Respiratory system

Thoracic cage & intercostal muscles

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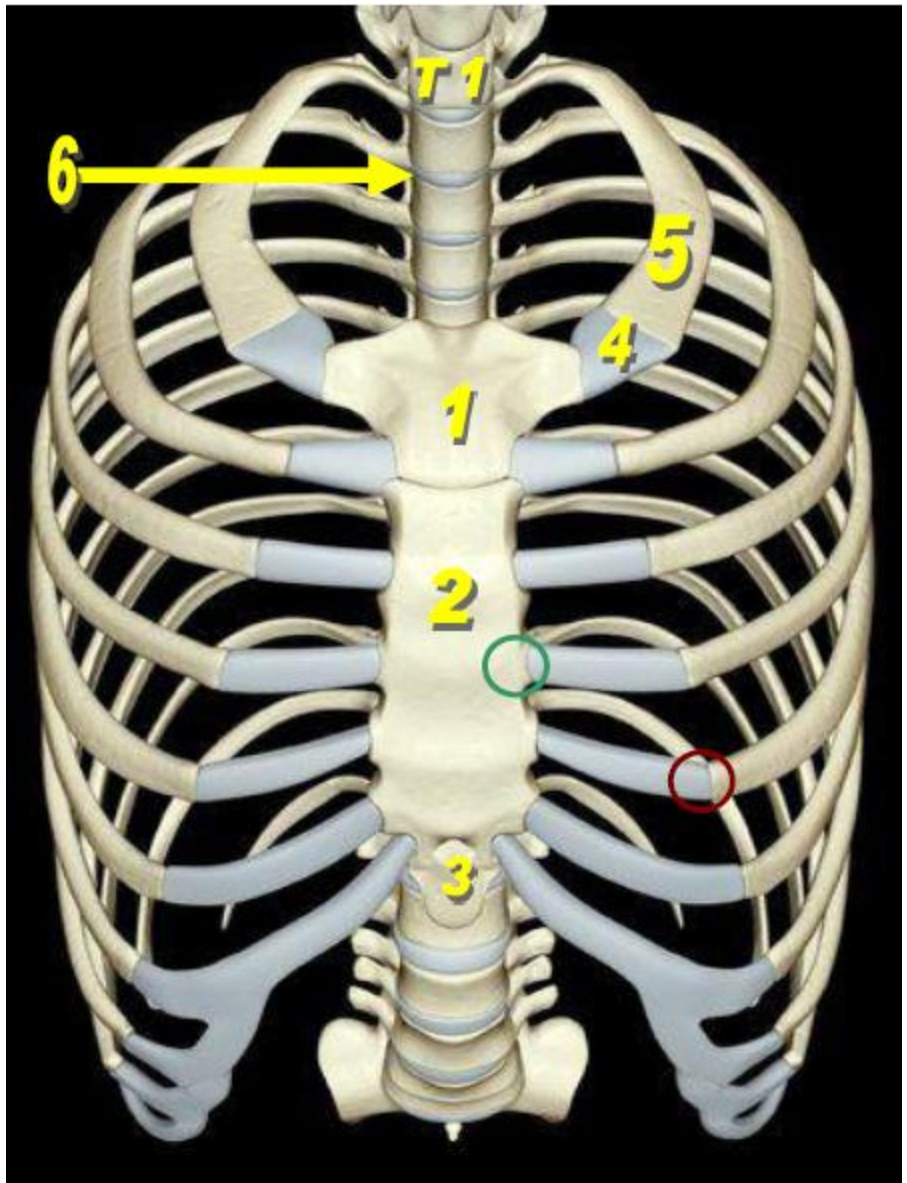
Bones of the thorax



1- Manubrium
2- Body of sternum
3- Xiphoid process
4- 1st costal cartilage
5- 1st Rib
6-Intervertebral disc
Sternocostal joint
Costochondral joint

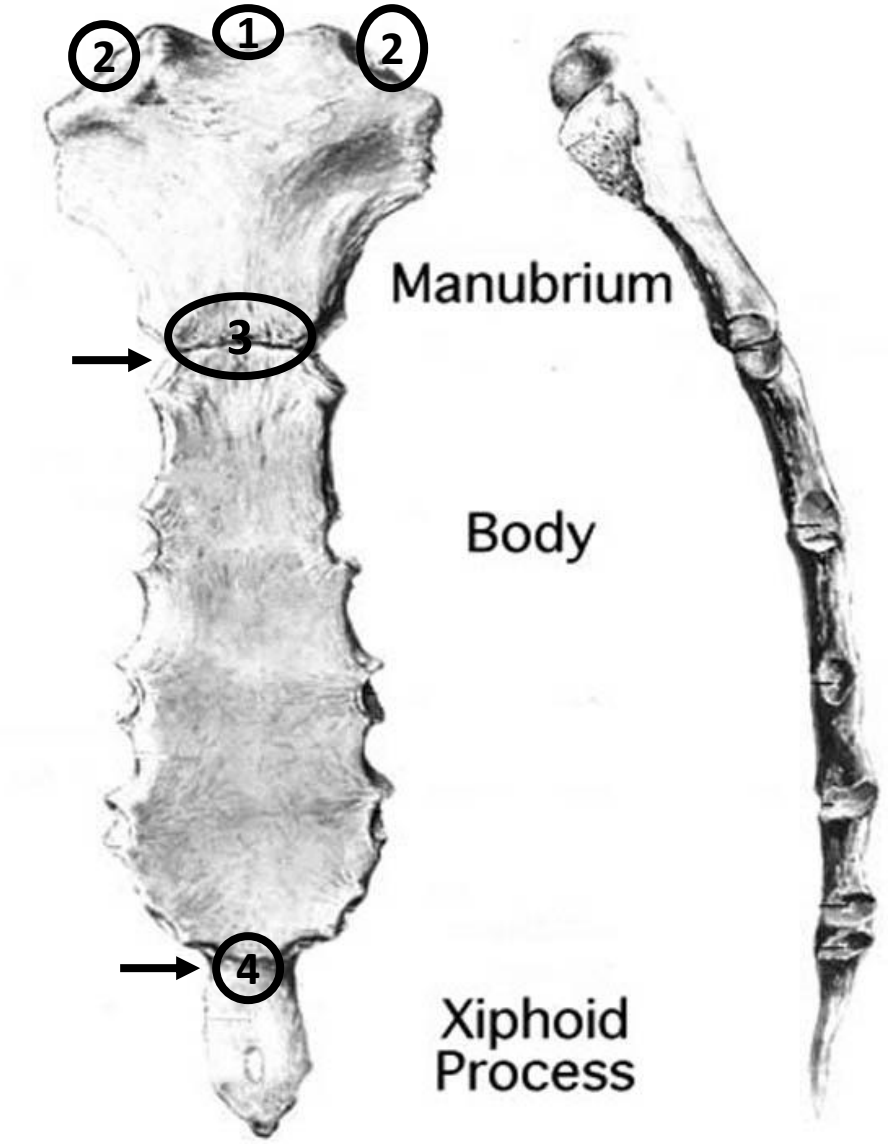
Boundries	Thoracic inlet	Thoracic outlet
posterior	T1 vertebra	T12 vertebra
lateral	1st rib	11th and 12th rib
Anterior	Manbrium sterni	Costal margin and xiphoid process

STERNUM

*Type: flat bone.
*Site: Anterior chest wall
1. Jugular notch.
2. Clavicular notch.
*Parts: Manubrium sterni, body and Xiphoid process

*Joints formed by:

1. Sternoclavicular joint .
(saddle synovial J).
2. 1st sternocostal joint.
3. Manubrio-sternal joint (sternal angle)
(2ry cartilagenous J).
4. Xiphi-sternal joint
(2ry cartilagenous J)

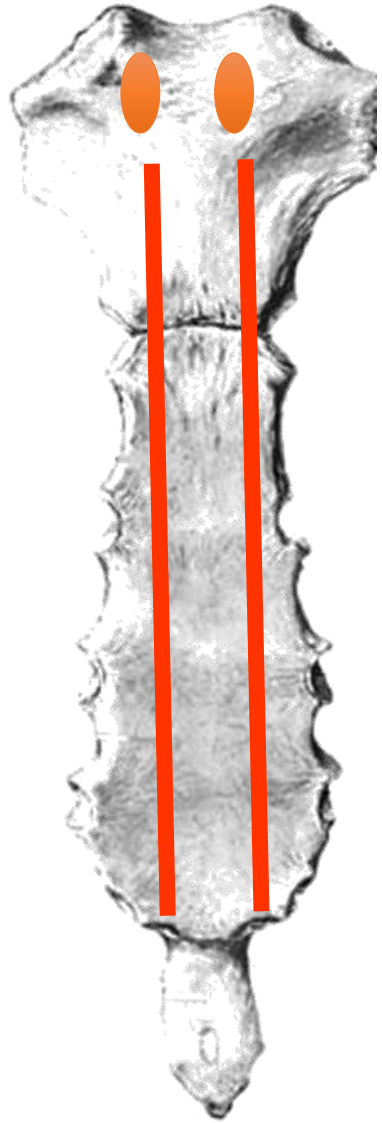


Anterior surface

the structure attached

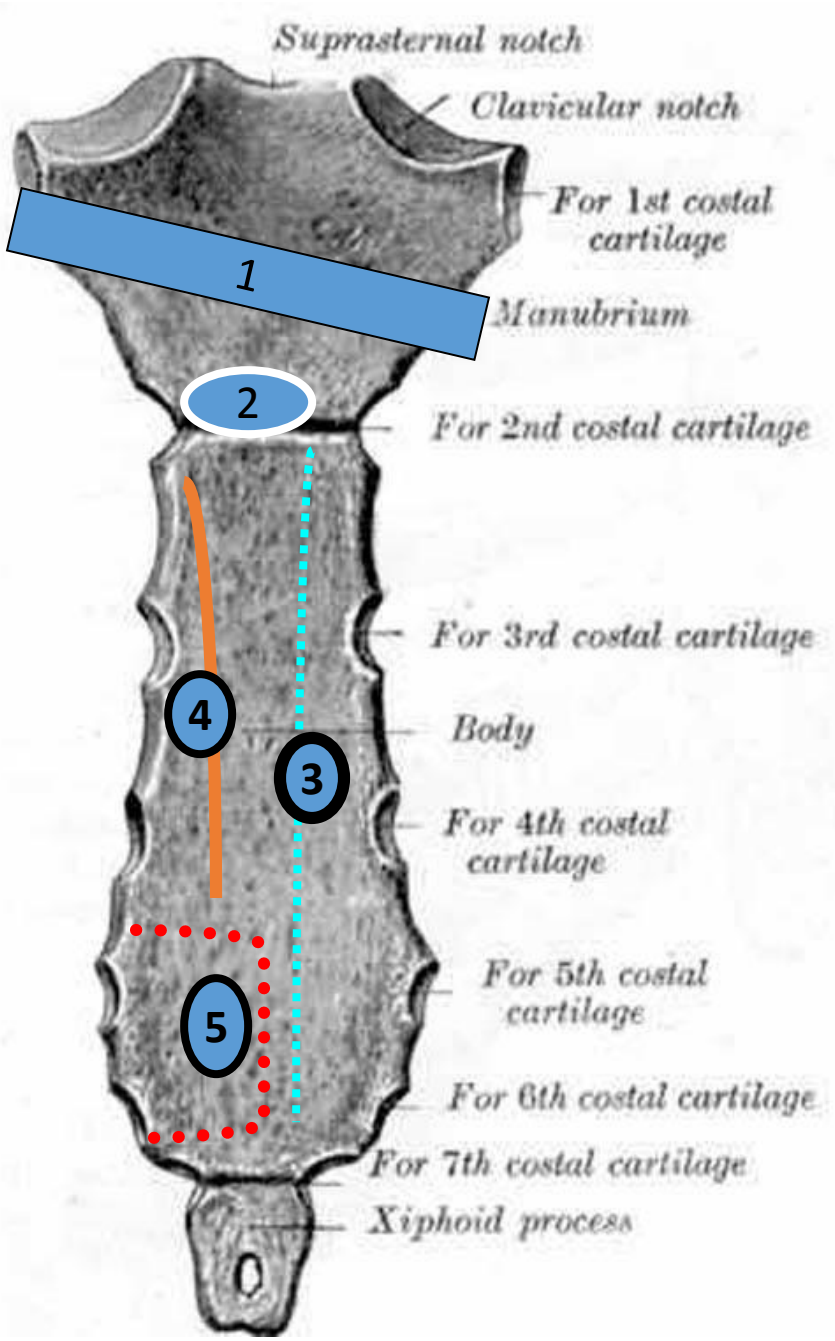
to the marked area:

Pectoralis major muscle



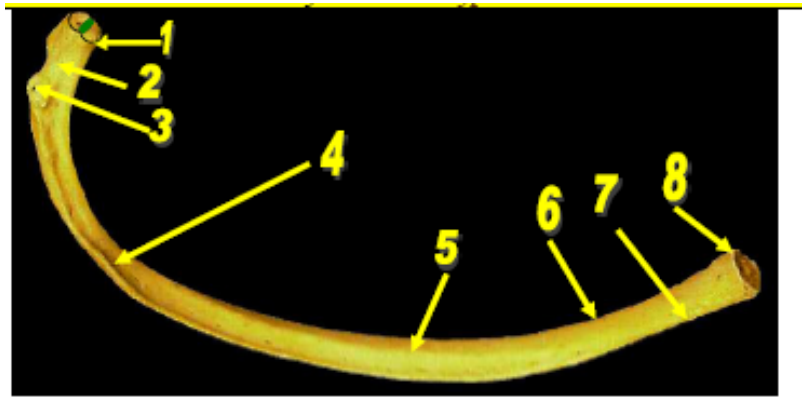
the structure <u>related</u> to the back of sternum (the marked area)

1. Lt. brachio-cephalic V.
2. Arch of aorta.
3. Right lung & Rt. Pleura.
4. Left lung& Lt. pleura.
5. Heart & pericardium.



RIBS

Typical rib



1- Head
2- Neck
3- Tubercle
4- Costal groove
5- Inner surface
6- Upper border
7- Lower border
8-Anterior end (concave)
9- Rib angle
Two articular demifacets separated by a crest

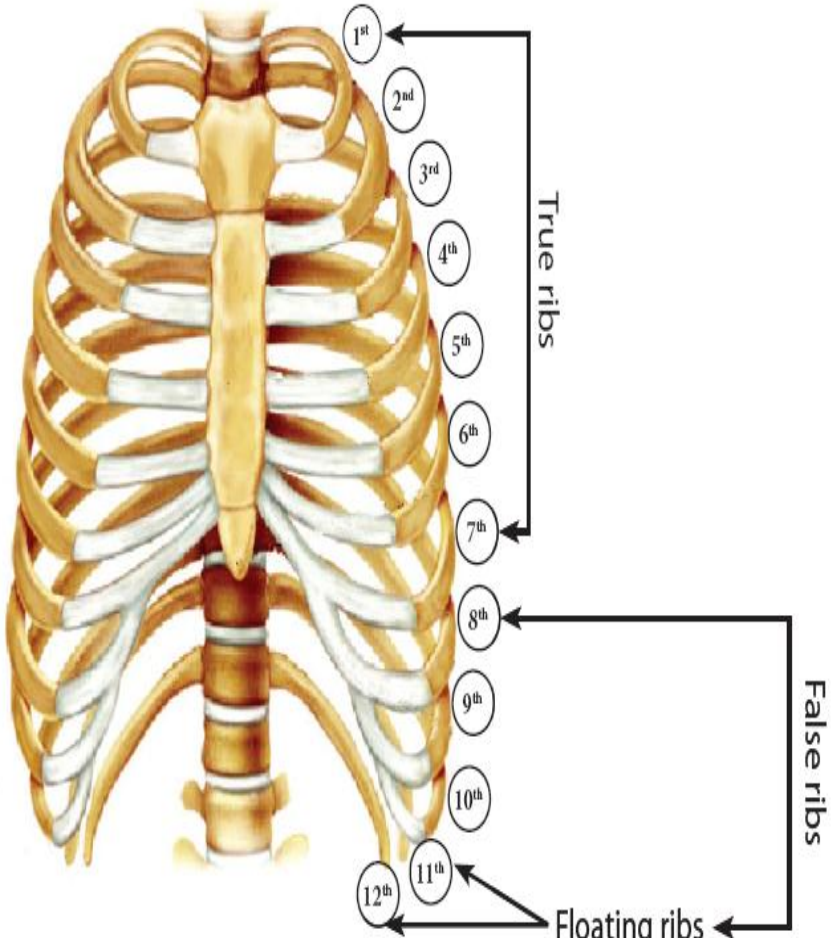
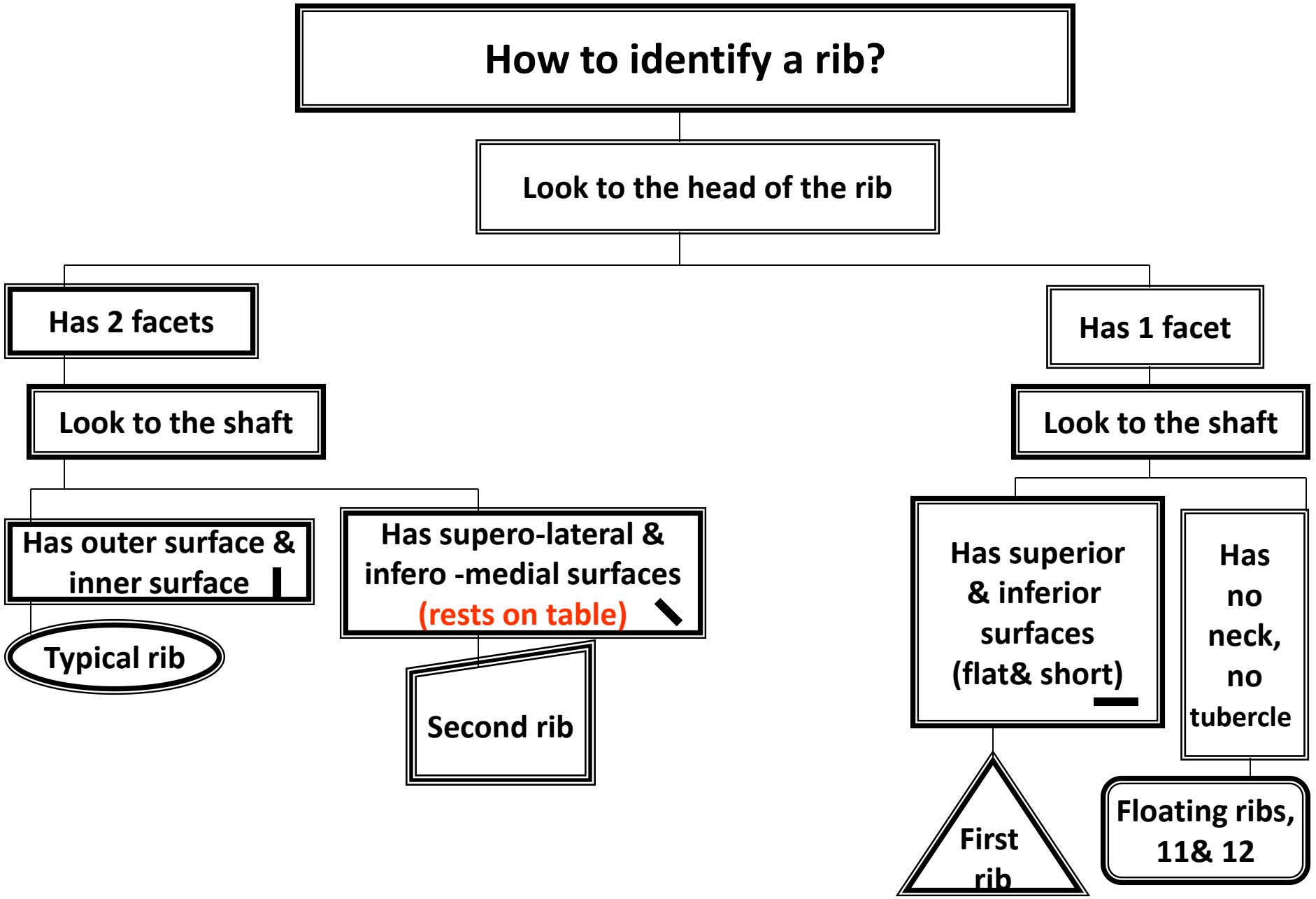


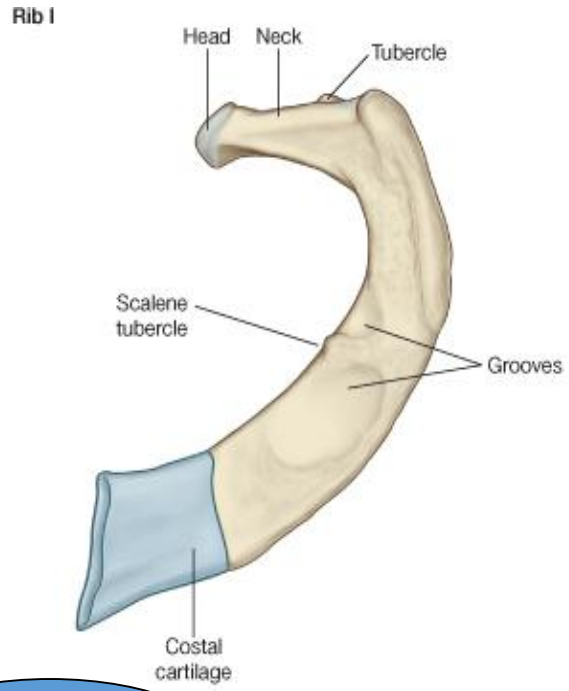
Figure (8): Types of ribs.

Joints formed by the rib:

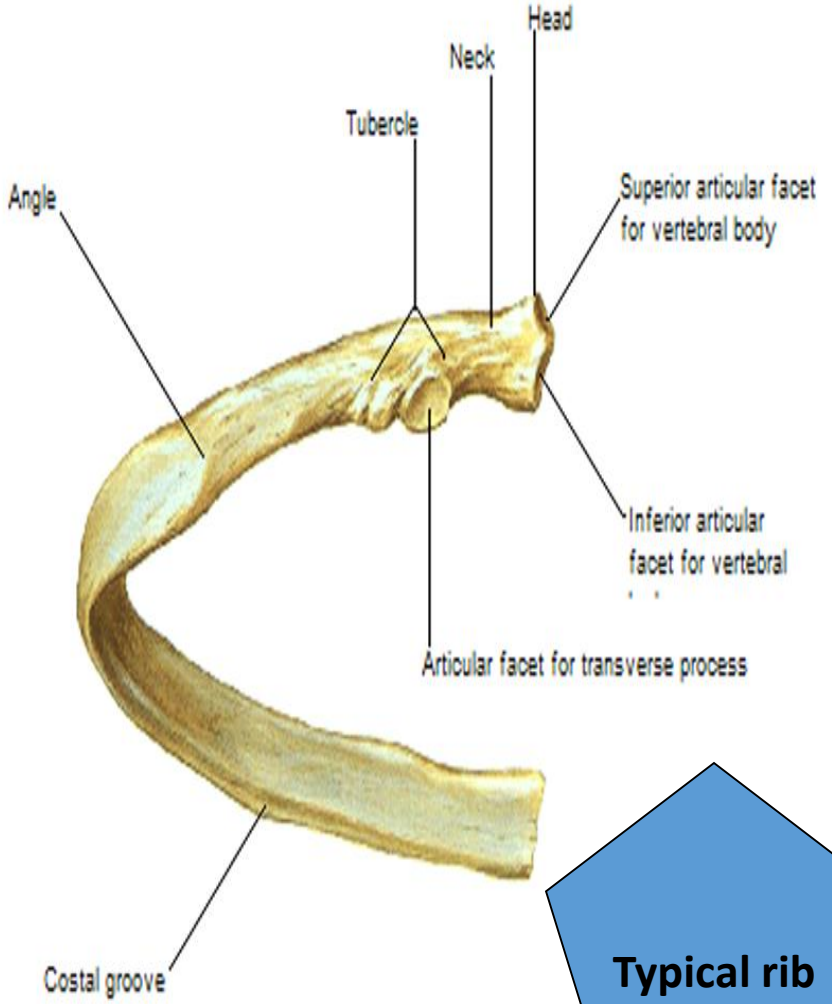
1-costovertebral joint: plane synovial joint.

2-costotransverse joint: plane synovial joint.


How to identify a rib?
Look to the head of the rib
Has 2 facets
Look to the shaft
Has outer surface & inner surface
Typical rib
Has supero-lateral & infero -medial surfaces
(rests on table)
Second rib
Has 1 facet
Look to the shaft
Has superior & inferior surfaces (flat& short)
First rib
Has no neck, no tubercle
Floating ribs, 11& 12



First rib



Typical rib

Floating rib

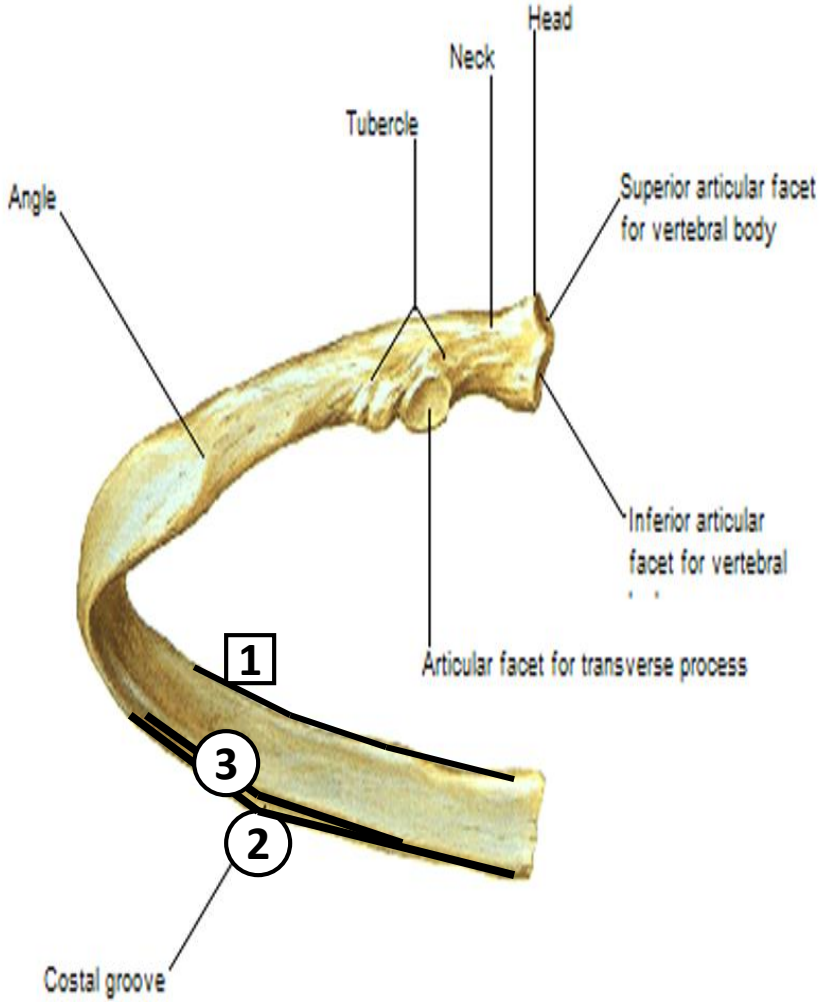
The structure attached to:

1. **External, internal & inner most intercostal muscles.**
2. **External intercostal muscle.**

The structure related :

Costal groove:

3. Posterior intercostal vein & artery and intercostal nerve.



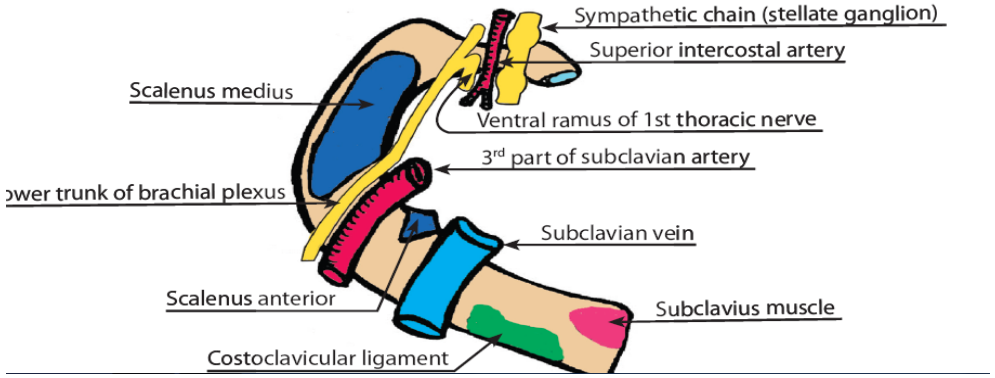
First Rib:

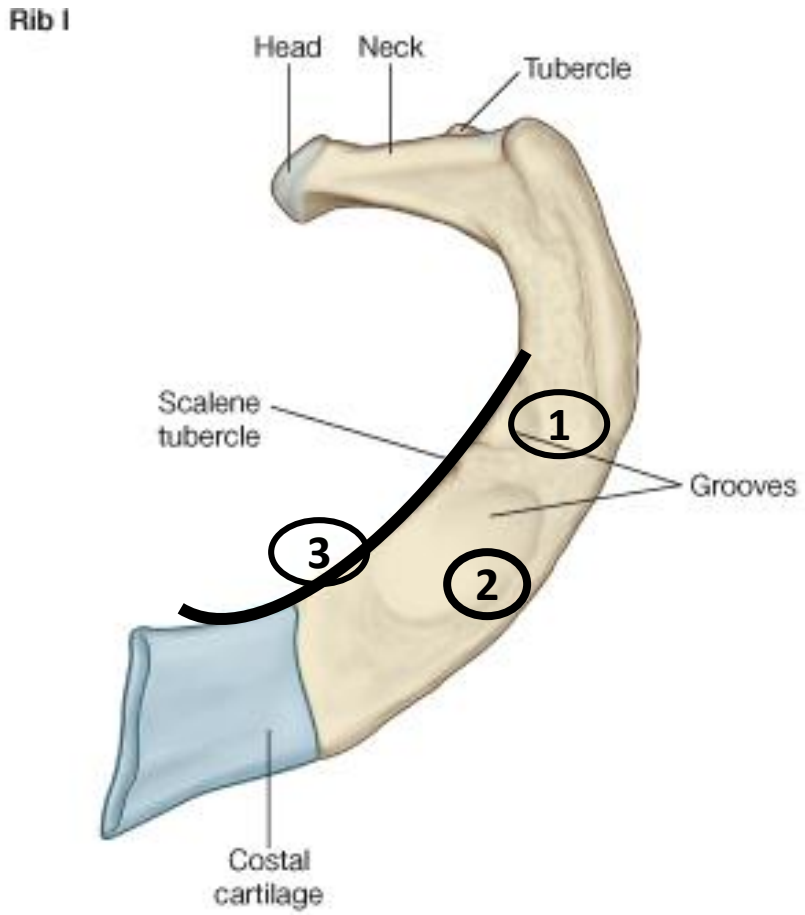
The structure related to the marked area.

1. **Subclavian artery.**
2. **Subclavian vein.**

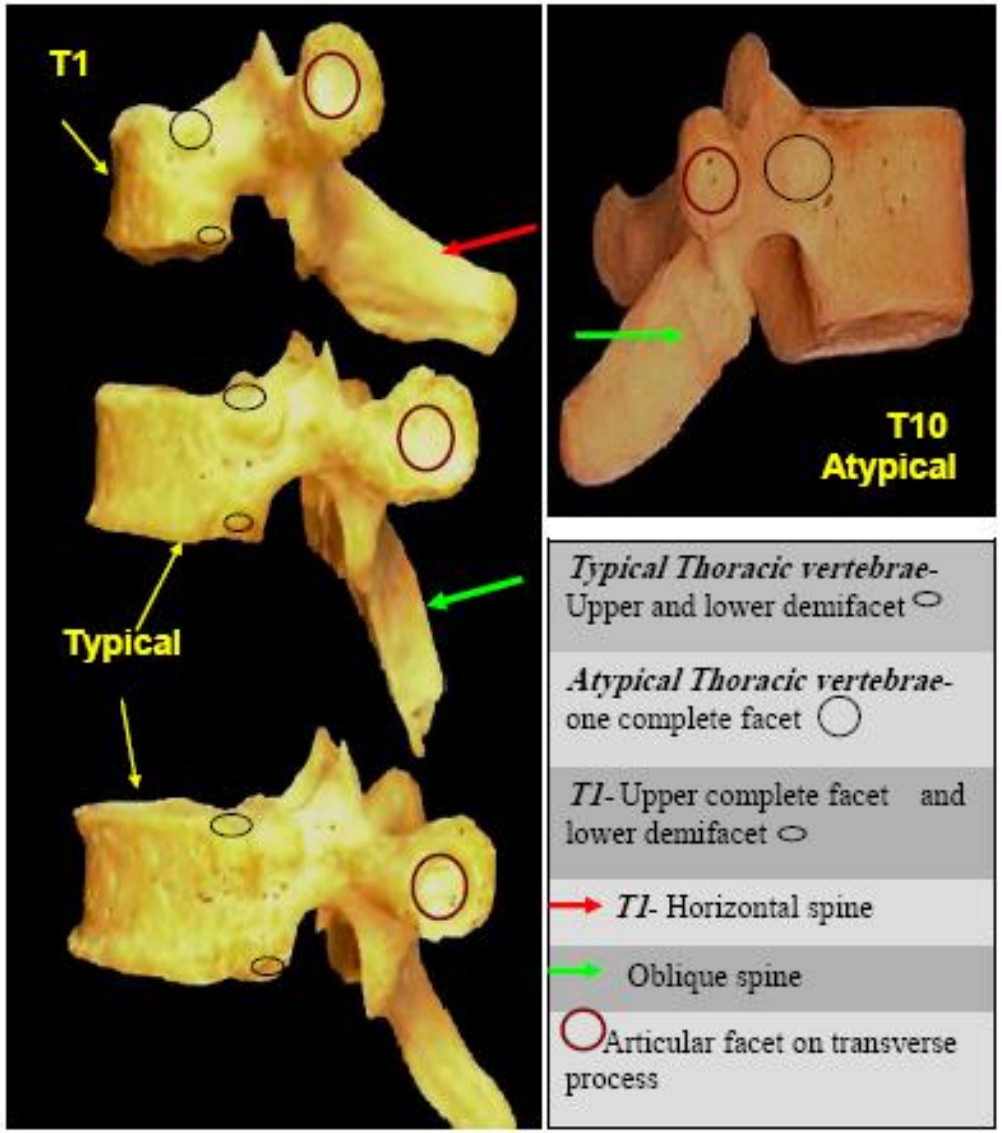
***The structure attached to the marked area.**

3. Suprapleural membrane





THORACIC VERTEBRAE



12 thoracic vertebra
2-9 typical
1,10,11,12 Atypical

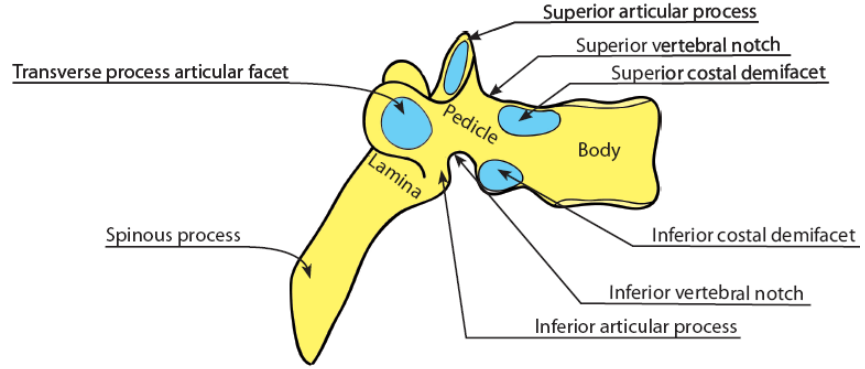


Figure (3): Typical thoracic vertebra, lateral view.

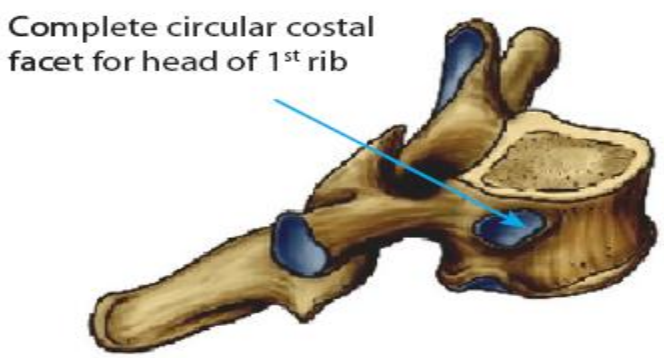


Figure (4): First thoracic vertebra.

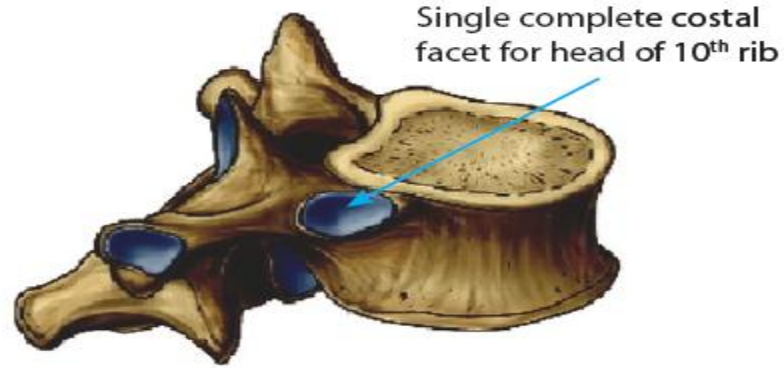


Figure (5): Tenth thoracic vertebra.

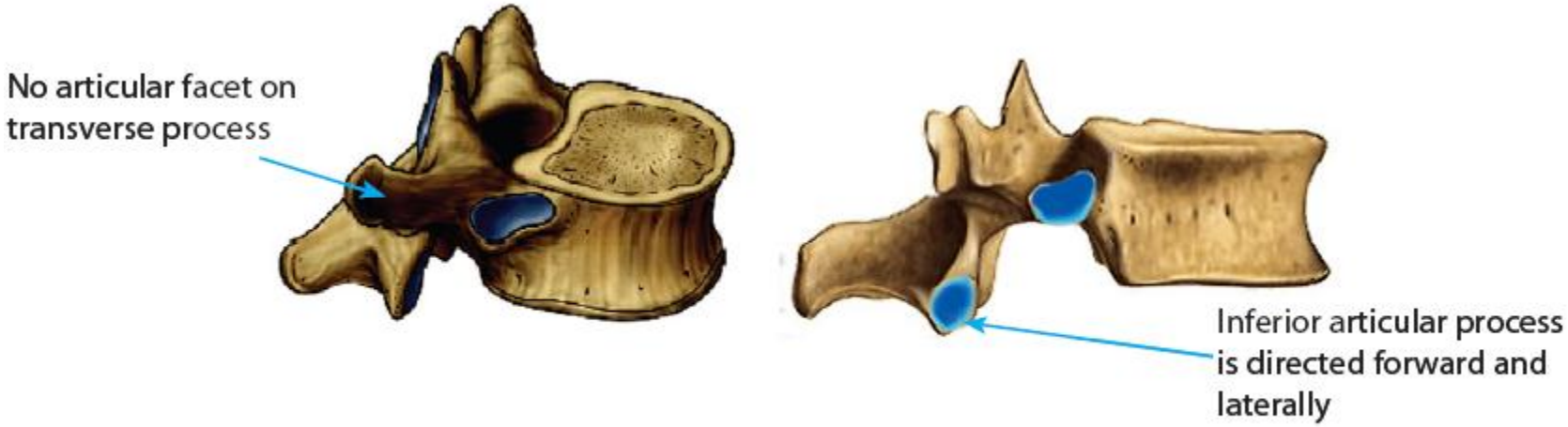
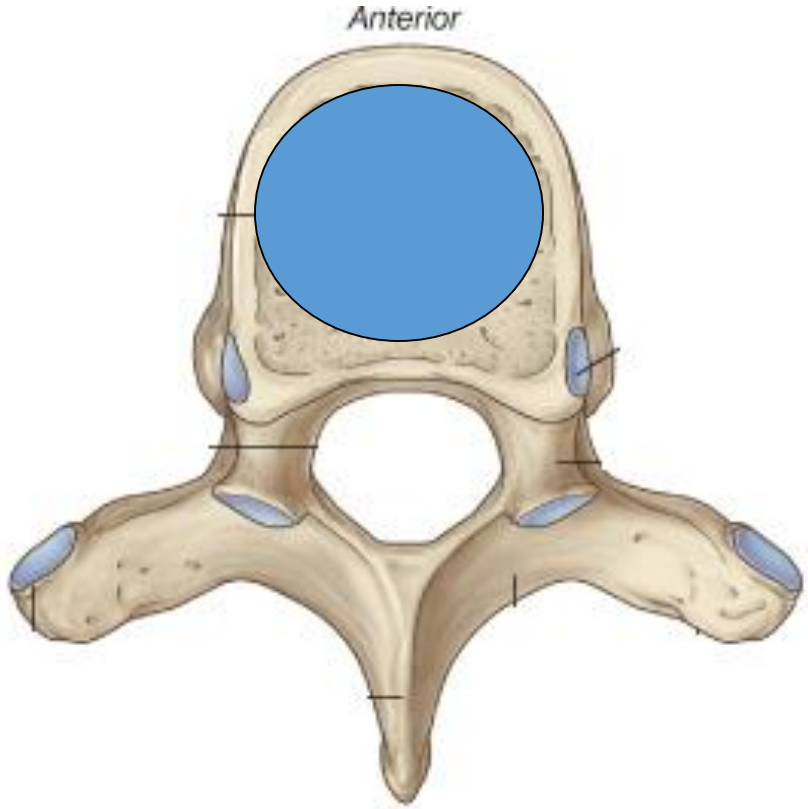


Figure (6): Eleventh and twelfth thoracic vertebrae.

The structure related to the marked area:

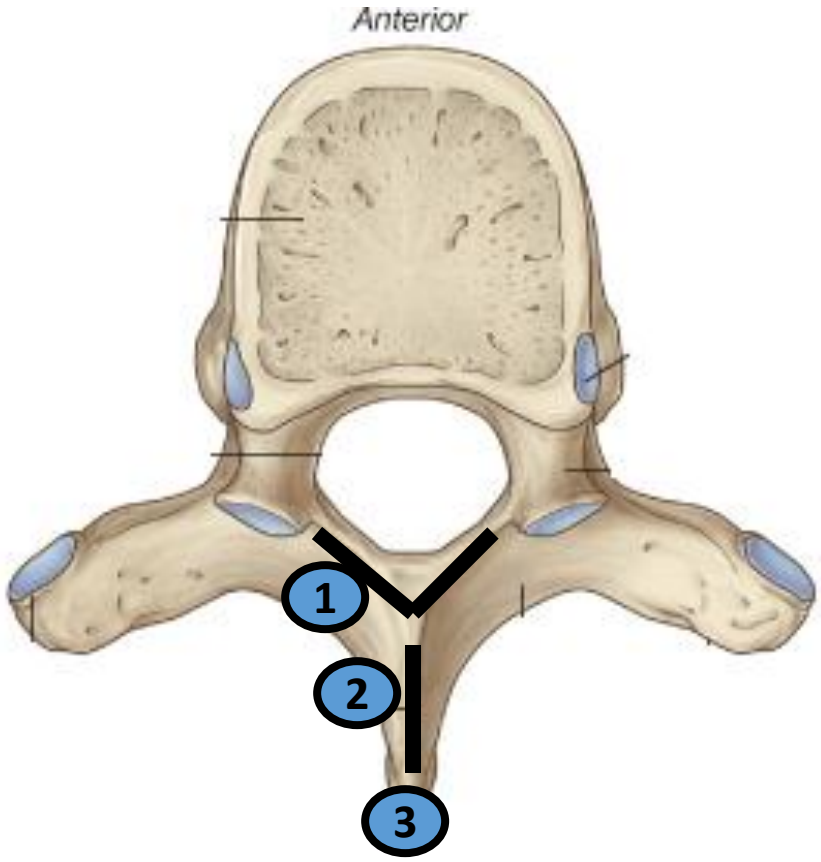
Inter - vertebral disc.

(Secondary cartilaginous J).



The structure attached to the marked area.

1) Ligamentum flavum.
2) Inter - spinous ligament.
3) Supra-spinous ligament.

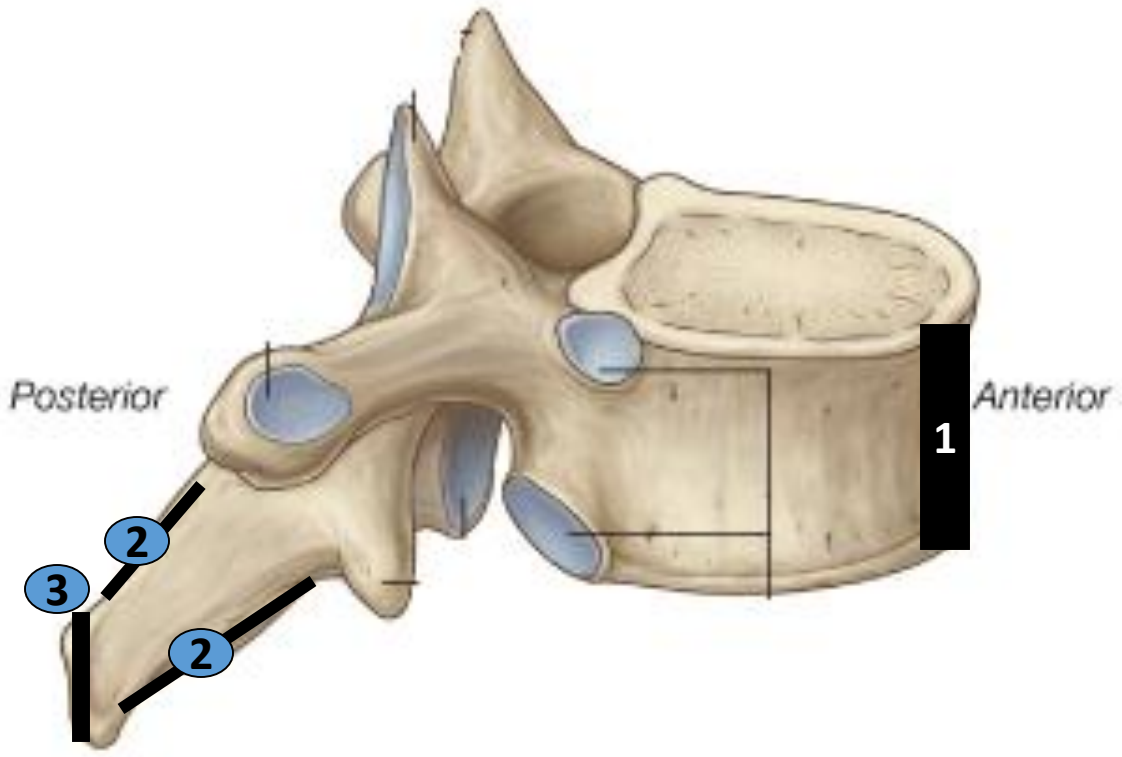


the structure attached to the marked area:

1) Anterior longitudinal ligament.

2) Supra spinous ligament.

3) Interspinous ligament.



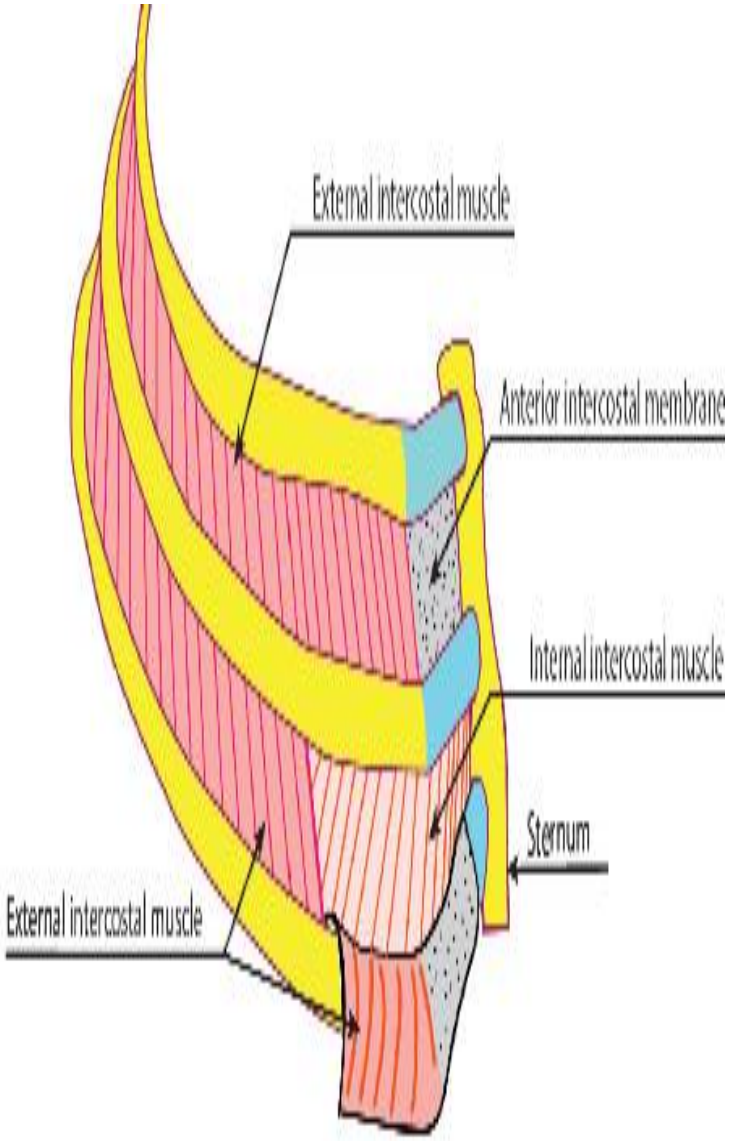
The intercostal muscles

1-External intercostal muscles:„

Extent: from the tubercle of the ribs posteriorly to the costochondral junction anteriorly where it is replaced by an aponeurosis, the anterior (external) intercostal membrane.

Attachments: Each muscle passes from the lower border of one rib to the upper border of the rib below.

Direction of fibers: downwards & forwards (as one putting his hand in his pocket).



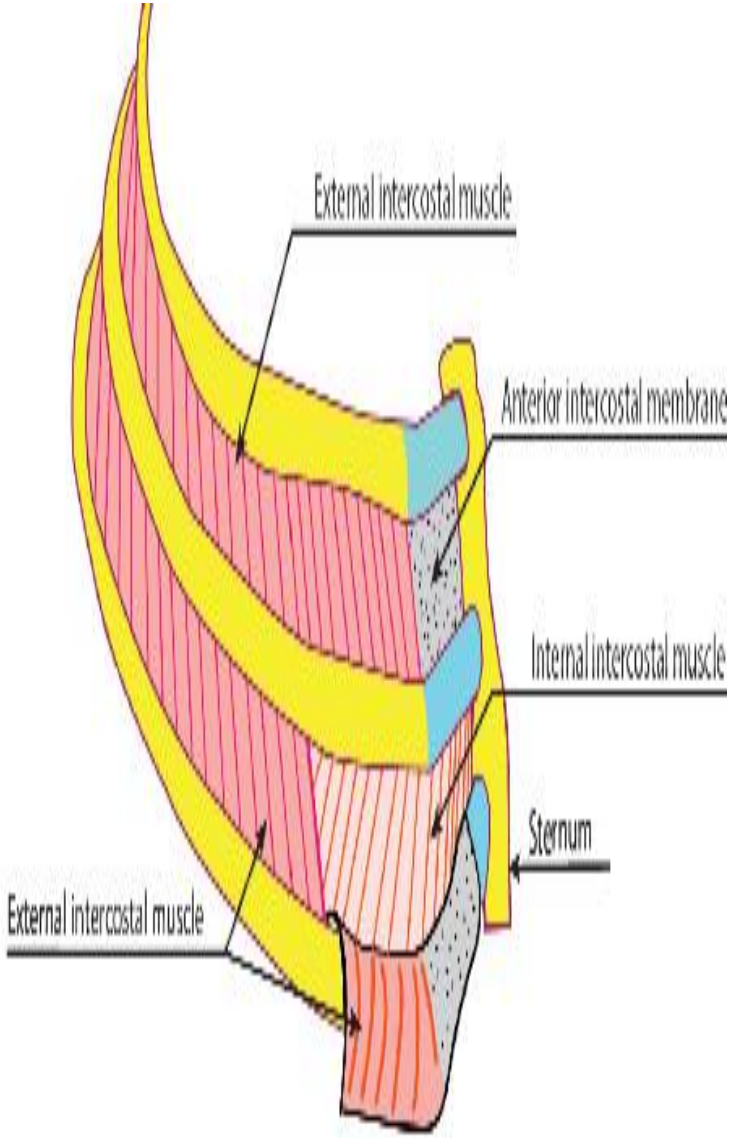
2-Internal intercostal muscles

Forms the intermediate layer.

Extent: from the sternum infront to the angle of the rib behind where each is replaced by internal (posterior) intercostal membrane.

Attachments: Each muscle descends from the floor of the costal groove of one rib to the upper border of the rib below.

Direction of fibers: downwards, backwards i.e. at right angles to those of the external intercostal muscle.

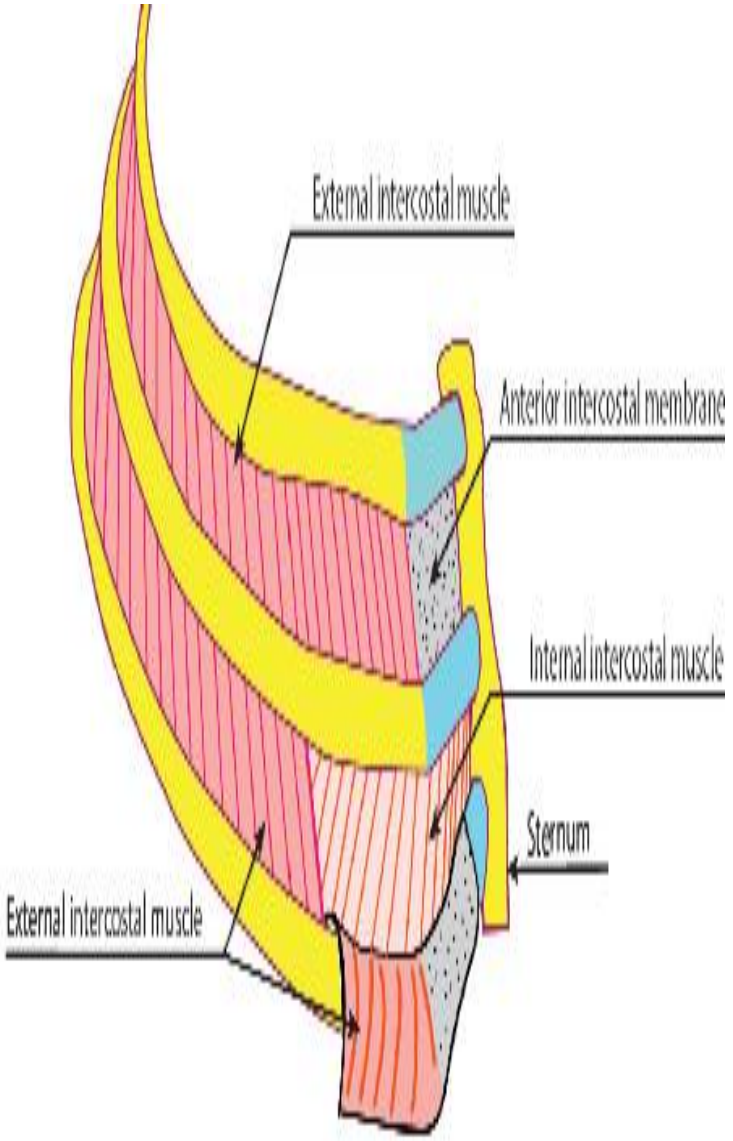


3.Innermost intercostal muscles

forms the deepest layer.

Extent: occupy the middle 2/4 of the intercostal spaces.

- **Attachments: Each muscle is attached to internal aspects of two adjoining ribs (from theupper border of the costal groove of one rib to the upper border of the rib below).**
- **Direction of fibers: As internal intercostal; acutally it is considered to be a part of the internal intercostal which is split off by the intercostal nerves and vessels.**



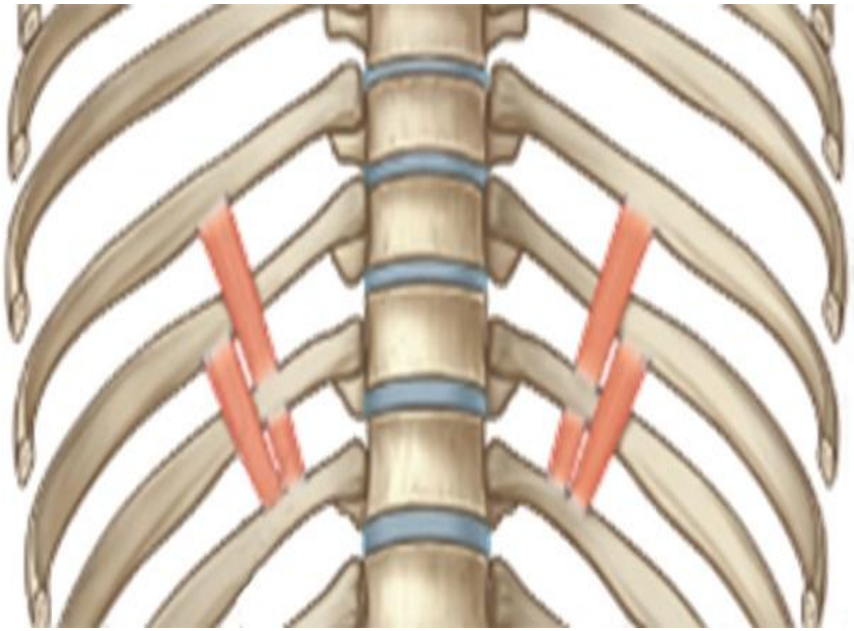
Subcostal Muscles (Subcostalis)

These muscles cross 2-3 ribs between their attachments.

Extent: They are well developed only in the lower and posterior part of the thorax lying near the angles of the ribs.

Attachments: Each muscle descends from the internal surface of one rib to the internal surface of the 2nd or 3rd rib below.

Direction of fibers: like those of the internal intercostal muscles.



Transversus Thoracis (Sternocostalis)

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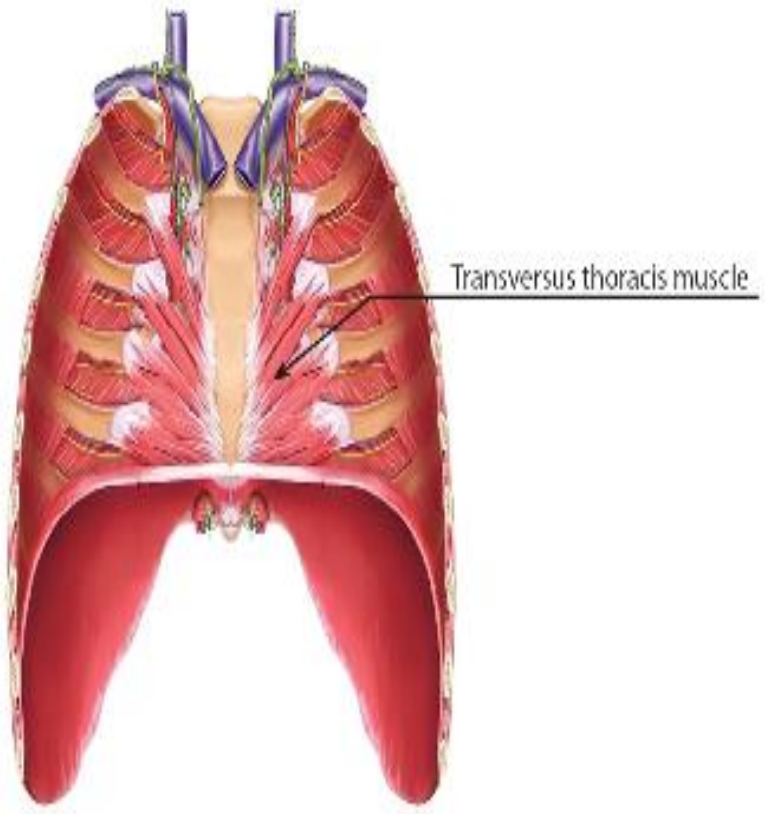
Extent: The muscle is present on the internal surface of the anterior part of the thoracic wall in line with the innermost intercostal.

Attachments: it arises from the lower half of the posterior surface of the body of sternum to be inserted by 5 slips into the lower border of the costal cartilages from the 2nd to the 6th.

Direction of fibres: upwards and laterally.



Nerve supply of muscles of the thorax:

All the above mentioned muscles are supplied by the adjacent intercostal nerves.

Action of muscles of the thorax:

1-The external intercostal muscles are most active in inspiration (elevators of the ribs).

2-The internal and innermost intercostal muscles are most active in expiration (depressors of the ribs).

3-Subcostales muscle: depresses the ribs.

4-Transversus thoracis: draws down the costal cartilages to which it is attached.