RESPIRATORY MUSCLES AND ABDOMINAL MUSCLES

Andrea Heinzlmann

Veterinary University

Department of Anatomy and Histology

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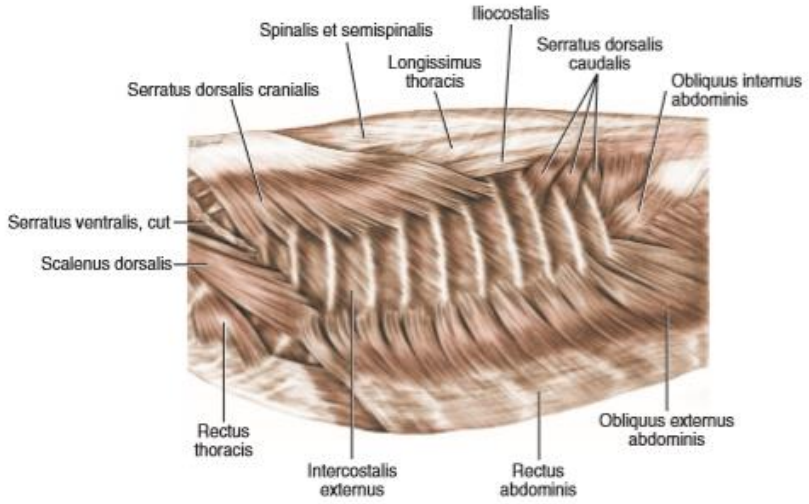
RESPIRATORY MUSCLES OF CARNIVORES

the muscles of respiration are those muscles that:

- **contribute to inhalation and exhalation**
- **by aiding in the expansion and contraction of the thoracic cavity**



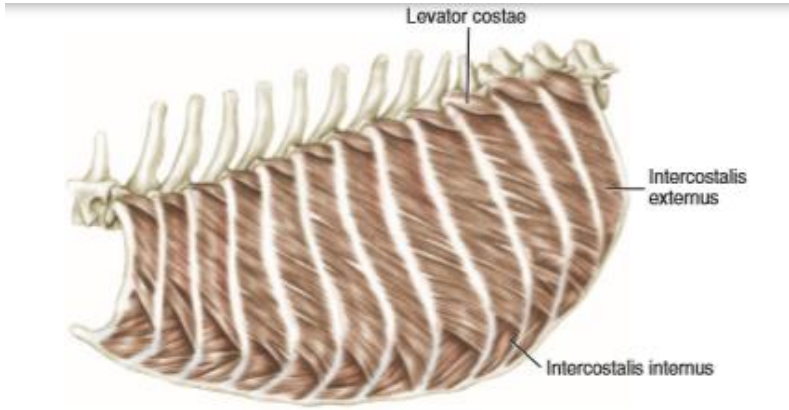


FIGURE 6-34 Deep muscles of thorax, lateral aspect.

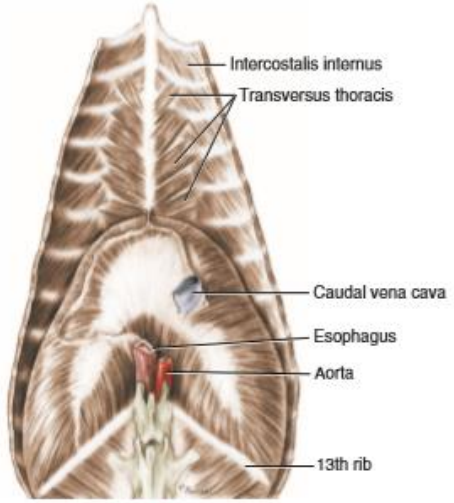
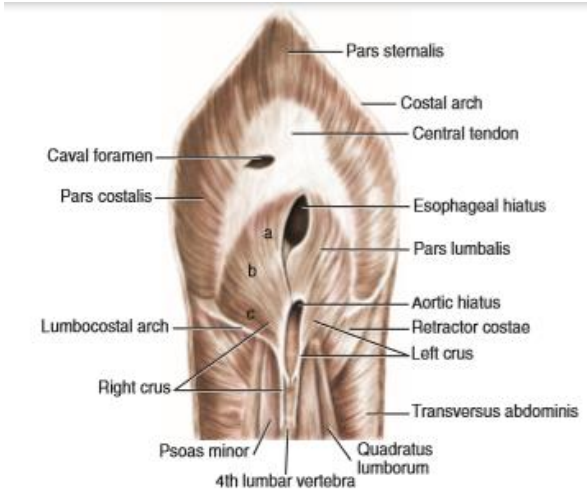
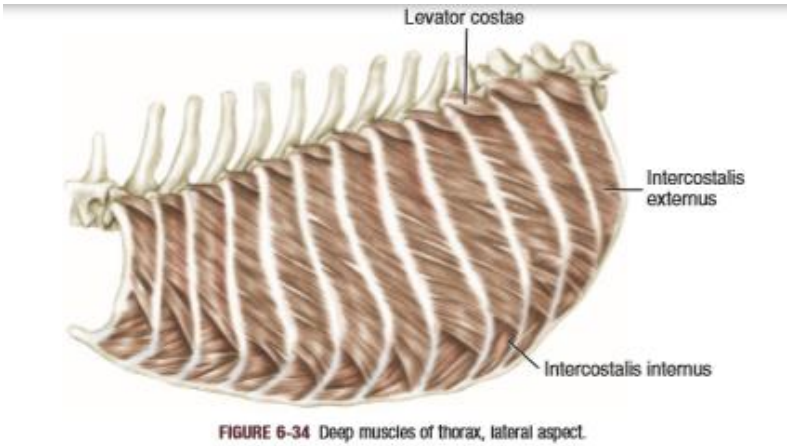


FIGURE 6-36 Diaphragm, thoracic surface.



RESPIRATORY MUSCLES OF CARNIVORES

1. M. scalenus dorsalis
2. M. scalenus medius
3. M. serratus dorsalis cranialis
4. M. serratus dorsalis caudalis
5. M. intercostalis externus
6. M. intercostalis internus
7. M. rectus thoracis
8. M. transversus thoracis
9. Mm. levatores costarum
10. M. retractor costae ultimatea
11. M. subcostalis
12. Diaphragm



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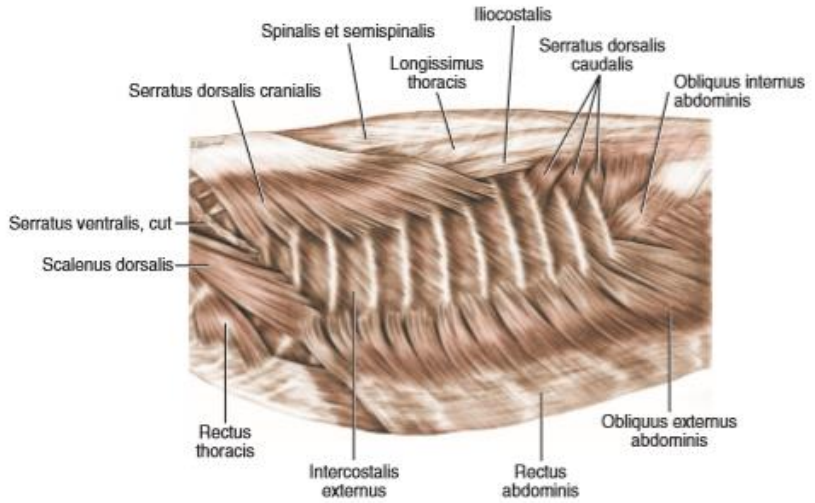

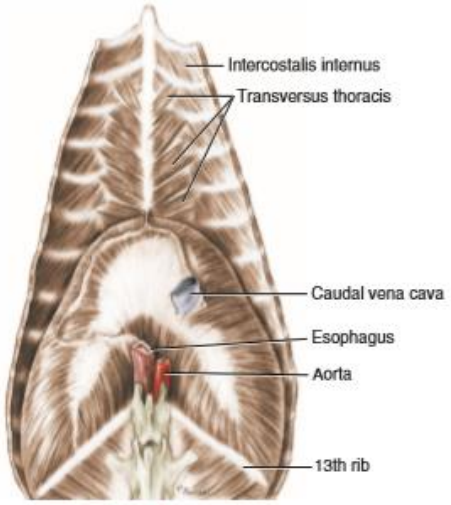

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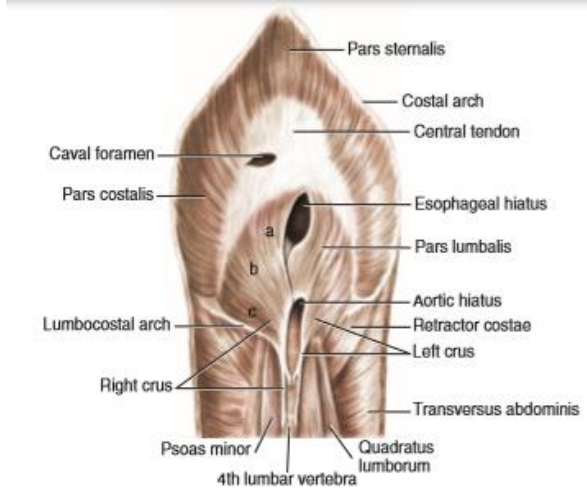


RESPIRATORY MUSCLES OF CARNIVORES

1. M. scalenus dorsalis:

Origin: transverse processes of 4 – 6 vertebrea cervicales

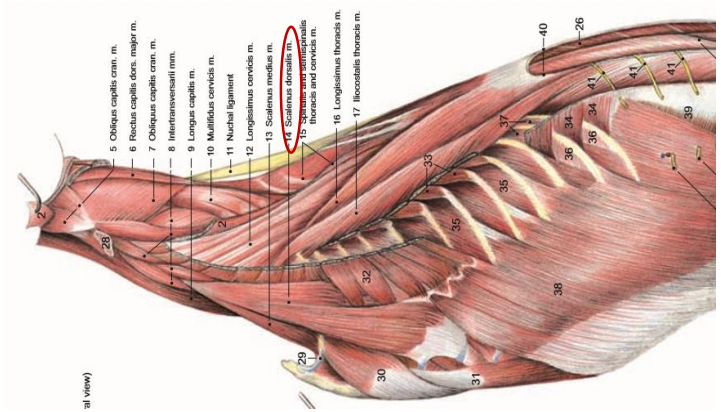
Insertion: a. dorsal muscular part – on the 1- 4 ribs

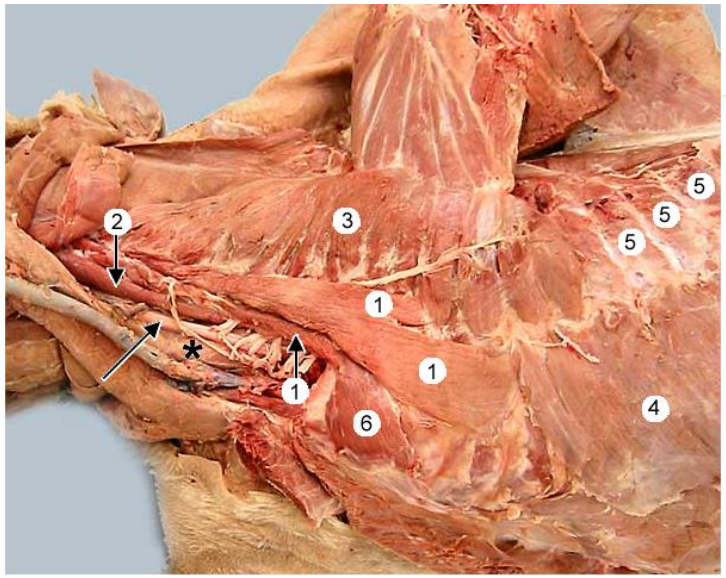
b. ventral muscular part – 1 – 9 ribs (longer)

Function: 1. helps in inspiration

2. unilateral contruction: flexes neck laterally

3. bilateral contruction: flexes neck ventrally





The thoracic limb is abducted. Identify the **scalenus m.** (1) which has three parts. By pulling ribs forward, the scaleneus m. acts as a muscle of inspiration. The **longus capitis m.** (2) runs on the ventrolateral surface of cervical vertebrae. The longus colli m., hidden by common carotid a, (arrow) and esophagus (asterisk), is medial to longus capitis m.

Other pertinent muscles include: **serratus ventralis** (3), **external abdominal oblique** (4), **external intercostal muscles** (5), and rectus thoracis (6).

http://vanat.cvm.umn.edu/carnLabs/Lab08/Img8-2.html

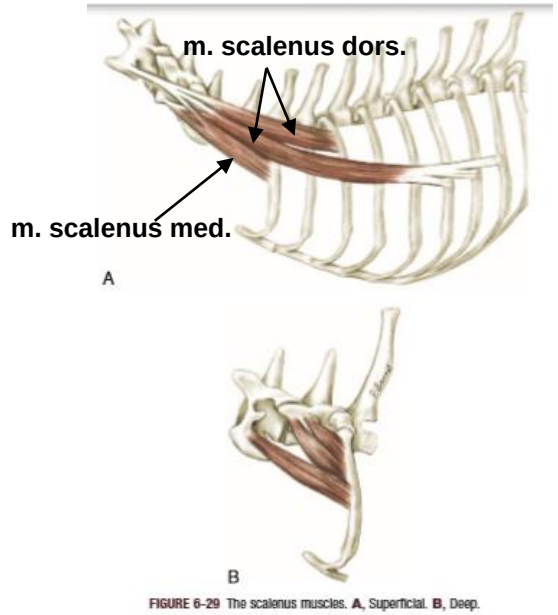
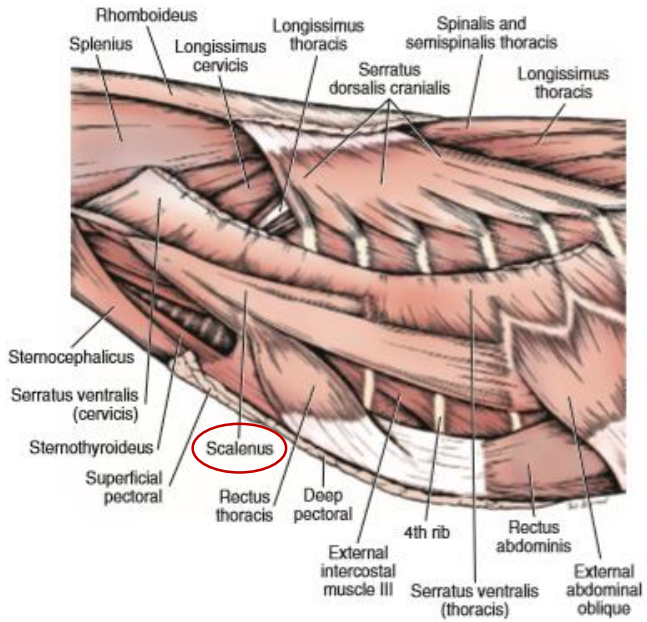


FIGURE 6–29 The scalenus muscles. **A**, Superficial. **B**, Deep.



RESPIRATORY MUSCLES OF CARNNIVORES

2. M. scalenus medialis (M. scalenus primae costae):

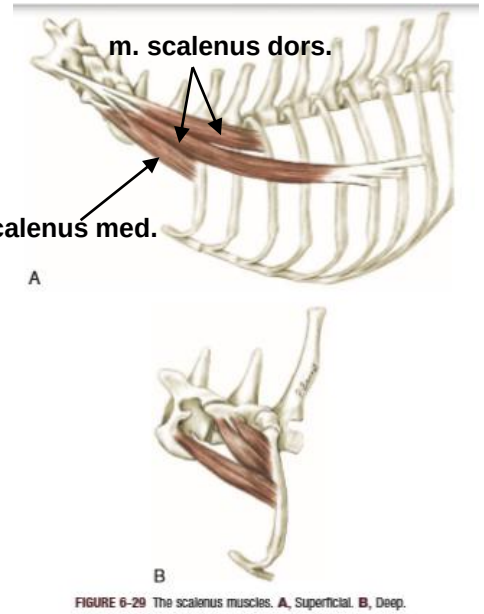
Origin: transverse processes of 6 – 7 vertebrea cervicales

Insertion: cranial border of first rib

Function: 1. helps in inspiration

2. unilateral contruction: flexes neck laterally

3. bilateral contruction: flexes neck ventrally



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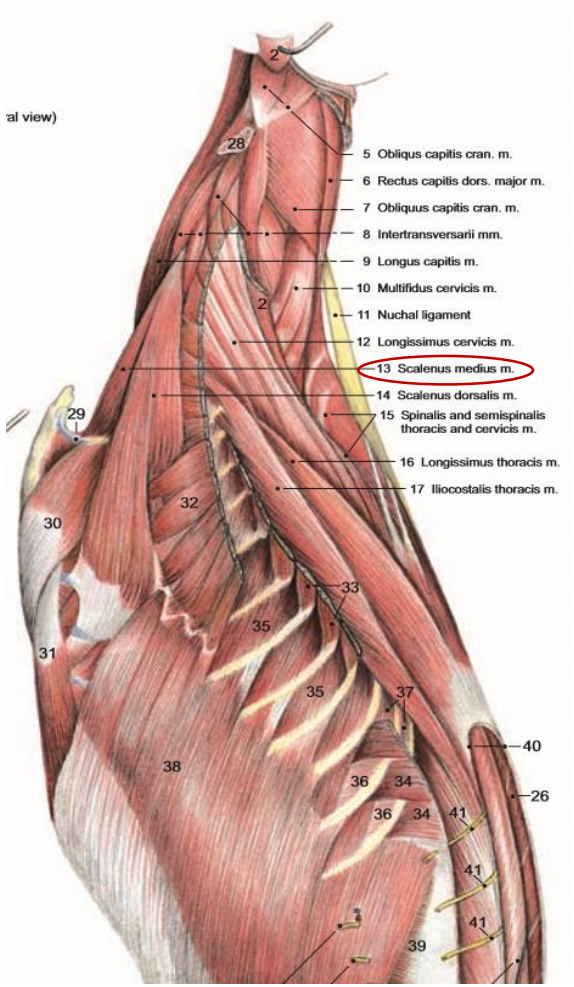

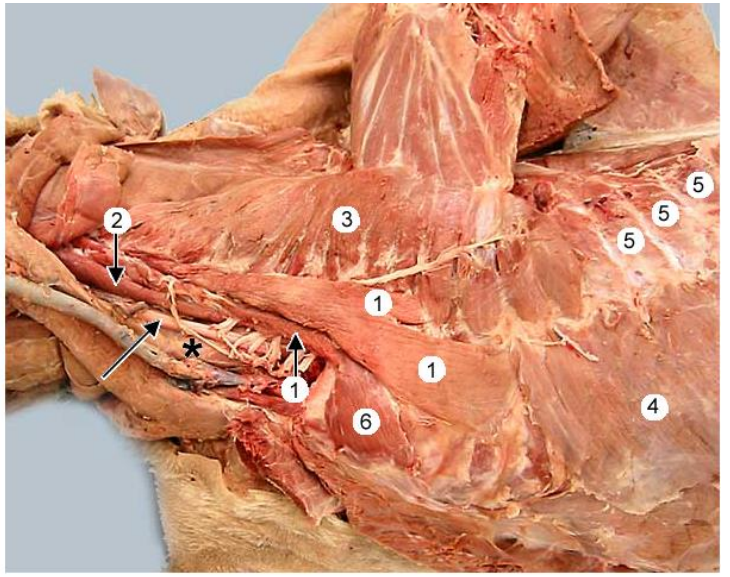

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Other pertinent muscles include: **serratus ventralis** (3), **external abdominal oblique** (4), **external intercostal muscles** (5), and rectus thoracis (6).

RESPIRATORY MUSCLES OF CARNIVORES

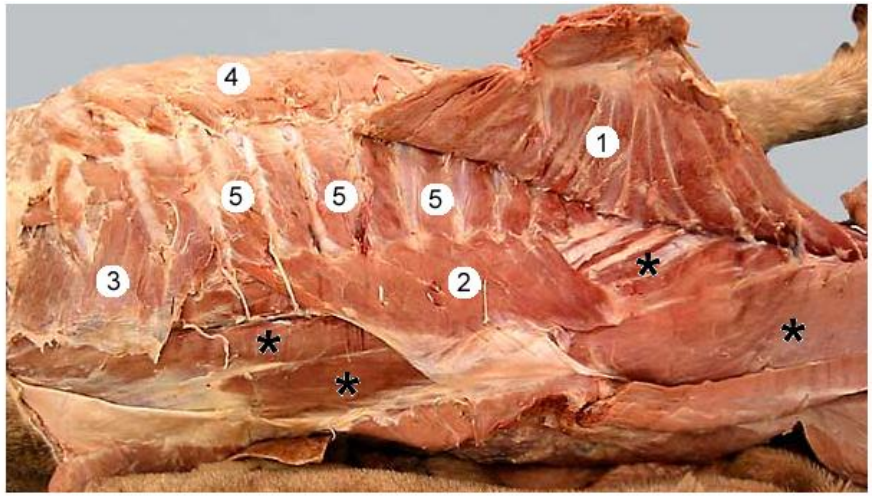
3. M. serratus dorsalis cranialis:

Origin: a. thoracolumbar fascia (fascia thoracolumbalis) by a broad aponeurosis

b. Th1-7 proc. spinosus vertebrae

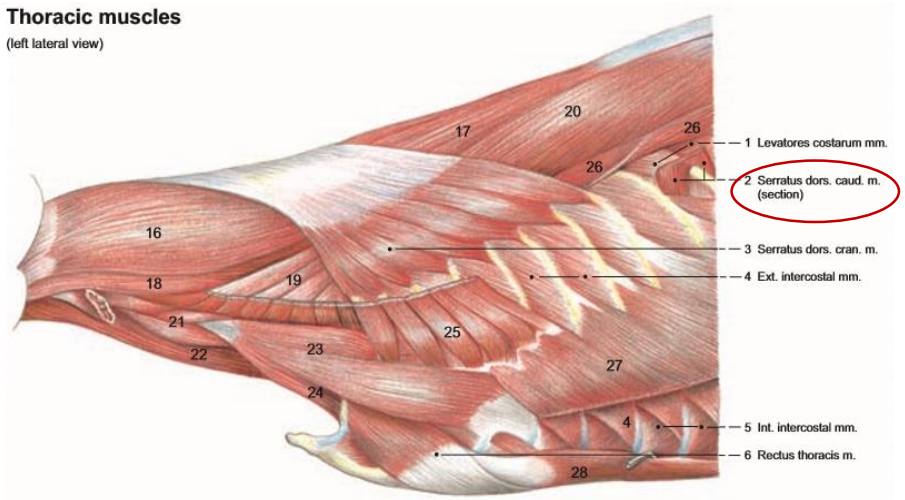
Insertion: proximally on ribs 2-10

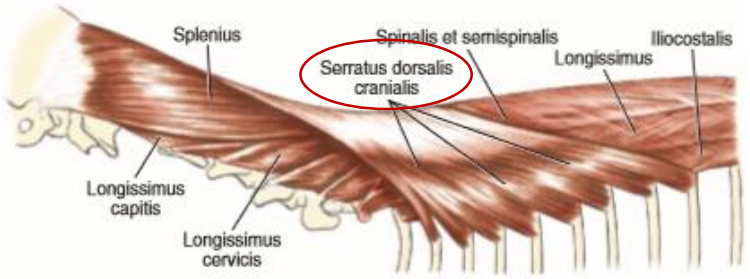
Function: inspiratory muscle

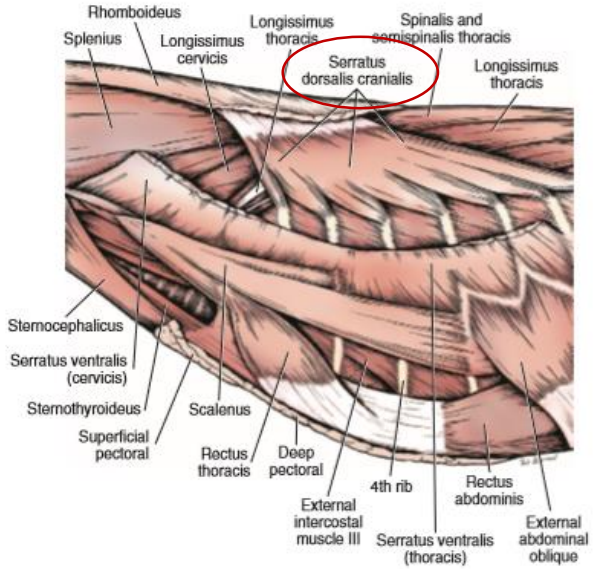


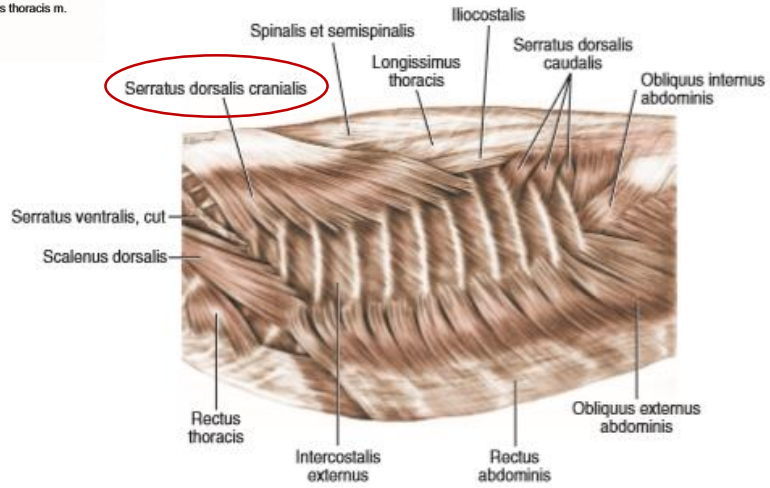
In this dorsal view, the thoracic limb and **serratus ventralis m.** (1) are pulled away. Notice the **serratus dorsalis cranialis m.** (2) and the **serratus dorsalis caudalis m.** (3). Identify the **external abdominal oblique m.** (4) and **external intercostal muscles** (5). The muscles marked by asterisks are epaxial muscles.

http://vanat.cvm.umn.edu/carnLabs/Lab08/Img8-3.html









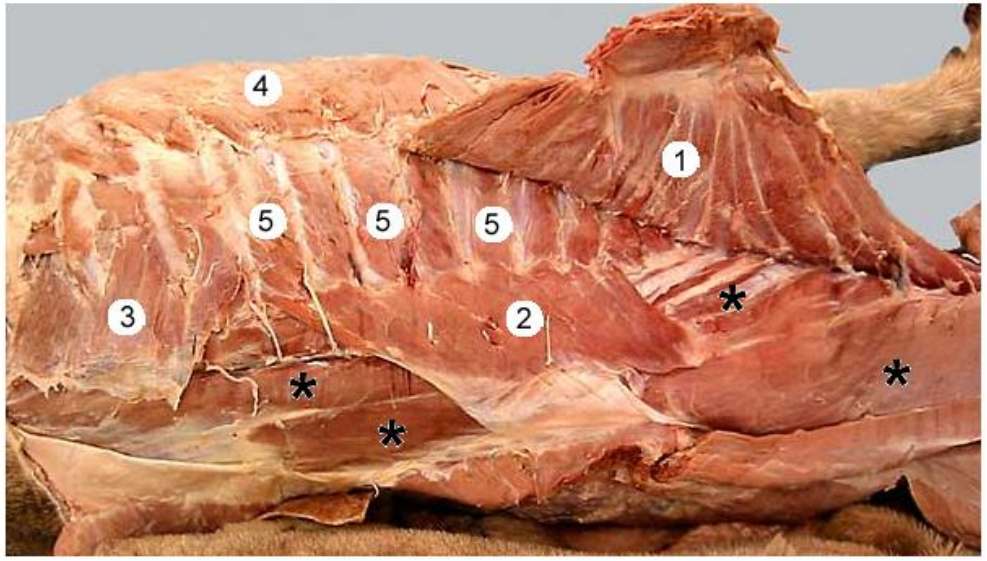
RESPIRATORY MUSCLES OF CARNIVORES

4. M. serratus dorsalis caudalis:

Origin: caudally on superficial layer of fascia thoracolumbalis

Insertion: proximal part of ribs 11-13

Function: expiration



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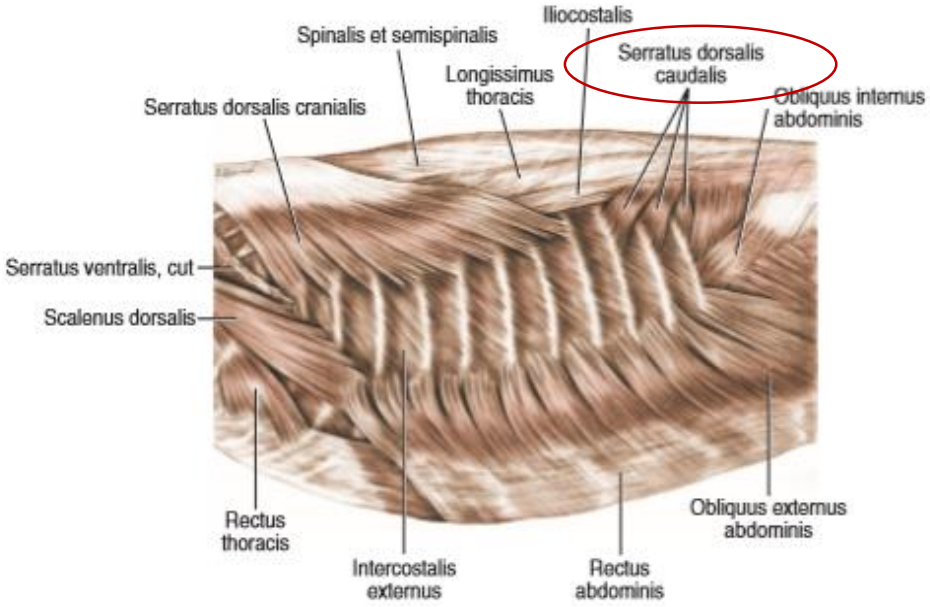


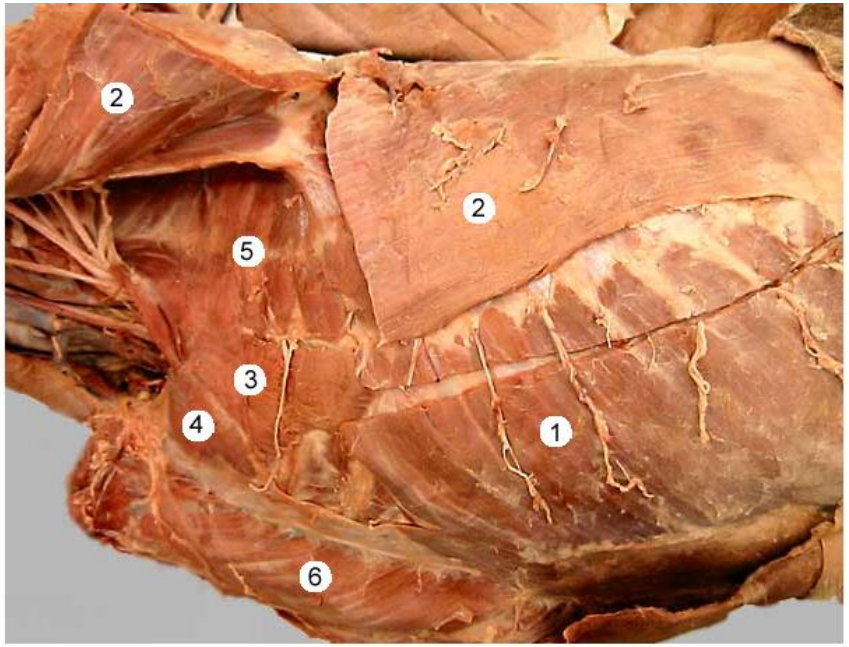
RESPIRATORY MUSCLES OF CARNIVORES

5. M. rectus thoracis:

Origin: first rib

Insertion: ventral ends of ribs 2-4

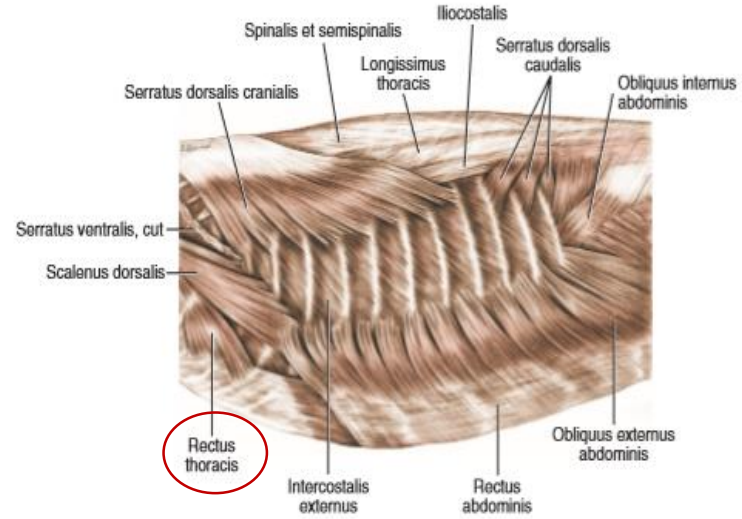
Function: inspiration

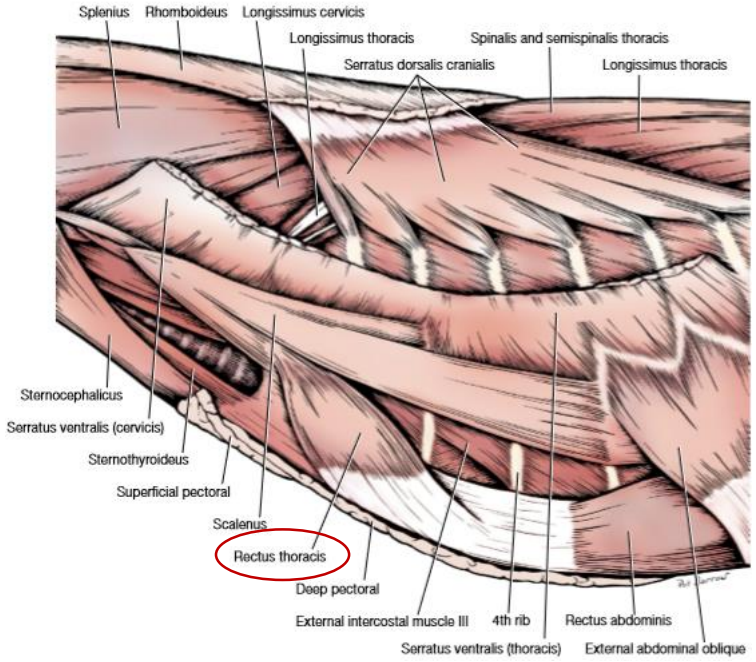


In this lateral view the **external abdominal oblique m.** (1) has been incised about a cm ventral to its attachment to ribs.

Other muscles include: latissimus dorsi (2), scalenus (3), rectus thoracis (4), serratus ventralis (5), and deep pectoral (6).

http://vanat.cvm.umn.edu/carnLabs/Lab08/Img8-4.html





RESPIRATORY MUSCLES OF CARNIVORES

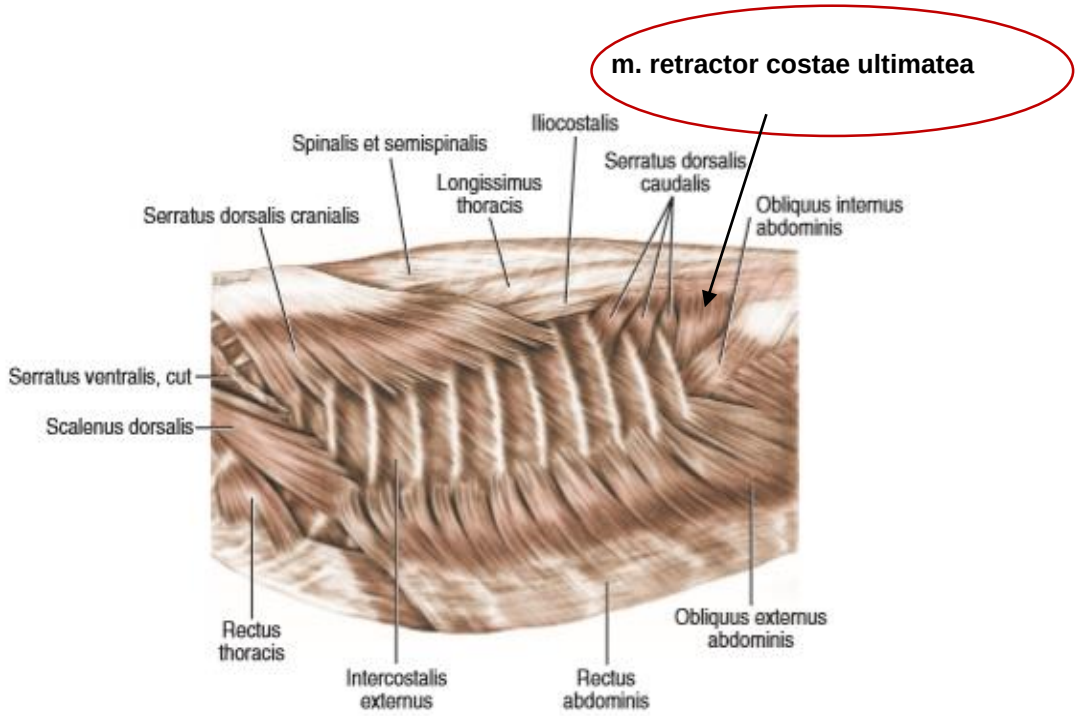
6. M. retractor costae ultimatea:

Origin: a. transverse processes of L1-4 vertebrae

b. caudal part of the thoracolumbal fascia over lumbal site

Insertion: caudal border of last ribs

Function: expiration



RESPIRATORY MUSCLES OF CARNIVORES

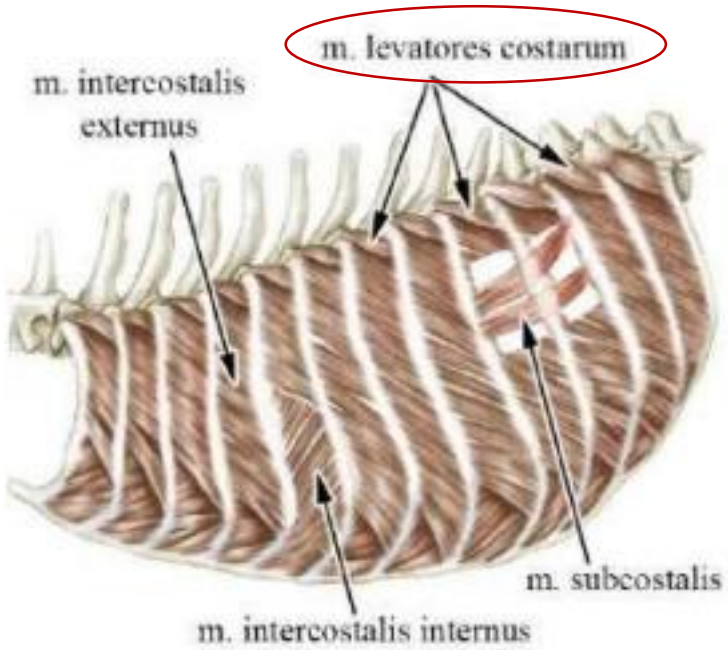
7. Mm. levatores costarum:

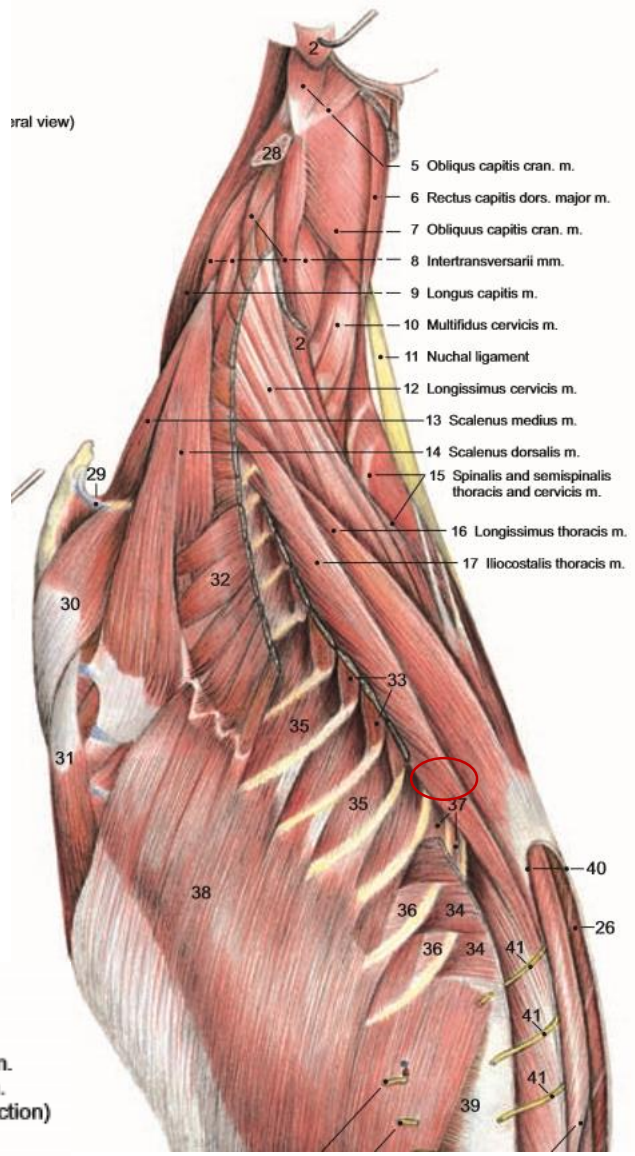
Origin: transverse processes of Th1-12 vertebrae

Insertion: cranial border of ribs near to angulus costae

- **covered by m. erector spinae**

Function: inspiration





RESPIRATORY MUSCLES OF CARNIVORES

8. M. transversus thoracis:

Origin: inner surface of sternum, close to the midline

Insertion: 2 – 8 costal cartilages, ventral to the costochondral junctions

Function: expiration

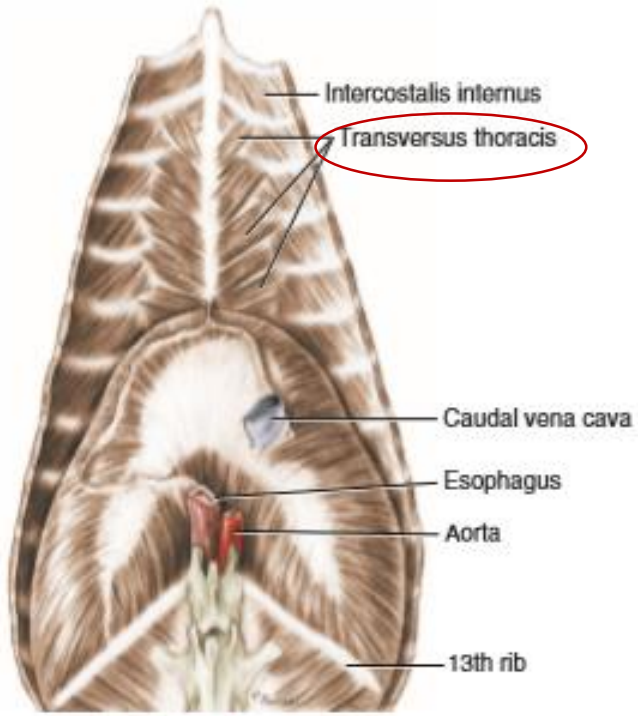
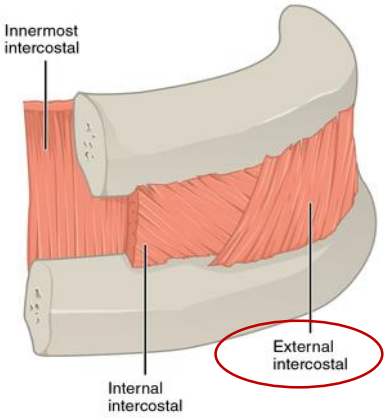


FIGURE 6-36 Diaphragm, thoracic surface.

RESPIRATORY MUSCLES OF CARNIVORES



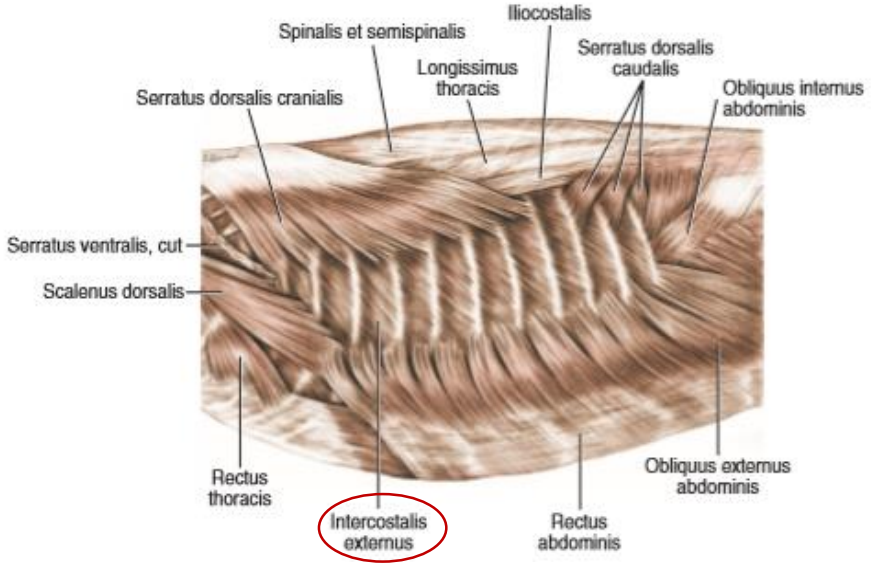
https://en.wikipedia.org/wiki/External_intercostal_muscles

9. M. intercostalis externus:

Origin and insertion:

- **muscle fibers run caudoventrally from caudal border of the upper rib to the cranial border of the rib below**

Function: inspiration



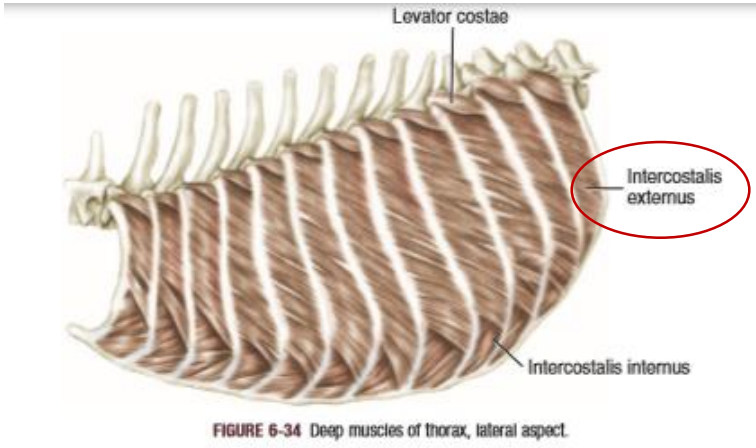
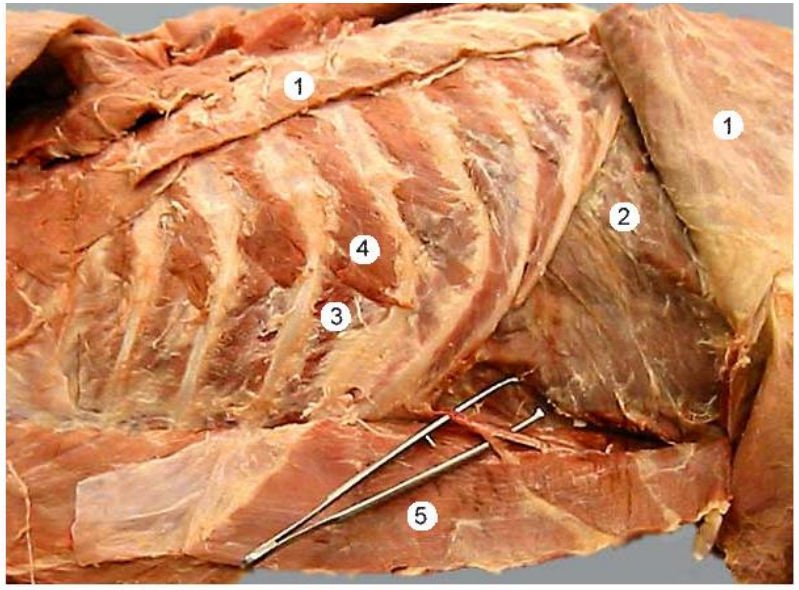


FIGURE 6-34 Deep muscles of thorax, lateral aspect.



The **external abdominal oblique m.** (1) has been reflected, exposing the **internal abdominal oblique m.** (2) which can be seen attaching to the costal arch. **Internal intercostal muscles** (3) extend further ventrally than **external intercostal muscles** (4). Also the **rectus abdominis m.** (5) has been reflected. (The forceps are elevating cranial epigastric vessels.)

http://vanat.cvm.umn.edu/carnLabs/Lab08/Img8-5.html

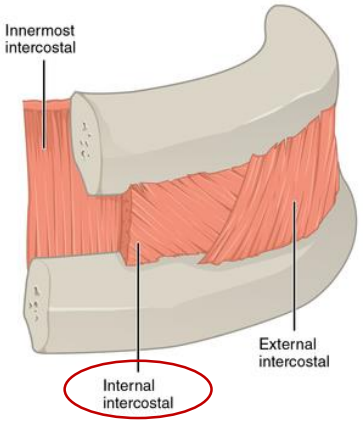
RESPIRATORY MUSCLES OF CARNIVORES

10. M intercostalis internus:

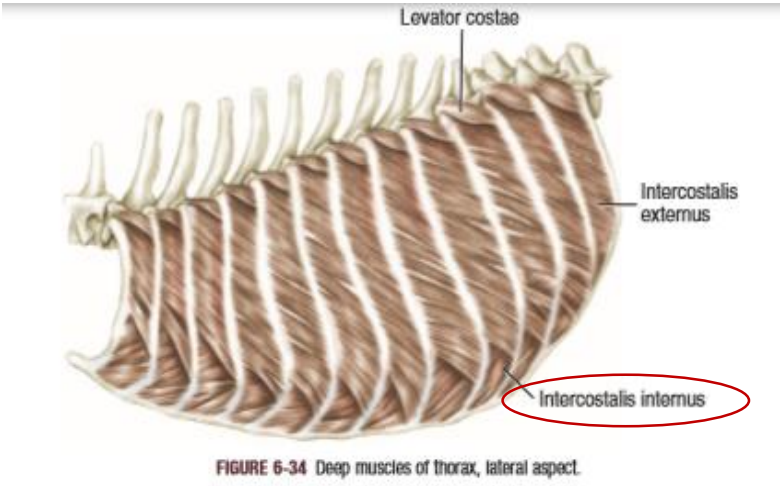
Origin and insertion:

- **from cranial border of the rib to the caudal border of the rib above**

Function: expiration



https://en.wikipedia.org/wiki/External_intercostal_muscles



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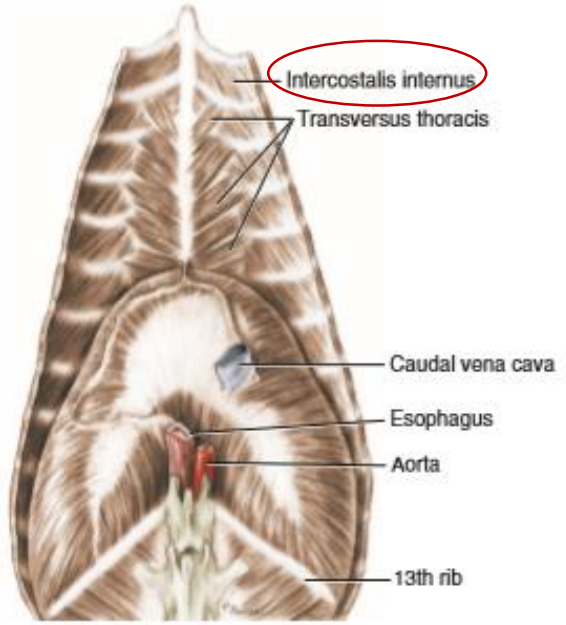

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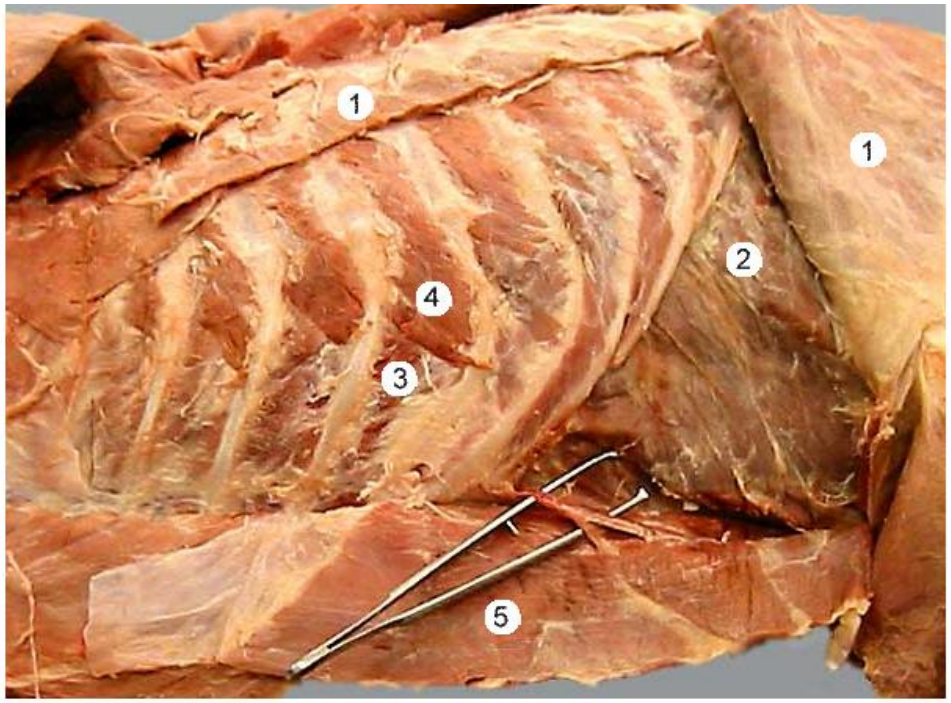

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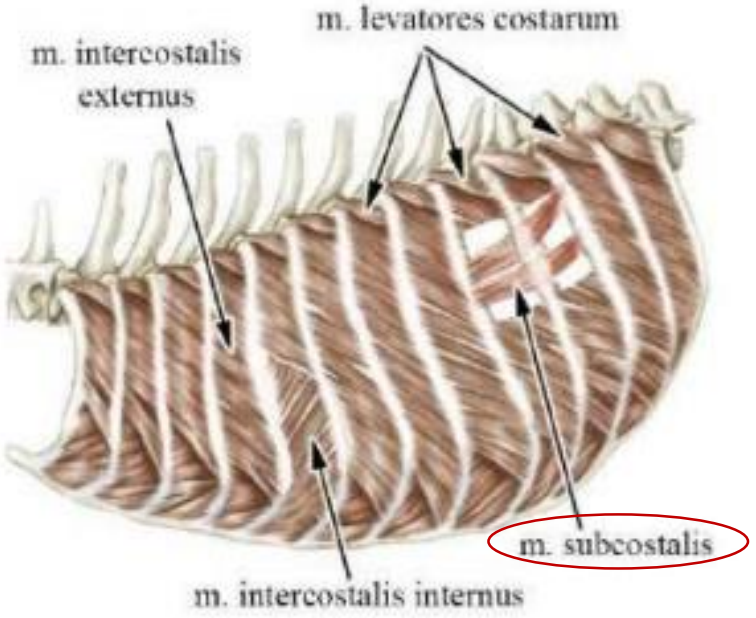
RESPIRATORY MUSCLES OF CARNIVORES

11. M. subcostalis:

Origin and insertion:

- **crossing medial surface of ribs 9-11 in a cranioventral direction inside the thoracic cavity**

Function: expiration



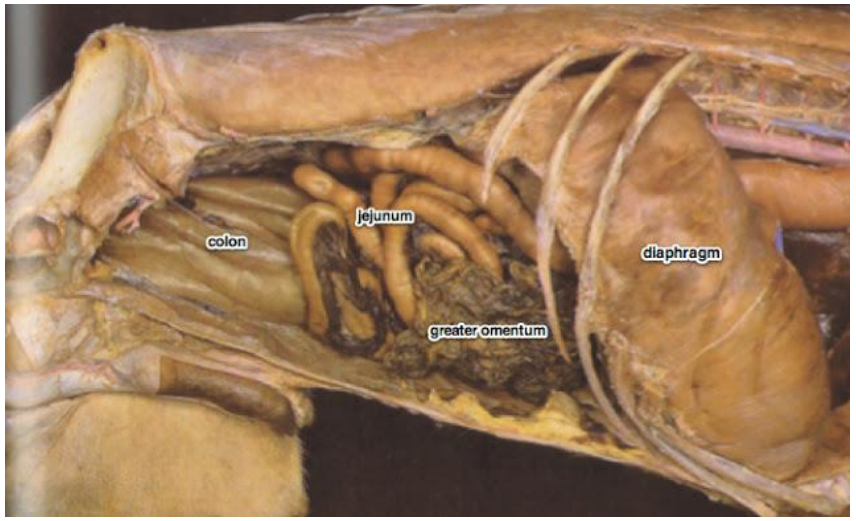
RESPIRATORY MUSCLES OF CARNIVORES

Diaphragm:

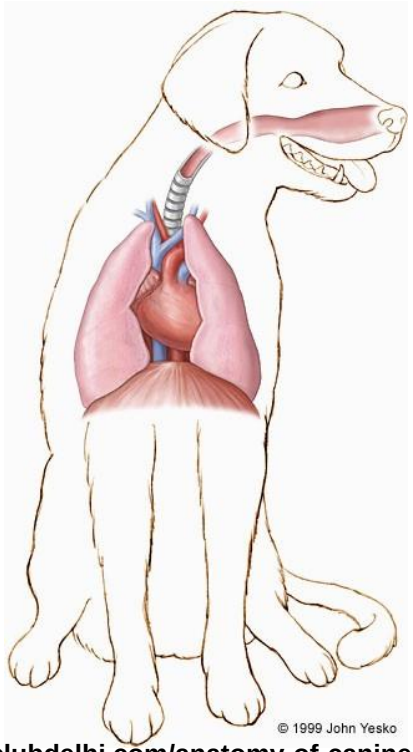
- **is a sheet of internal skeletal muscle**
- **extends across the bottom of the thoracic cavity**
- **separates the thoracic cavity from the abdominal cavity**
- **performs an important function in respiration: as the diaphragm contracts, the volume of the thoracic cavity increases and air is drawn into the lungs**

Dog Thorax, contents of Thoracic Cavity removed. ©University of Nottingham 2008
D: diaphragm

https://en.wikivet.net/Diaphragm_-_Anatomy_%26_Physiology



http://bvetmed1.blogspot.com/2013/03/canine-abdomen-lecture-140.html



http://readersclubdelhi.com/anatomy-of-canine-lungs/

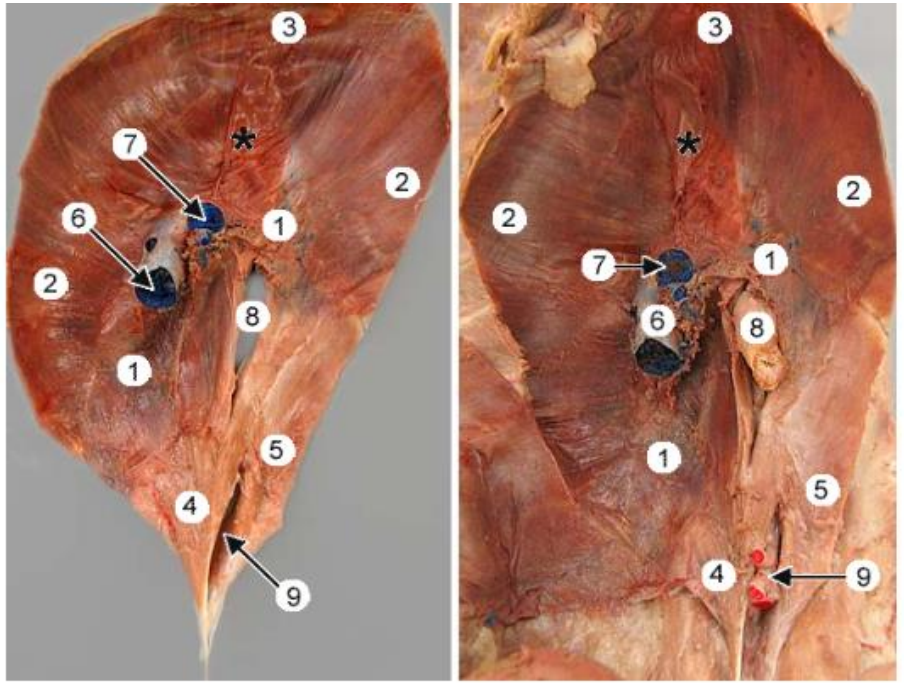
RESPIRATORY MUSCLES OF CARNIVORES

Diaphragm:

Five layers:

From cranial to caudal :

1. **Pleura + fascia endothoracica**
2. **Fascia transversa thoracis**
3. **Phrenic muscle**
4. **Fascia transversa abdominis**
5. **Peritoneum**



The **diaphragm** (viewed from the abdomen with ventral at the top) is shown removed from the cadaver (left) and *in situ* (right). The diaphragm has a horse-shoe shaped **tendinous center** (1) that separates an outer rim of skeletal muscle from muscular crura. The outer diaphragmatic muscle can be divided into costal (2) and sternal (3) regions. Dorsal to the tendinous center, notice that the **right crus** (4) and the **left crus** (5) have tendons (which attach to the bodies of lumbar vertebrae).

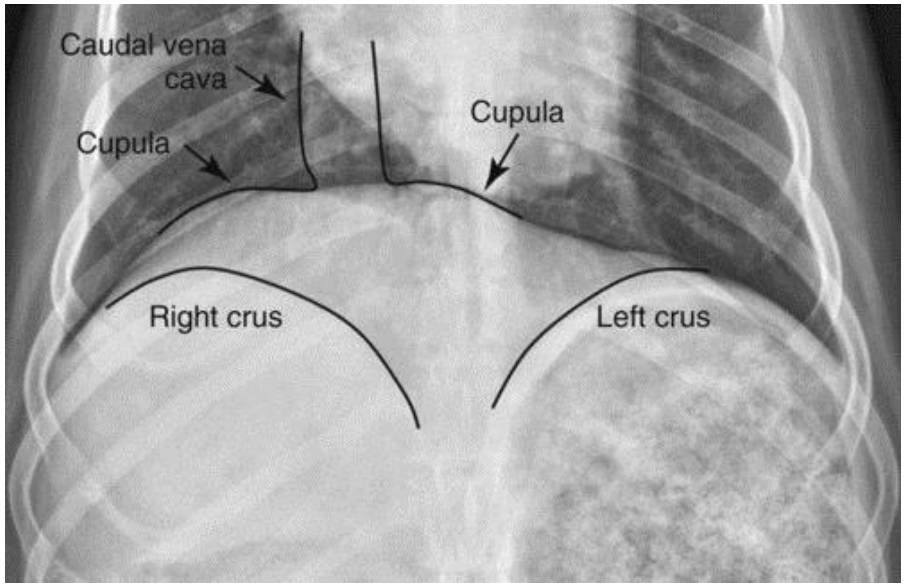
The tendinous center region contains a **caval foramen** through which the caudal vena cava (6) passes (also a hepatic vein (7) joining the caudal vena cava and the falciform ligament (asterisk) are evident). Between the crura, the esophagus passes through the **esophageal hiatus** (8) and the aorta passes through the **aortic hiatus**(9).

http://vanat.cvm.umn.edu/carnLabs/Lab16/Img16-8.html

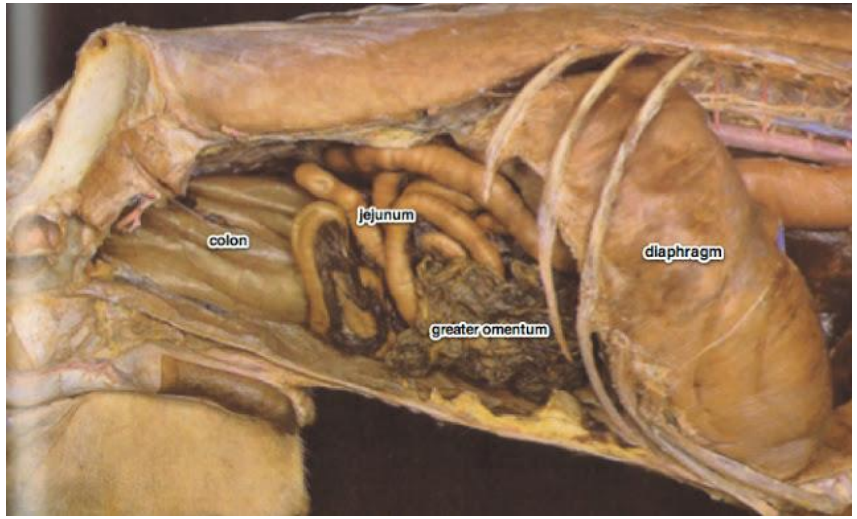
RESPIRATORY MUSCLES OF CARNIVORES

CUPULA DIAPHRAGMATICA:

- **dome – shaped part**
- **curves upwards projecting into the thoracic cavity**
- **the superior surface of the dome forms the floor of the thoracic cavity**
- **the inferior surface the roof of the abdominal cavity**



http://nivoteam.info/crura-diaphragm.html



RESPIRATORY MUSCLES OF CARNIVORES

Diaphragm:

M. phrenicus:

- **CORONA MUSCULARIS: its musculary origin**

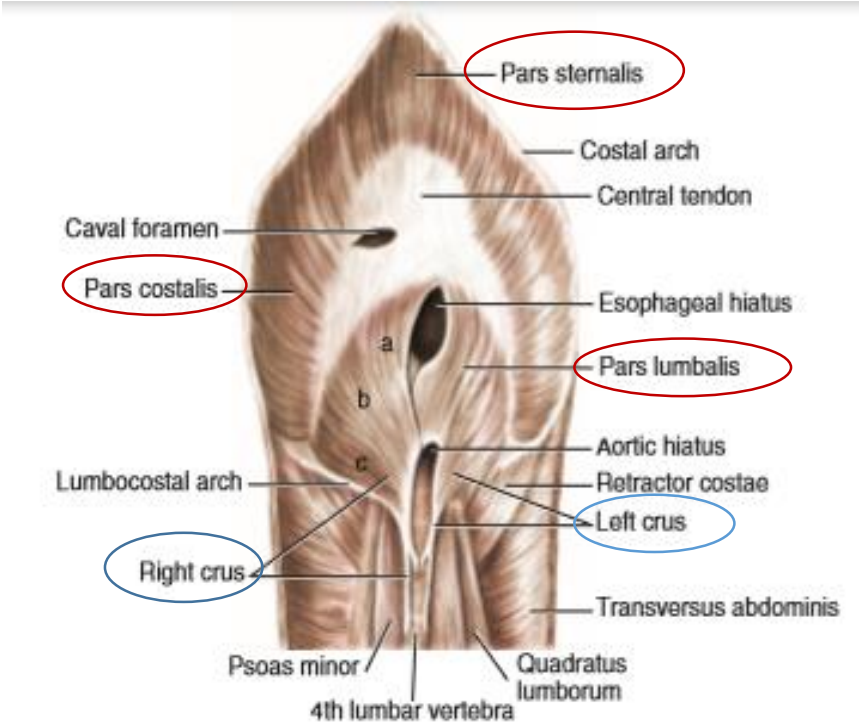
PARTS OF CORONA MUSCULARIS:

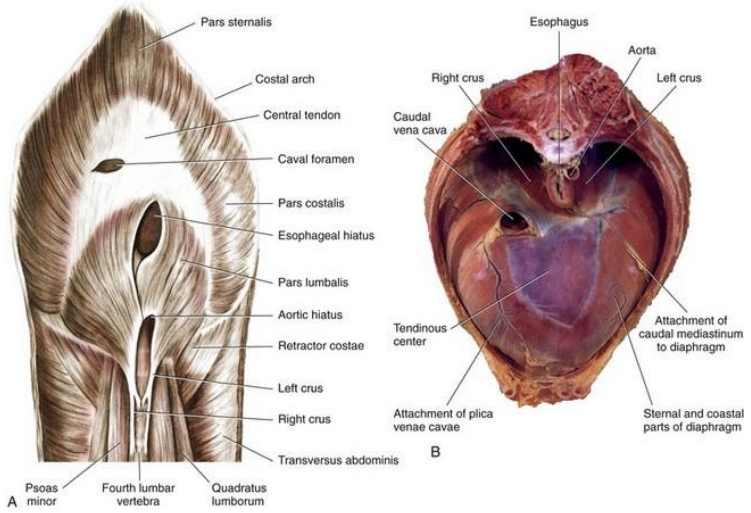
a. pars sternalis (sternal part) – from xyphoid process

b. pars costalis (costal part) – from inner surface of ribs 6-12

c. pars lumbalis (lumbal part) – vertebrae Th12, L1-2

- crus dexter et sinister





RESPIRATORY MUSCLES OF CARNIVORES

Diaphragm:

M. phrenicus:

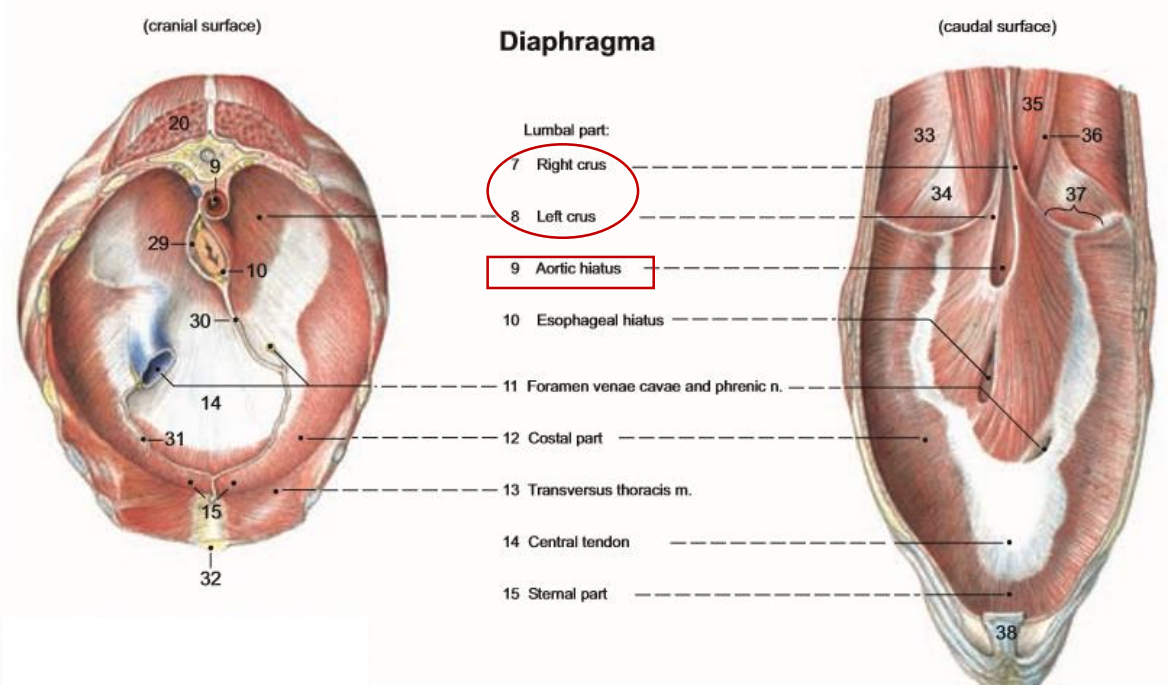
c. pars lumbalis (lumbal part)

a) crus dexter

b) crus sinister

Origin: 3 - 4 lumbal vertebrae

- **formation of opening of aorta (hiatus aorticus)**



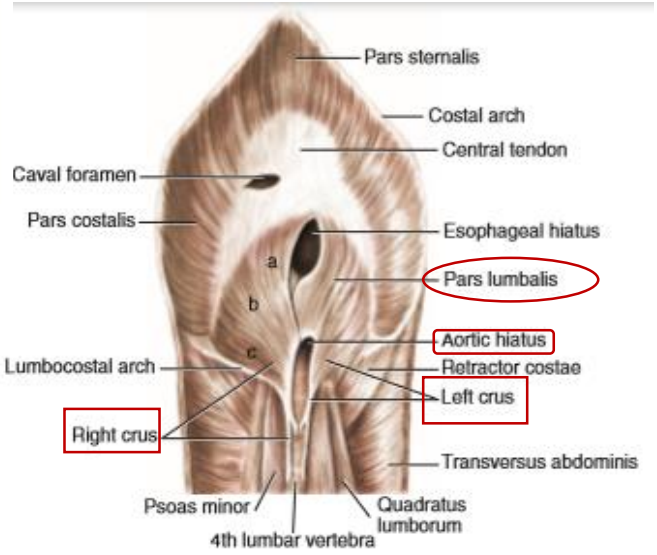


FIGURE 6-35 Diaphragm, abdominal surface. a – medial, b – intermediate, and c – lateral portions of pars lumbalis. Label: Lumbocostal arch.

RESPIRATORY MUSCLES OF CARNIVORES

Diaphragm:

M. phrenicus:

c. pars lumbalis (lumbal part)

Crus dexter:

- **extends more ventrally**
- **surrounds oesophagus – hiatus oesophageus**

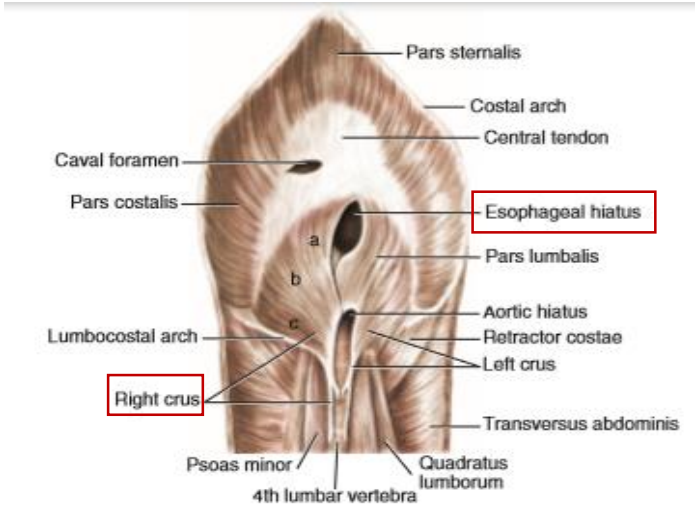
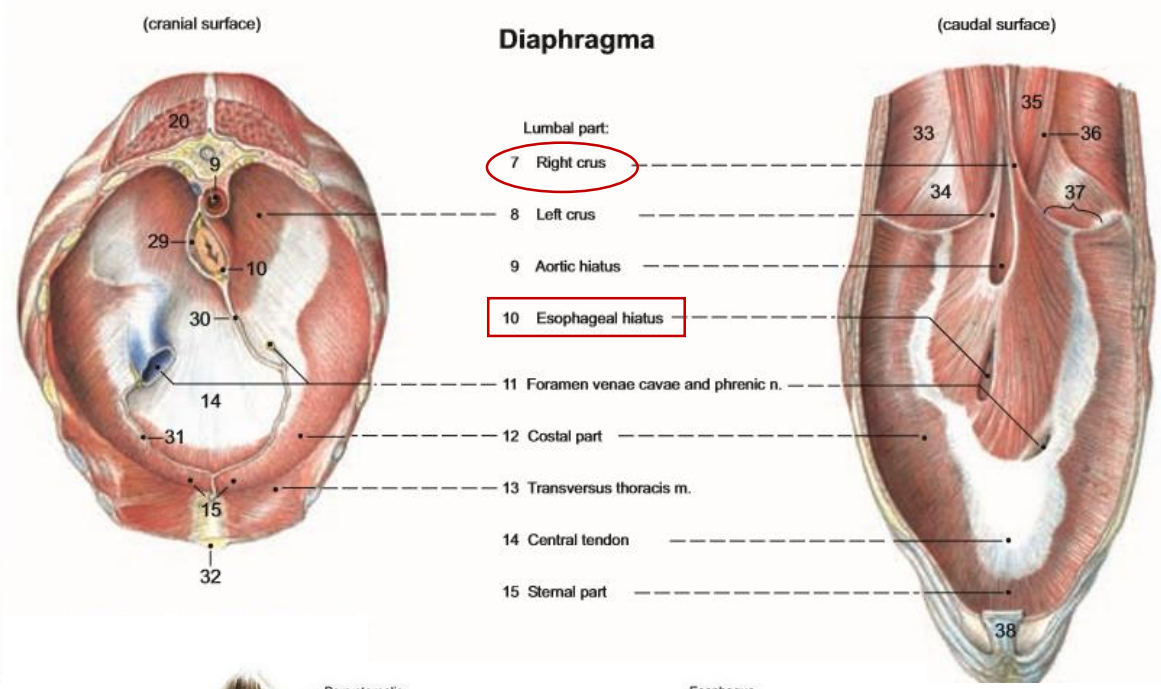
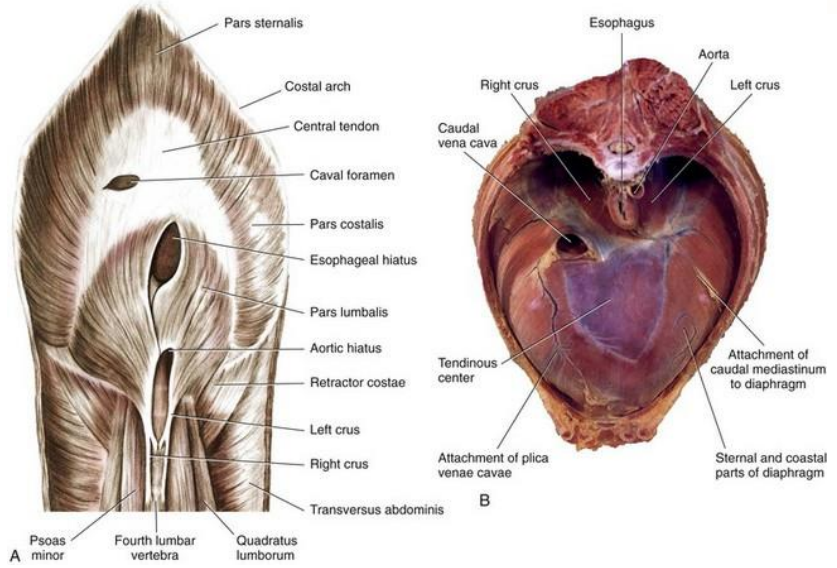


FIGURE 6-35 Diaphragm, abdominal surface. a – medial, b – intermediate, and c – lateral portions of pars lumbalis. Label: Lumbocostal arch.



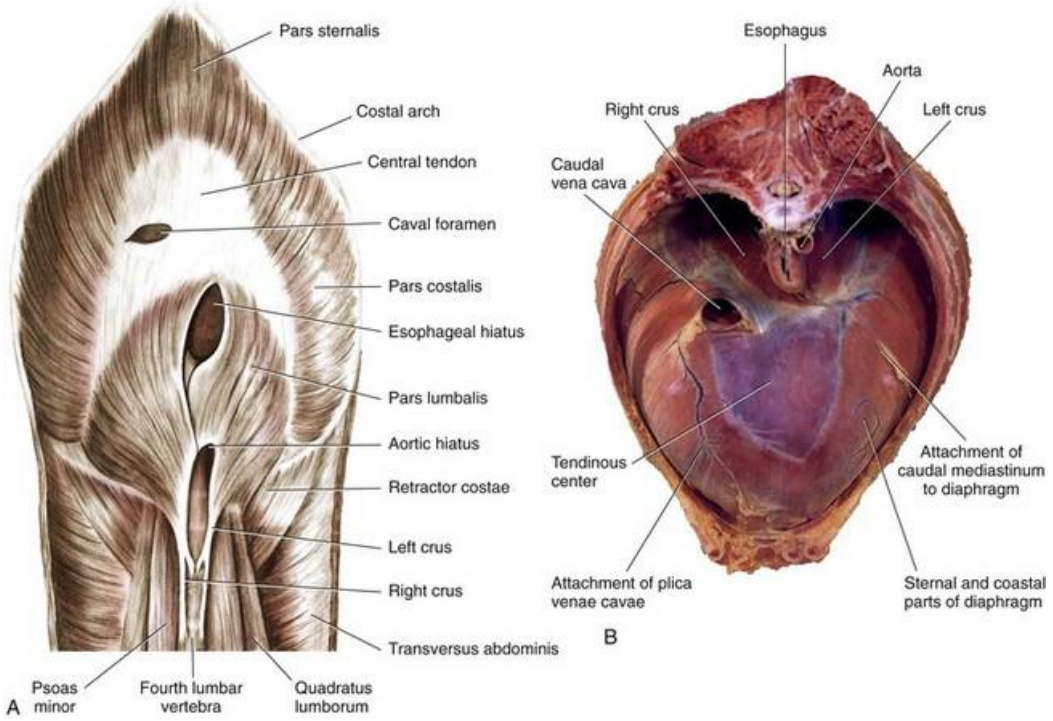


RESPIRATORY MUSCLES OF CARNIVORES

Diaphragm:

ARCUS LUMBOCOSTALIS:

- **lumbal and costal parts are connected by this arch**
- **tendinous fascia that arches over the psoas major muscle as it passes through the diaphragm**



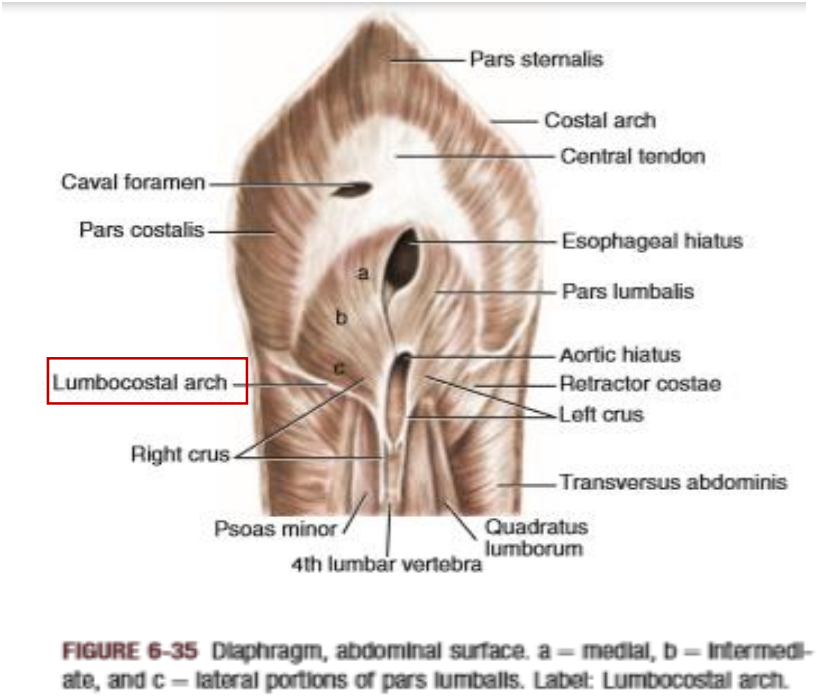
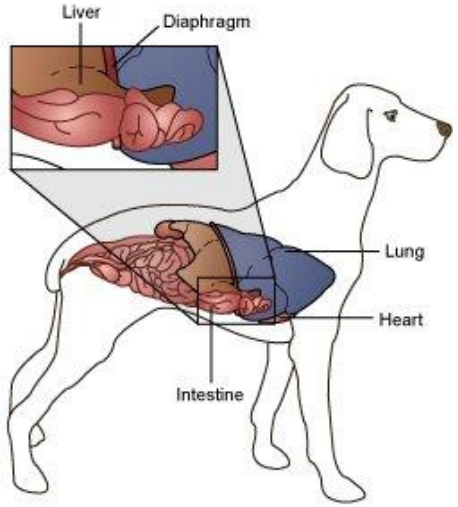


FIGURE 6-35 Diaphragm, abdominal surface. a — medial, b — intermediate, and c — lateral portions of pars lumbalis. Label: Lumbocostal arch.

RESPIRATORY MUSCLES OF CARNIVORES

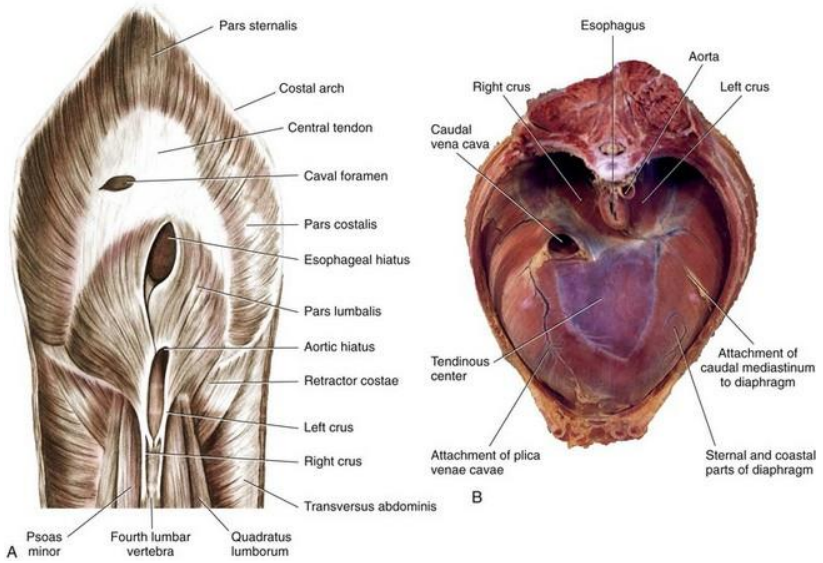


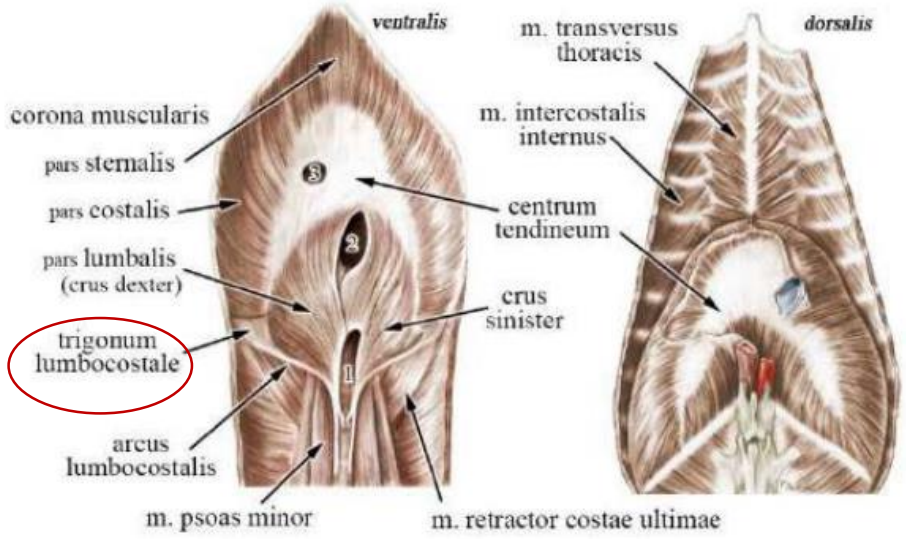
https://vcahospitals.com/know-your-pet/hernia-diaphragmatic-in-dogs

Diaphragm:

TRIGONUM LUMBOCOSTALE:

- **is a space between the costal and lumbar parts of the diaphragm**
- **formed by muscle attachments**
- **phrenic muscle is absent - VULNERABLE SPACE FOR HERNIATION**
- **herniation: Malformation of the diaphragm allows the abdominal organs to push into the chest cavity**
- **possible infection can be transmitted through this**





http://www.downloads.imune.net/medicalbooks/IMUNE/INVIO/Anatomy%201.%20Lesson%2015.%20Student.pdf

RESPIRATORY MUSCLES OF CARNIVORES

Diaphragm:

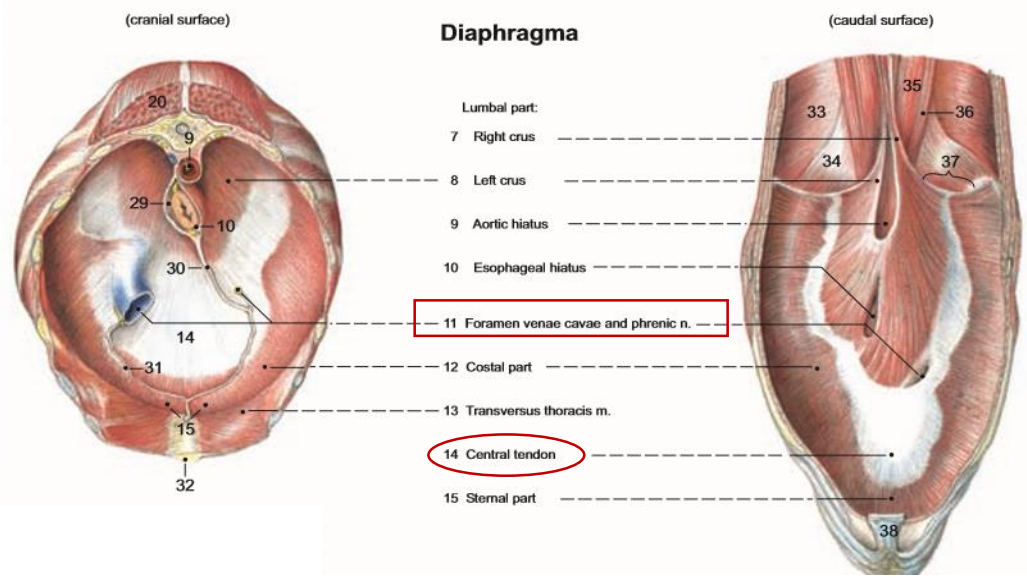
M. phrenicus:

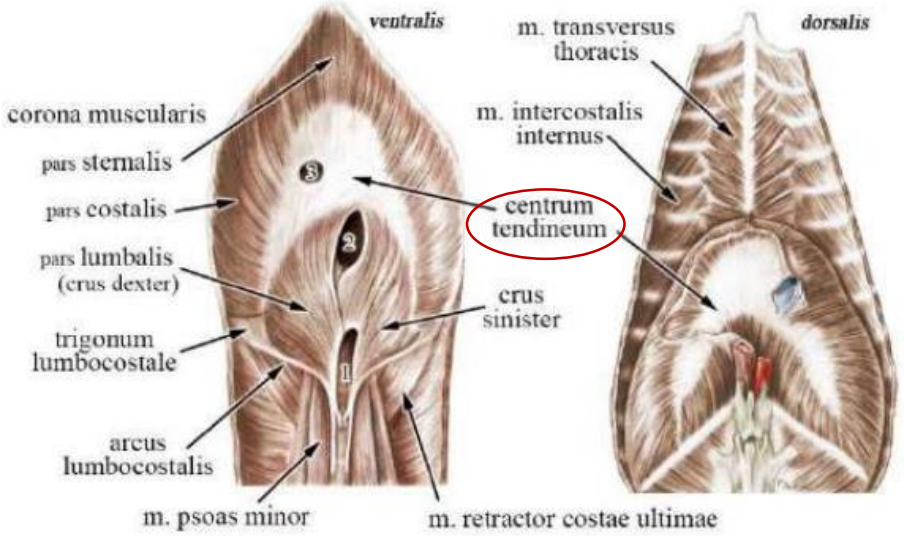
Centrum tendineum (central tendineous plate):

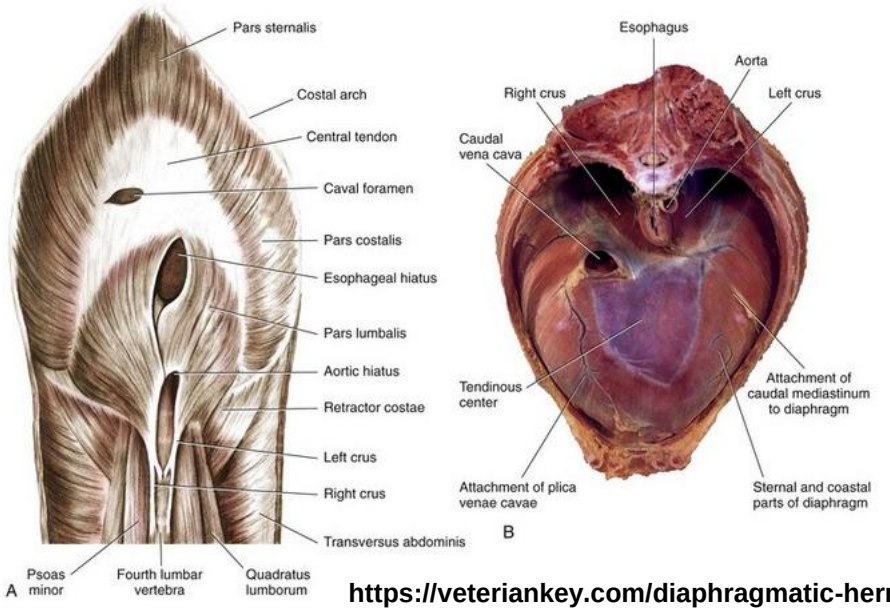
- strong aponeurosis

- forms the insertion of the part of corona muscularis

- foramen venae cavae







https://veteriankey.com/diaphragmatic-hernias/

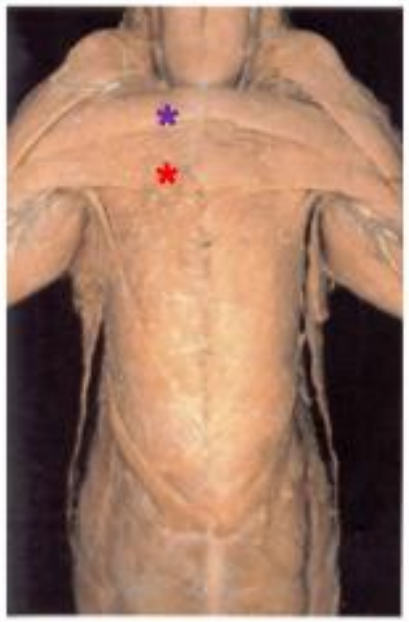
PECTORAL MUSCLES OF CARNIVORES

1. M. pectoralis superficialis:

a. M. pectoralis descendens

b. M. pectoralis transversus

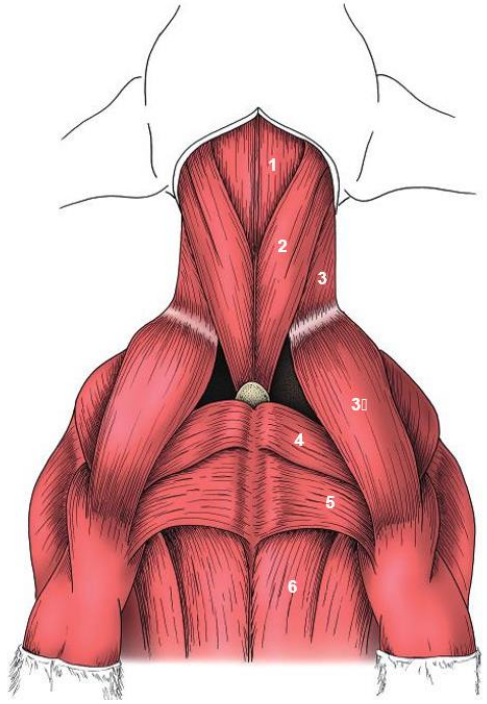
2. M. pectoralis profundus



Purple star: m. pectoralis superfic. pars descendens

Red star: m. pectoralis superfic. pars transversus

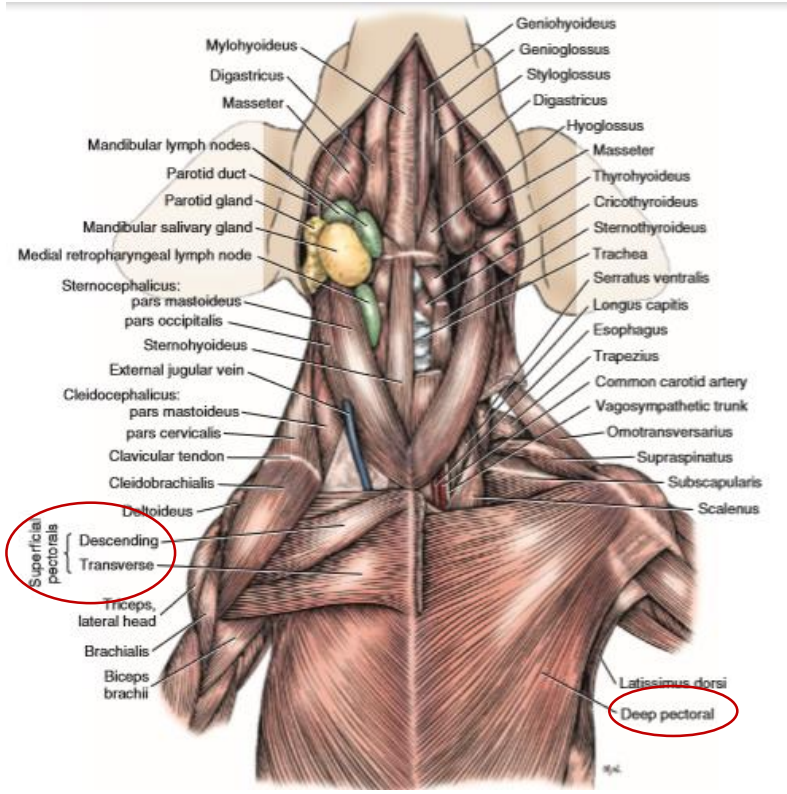
Red star: m. pectoralis prof



1. Combined sternohyoideus and sternothyroideus
2. Sternocephalicus
3. Cleidocephalicus, cervical part

3′. Brachiocephalicus, cleidobrachialis

4. Pectoralis descendens
5. Pectoralis transversus
6. Pectoralis profundus



https://www.cram.com/flashcards/extrinsic-thoracic-muscles-osu-cvm-5125510

PECTORAL MUSCLES OF CARNIVORES

1. M. pectoralis superficialis:

a. M. pectoralis descendens

Origin: manubrium sterni

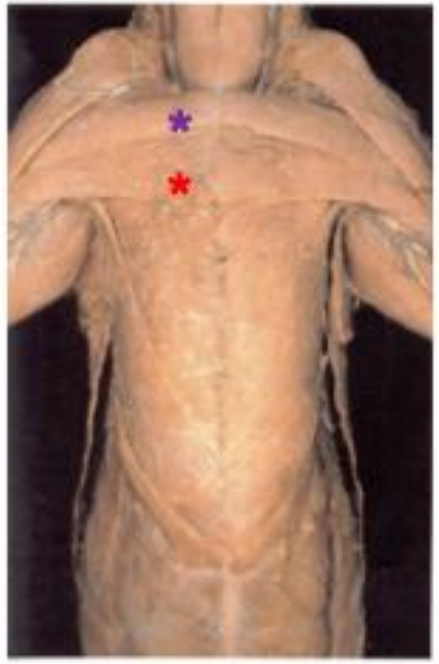
Insertion: a. crista tuberculi majoris (humerus)

b. upper part of crista humeri

Function: 1. forms ventral connection of forelimb

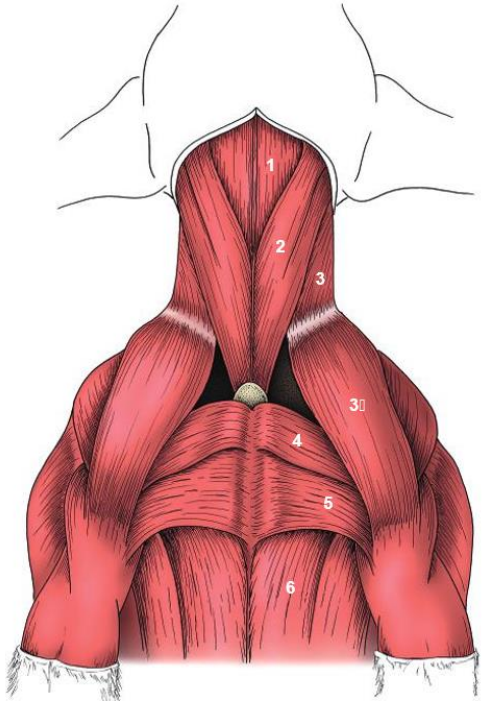
2. adduction

3. drows limb cranially or caudally depending on its position



Purple star: m. pectoralis superfic. pars descendens

Red star: m. pectoralis superfic. pars transversus



1. Combined sternohyoideus and sternothyroideus
2. Sternocephalicus
3. Cleidocephalicus, cervical part

3′. Brachiocephalicus, cleidobrachialis

4. Pectoralis descendens
5. Pectoralis transversus
6. Pectoralis profundus

PECTORAL MUSCLES OF CARNIVORES

1. M. pectoralis superficialis:

b. M. pectoralis transversus

Origin: 1st – 3rd sternebrae

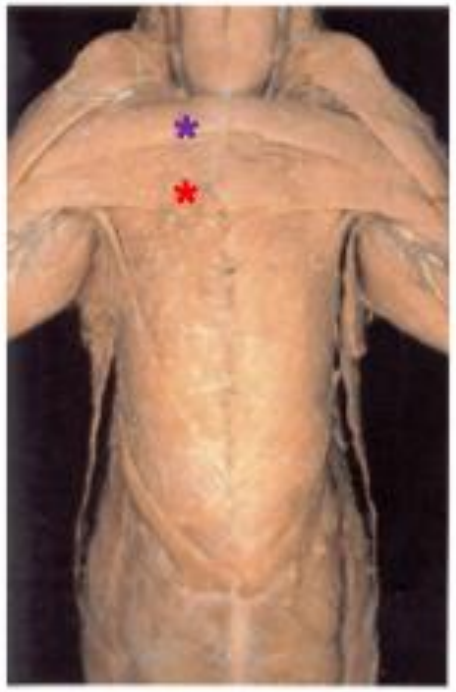
Insertion: a. crista tuberculi majoris (humerus)

b. upper part of crista humeri

Function: 1. forms ventral connection of forelimb

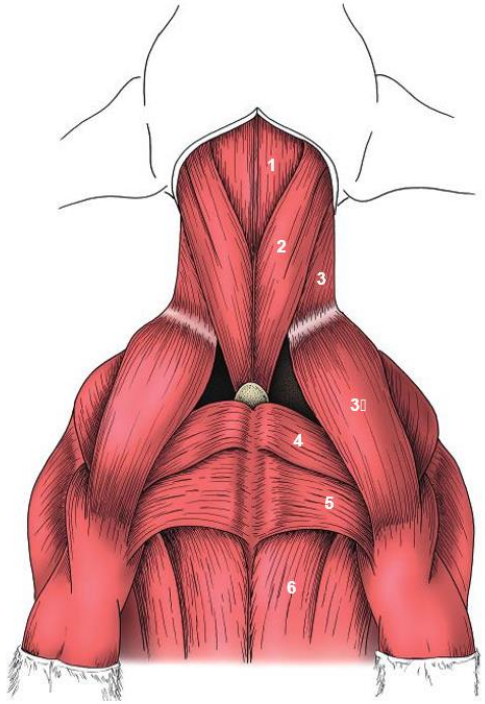
2. adduction

3. drows limb cranially or caudally depending on its position



Purple star: m. pectoralis superfic. pars descendens

Red star: m. pectoralis superfic. pars transversus



1. Combined sternohyoideus and sternothyroideus
2. Sternocephalicus
3. Cleidocephalicus, cervical part

3′. Brachiocephalicus, cleidobrachialis

4. Pectoralis descendens
5. Pectoralis transversus
6. Pectoralis profundus

PECTORAL MUSCLES OF CARNIVORES

2. M. pectoralis profundus (M. pectoralis ascendens):

Origin: a. all sternebrae of sternum

b. costal cartilage of true ribs

Insertion: a. tuberculum minor of humerus - insertion of main part of muscle

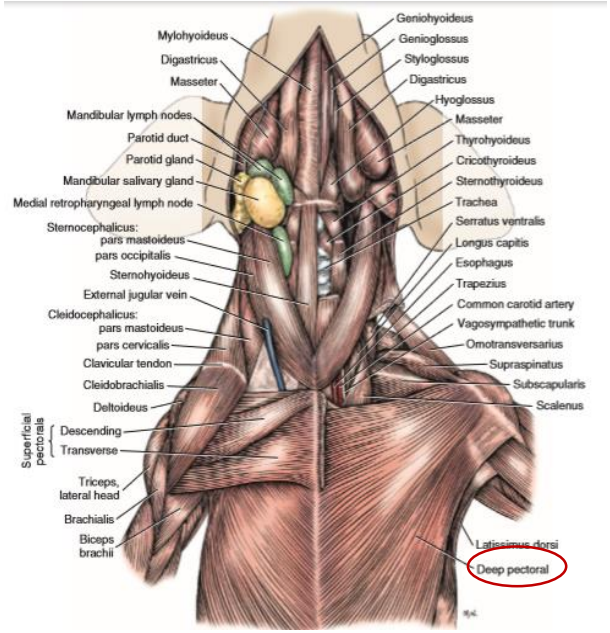
b. tuberculum major of humerus – insertion for a small aponeurosis

Function: a. supports trunk

b. a strong retractor – drows limb caudally

c. adductor of forelimb

Red star: m. pectoralis prof



RESPIRATORY MUSCLES OF THE HORSE

- **the respiratory muscles are well developed**

1. **M. serratus dorsalis cranialis**
2. **M. serratus dorsalis caudalis**
3. **M. intercostalis externus et internus**
4. **M. intercartilagineus**
5. **M. retractor**
6. **M. rectus thoracis**
7. **M. transversus thoracis**
8. **Diaphragm**

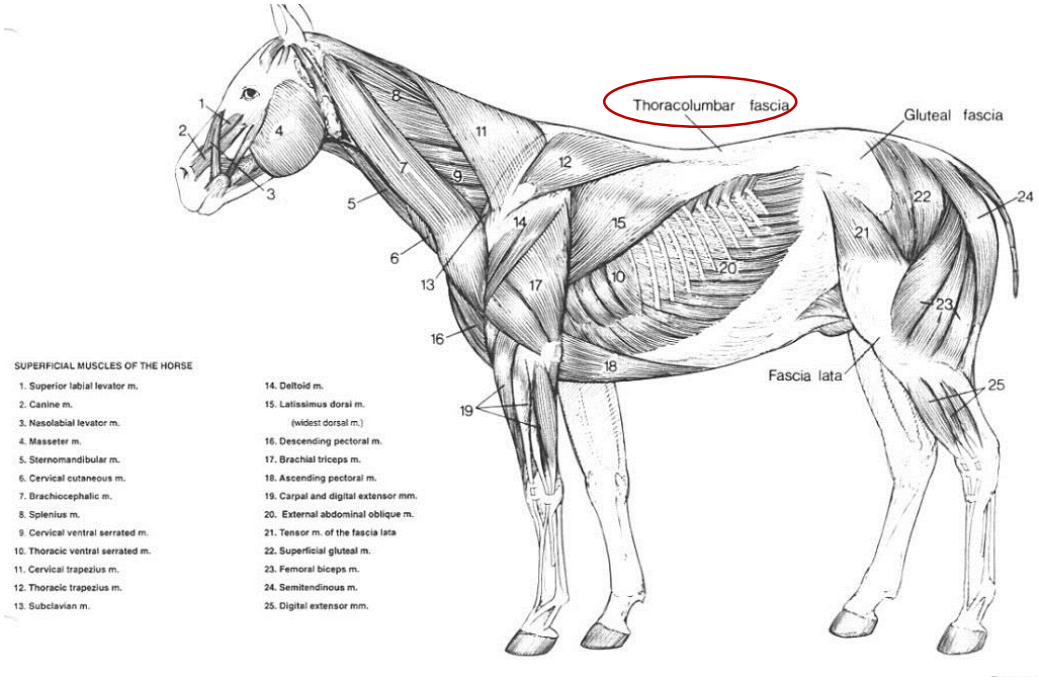
RESPIRATORY MUSCLES OF THE HORSE

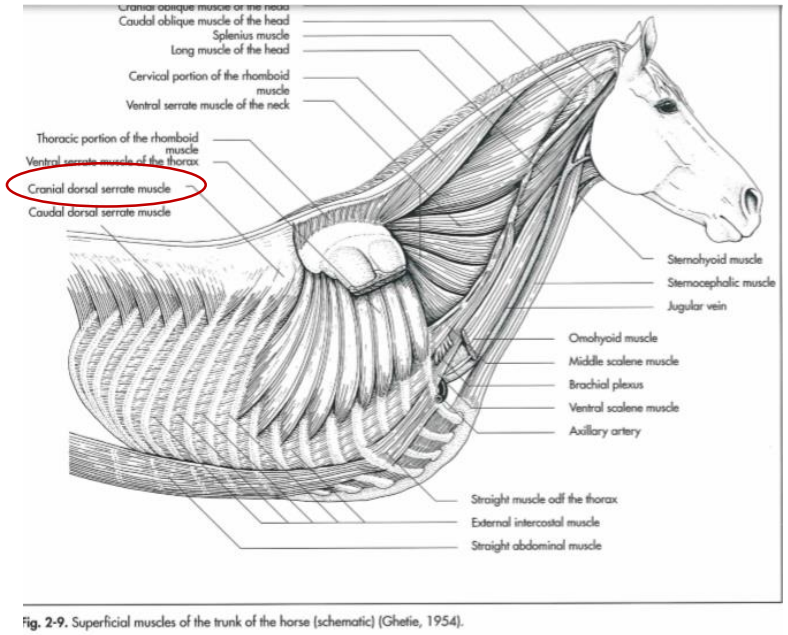
1. M. serratus dorsalis cranialis

Origin: a. by an aponeurosis from the spinocostotransverse fascia

b. by an aponeurosis from the thoracolumbal fascia

Insertion: cranial border and lateral surface of the 5th - 11th ribs, lateral to the iliocostal muscle





ig. 2-9. Superficial muscles of the trunk of the horse (schematic) (Ghetie, 1954).

http://browneyedcowgirls.blogspot.com/2011/10/bad-horse-mommy.html

RESPIRATORY MUSCLES OF THE HORSE

2. M. serratus dorsalis caudalis:

Origin: a. by an aponeurosis from the spinocostotransverse fascia

b. by an aponeurosis from the thoracolumbal fascia

Insertion: caudal border of the 11th - 18th ribs

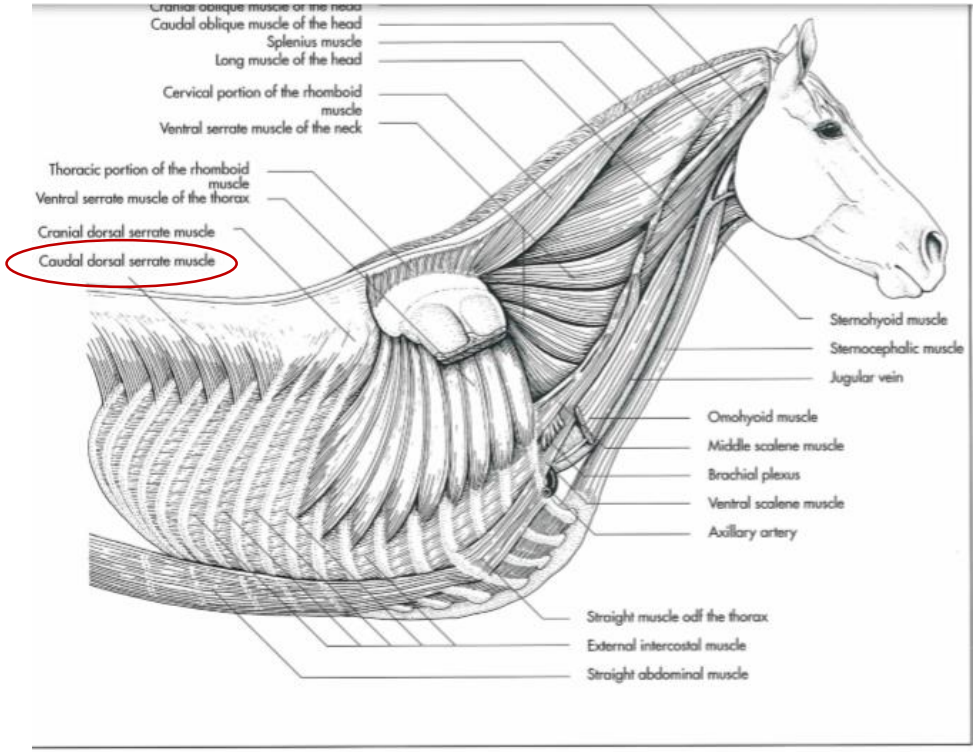
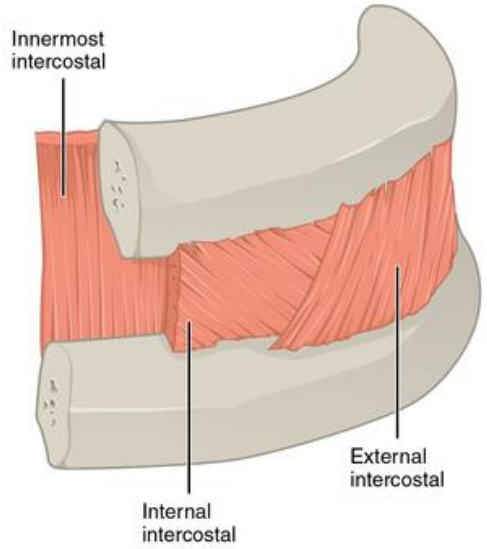


Fig. 2-9. Superficial muscles of the trunk of the horse (schematic) (Ghetie, 1954).

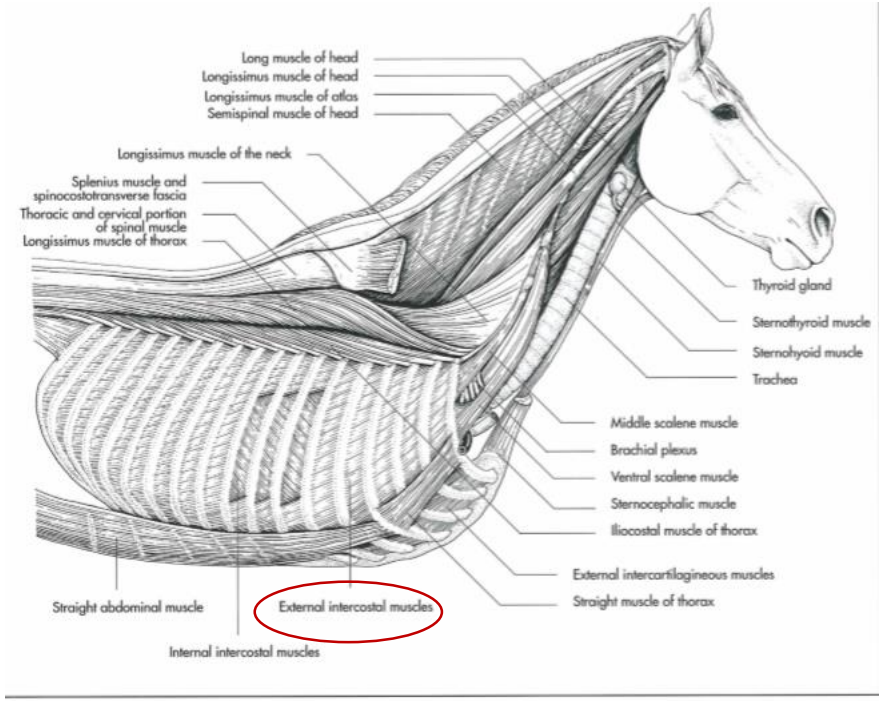
RESPIRATORY MUSCLES OF THE HORSE



https://en.wikipedia.org/wiki/External_intercostal_muscles

3. M. intercostalis externus:

- **more horizontally arranged**
- **the muscle fibers are heavily permetaed by collagen**
- **in the region of the last rib blend with the external obligues abdominal muscle**



ig. 2-11. Superficial and middle layers of the trunk musculature of the horse (schematic) (Ghetie, 1954).

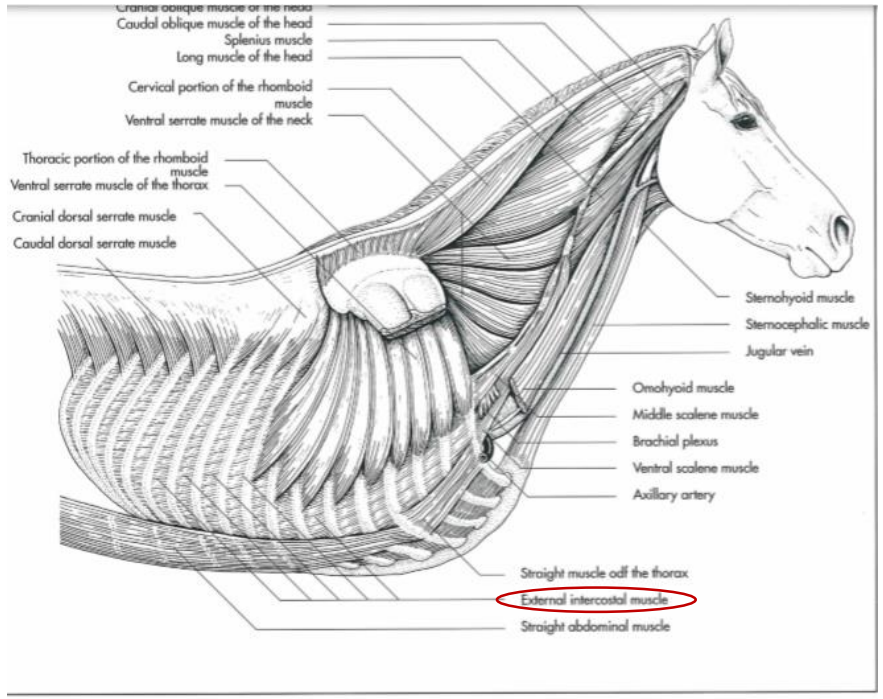


Fig. 2-9. Superficial muscles of the trunk of the horse (schematic) (Ghetie, 1954).

RESPIRATORY MUSCLES OF THE HORSE

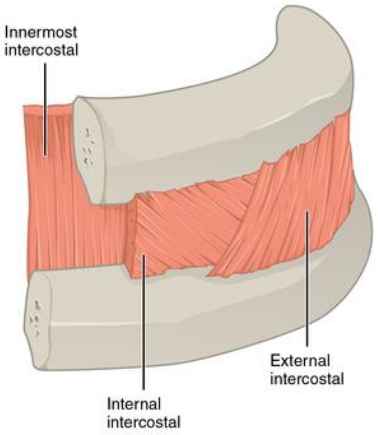
4. M. intercostalis internus:

a. Cranial half:

- **are fleshy by the first 8 intercostal spaces**
- **lie below the thoracic ventral serrate muscle**

b. Caudal half:

- **are tendinous**



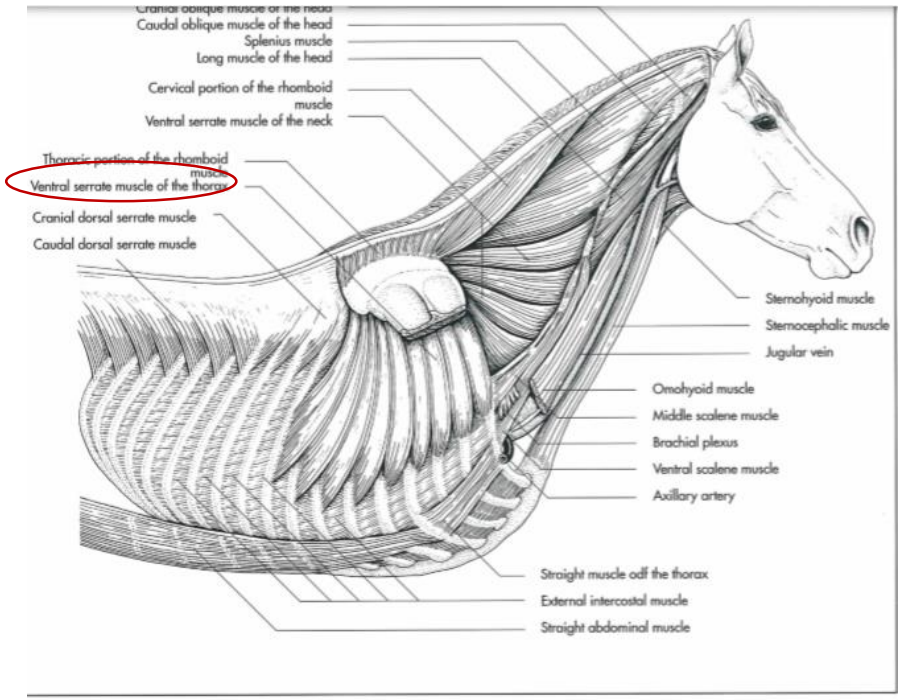


Fig. 2-9. Superficial muscles of the trunk of the horse (schematic) (Ghetie, 1954).

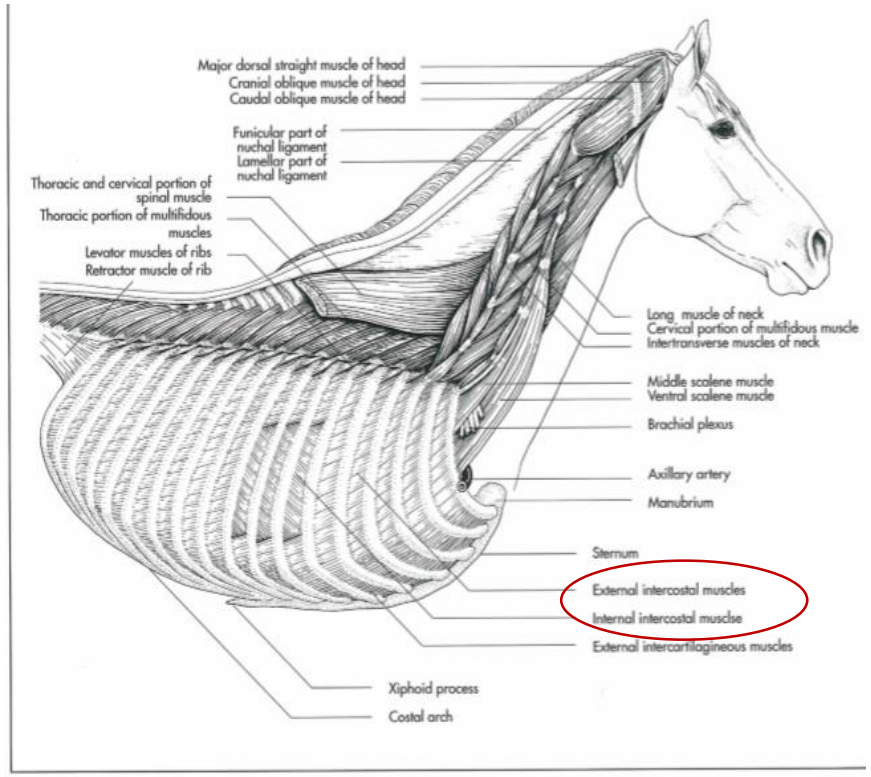
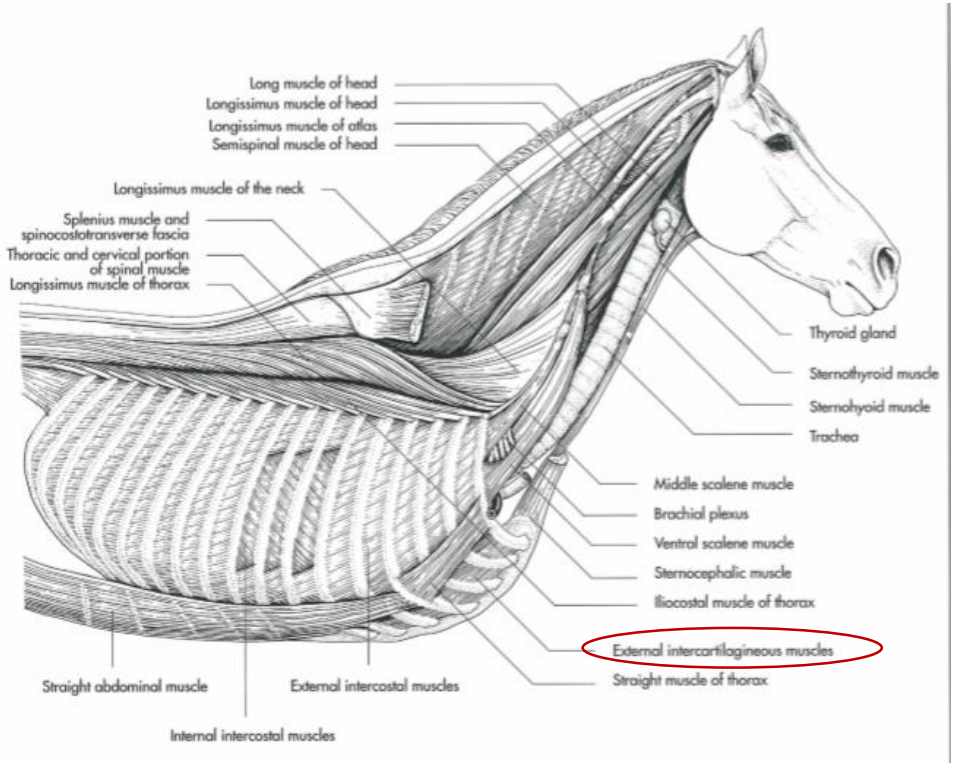


Fig. 2-12. Deep layer of the trunk musculature of the horse (schematic) (Ellenberger and Baum, 1943).

RESPIRATORY MUSCLES OF THE HORSE

5. M. intercartilagineus:

- **in the region of the false ribs applied to the lateral surface of the costal cartilage**



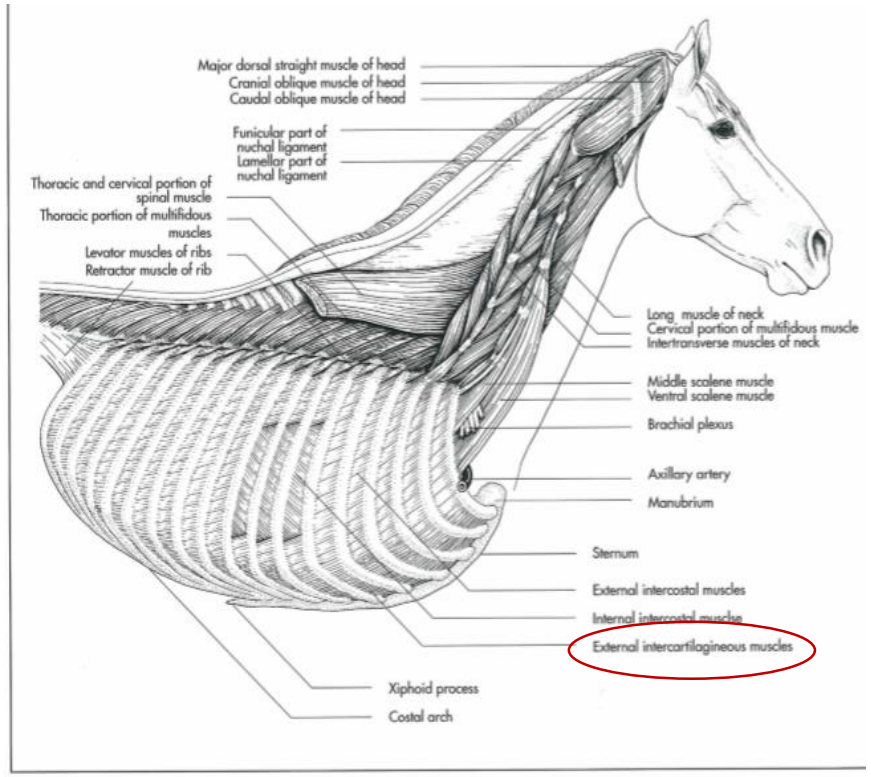
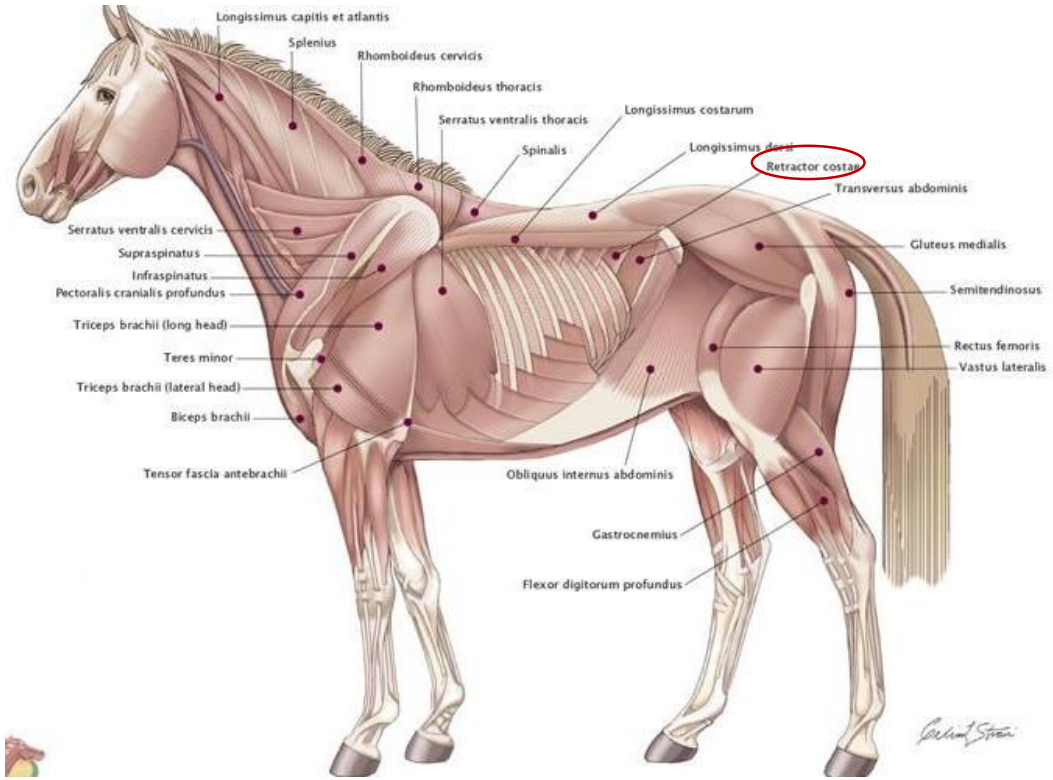


Fig. 2-12. Deep layer of the trunk musculature of the horse (schematic) (Ellenberger and Baum, 1943).

RESPIRATORY MUSCLES OF THE HORSE

6. M. retractor:

- **between the thoracolumbar fascia and the last ribs**



https://hu.pinterest.com/pin/441493569700501727/

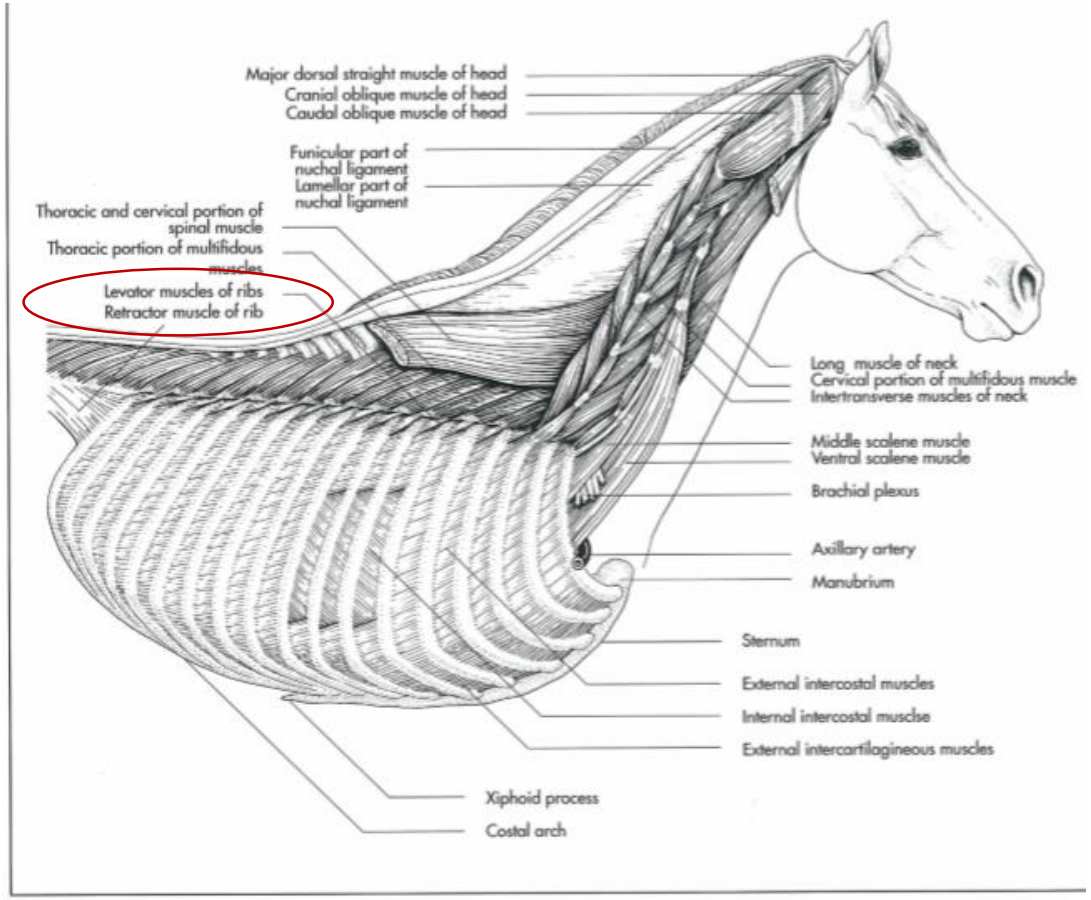


Fig. 2-12. Deep layer of the trunk musculature of the horse (schematic) (Ellenberger and Baum, 1943).

RESPIRATORY MUSCLES OF THE HORSE

7. M. rectus thoracis:

- **extends over the three or four ribs**
- **often forming a direct contact with the rectus abdominis muscle**

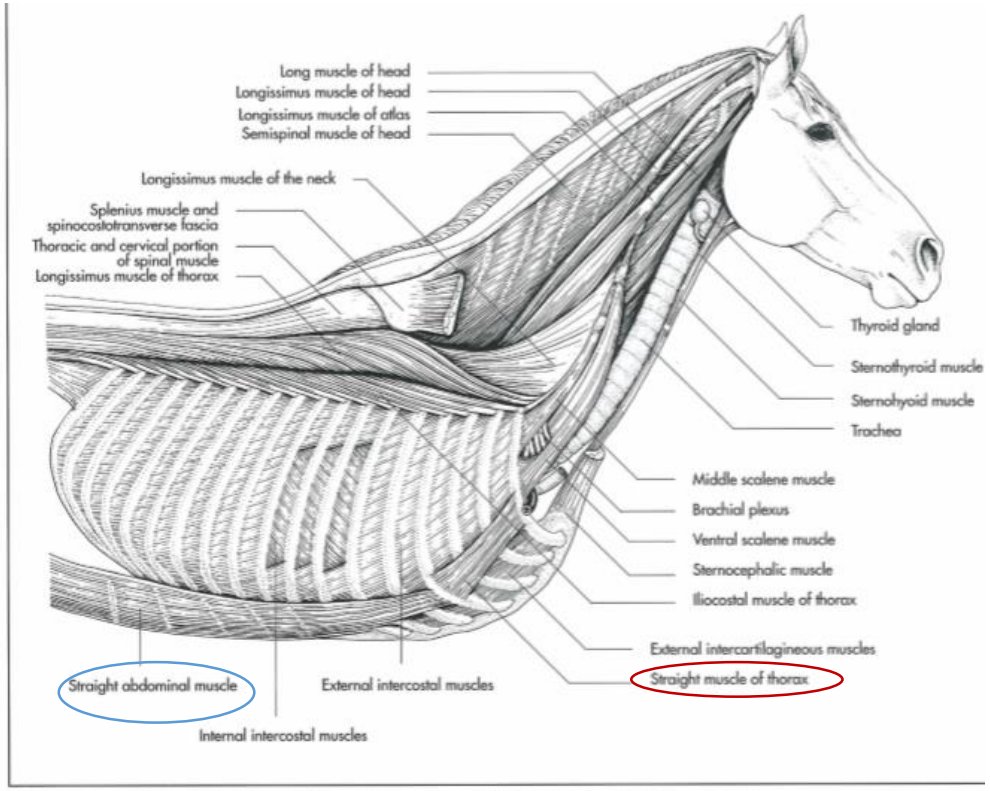


Fig. 2-11. Superficial and middle layers of the trunk musculature of the horse (schematic) (Ghetie, 1954).

RESPIRATORY MUSCLES OF THE HORSE

8. M. transversus thoracis:

Origin: arises bilaterally from the middle limb of the strenal ligament

Insertion: 2 - 8th ribs at the costochondral junction

RESPIRATORY MUSCLES OF THE HORSE

9. Diaphragm:

- **taller than its wide**
- **caracterised by the size of its tendinous centre**

a) Pars costalis

b) Pars sternalis

c) Pars lumbalis

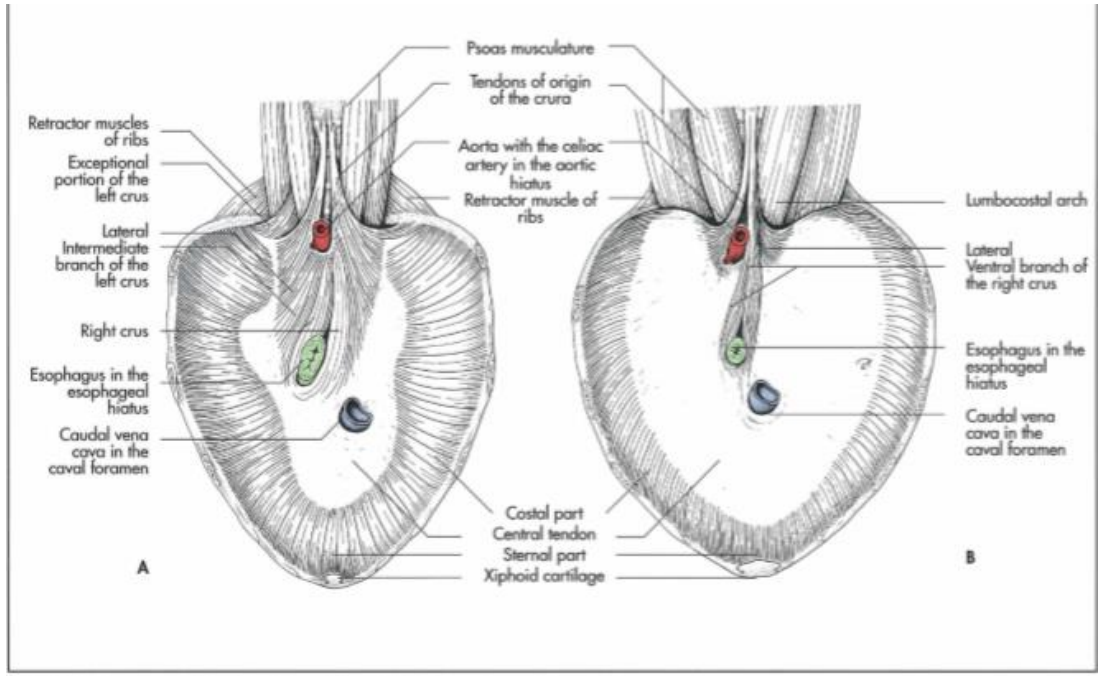
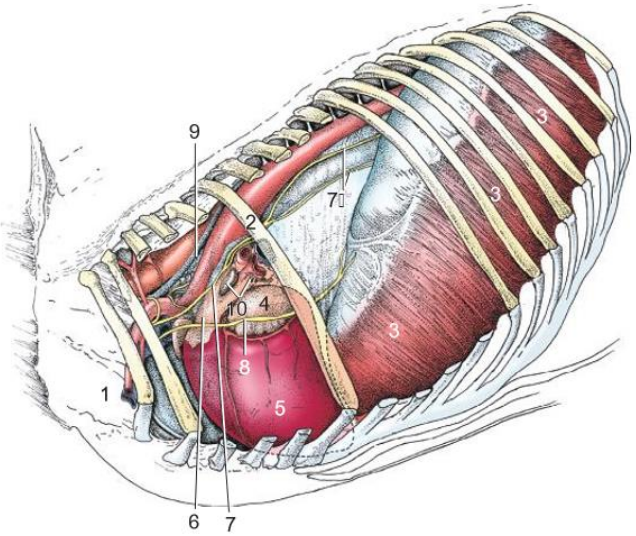


Fig. 2-14. Diaphragm of the dog **(A)** and horse **(B)** (schematic, caudal aspect).



1. Axillary vessels
2. Sixth rib
3. Diaphragm
4. Left auricle
5. Left ventricle
6. Pulmonary trunk
7. Vagus

7'. Dorsal and ventral vagal trunks

8. Phrenic nerve
9. Thoracic duct
10. Tracheobronchial lymph nodes

Note: The mediastinal pleura cranial to the heart have been removed, exposing the cranial lobe of the right lung.

RESPIRATORY MUSCLES OF THE HORSE

a. Pars costalis:

Origin: by digitations laying between those of the transverse muscle

Insertion: costochondral junctions of the 14th – 8th ribs

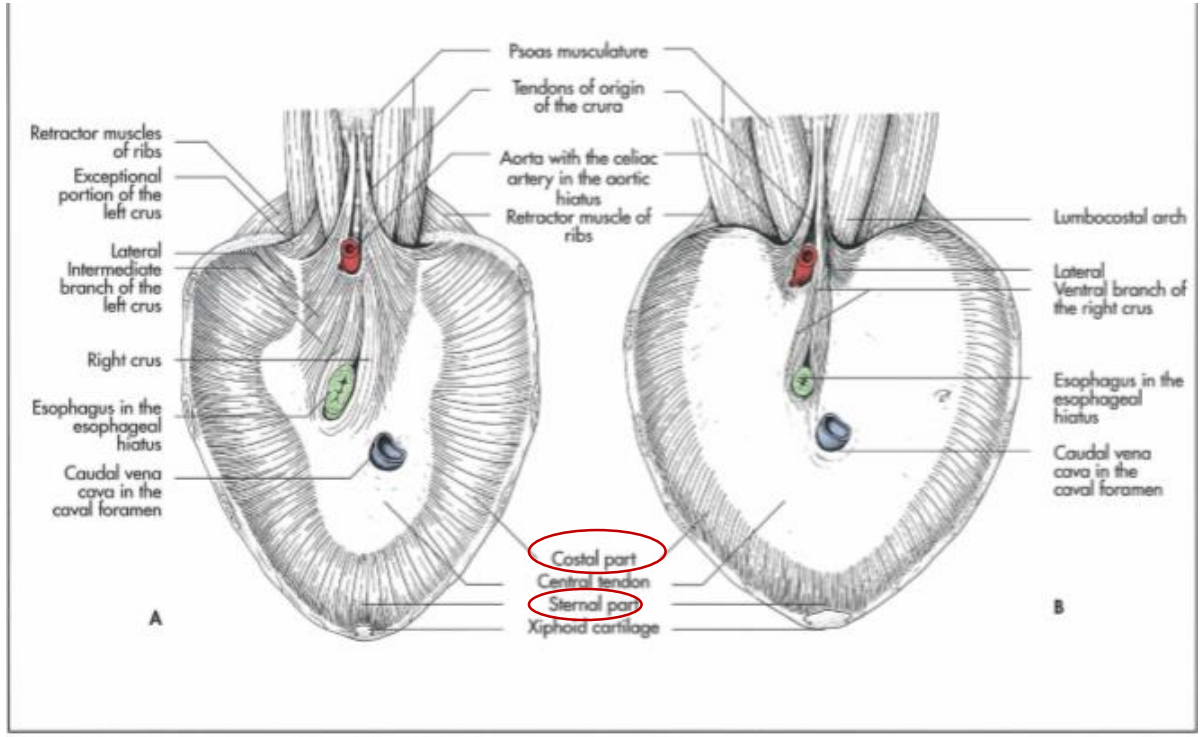


Fig. 2-14. Diaphragm of the dog **(A)** and horse **(B)** (schematic, caudal aspect).

RESPIRATORY MUSCLES OF THE HORSE

b. Pars sternalis:

- **it is not distinctly separable from the costal part**

Origin: Xyphoid cartilage

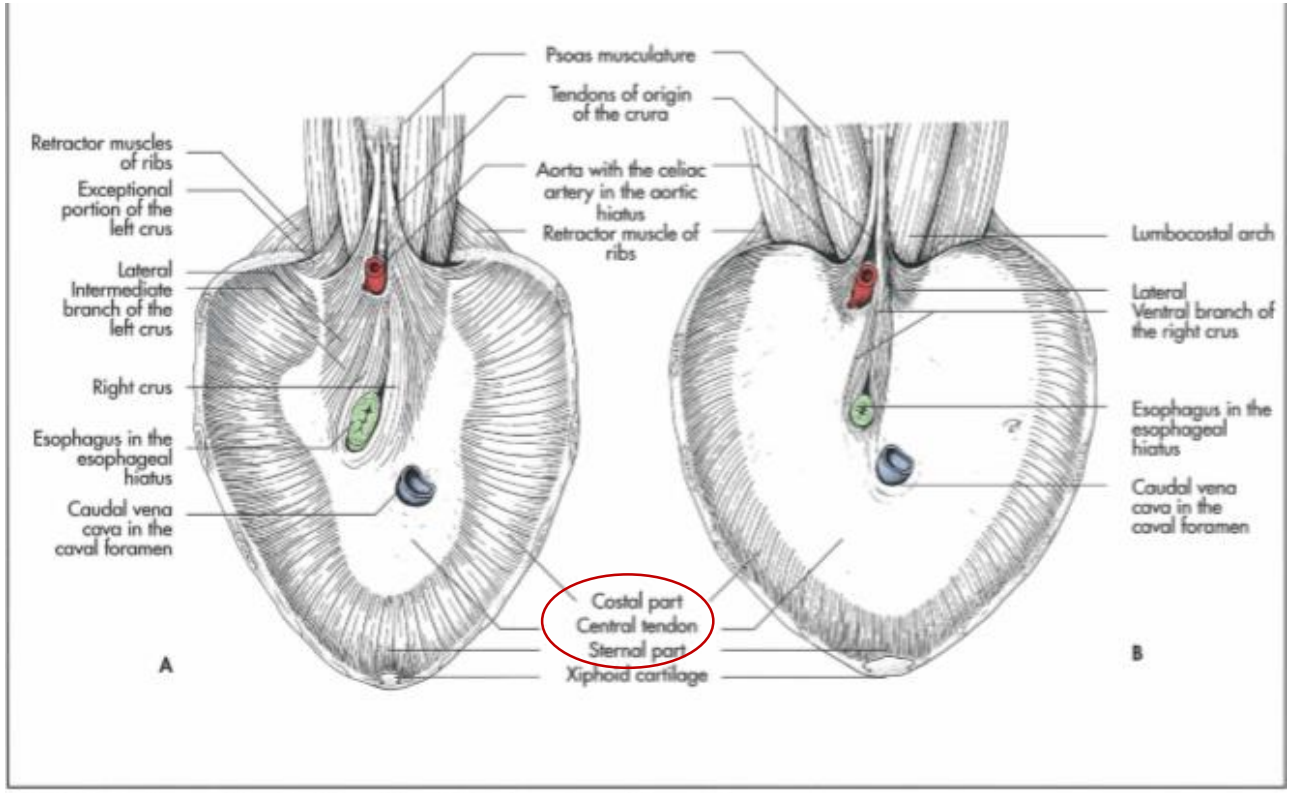


Fig. 2-14. Diaphragm of the dog **(A)** and horse **(B)** (schematic, caudal aspect).

RESPIRATORY MUSCLES OF THE HORSE

c. Pars lumbalis:

1. left crus:

i. lateral limb

2. right crus

i. lateral limb

ii. ventral limb

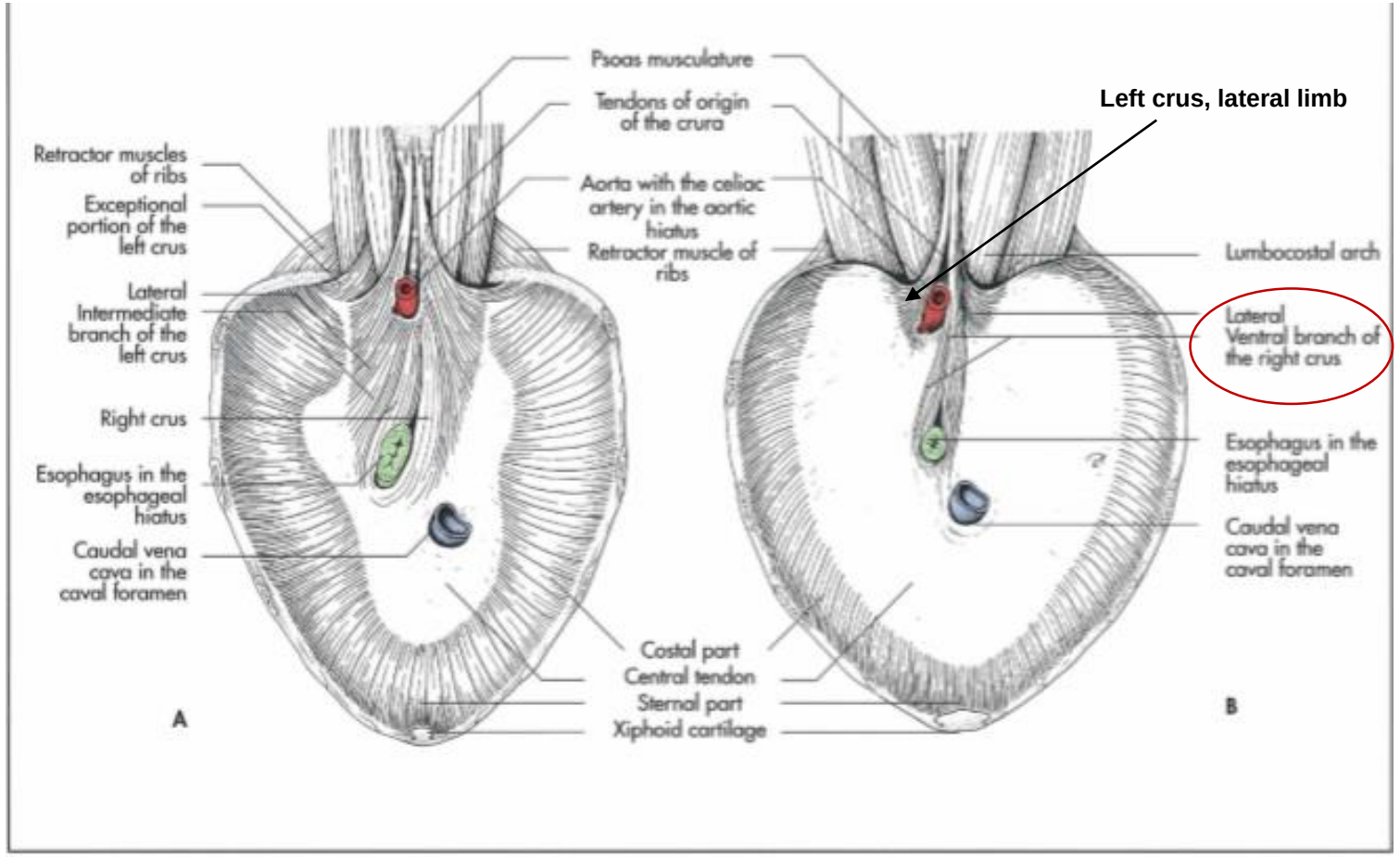


Fig. 2-14. Diaphragm of the dog **(A)** and horse **(B)** (schematic, caudal aspect).

RESPIRATORY MUSCLES OF THE HORSE

c. Pars lumbalis:

Left crus:

- **arises from the 1st-2nd lumbal vertebrea**
- **broadens out to the left of the aortic hiatus**

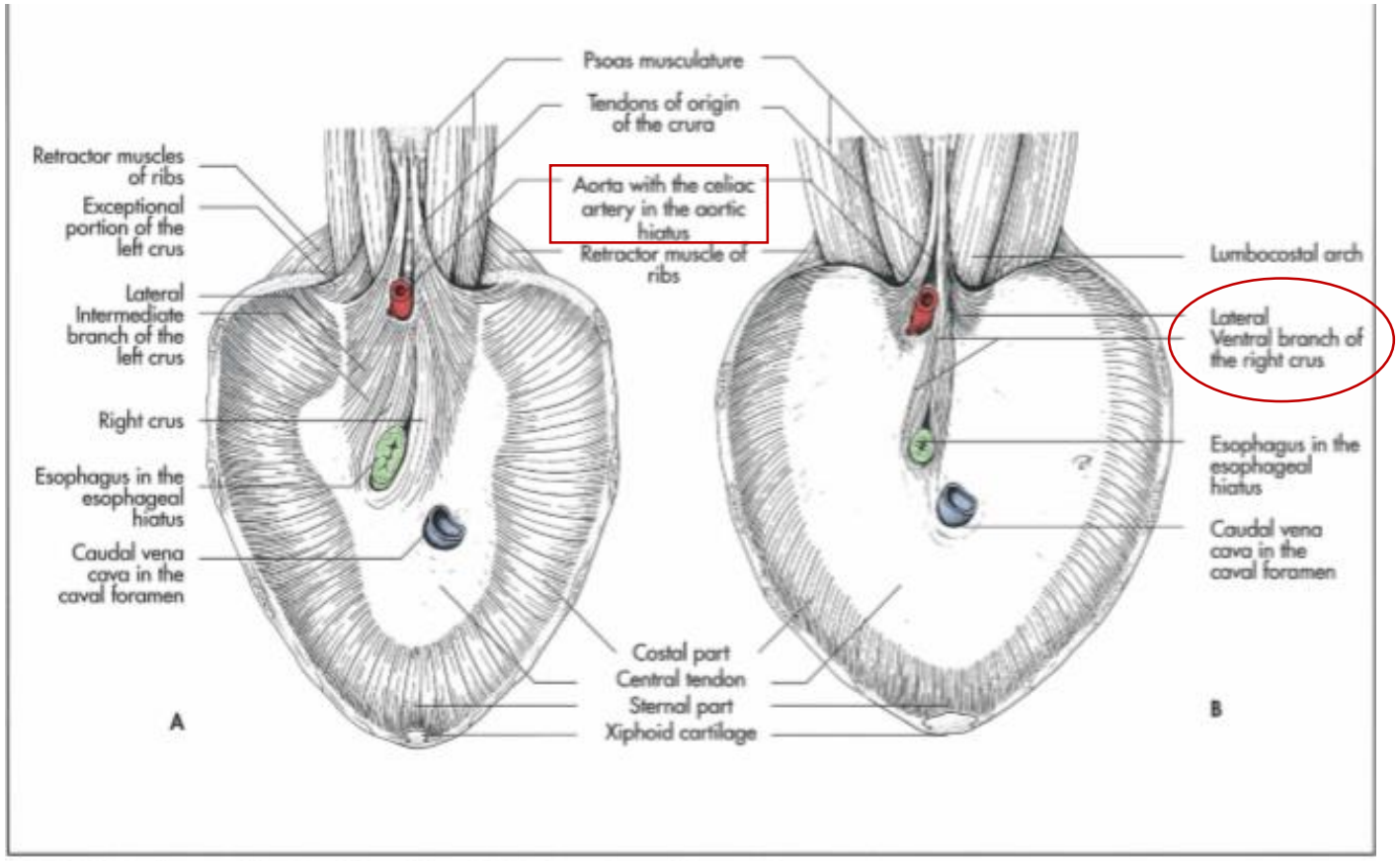


Fig. 2-14. Diaphragm of the dog **(A)** and horse **(B)** (schematic, caudal aspect).

RESPIRATORY MUSCLES OF THE HORSE

Hiatus oesophageus:

- **formed by strong muscle bundles of the ventral limb of the right crus**

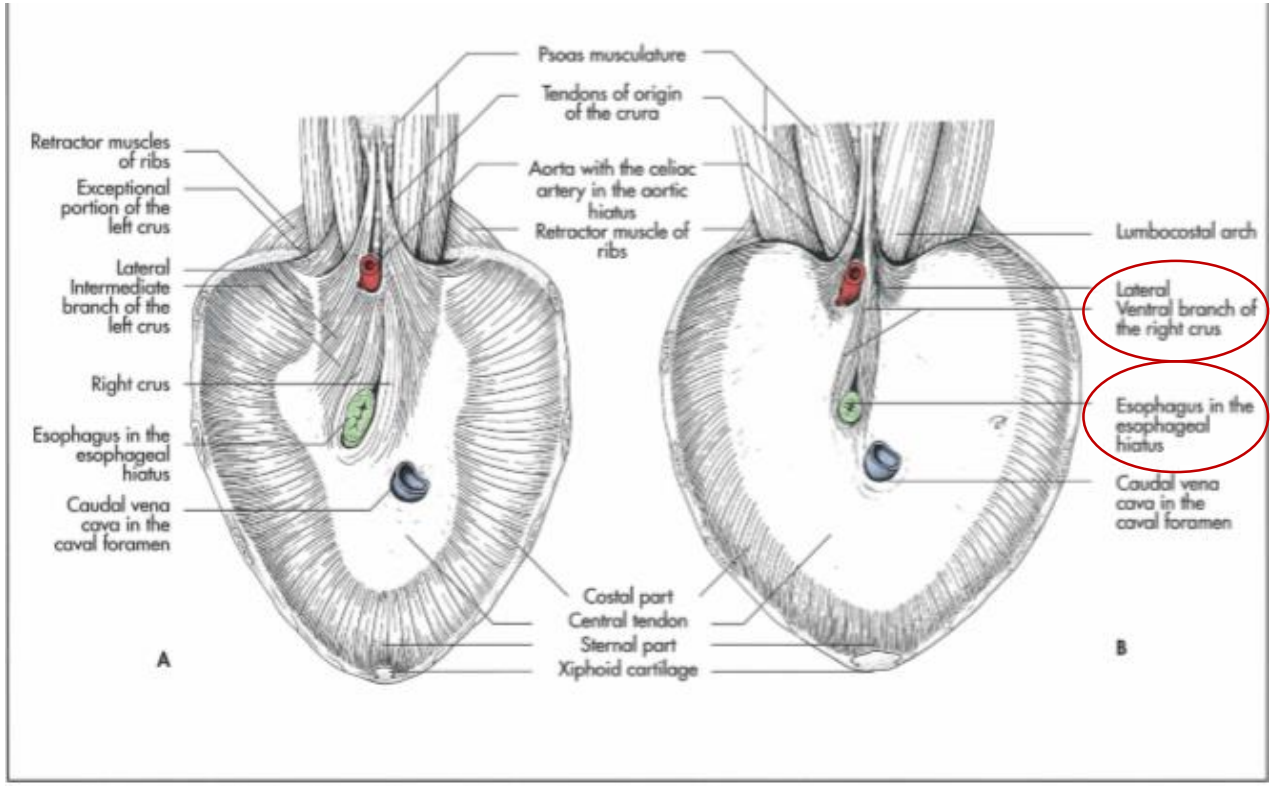


Fig. 2-14. Diaphragm of the dog **(A)** and horse **(B)** (schematic, caudal aspect).

RESPIRATORY MUSCLES OF THE HORSE

Foramen cavea:

- **situated in the lateral part**
- **about the level of the 7th intercostal space**
- **formed by strong tendon tracts which merge with the right part of the ventral limb of the right crus**

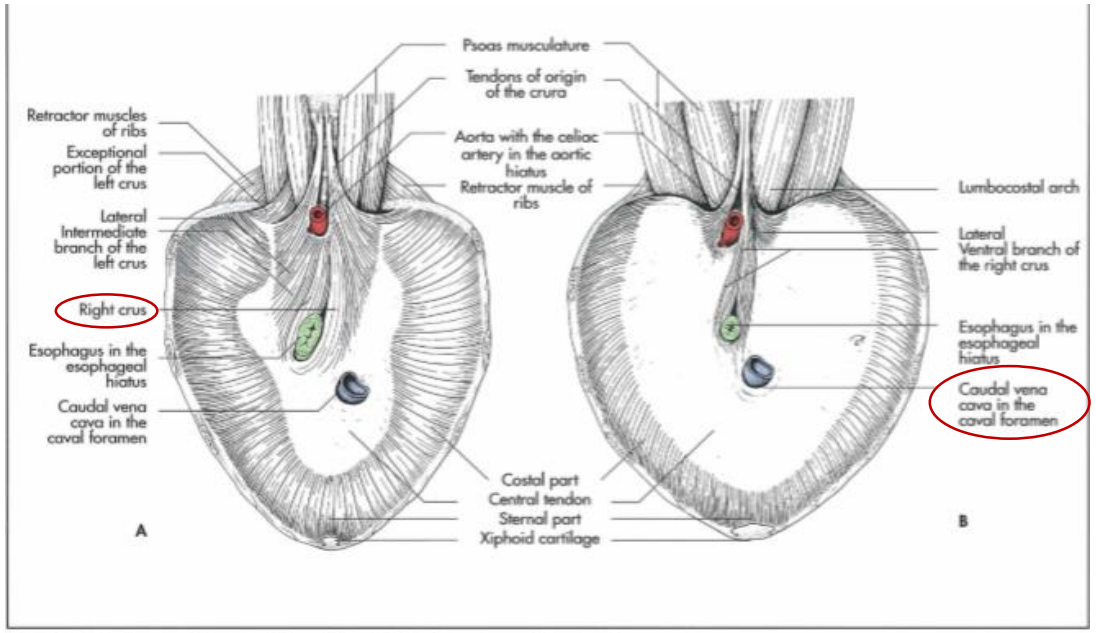
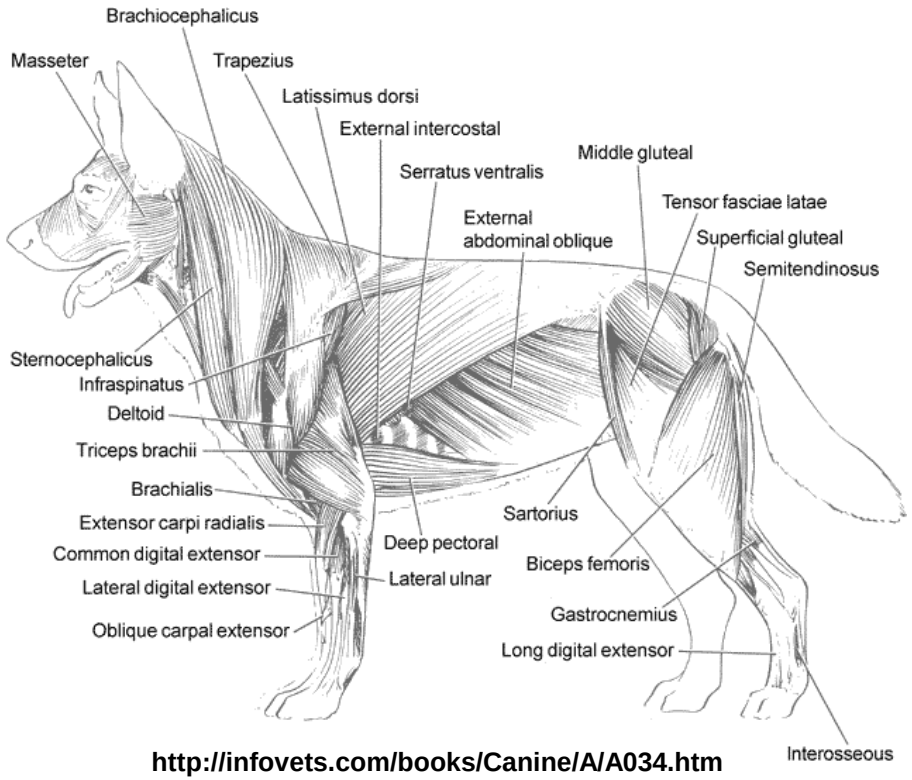


Fig. 2-14. Diaphragm of the dog **(A)** and horse **(B)** (schematic, caudal aspect).

ABDOMINAL MUSCLES OF CARNIVORES

Functions:

- **form the abdominal wall**
- **maintain abdominal pressure (urination, defecation, parturition)**
- **protection of abdominal organs**



http://infovets.com/books/Canine/A/A034.htm

ABDOMINAL MUSCLES OF CARNIVORES

1. **M. obliquus externus abdominis**
2. **M. obliquus internus abdominis**
3. **M. transversus abdominis**
4. **M. rectus abdominis**

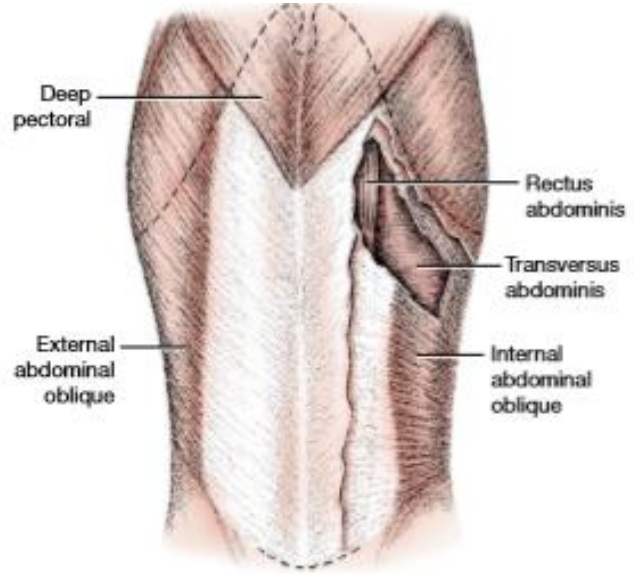
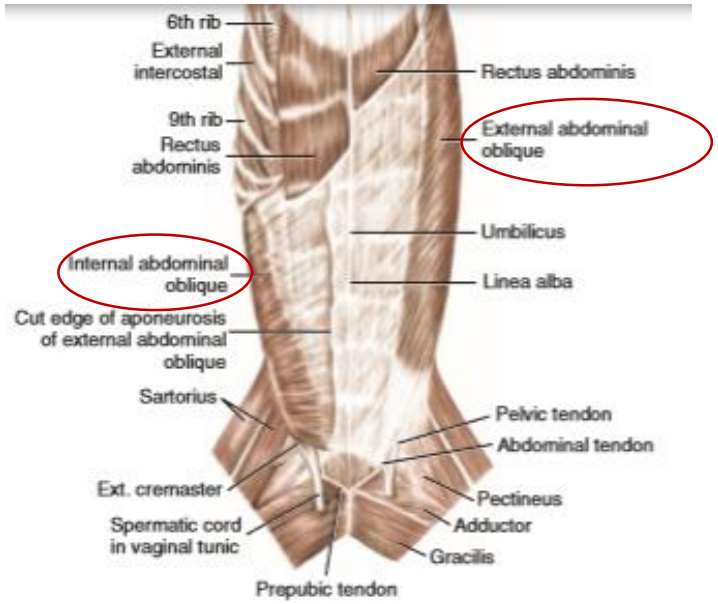


Fig. 2-77 Muscles of abdominal wall, ventral view.



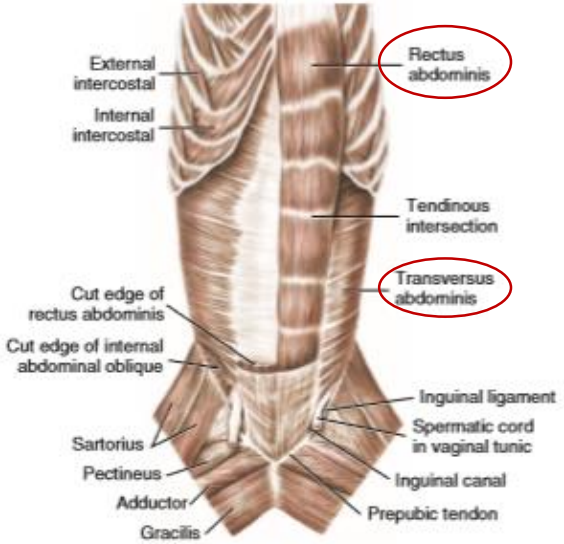


FIGURE 6-38 Muscles of trunk, deep dissection, ventral aspect.

ABDOMINAL MUSCLES OF CARNIVORES

M. obliquus externus abdominis:

Origin: a. superficial layer of thoracolumbal fascia

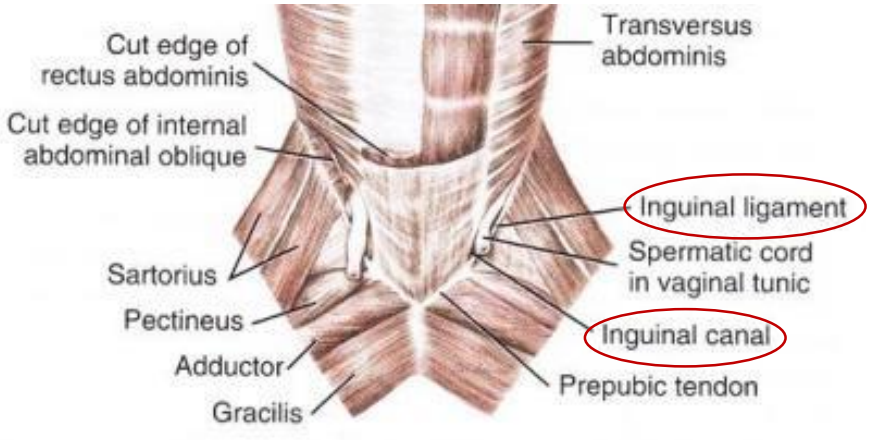
b. lateral aspect of ribs 4 – 12

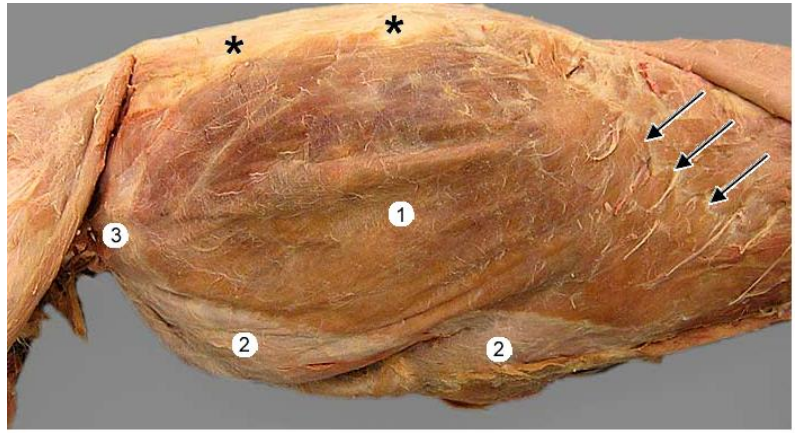
Insertion:

a. fibers run caudoventrally to linea alba

b. fibers run caudally to pelvis – formation of inguinal ligament (ligamentum inguinale poparti)

c. formation of medial and lateral crus around the superficial inguinal ring (anulus inguinalis superficialis)

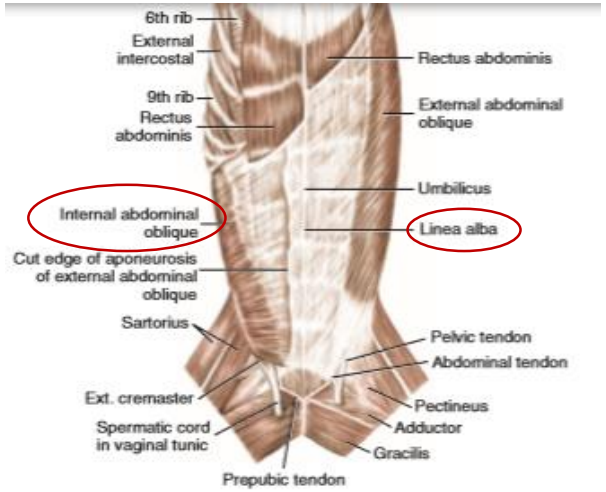




Abdominal muscles of the cat. The **external abdominal oblique m.** (1) takes origin from thoracic ribs (arrows) and from thoracolumbar deep fascia (asterisks). It inserts on the linea alba via an aponeurosis (2) that covers the rectus abdominis m. Caudally, the aponeurosis (3) contacts the thigh. Notice that muscle fascicles of the external abdominal oblique m. are angled caudally (i.e., they run from craniodorsal to ventrocaudal).

http://vanat.cvm.umn.edu/carnLabs/Lab08/Img8-7.html

ABDOMINAL MUSCLES OF CARNIVORES



2. M. obliquus internus abdominis:

Origin: a. superficial layer of thoracolumbal fascia

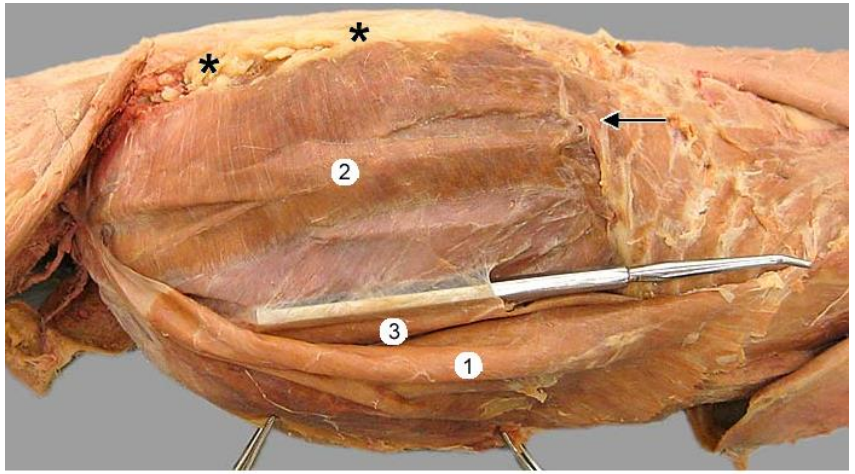
b. tuber coxae

c. lig. inguinale

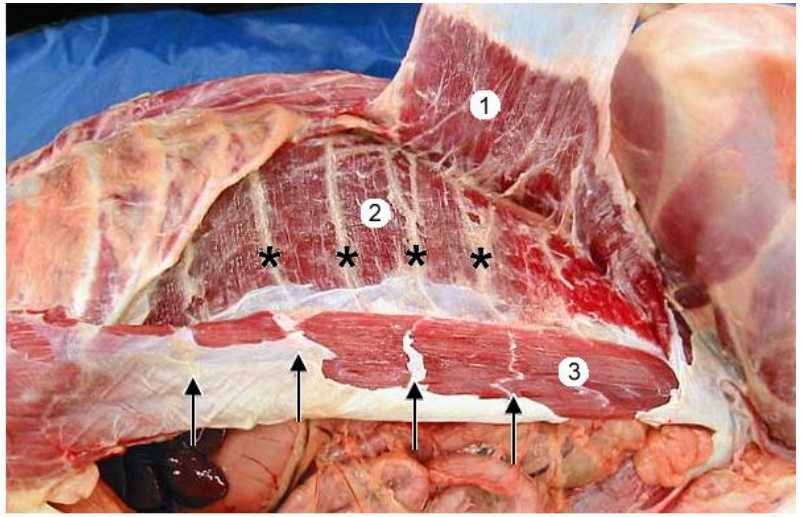
Insertion:

a. fibers run cranioventrally to linea alba

b. at preumbilical level – outer and inner layer – formation of rectus scheet



Abdominal muscles of the cat. The **external abdominal oblique m.** (1) is reflected ventrally, exposing the **internal abdominal oblique m.** (2) which originates form the last ribs (arrow) and from thoracolumbar deep fascia (asterisks) and from the ilium (tuber coxae). The internal abdominal oblique m. inserts on the linea alba via an aponeurosis (elevated by a probe) that ensheathes the rectus abdominis m. (3). Notice that muscle fascicles of the internal abdominal oblique m. are angled cranially (i.e., they run from caudodorsal to ventrocranial).



Here the **internal abdominal oblique m.** (1) is reflected, exposing the **transversus abdominis m.** (2) (which has ventral branches of spinal nerves (asterisks) running down its lateral surface). The **rectus abdominis m.** (3) has been exposed by reflecting the aponeuroses that ensheath it. The muscle is segmented by tendinous intersections (arrows). The abdomen has been opened by incising the linea alba.

http://vanat.cvm.umn.edu/carnLabs/Lab08/Img8-6.html

ABDOMINAL MUSCLES OF CARNIVORES

3. M. transversus abdominis:

Origin: a. deep layer of thoracolumbal fascia from transverse processes of lumbal vertebrae

b. medial surface of false ribs

Insertion: fibers run transversely to linea alba

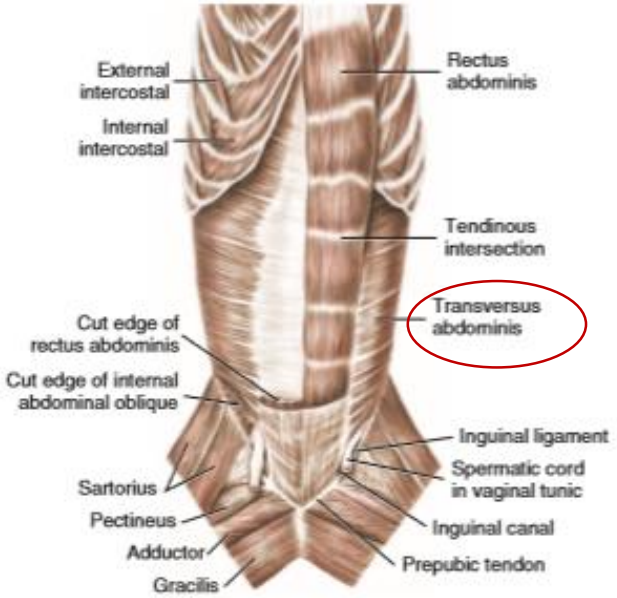
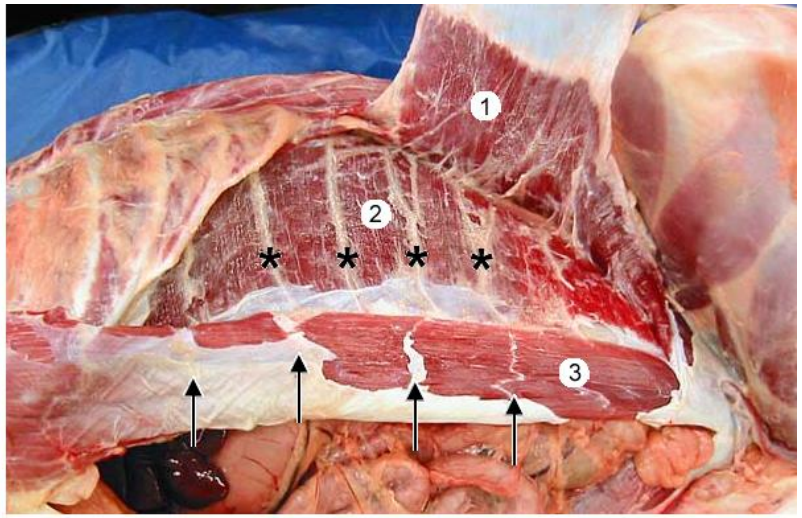
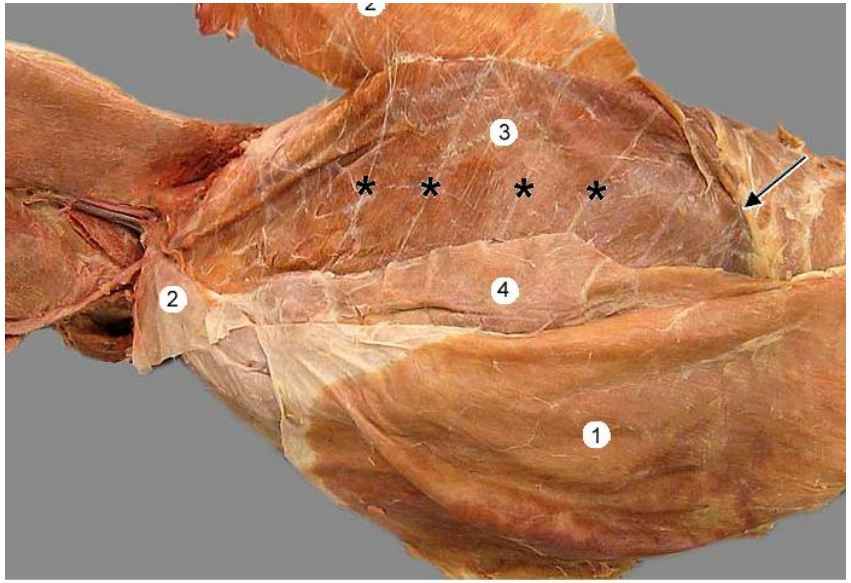


FIGURE 6-38 Muscles of trunk, deep dissection, ventral aspect.



Here the **internal abdominal oblique m.** (1) is reflected, exposing the **transversus abdominis m.** (2) (which has ventral branches of spinal nerves (asterisks) running down its lateral surface). The **rectus abdominis m.** (3) has been exposed by reflecting the aponeuroses that ensheath it. The muscle is segmented by tendinous intersections (arrows). The abdomen has been opened by incising the linea alba.



Abdominal muscles of the cat. The **external abdominal oblique m.** (1) has been reflected ventrally and the **internal abdominal oblique m.** (2) is reflected dorsally, exposing the **transversus abdominis m.** (3) which originates from thoracolumbar deep fascia and from the costal arch (arrow). The transversus abdominis m. inserts on the linea alba via an aponeurosis that passes deep to the **rectus abdominis m.** (4). Ventral branches (asterisks) of lumbar spinal nerves run on the surface of the transversus abdominis m.

http://vanat.cvm.umn.edu/carnLabs/Lab08/Img8-9.html

ABDOMINAL MUSCLES OF CARNIVORES

M. rectus abdominis:

Origin: cranially from sternum

Insertion: pecten ossis pubis on prepubic tendon with m. pectineus

- **tendinous intersections**

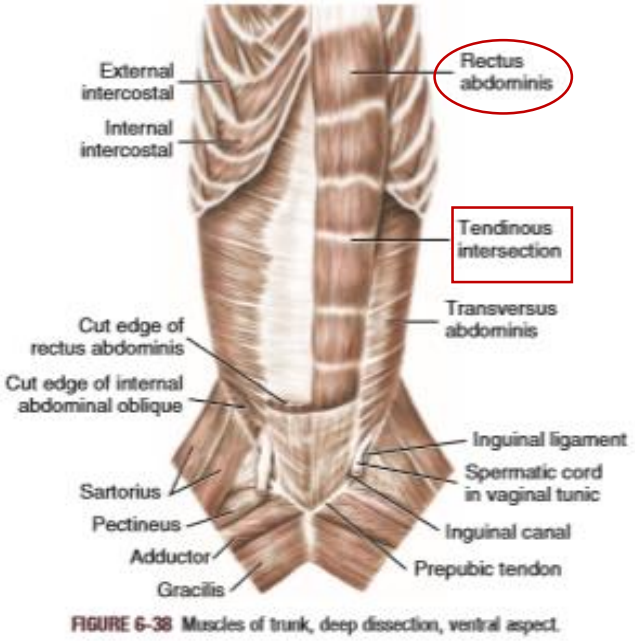
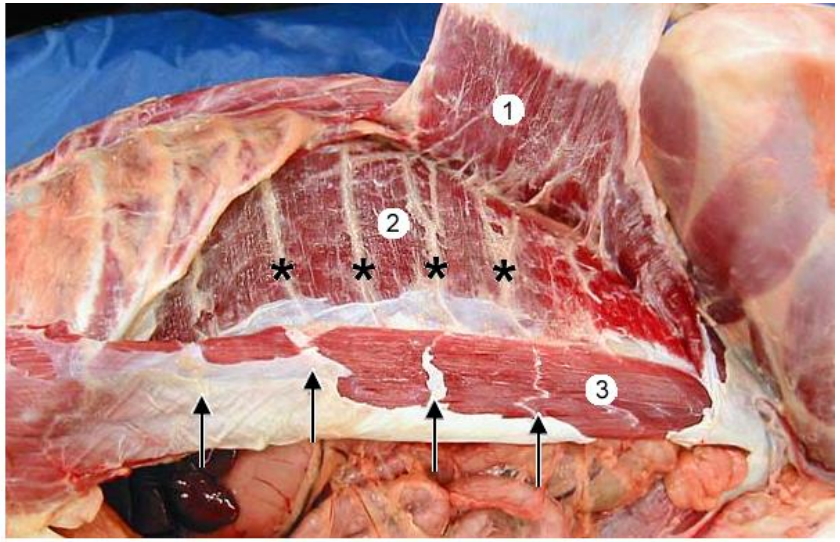
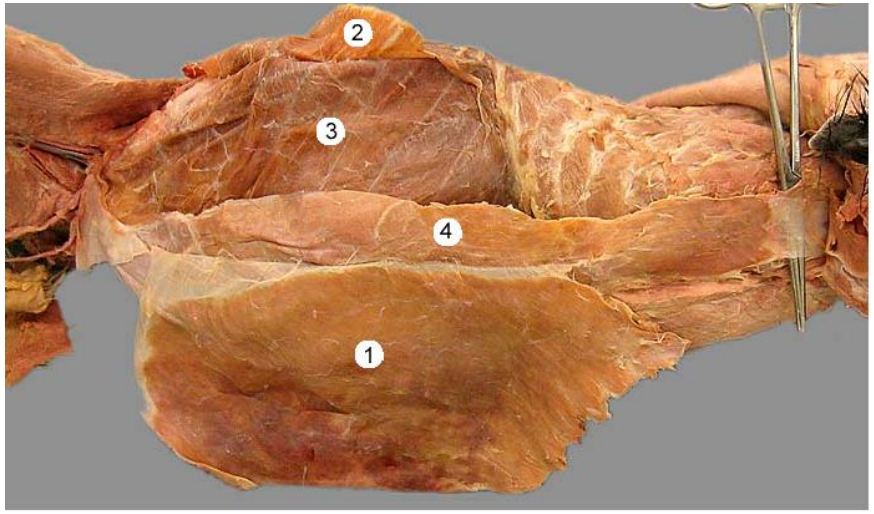


FIGURE 6-38 Muscles of trunk, deep dissection, ventral aspect.



Here the **internal abdominal oblique m.** (1) is reflected, exposing the **transversus abdominis m.** (2) (which has ventral branches of spinal nerves (asterisks) running down its lateral surface). The **rectus abdominis m.** (3) has been exposed by reflecting the aponeuroses that ensheath it. The muscle is segmented by tendinous intersections (arrows). The abdomen has been opened by incising the linea alba.



Abdominal muscles of the cat. The **external abdominal oblique m.** (1) has been reflected ventrally and the **internal abdominal oblique m.** (2) has been reflected dorsally, revealing the **transversus abdominis m.** (3). The **rectus abdominis m.** (4) is exposed entirely by the reflections. Cranially, the rectus abdominis m. attaches to ribs via an aponeurosis (elevated by forceps). Caudally, the rectus abdominis m. attaches to the pubis via a prepubic tendon (not shown). (The tendinous intersections characteristic of the rectus abdominis m. are not evident in this image.)

http://vanat.cvm.umn.edu/carnLabs/Lab08/Img8-10.html

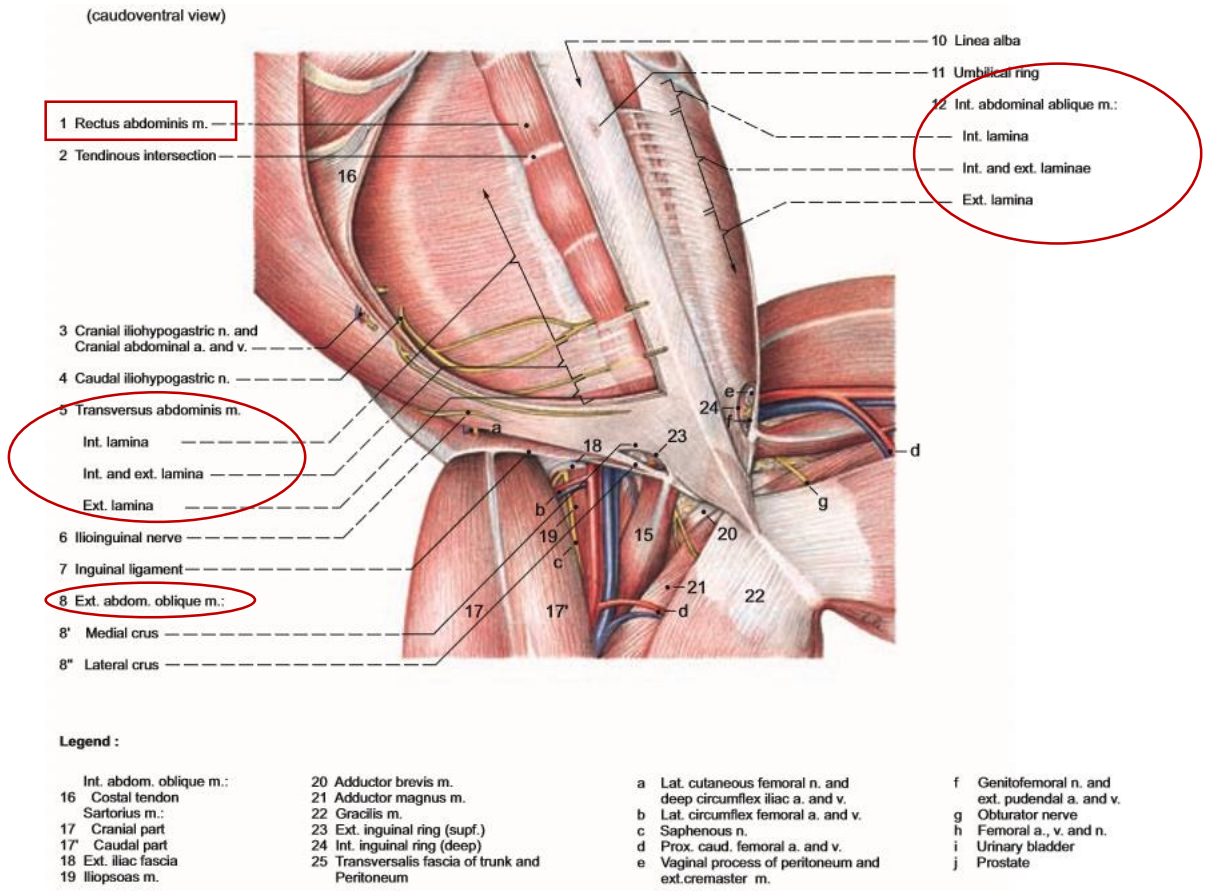
ABDOMINAL MUSCLES OF CARNIVORES

RECTUS SHEATH (VAGINA RECTI):

- **formed by the aponeuroses of the transverse abdominal and the external and internal oblique muscles**
- **contains the rectus abdominis**

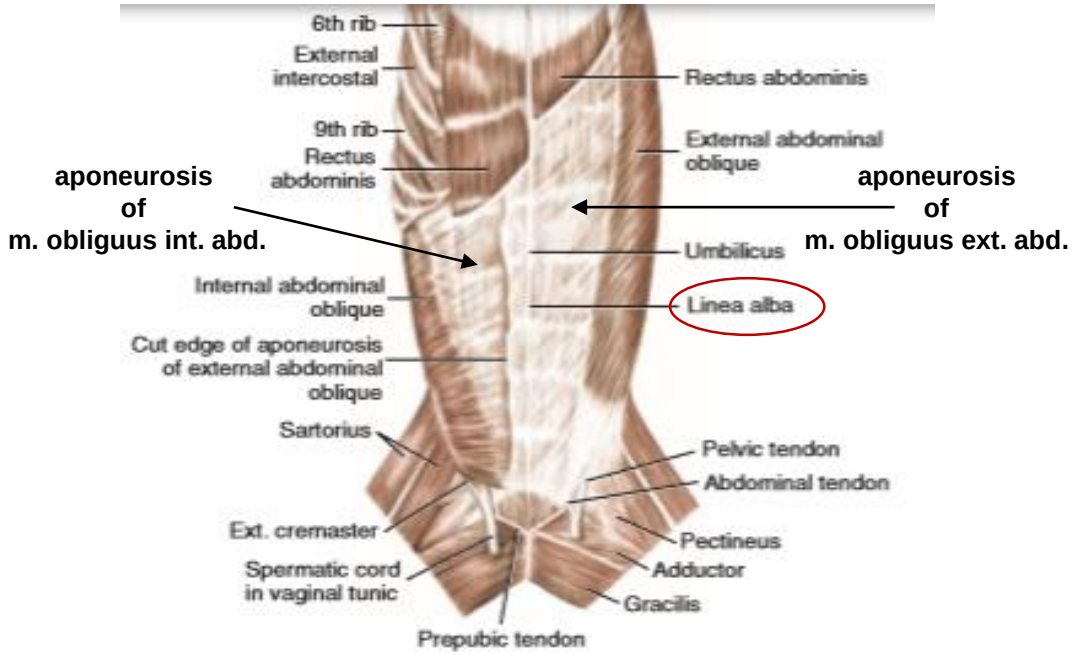
divided into:

1. **anterior lamina**
2. **posterior lamina**



ABDOMINAL MUSCLES OF CARNIVORES

- **aponeuroses of the transverse abdominal and the external and internal oblique muscles**



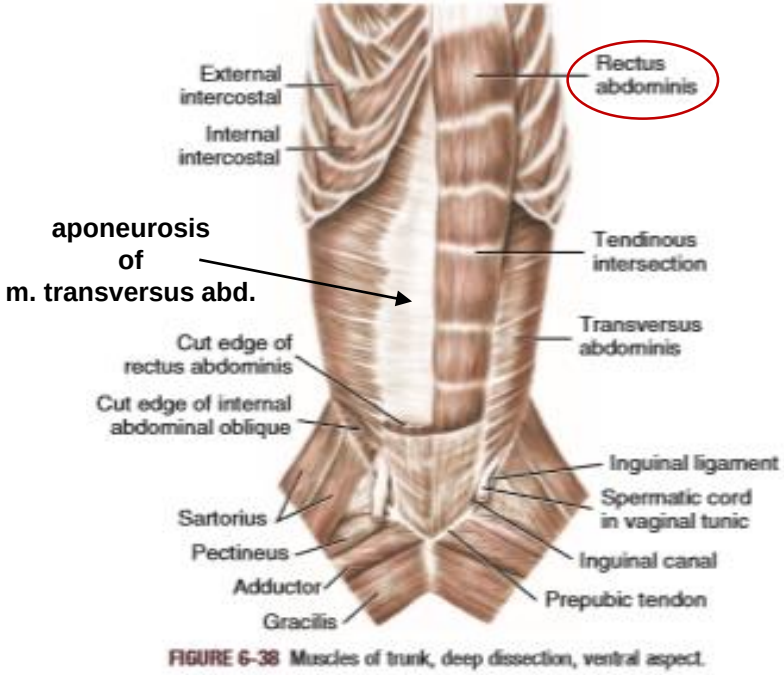
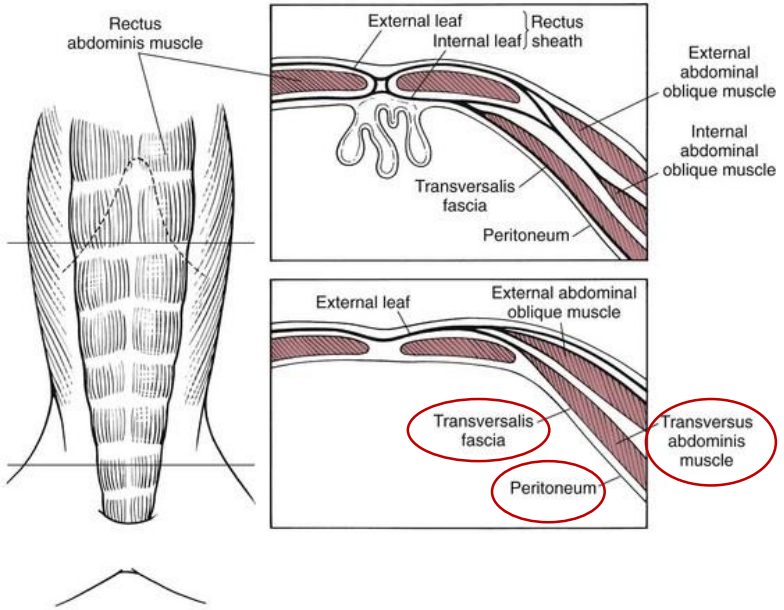


FIGURE 6-38 Muscles of trunk, deep dissection, ventral aspect.

ABDOMINAL MUSCLES OF CARNIVORES

FASCIA ABDOMINIS TRANSVERSA:

- **a thin aponeurotic membrane**
- **lies between the inner surface of the transverse abdominal muscle and the parietal peritoneum**
- **forms part of the general layer of fascia lining the abdominal wall**
- **directly continuous with the iliac fascia, internal spermatic, and pelvic fasciae**
- **the spermatic cord in the male, the round ligament of the uterus in the female pass through the transverse fascia at the deep inguinal ring the entrance to the inguinal canal**
- **in the male the transverse fascia extends downwards as the internal spermatic fascia**



https://veteriankey.com/surgery-of-the-abdominal-cavity/

ABDOMINAL MUSCLES OF CARNIVORES

PERITONEUM :

- is the serous membrane

- forms the lining of the abdominal cavity

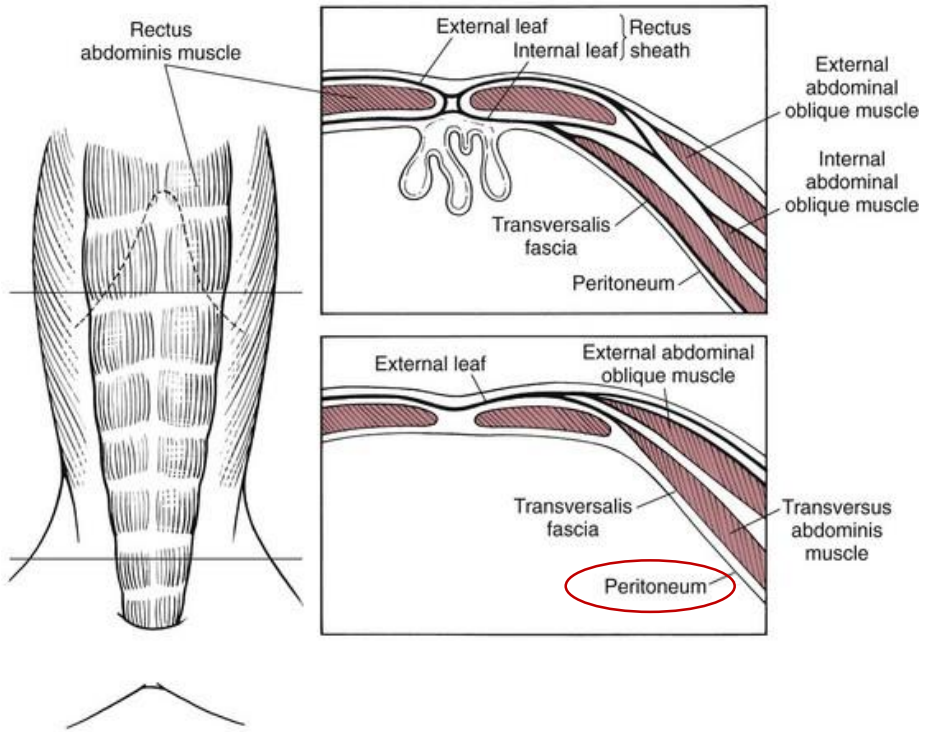
- covers most of the intra-abdominal organs

- composed of a layer of mesothelium

- **supported by a thin layer of connective tissue**

- **supports many of the abdominal organs**

- conducts blood vessels, lymphatic vessels, and nerves



ABDOMINAL MUSCLES OF CARNIVORES

PERITONEUM:

- **the peritoneum is one continuous sheet**
- **two layers and a potential space between them: the peritoneal cavity**

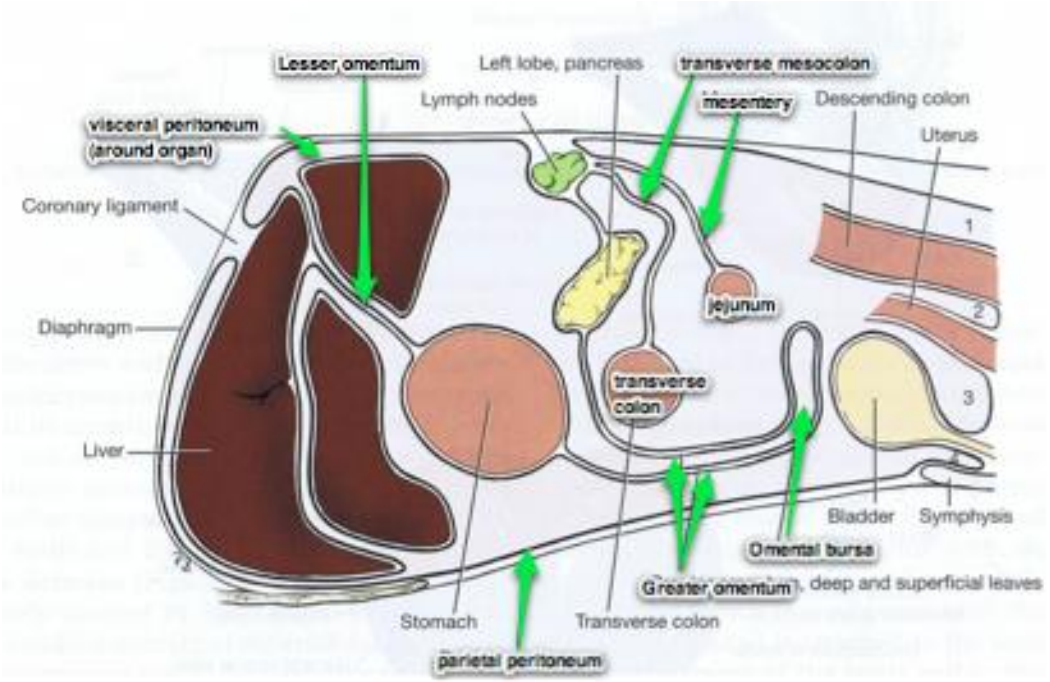
LAYERS OF PERITONEUM:

1. the outer layer, the parietal peritoneum:

- **is attached to the abdominal wall and the pelvic walls**

2. the inner layer, the visceral peritoneum

- **wrapped around the visceral organs**



ABDOMINAL MUSCLES OF CARNIVORES

FOUR REGIONS OF RECTUS SHEET:

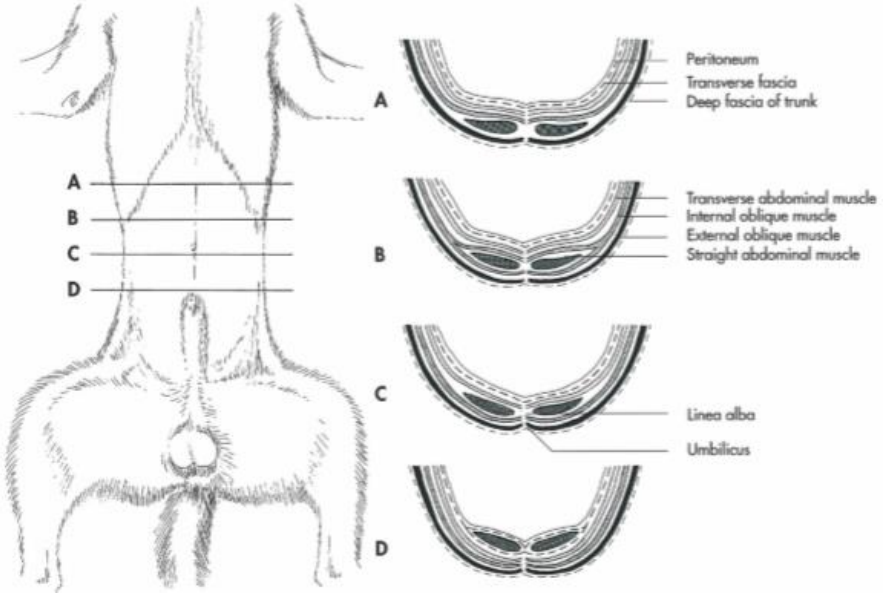
from lateral to medial order:

1. THORACIC REGION

2. PREUMBILICAL REGION

3. UMBILICAL REGION

4. POSTUMBILICAL REGION



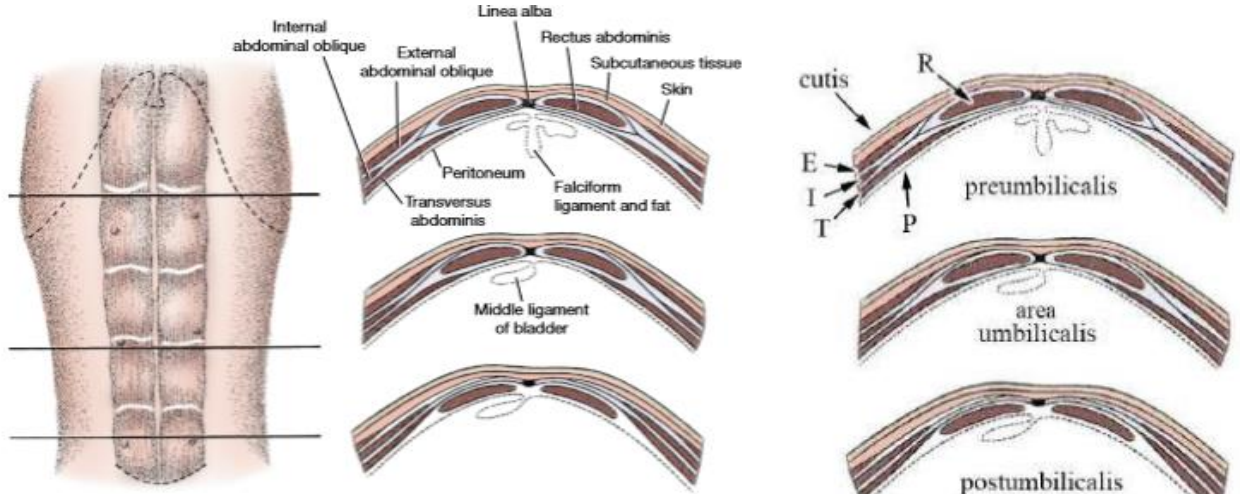


Fig. 2-78 Abdominal wall in ventral view with transections at three levels.

ABDOMINAL MUSCLES OF CARNIVORES

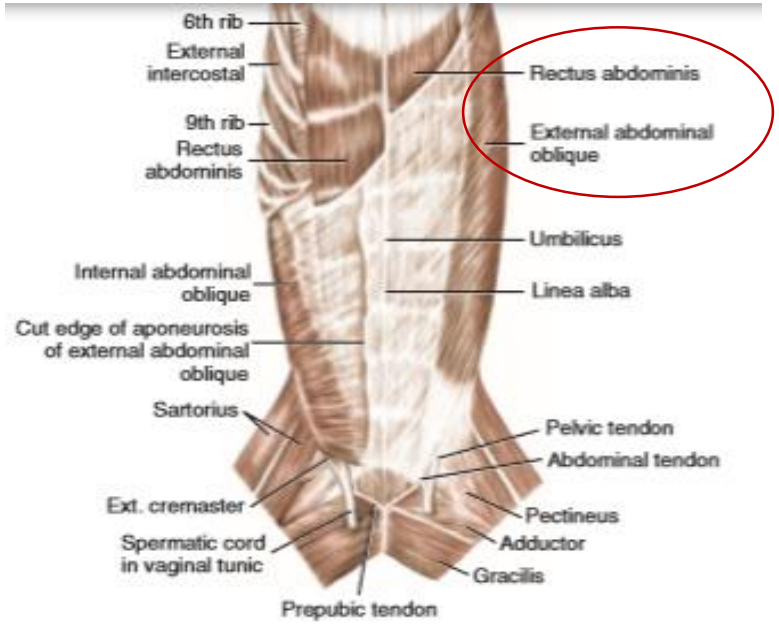
1. THORACIC REGION OF RECTUS SHEET

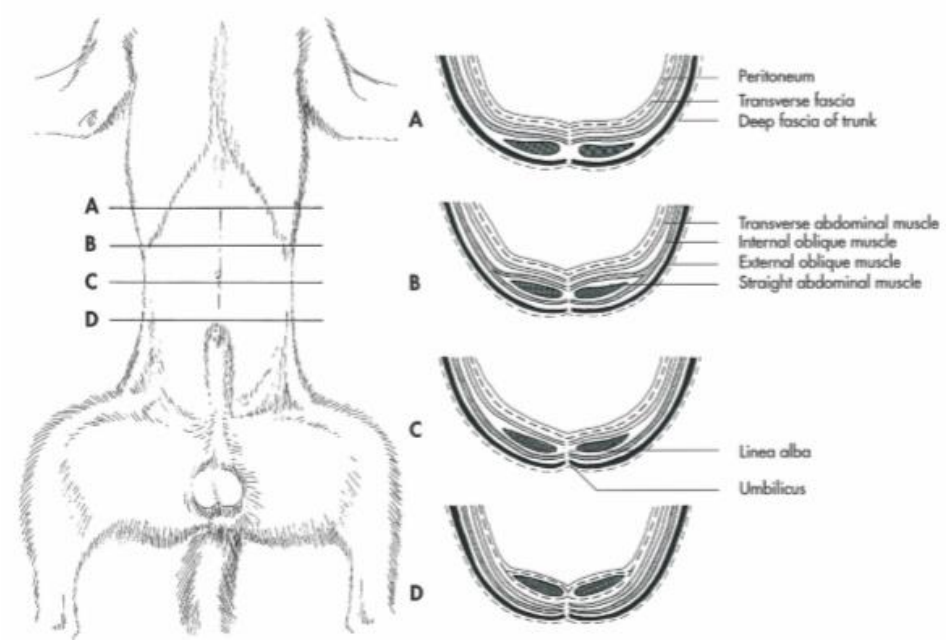
formed by:

a. m. obliguus externus abdominis

b. m. rectus abdominis

c. thoracic wall





ABDOMINAL MUSCLES OF CARNIVORES

2. PREUMBILICAL REGION OF RECTUS SHEET:

formed by:

a. m. obliguus externus abdominis

b. m. obliguus internus abdominis outer layer

c. m. rectus abdominis

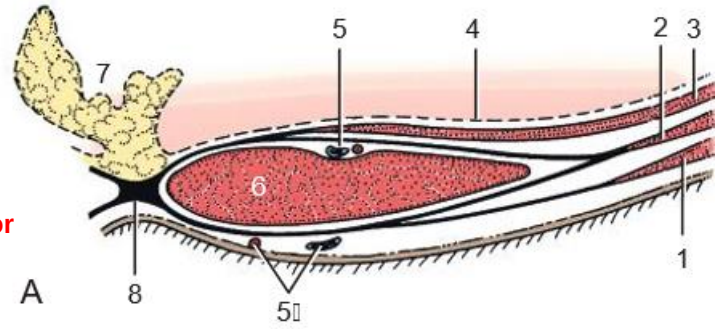
d. m. obliguus internus abdominis inner layer

e. m. transversus abdominis

f. fascia transversa abdominis

g. peritoneum parietalis

anterior wall



1. External abdominal oblique
2. Internal abdominal oblique
3. Transversus abdominis
4. Peritoneum
5. Cranial epigastric vessels
5′. Cranial superficial epigastric vessels
6. Rectus abdominis
7. Fat-filled falciform ligament
8. Linea alba
9. Caudal epigastric vessels
9′. Caudal superficial epigastric vessels
10. Internal lamina of the rectus sheath
11. External lamina of the rectus sheath
12. Skin
13. Median ligament of the bladder

Note: Transverse sections taken cranial **(A)** and caudal **(B)** to the umbilicus and near the pubis **(C)**.

posterior wall

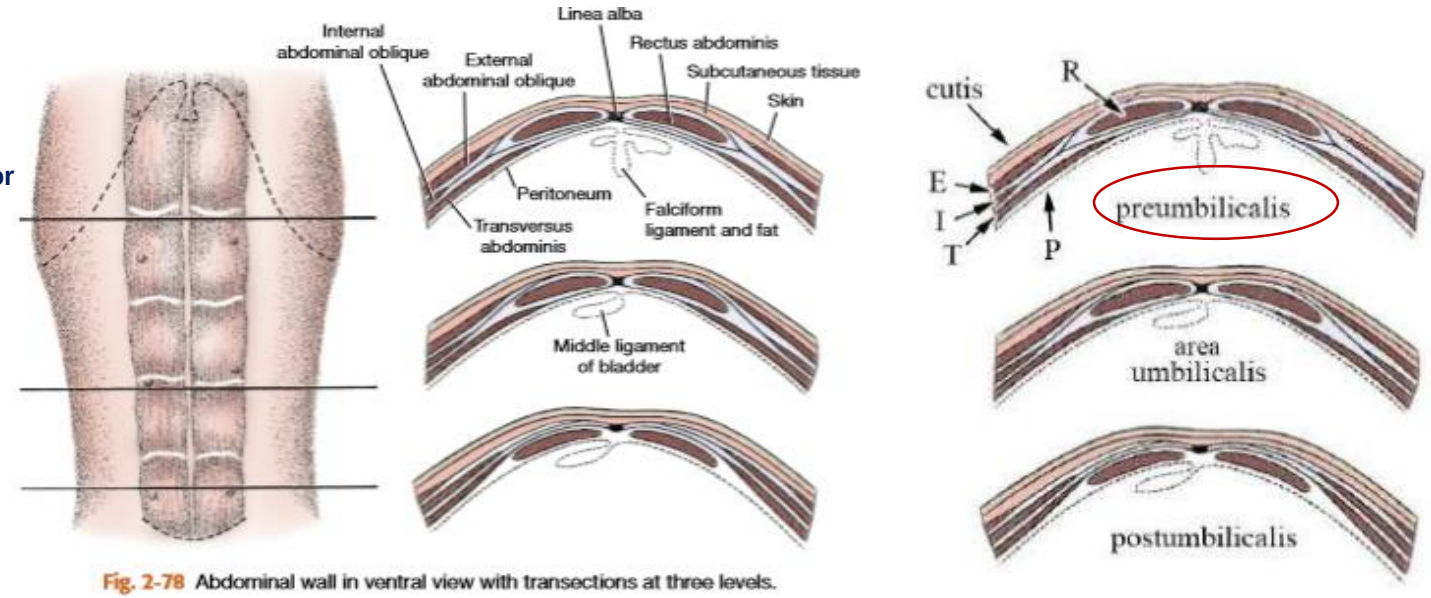


Fig. 2-78 Abdominal wall in ventral view with transections at three levels.

ABDOMINAL MUSCLES OF CARNIVORES

3. UMBILICAL REGION OF RECTUS SHEET:

formed by:

a. m. obliguus externus abdominis

b. m. obliguus internus abdominis outer and inner layer

c. m. rectus abdominis

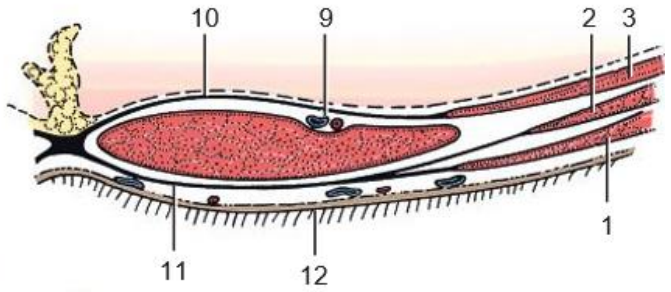
d. m. transversus abdominis

e. fascia transversa abdominis

f. peritoneum parietalis

anterior wall

posterior wall



1. External abdominal oblique
2. Internal abdominal oblique
3. Transversus abdominis
4. Peritoneum
5. Cranial epigastric vessels
5′. Cranial superficial epigastric vessels
6. Rectus abdominis
7. Fat-filled falciform ligament
8. Linea alba
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9′. Caudal superficial epigastric vessels
10. Internal lamina of the rectus sheath
11. External lamina of the rectus sheath
12. Skin
13. Median ligament of the bladder

Note: Transverse sections taken cranial **(A)** and caudal **(B)** to the umbilicus and near the pubis **(C).**

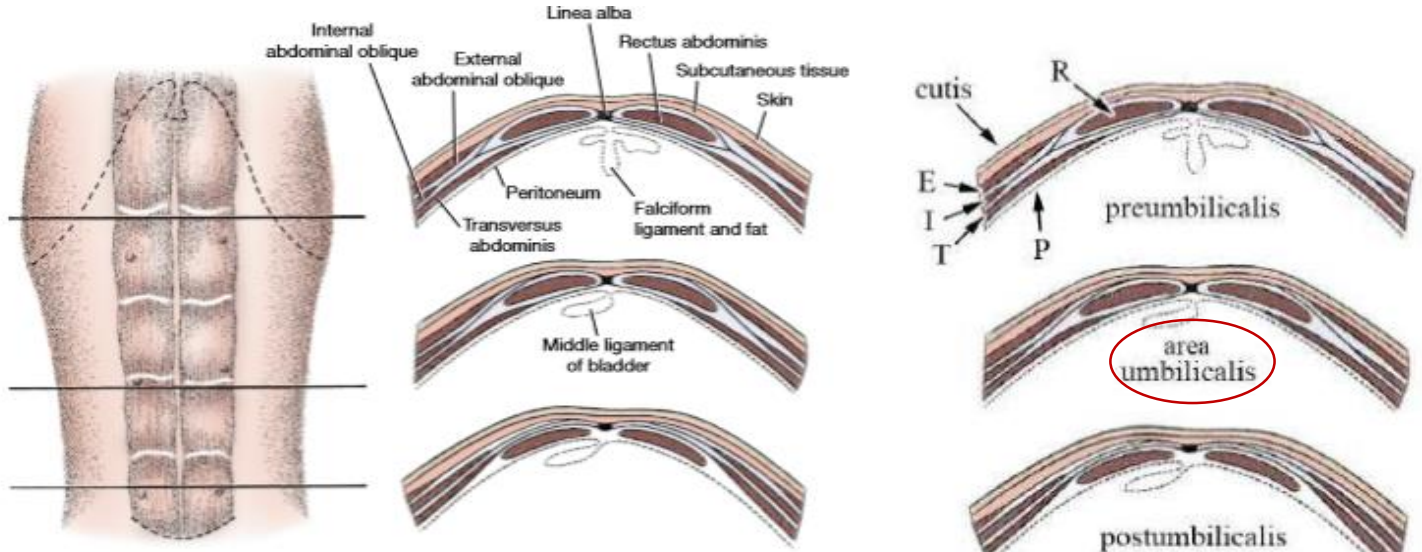


Fig. 2-78 Abdominal wall in ventral view with transections at three levels.

ABDOMINAL MUSCLES OF CARNIVORES

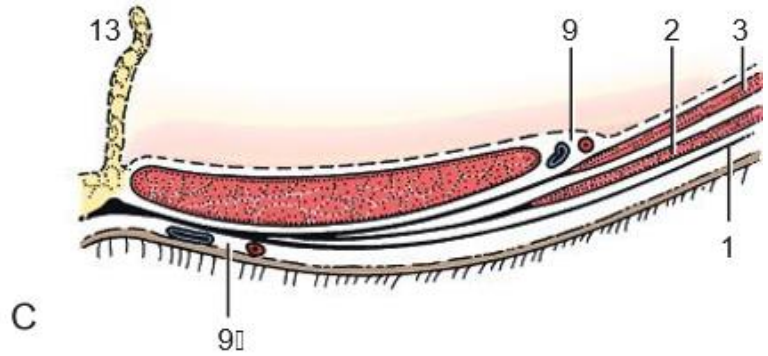
4. POSTUMBILICAL REGION OF RECTUS SHEET:

a. **m. obliguus extrenus abdominis**
b. **m. obliguus internus abdominis**
c. **m. transversus abdominis**

anterior wall

d. **m. rectus abdominis**
e. **fascia transversa abdominis**
f. **peritoneum parietalis**

posterior wall



1. External abdominal oblique
2. Internal abdominal oblique
3. Transversus abdominis
4. Peritoneum
5. Cranial epigastric vessels
5′. Cranial superficial epigastric vessels
6. Rectus abdominis
7. Fat-filled falciform ligament
8. Linea alba
9. Caudal epigastric vessels
9′. Caudal superficial epigastric vessels
10. Internal lamina of the rectus sheath
11. External lamina of the rectus sheath
12. Skin
13. Median ligament of the bladder

Note: Transverse sections taken cranial **(A)** and caudal **(B)** to the umbilicus and near the pubis **(C)**.

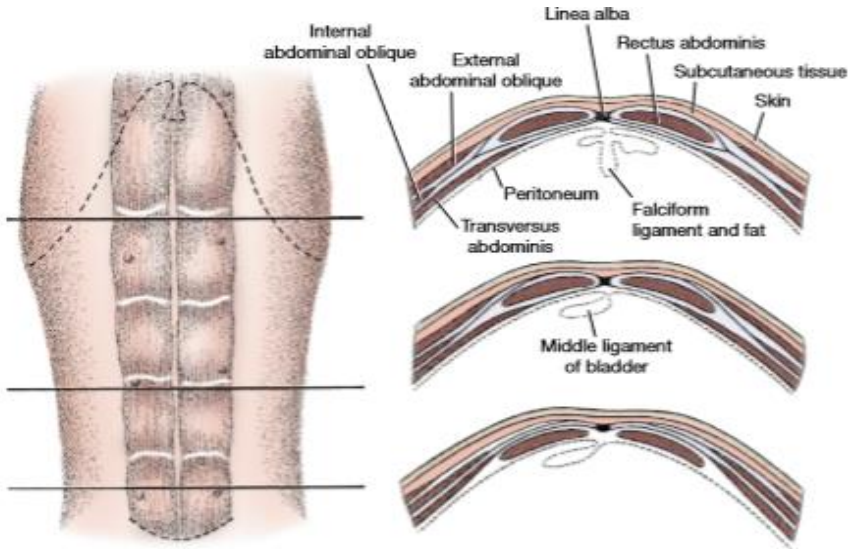
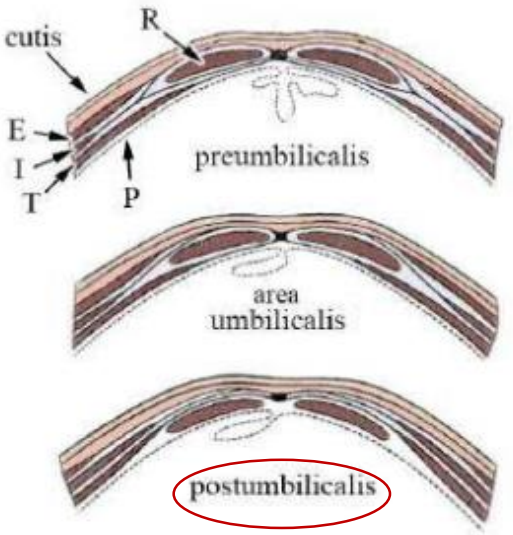


Fig. 2-78 Abdominal wall in ventral view with transections at three levels.



ABDOMINAL MUSCLES OF CARNIVORES

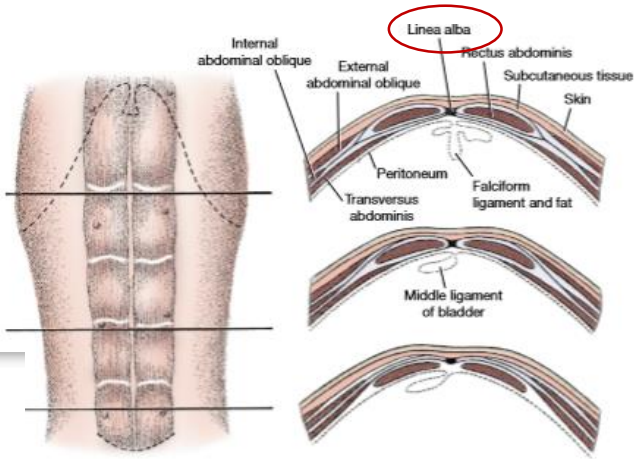


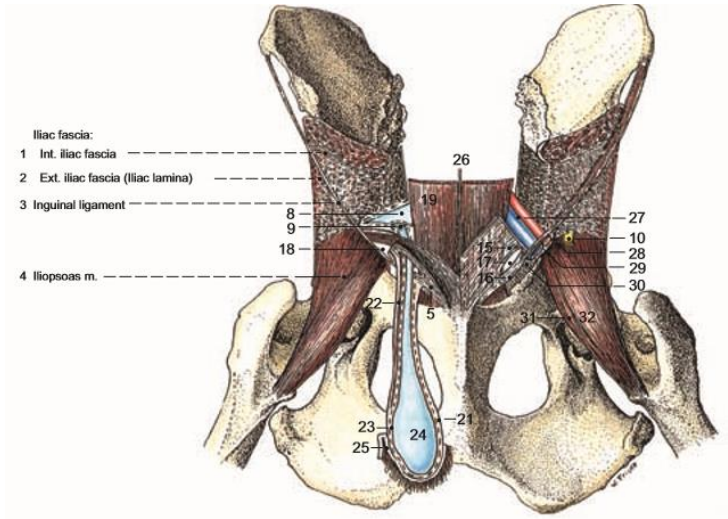
Fig. 2-78 Abdominal wall in ventral view with transections at three levels.

LINEA ALBA:

- **white line**
- **fibrous structure**
- **runs down the midline of the abdomen**
- **runs from the xyphoid process to the pubic symphysis**
- **formed by the fusion of the aponeuroses of the abdominal muscles**
- **separates the left and right rectus abdominis muscles**
- **it consists of mostly connective tissue**

- **does not contain any primary nerves or blood vessels - a *median incision* through the linea alba is a common surgical approach**

ABDOMINAL MUSCLES OF CARNIVORES



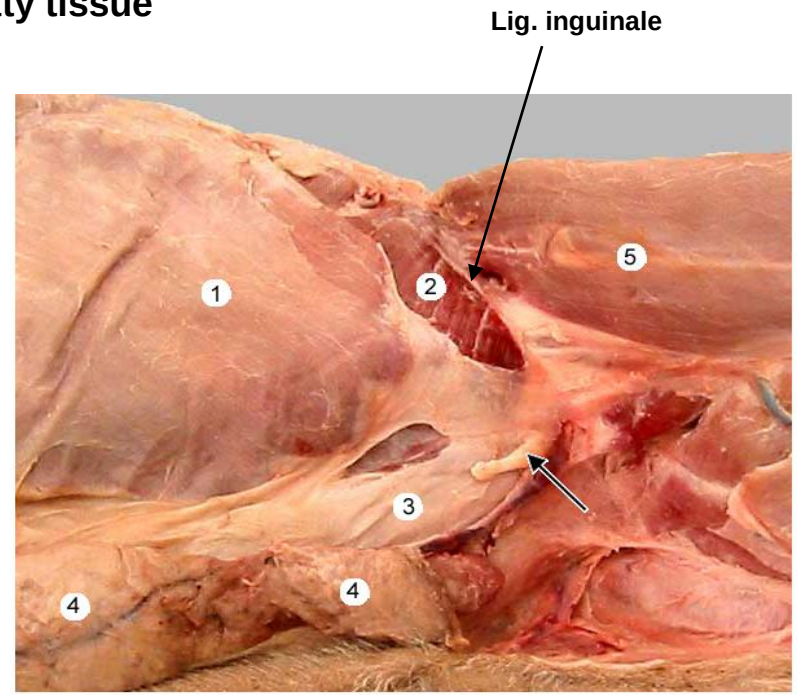
CANALIS INGUINALIS:

- **two passages in the anterior abdominal wall**

a) in male dog convey the spermatic cords

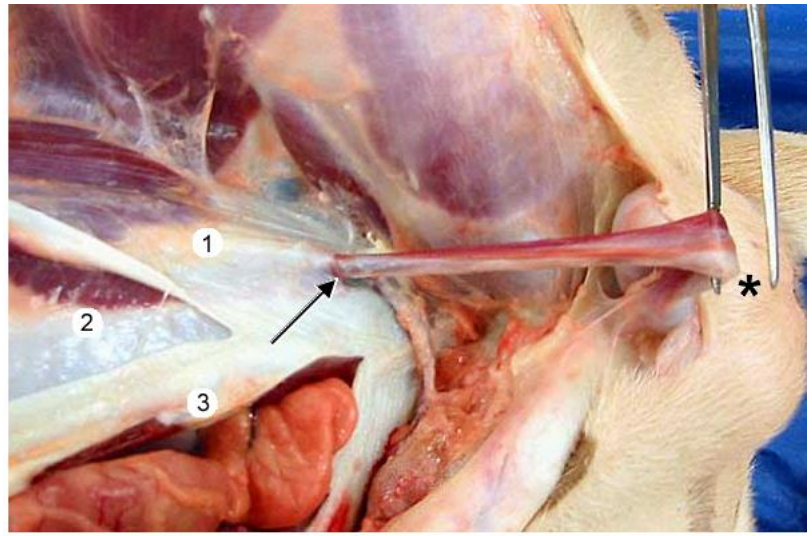
b) in female dog processus vaginalis – fatty tissue

- **situated just above the inguinal ligament**



In females, a fat-filled **vaginal process** (arrow) exits the inguinal canal. Identify the **external abdominal oblique m.** (1), **internal abdominal oblique m.** (2), the ensheathed **rectus abdominis m.** (3), mammary tissue (4) and the sartorius m. (5).

http://vanat.cvm.umn.edu/carnLabs/Lab08/Img8-14.html



The spermatic cord (along with external pudendal vessels) can be seen emerging from the **superficial inguinal ring** (arrow), which is an opening in the aponeurosis of the external abdominal oblique m. (1). The spermatic cord proceeds to the scrotum (asterisk). Also, identify the internal abdominal oblique m. (2) and the incised rectus abdominis m. (3).

http://vanat.cvm.umn.edu/carnLabs/Lab08/Img8-11.html

ABDOMINAL MUSCLES OF CARNIVORES

CANALIS INGUINALIS:

1. anterior wall

2. inferior wall ("floor")

4. superior wall ("roof")

4. posterior wall

5. inner opening (deep ring)

6. outer opening (superficial ring)

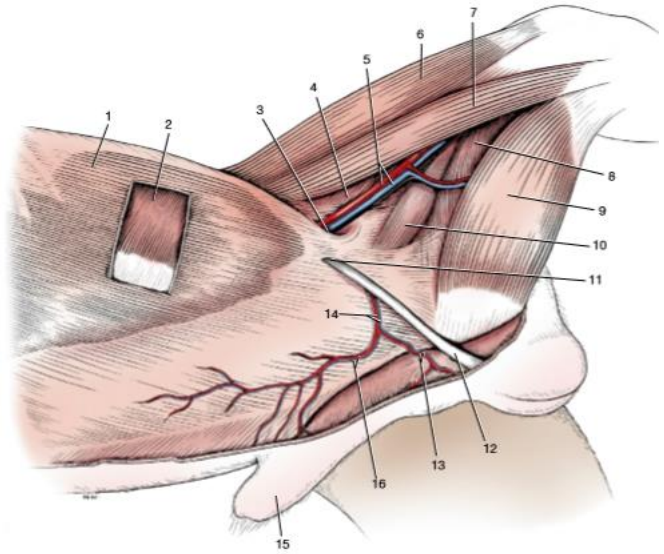
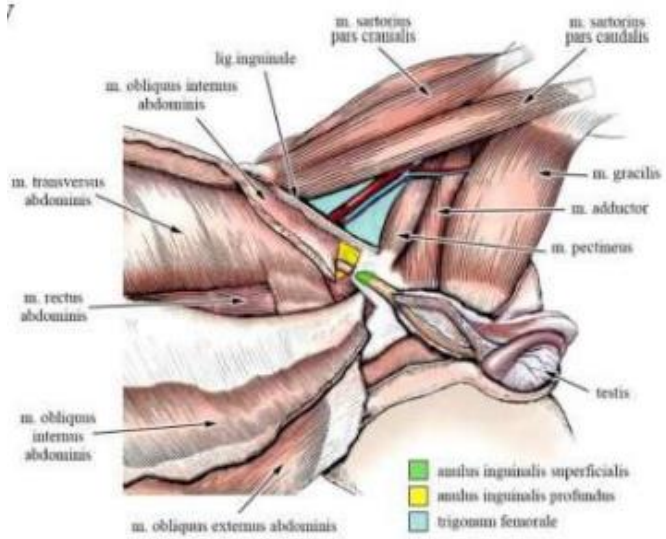


Fig. 2-79 Abdominal muscles and inguinal region of the male, superficial dissection, left side.
1. External abdominal oblique
2. Internal abdominal oblique
3. Vascular lacuna
4. Vastus medialis
5. Femoral artery and vein in femoral triangle
6. Cranial part of sartorius
7. Caudal part of sartorius
8. Adductor
9. Gracilis
10. Pectineus
11. Superficial inguinal ring
12. Parietal vaginal tunic
13. Cranial scrotal artery and vein
14. External pudendal artery and vein
15. Prepuce
16. Caudal superficial epigastric artery and vein



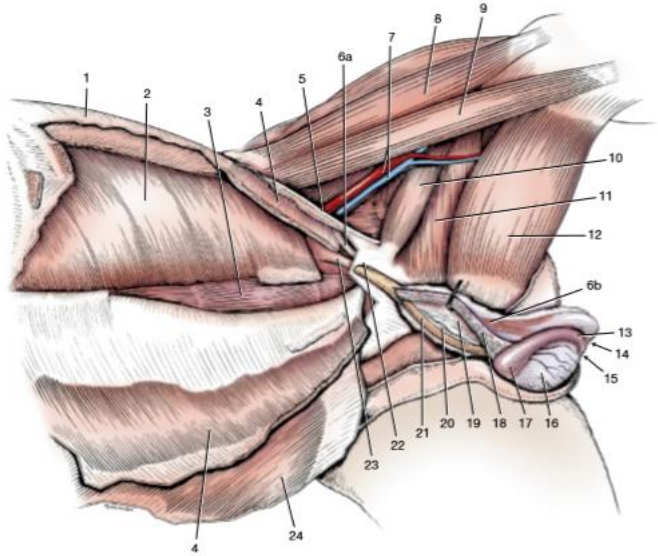


Fig. 2-80 Abdominal muscles and inguinal region of the male, deep dissection, left side.
1. Thoracolumbar fascia
2. Transversus abdominis
3. Rectus abdominis
4. Internal abdominal oblique (transected and reflected)
5. Inguinal ligament (caudal border of aponeurosis of external abdominal oblique muscle)
6a. Cremaster muscle at its origin
6b. Cremaster muscle on external surface of parietal layer of vaginal tunic
7. Femoral artery and vein
8. Cranial part of sartorius
9. Caudal part of sartorius
10. Pectineus
11. Adductor
12. Gracilis
13. Tail of epididymis
14. Ligament of tail of epididymis
15. Proper ligament of testis
16. Testis in visceral vaginal tunic
17. Head of epididymis
18. Testicular artery and vein in visceral vaginal tunic (mesorchium)
19. Mesorchium
20. Mesoductus deferens
21. Ductus deferens in visceral vaginal tunic
22. Superficial inguinal ring, lateral crus
23. Parietal vaginal tunic in the inguinal canal
24. External abdominal oblique (reflected)

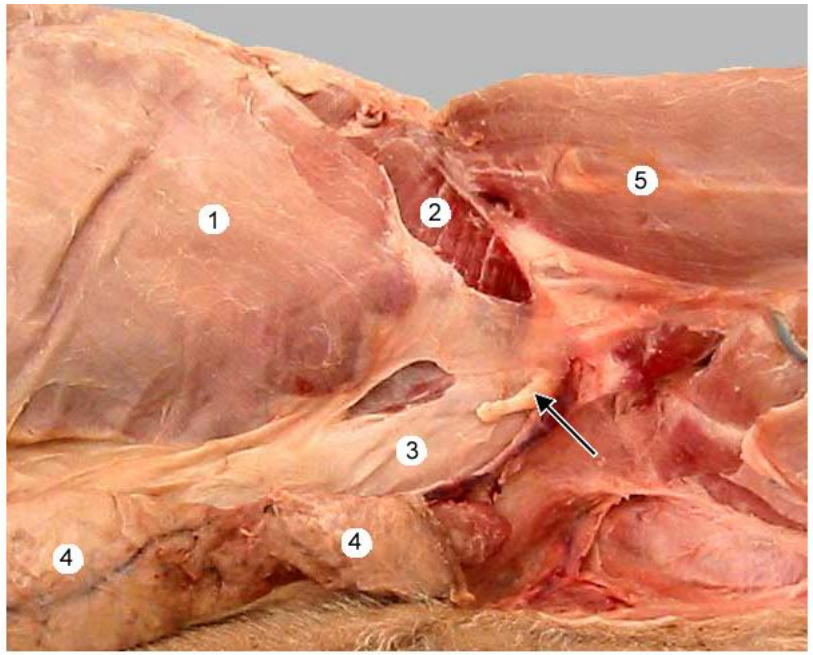
ABDOMINAL MUSCLES OF CARNIVORES

CANALIS INGUINALIS:

1. anterior wall:

a) aponeurosis of external oblique muscle

b) superficial inguinal ring



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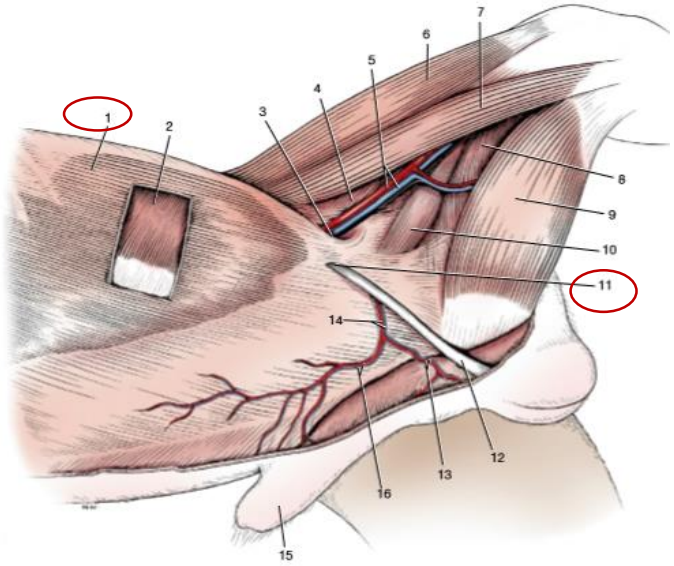
http://vanat.cvm.umn.edu/carnLabs/Lab08/Img8-14.html



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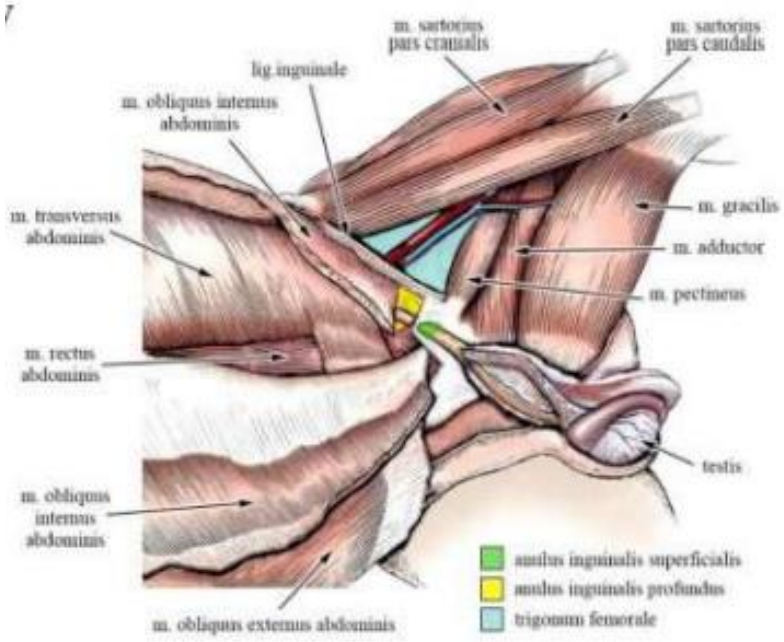
12. Parietal vaginal tunic
13. Cranial scrotal artery and vein
14. External pudendal artery and vein
15. Prepuce
16. Caudal superficial epigastric artery and vein

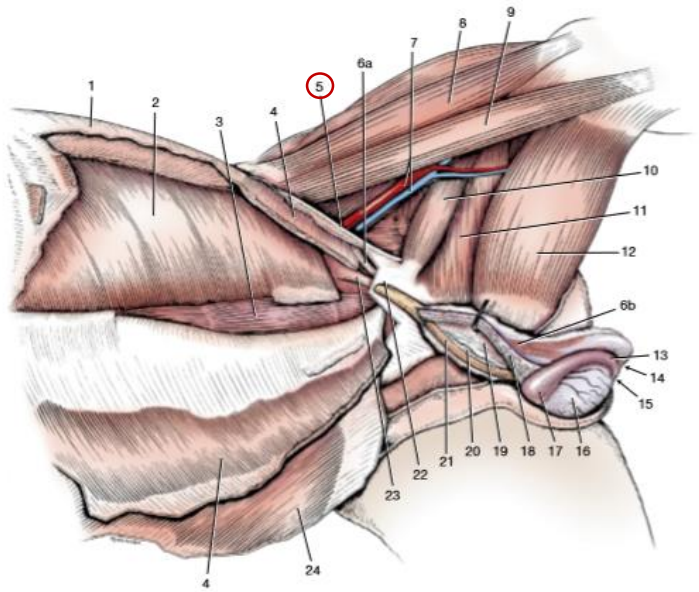


ABDOMINAL MUSCLES OF CARNIVORES

CANALIS INGUINALIS:

2. inferior wall ("floor")

a. inguinal ligament



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6b. Cremaster muscle on external surface of parietal layer of vaginal tunic

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23. Parietal vaginal tunic in the inguinal canal
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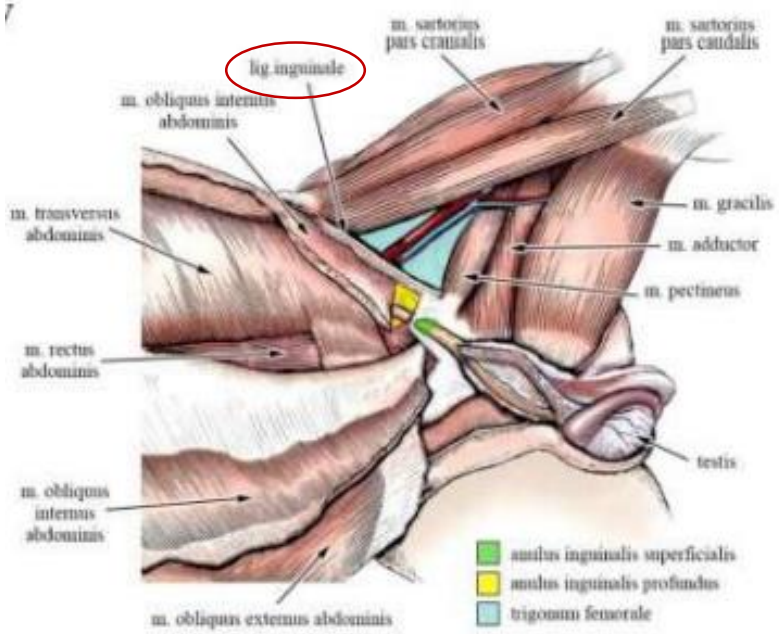


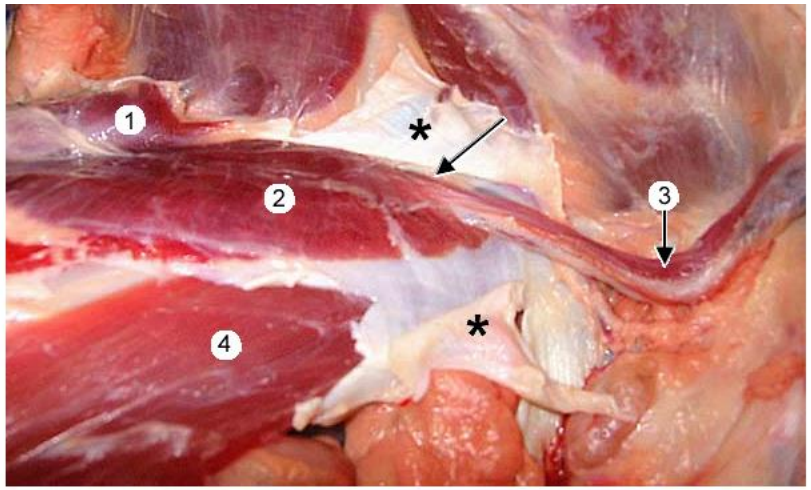
ABDOMINAL MUSCLES OF CARNIVORES

CANALIS INGUINALIS:

3. superior wall ("roof"):

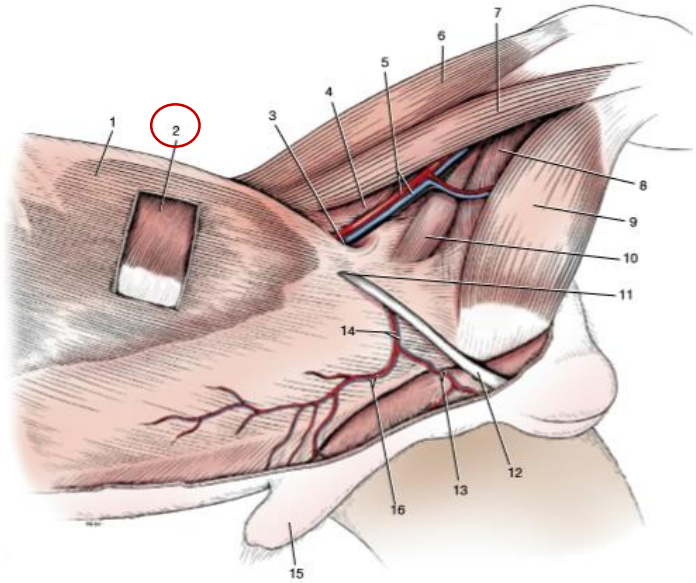
a. medial crus of aponeurosis of external oblique muscle

b. musculoaponeurotic arches of internal oblique and transverse abdominal muscle



The **deep inguinal ring** (arrow) has been exposed by reflecting the aponeurosis (asterisks) of the external abdominal oblique m. (1). The caudal edge of the aponeurosis (inguinal ligament) forms the caudal border of the deep inguinal ring. The **internal abdominal oblique m.** (2) forms the cranial border of the deep inguinal ring and gives rise to the cremaster m. (3) which runs on the spermatic cord. The **rectus abdominis m.** (4) forms the medial border of the deep inguinal ring.

http://vanat.cvm.umn.edu/carnLabs/Lab08/Img8-13.html



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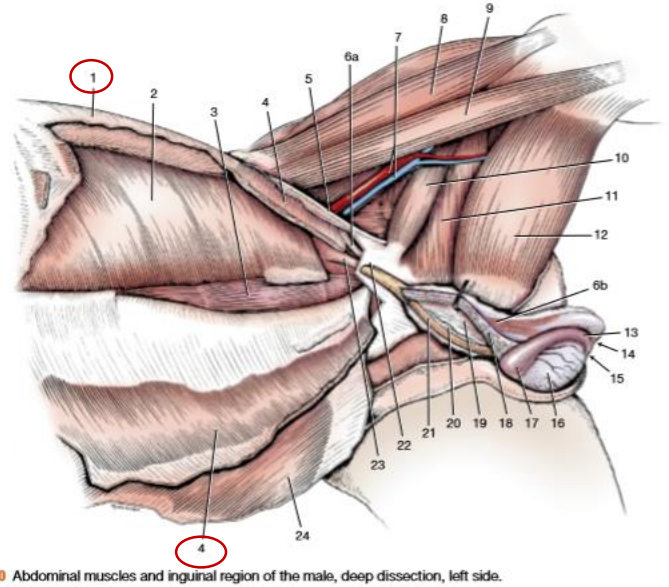

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24. External abdominal oblique (reflected)

ABDOMINAL MUSCLES OF CARNIVORES

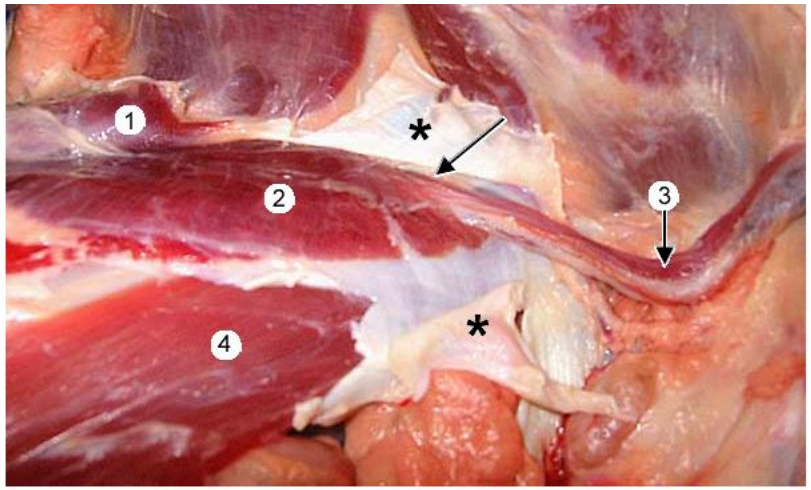
CANALIS INGUINALIS:

4. posterior wall:

a. fascia transversa abdominis

b. peritoneum

c. deep inguinal ring



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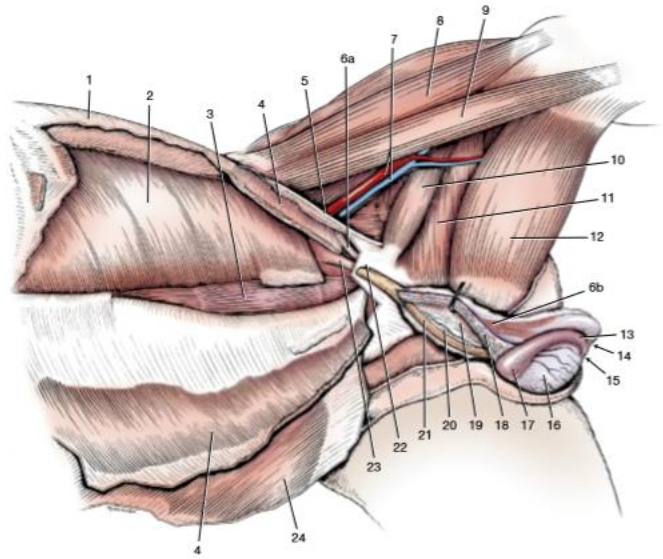
http://vanat.cvm.umn.edu/carnLabs/Lab08/Img8-13.html



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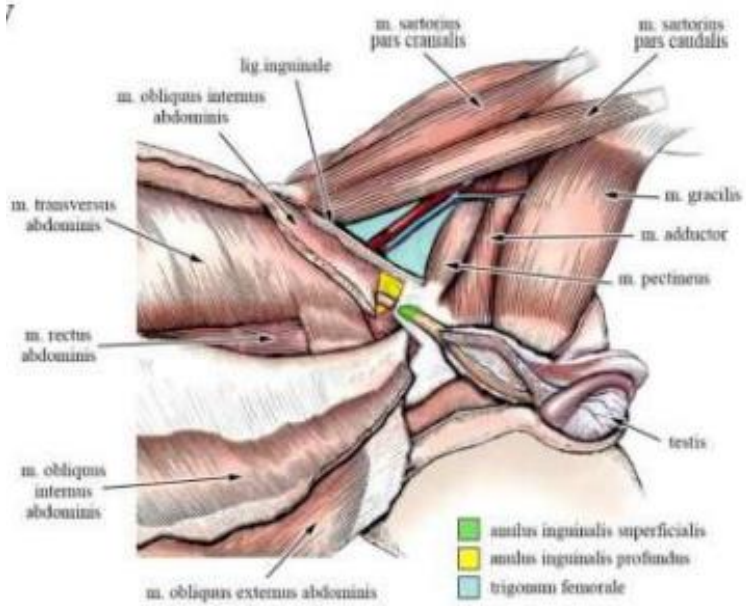


ABDOMINAL MUSCLES OF CARNIVORES

CANALIS INGUINALIS:

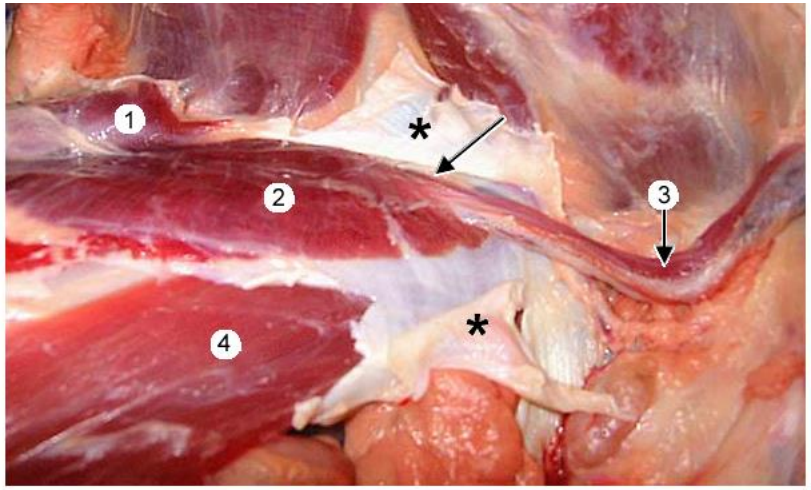
5. inner opening (deep ring, anulus inguinalis profundus):

bordered by:

a) **rostral: m. obliguus intrenus abdominis**

b) **caudal: ligamentum inguinle**

c) **medial: m. rectus abdominis**



The **deep inguinal ring** (arrow) has been exposed by reflecting the aponeurosis (asterisks) of the external abdominal oblique m. (1). The caudal edge of the aponeurosis (inguinal ligament) forms the caudal border of the deep inguinal ring. The **internal abdominal oblique m.** (2) forms the cranial border of the deep inguinal ring and gives rise to the cremaster m. (3) which runs on the spermatic cord. The **rectus abdominis m.** (4) forms the medial border of the deep inguinal ring.

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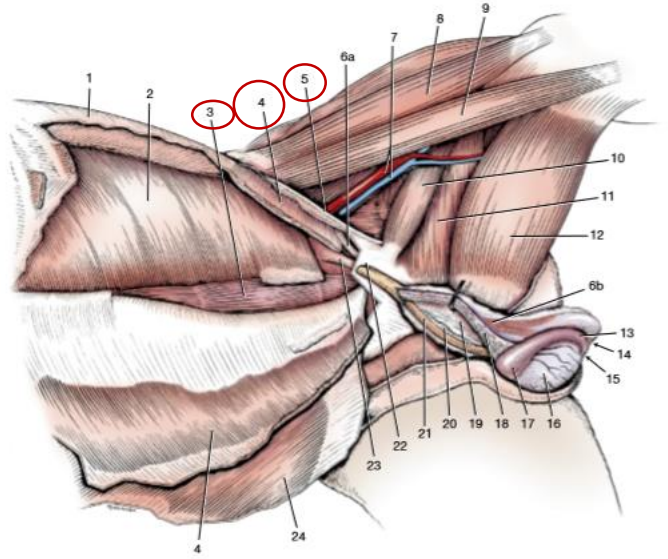

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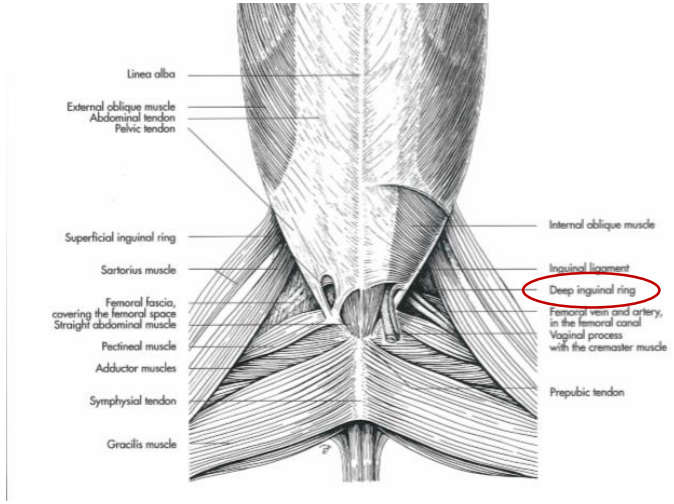
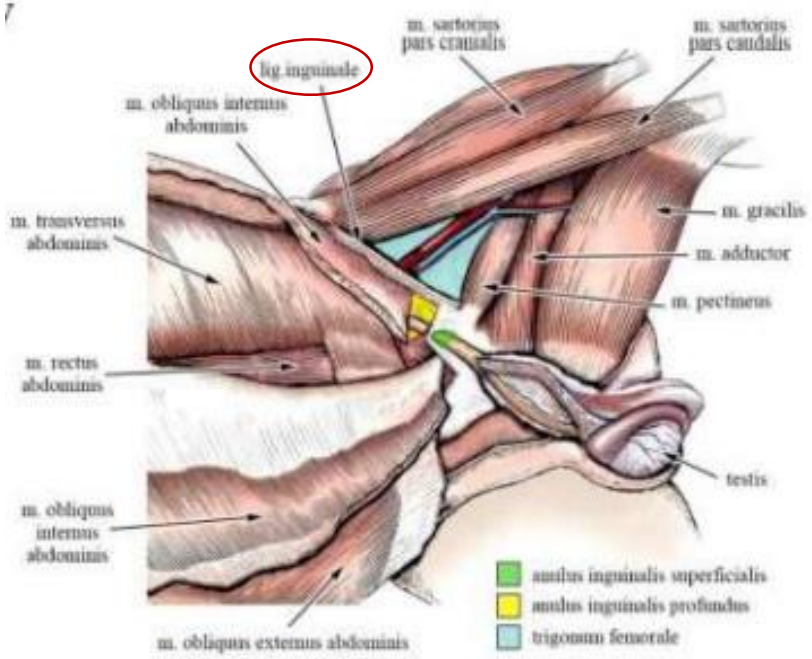
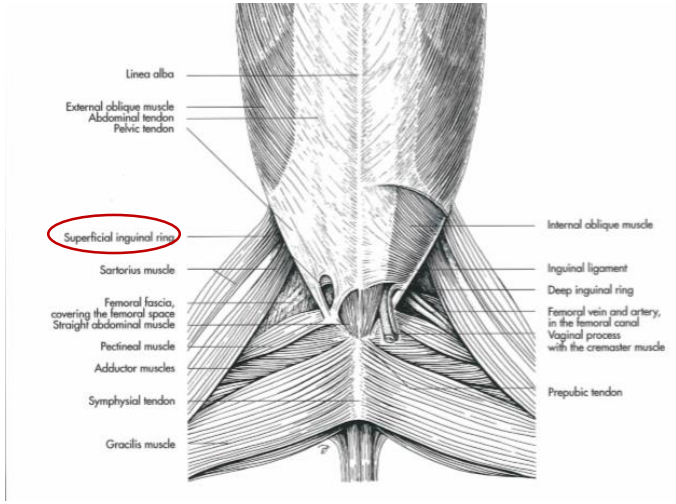




ABDOMINAL MUSCLES OF CARNIVORES



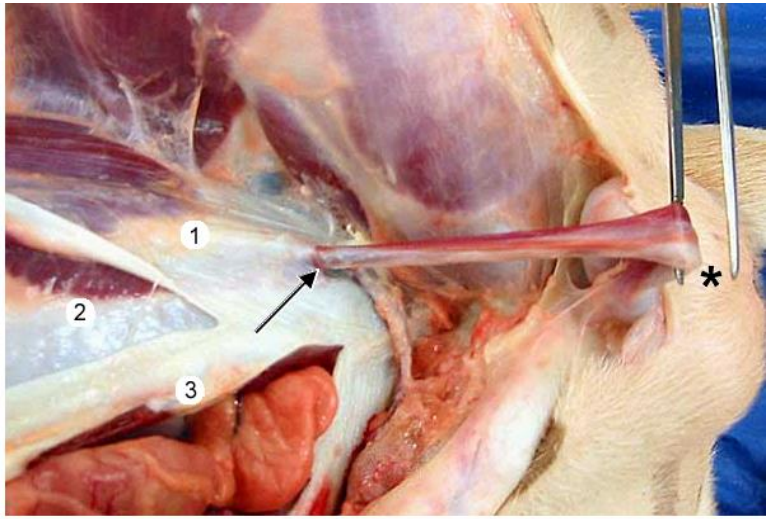
CANALIS INGUINALIS:

6. outer opening (superficial ring, anulus inguinalis superficialis):

bordered by:

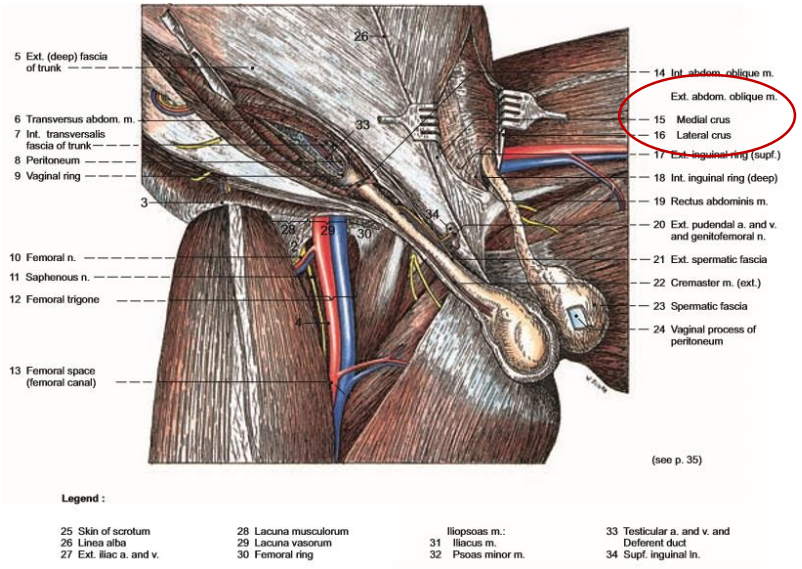
a) crus mediale (lamina abdominalis)

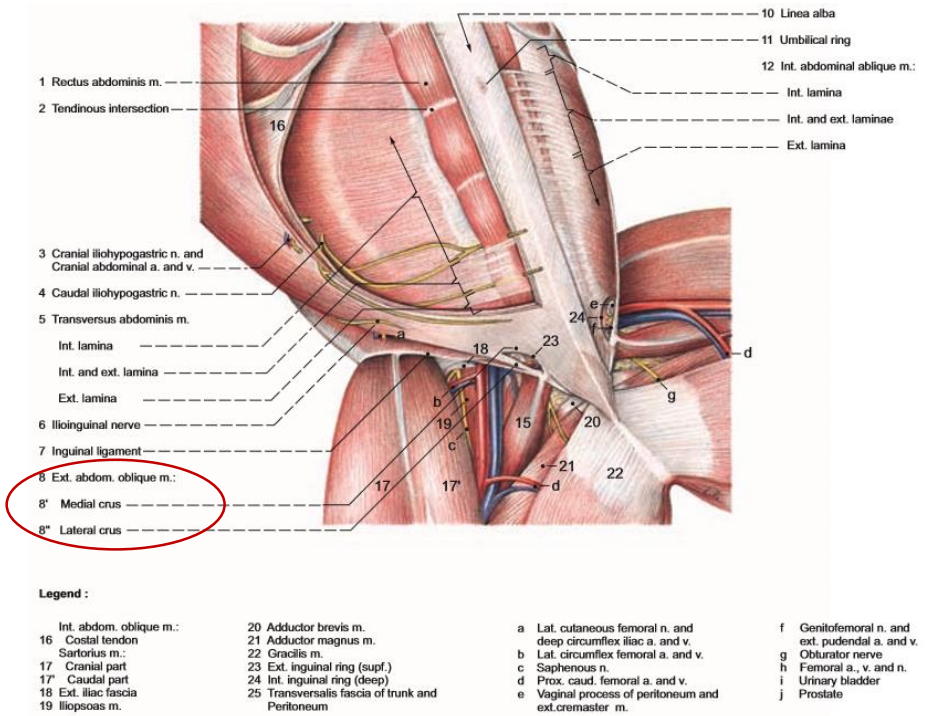
b) crus laterale (lamina pelvina) from m. obliguus extrenus abdominis



The spermatic cord (along with external pudendal vessels) can be seen emerging from the **superficial inguinal ring** (arrow), which is an opening in the aponeurosis of the external abdominal oblique m. (1). The spermatic cord proceeds to the scrotum (asterisk). Also, identify the internal abdominal oblique m. (2) and the incised rectus abdominis m. (3).

http://vanat.cvm.umn.edu/carnLabs/Lab08/Img8-11.html

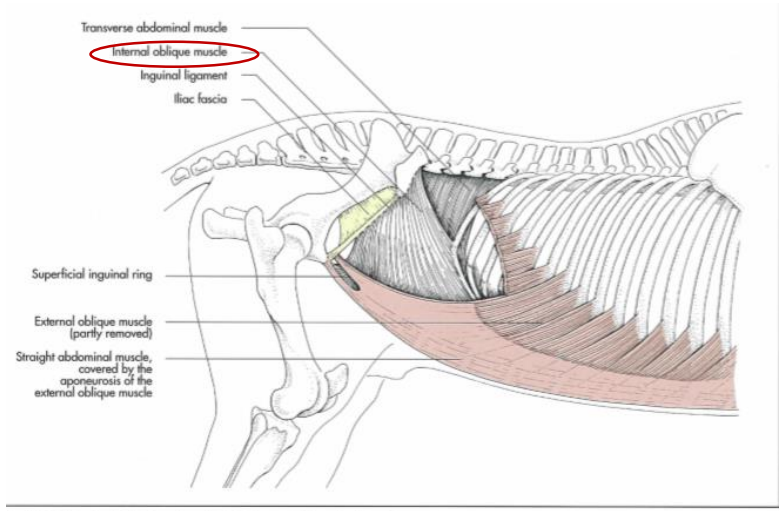




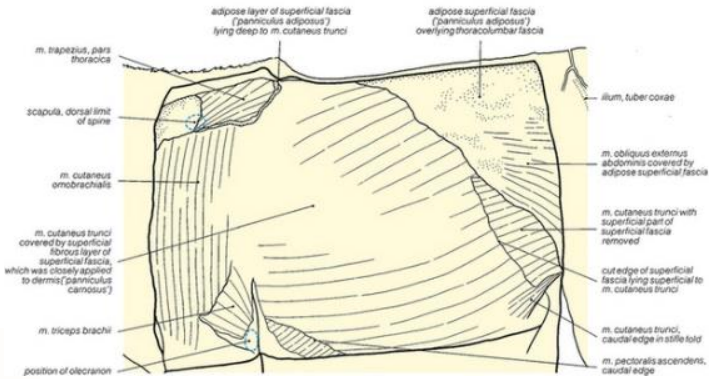
ABDOMINAL MUSCLES OF THE HORSE

- **the tendinous part of the abdomonial muscles is larger**

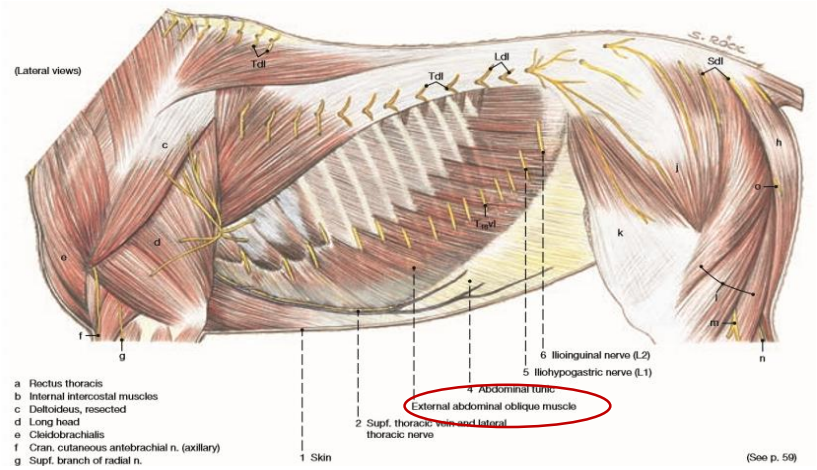
1. **M. obliguus abdominis externus**
2. **M. obliguus abdominis internus**
3. **M. transversus abdominis**
4. **M. rectus abdominis**

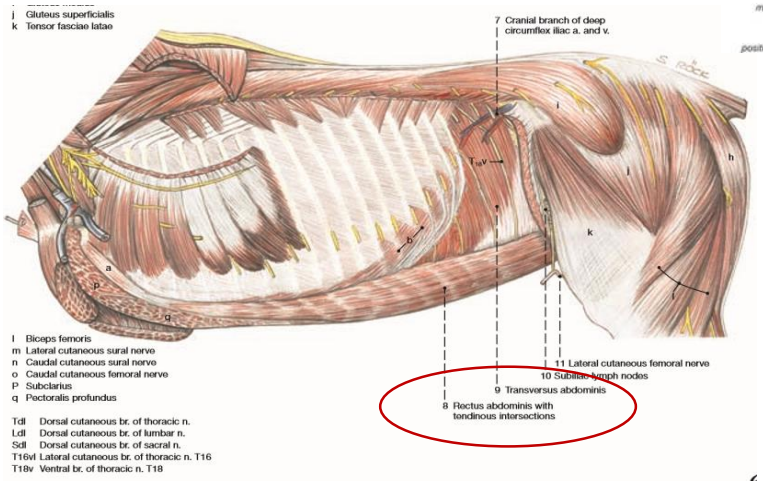


ig. 2-15. Muscles of the thoracic wall of the horse (schematic, lateral aspect).



https://veteriankey.com/5-the-abdomen/





ABDOMINAL MUSCLES OF THE HORSE

1. M. obliguus abdominis externus:

a. Thoracic part:

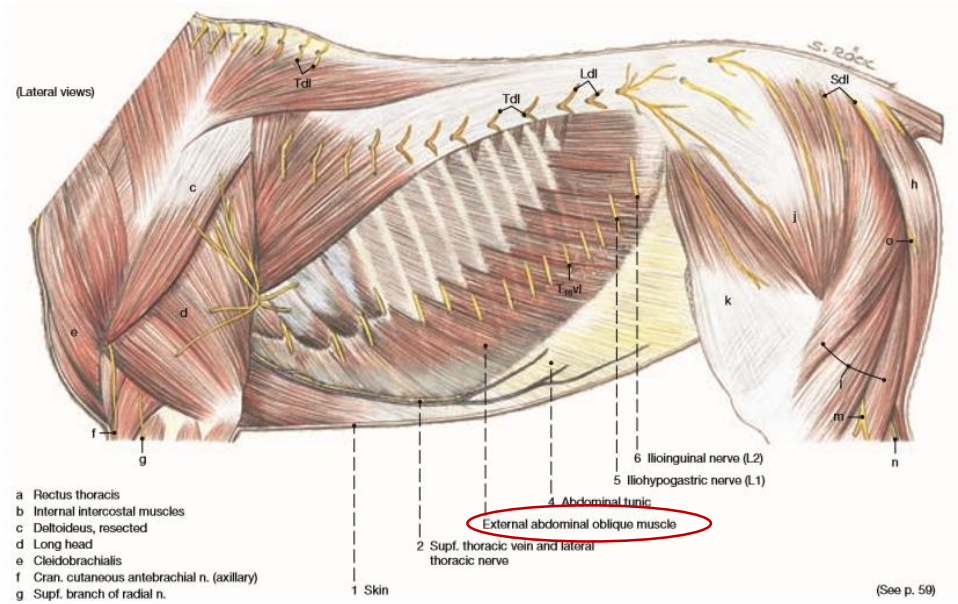
Origin: from 4th – to 18th ribs

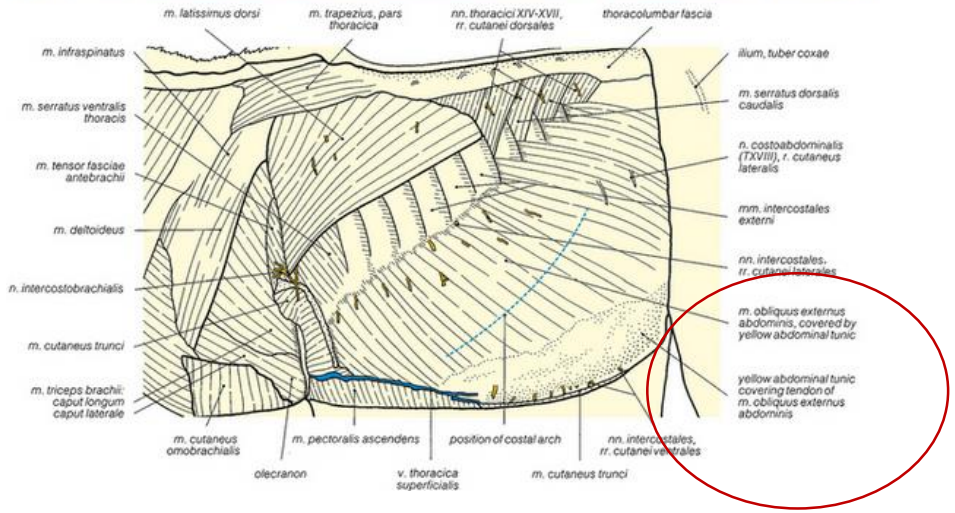
b. Lumbar part:

Origin:from the last ribs

from the thoracolumbal fascia

Insertion: tuber coxae





https://veteriankey.com/5-the-abdomen/

ABDOMINAL MUSCLES OF THE HORSE

1. M. obliguus abdominis externus:

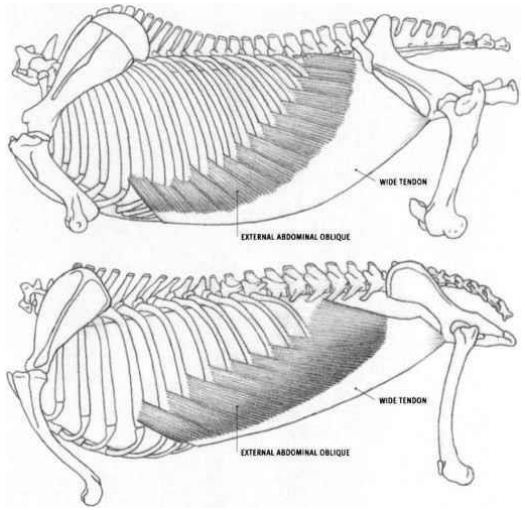
Abdominal tendon:

- **reinforced by the tunica flava**

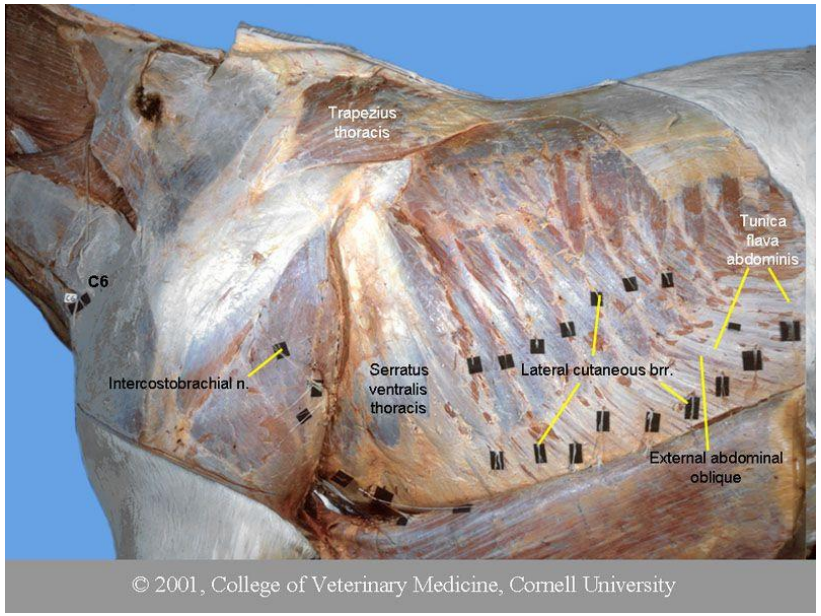
Insertion: a. along the linea alba

b. middle crus of the external inguinal ring

c. on the cranial pubic ligament



https://www.joshuanava.biz/animal-anatomy/mylohyoid.html



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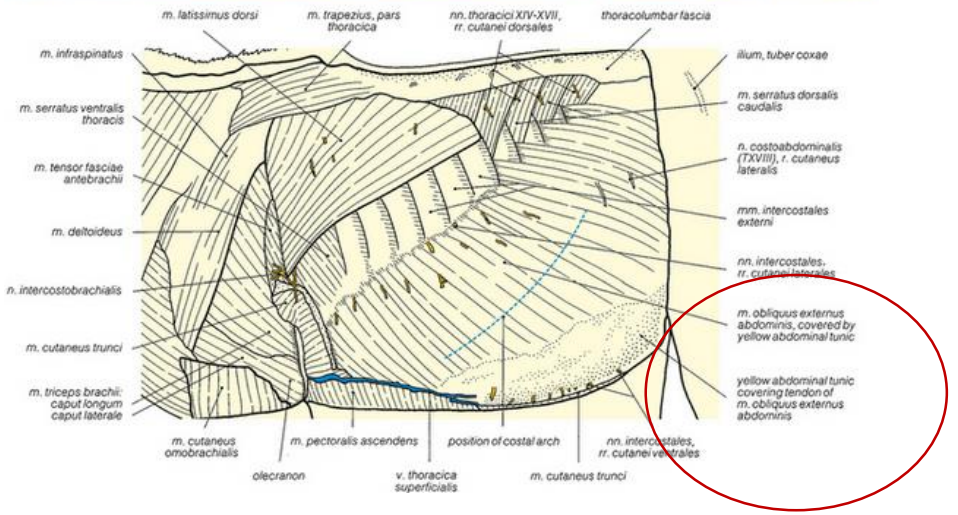


https://veteriankey.com/5-the-abdomen/

ABDOMINAL MUSCLES OF THE HORSE

2. M. obliguus abdominis internus:

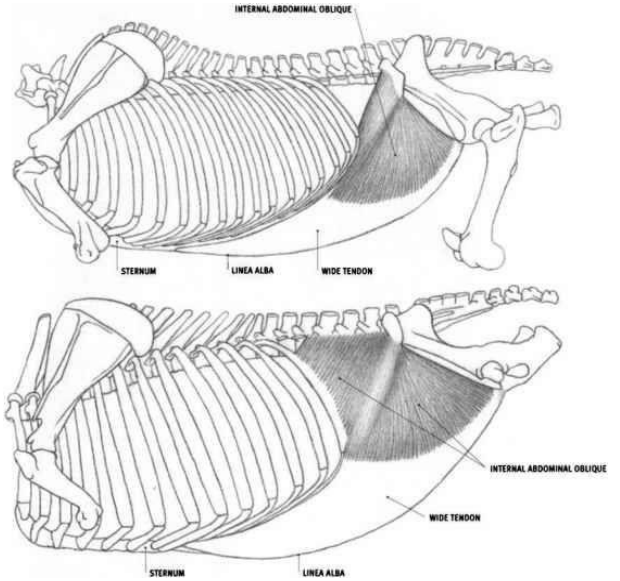
- **fibers diverge in radial fashion**

Origin: a. tuber coxae

b. inguinal ligament

Insertion: a. last rib

b. by individual tendons on the last four or five costal cartilage



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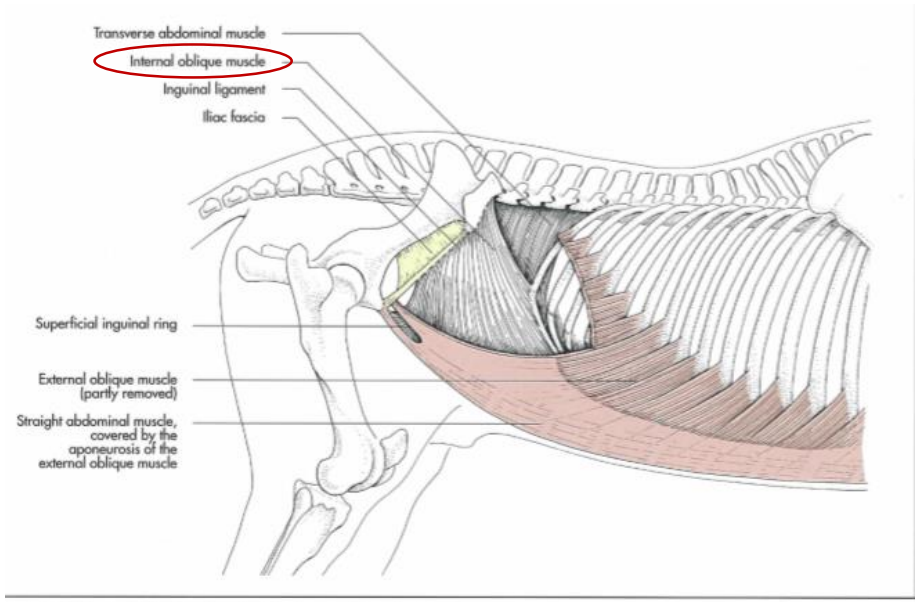
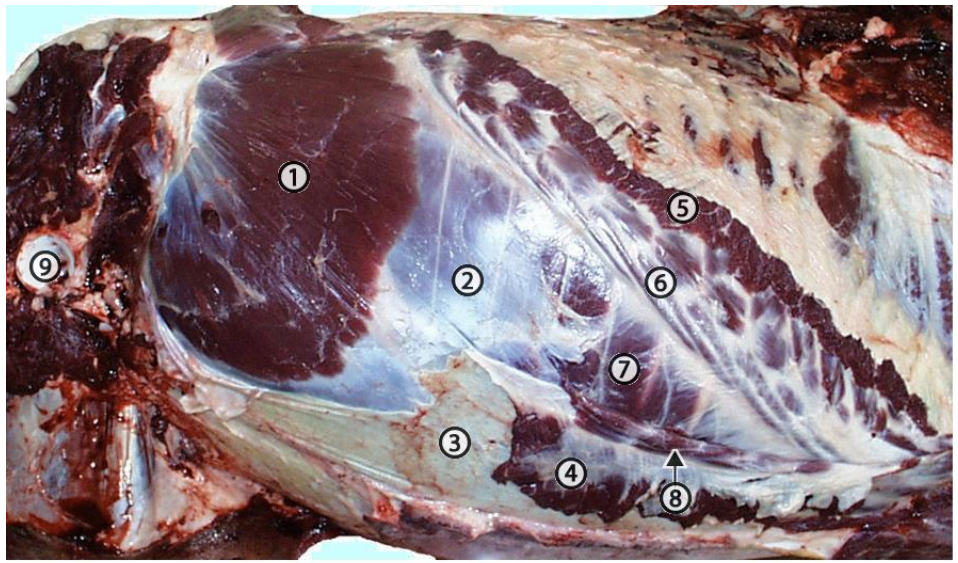


ig. 2-15. Muscles of the thoracic wall of the horse (schematic, lateral aspect).



Exposure of the internal oblique muscle (1) of a horse. 2, aponeurosis (sheet like tendon) of the internal abdominal oblique m.; 3, ext. abdominal oblique m. aponeurosis; 4, ext. abdominal oblique m. reflected; 5, cut edge of the ext. abdominal oblique m.; 6, costal arch; 7, transversus abdominis m. exposed through a hole in the int. oblique aponeurosis; 8, rectus abdominis m.; 9, acetabulum.

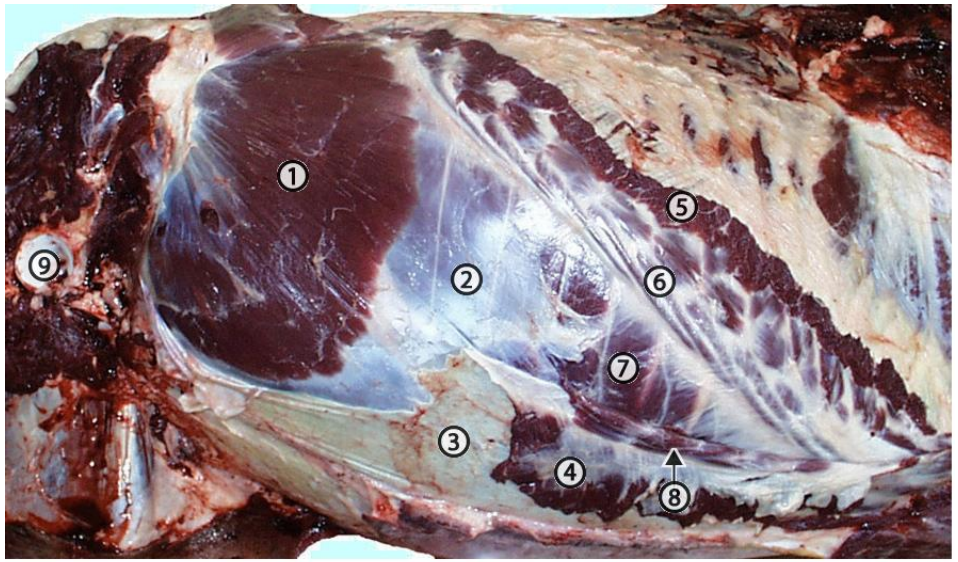
http://vanat.cvm.umn.edu/ungDissect/Lab11/Img11-6.html

ABDOMINAL MUSCLES OF THE HORSE

2. M. obliguus abdominis internus:

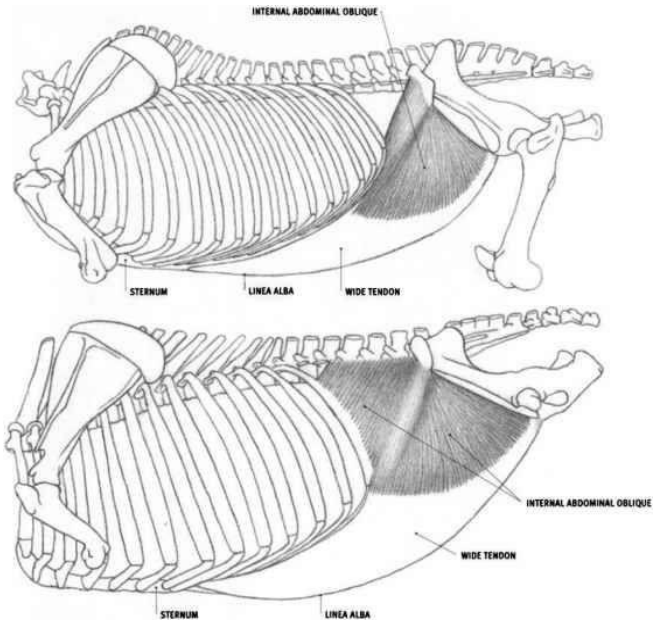
Abdominal part:

- **becomes an aponeurosis at the level of the lateral border of the rectus abdominis muscle**
- **blends with the abdominal tendon of the external obligue muscle – to form the outer layer of the rectus sheath**



Exposure of the internal oblique muscle (1) of a horse. 2, aponeurosis (sheet like tendon) of the internal abdominal oblique m.; 3, ext. abdominal oblique m. aponeurosis; 4, ext. abdominal oblique m. reflected; 5, cut edge of the ext. abdominal oblique m.; 6, costal arch; 7, transversus abdominis m. exposed through a hole in the int. oblique aponeurosis; 8, rectus abdominis m.; 9, acetabulum.

http://vanat.cvm.umn.edu/ungDissect/Lab11/Img11-6.html



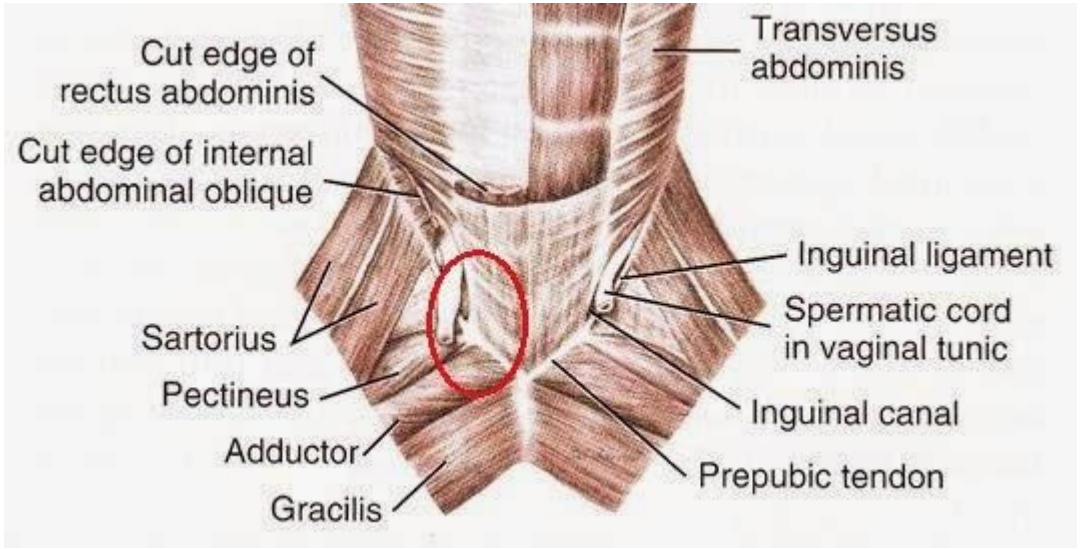
https://co.pinterest.com/pin/835558537089921469/

ABDOMINAL MUSCLES OF THE HORSE

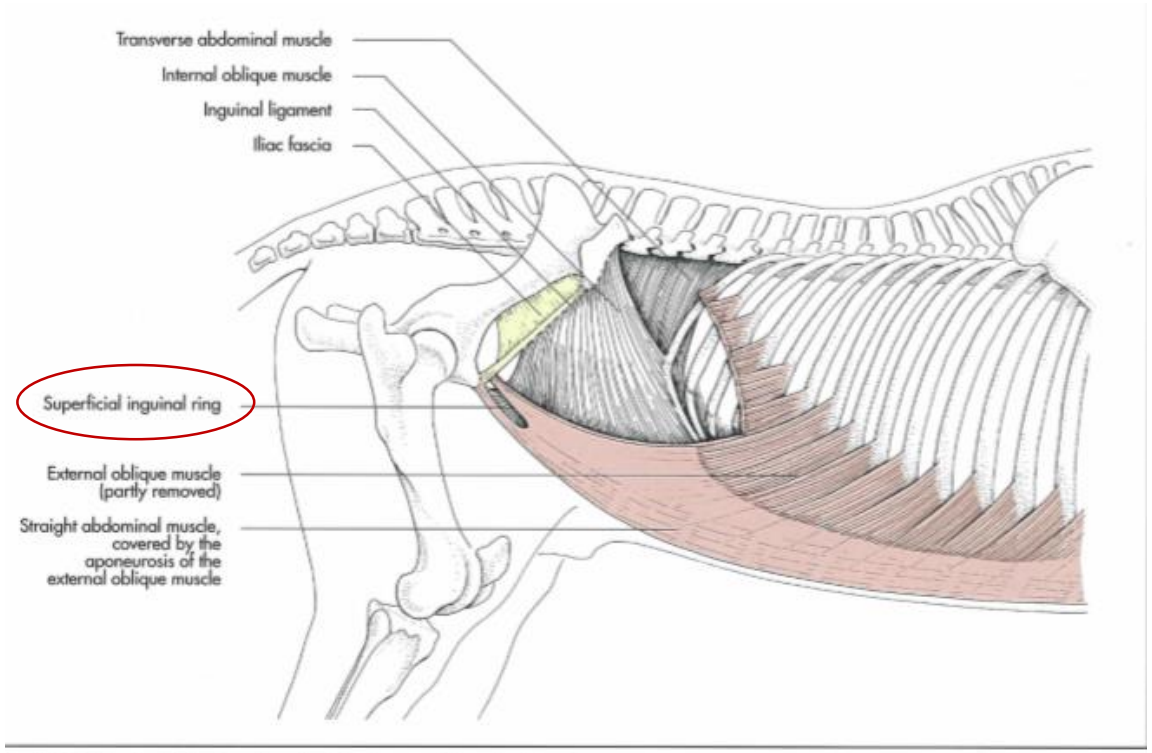
2. M. obliguus abdominis internus:

In the inguinal region forms:

- **the medial wall of the inguinal canal**
- **cranial border of the internal inguinal ring**



http://drssnairvet.blogspot.com/2015/04/



ig. 2-15. Muscles of the thoracic wall of the horse (schematic, lateral aspect).

ABDOMINAL MUSCLES OF THE HORSE

3. M. transversus abdominis:

Origin: a. 2th – 13th last ribs

b. processus transversus of the lumbal vertebrea

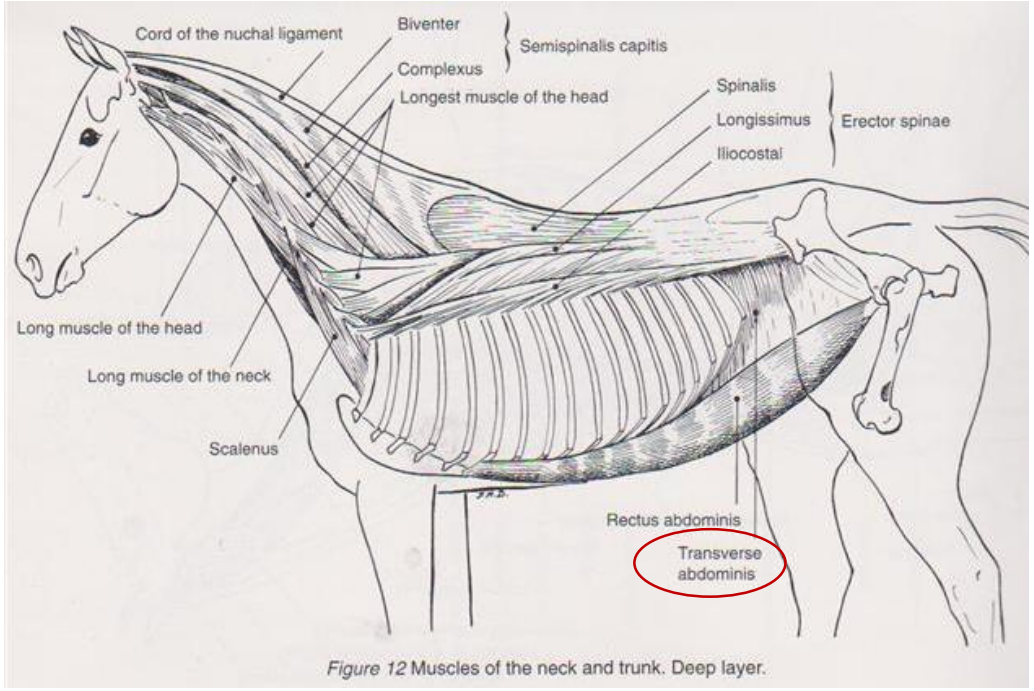
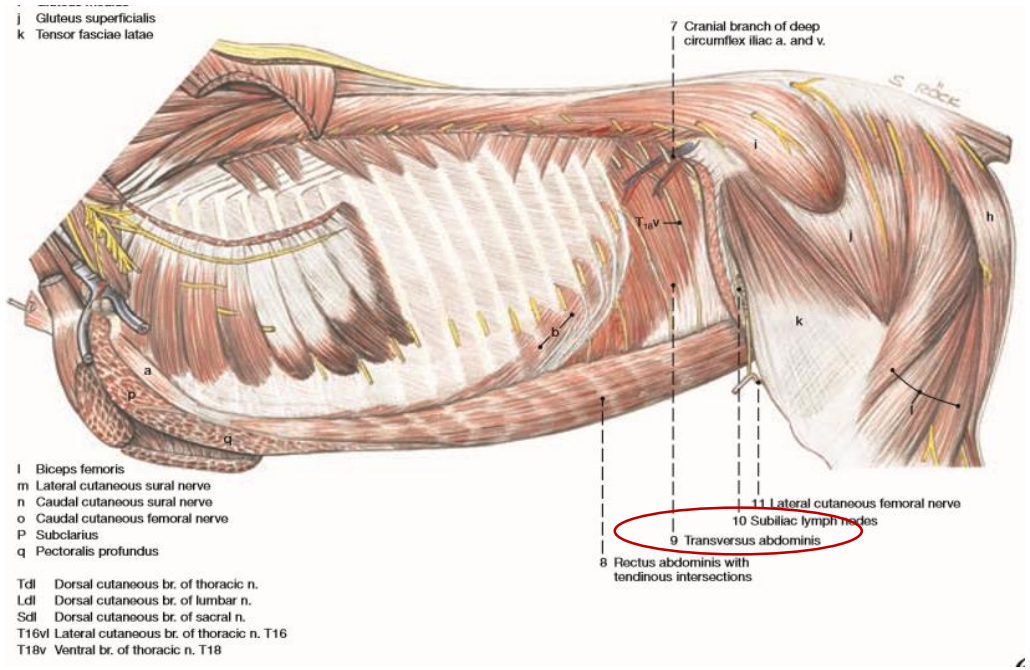


Figure 12 Muscles of the neck and trunk. Deep layer.



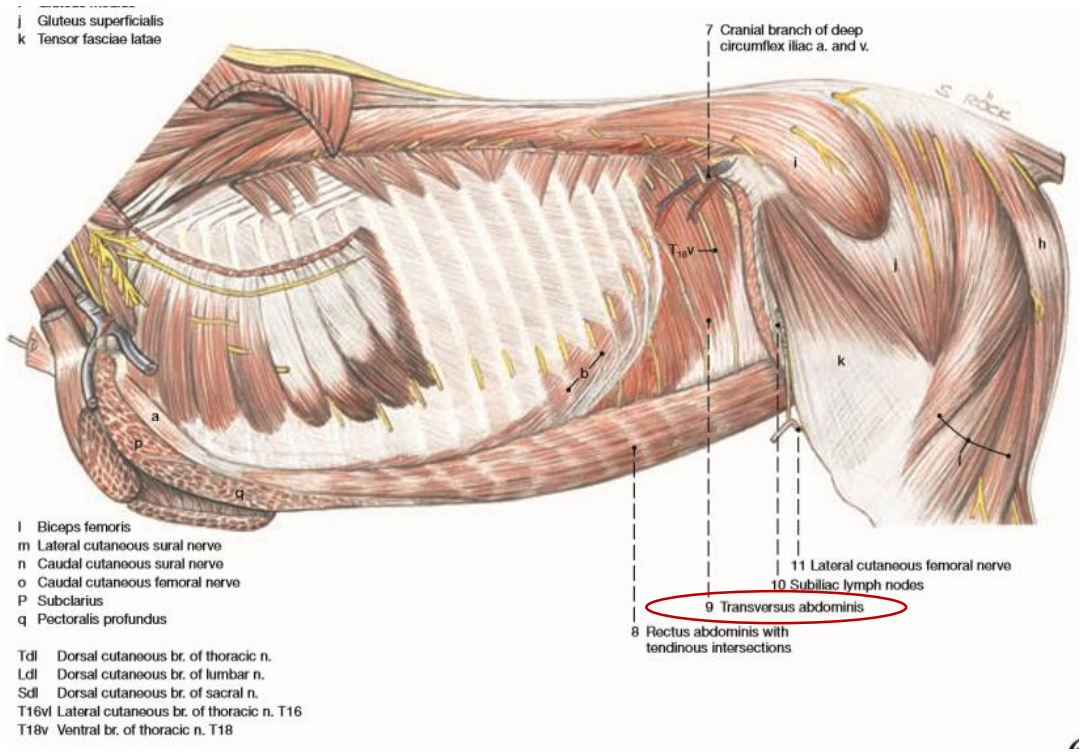
http://www.coolgrannyflats.com/horse-neck-muscles-anatomy/horse-neck-muscles-anatomy-deep-horse-muscles-diagram-markings-anatomy/

ABDOMINAL MUSCLES OF THE HORSE

3. M. transversus abdominis:

In the lumbal region:

- **fibers become an aponeurosis**
- **forms the inner layer of the rectus sheeth**
- **the caudal border of the muscle – at the level of the tuber coxae**



ABDOMINAL MUSCLES OF THE HORSE

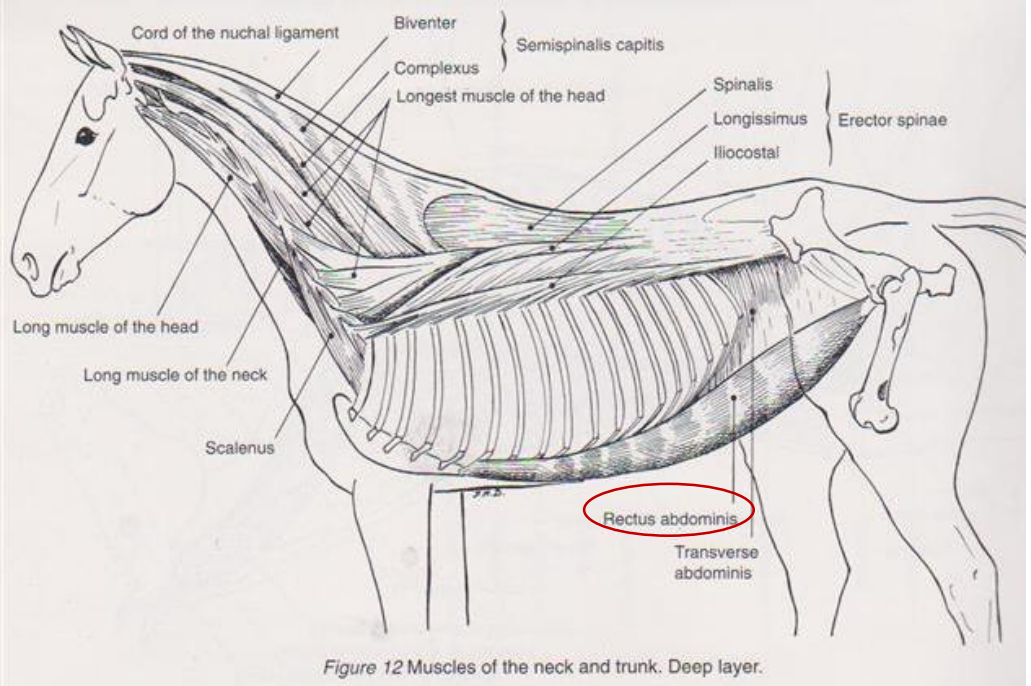
5. M. rectus abdominis:

- **9 – 11 tendinous inscripitions – blendid with the outer layer of the rectus sheath**

Origin: 4th to 9th costal cartilages

Insertion: cranial pubic ligament

ventral pubic tubercle



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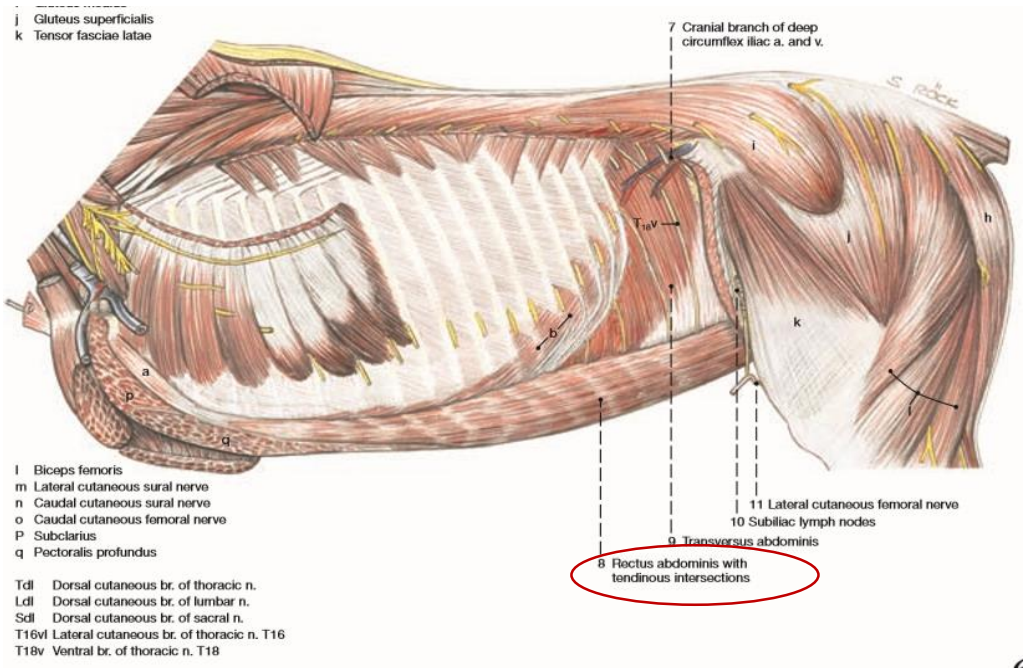

THANK YOU FOR YOUR ATTENTION!

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