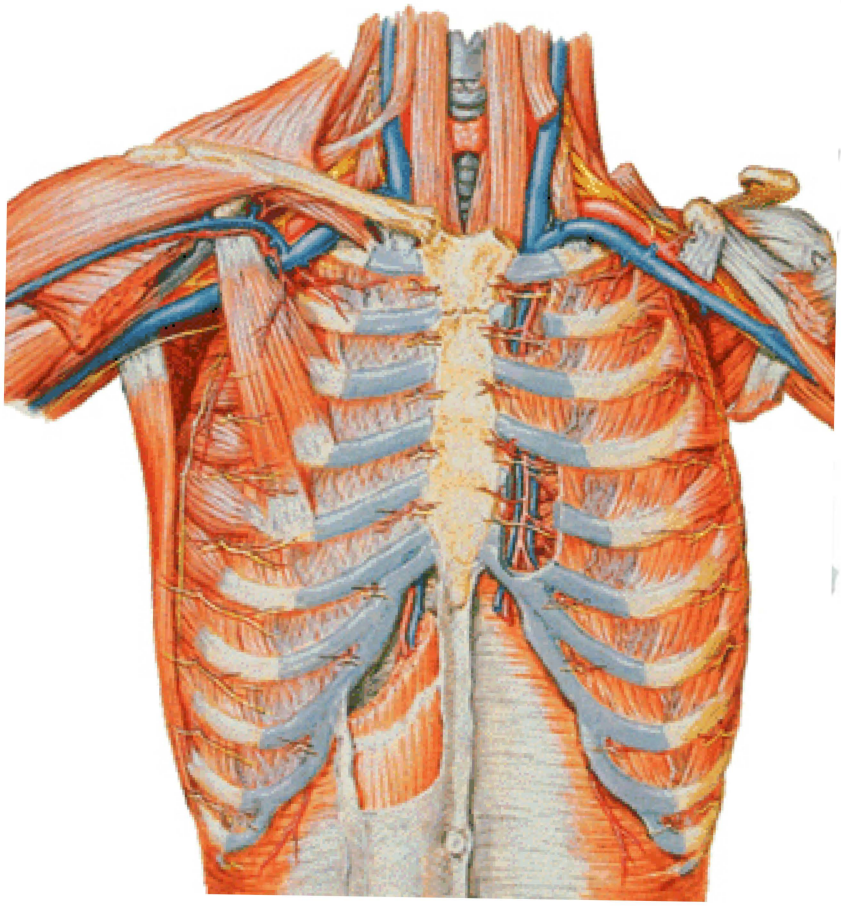
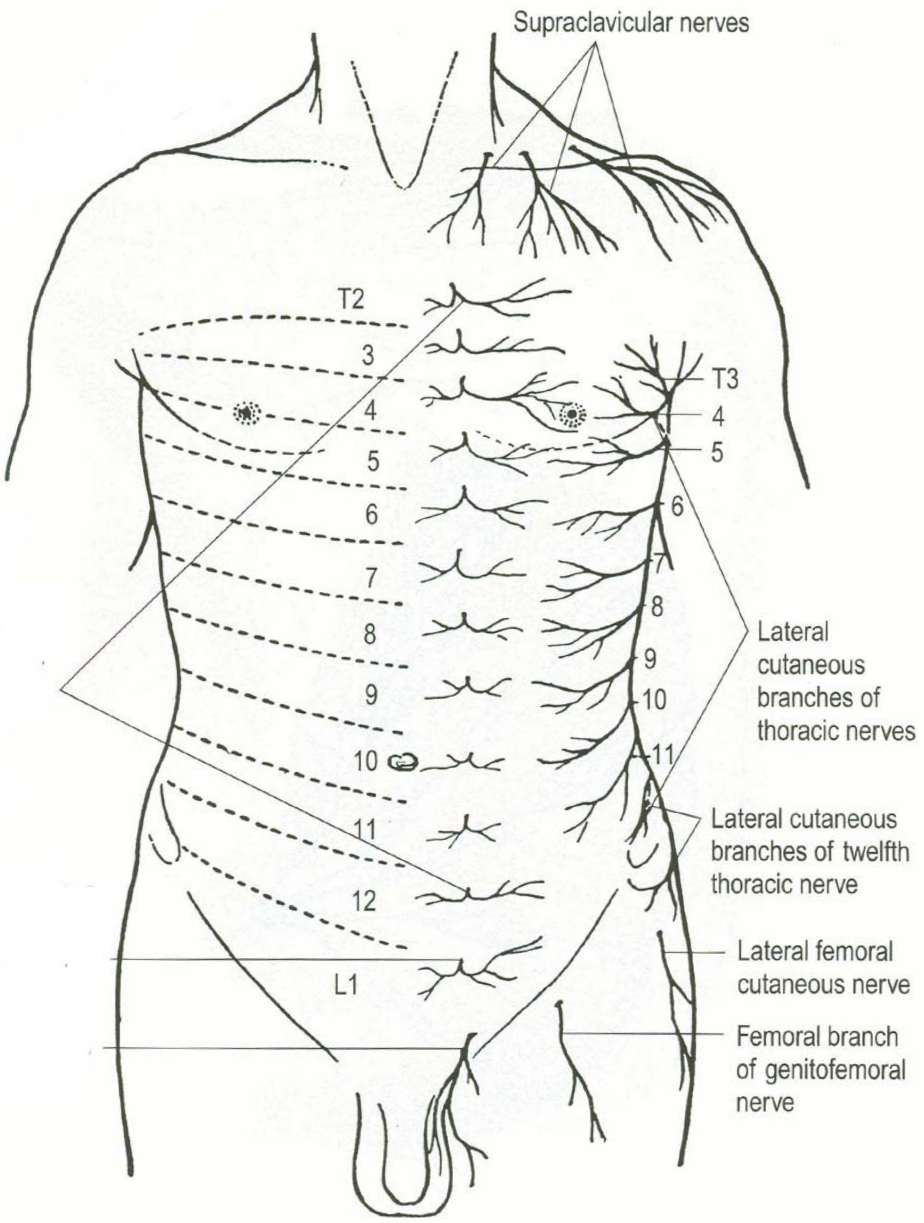
Thoracic Wall

Coverings

- Skin – Thin anteriorly & thick posteriorly, variable hair distribution
- Superficial Fascia – More dense posteriorly
- Deep Fascia – Thin , ill defined for free movement of chest for breathing
- Extrinsic muscles –Upper limb , Back, Abdomen & Head & Neck




Supraclavicular nerves
T2
3
4
5
6
7
8
9
10
11
12
L1
T3
4
5
6
7
8
9
10
11
Lateral cutaneous branches of thoracic nerves
Lateral cutaneous branches of twelfth thoracic nerve
Lateral femoral cutaneous nerve
Femoral branch of genitofemoral nerve

Intercostal Spaces

- Eleven (11) intercostal spaces on each side
- Last two spaces are open in front

Features of Space

- Each directed downward & forward
- Narrow towards vertebral column & broad towards sternum, widest at costo-chondral junction
- Posterior part is inter-osseous while ant part is inter-cartilaginous

Contents – Intercostal muscles , vessels & nerves

Intercostal Spaces

Typical I/C space

Spaces b/w typical ribs & transversed by nerves & vessels & confined to thoracic wall

Boundaries of a typical I/c space – 3rd to 6th

- Above – Sharp lower margin of upper rib & its cartilage
- Below – Blunt upper margin of lower rib & its cartilage
- In front – Lateral border of sternum b/w costal notches
- Behind – Body of corresponding thoracic vertebra

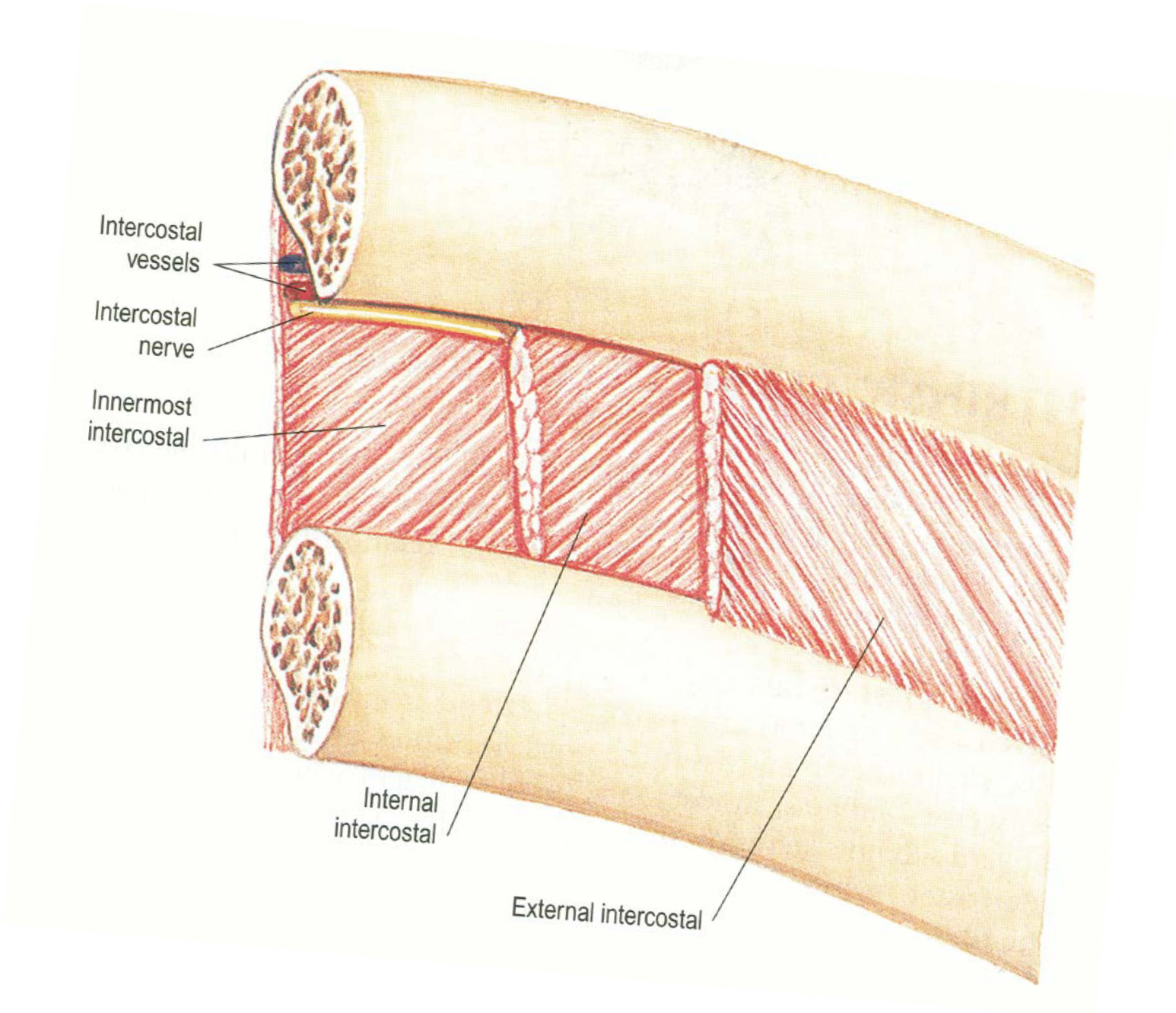
Intercostal muscles

Arranged in three sheets from outside inward

- External Intercostal
- Internal Intercostal
- Transverses thoracis – intercostalis intimi
  Subcostalis
  sternocostalis

Main action

Prevent retraction during inspiration & bulging during expiration of the intercostal spaces


Intercostal vessels
Intercostal nerve
Innermost intercostal
Internal intercostal
External intercostal

External Intercostal

Origin: Lower border of the rib above.

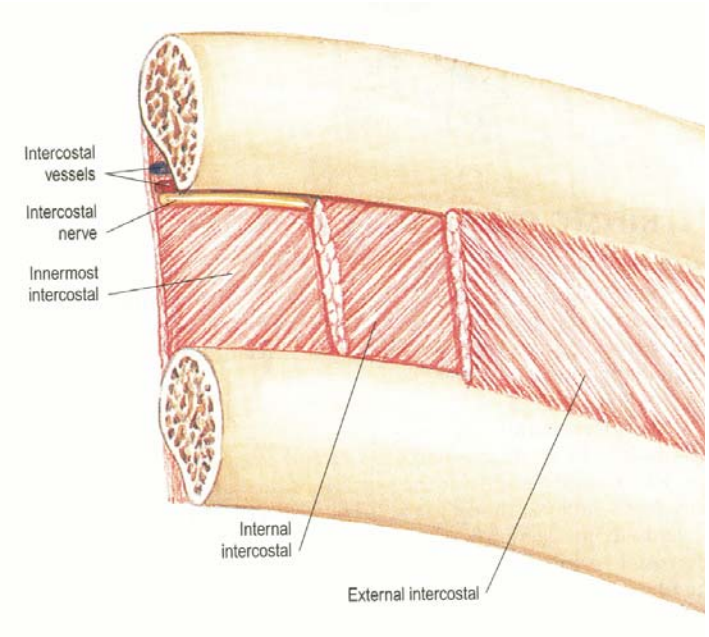
Insertion: Outer lip of upper border of rib below.

Extent: From costocondral junction anteriorly to tubercle of rib posteriorly. Medial to costochondral junction replaced by external (Ant.) intercostal membrane.

Direction of fibres:

Downwards and laterally at the back and

Downwards, forwards and medially in front.



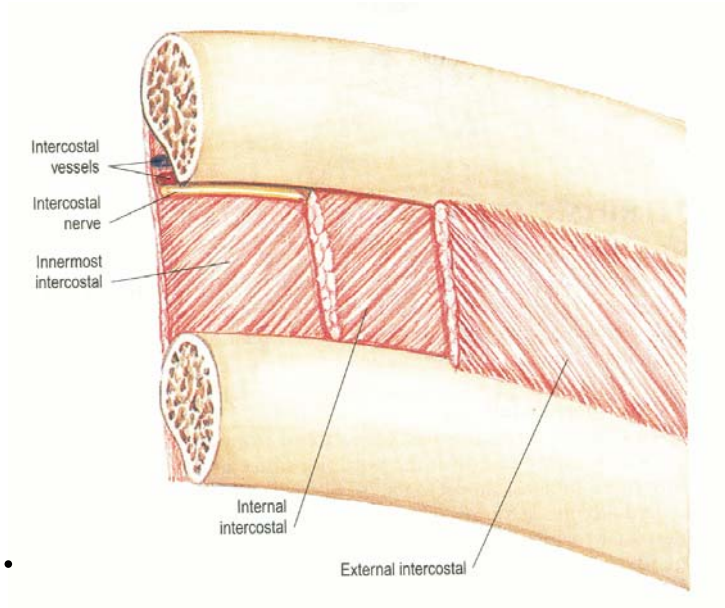
INTERNAL INTERCOSTAL MUSCLE

Origin: Floor of costal groove of rib above.

Insertion: Superior border of rib below (inner to the attachment of external intercostal muscle).

Extent: From lateral border of sternum anteriorly to angle of rib posteriorly.

Medial to it, replaced by internal(Posterior) intercostal membrane.



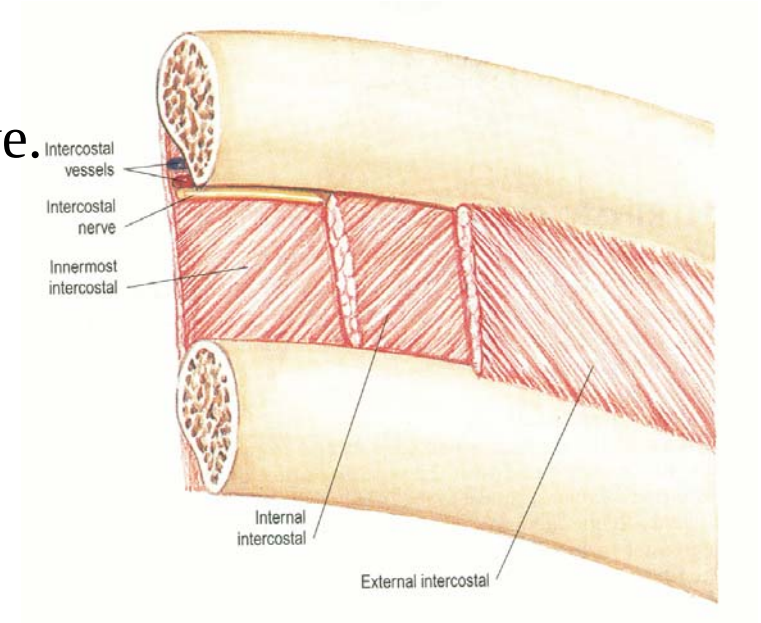
Direction of fibres:

At right angle to the direction of external intercostal.

INNERMOST INTERCOSTAL (Intercostalis Intimi)

Origin:

Upper margin of subcostal groove of rib above.



Insertion:

Superior border of rib below (inner to the attachment of internal intercostal muscle),

Extent:

Present in middle two fourths of the lower intercostal spaces.

Poorly developed or even absent in the upper spaces.

Direction of fibres:

Same as internal intercostal (at right angle to the direction of external intercostal).

Sternocostalis

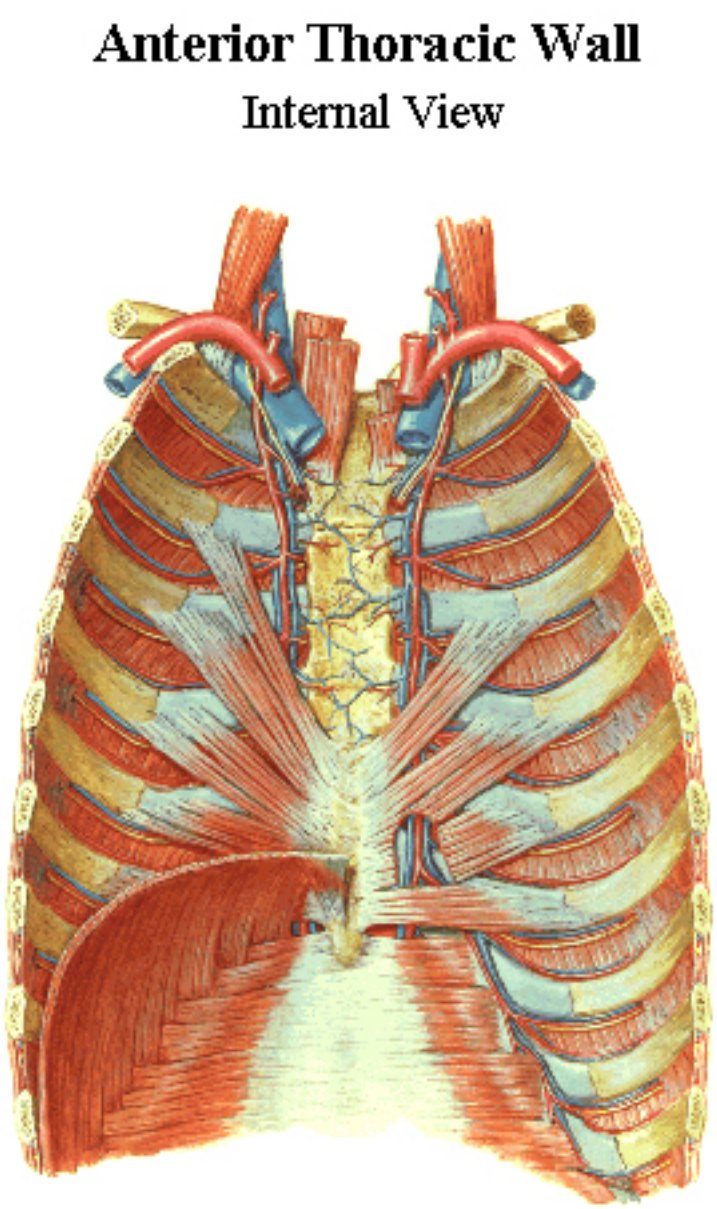
Present on the inner surface of anterior thoracic wall.

Origin: Lower 1/3 of posterior surface of body of sternum, Posterior surface of xiphoid & posterior surfaces of costal cartilages of 4^{th} to 7^{th} ribs.

Insertion: Lower border and posterior surfaces costal cartilages of 2^{nd} to 6^{th} ribs.

Attachments are variable and may even differ on the two sides.

Direction of fibres:Lowest fibres are horizontal, become gradually oblique and upper most fibres are directed upwards and laterally.



Subcostalis

Present on the inner aspect of intercostal spaces posteriorly.

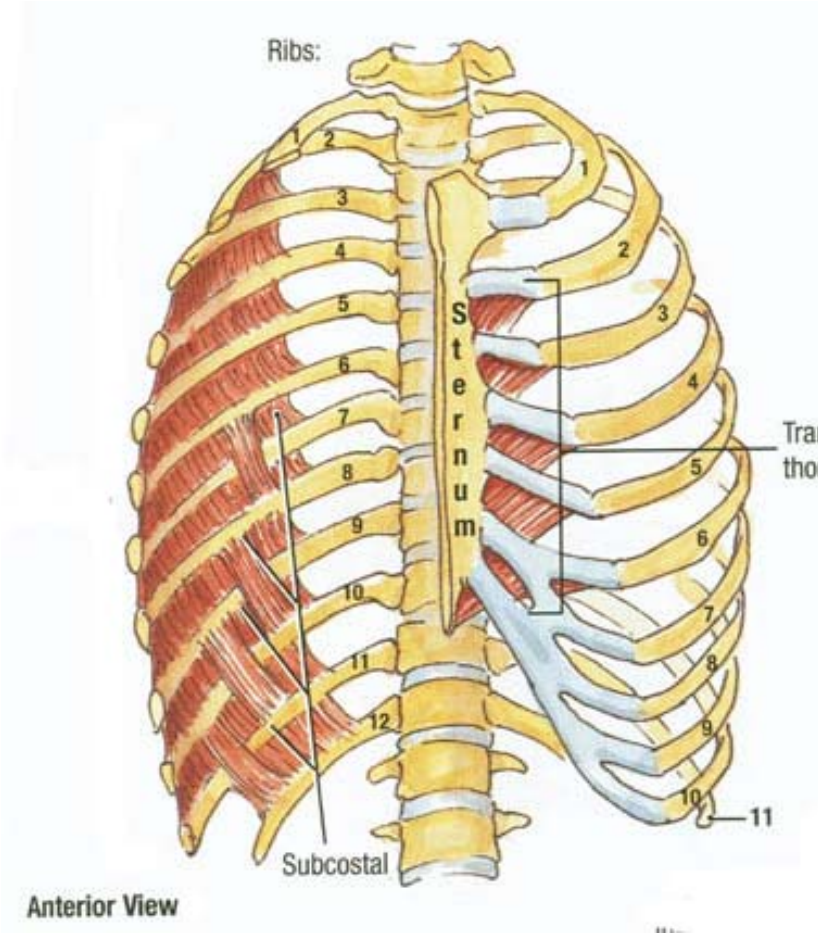
Origin:Inner surface of rib above, near its angle.

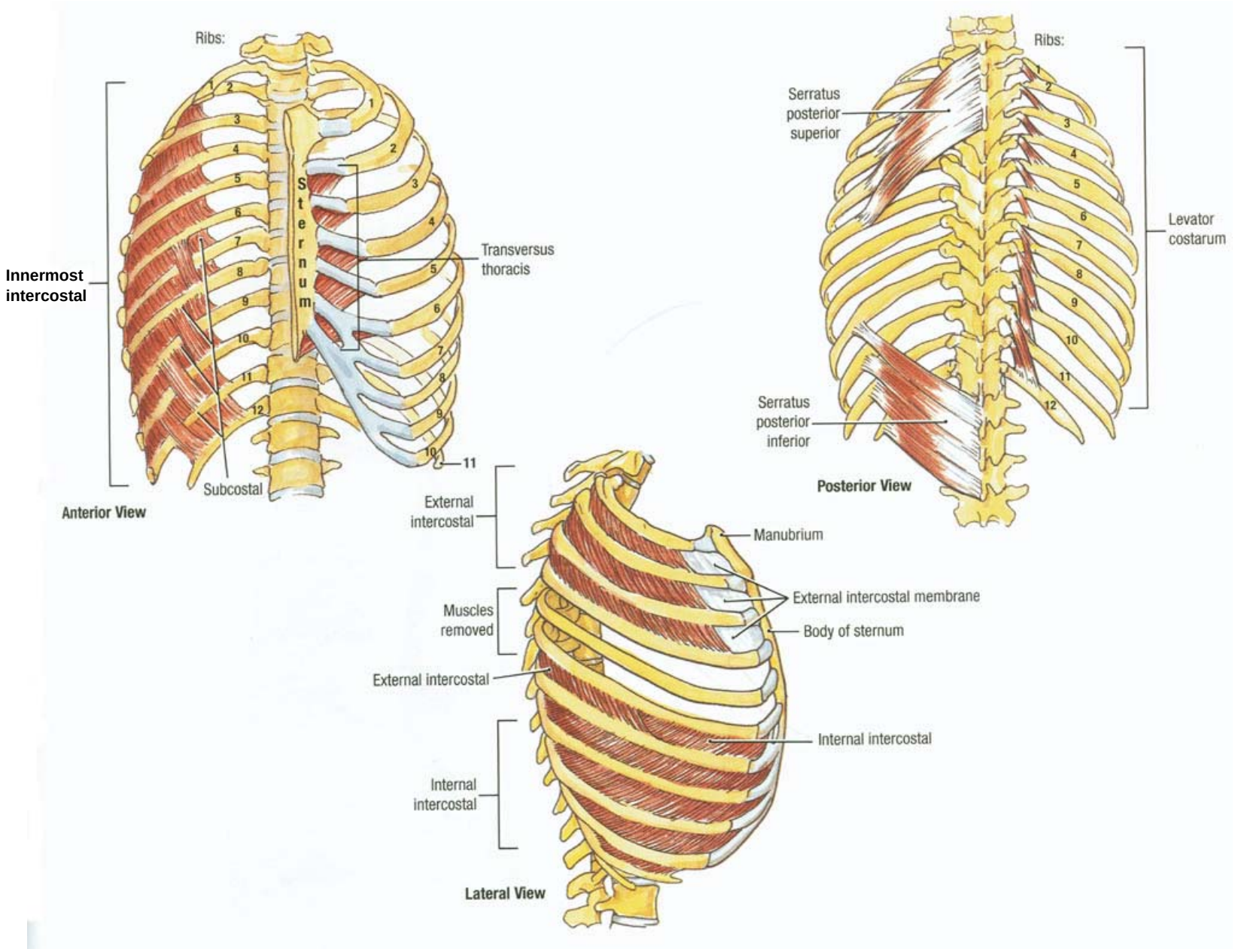
Insertion: Inner surface of second or third rib below.

Extent: Confined to post. Part of the lower spaces only

Direction of fibres:

Same as innermost intercostal.




Ribs:
Sternum
Transversus thoracis
Innermost intercostal
Subcostal
Anterior View
Ribs:
Serratus posterior superior
Levator costarum
Serratus posterior inferior
Posterior View
External intercostal
Manubrium
External intercostal membrane
Muscles removed
Body of sternum
External intercostal
Internal intercostal
Internal intercostal
Lateral View

Actions

- Ext. intercostal-Inspiration, moves ribs superiorly
- Int. intercostal- Expiration, moves ribs inferiorly
- Innermost intercostal-Expiration
- Subcostales – depress ribs
- S.P.S → elevates sup. 4 ribs, raising the sternum and ↑ AP diameter
- S.P.I. → depresses the inf. Ribs, so prevents then to be picked sup. By dia.
- Transverse throcis
- Lev. Costarum unimportant

Intercostal vessels

- Each space has arteries arranged in two groups – Anterior(2) & posterior (1)
- Veins also correspond to arteries & are arranged in two groups – Anterior(2) & posterior(1)
- Intercostal nerves are 11 in no. on each side & are the ventral ramus of thoracic nerve

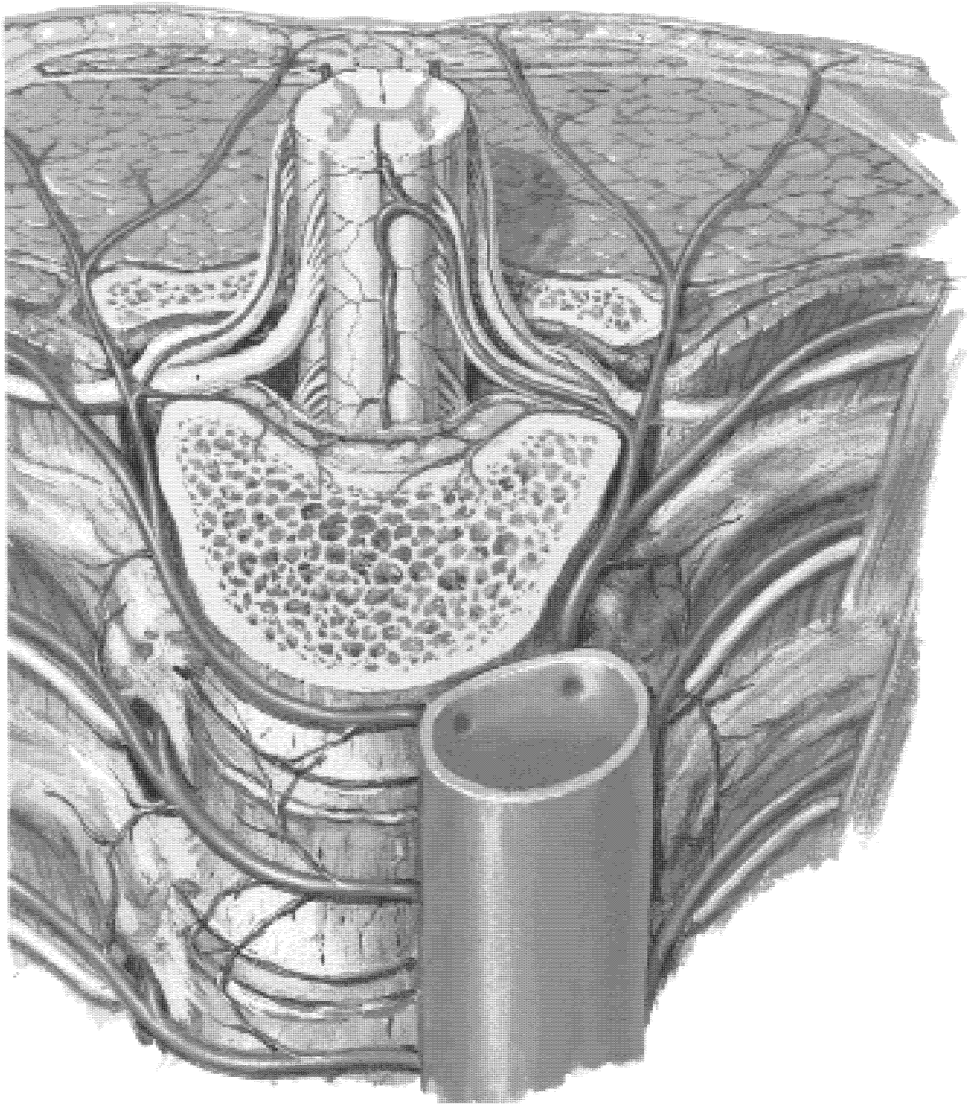
Intercostal Arteries

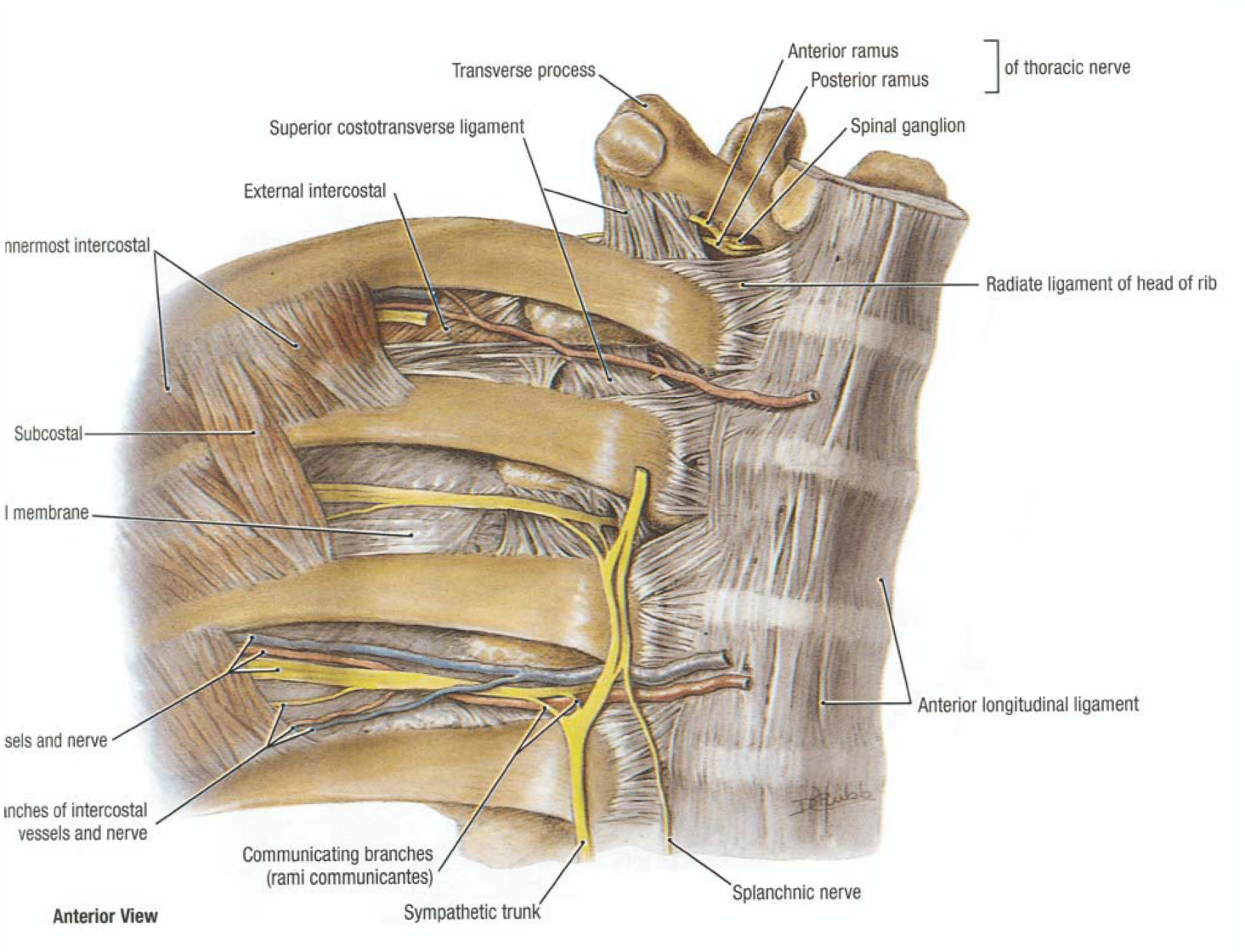
Post intercostal artery

- 11 on each side
- One in each space
- 1,2 – from superior IC artery
  (branch of costo-cervical trunk of subclavian
- 3 – 11 – from descending thoracic aorta

(Aortic intercostal arteries of Rt. Side are longer)

Thoracic Section




Transverse process
Anterior ramus
Posterior ramus
of thoracic nerve
Superior costotransverse ligament
Spinal ganglion
External intercostal
nnermost intercostal
Radiate ligament of head of rib
Subcostal
l membrane
Anterior longitudinal ligament
sels and nerve
nches of intercostal
vessels and nerve
Communicating branches
(rami communicantes)
Splanchnic nerve
Sympathetic trunk
Anterior View

Post. Intercostal artery

Course

Rt. Post IC artery arise from back of aorta

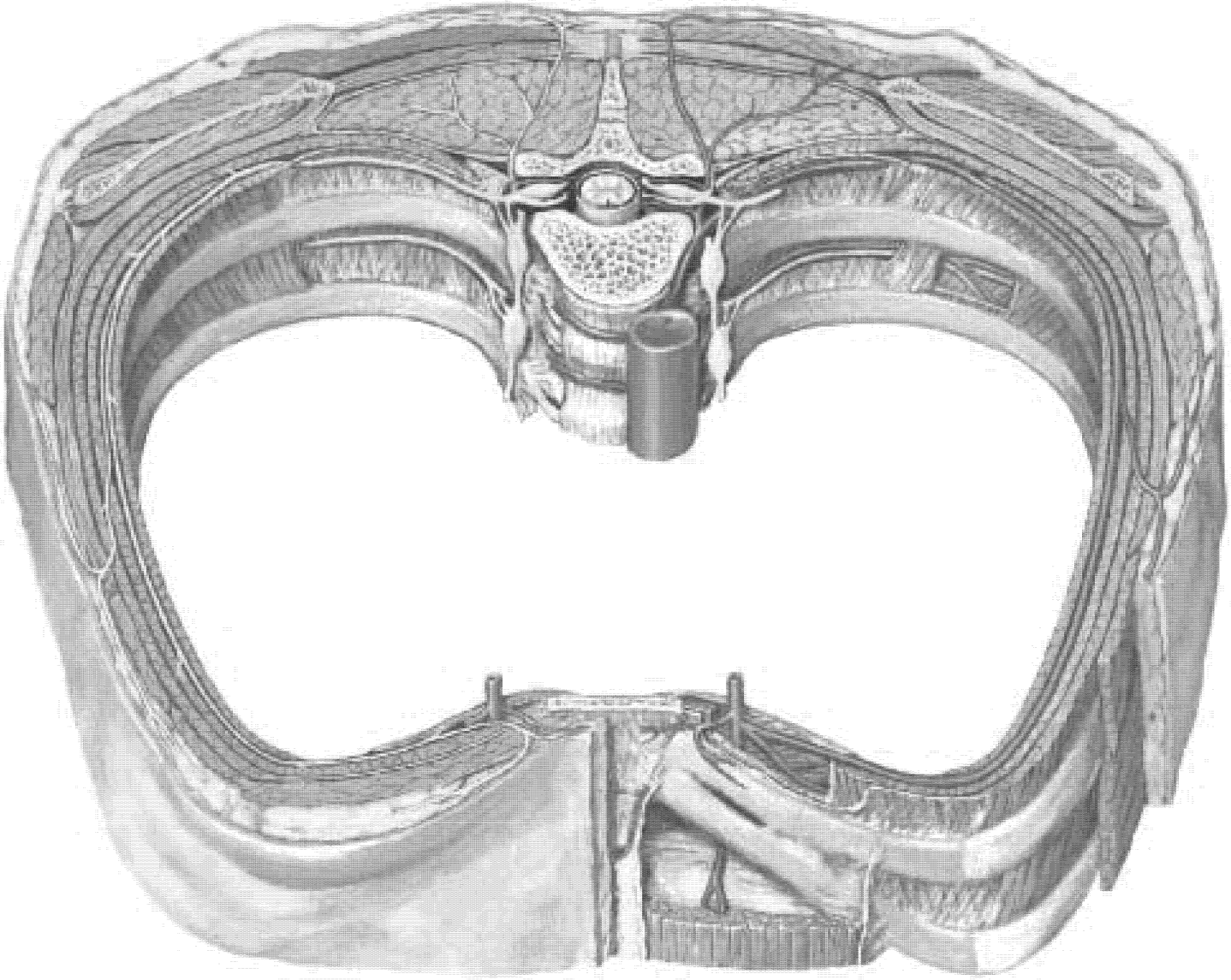
Pass backward & laterally in front of Vertebral column & behind oesophagus , thoracic duct & azygos vein & sympathetic trunk

Left passes behind Hemiazygos vein & sympathetic trunk

In the Space

Accompanied by vein & nerve

VAN – from above down wards



Post. Intercostal artery

- Each artery passes upward & laterally toward angle of upper rib
- Run along the costal groove between 2nd & 3rd layer
- Give a collateral branch at angle of rib &main branch continue & anastomose with upper anterior intercostal artery & collateral with lower ant. IC artery at costochondral junction

Anterior Intercostal artery

- Present in all spaces except last two which are open in front

1-6 arise from internal thoracic artery

7-9 from musculophrenic artery

Each space has two (upper & lower)

Venous drainage

- Ant.IC Veins (upper 6 space) – internal thoracic V
- Rest in musculophrenic vein
- Post. IC Vein – one in each space

Ist IC space – On Rt. & Lt.brachiocephalic vein

2^{nd} , 3^{rd} & 4^{th} IC space –Form Rt. superior IC vein which drain in Azygos vein

On left side form Lt superioor IC vein which drain in Lt brachiocephalic V

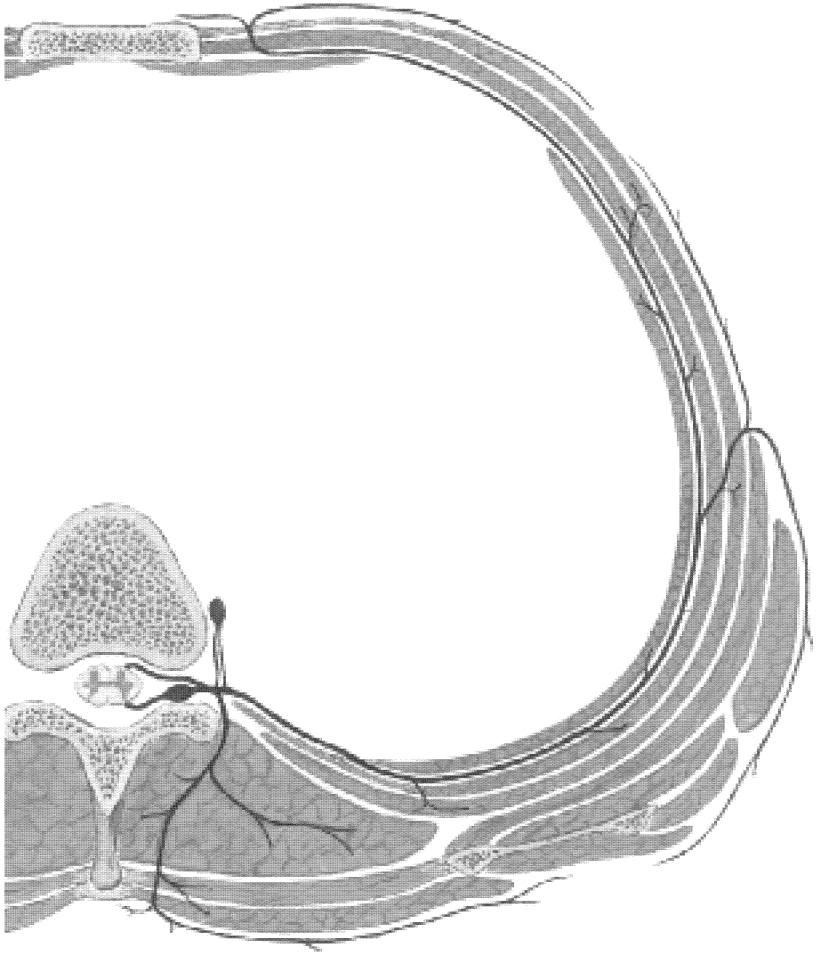
5^{th} to 11^{th} (Right) $\rightarrow$ azygos vein

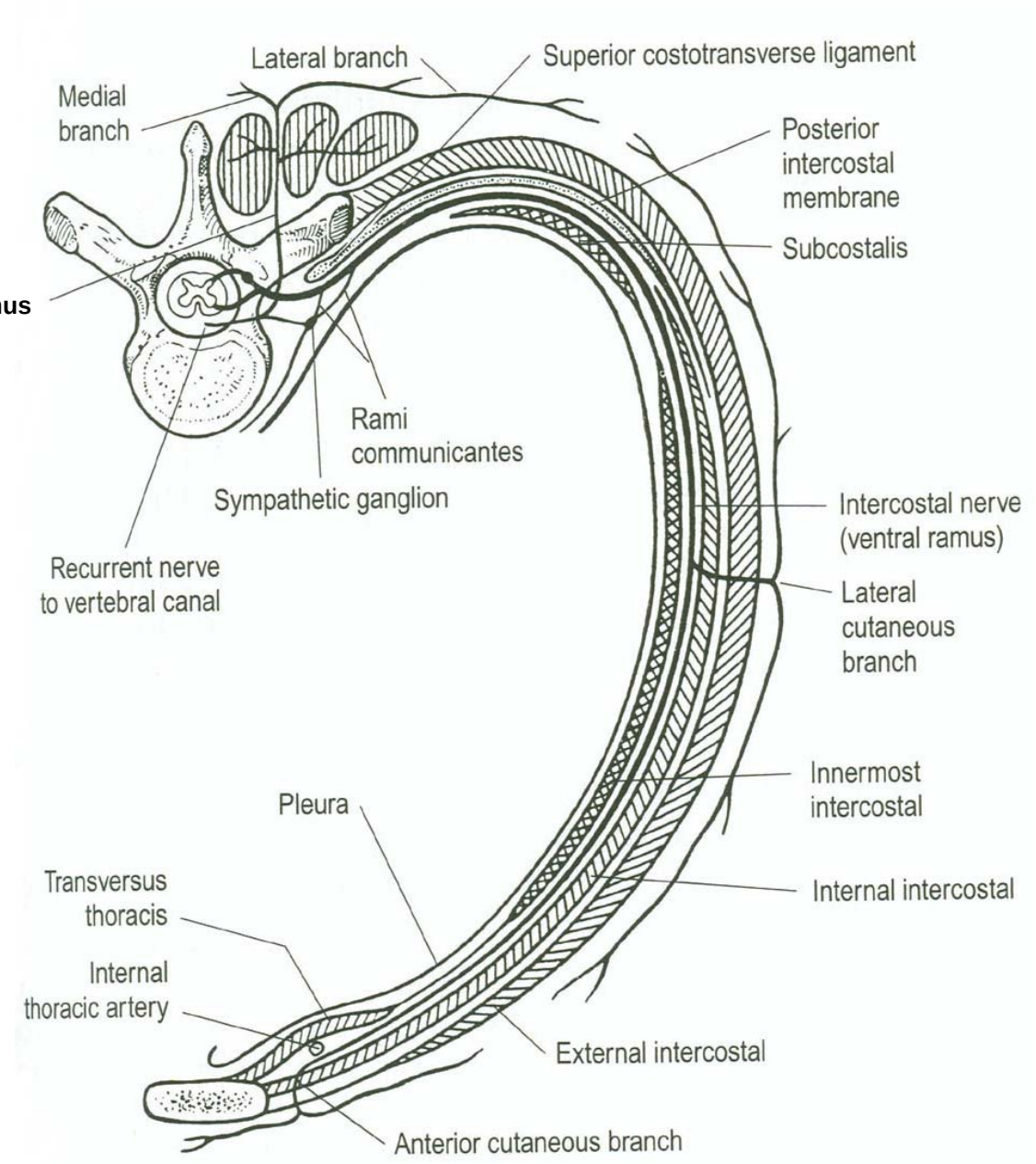
5^{th} to 8^{th} (Left) $\rightarrow$ acc. Hemiazygos

9^{th} to 11^{th} (Left) $\rightarrow$ hemiazygos

12^{th} – subcostal vein

Typical Thoracic Spinal Nerve




Lateral branch
Superior costotransverse ligament
Medial branch
Posterior intercostal membrane
Subcostalis
Dorsal ramus
Rami communicantes
Sympathetic ganglion
Intercostal nerve (ventral ramus)
Recurrent nerve to vertebral canal
Lateral cutaneous branch
Innermost intercostal
Pleura
Transversus thoracis
Internal intercostal
Internal thoracic artery
External intercostal
Anterior cutaneous branch