

# MUSCLES OF THE THORAX, BACK & ABDOMEN



# Muscles of the Thorax



*Superficial*

*Deep*

Pectoralis major

Pectoralis minor

Serratus anterior

Tendinous intersections

Rectus sheath

Umbilicus

Linea alba

Aponeurosis of external oblique

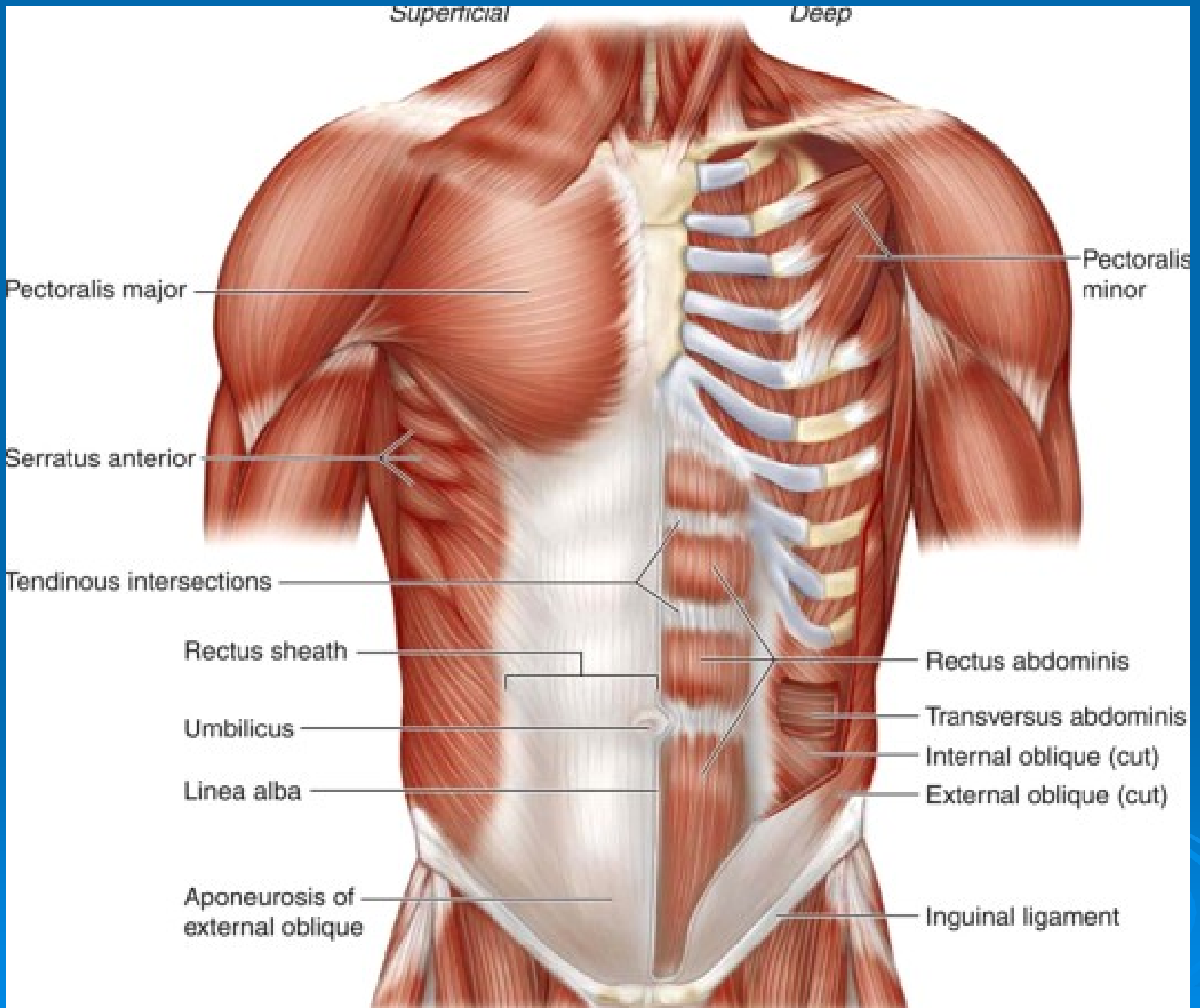
Rectus abdominis

Transversus abdominis

Internal oblique (cut)

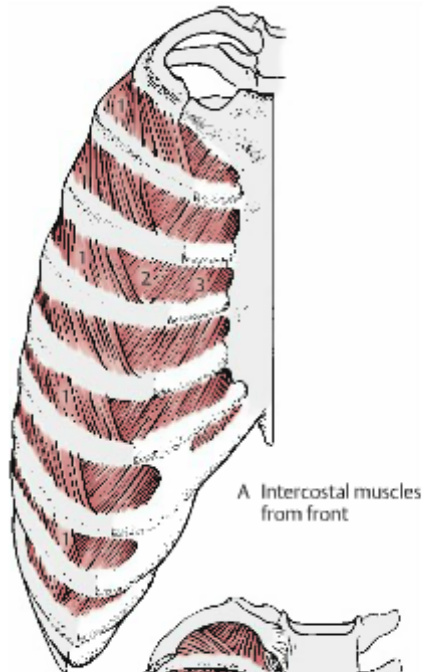
External oblique (cut)

Inguinal ligament



| Thoracic Muscles            |                     | Origin   | Insertion                                    | Action   | Innervation       |
|-----------------------------|---------------------|--|--|--|-------------------|
| <b>M. pectoralis major</b>  | pars clavicularis   | clavicula<br>(medial ½ )                         | crista tuberculi majoris                     | adduction, internal rotation, arm flexion; auxiliary inspiratory m.  | Plexus brachialis |
| <b>M. pectoralis major</b>  | pars sternocostalis | manubrium sterni et cartilagine costae (2nd-7th) |  |  |                   |
| <b>M. pectoralis major</b>  | pars abdominalis    | vagina muscoli recti abdominis                   |  |  |                   |
| <b>M. pectoralis minor</b>  |                     | 3rd - 5th rib                                    | processus coracoideus scapulae               | pulls the clavicle; auxiliary inspiration m  |                   |
| <b>M. subclavius</b>        |                     | first rib  | clavicula (inferior surface)                 | pulls clavicle → indirectly the shoulder distoventrally; auxiliary inspiration m.                              |                   |
| <b>M. serratus anterior</b> |                     | cranial 9 ribs                                   | scapula (margo medialis et angulus inferior) | pulls the clavicle from the backbone; pulls inferior angle laterally → rotates scapula; auxiliary respirat. m. |                   |

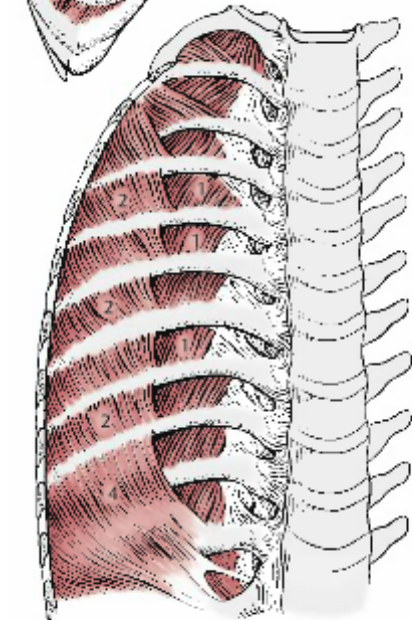
| Thoracic Muscles                 |                           | Origin   | Insertion                                 | Action   | Innervation       |
|----------------------------------|---------------------------|--|---|--|-------------------|
| <b>Mm. intercostales externi</b> |                           | inferior margin of ribs - from the costal tubercle to the beginning of rib cartilage | superior margin of ribs immediately below | elevation of lower ribs, thorax expansion → inspiratory m. | Nn. intercostales |
| <b>Mm. intercostales interni</b> |                           | superior margin of ribs - costal angle to sternum                                    | inferior margin of ribs immediately above | adduction of cranial ribs to caudal ribs → expiratory m.   |                   |
| <b>M. transversus thoracis</b>   |                           | internal surface of xiphoid process and body of sternum                              | cartilagine costae verae                  | expiratory muscle  |                   |
| <b>Diaphragma</b>                | sternal part              | inner surface of xiphoid process   | central tendon                            | main inspiratory muscle; abdominal press                   | Plexus cervicalis |
| <b>Diaphragma</b>                | costal part               | inner surface of cartilage of ribs 7-12  |   |  |                   |
| <b>Diaphragma</b>                | lumbar part, medial crus  | ligamentum longitudinale anterius (vertebrae lumbales)                               |   |  |                   |
| <b>Diaphragma</b>                | lumbar part, lateral crus | ligaments jump over the psoas and quadratus muscles                                  |   |  |                   |



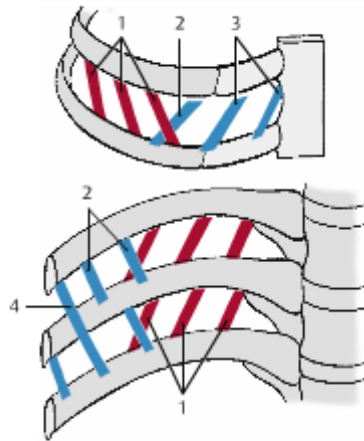
A Intercostal muscles from front



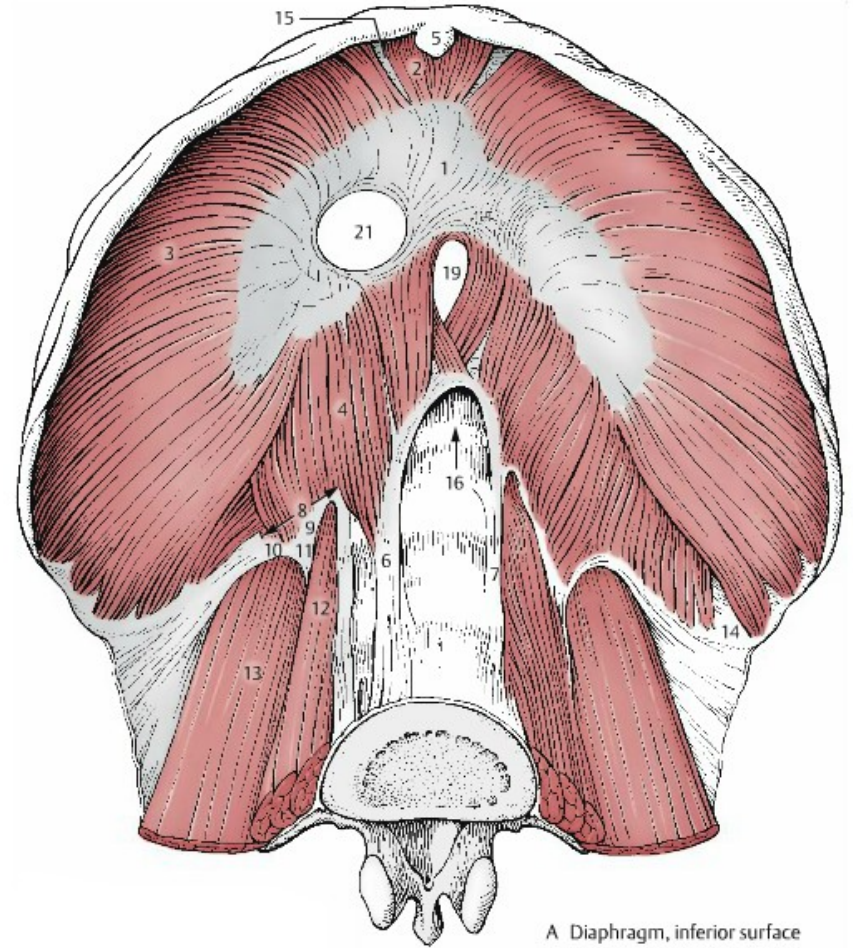
B Transversus thoracis, viewed from inside anterior thoracic wall



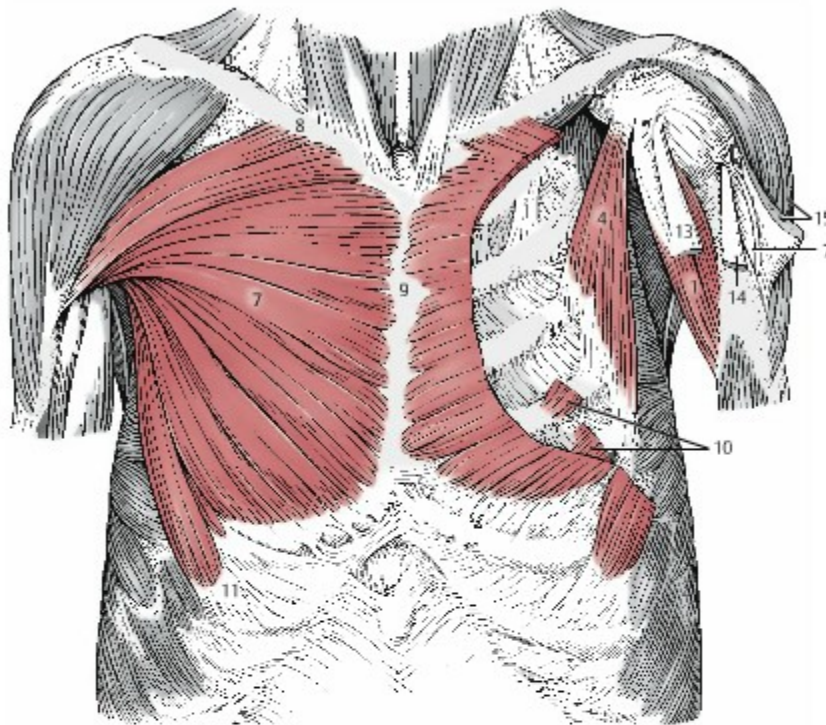
C View from inside posterior thoracic wall



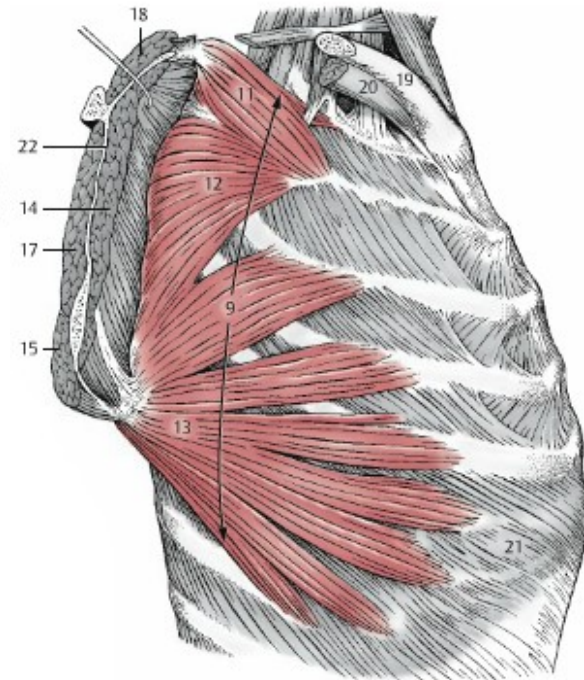
D Diagram of origin, course, and insertion of muscles



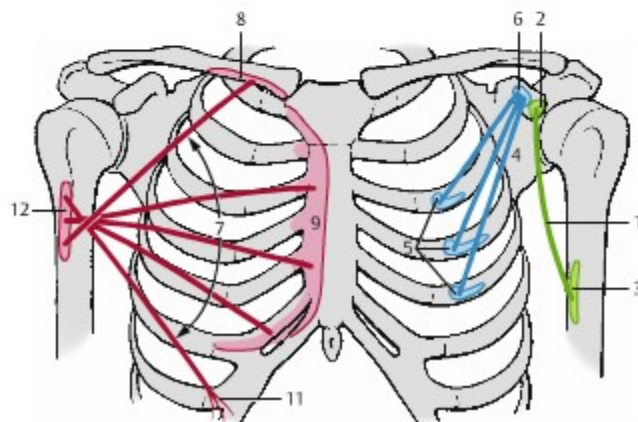
A Diaphragm, inferior surface



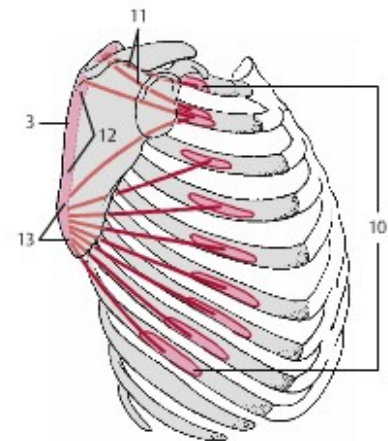
A Ventral shoulder muscles, anterior view



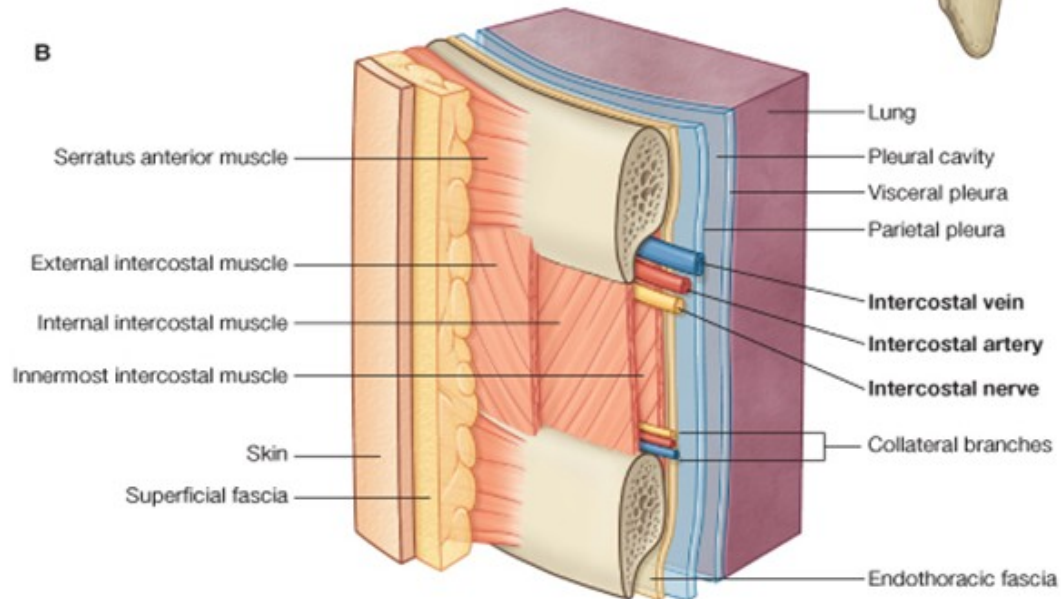
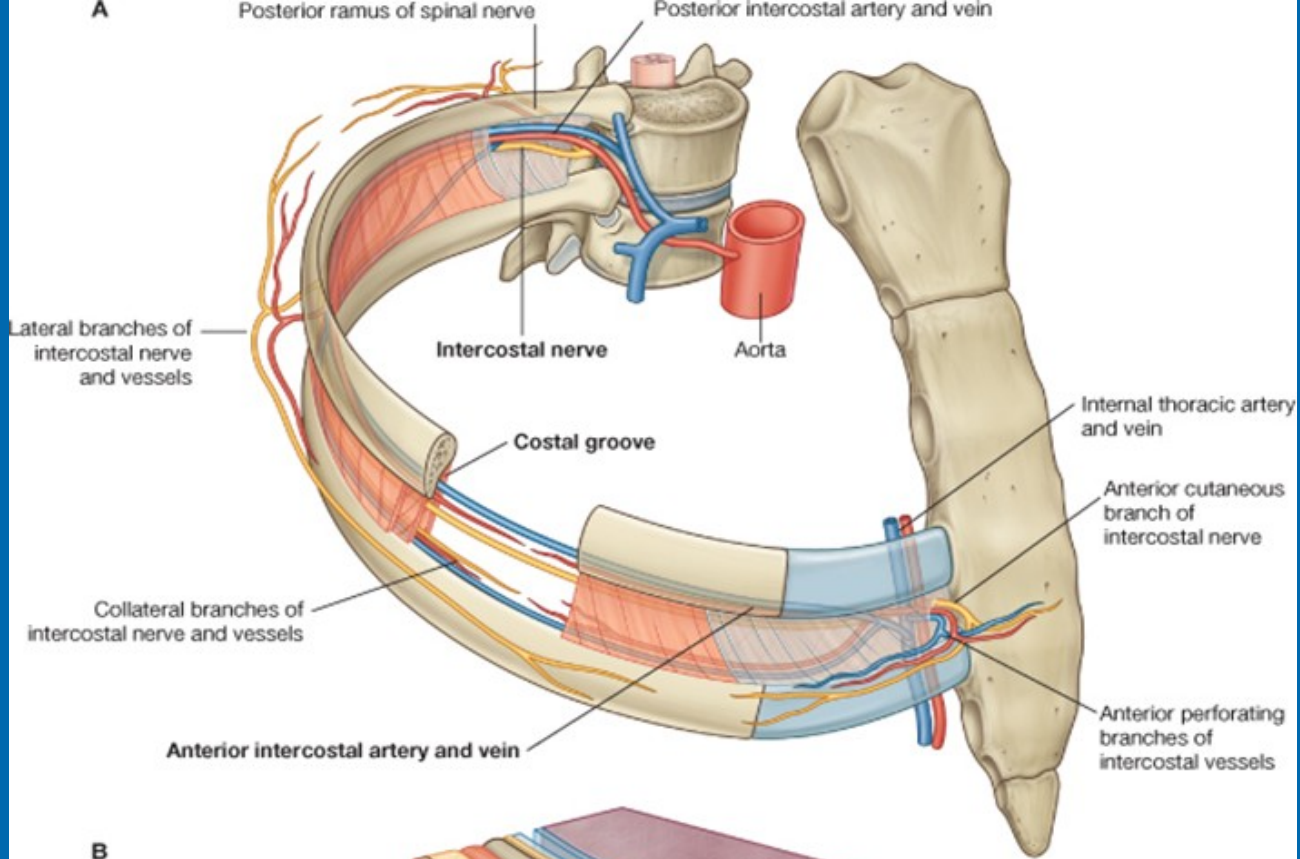
C Serratus anterior muscle, lateral view



B Diagram of origin, course, and insertion of muscles



D Diagram of origin, course, and insertion of serratus anterior muscle





# Muscles of the Back



## Superficial muscles

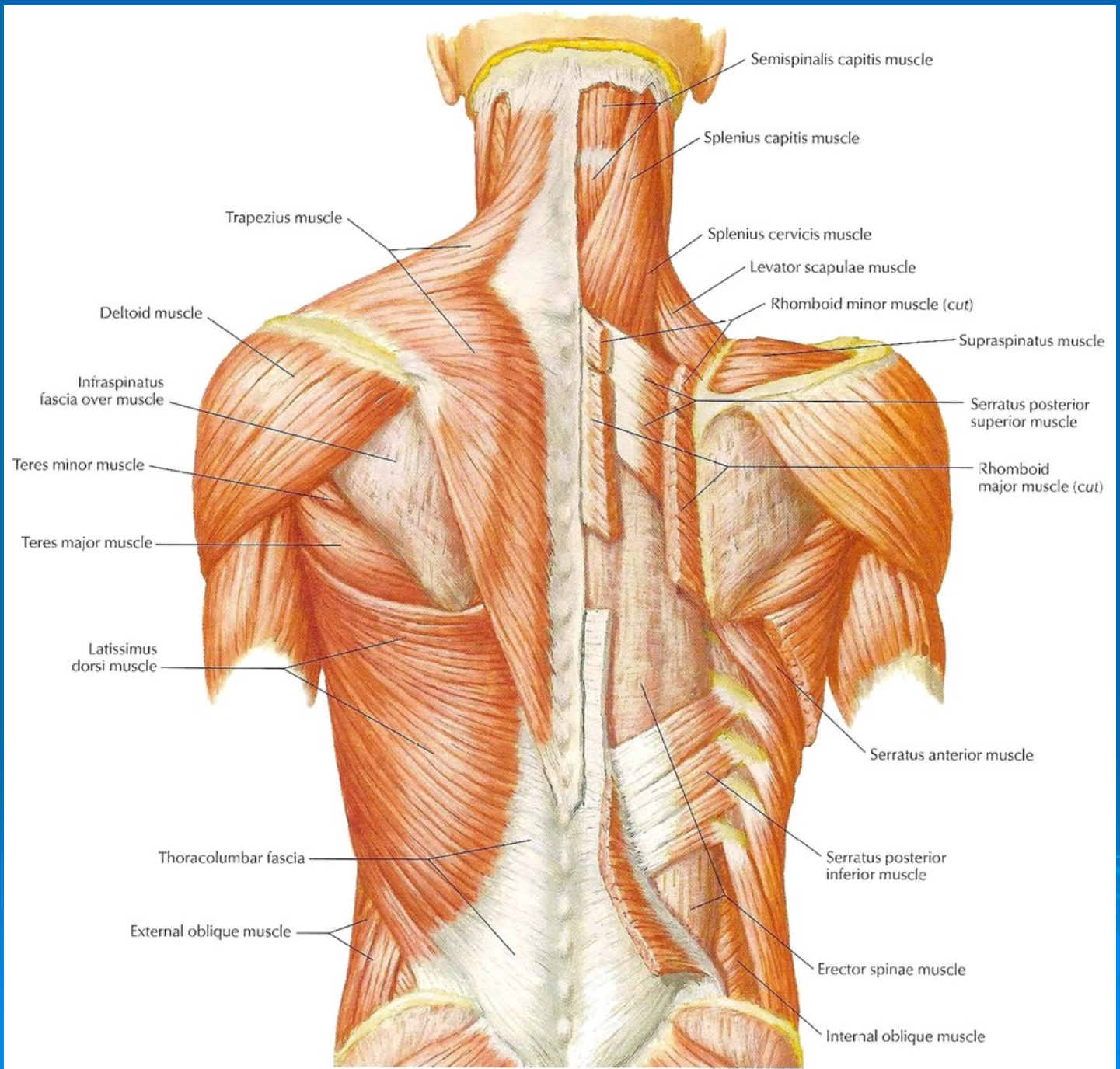
- functionally belong to the upper limb

## Intermediate muscles

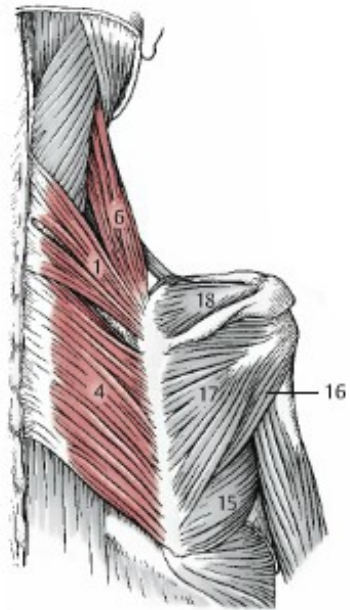
- active during respiration

## Deep muscles

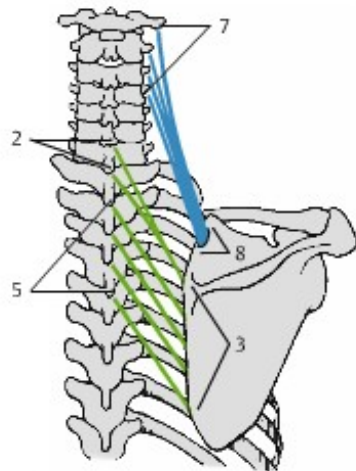
- true muscles of the back
- originates at lower levels → ascend in staggered fashion and insert into higher levels
- extends the vertebral column and head



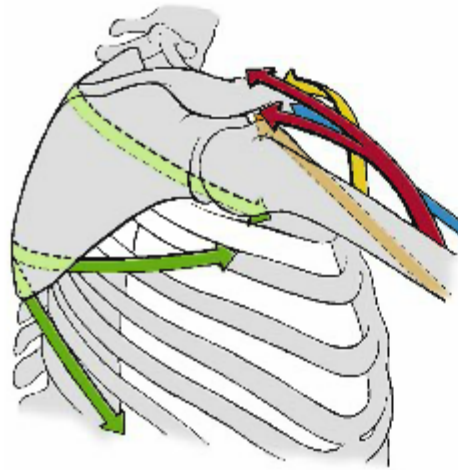
|                     | <b>Heterochtonnous muscles</b>        | <b>origin</b>   | <b>insertion</b>                                     | <b>action</b>  | <b>innervation</b>                |
|---------------------|---------------------------------------|---|--|--|-----------------------------------|
| <b>Spinohumeral</b> | <b>M. trapezius</b>                   | protuberantia occipitalis externa, septum nuchae, processus spinosi C7 and all thoracic vertebrae       | lateral 1/3 of clavicle, acromion and spina scapulae | adduction of shoulder, upper fibres elevates the scapula; the lower part pulls the scapula | n. accessorius, plexus cervicalis |
|                     | <b>M. latissimus dorsi</b>            | processus spinosi of caudal thoracic vertebrae, lumbar vertebrae, sacrum, crista iliaca and caudal ribs | crista tuberculi minoris                             | adduction, extension, medially rotation  | n. thoracodorsalis                |
|                     | <b>M. levator scapulae</b>            | processus transversi of cranial cervical vertebrae  | angulus superior scapulae                            | elevates scapula, rotates scapula medially   | n. dorsalis scapulae              |
|                     | <b>M. rhomboideus minor et major</b>  | processus spinosus of caudal cerical and cranial thoracic vertebrae                                     | margo medialis scapulae                              | pulls the scapula medially and cranially   |                                   |
| <b>Spinocostal</b>  | <b>M. serratus posterior superior</b> | processus spinosus of caudal cervical and cranial thoracic vertebrae                                    | cranial ribs   | elevates the ribs → auxilliary inspiratory muscle  | nn. intercostales                 |
|                     | <b>M. serratus posterior inferior</b> | processus spinosus of caudal thoracic and cranial lumbar vertebrae                                      | caudal ribs  | auxiliary expiratory muscle  |                                   |



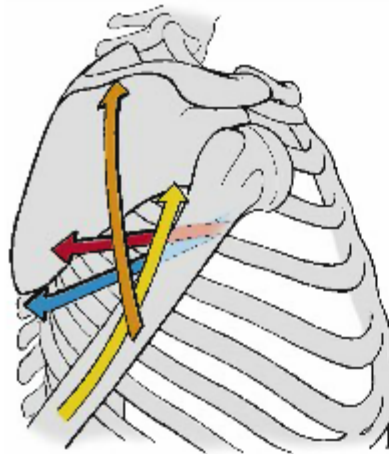
A Rhomboid muscles and levator scapulae muscle, posterior view



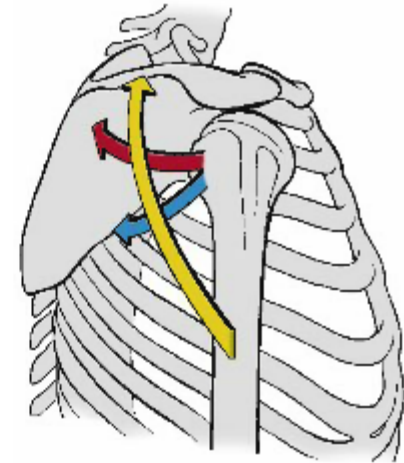
B Diagram of origin, course, and insertion of muscles



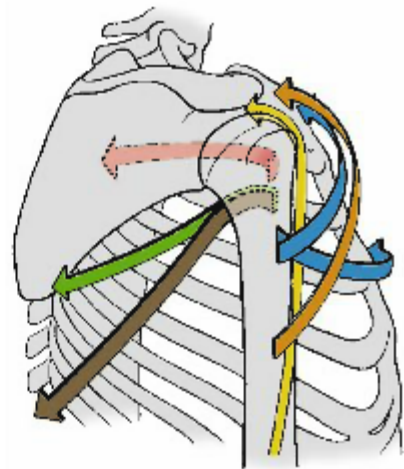
A Anteverision



B Retroversion



C Lateral rotation

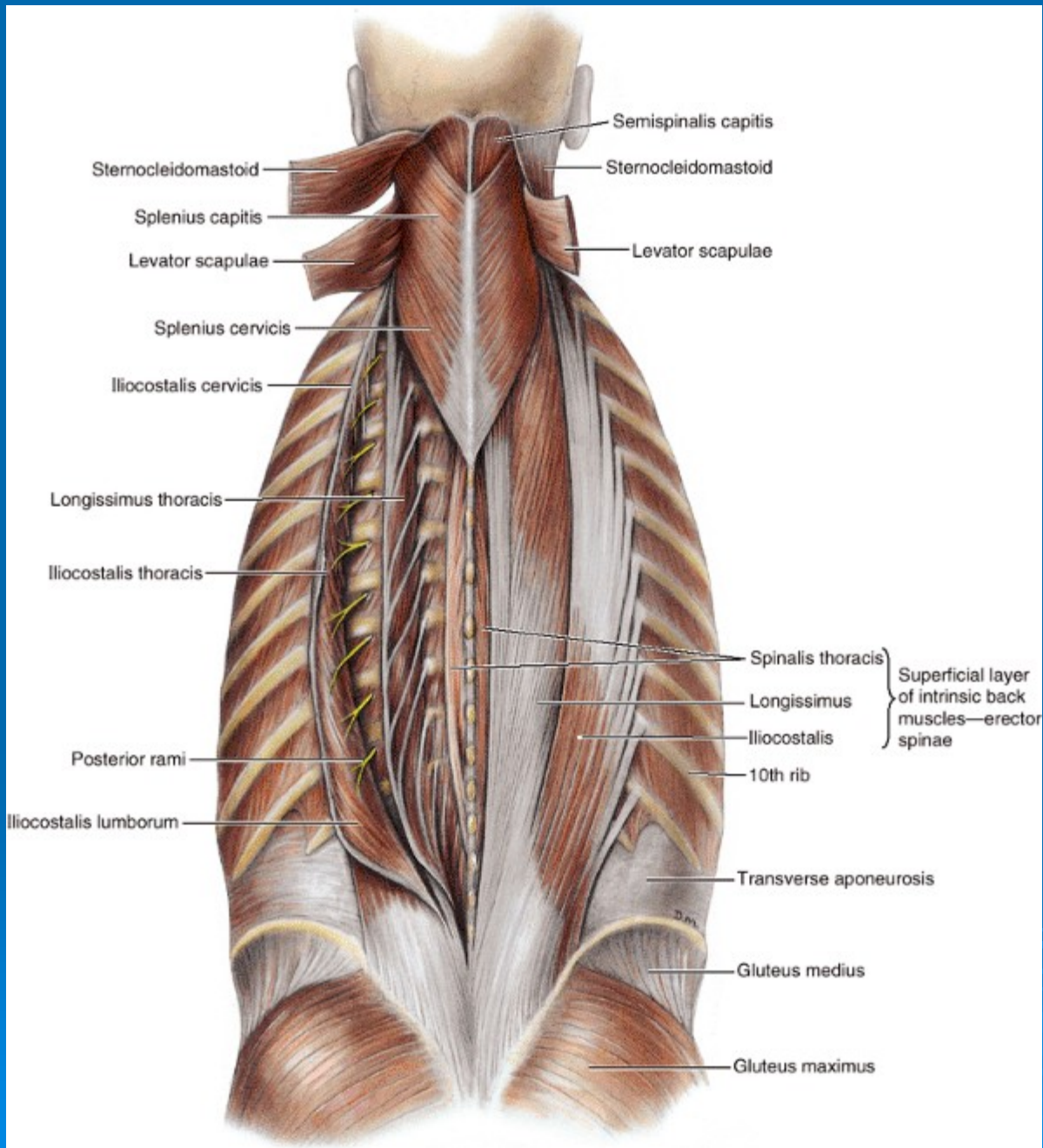


D Medial rotation

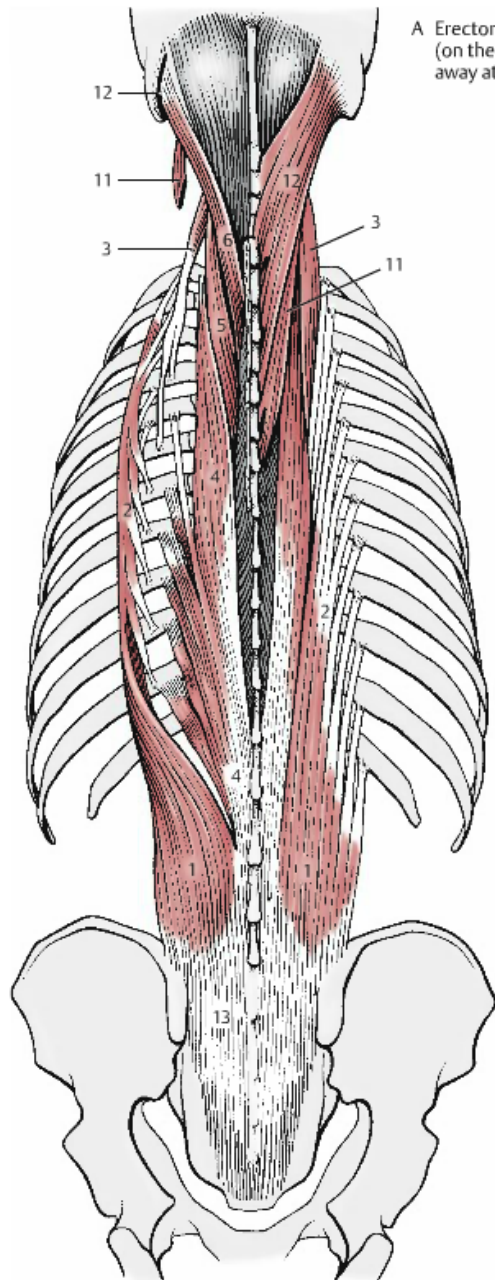
A-D  
Function of the shoulder  
girdle muscles  
(continued)

|                    | <b>Autochthonous muscles</b>                       | <b>Origin</b>   | <b>Insertion</b> | <b>Action</b>  | <b>Innervation</b>  |
|--------------------|--|---|------------------|--|---------------------|
| <b>Sacrospinal</b> | <b>M. longissimus dorsi et cervicis</b>            | fill the space between processus spinosus et transversus                        | medial part      | bilateral - dorsiflexion, unilateral - homolateral lateroflexion | DR of spinal nerves |
|                    | <b>M. longissimus capitis</b>                      |   | cranial base     |  |                     |
|                    | <b>M. iliocostalis</b>                             |   | lateral part     |  |                     |
| <b>Spinospinal</b> | <b>Mm. spinales thoracis et cervicis</b>           | are stretched between processus spinosus of the thoracic and cervical vertebrae |                  | unilateral - lateroflexion, bilateral - dorsiflexion             |                     |
|                    | <b>Mm. interspinales cervicis</b>                  |   |                  |  |                     |
|                    | <b>Mm. intertransversarii posteriores cervicis</b> |   |                  |  |                     |

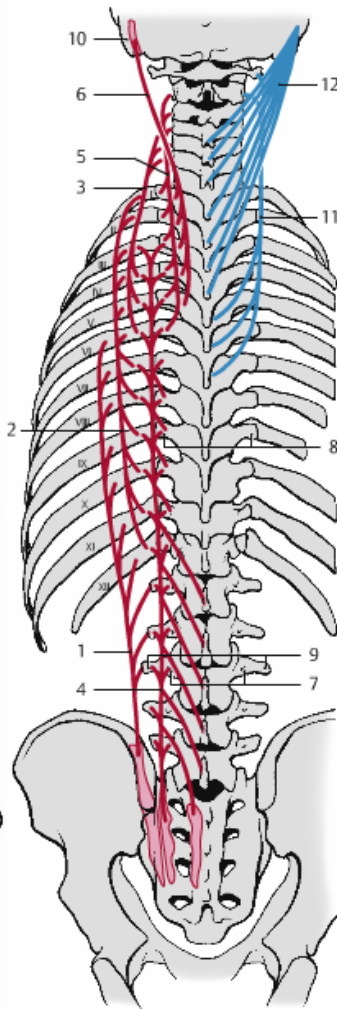
|                         | <b>Autochthonous muscles</b>                | <b>Origin</b>  | <b>Insertion</b>        | <b>Action</b>   | <b>Innervation</b>  |
|-------------------------|---|--|-------------------------|---|---------------------|
| <b>Transversospinal</b> | <b>M. semispinalis thoracis et cervicis</b> | are stretched from transversal to the spinous processes; is located along the whole spine with insertion on the cranial base | jump over 4-5 vertebrae | bilateral - dorsiflexion, unilateral - homolateral lateroflexion and contralateral rotation | DR of spinal nerves |
|                         | <b>M. semispinalis capitis</b>              |  |                         |   |                     |
|                         | <b>Mm. multifidi</b>                        |  | jump over 1-3 vertebrae |   |                     |
| <b>Spinotransversal</b> | <b>M. splenius capitis</b>                  | runs from processus spinosus to processus transversus  | cranial base            | bilateral - dorsiflexion, unilateral - lateroflexion and homolateral rotation               |                     |
|                         | <b>M. splenius cervicis</b>                 |  | cervical vertebrae      |   |                     |



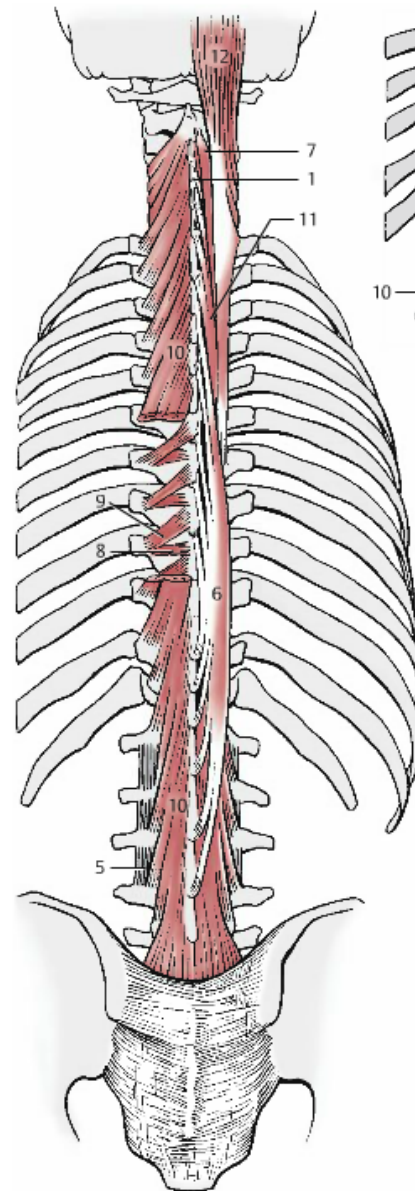




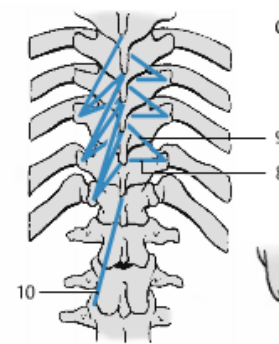
A Erector spinae muscle  
(on the left the splenii have been cut  
away at their origin and insertion)



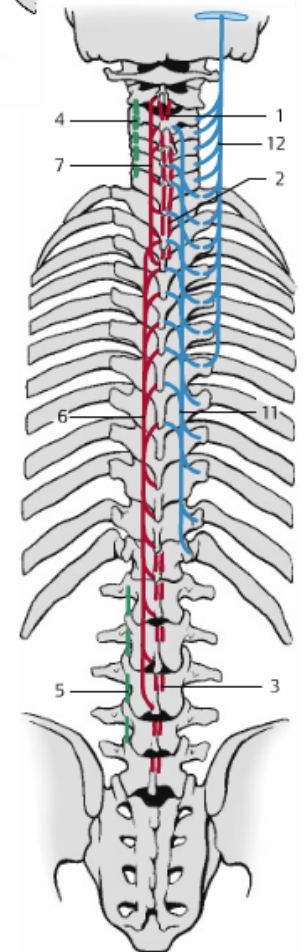
B Diagram of origin, course,  
and insertion of muscles



A Erector spinae muscle, multifidus muscle  
partially removed to make the rotator  
muscles visible)

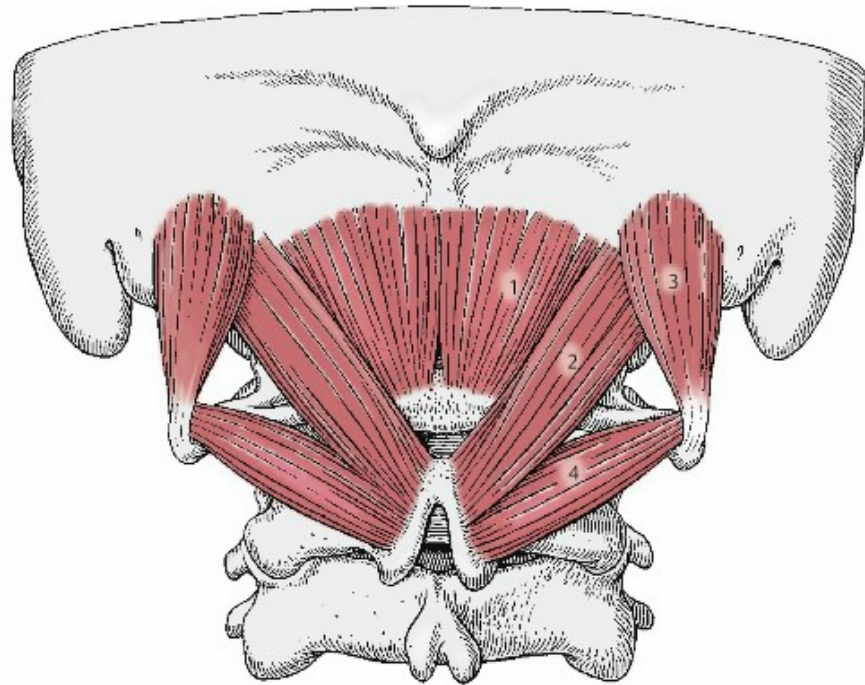


C Diagram of origin,  
course, and insertion  
of transversospinales

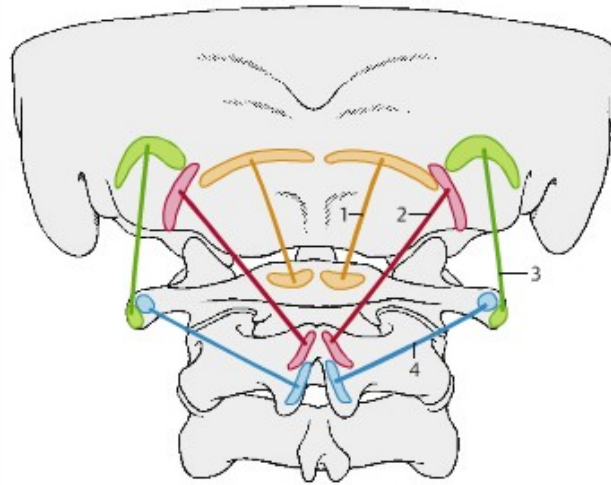


B Diagram of origin, course,  
and insertion of straight  
muscle system

| <b>Mm. nuchae<br/>profundi</b>               | <b>Origin</b>                    | <b>Insertion</b>                 | <b>Action</b>   | <b>Innervation</b> |
|--|----------------------------------|----------------------------------|---|--------------------|
| <b>M. rectus capitis<br/>posterior minor</b> | tuberculum posterius<br>atlantis | linea nuchae inferior            | unilateral - homolateral<br>lateroflexion, bilateral -<br>dorsiflexion              | suboccipital nerve |
| <b>M. rectus capitis<br/>posterior major</b> | processus spinosus<br>axis       | linea nuchae inferior            | bilateral - dorsiflexion,<br>unilateral - homolateral<br>lateroflexion and rotation |                    |
| <b>M. obliquus capitis<br/>superior</b>      | processus transversi<br>atlantis | linea nuchae inferior            | bilateral - dorsiflexion,<br>unilateral - homolateral<br>lateroflexion              |                    |
| <b>M. obliquus capitis<br/>inferior</b>      | processus spinosu<br>axis        | processus transversi<br>atlantis | homolateral rotation  |                    |



A Suboccipital muscles

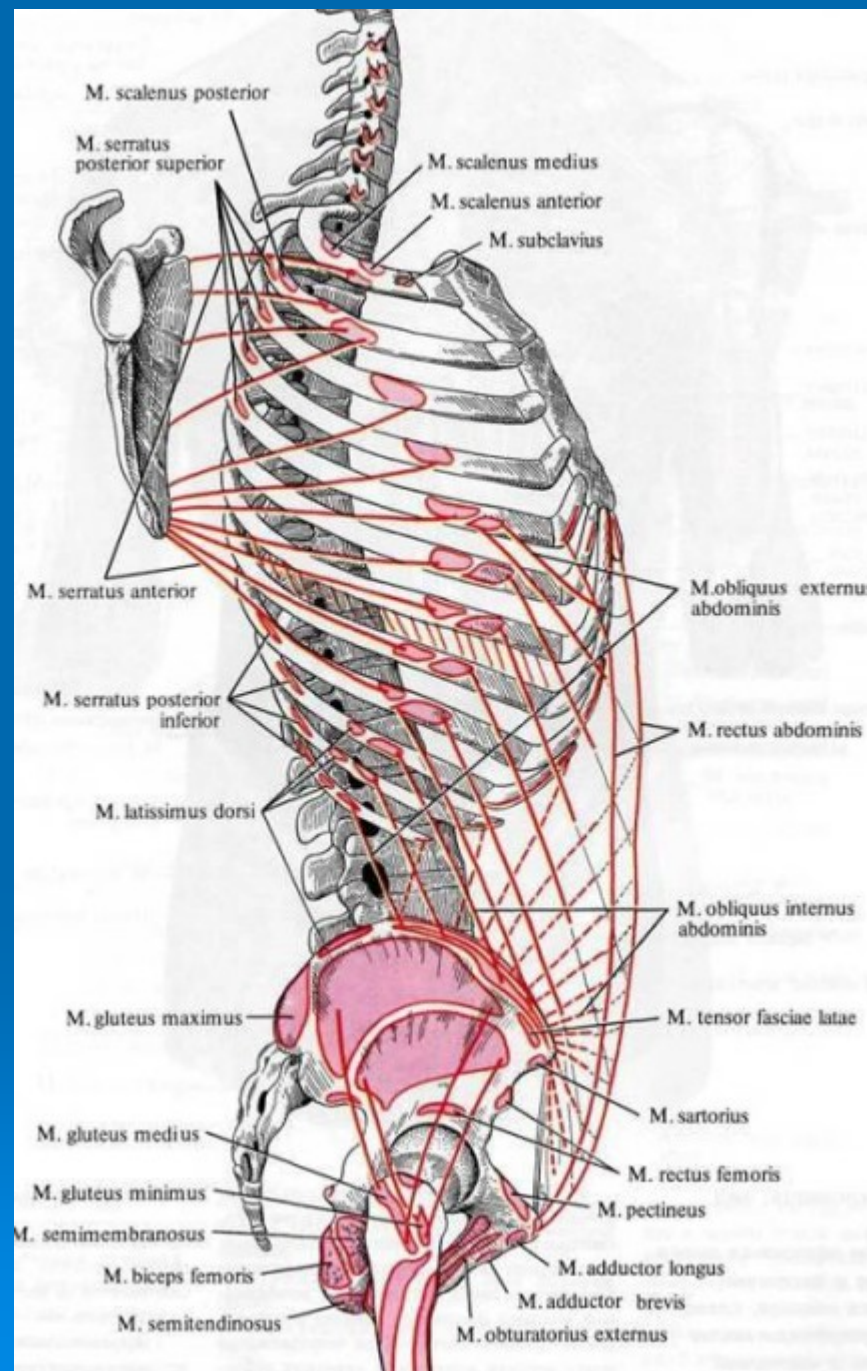


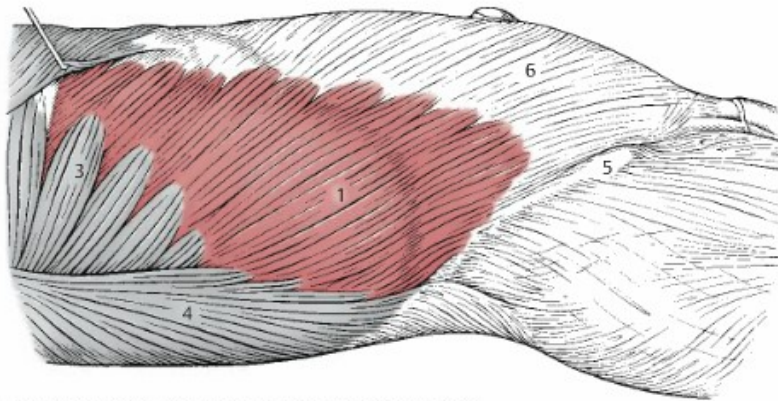
B Diagram of origin, course, and insertion of muscles

# Muscles of the Abdomen

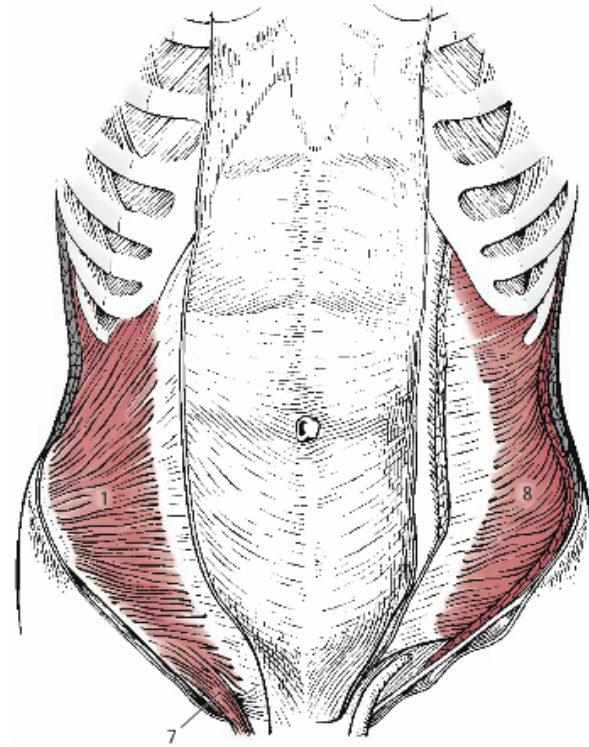


| <b>Abdominal muscles</b>              | <b>Origin</b>   | <b>Insertion</b>   | <b>Action</b>  | <b>Innervation</b> |
|---------------------------------------|---|--|--|--------------------|
| <b>M. rectus abdominis</b>            | xiphoid process and costal cartilages 5 - 7                               | tuberculum pubicum   | trunk anteflexion;<br>increase abdominal press   | Nn. Intercostales  |
| <b>M. obliquus externus abdominis</b> | lower ribs  | crista iliaca,<br>ligamentum inuinale,<br>vagina muscoli recti abdominis | ↑ abdominal press;<br>bilateral - anteflexion,<br>unilateral - contralateral rotation                        |                    |
| <b>M. obliquus internus abdominis</b> | fascia thoracolumbalis,<br>crista iliaca,<br>ligamentum inuinale          | lower ribs et vagina muscoli recti abdominis                             | auxiliary expiration m, ↑ abdominal press;<br>bilateral - dorsiflexion,<br>unilateral - homolateral rotation |                    |
| <b>M. transversus abdominis</b>       | fascia thoracolumbalis,<br>crista iliaca, lower ribs                      | vagina muscoli recti abdominis   | auxiliary respiratory m,<br>↑ abdominal press;<br>unilateral - homolateral lateroflexion                     |                    |
| <b>M. quadratus lumborum</b>          | The muscle is attached between last rib, iliac crest and lumbar vertebrae |  | unilateral - homolateral lateroflexion, bilateral - dorsiflexion of backbone                                 |                    |

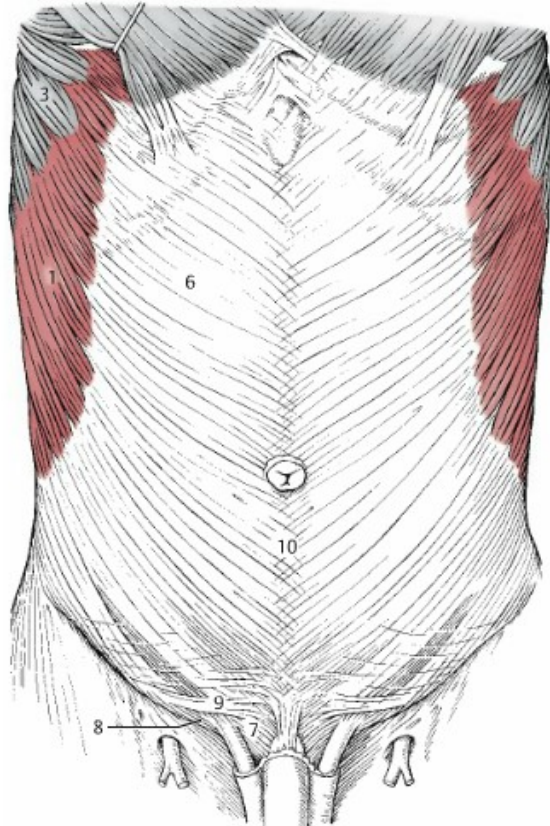




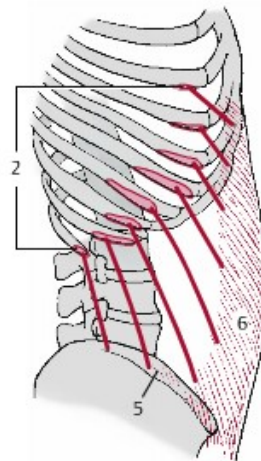
A Abdominal wall from side: external abdominal oblique



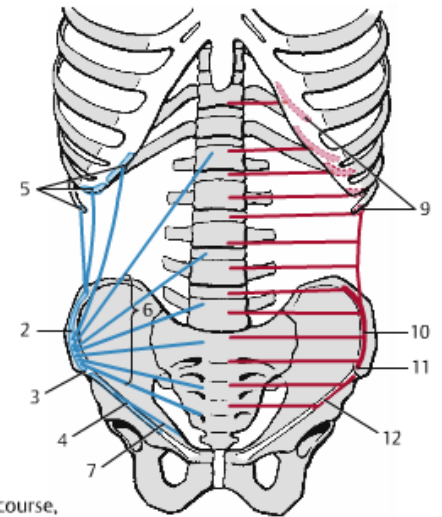
B Abdominal wall from front: external abdominal oblique



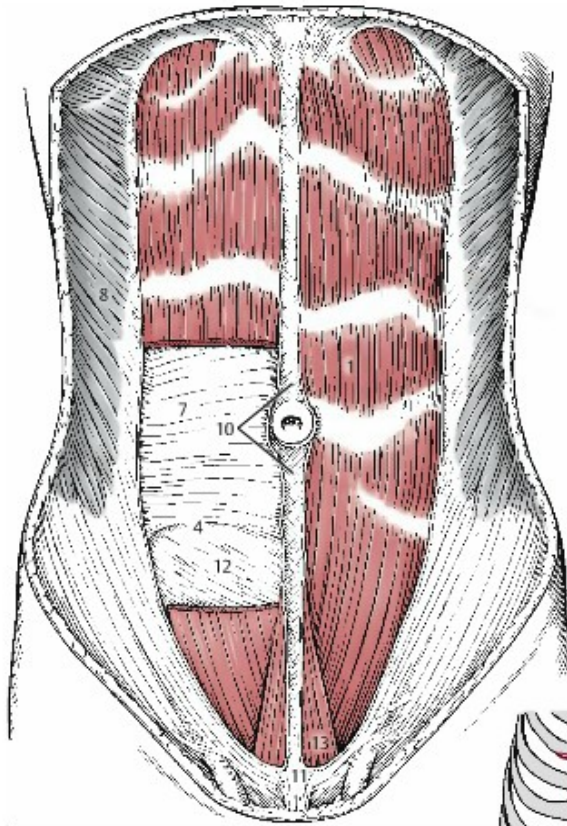
A Abdominal wall from front, internal abdominal oblique muscle and transversus abdominis



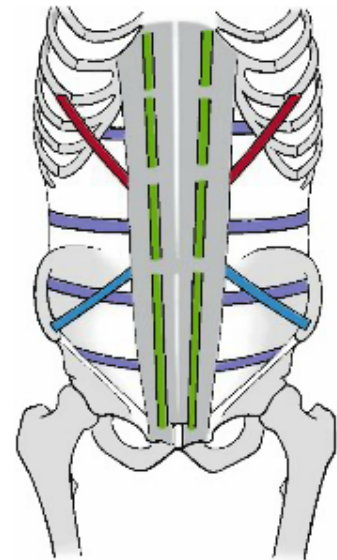
C Diagram of origin, course, and insertion of muscles



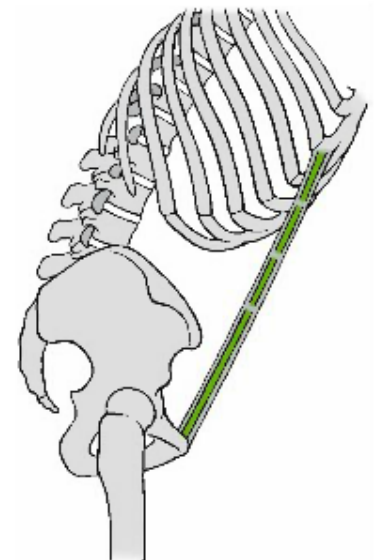
B Diagram of origin, course, and insertion of muscles



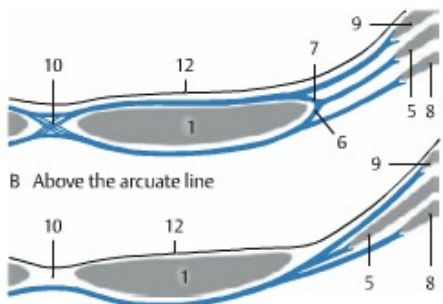
A Rectus abdominis (sectioned and partly removed on right) and pyramidalis muscle



A Direction of tension of the muscle fibers



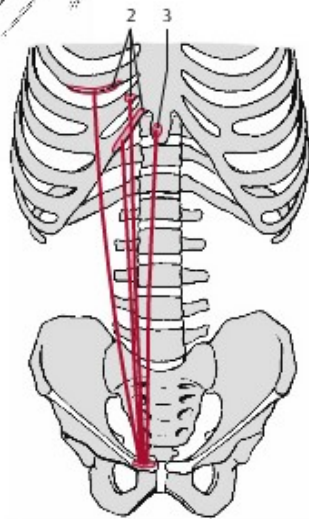
B Anterior flexion



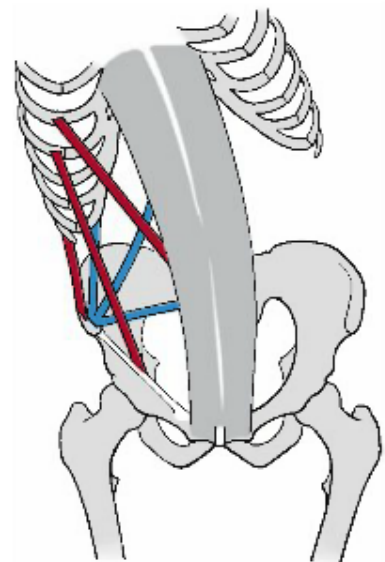
B Above the arcuate line

C Below the arcuate line

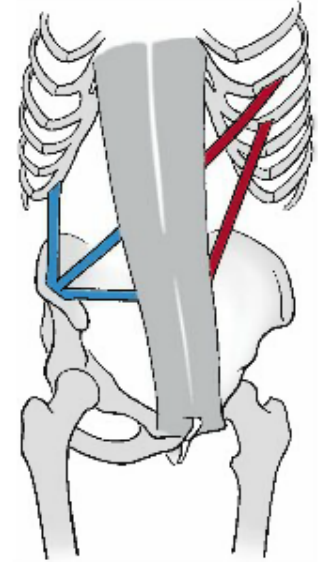
B, C Diagrammatic transverse sections through anterior abdominal wall



D Diagram of origin, course, and insertion of muscles



C Lateral flexion



D Lateral rotation

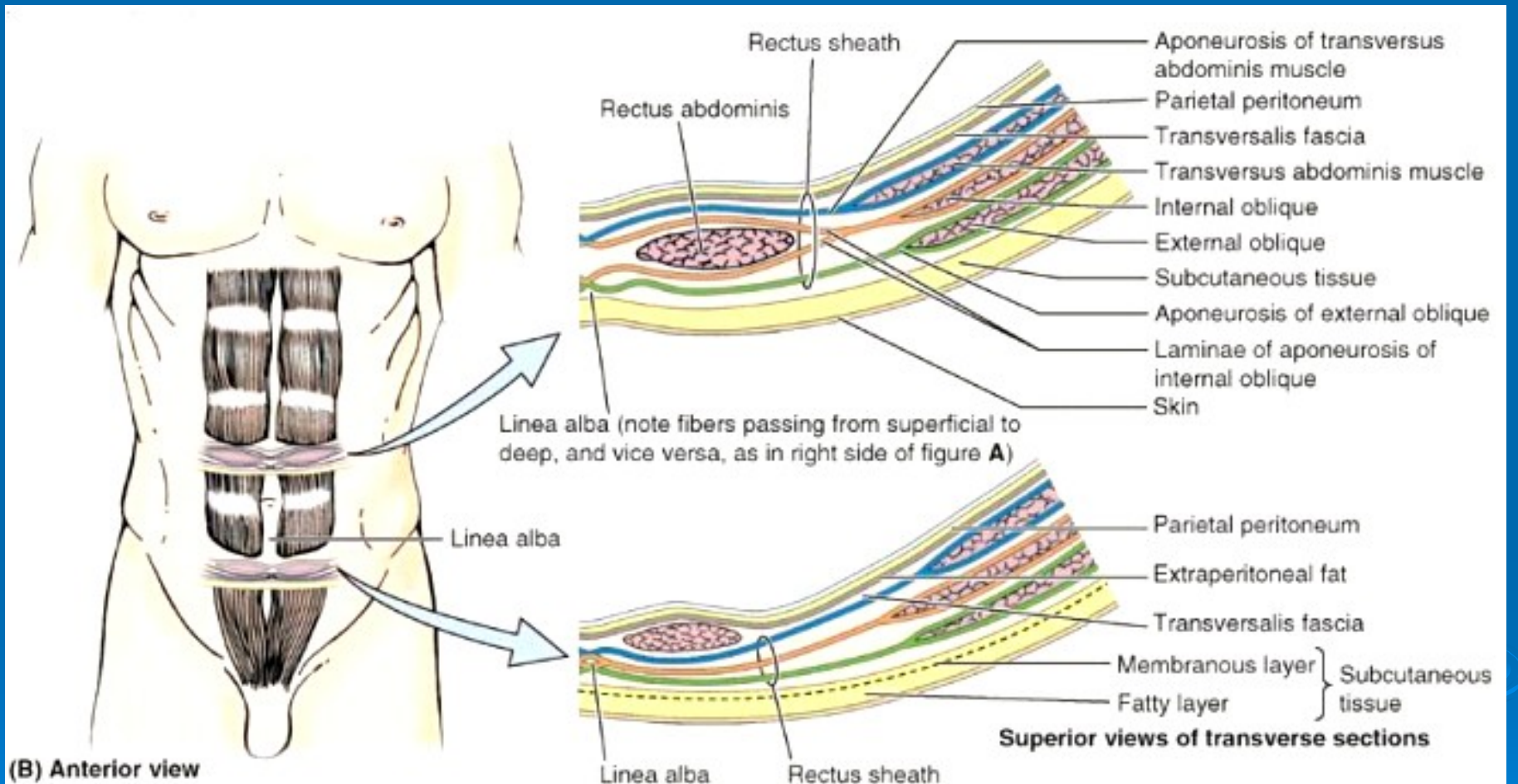


## Anterior abdominal wall

- Muscles of abdominal wall are continue anteriorly and medially as **strong sheet-like aponeuroses**
- Between the midclavicular line and the midline form the **rectus sheath enclosing the rectus abdominis muscle**
- In midline aponeuroses interweave with their fellows of the opposite side forming a midline raphe = **linea alba** (extends from the xiphoid process to the pubic symphysis)
- **The deep surface of the transversus abdominis muscle and its aponeurosis is transversalis fascia**

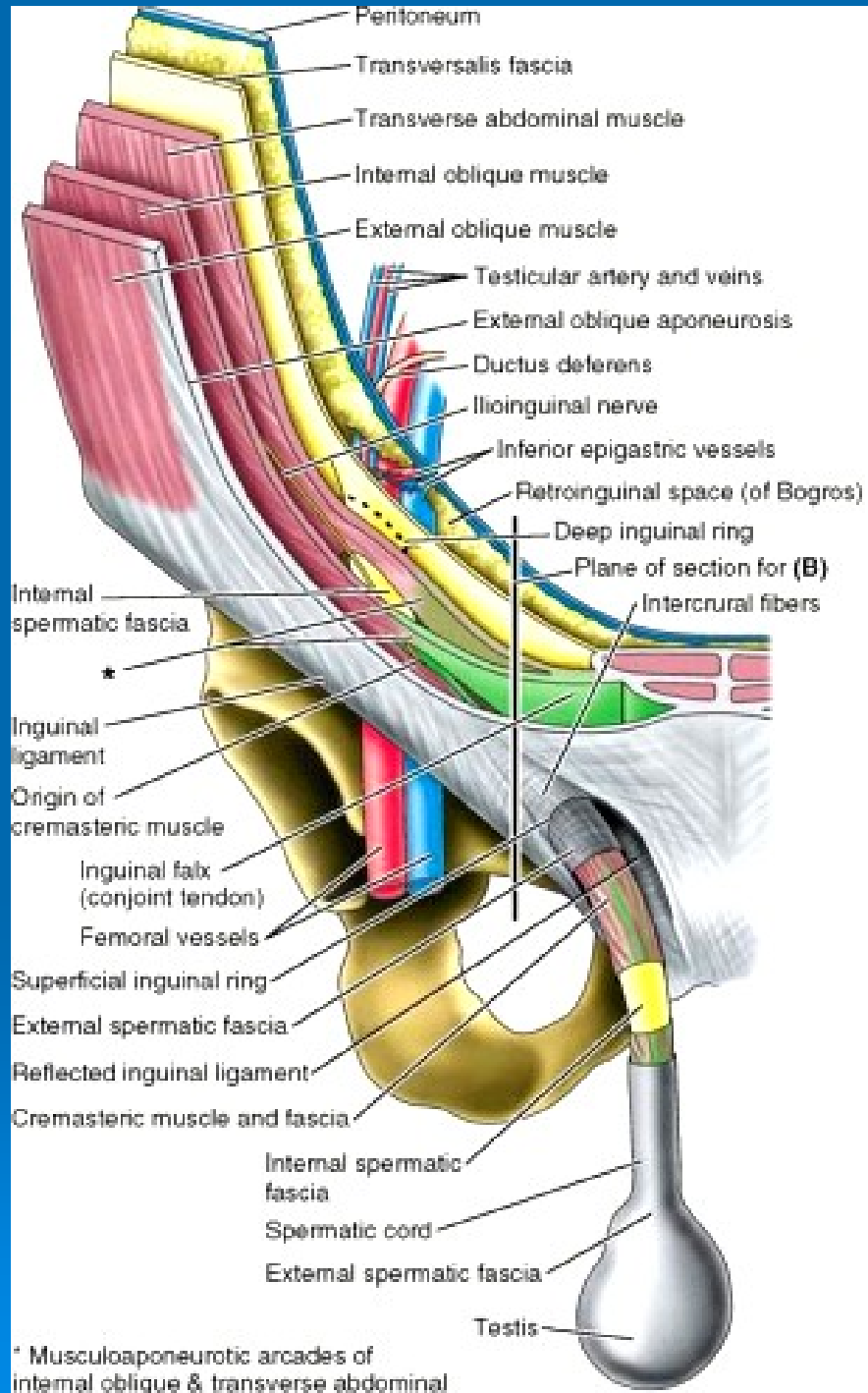
## Anterior abdominal wall

- **Approximately one third of the distance from the umbilicus to the pubic crest**, the aponeuroses of the **three flat muscles pass anterior** to the rectus abdominis to form the anterior layer of the rectus sheath
- **Leaving only** the relatively thin **transversalis fascia** to cover the rectus abdominis posteriorly
- **Arcuate line** – demarcates the transition between the aponeurotic posterior wall of the sheath covering the superior three quarters of the rectus and the transversalis fascia covering the inferior quarter

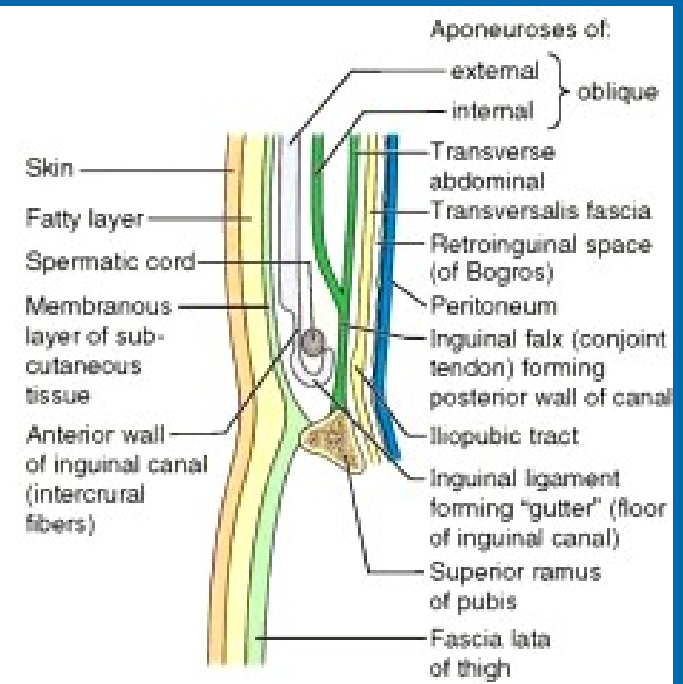


# Inguinal canal

- A passage through the lower anterior abdominal wall situated just above the medial half of the inguinal ligament
- Extends in a downward and medial direction from the deep inguinal ring to the superficial inguinal ring
- **Deep inguinal ring**
- Opening of the evagination of the transversalis fascia at a point midway between the anterior superior iliac spine and the pubic symphysis → continues into the canal forming the innermost covering of the structures traversing the canal
- **Superficial inguinal ring**
- Triangular opening in the aponeurosis of the external oblique muscle



\* Musculoaponeurotic arcades of internal oblique & transverse abdominal



(B) Schematic sagittal section of inguinal canal □

