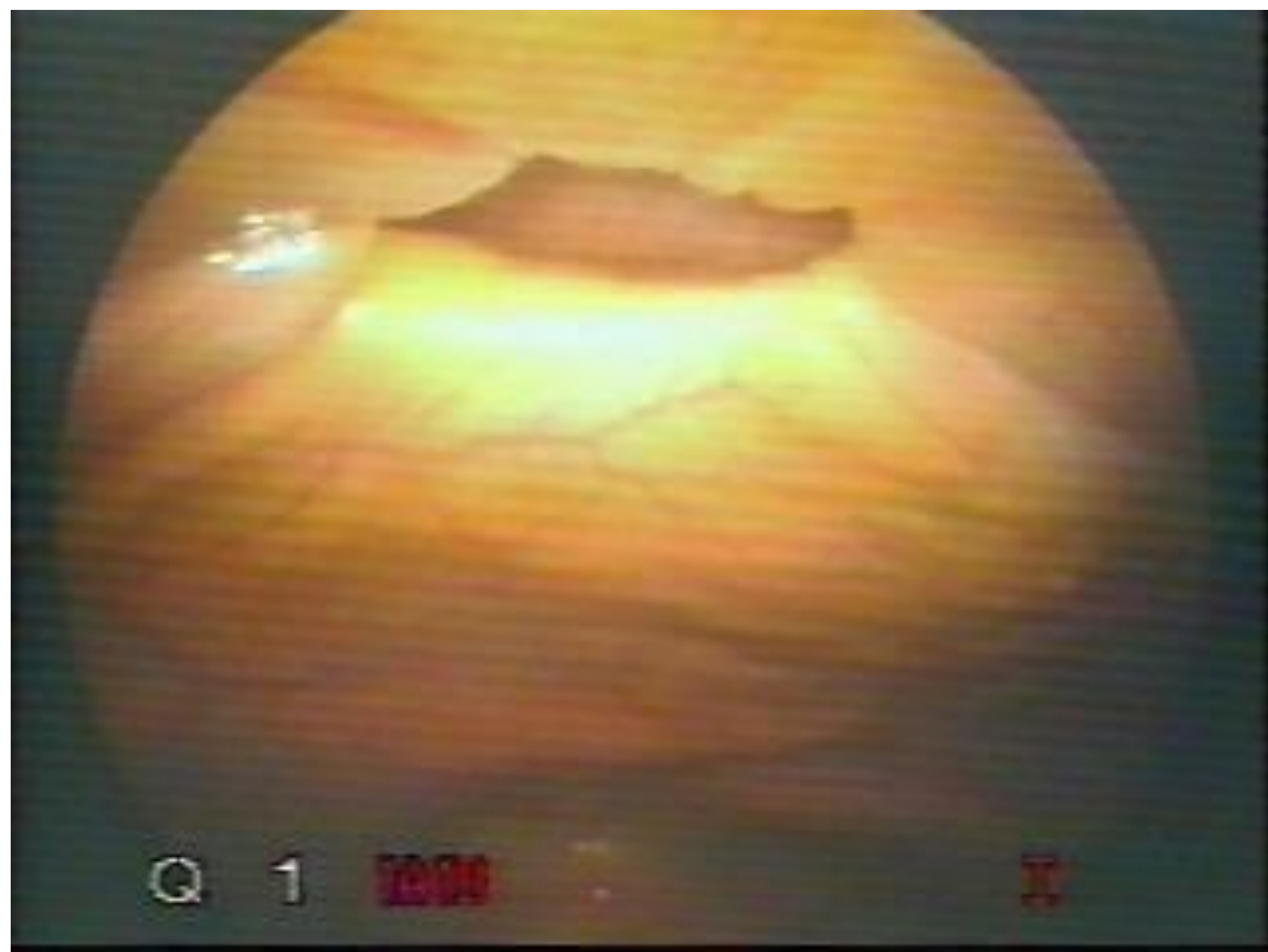
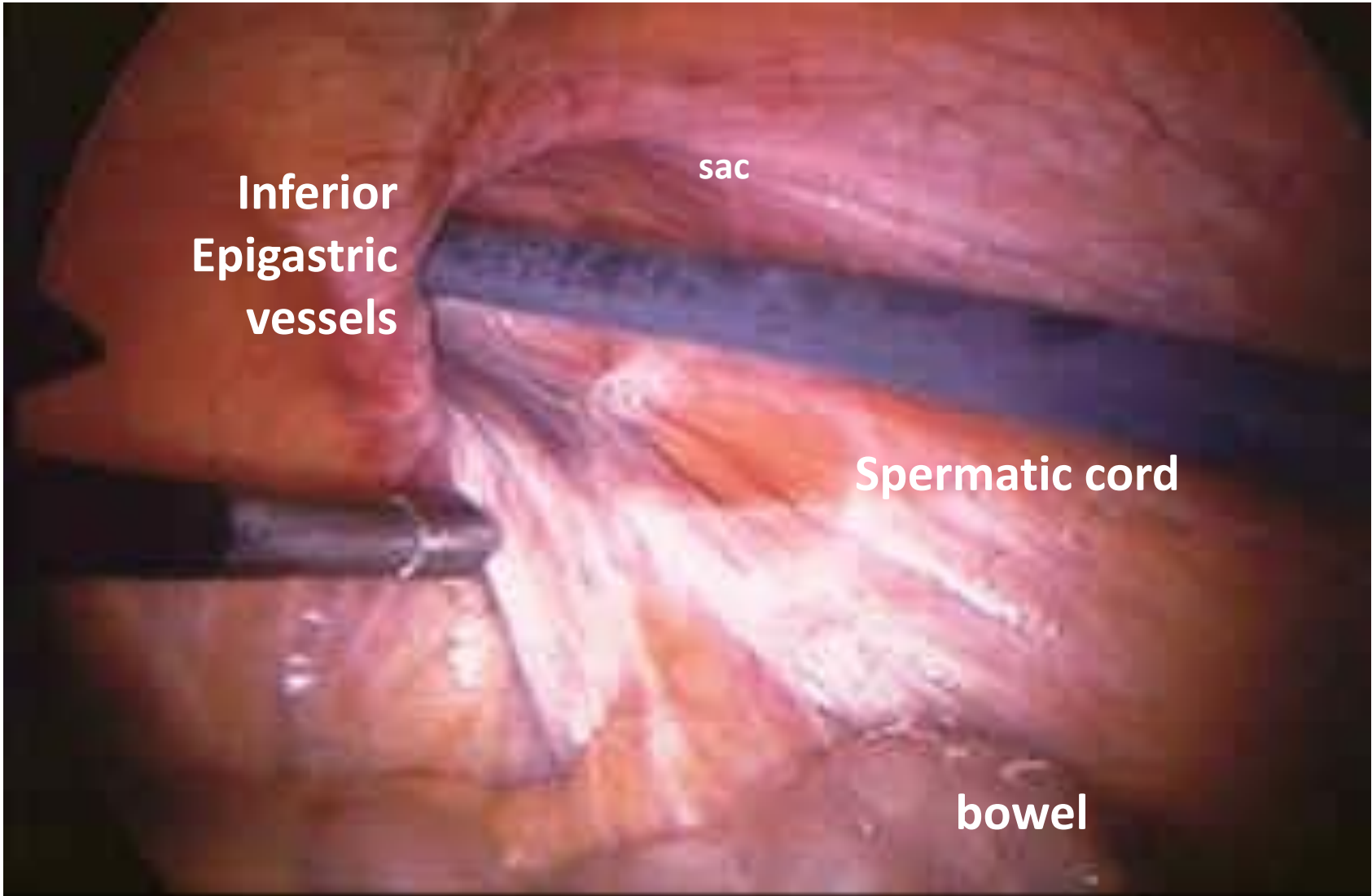


Fig 5.4 Internal structures of the scrotum. This illustration shows portions of the scrotum cut away to reveal the cremasteric muscle, spermatic cord, vas deferens, and a testis within the scrotal sac.





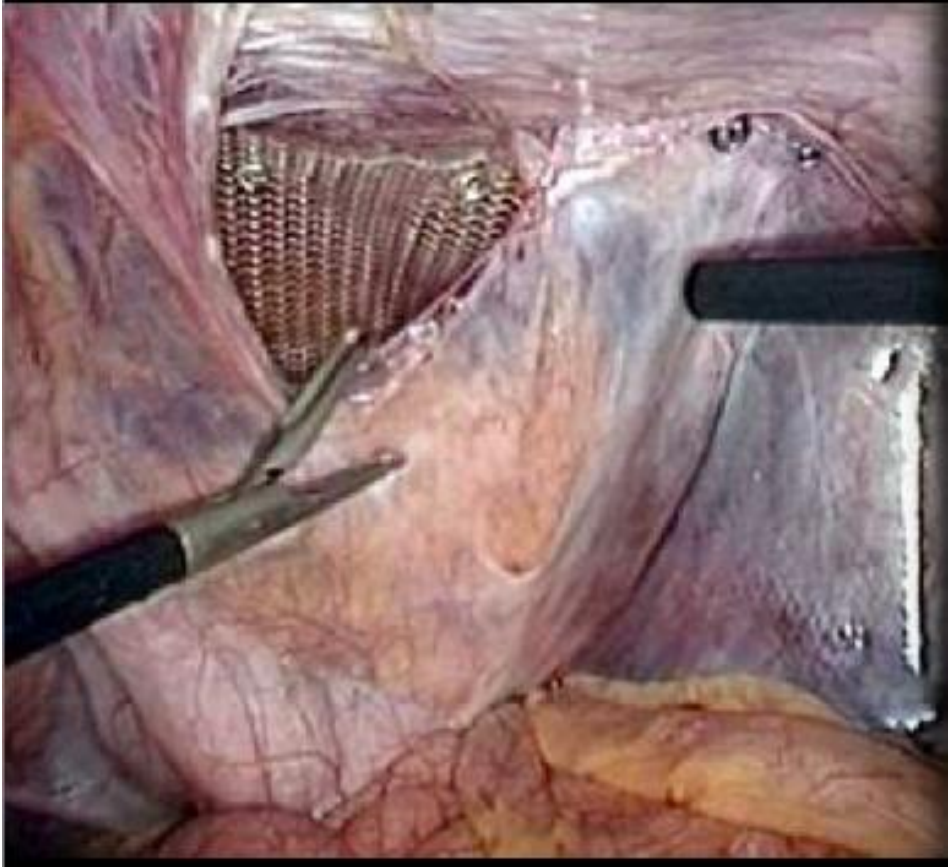
**Inferior
Epigastric
vessels**

sac

Spermatic cord

bowel

Laparoscopic mesh repair

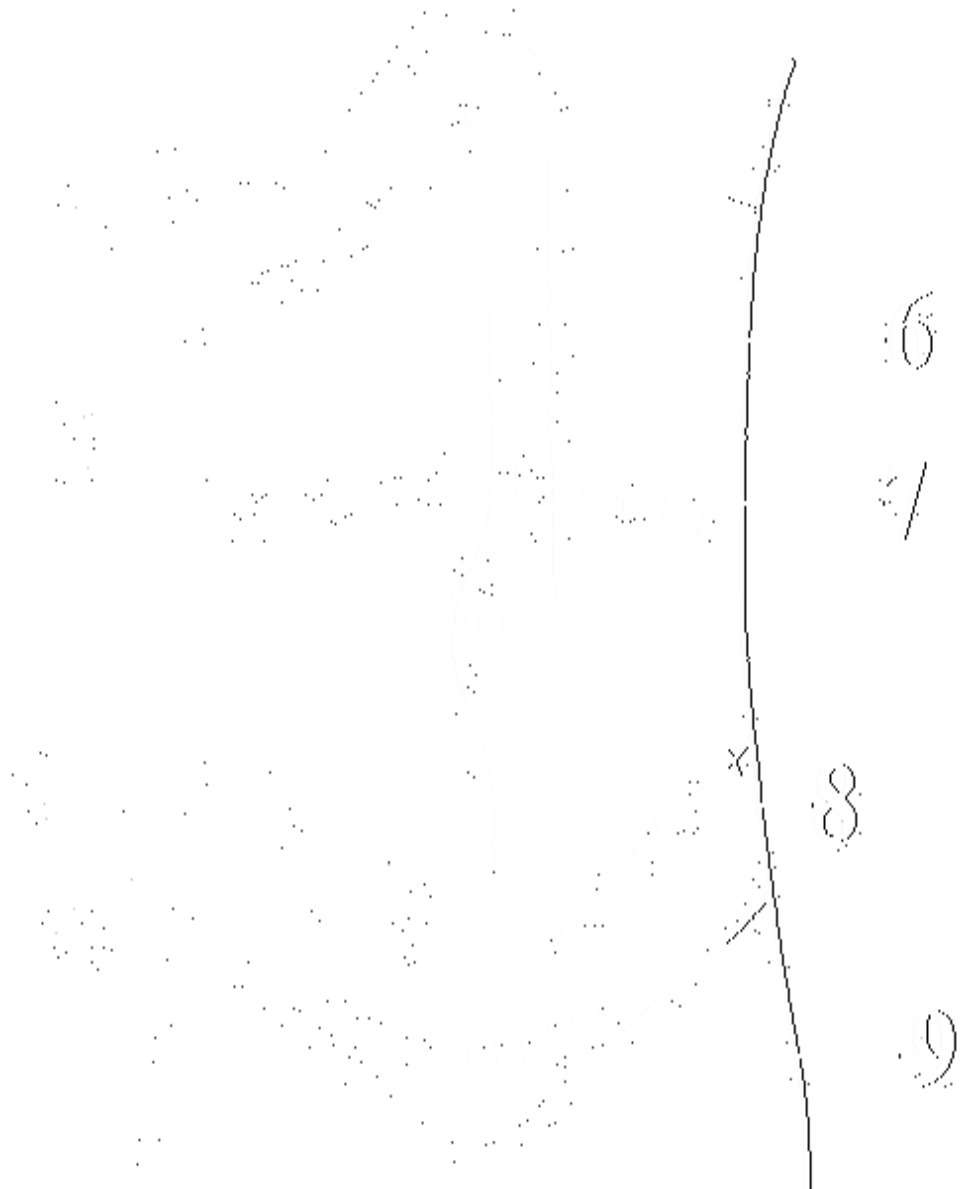


Steps in Tension-Free Hernioplasty



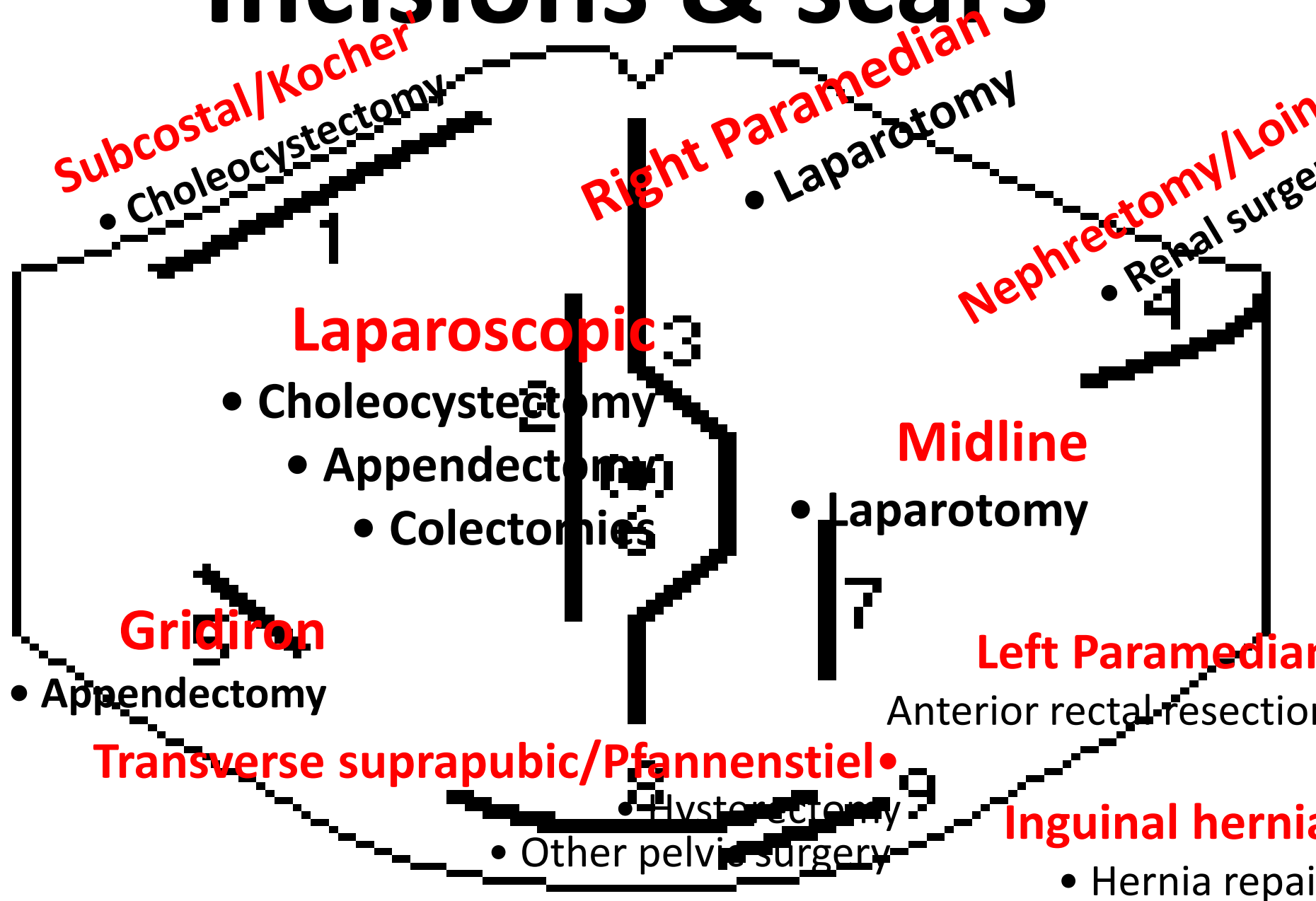
Completed Tension-free Repair

INCISIONS

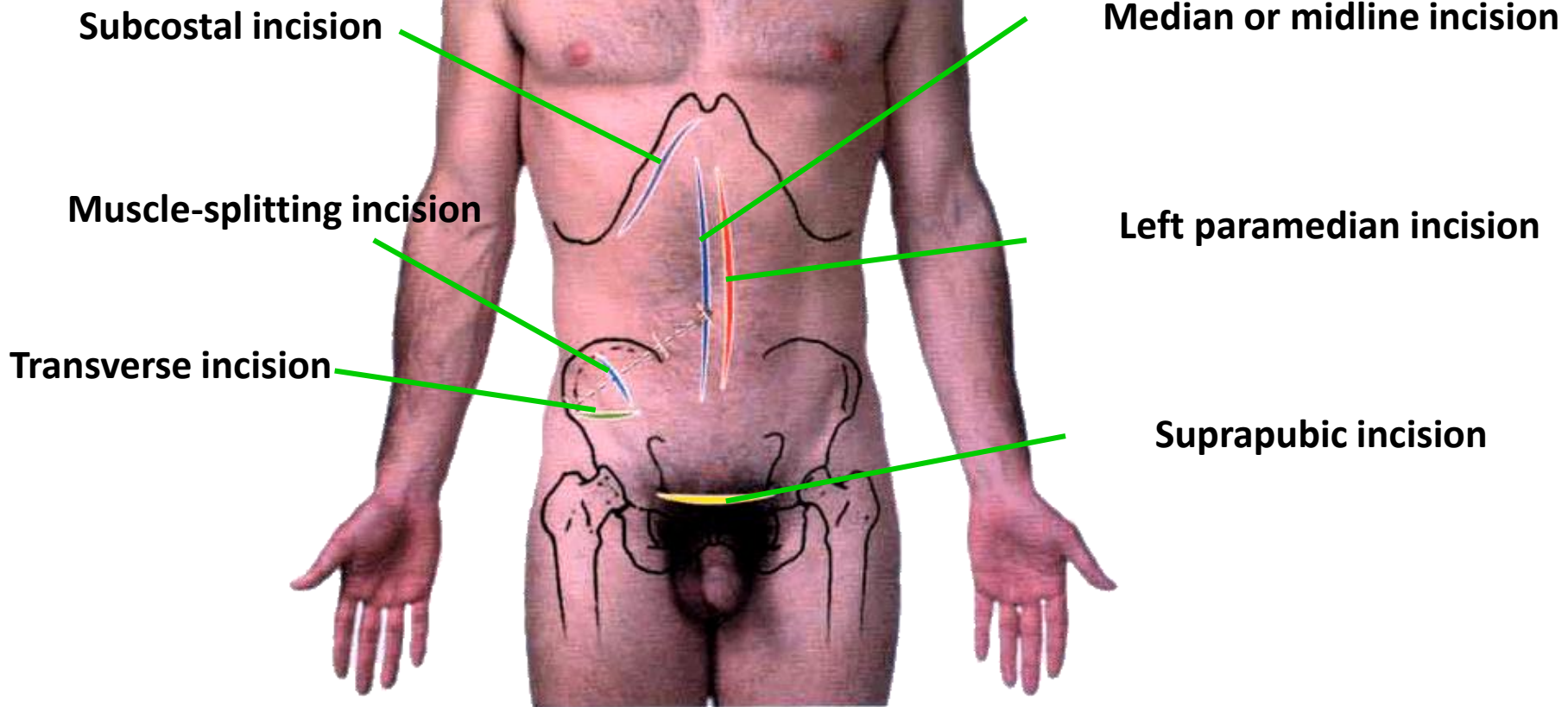


- Longitudinal
 - Midline
 - Paramedian
 - Transrectal
- Oblique
 - Subcostal
 - McBurney's
- Transverse
 - Pfannenstiel
- Combined
 - Thoracal-abdominal

Incisions & scars



Layer ?



Muscles of back are arranged in 4 layers. •

1st. Layer : •

1- Trapezius.

2- Latissimus Dorsi.

2nd Layer: •

1- Levator Scapulae.

2- Rhomboideus minor.

3- Rhomboideus major.

Also the 2nd layer contains 2 other muscles: •

4- Serratus posterior superior.

5- Serratus posterior inferior

3rd Layer : •

Erector spinae (Sacrospinalis) & Semispinalis.

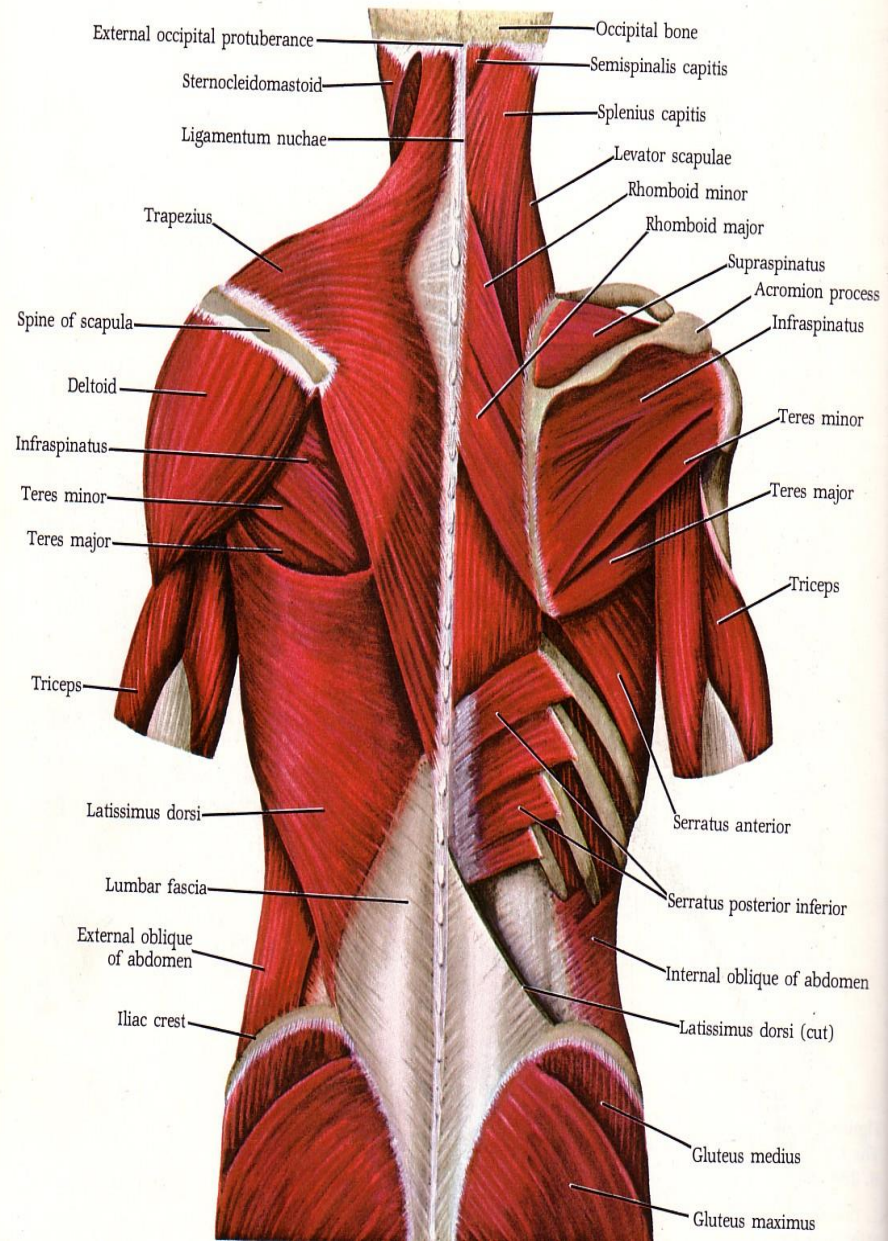
4th Layer : •

Number of small muscles called multivators, rotators, interspinalis, intertransverses & muscles forming the suboccipital triangle.

Trapezius

Origin: From Medial 1/3 of superior nuchal, external occipital protuberance, Ligamentum nuchae, spines of all cervical & all thoracic vertebrae and supraspinous ligament

Insertion : posterior border of lateral 1/3 of the clavicle, medial margin of acromion upper lip of the crest of the spine of the clavicle.



Nerve supply: Spinal part of the accessory cranial nerve & C 3,4

Actions:

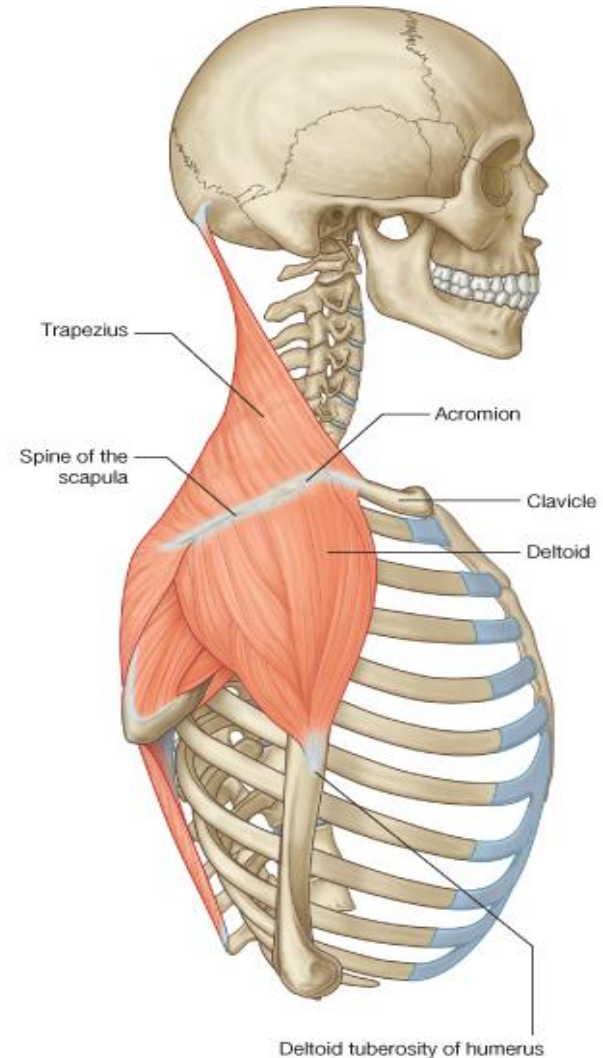
• upper fibers: elevate the shoulder

• Lower fibers: depress the shoulder.

• Middle fibers: brace back (retraction) of shoulder

• It also, helps in raising the arm above 90° with (serratus anterior).

Trapezius



Latissimus Dorsi

Origin: •

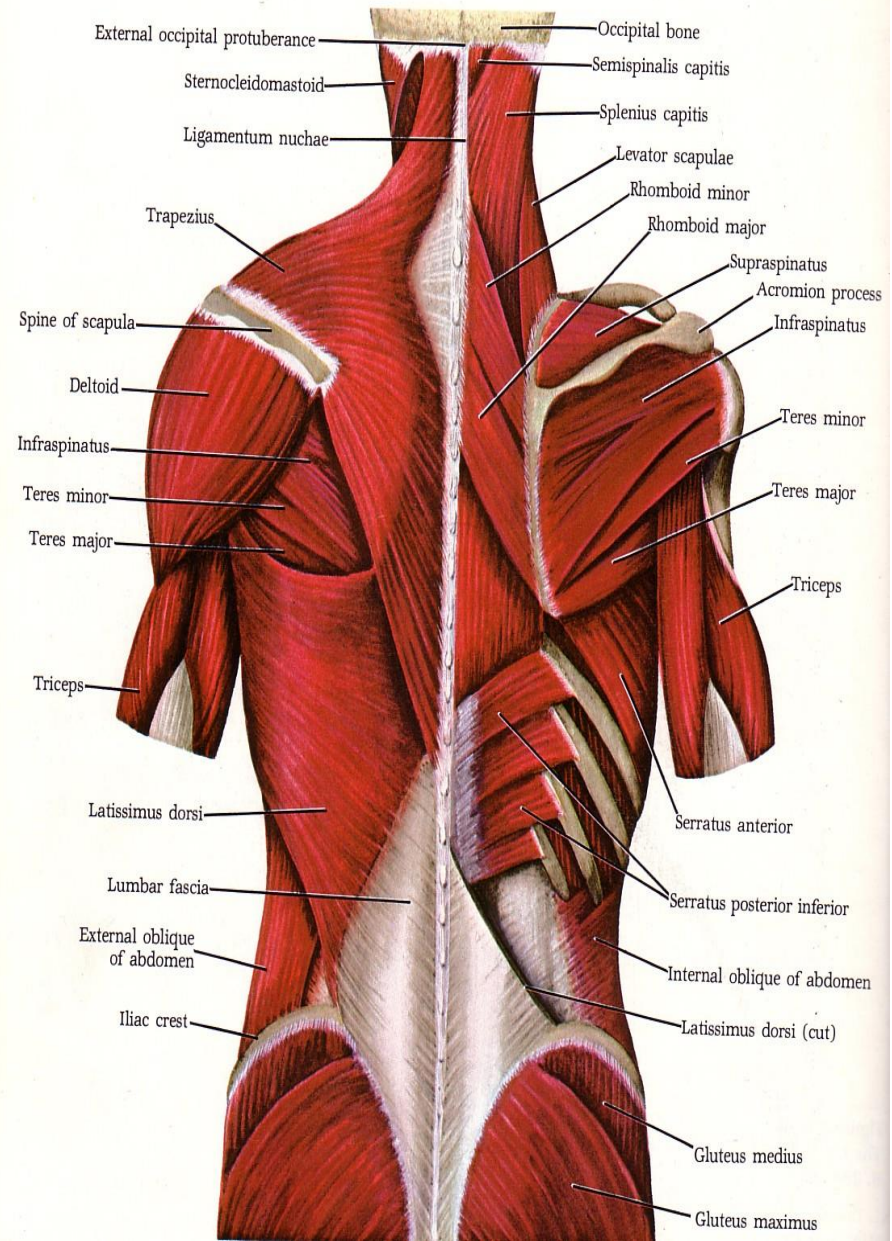
- 1- Lower 6 thoracic spine.
- 2- Thoracolumbar fascia.
- 3- Iliac crest.
- 4- Lower 3 or 4 ribs.
- 5- Back of the inferior angle of the scapula.

Insertion: floor of the bicipital groove. •

Nerve supply: Nerve to Latissimus dorsi (thoracodorsal nerve). •

Action: adduction, medial rotation. •

It also helps in extension and climbing. •



Levator scapulae •

Origin: Transverse processes of upper 4 cervical vertebrae. •

Insertion: Medial border of scapula. •

Nerve supply: C3,4 & 5 •

Action: Elevate the medial border of the scapula. •

Rhomboid minor •

Origin: Ligamentum nuchae & spines of C 7& T1 •

Insertion: Medial border of the scapula. •

Nerve supply: C4& 5 •

Action: Raises the medial border of scapula upward & medially. •

Rhomboid Major •

Origin: Spines of T2,T3,T4 & T5. •

Insertion: Medial border of scapula. •

Nerve supply: C4 & 5. •

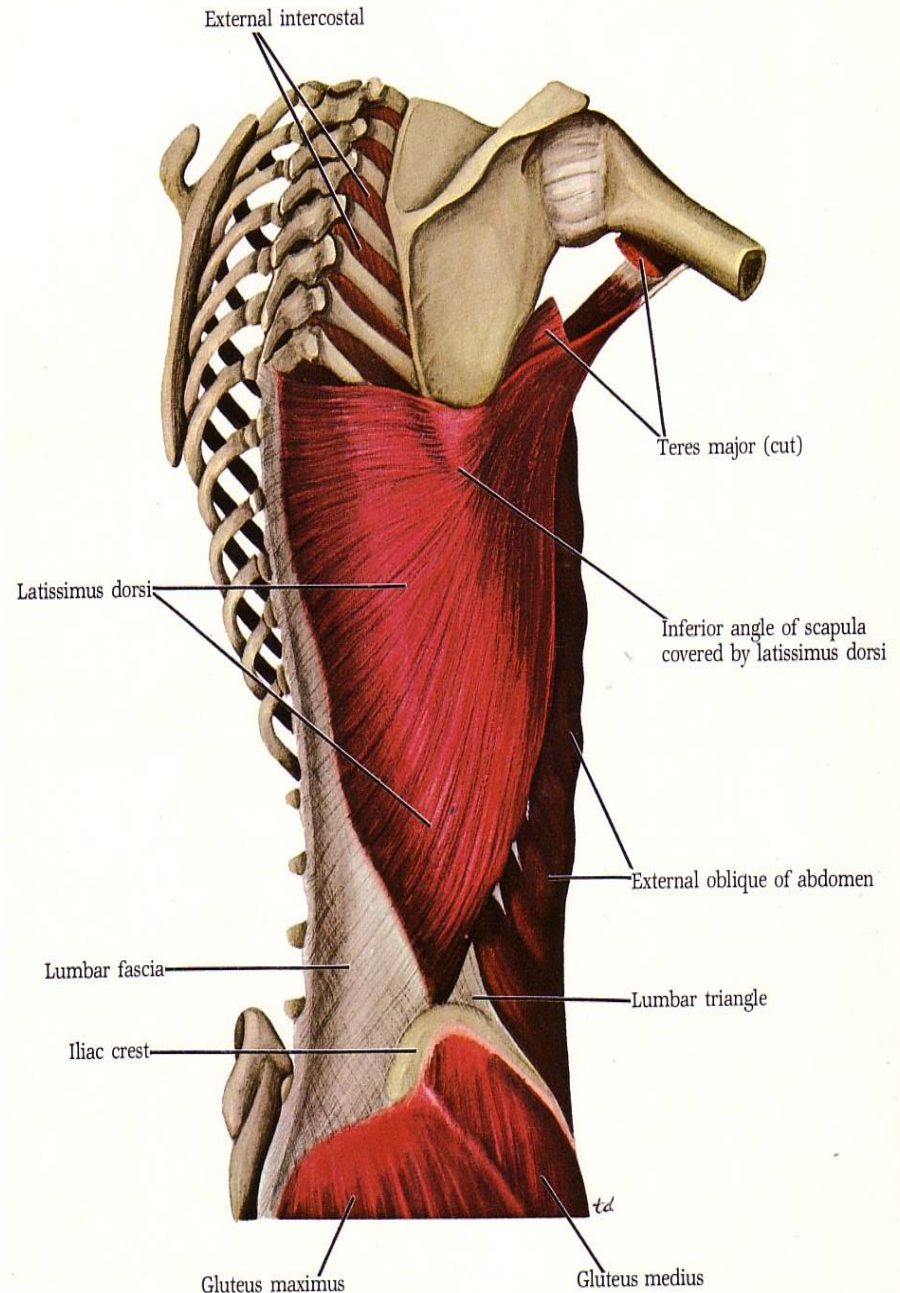
Action: Raises the medial border of the scapula upward and medially. •

Origin: •

- 1- Lower 6 thoracic spine,
- 2- Thoracolumbar fascia,
- 3- Iliac crest
- 4- Lower 3 or 4 ribs and
- 5- Back of the inferior angle of the scapula

Insertion:

floor of the bicipital groove



Muscles of the back are organized in layers

Movements of upper limb and respiration. **Extrinsic:**

Trapezius	1 st layer:
Latissimus Dorsi	
Levator Scapulae	2 nd layer:
Rhomboids (minor & major)	
Serratus posterior (superior & inferior)	3 rd layer:

Act on vertebral column and neck. **Intrinsic:**

Splenius	1 st layer:
Iliocostalis	Erector Spinae:
Longissimus	2 nd layer:
Spinalis	
Multifidus	Transversospinal:
Rotatores	3 rd layer:
Semispinalis	

The Exceptions

Serratus Posterior Superior •

Lig. Nuchae and spinous processes of C7-T3 to 2nd –
to 5th ribs

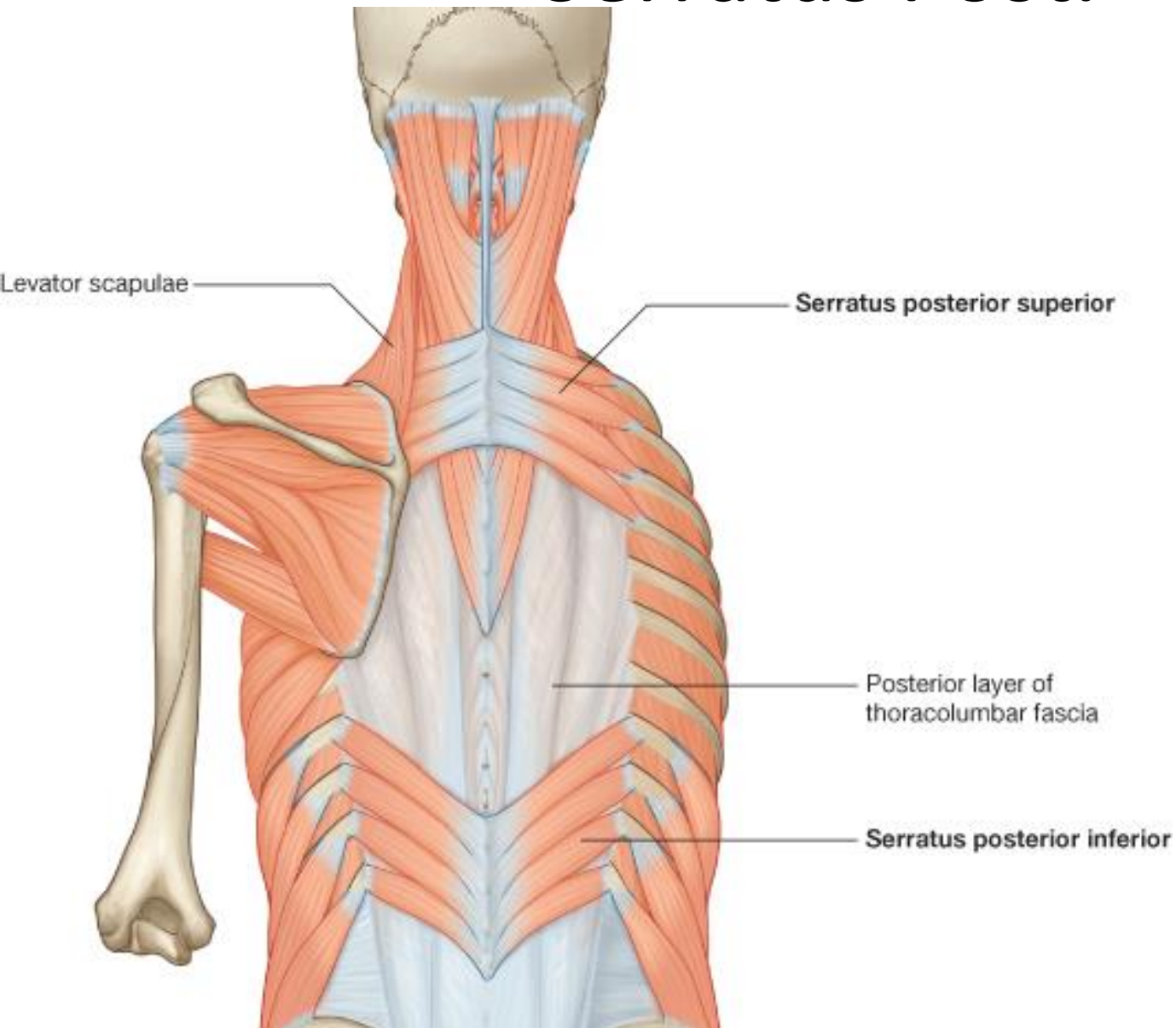
Serratus Posterior Inferior •

Spinous Processes of T11-L2 to inferior borders of –
last 4 ribs

Elevate or depress ribs (accessory respiratory •
muscles)

Innervated by ventral rami •

Serratus Post.



Major Groups of Back Muscles

Those that arise from the mid-line and run superiorly and laterally – The Splenius Muscles (Bandage) •

Those that arise from near the mid-line or slightly laterally and run almost longitudinally with no marked inward or outward slant – called the Erector Spinae •

Major Groups

The third group are those that arise laterally and run towards the mid-line as they travel up •

Called the Transversospinalis group –

Last – small muscles that run from one spinous process to another or one transverse process to another (interspinales **and** intertransvesus) •

Splenius Muscles

Splenius Capitis •

Lig. Nuchae and Spinous Process of C7-T4 to sup. Nuchal line and –
mastoid process

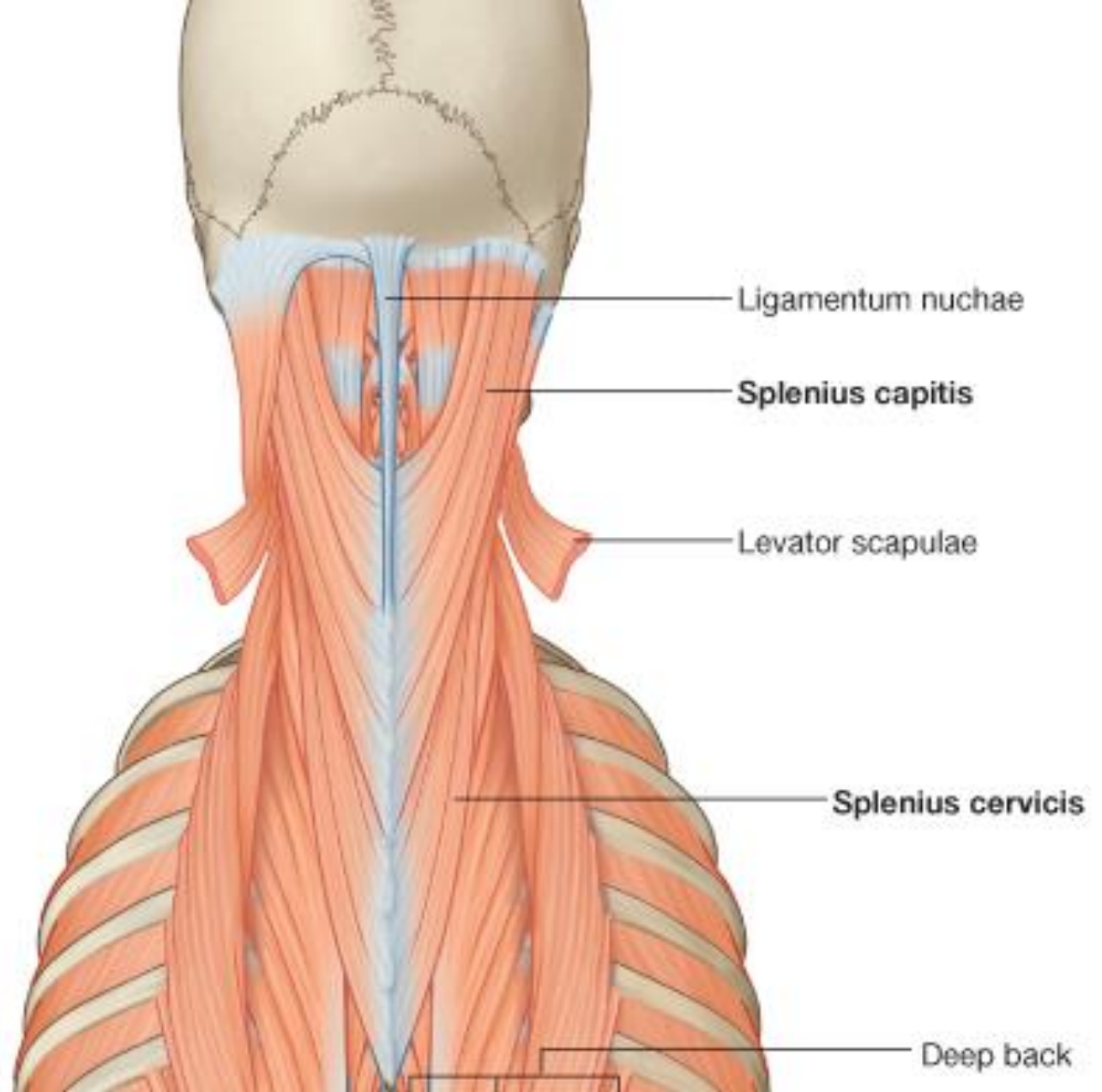
Splenius Cervicis •

Spinous processes of T3-T6 to Transvers process of C2-C4 –

Both extend head and neck and can laterally flex (side bend) •
the head; Also support and can contribute to rotation of
cervical spine and, thus, the head

Dorsal rami of spinal nerves nearest their respective origins •

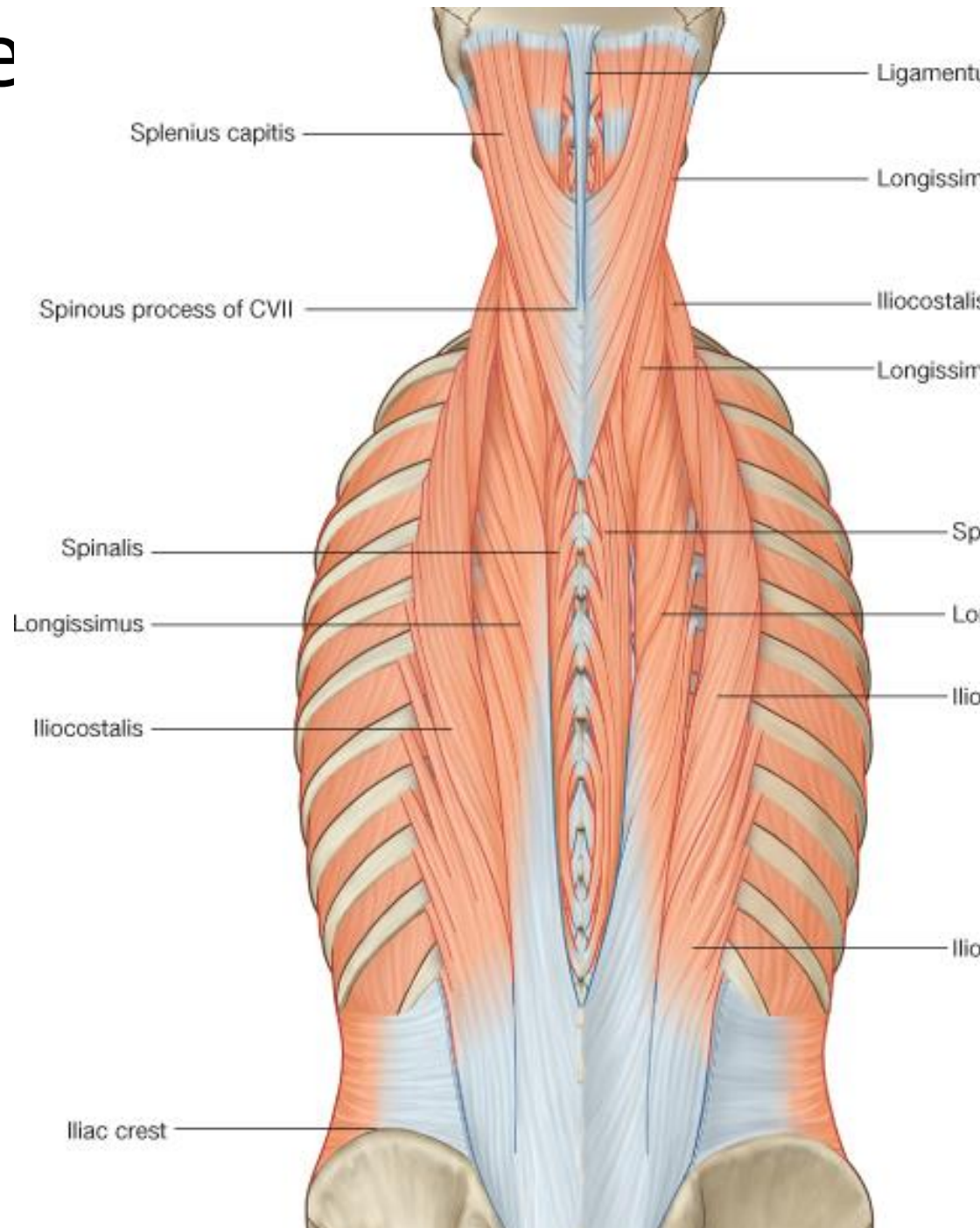
Splenius



Erector Spinae

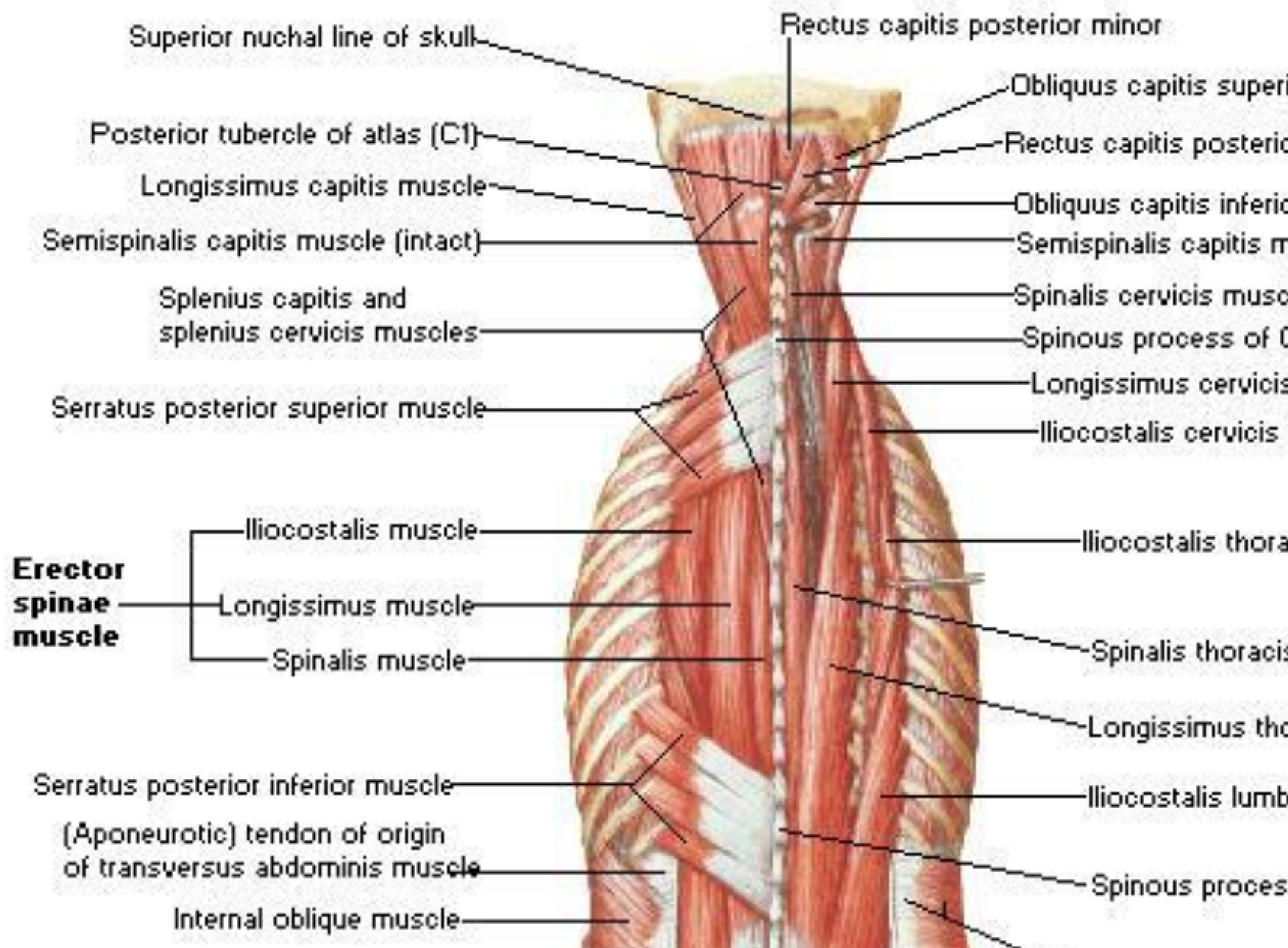
- Long Muscles with multiple, overlapping, origins
- Three sub groups; iliocostalis, longissimus, spinalis
- Common “origin” of the entire group is a muscle mass located on the posterior sacrum, iliac crest, and spinous process of lumbar vertebrae
- Beyond that, specific muscles have various attachments

Erector Spinae



Muscles of Back

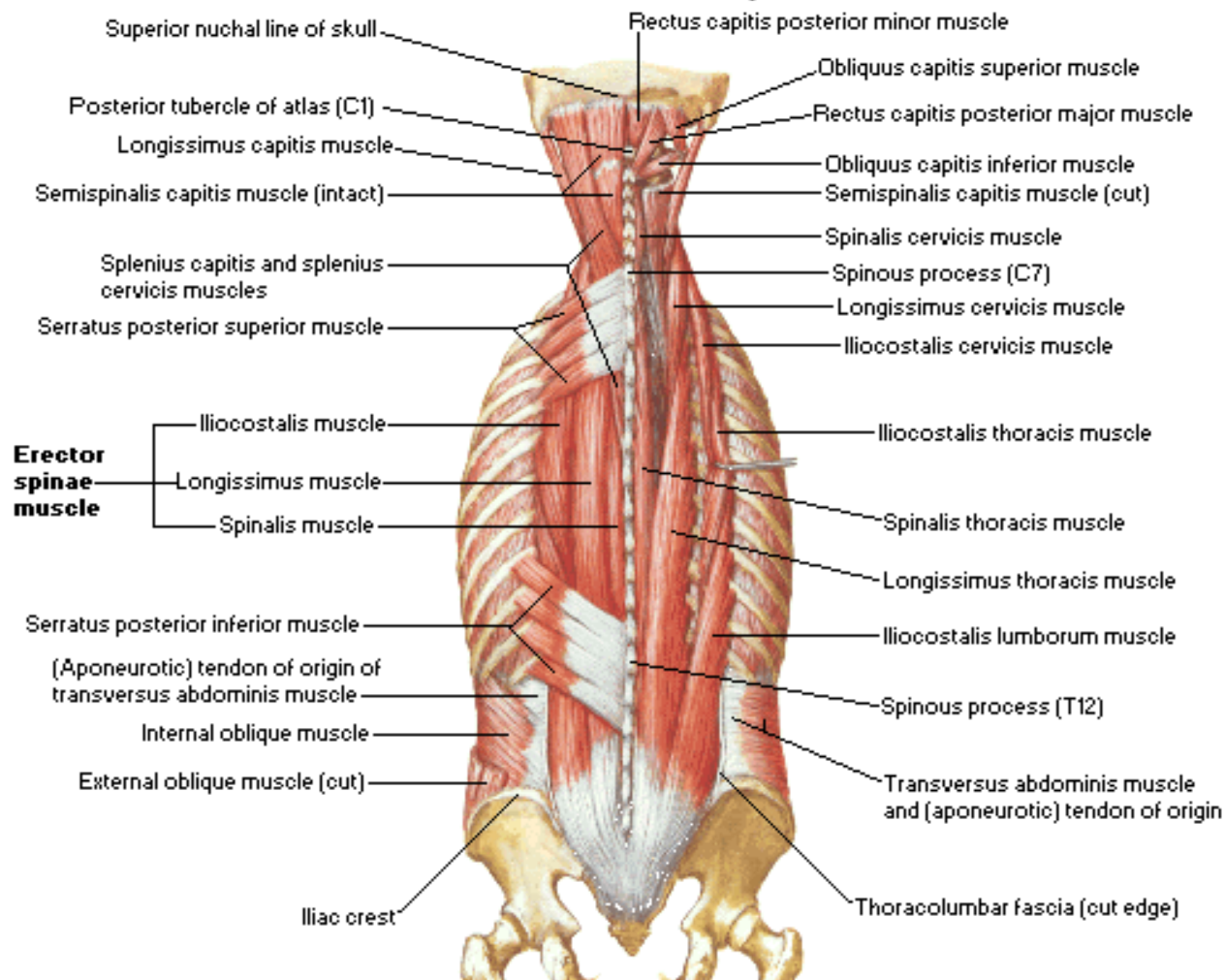
Intermediate Layers



E. Spinae

Muscles of Back

Intermediate Layers



Longissimus

- Generally, run from the transverse processes of one level of v. column up several levels to attach to another transverse process
- The longissimus capitis originates on transverse processes of T1-T4 and attach to the skull at the mastoid process, hence the name capitis
- Is the only **E.Spinae** to attach to skull

Transversospinalis Group

Arise laterally and run, more or less, to the mid-line •

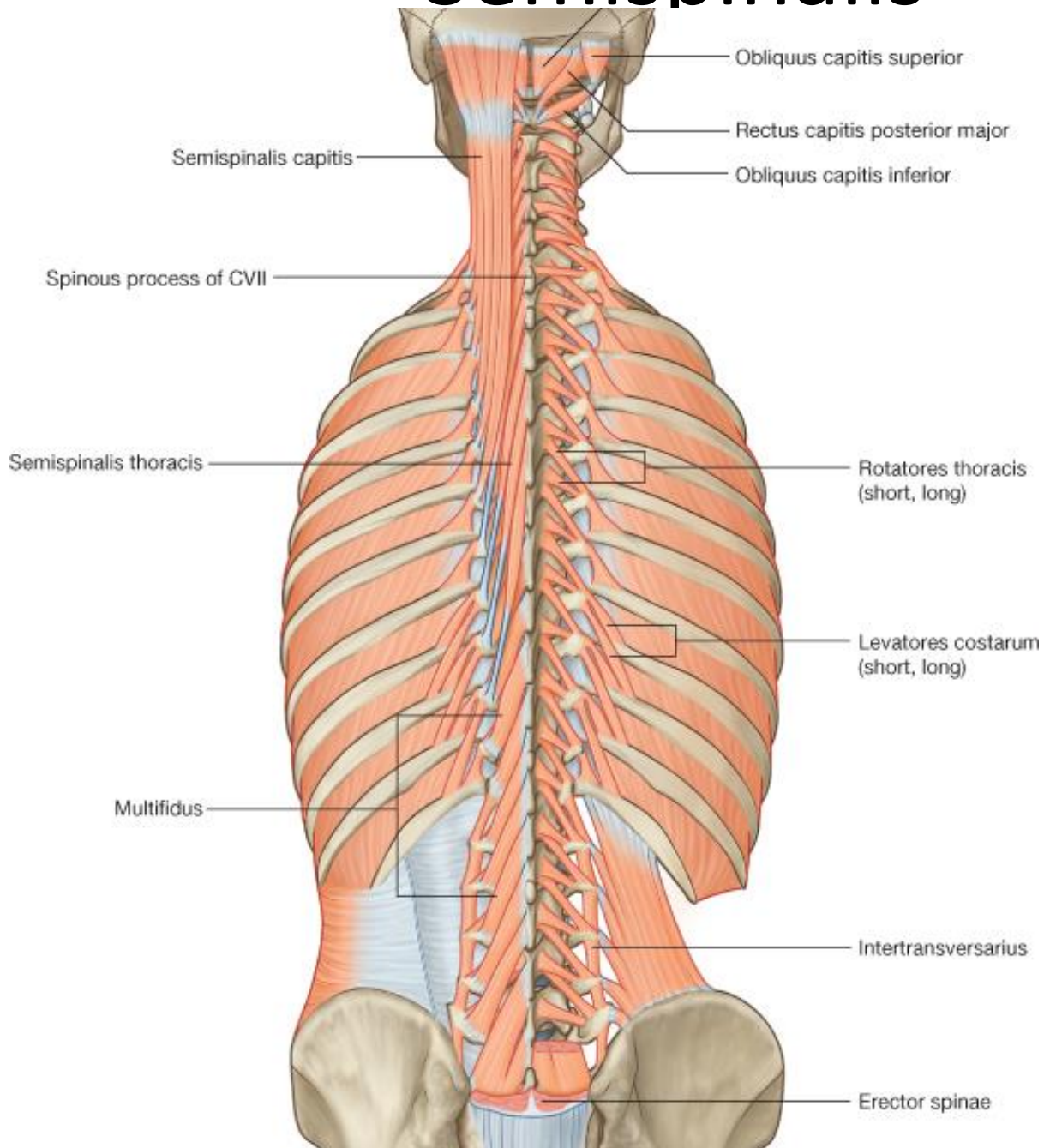
Semispinalis Capitis •

Transverse Process C7-T6 to Occipital bone, near mid-line, –
Extend head, rotate to same side

Semispinalis Cervicis •

Transverse process T1-T6 to Spines of C2-C6, Extend head –
(Cervical Spine) and side bend

Semispinalis



Intrinsic Muscles of the Back

Intermediate intrinsic back muscles: 2.

Erector spinae is the chief extensor of the vertebral column & is divided into three columns (also called as the **long muscle of the back**).

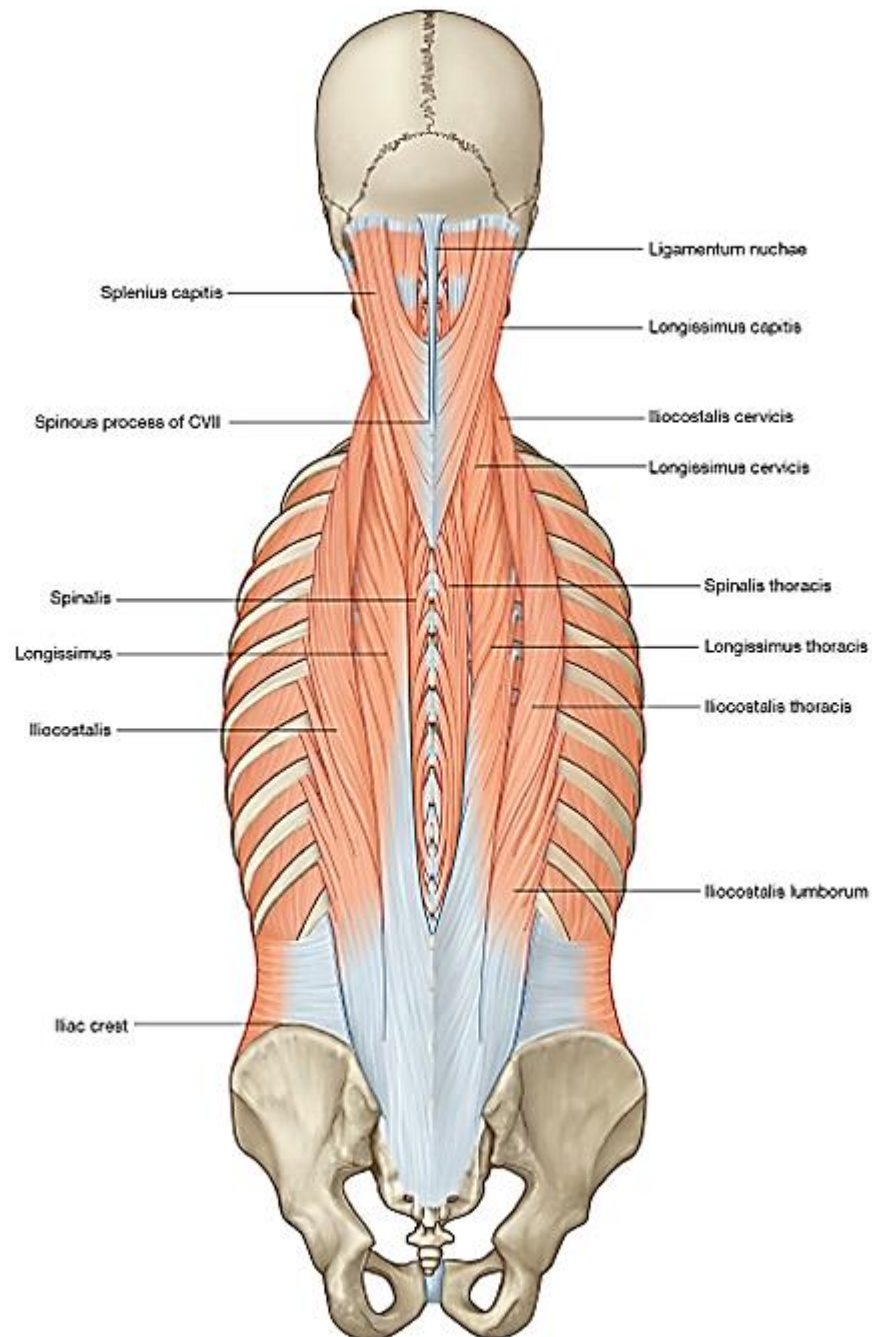
Ilio-costalis (forms lateral column) ➤

Longissimus (forms intermediate column) ➤

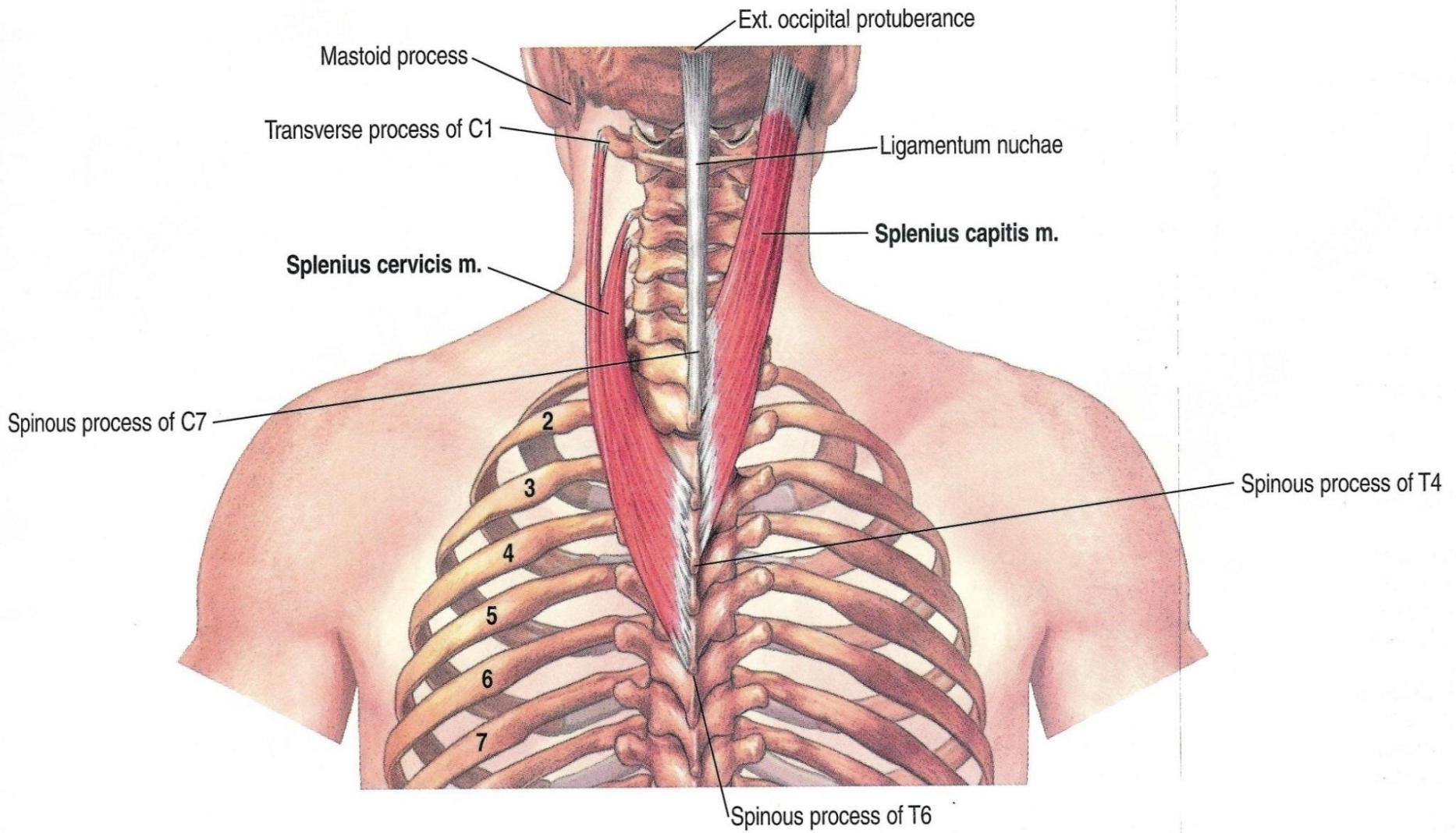
Spinalis (forms medial column) ➤

Intermediate Intrinsic Back Muscles

Erector Spinae
(Ilio-costalis
Longissimus
Spinalis)

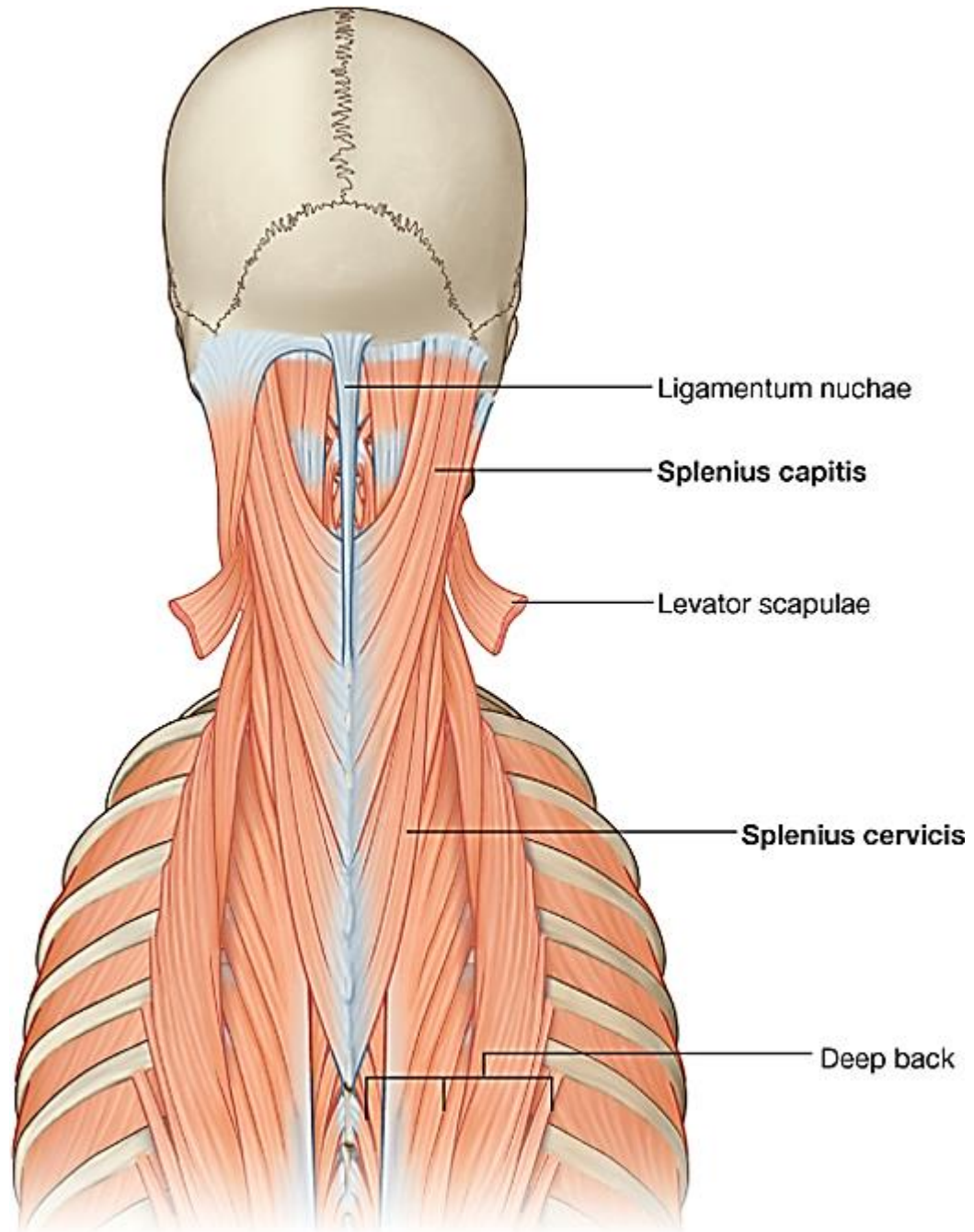


Superficial Intrinsic Back Muscles



Superficial Intrinsic Back Muscles

Splenius cervicis
&
splenius capitis



Following an emergency appendectomy your patient complained of having paresthesia (numbness) of the skin at the pubic region. The most likely nerve that has been injured during the operation is:

Genitofemoral .A

Iliohypogastric .B

Subcostal .C

Spinal nerve T10 .D

Spinal nerve T9 .E

An obstetrician decides to do a Caesarean section on a 25-year-old pregnant woman. A transverse suprapubic incision is chosen for that purpose. All of the following abdominal wall layers will be encountered during the incision EXCEPT the:

Anterior rectus sheath .A

Posterior rectus sheath .B

Rectus abdominis muscle .C

Skin and subcutaneous tissue .D

Transversalis fascia, extraperitoneal fat, .E
and peritoneum

Surgical approaches to the abdomen sometimes necessitate a midline incision between the two rectus sheaths, i.e., through the:

Linea aspera .A

Arcuate line .B

Semilunar line .C

Iliopectineal line .D

Linea alba .E

Surgical approaches to the abdomen sometimes necessitate a midline incision between the two rectus sheaths, i.e., through the:

Linea aspera .A

Arcuate line .B

Semilunar line .C

Iliopectineal line .D

Linea alba .E

Which structure passes through the deep
inguinal ring?

Iliohypogastric nerve .A

Ilioinguinal nerve .B

Inferior epigastric artery .C

Medial umbilical ligament .D

Round ligament of the uterus .E

The superficial inguinal ring is an opening in
which structure?

External abdominal oblique aponeurosis .A

Falx inguinalis .B

Internal abdominal oblique muscle .C

Scarpa's fascia .D

Transversalis fascia .E

Which nerve passes through the superficial inguinal ring and may therefore be endangered during inguinal hernia repair?

Femoral branch of the genitofemoral .A

Ilioinguinal .B

Iliohypogastric .C

Obturator .D

Subcostal .E

During exploratory surgery of the abdomen, an incidental finding was a herniation of bowel between the lateral edge of the rectus abdominis muscle, the inguinal ligament and the inferior epigastric vessels. These boundaries defined the hernia as a(n):

Congenital inguinal hernia .A

Direct inguinal hernia .B

Femoral hernia .C

Indirect inguinal hernia .D

Umbilical hernia .E