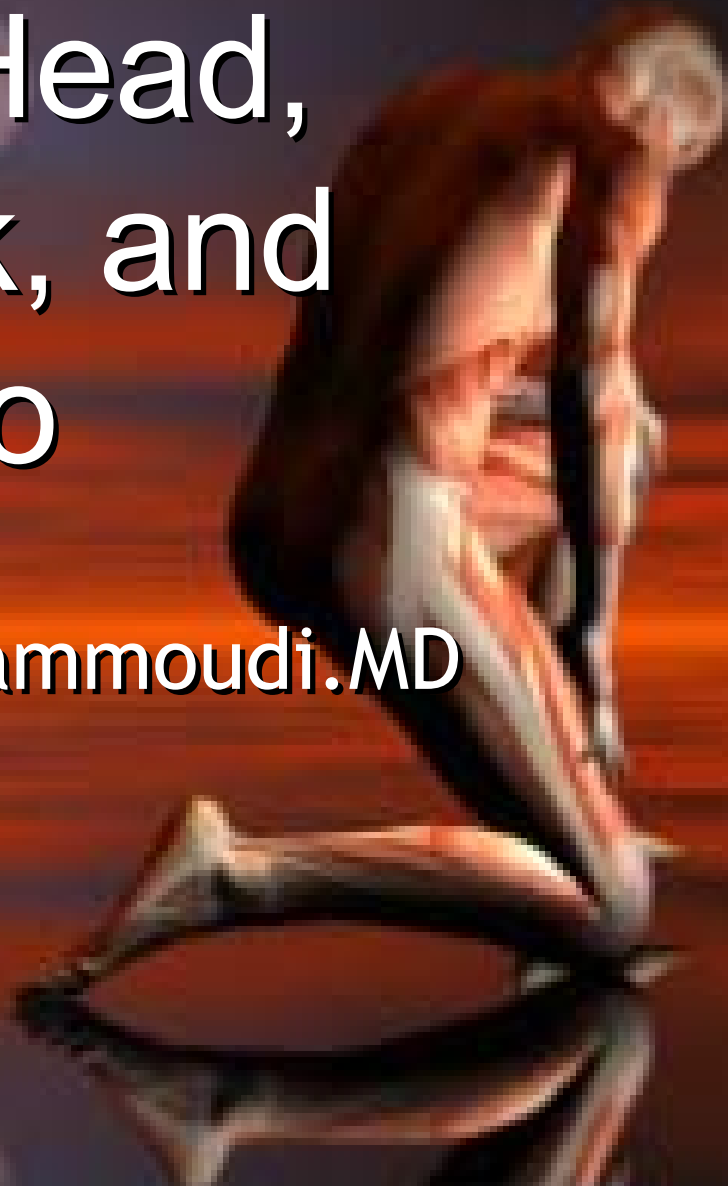


Muscles of the Head, Neck, and Torso

Danil Hammoudi.MD



Muscle Fiber/Nerve Terminal

myofibril

motor end plate

sarcomere

I-band

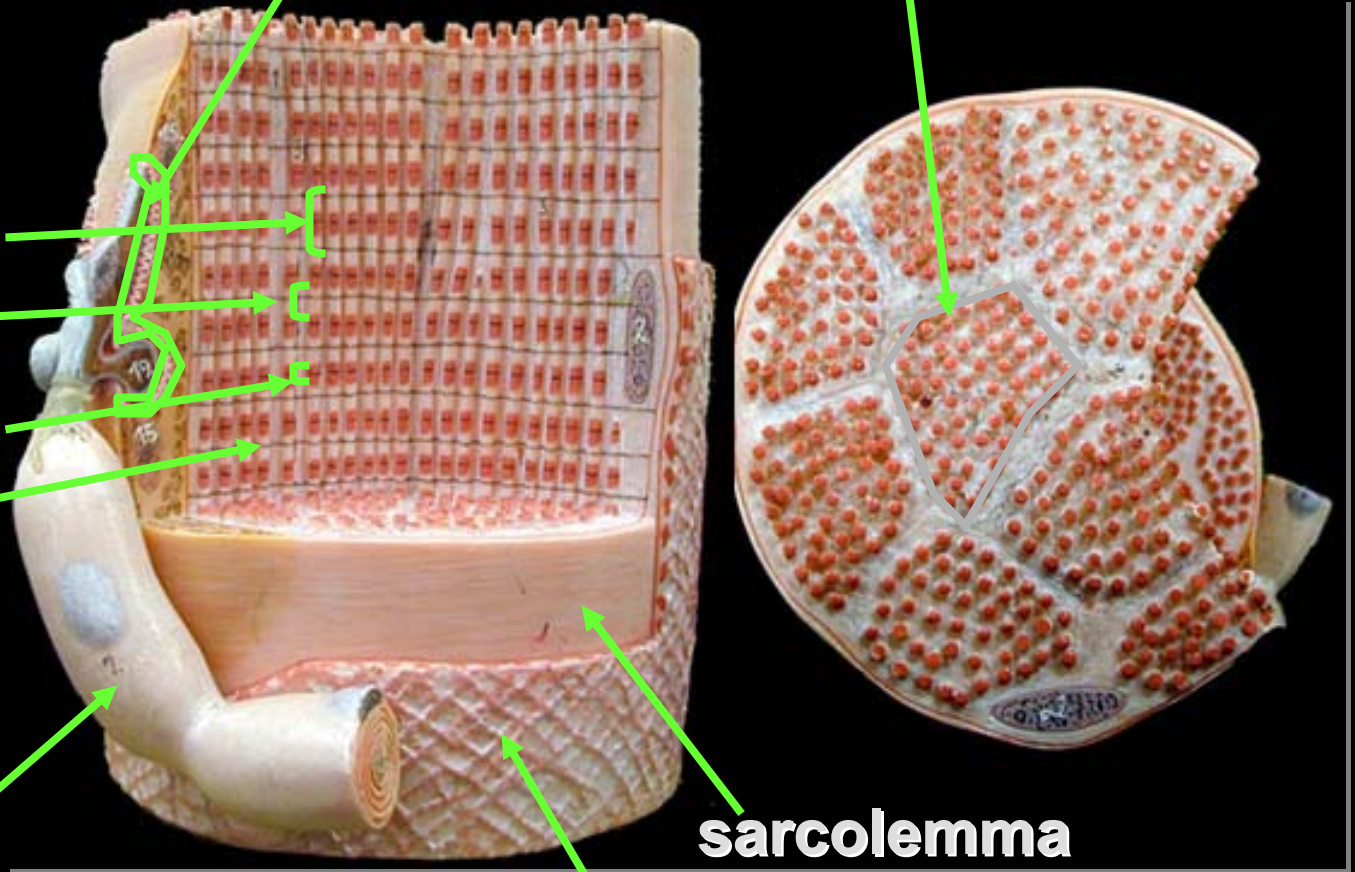
A-band

Z-line

motor neuron

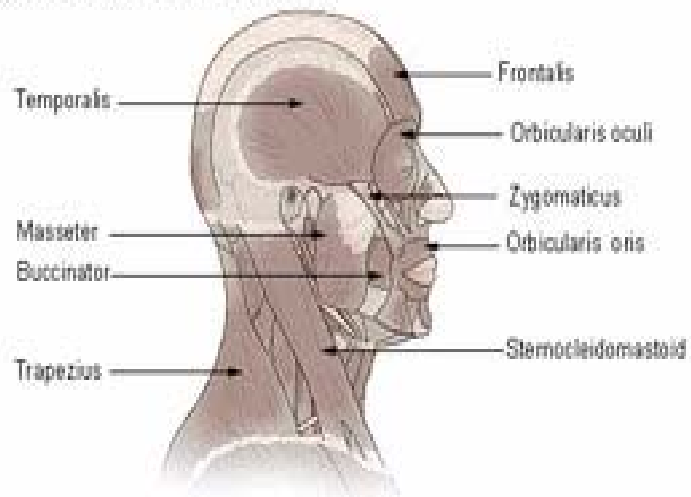
sarcolemma

endomysium



Some definition

- **aponeurosis** - A sheetlike fibrous membrane, resembling a flattened tendon, that serves as a fascia to bind muscles together or as a means of connecting muscle to bone. any of the deeper and thicker fascia that attach muscles to bones; resemble flattened tendons,
- **fascia** - a sheet or band of fibrous connective tissue separating or binding together muscles and organs etc
- **Ligament:** A ligament is a tough band of connective tissue that connects various structures such as two bones. "Ligament" is a fitting term; it comes from the Latin "ligare" meaning "to bind or tie."
- **Tendon:** The tissue by which a muscle attaches to bone. A tendon is somewhat flexible, but fibrous and tough.



Muscles of the head

Epicranius.: Occipitofrontalis The epicranium covers the forehead, the top of the skull, and the back of the skull. It has two bellies, joined in the middle by a large aponeurosis [**galea aponeurotica** (*epicranial aponeurosis*)]. Its primary action is to raise the eyebrows.

- **Orbicularis oculi.** The primary action is to close the eye.
- **Orbicularis oris.** The primary action of this muscle is to close or “purse” the lips. This muscle is used when whistling or kissing.
- **Masseter*.** The primary action of this muscle is to elevate the mandible. This muscle originates on the zygomatic arch and maxilla, and it inserts on the angle and ramus of the mandible.

Temporalis*. It should be easy to remember the name of this muscle, as it covers the temporal bone. Its primary action is to elevate the mandible.

closing the mouth (accomplished by the masseter and temporalis muscles)

closing the lips (accomplished by the orbicularis oris).

The temporalis originates on the temporal bone, and it inserts on the coronoid process of the mandible.

Platysma. The primary action of the platysma is to depress the mandible.

There are six muscles involved in rotating the eyeball, and we will examine four of them.

Superior rectus. This muscle rotates the eyeball superiorly, to look upward. The **superior rectus muscle** is a muscle in the orbit. It is one of the extraocular muscles.

It is innervated by the superior division of the oculomotor nerve (Cranial Nerve III).

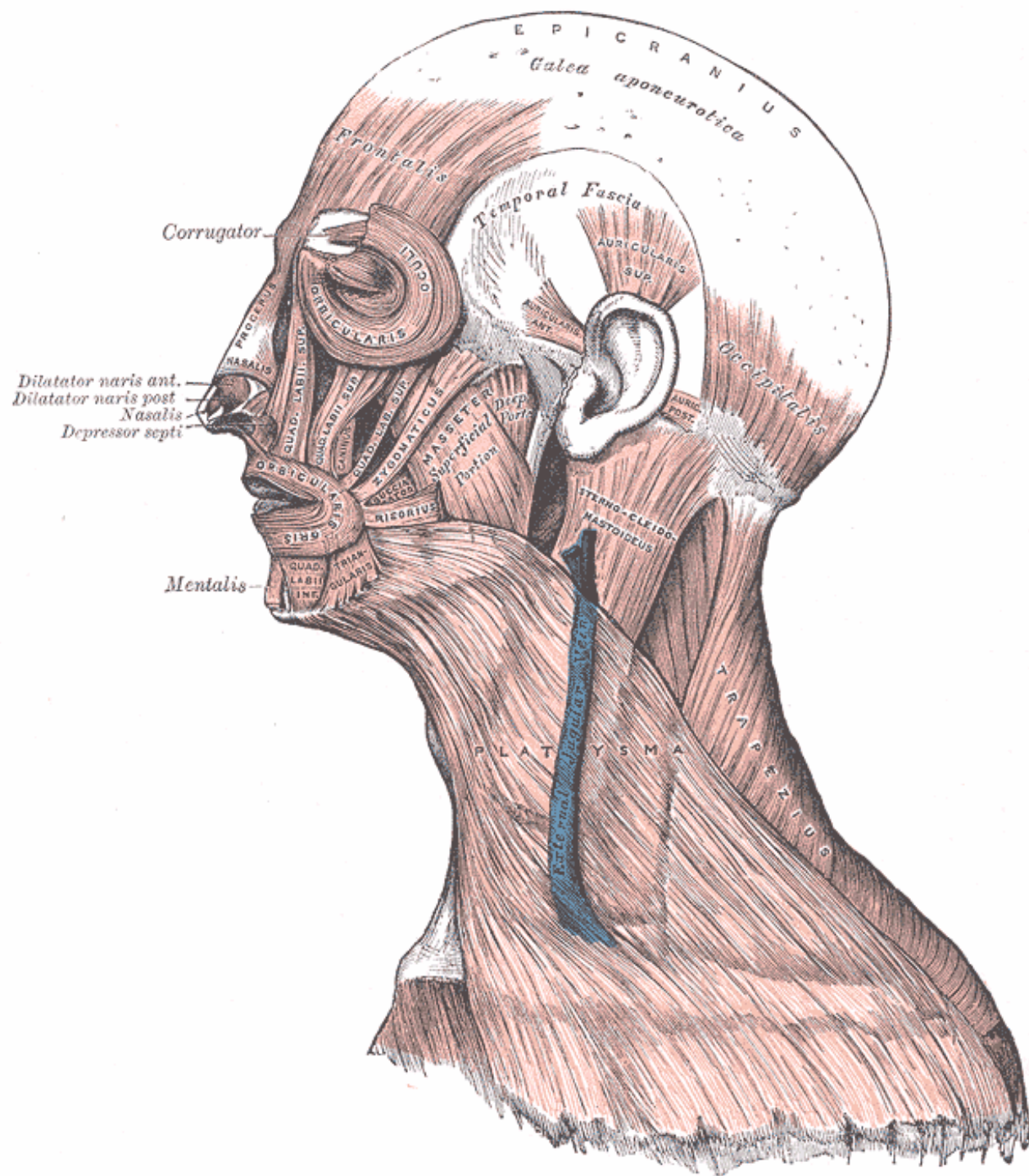
In the primary position (looking straight ahead), the superior rectus muscle's primary function is elevation, although it also contributes to intorsion and adduction.

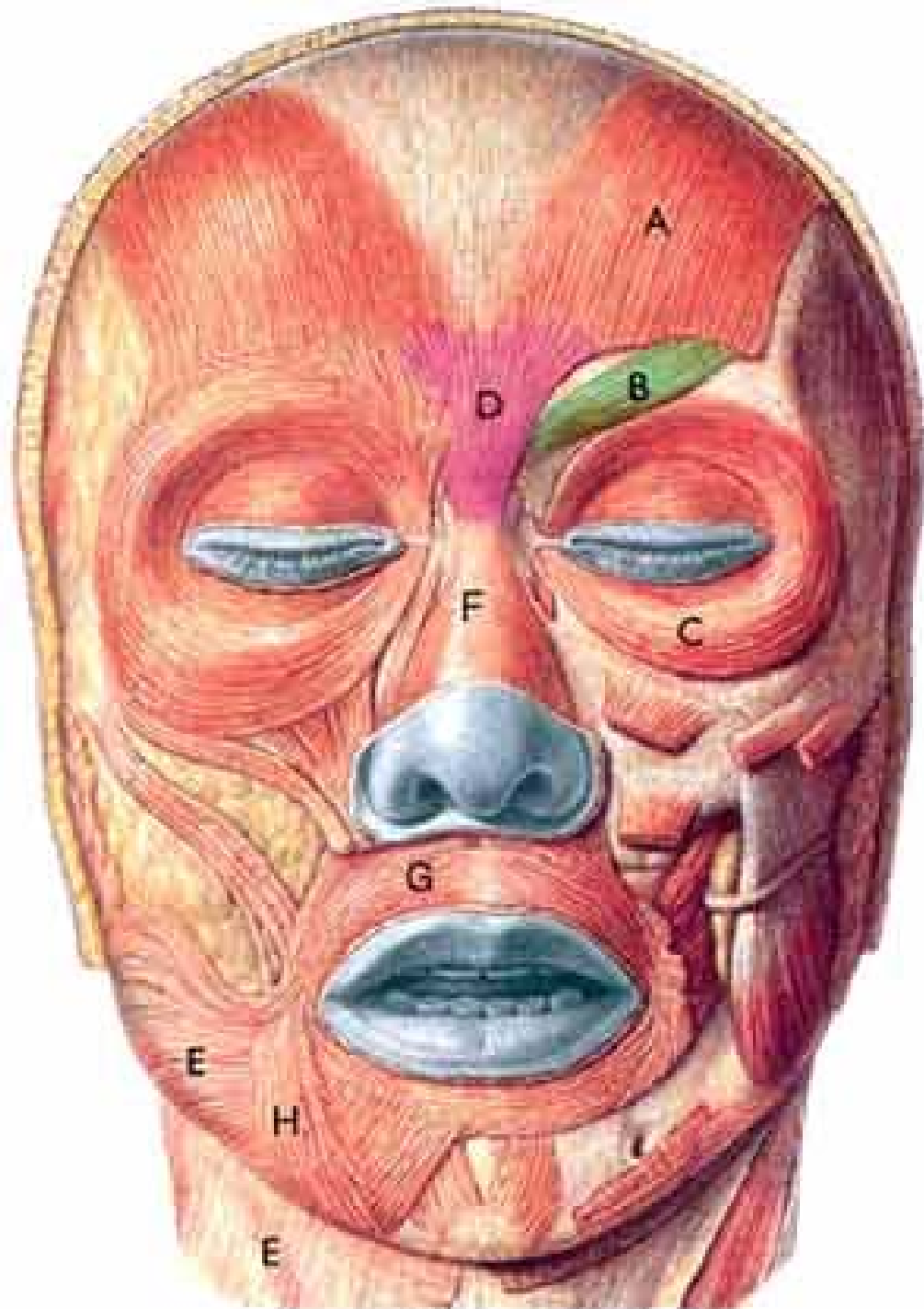
Inferior rectus. This muscle rotates the eyeball inferiorly, to look downward. The inferior rectus makes the eye look downwards or medially or wheel-rotates it laterally (extorsion). By means of its fascial expansion it also depresses the lower lid.

The principal action is depression which increases as the eye is turned out and is nil when the eye is adducted. The inferior rectus is the only depressor in the abducted position of the eye.

Medial rectus. This muscle rotates the eyeball medially, toward the nose. The medial rectus is a pure adductor.

Lateral rectus. This muscle rotates the eyeball laterally. The lateral rectus is a pure abductor – that is, makes the eye look directly laterally in the horizontal plane.





The primary muscles of facial expression treated with botulinum toxin administration include:

- (A) Frontalis**
- (B) Corrugator and Depressor supercilli complex**
- (C) Orbicularis oculi**
- (D) Procerus**
- (E) Platysma**
- (F) Nasalis**
- (G) Orbicularis oris**
- (H) Depressor anguli oris**

Muscles of facial expression (image 1):

1.frontalis

2.orbicularis oculi

- orbital portion**

- palpebral portion**

1.zygomaticus major

2.levator labii superioris

alequae nasii

3.levator anguli oris

4.orbicularis oris

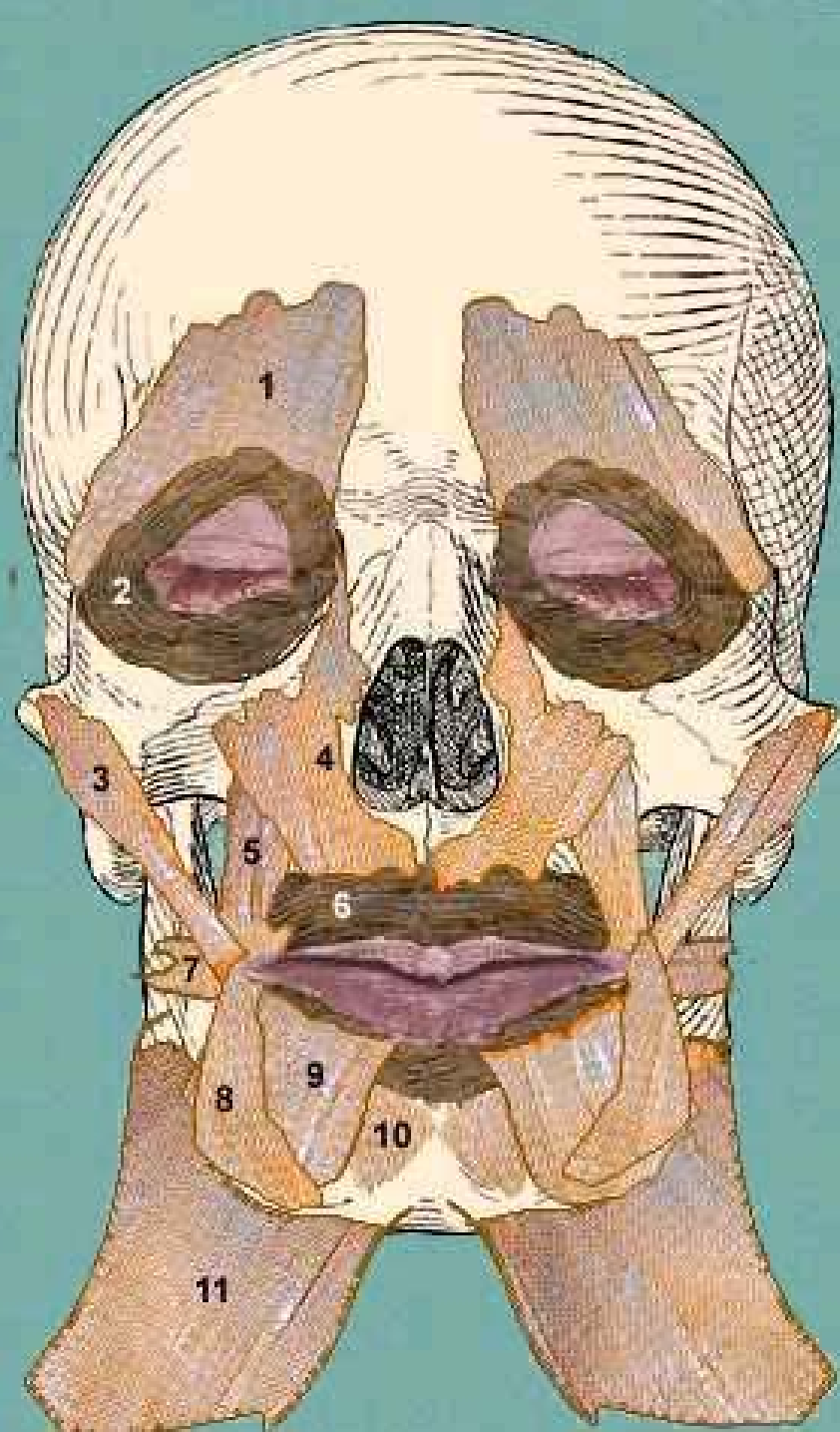
5.risorius

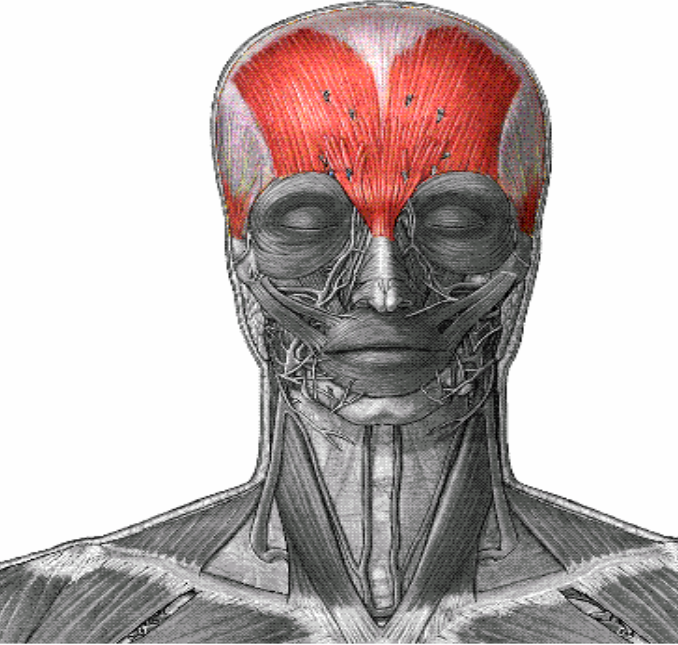
6.depressor anguli oris

7.depressor labii inferioris

8.mentalis

9.platysma





Epicraniu

S.

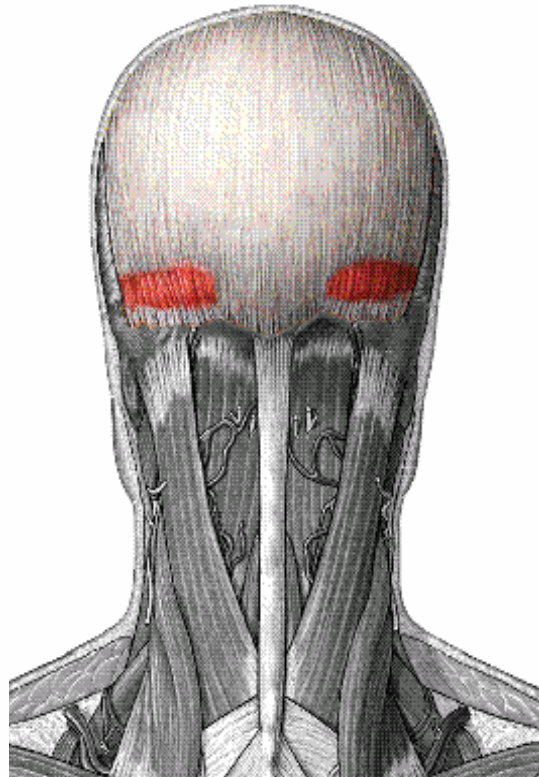
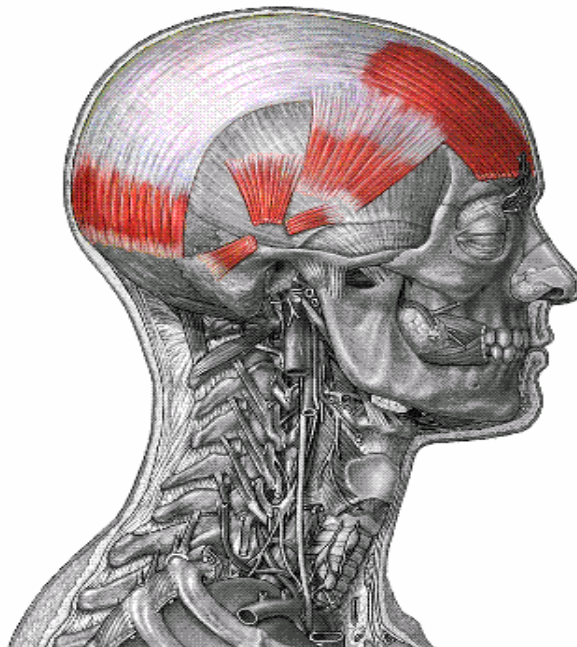
The epicranium muscle covers the upper part of the cranium and consists of two muscular parts:

- the "frontalis," which lies over the frontal bone,
- and the "occipitalis," which lies over the occipital bone.

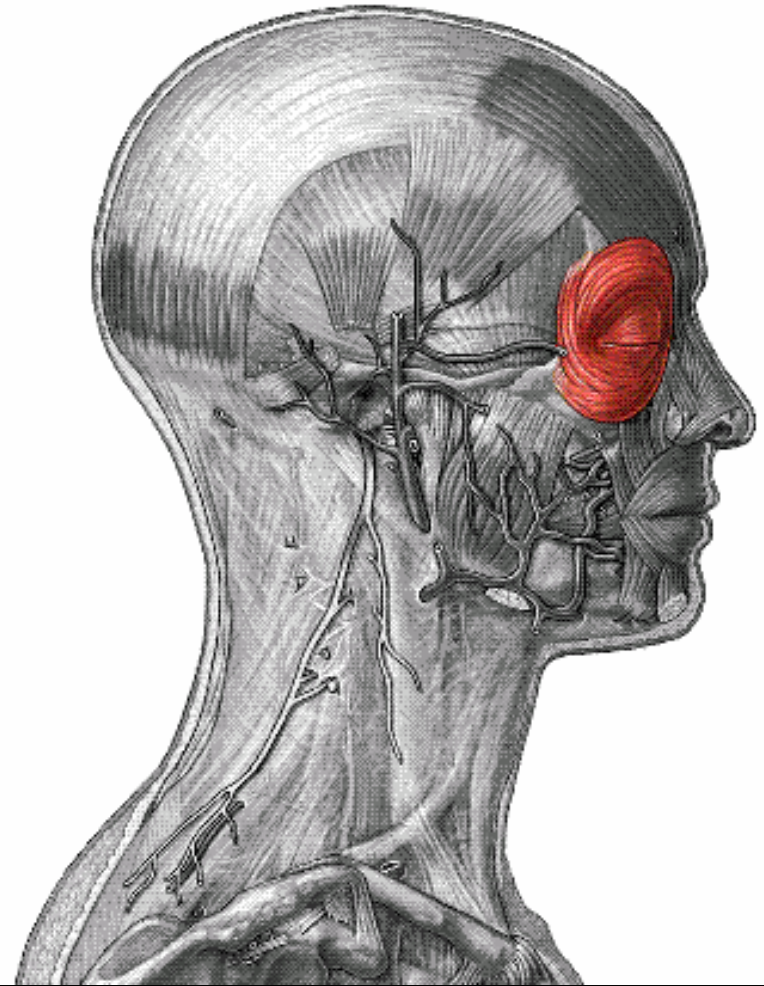
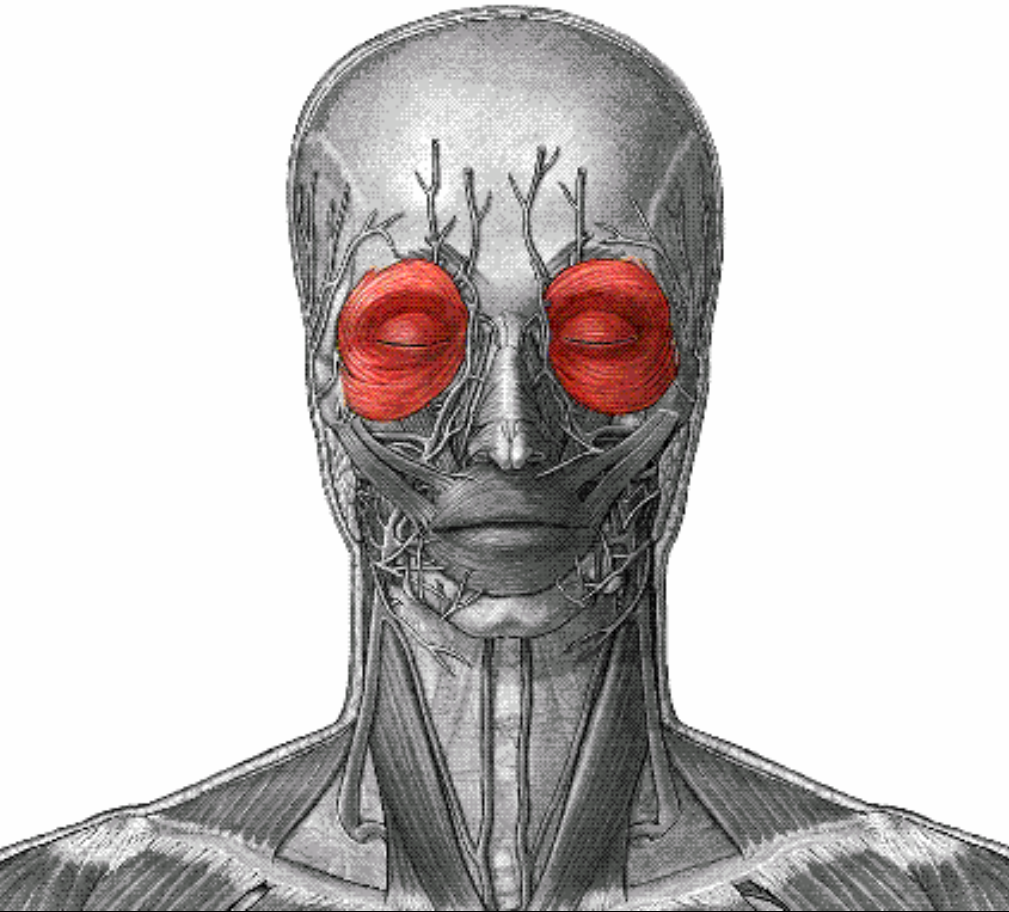
- These parts are united by a broad, tendinous membrane called the "epicranial aponeurosis," which covers the cranium like a cap.

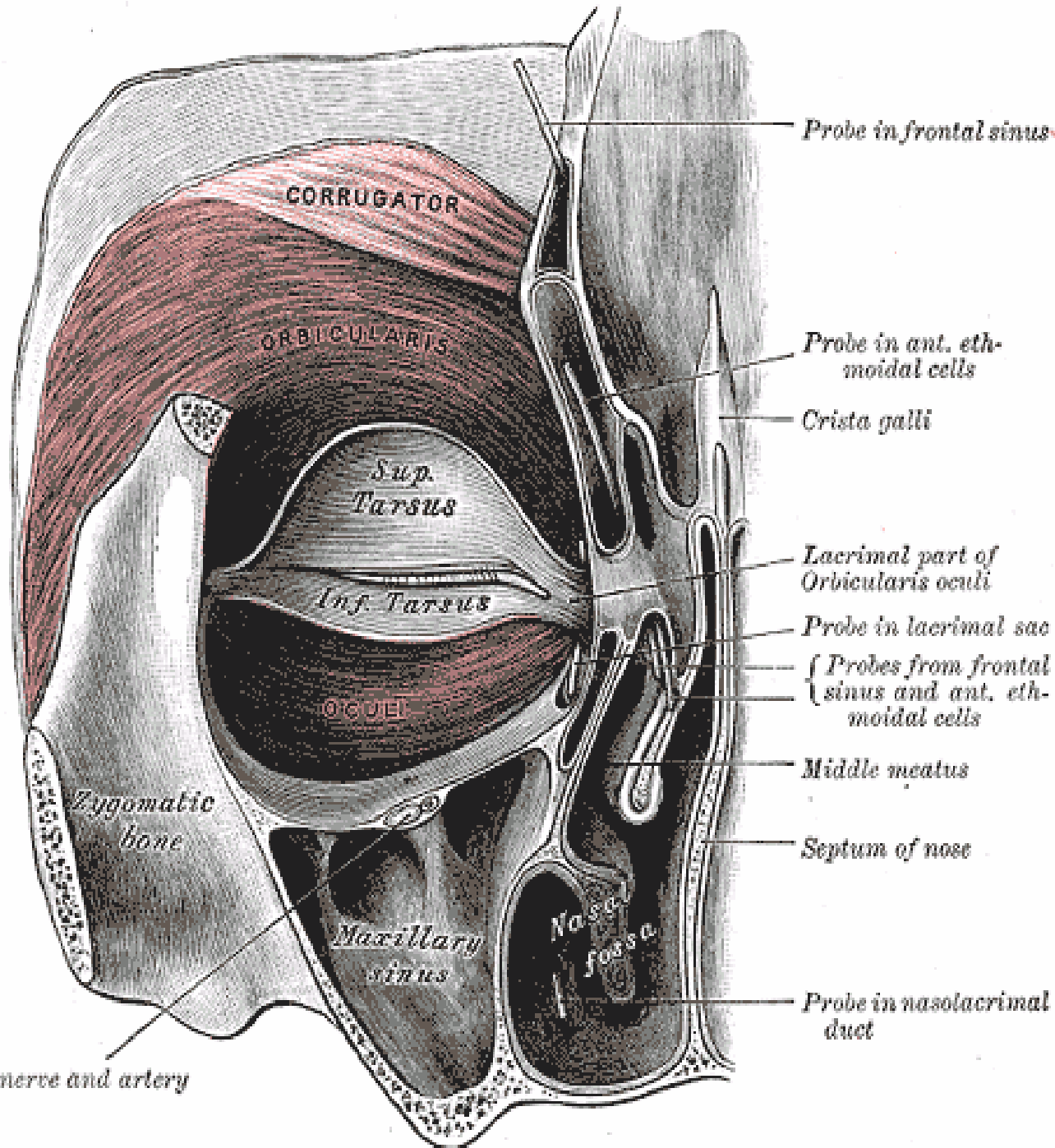
- Contraction of the epicranium raises the eyebrows and causes the skin on the forehead to wrinkle horizontally, as when a person expresses surprise.

- Headaches often result from the continual contraction of this muscle.



Orbicularis oculi.





Orbicularis palpebrarum

Origin: frontal bone; palpebral ligament; lacrimal

bone Insertion: palpebral raphe

Blood: ophthalmic artery

Nerve: zygomatic branch of facial nerve

Action: closes eyelids

ORBICULARIS ORIS

ORIGIN

Near midline on anterior surface of maxilla and mandible and modiolus at angle of mouth

INSERTION

Mucous membrane of margin of lips and raphe with buccinator at modiolus

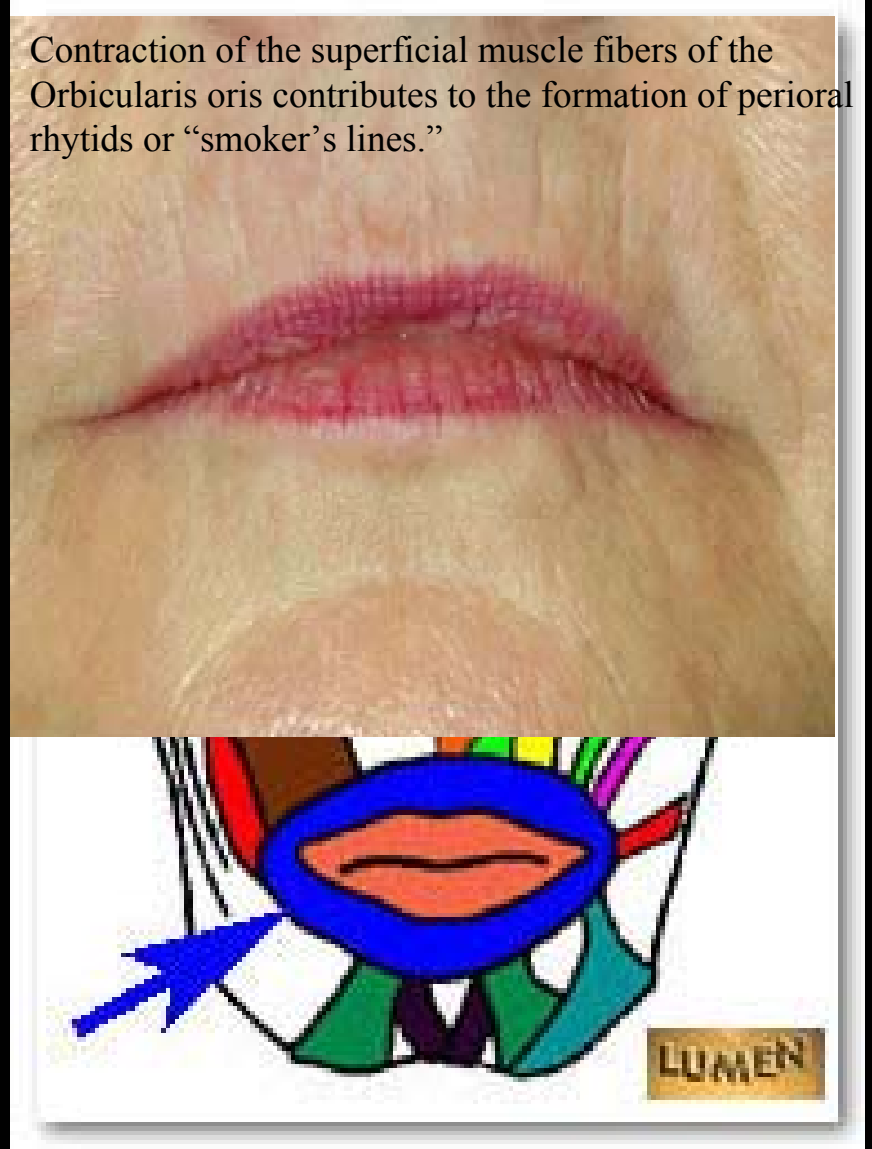
ACTION

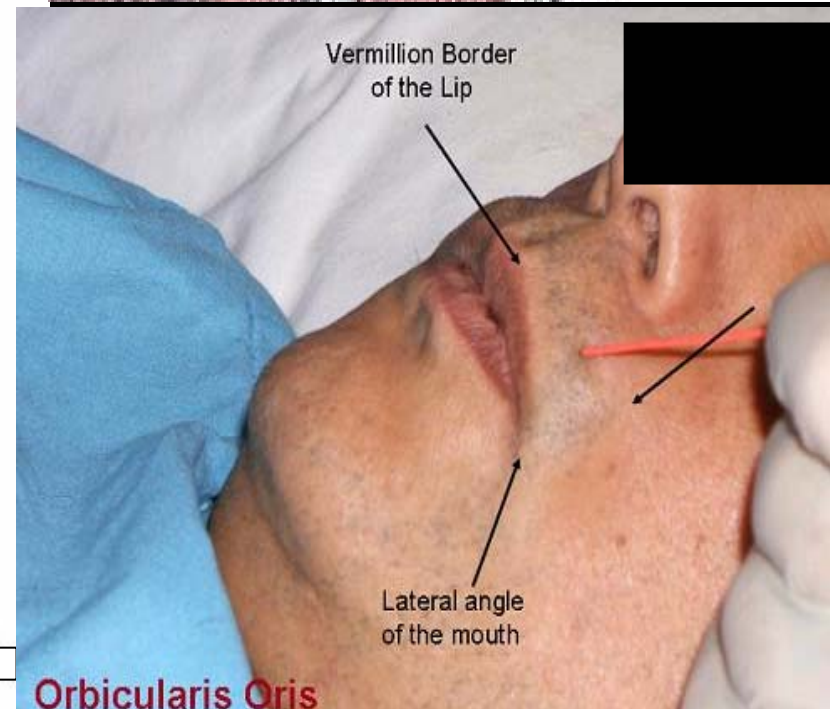
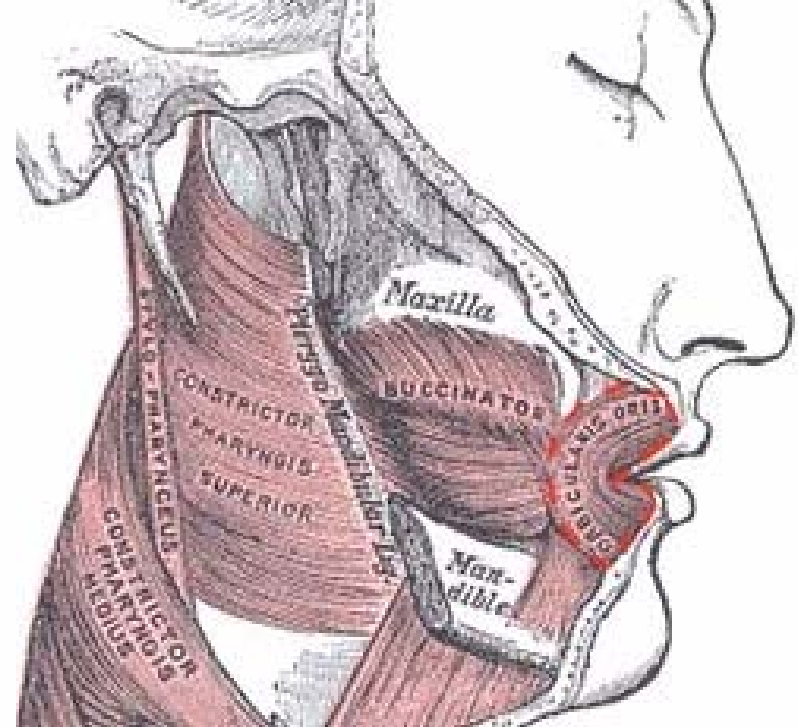
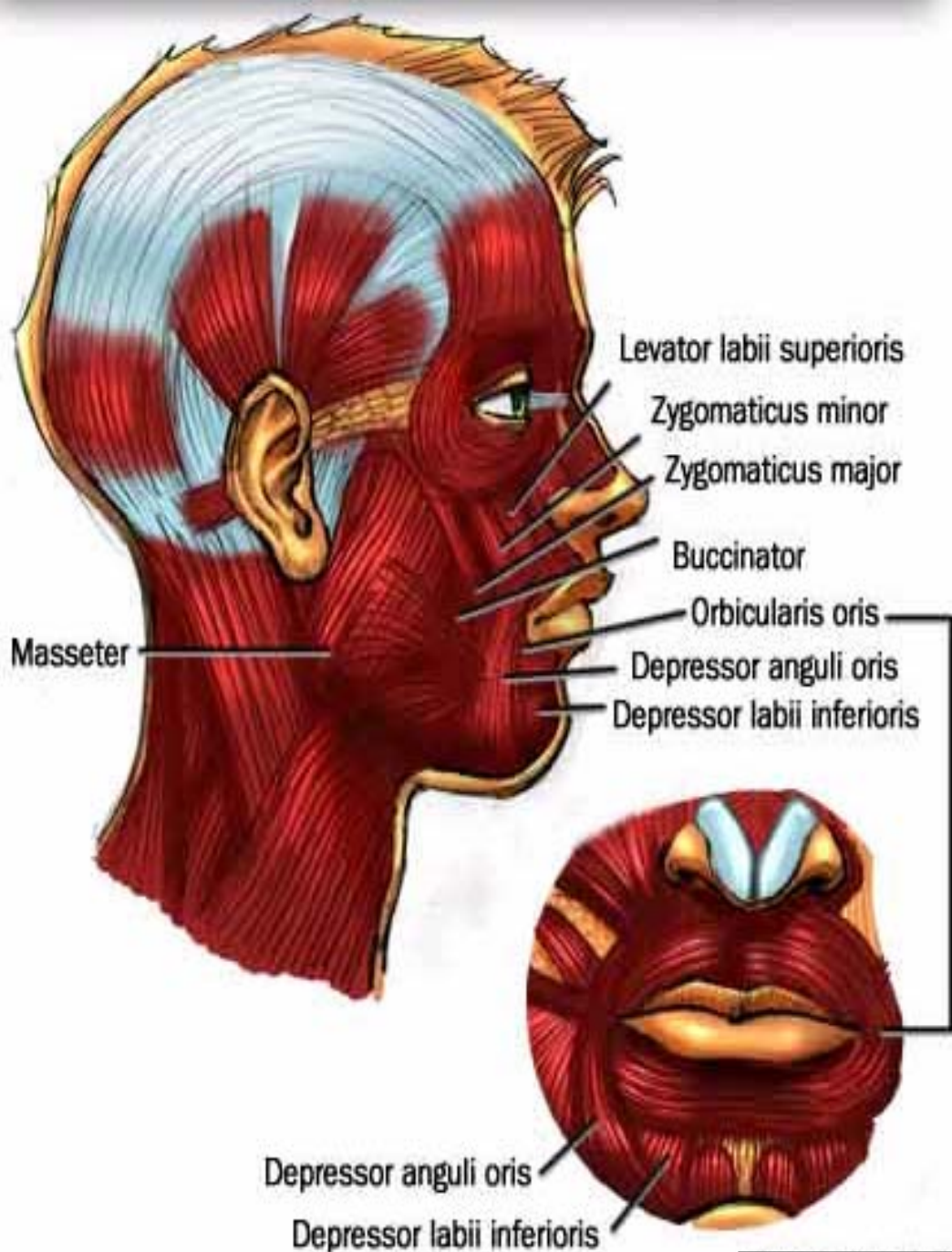
Narrows orifice of mouth, purses lips and puckers lip edges

NERVE

Accessory parts are incisivus labii superioris and inferioris

Contraction of the superficial muscle fibers of the Orbicularis oris contributes to the formation of perioral rhytids or “smoker’s lines.”





masseter

MASSETER

ORIGIN:

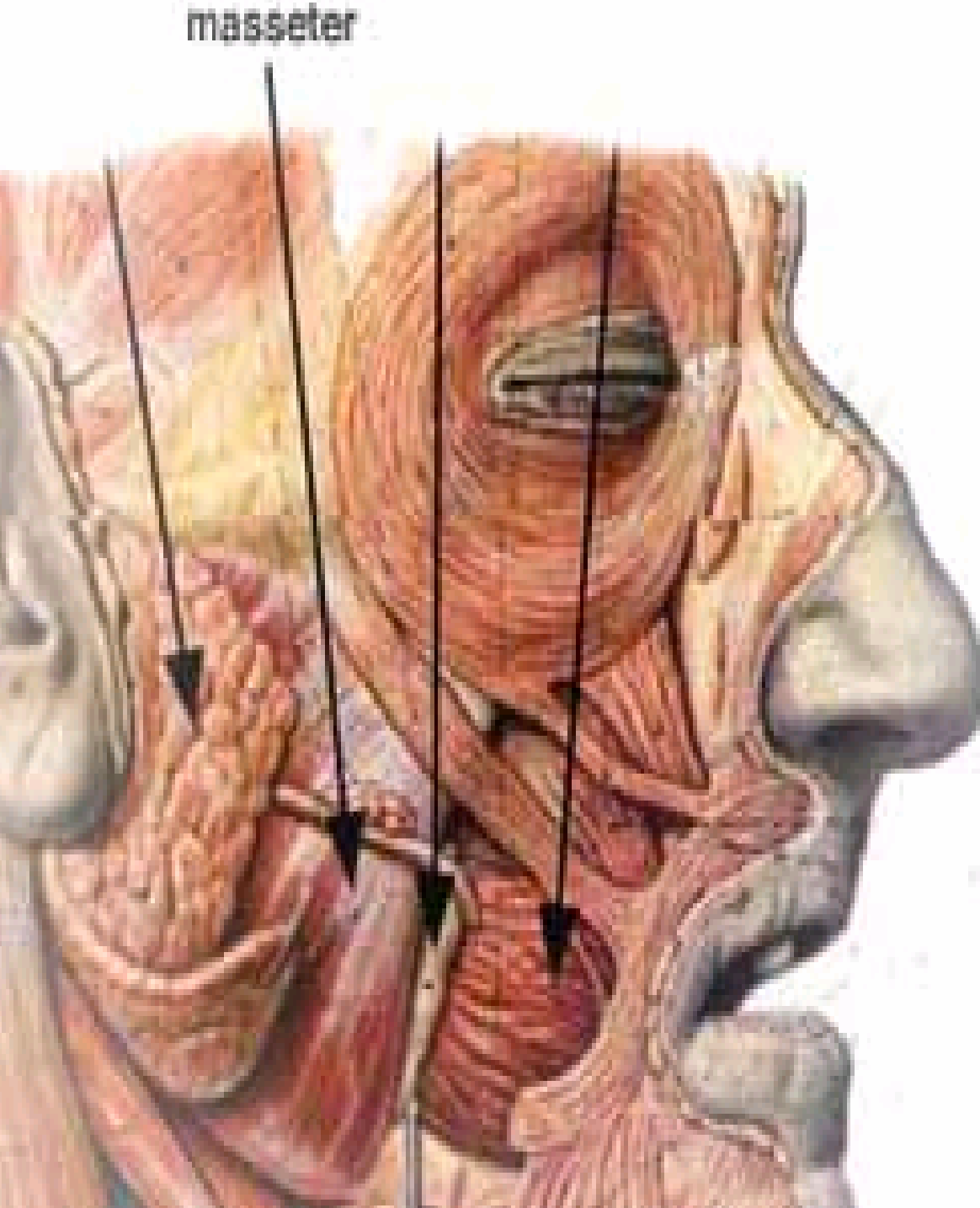
zygomatic arch

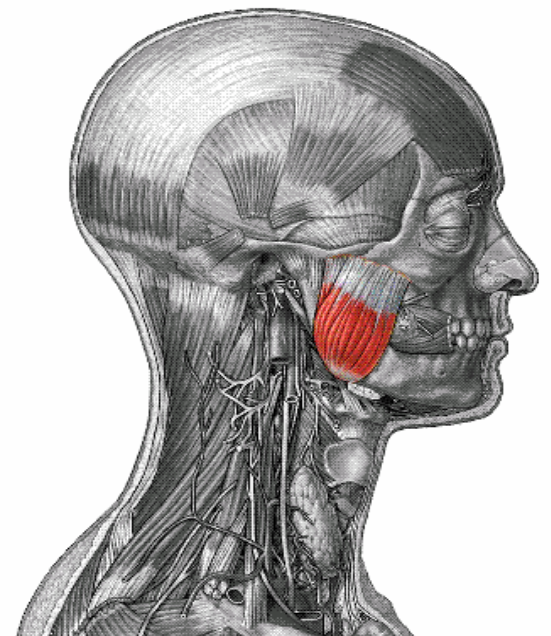
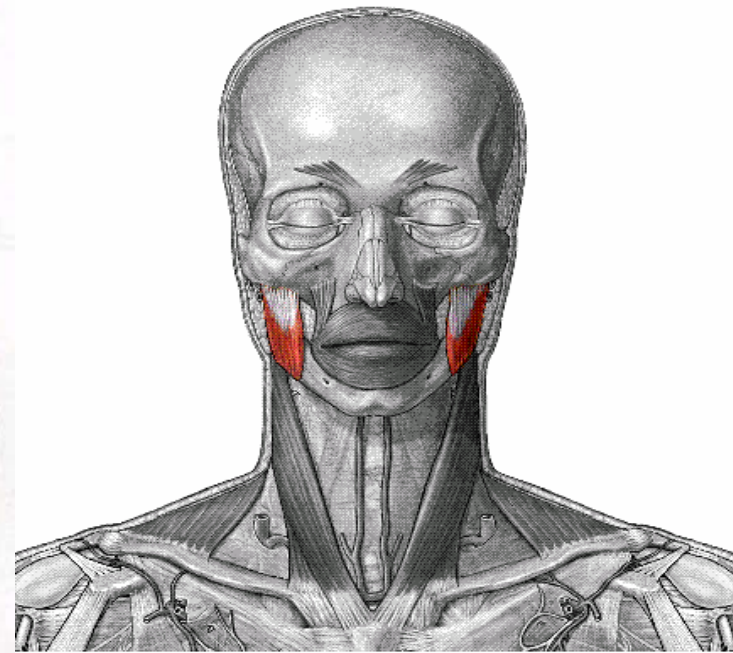
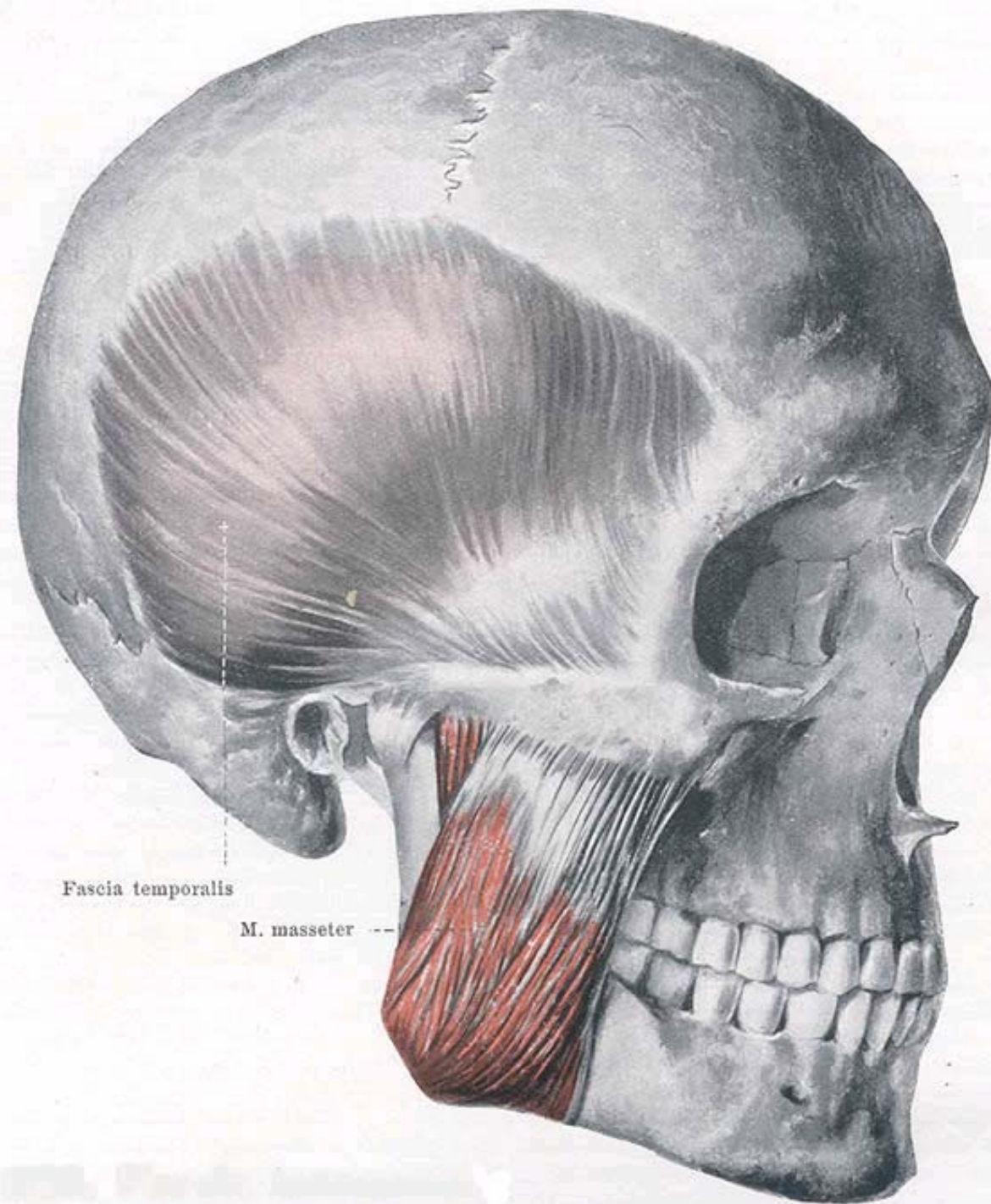
INSERTION:

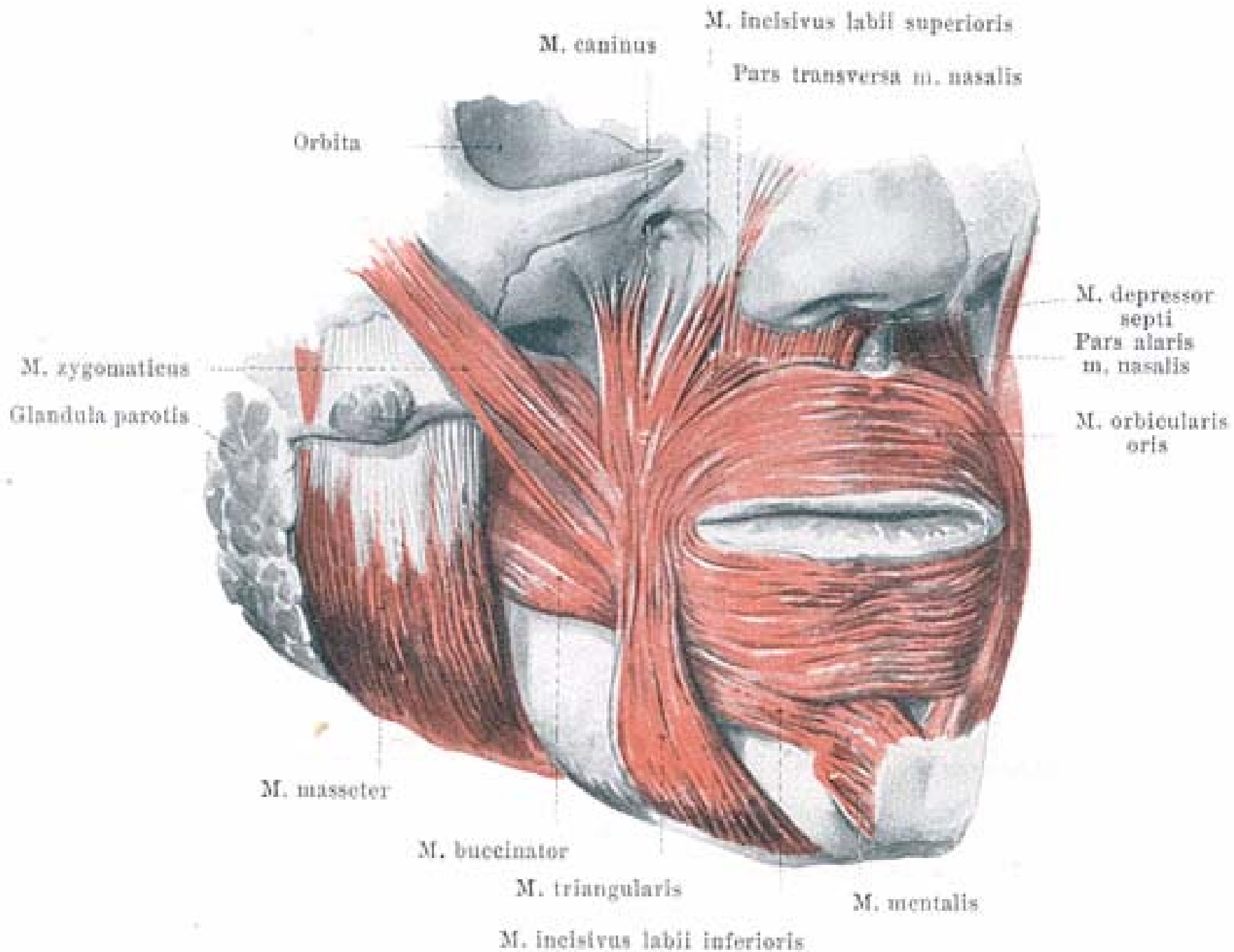
lateral aspect of mandibular ramus and angle

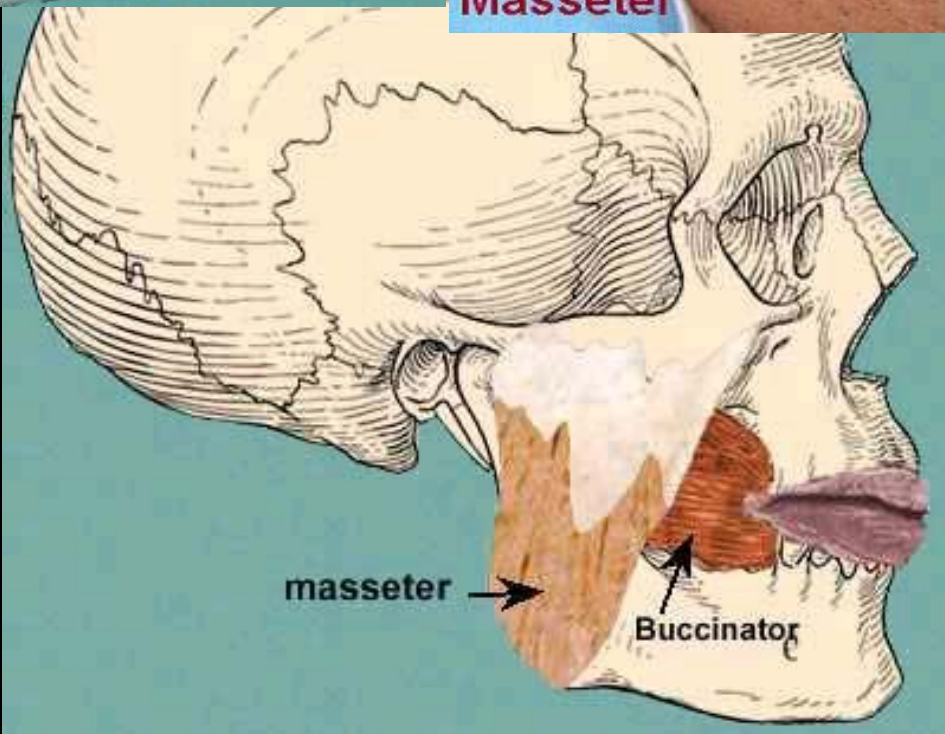
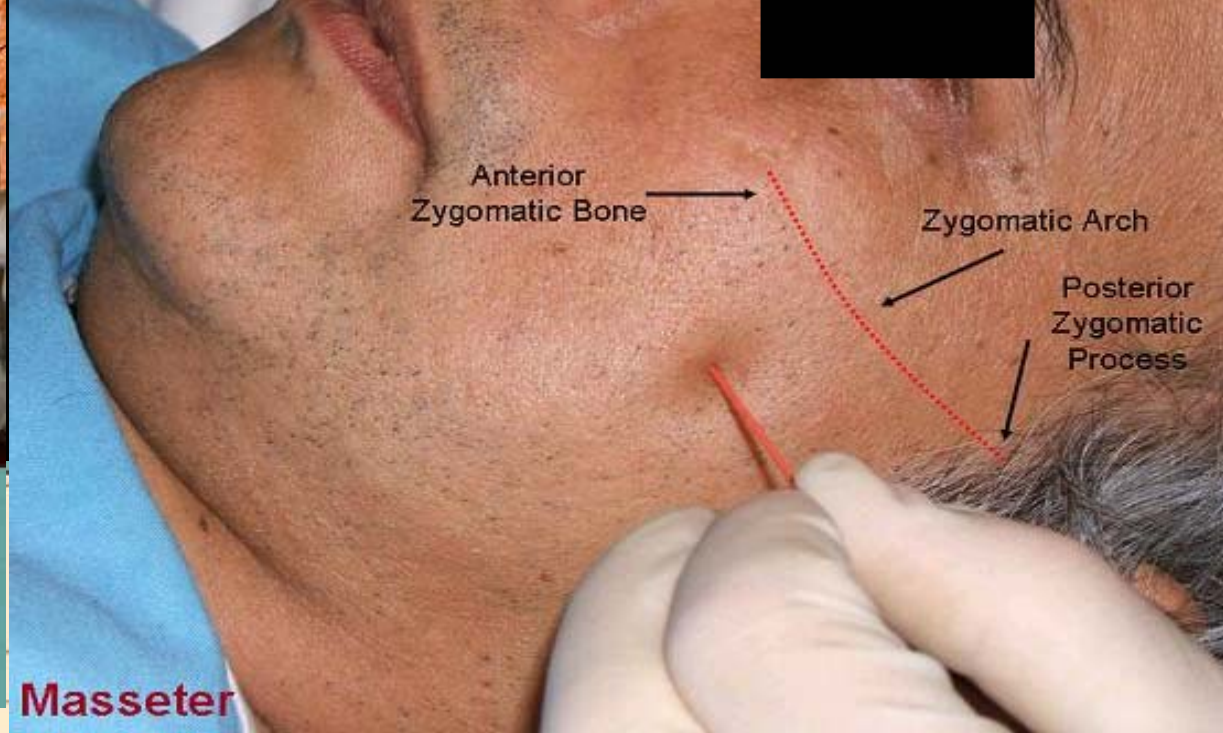
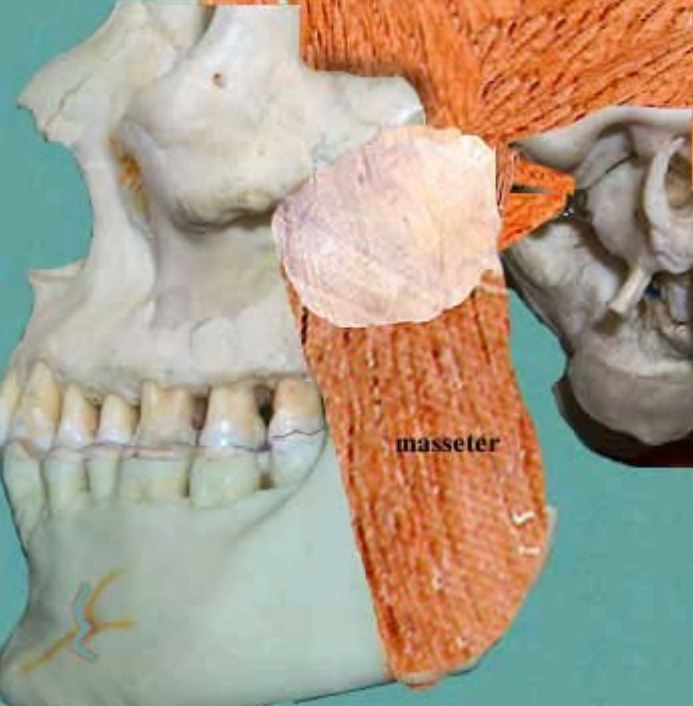
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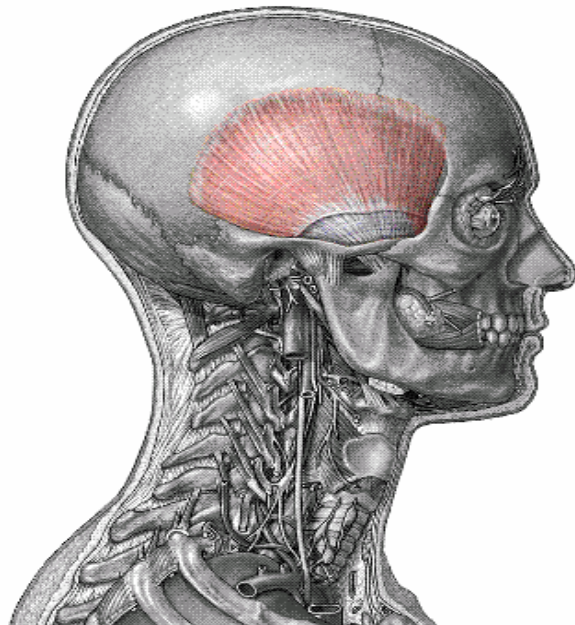
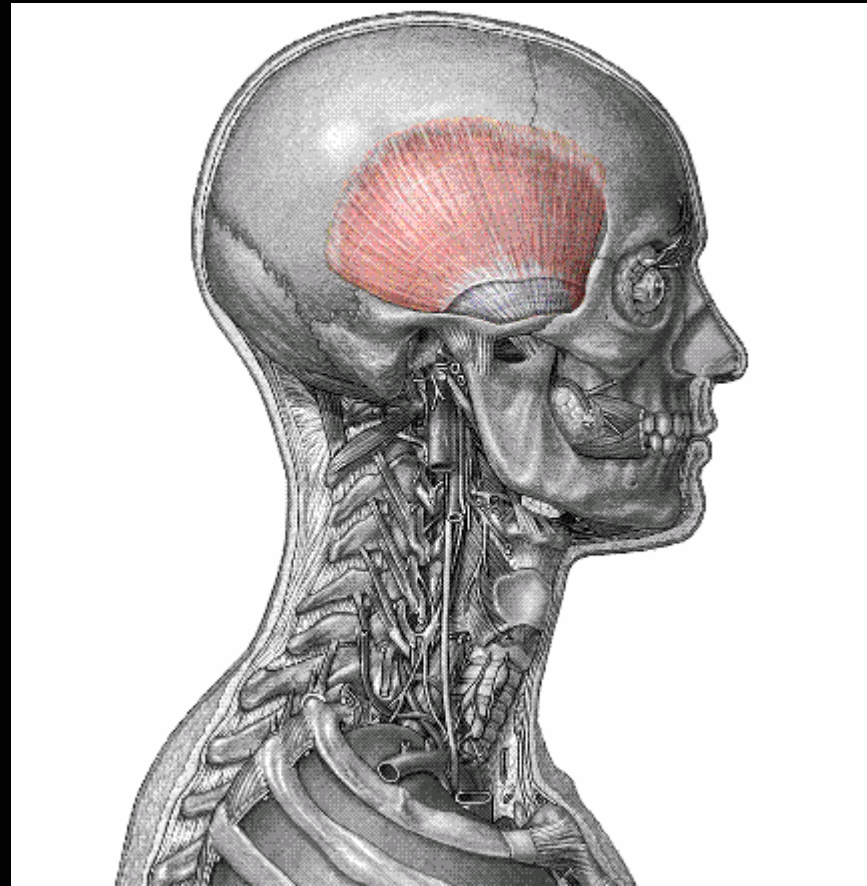
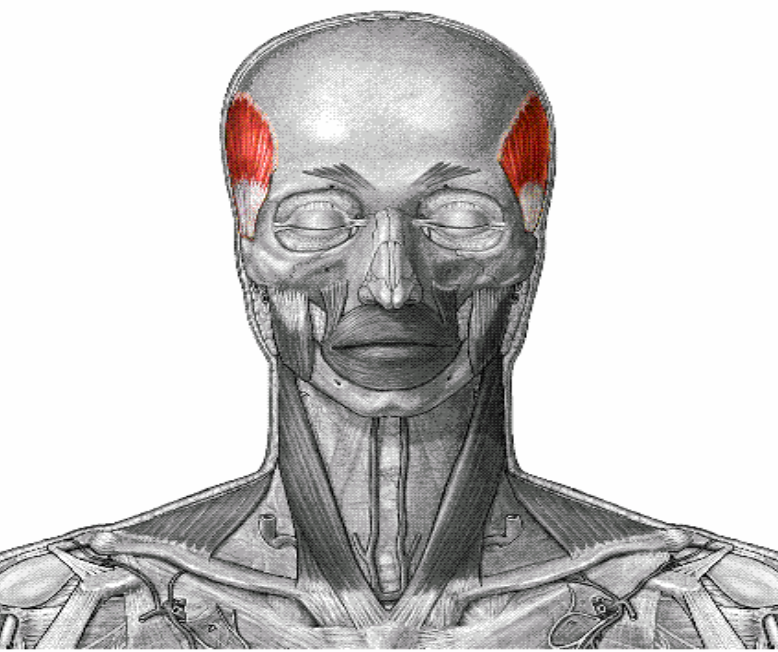
elevates mandible for biting and chewing; causes some lateral excursion of mandible









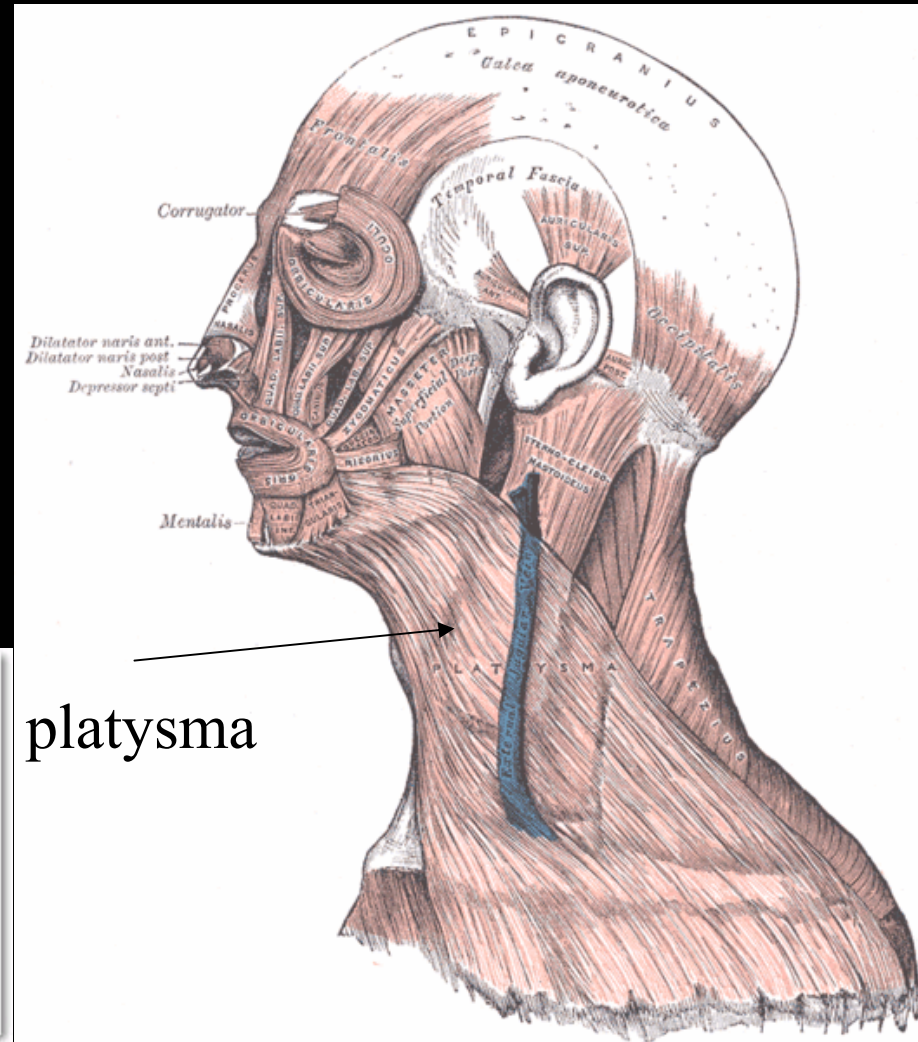
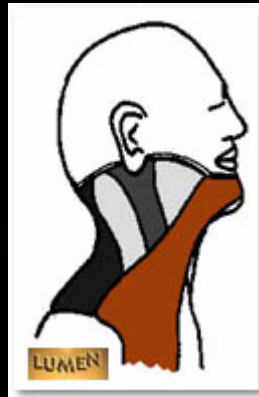
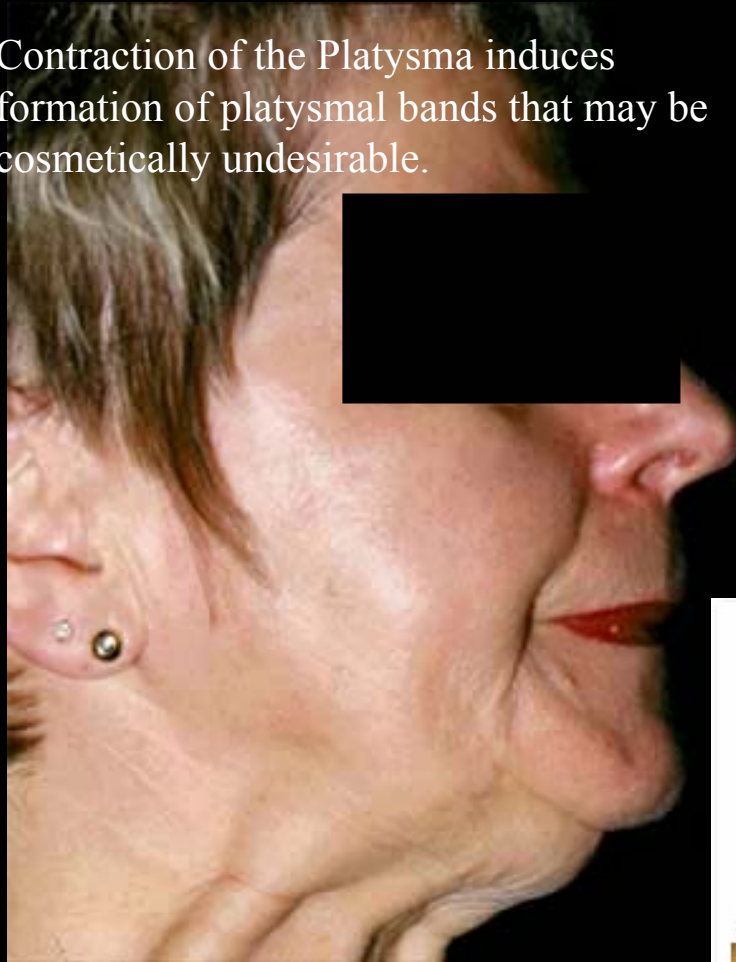


Temporalis*.

The Platysma

The Platysma is a broad sheet of muscle arising from the fascia of the Pectoralis and the Deltoid muscles. Its fibers cross the clavicle and extend obliquely and upward along the side of the neck. The fibers then extend across the angle of the jaw and insert into the skin and subcutaneous tissue of the lower face as well as the muscles surrounding the angle and the lower part of the mouth including the Depressor anguli oris. With aging, the cervical neck skin loses its elasticity and the anterior portion of the platysmal muscle separates to form two diverging vertical bands. When the neck is animated, these bands contract and become more visible.

Contraction of the Platysma induces formation of platysmal bands that may be cosmetically undesirable.



ORIGIN

PLATYSMA

Skin over lower neck and upper lateral chest

INSERTION

Inferior border of mandible and skin over lower face and angle of mouth

ACTION
Depresses and wrinkles skin

PLATYSMA ORIGIN

Skin over lower neck and upper lateral chest

INSERTION

Inferior border of mandible and skin over lower face and angle of mouth

ACTION

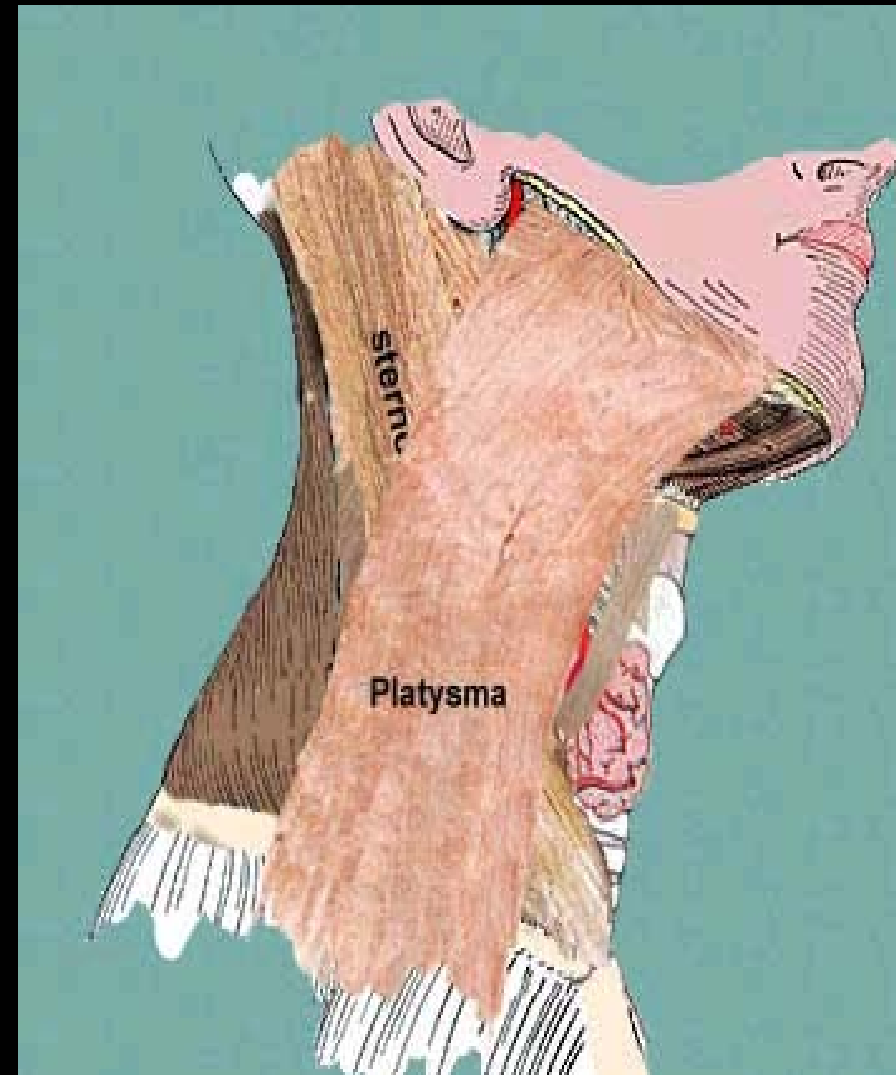
Depresses and wrinkles skin of lower face and mouth. Aids forced depression of mandible

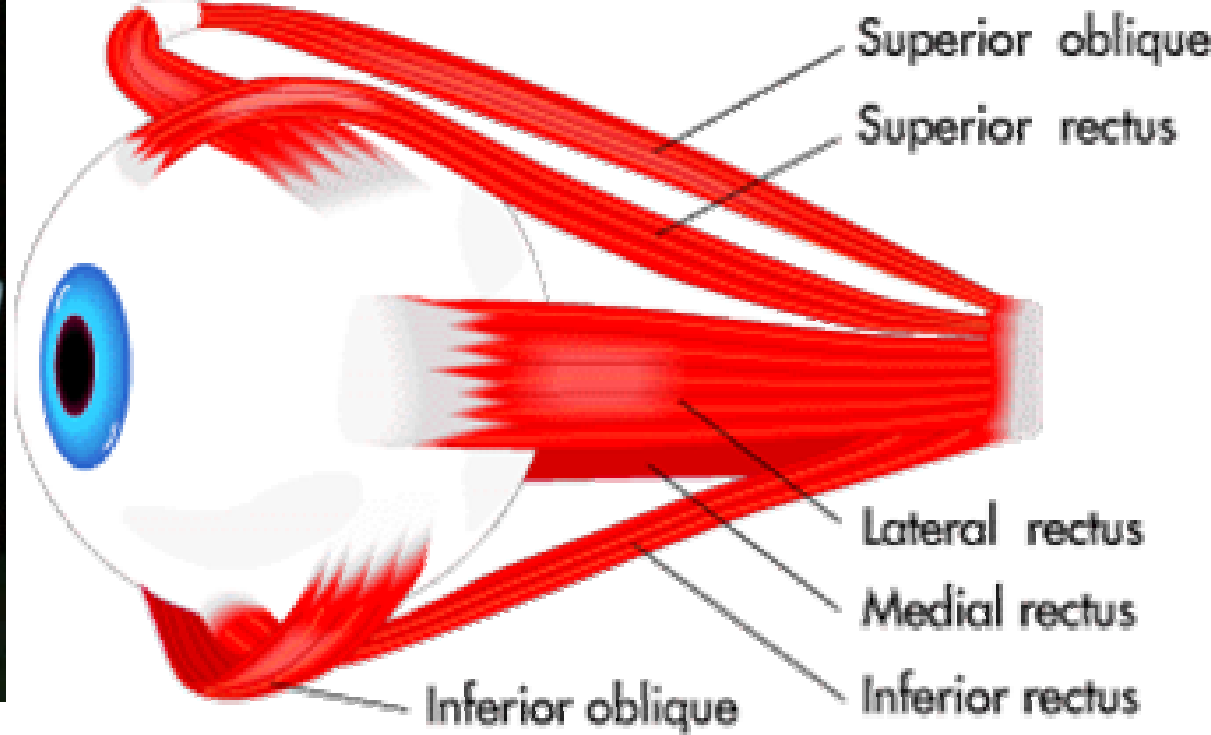
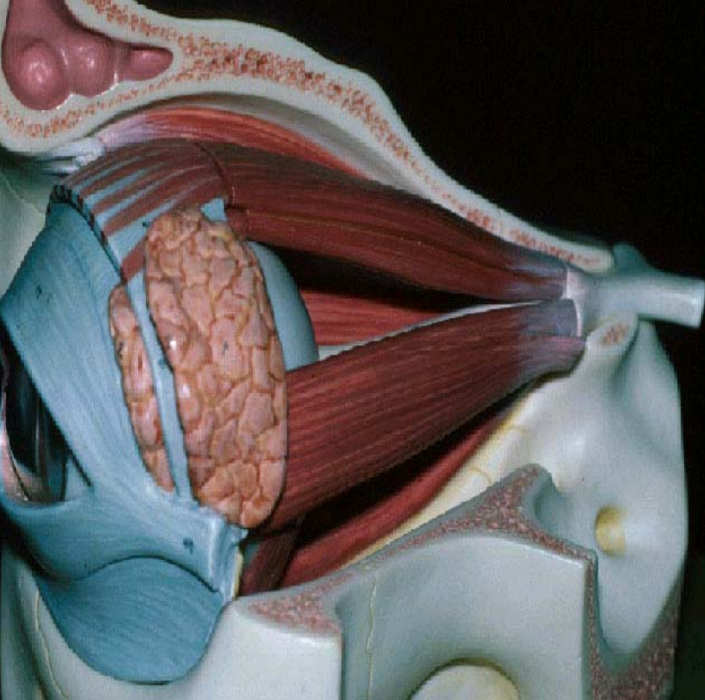
NERVE

Cervical branch of facial nerve (VII) of lower face and mouth. Aids forced depression of mandible

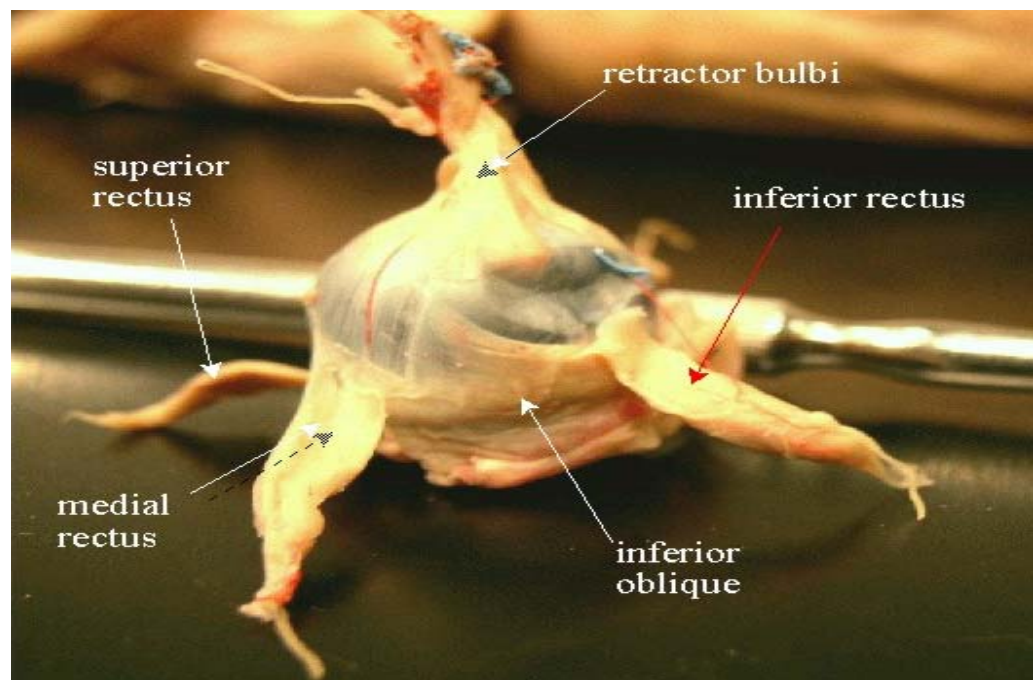
NERVE

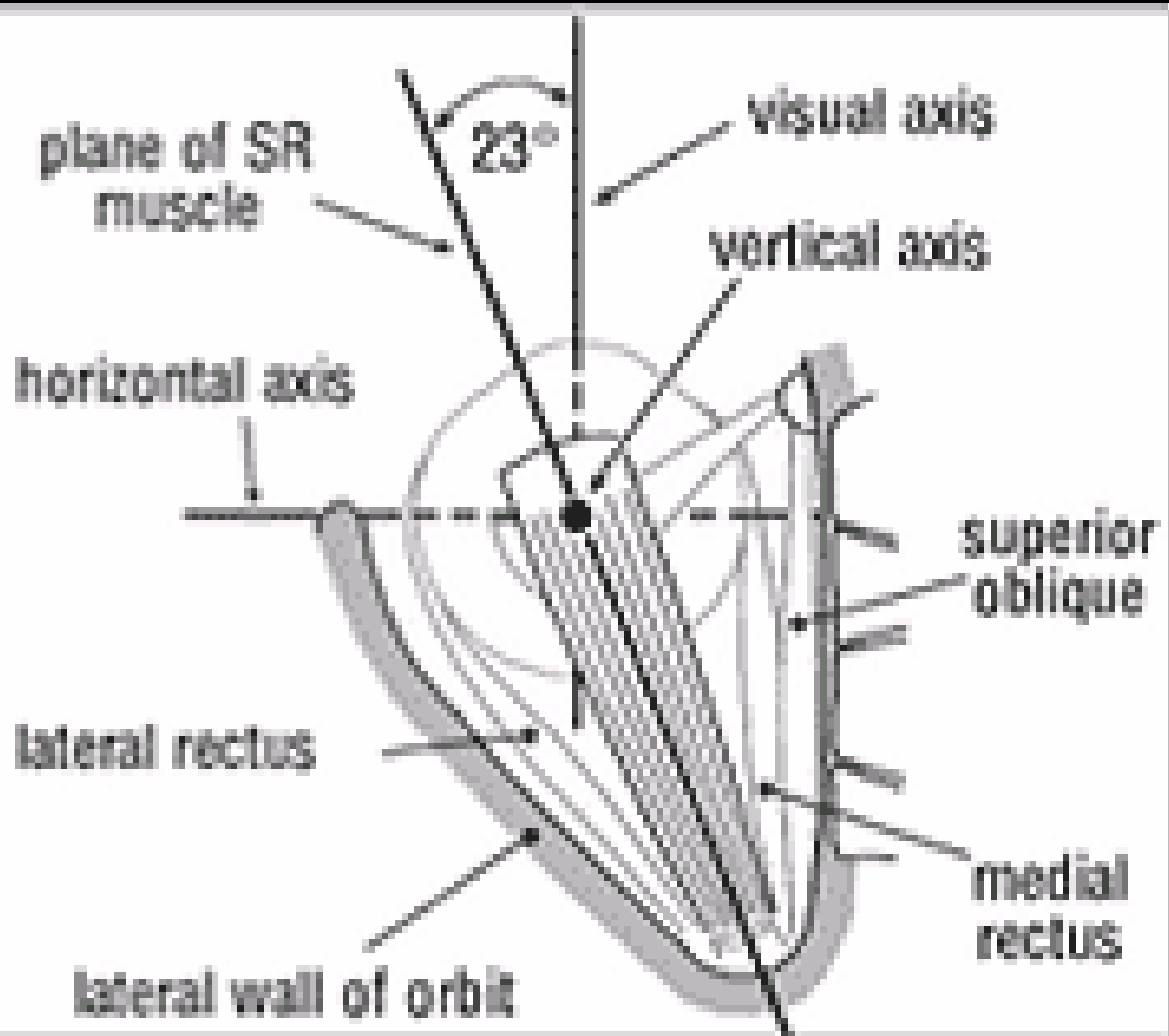
Cervical branch of facial nerve (VII)

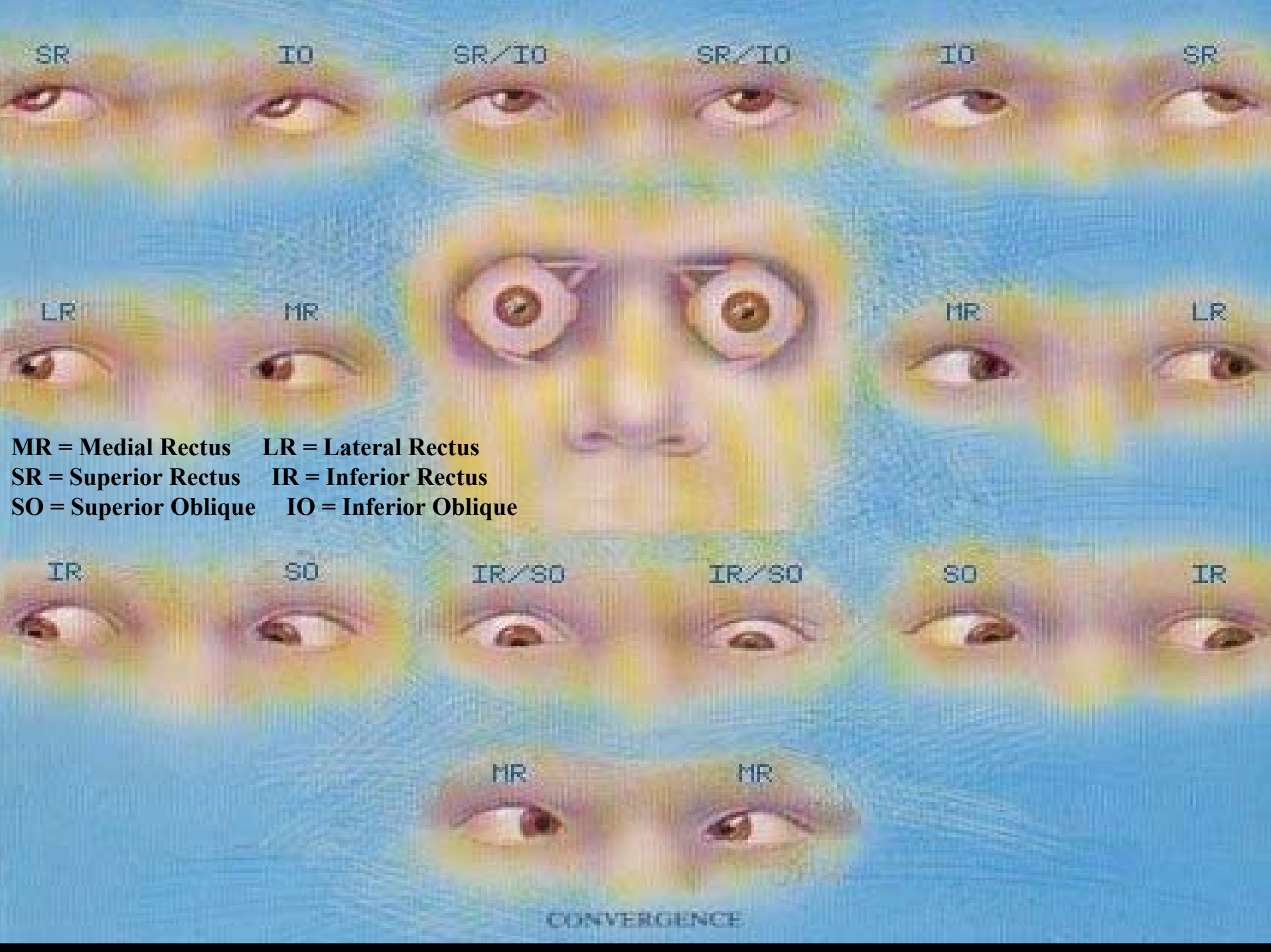




Muscle	Primary Function
Medial rectus	moves eye towards nose
Lateral rectus	moves eye away from nose
Superior rectus	raises eye
Inferior rectus	lowers eye
Superior oblique	rotates eye
Inferior oblique	rotates eye







SR

IO

SR/IO

SR/IO

IO

SR

LR

MR

MR

LR

MR = Medial Rectus LR = Lateral Rectus
SR = Superior Rectus IR = Inferior Rectus
SO = Superior Oblique IO = Inferior Oblique

IR

SO

IR/SO

IR/SO

SO

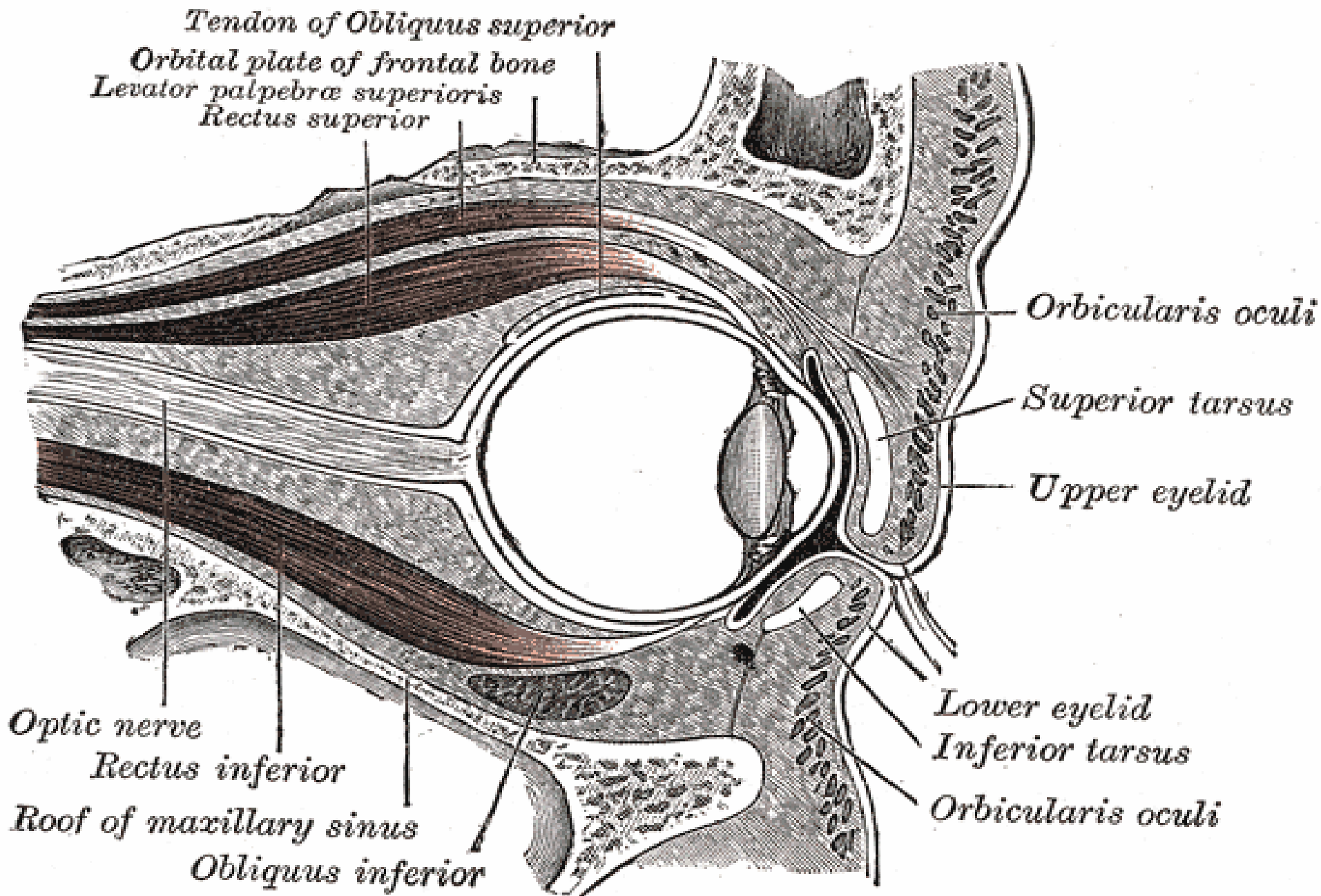
IR

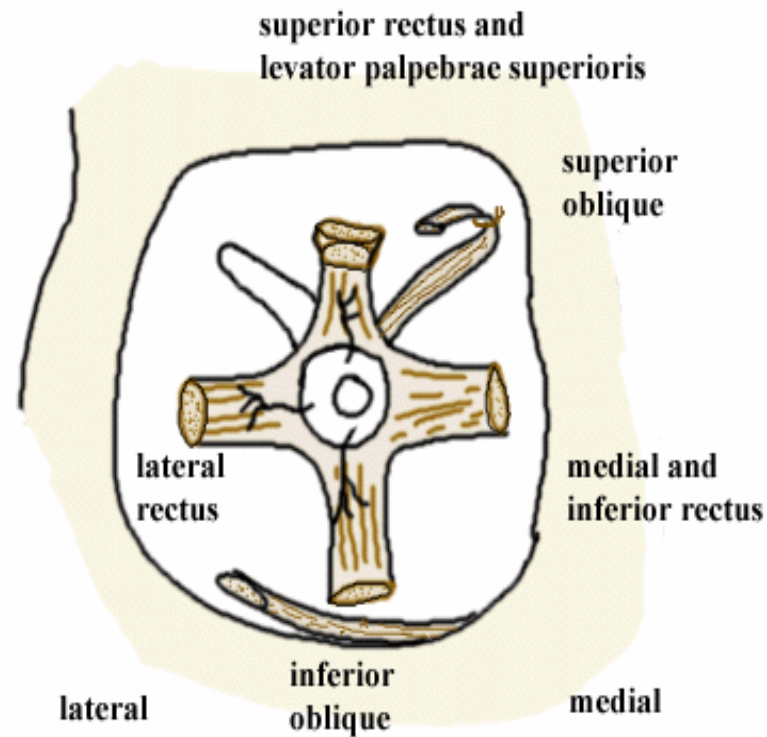
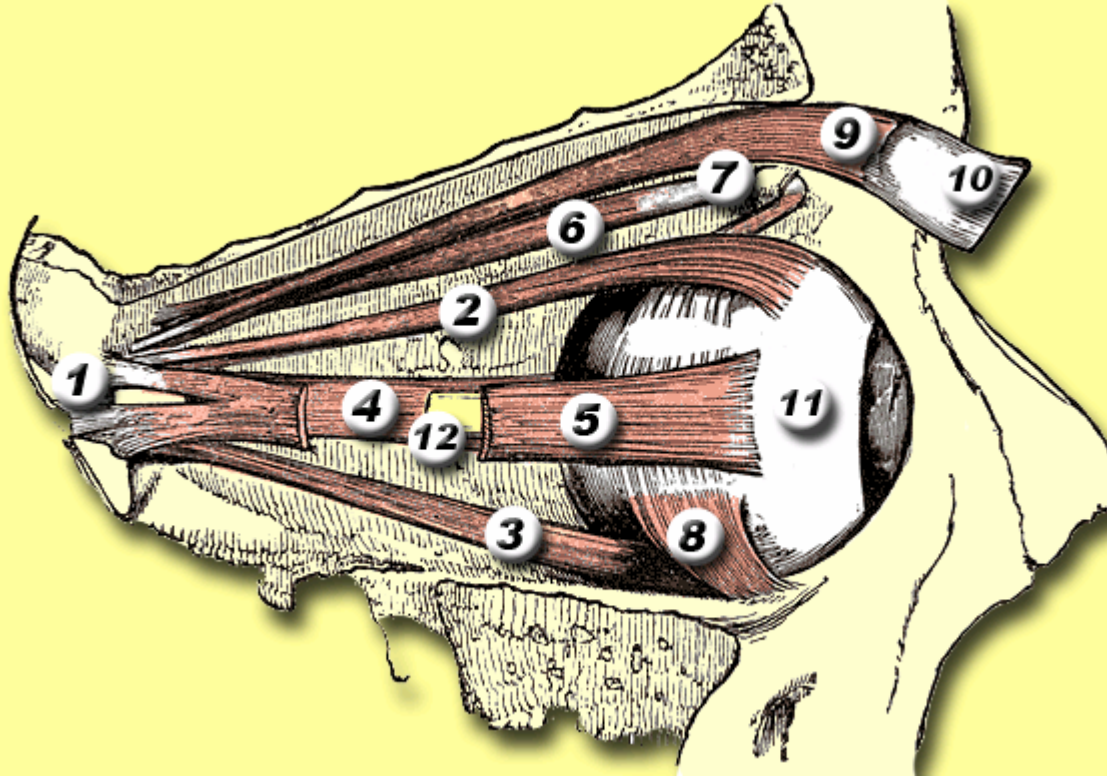
MR

MR

CONVERGENCE

Obliquus inferior.





Rectus muscles:

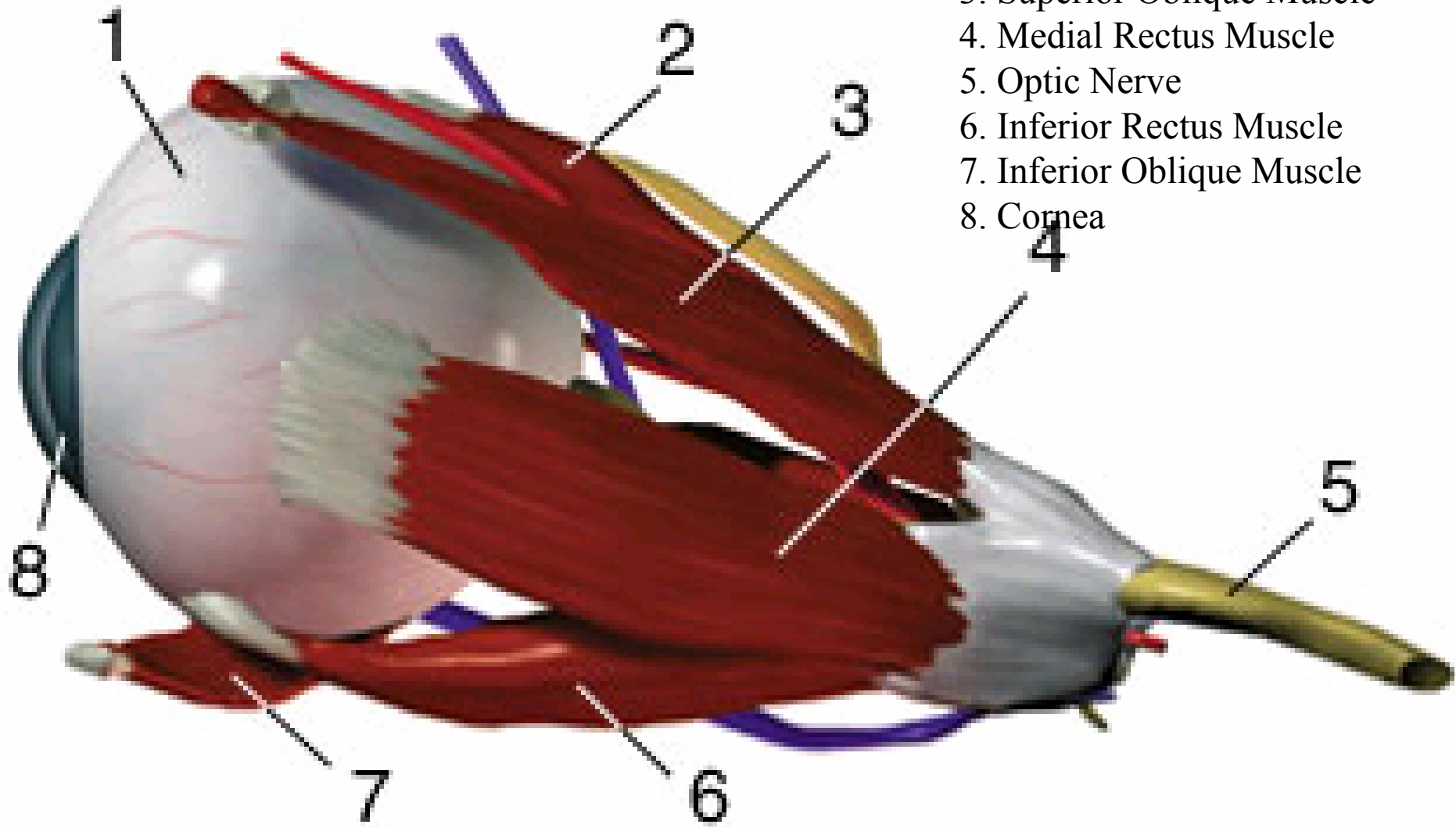
2 = superior, 3 = inferior, 4 = medial, 5 = lateral

Oblique muscles: 6 = superior, 8 = inferior

Other muscle: 9 = levator palpebrae superioris

Other structures: 1 = Annulus of Zinn, 7 = Trochlea, 10 = Superior tarsus, 11 = Sclera, 12 = Optic nerve

1. Eyeball
2. Superior Rectus Muscle
3. Superior Oblique Muscle
4. Medial Rectus Muscle
5. Optic Nerve
6. Inferior Rectus Muscle
7. Inferior Oblique Muscle
8. Cornea



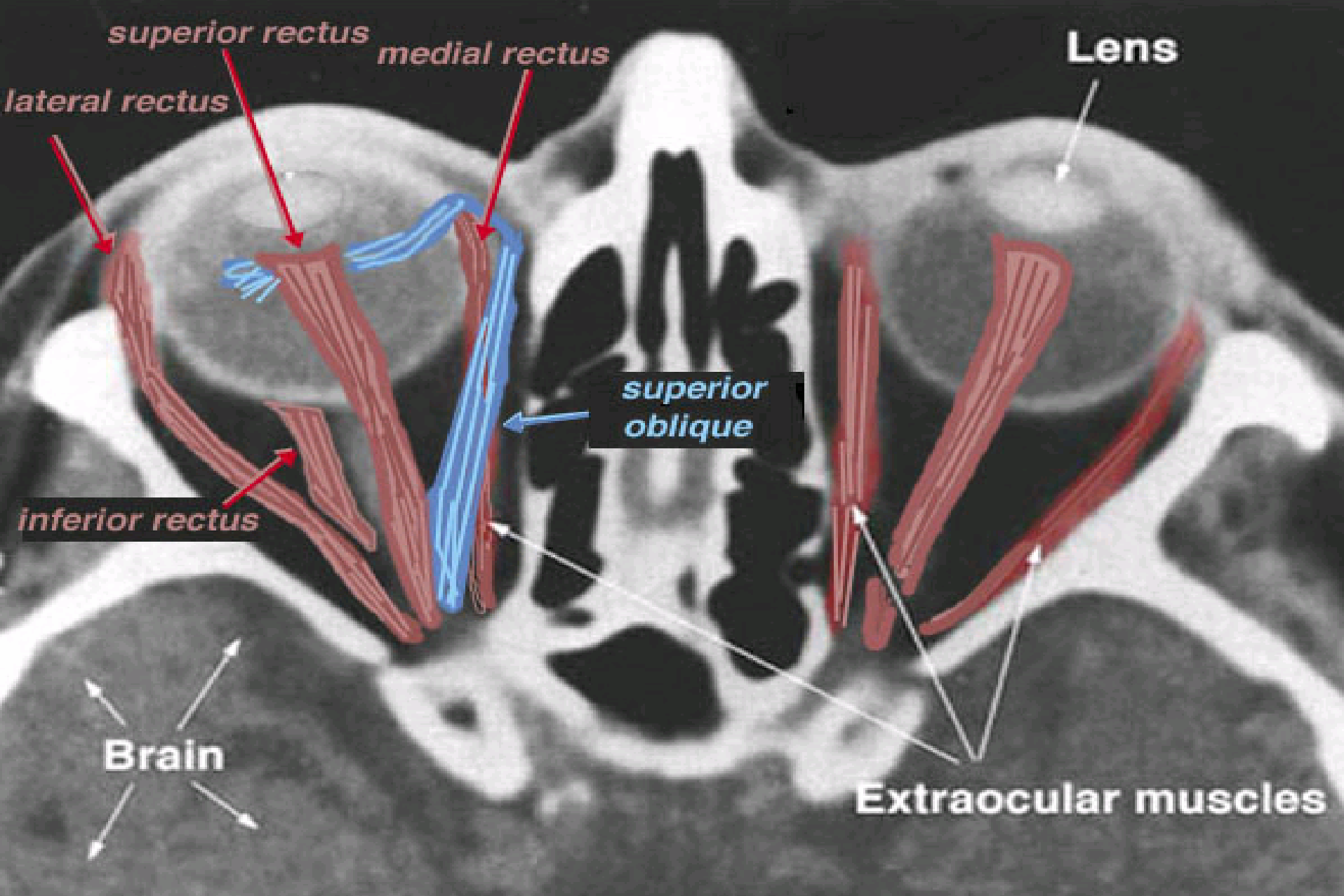


Fig. 3. CT Horizontal transverse scan at the plane of the brain, orbits and nose of the human head.

Each extraocular muscle is innervated by a specific cranial nerve (C.N.):

- **medial rectus (MR)—cranial nerve III (Oculomotor)**
- **lateral rectus (LR)—cranial nerve VI (Abducens)**
- **superior rectus (SR)—cranial nerve III (Oculomotor)**
- **inferior rectus (IR)—cranial nerve III (Oculomotor)**
- **superior oblique (SO)—cranial nerve IV (Trochlear)**
- **inferior oblique (IO)—cranial nerve III (Oculomotor)**

The following can be used to remember the cranial nerve innervations of the six extraocular muscles:

$LR_6(SO_4)_3$.

That is, the lateral rectus (LR) is innervated by C.N. 6, the superior oblique (SO) is innervated by C.N. 4, and the four remaining muscles (MR, SR, IR, and IO) are innervated by C.N. 3.

Muscles of the neck

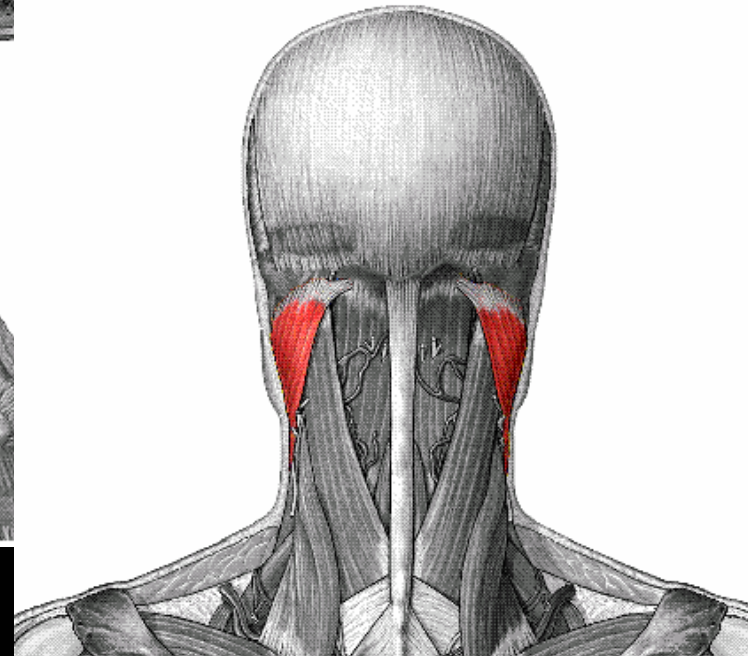
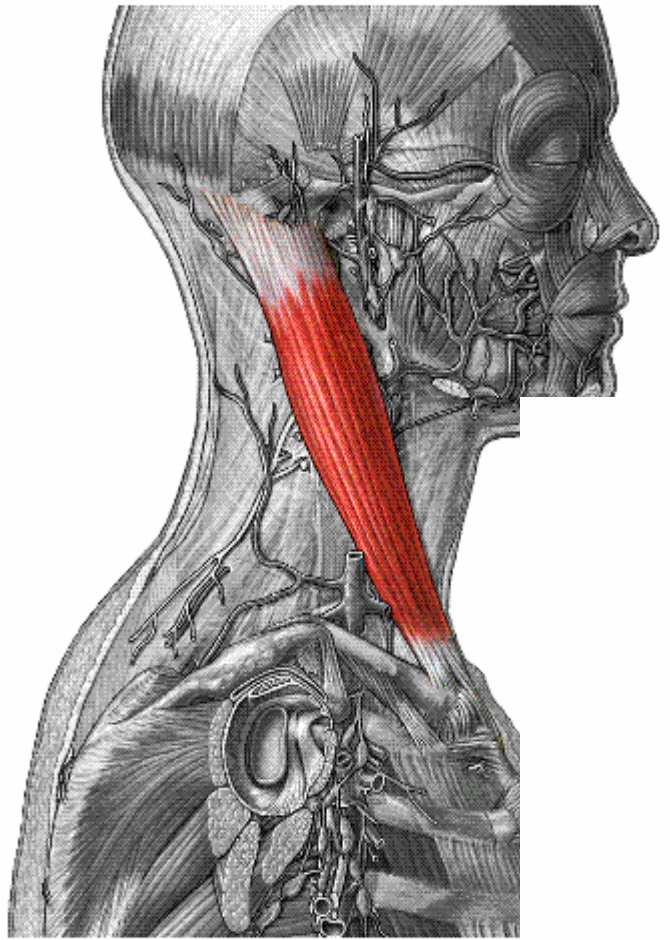
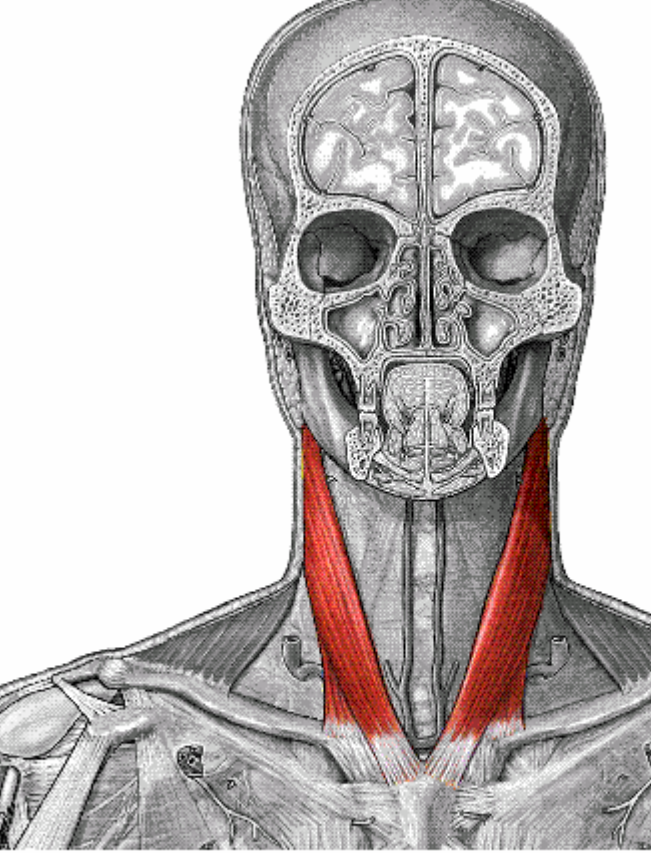
Muscles of the neck typically have actions associated with movement of the head and swallowing.

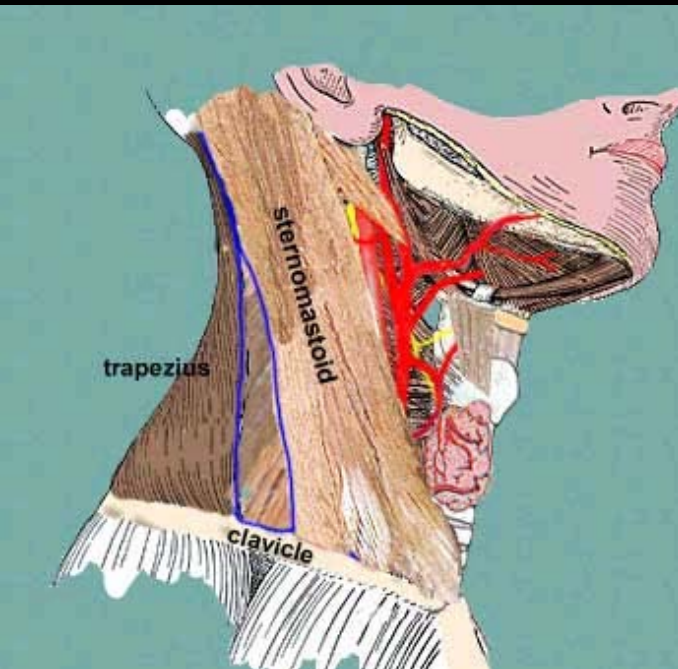
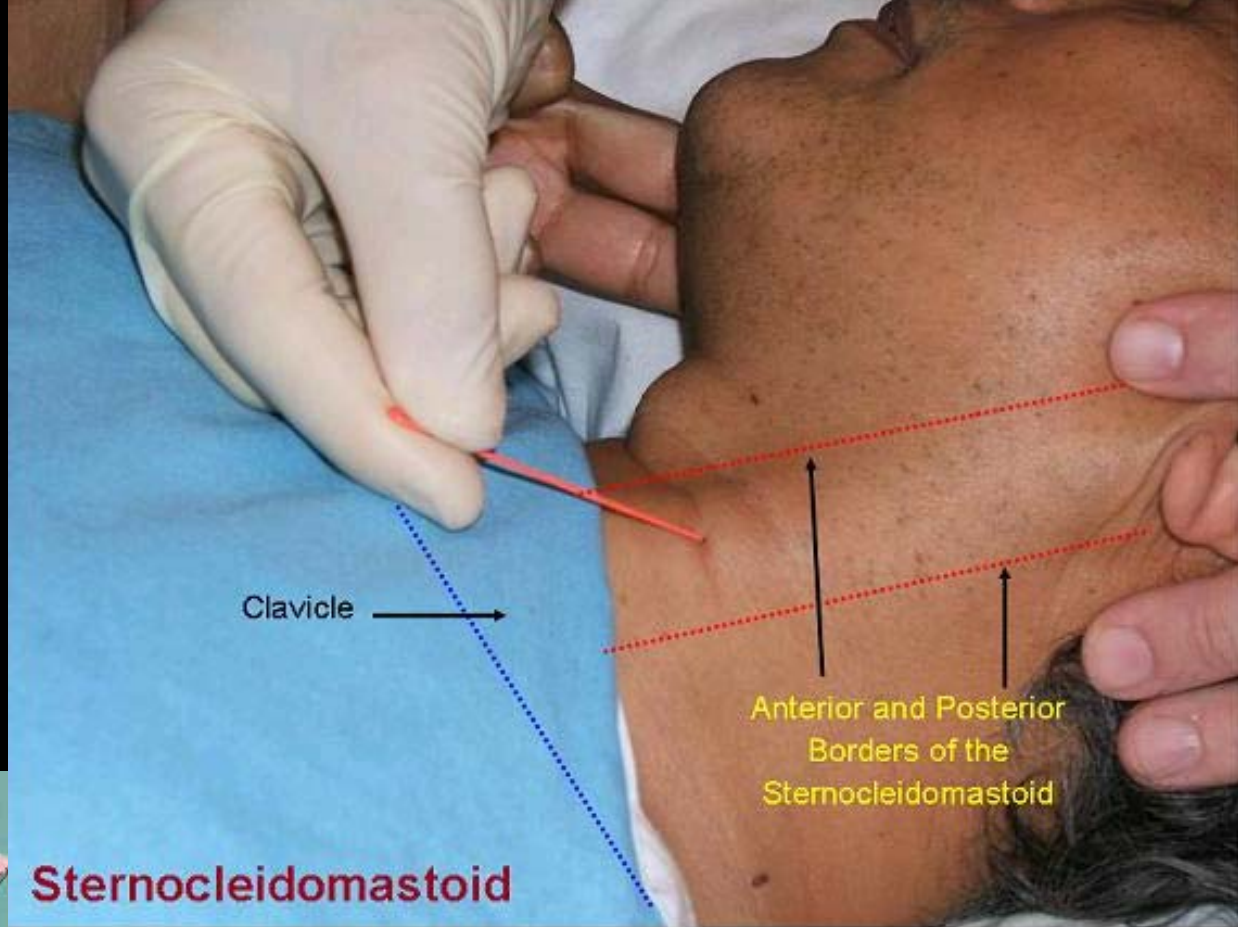
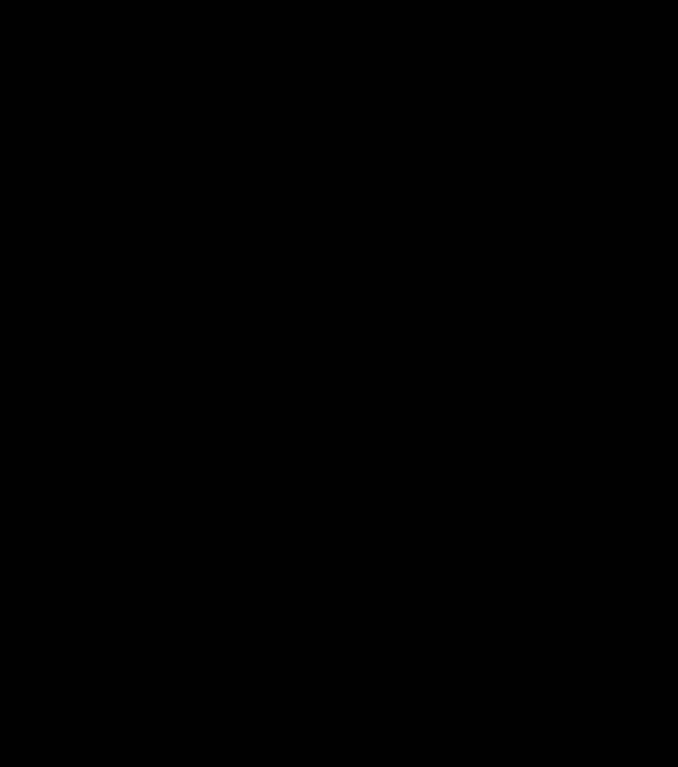
- **Sternocleidomastoid***. This muscle can have two primary actions, depending on whether both muscles contract or just one. If both contract, the head flexes; if one contracts, the head rotates. This muscle originates on the manubrium and the clavicle. It inserts on the mastoid process.
- **Splenius capitis**. This muscle can have two primary actions, depending on whether both muscles contract or just one. If both contract, the head extends; if one contracts, the head rotates. When both splenius capitis muscles contract together, they act as antagonists of the sternocleidomastoids. However, one of the splenius capitis muscles can work as synergist with one of the sternocleidomastoids to rotate the head.

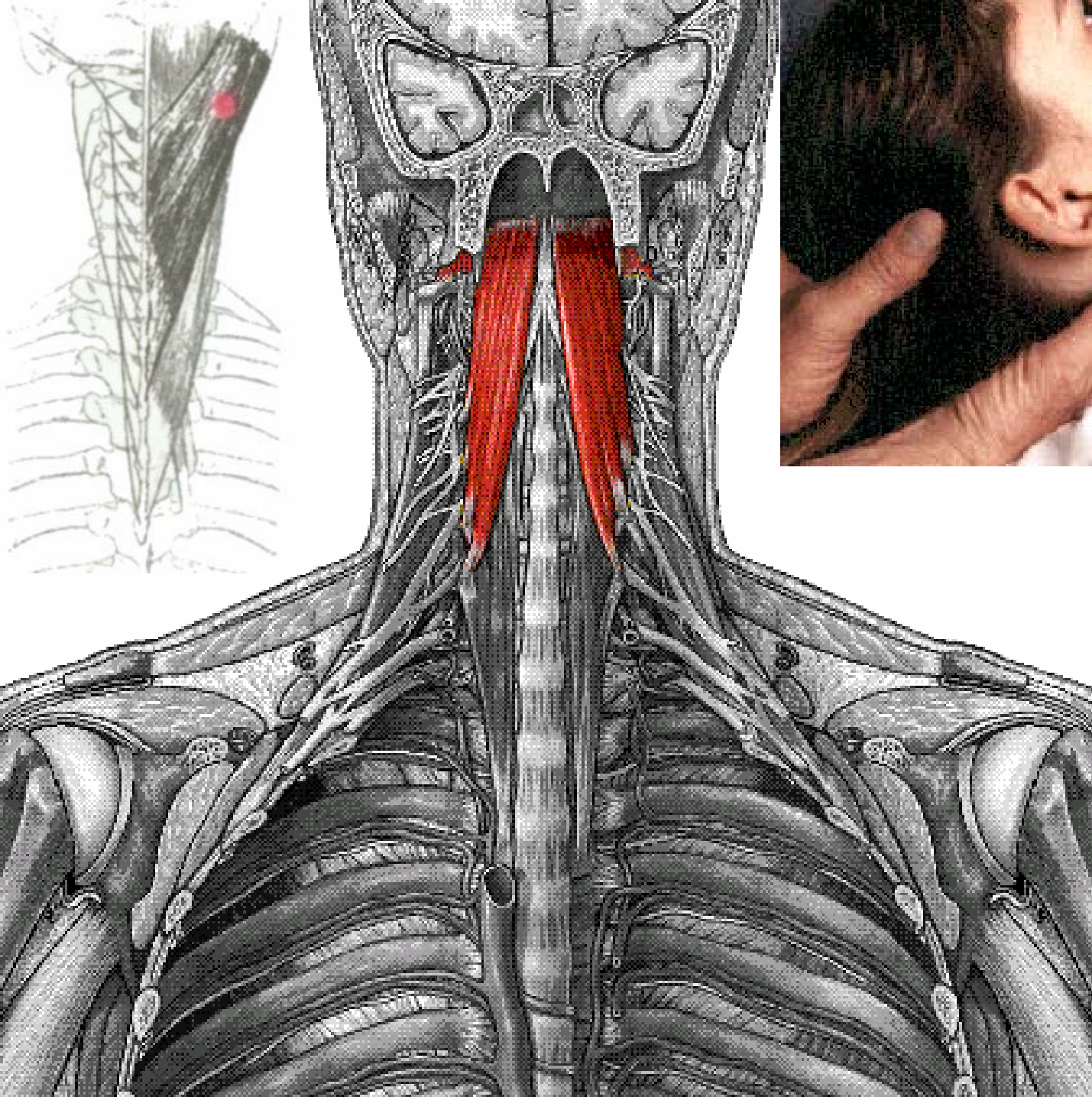
This muscle originates at some of the spinous processes in your thoracic vertebrae (the thoracic vertebrae are the ones where your ribs connect), and it inserts at the transverse processes of the first three vertebrae in your neck. You have a left and a right splenius cervicis, when both shorten it causes your head to go back so that you are looking up (neck extension). When the left or right splenius cervicis shortens individually, it causes lateral flexion (ear to shoulder). In addition, when the left or right shorten individually, they assist other muscles in rotation of your head.

This muscle is easily felt, as it is part of the fleshy area on the back of your neck. When you reach around and rub your neck, this muscle is often the one you find.

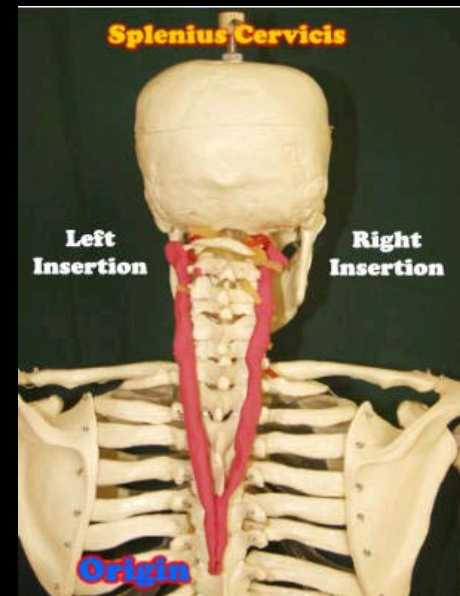
Sternocleidomastoid*.





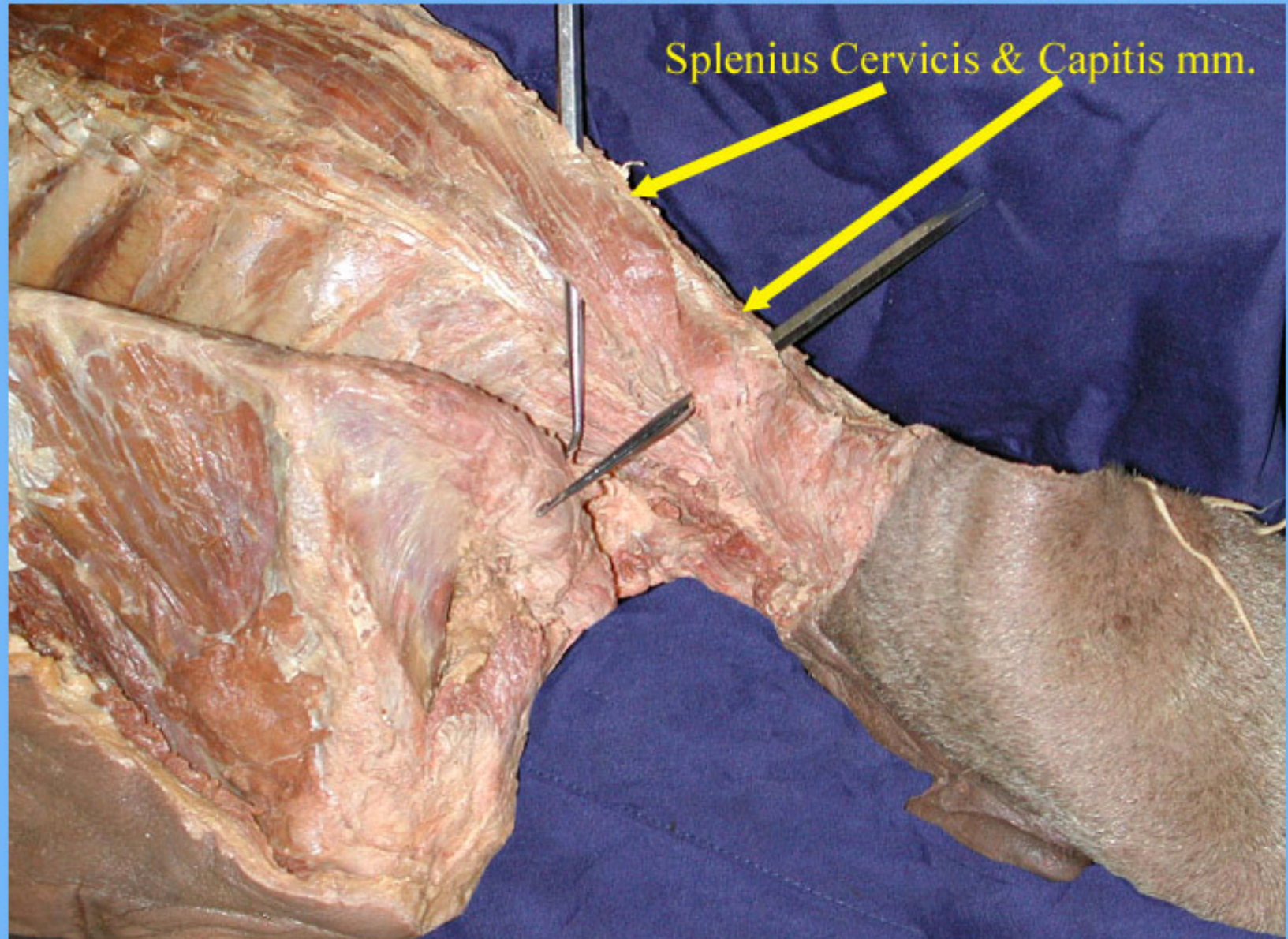


Splenius capitis



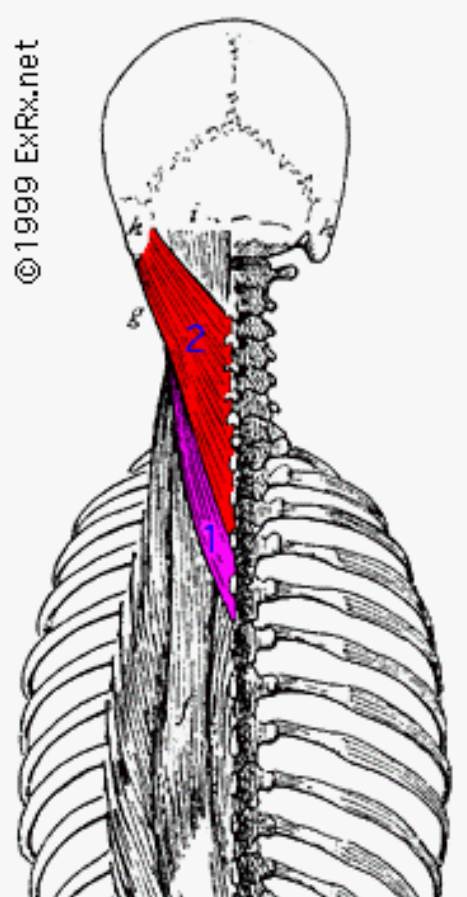
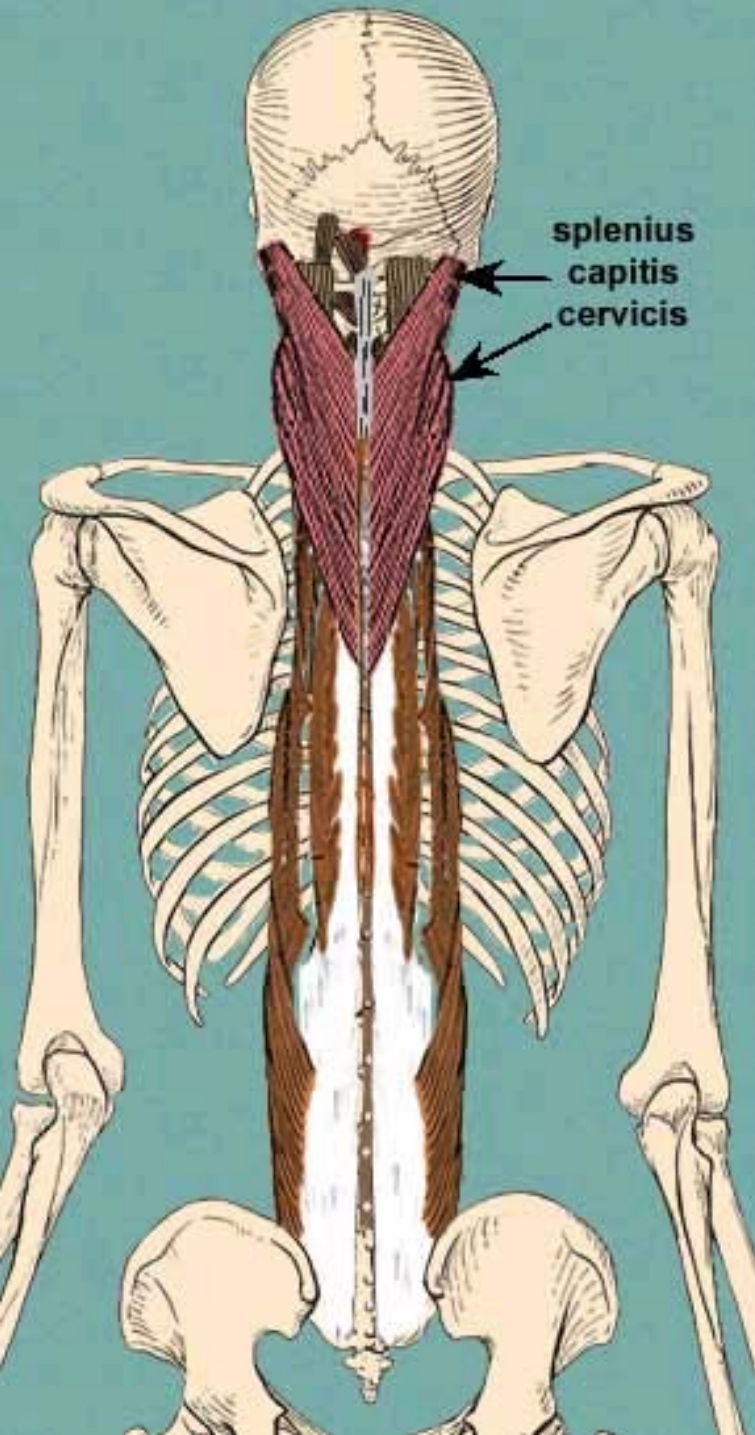
INFERIOR

MEDIAL



**L
A
T
E
R
A
L**

**S
U
P
E
R
I
O
R**



- 1.Cervicis Splenius
- 2.Capitis Splenius



Both of these muscles work to extend and assist with rotation of the head.

Muscles of the torso

Posterior

Torso

Muscles
trapezius

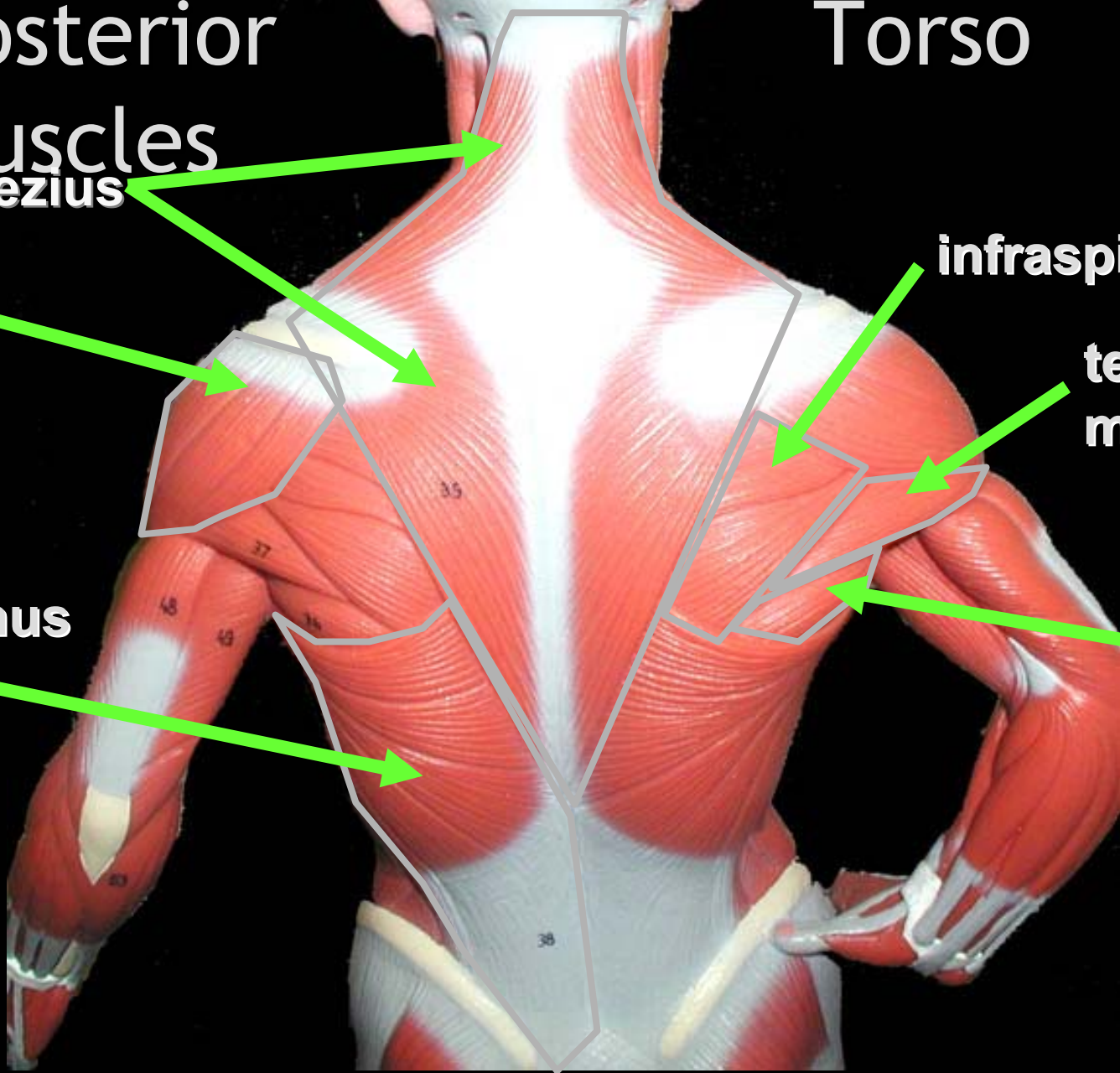
deltoid

latissimus
dorsi

infraspinatus

teres
minor

teres
major



- **Erector spinae**. The primary action of these muscles is to extend the vertebral column.

Unilaterally they produce lateral flexion and rotation to the opposite side. Bilateral they help to extend the spine. They may also be used as accessory muscles for respiration.

- **Diaphragm**. The primary action of this muscle is inhalation. the **diaphragm** is a shelf of muscle extending across the bottom of the ribcage. The diaphragm separates the thoracic cavity (with lung and heart) from the abdominal cavity (with liver, stomach, intestines, etc.). In its relaxed state, the diaphragm is shaped like a dome. It is controlled by the phrenic nerve.

In order to avoid confusion with other types of diaphragm, it is sometimes referred to as the **thoracic diaphragm**

- **External intercostals**. These muscles elevate the rib cage to aid inhalation.
- **Internal intercostals**. These muscles depress the rib cage to aid exhalation.
- .

Intercostal muscles are several groups of muscles that run between the ribs, and help form and move the chest wall.

There are three principle layers;

- the external intercostal muscles, which aid in quiet and forced inhalation.
- the internal intercostal muscles, which aid in forced expiration (quiet expiration is a passive process).
- the innermost intercostal muscle

Their fibers run in opposite directions.

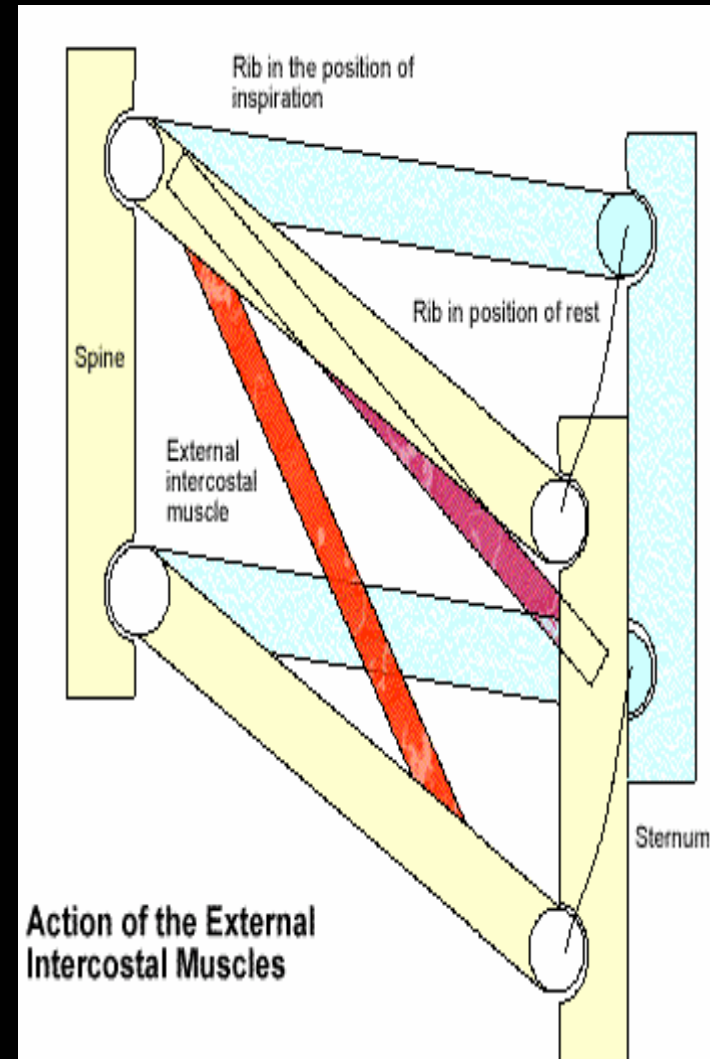
The external intercostal muscles originate on ribs 1-11 and have their insertion on ribs 2-12. The external intercostals are responsible for the elevation of the ribs, and expanding the transverse dimensions of the thoracic cavity.

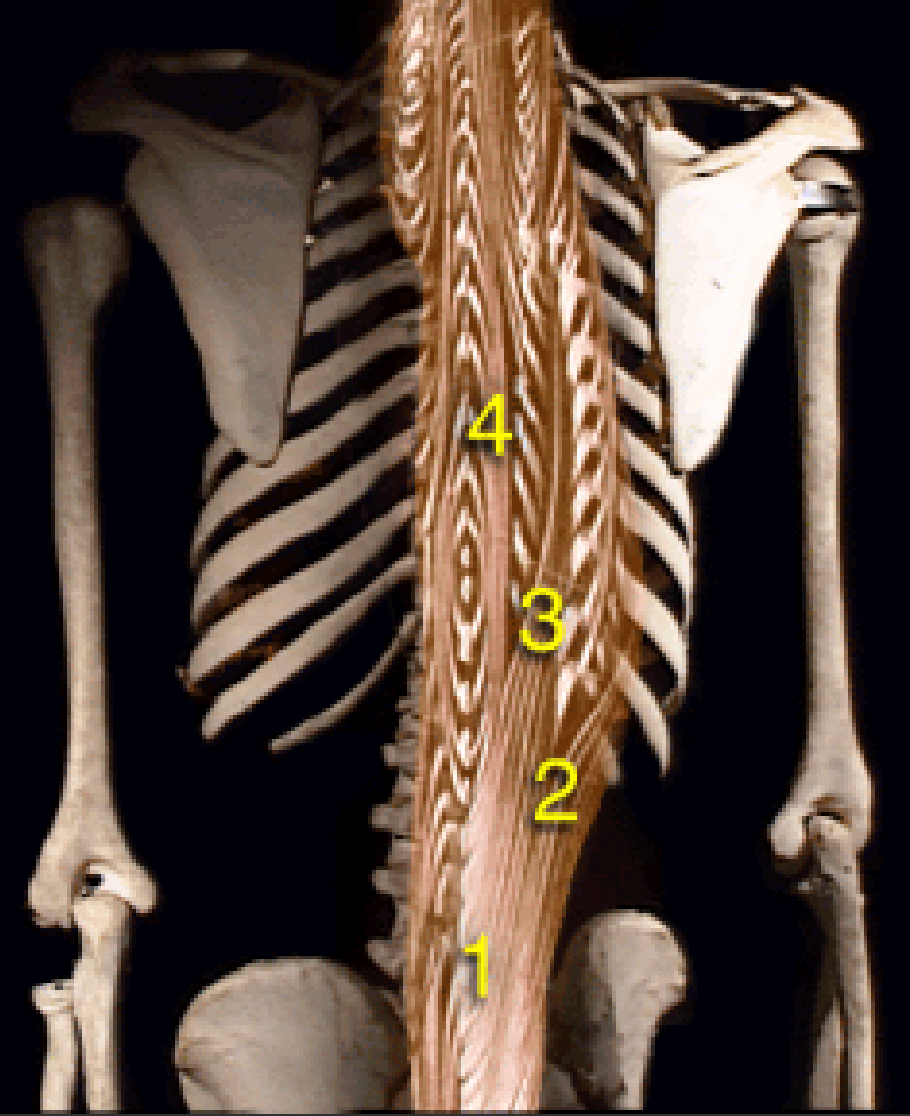
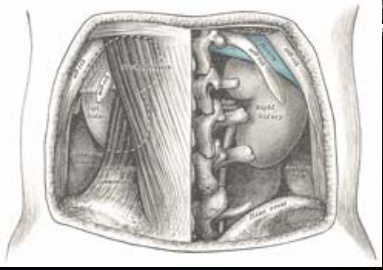
The internal intercostal muscles originate on ribs 1-11 and have their insertions on ribs 2-12. The internal intercostals are responsible for the depression of the ribs decreasing the transverse dimensions of the thoracic cavity.

Both these muscles are innervated by the intercostal nerves (=ventral rami of thoracic spinal nerves), and are provided by the intercostal arteries and veins.

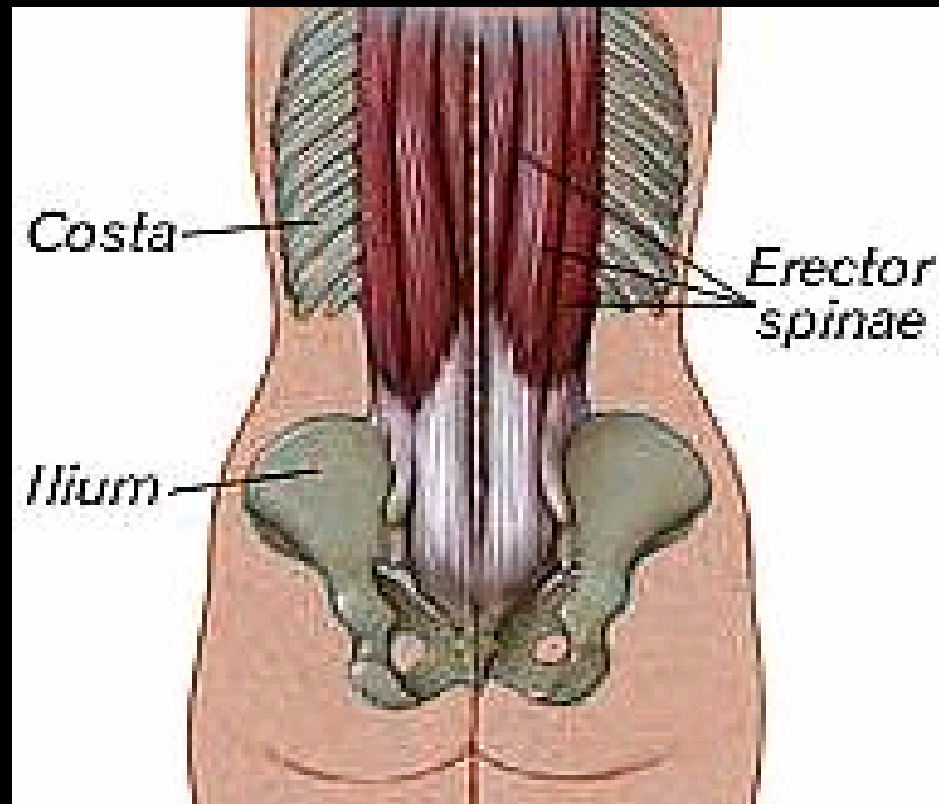
Besides the scaleni, who also move the chest wall and have a function in inhalation, other intercostal muscles are:

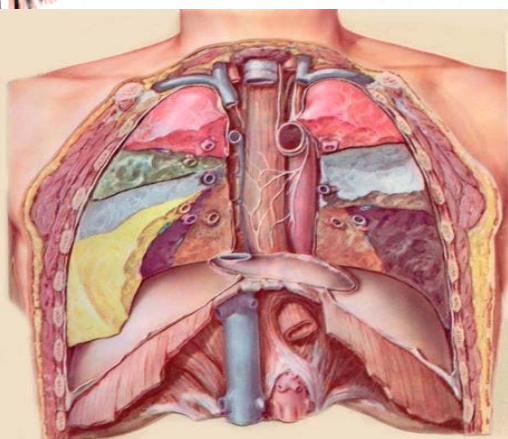
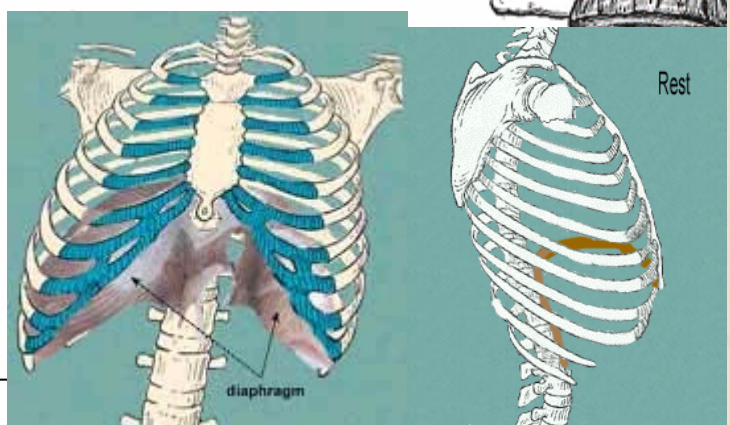
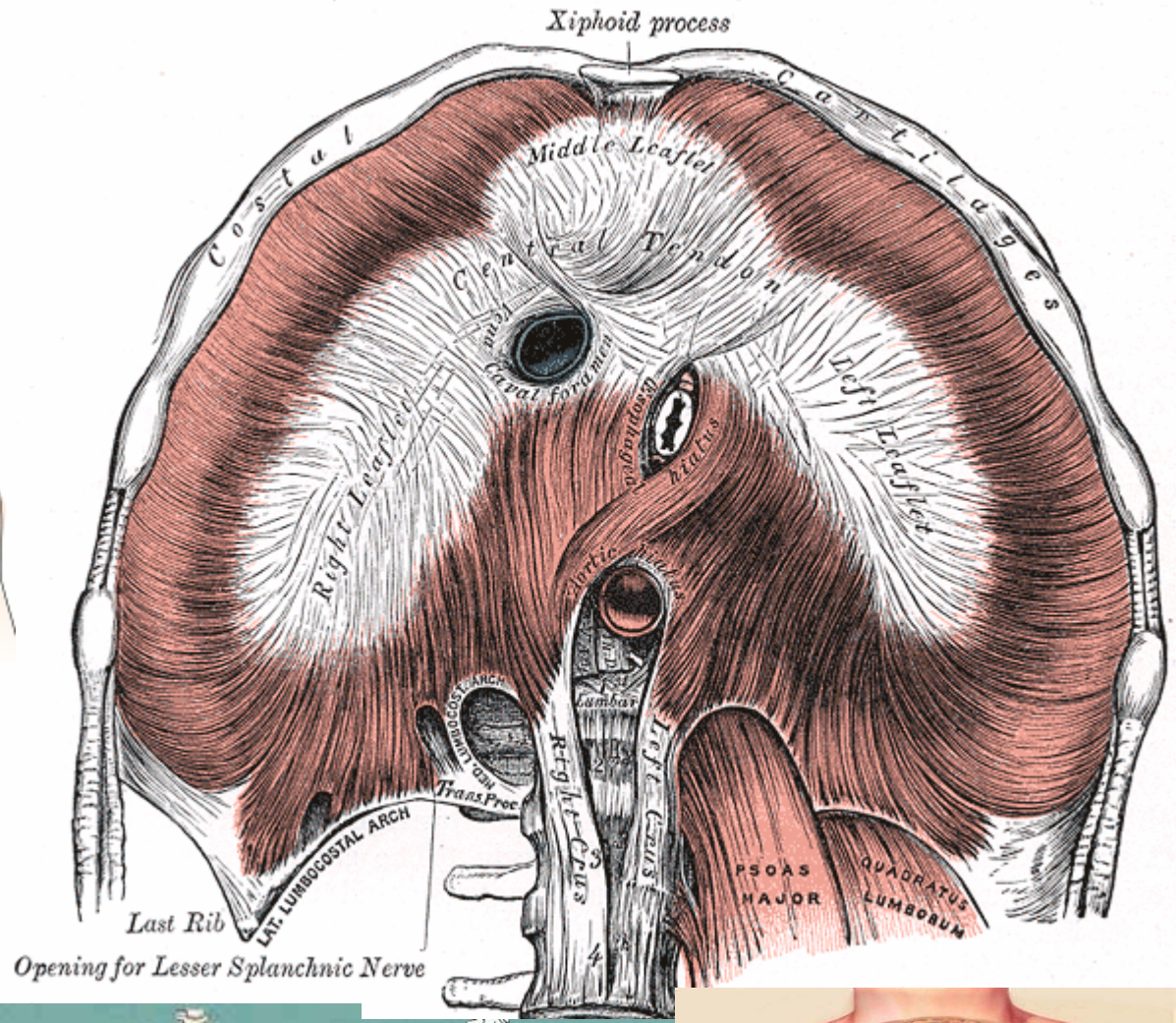
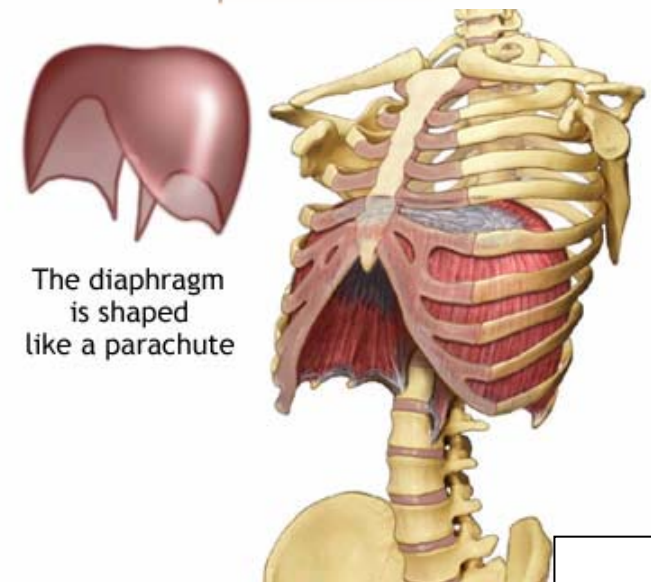
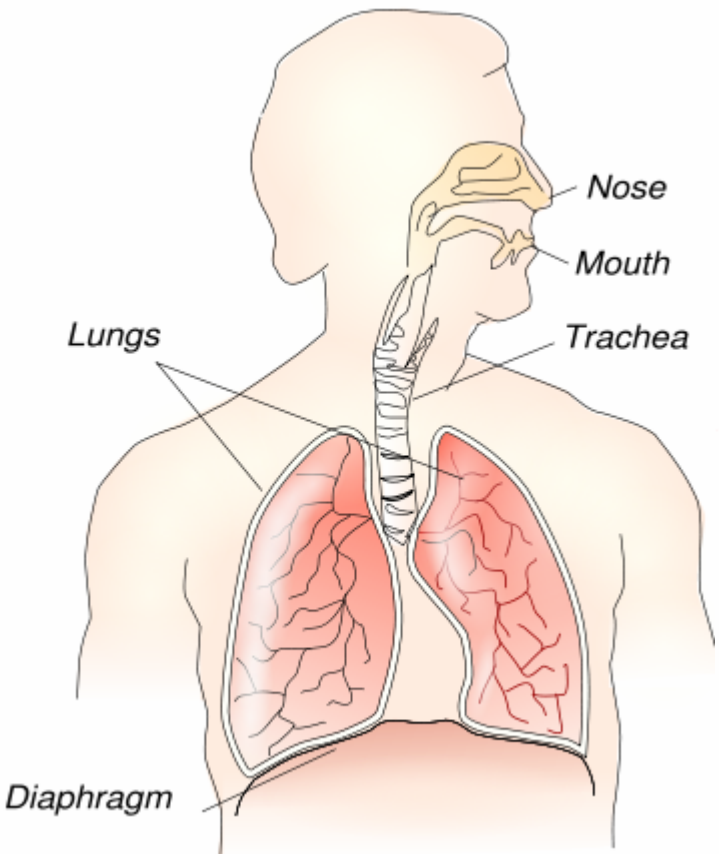
- Subcostal muscles
- Transversus thoracis muscle





1. **Erector spinae**
2. **Iliocostalis lumborum**
3. **Longissimus thoracis**
4. **Spinalis thoracis**





pectoralis minor

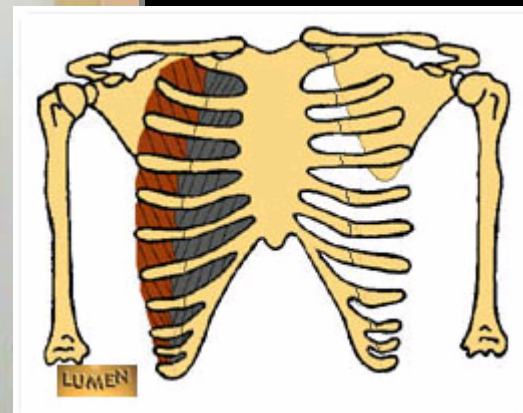
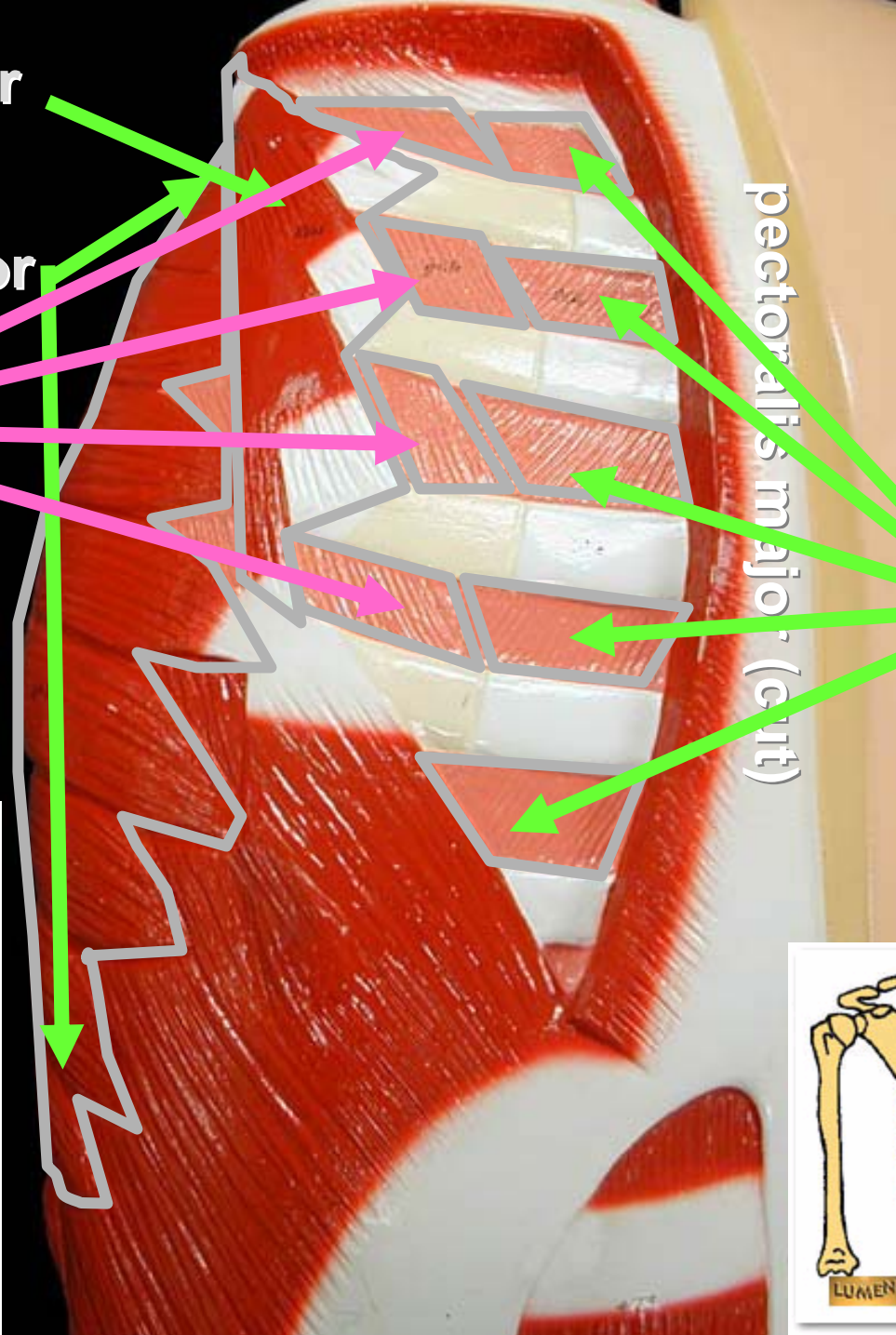
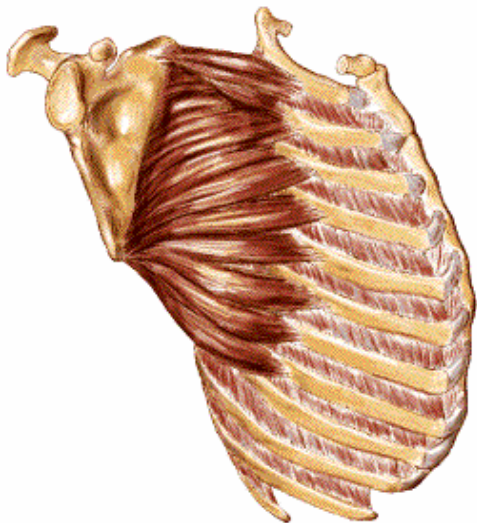
serratus anterior

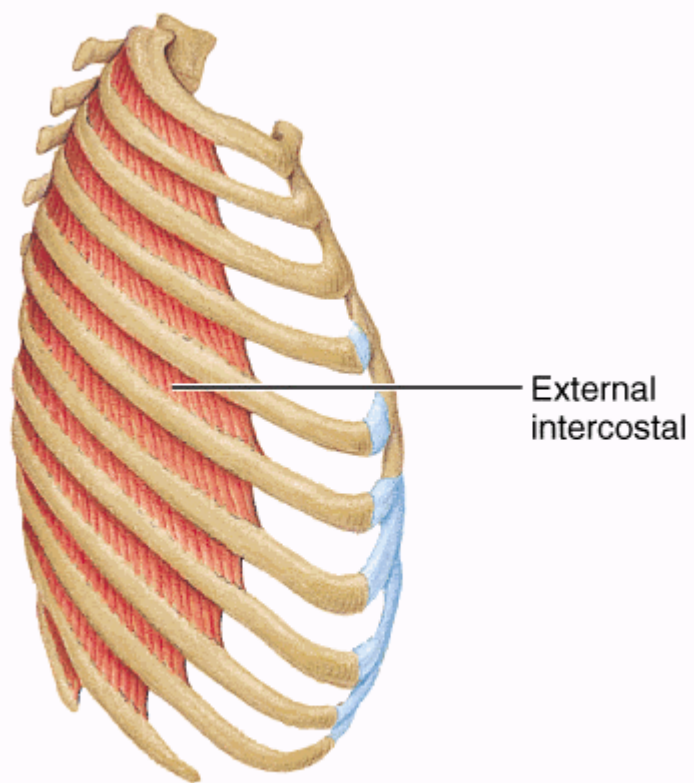
**external
intercostals**

pectoralis major (cut)

**Anterior
Upper
Torso
Muscles**

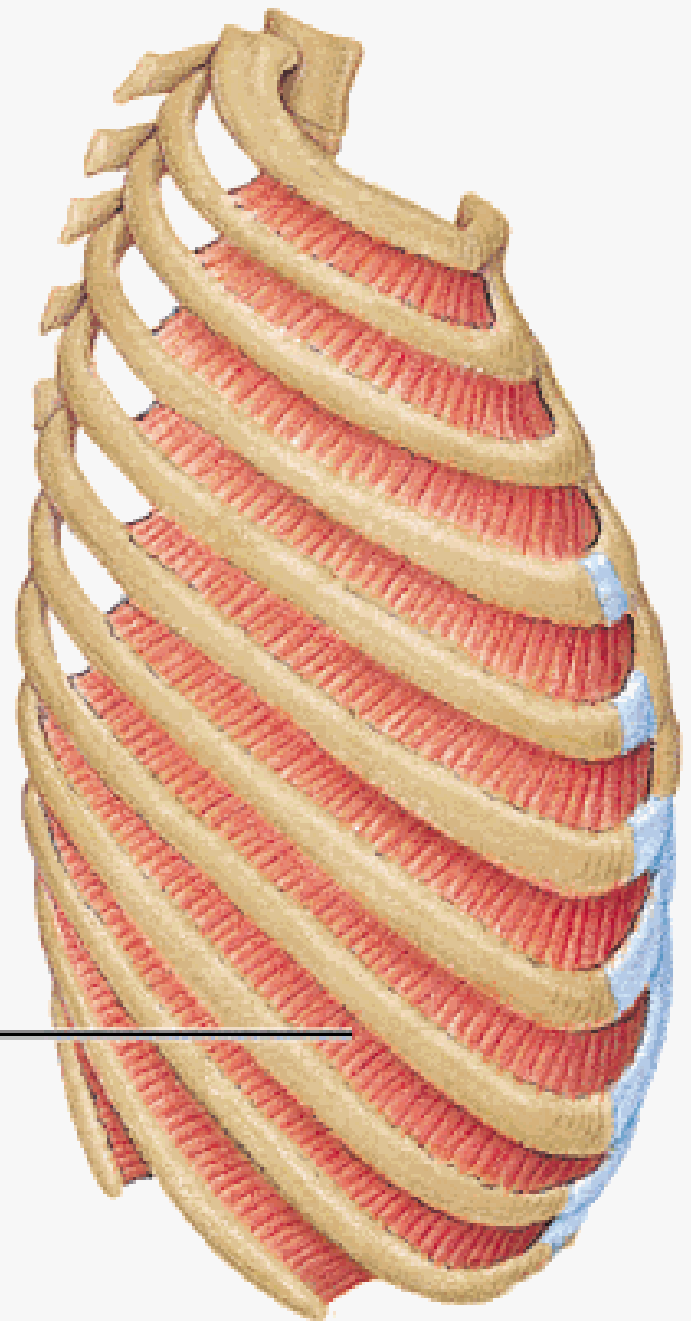
**internal
intercostals**

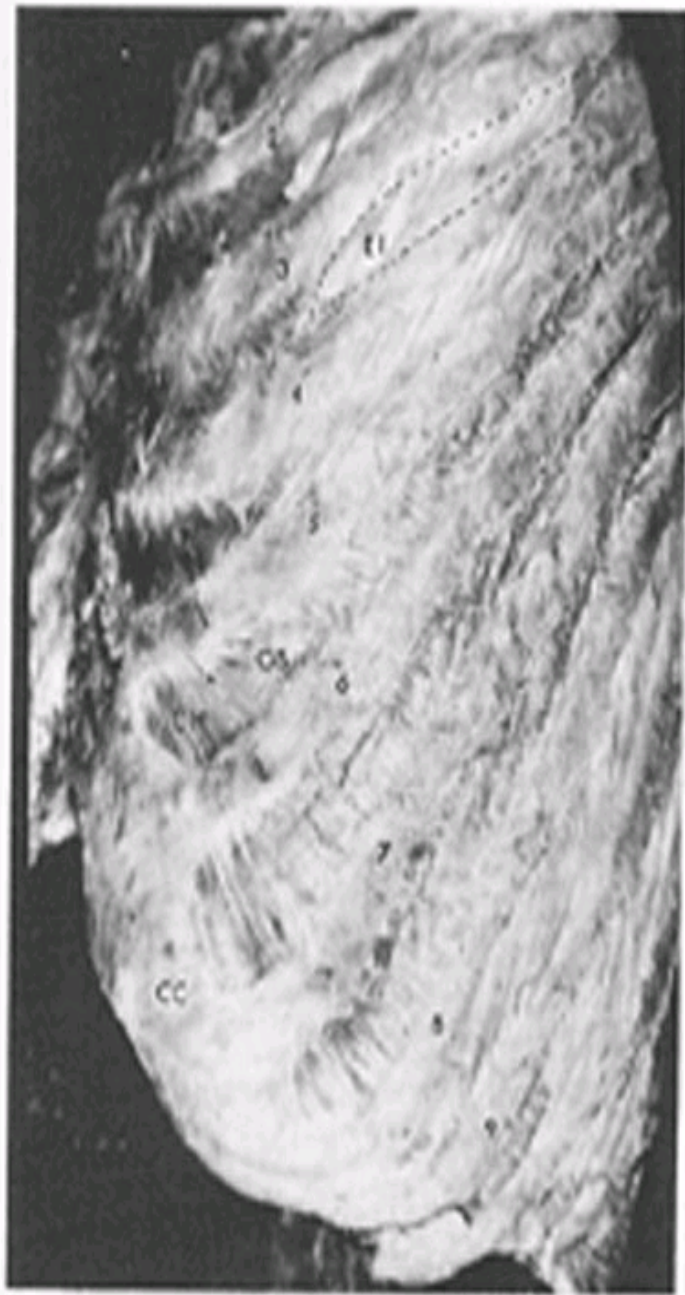




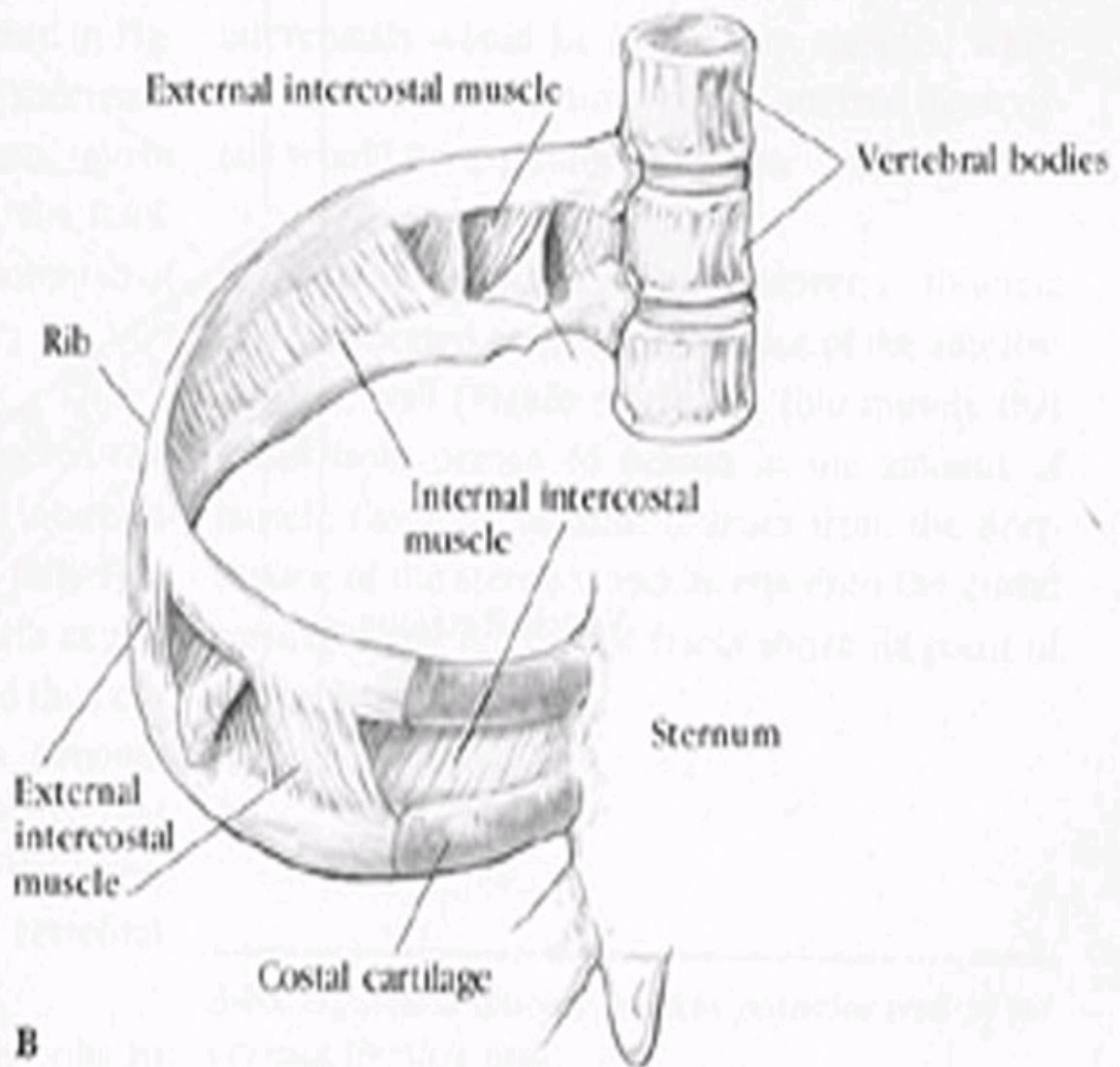
(a)
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Internal intercostal



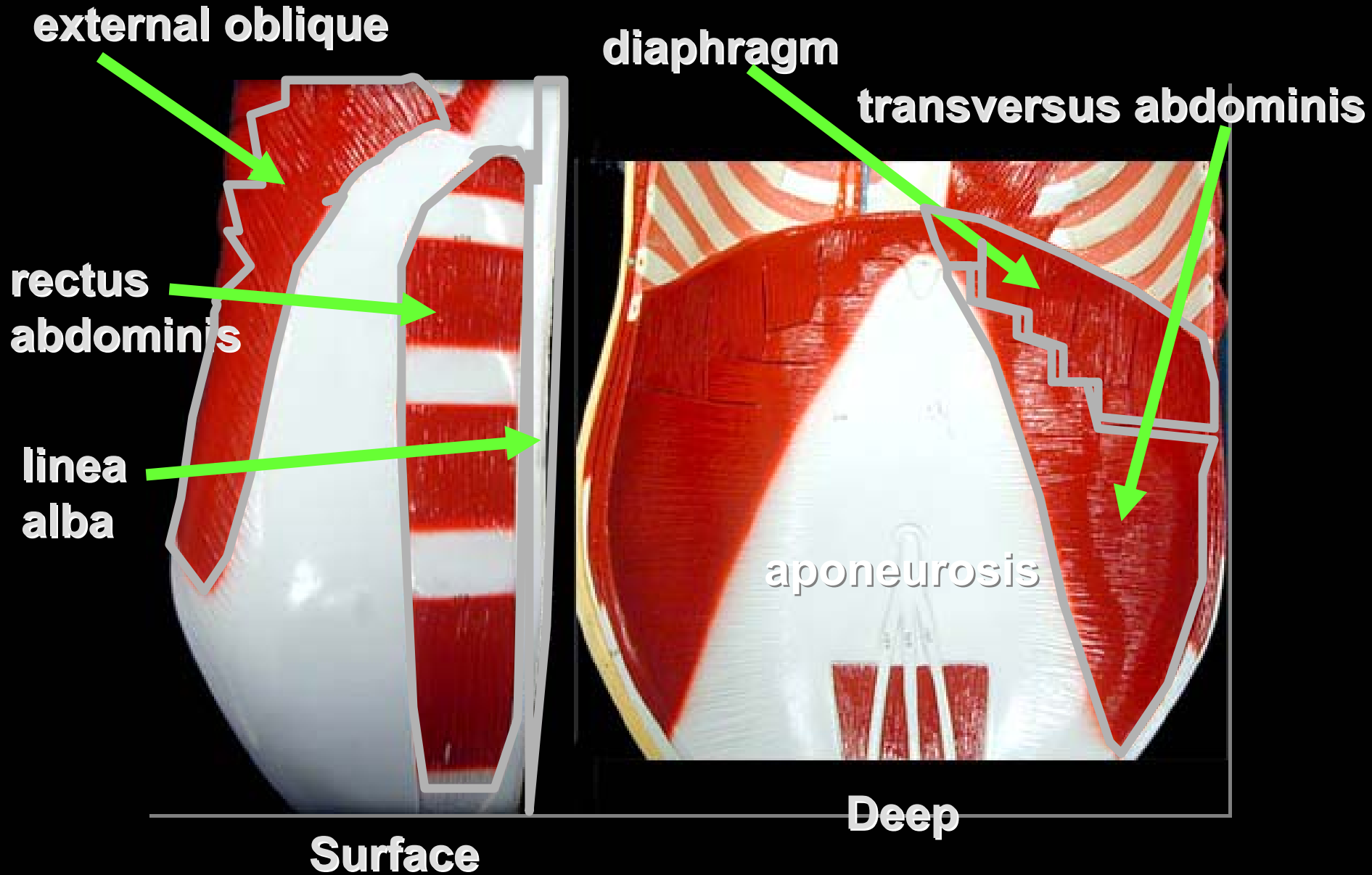


A



B

Abdominal Muscles

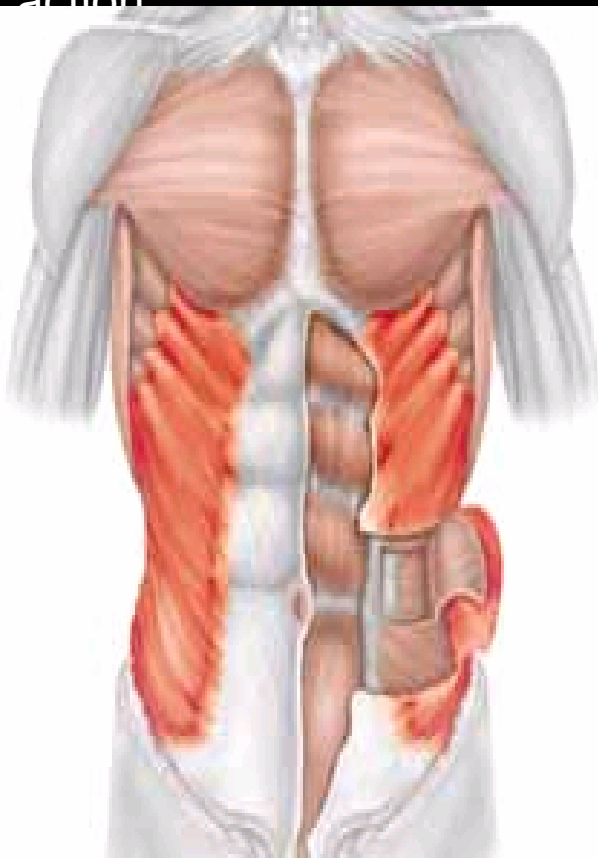


•**External oblique.** When both sides contract, the vertebral column flexes. When one side contracts, the trunk rotates.

The Obliques and the Transversus Abdominis (not listed) increase the intra-abdominal pressure necessary for the support of the vertebral column in some exercises.

•**Internal oblique.** When both sides contract, the vertebral column flexes. When one side contracts, the trunk rotates.

•**Transversus abdominis.** The primary action is to compress the abdomen. This action



EXTERNAL OBLIQUE

ORIGIN:

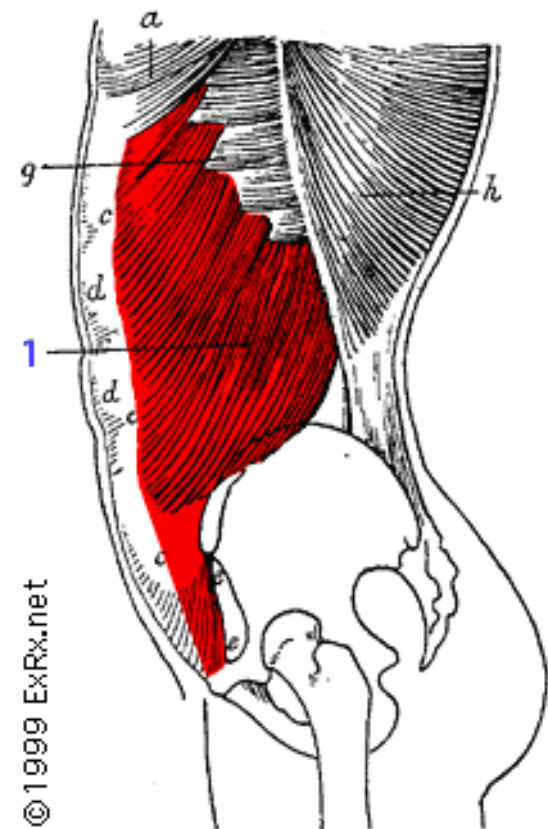
ribs 5-12

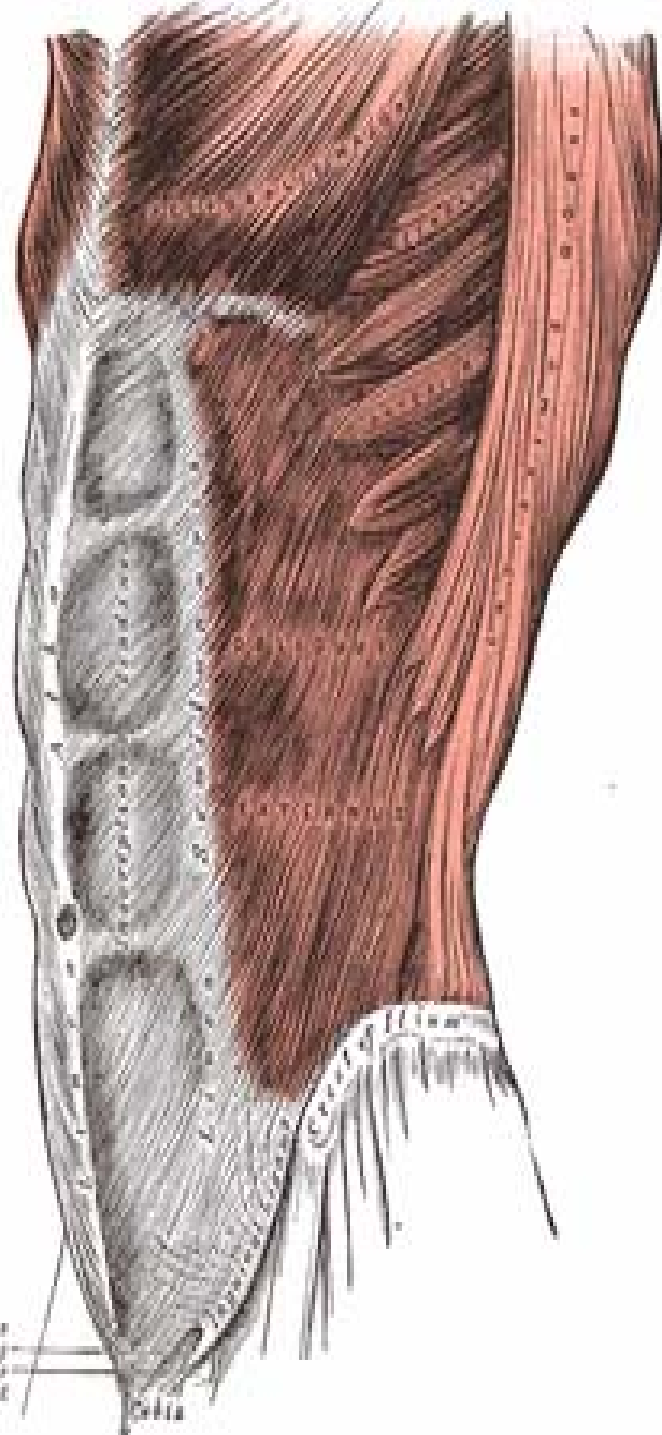
INSERTION:

xiphoid process and linea alba

ACTION:

flexes waist as in sit-ups and
flexes and rotates vertebral
column



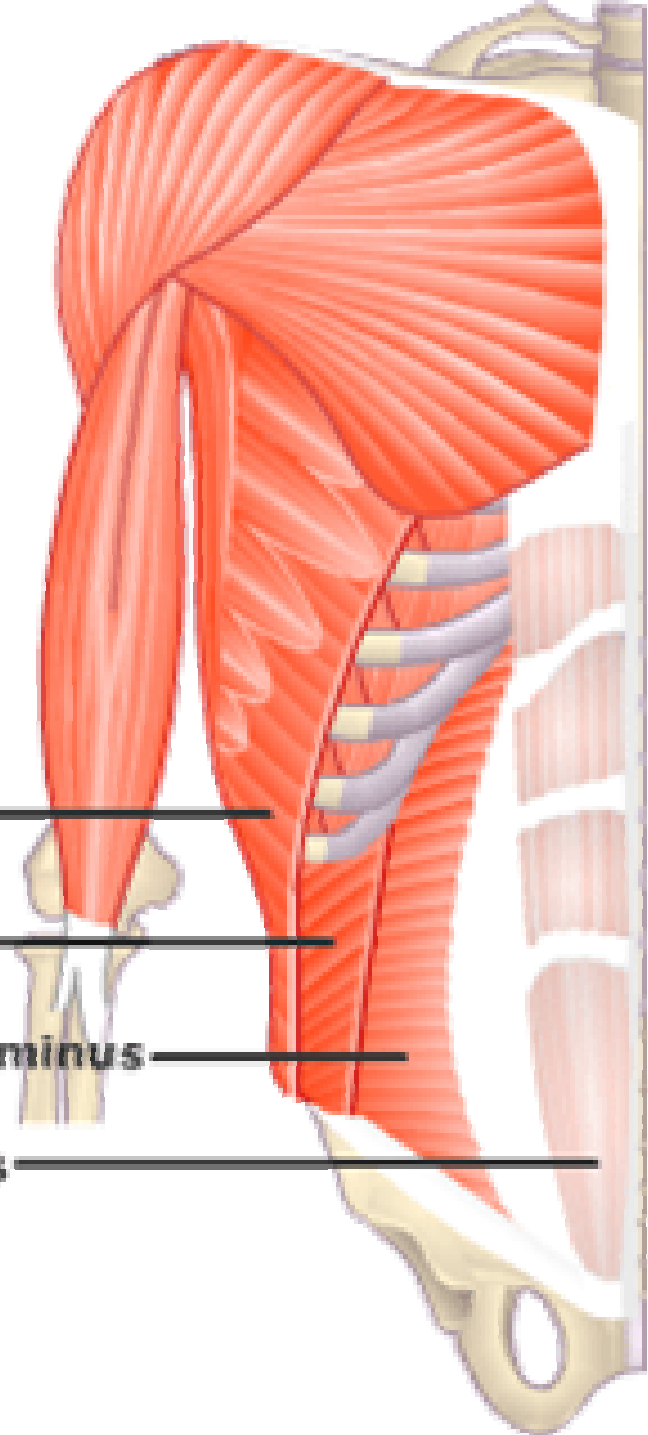


External oblique

Internal oblique

Transversus abdominus

Rectus abdominus

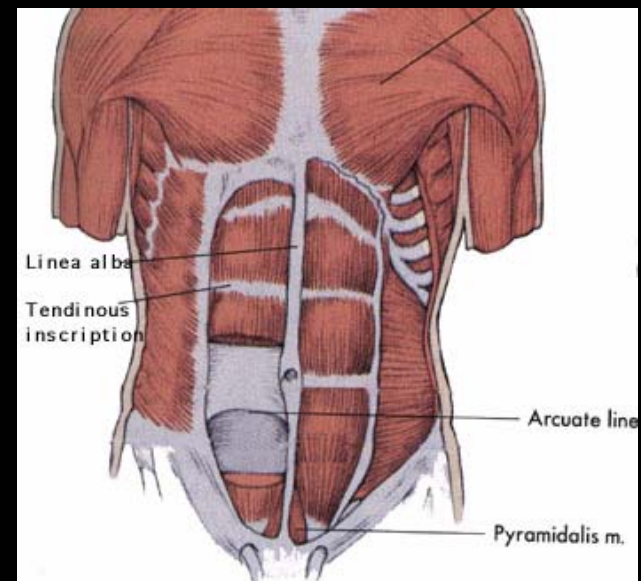
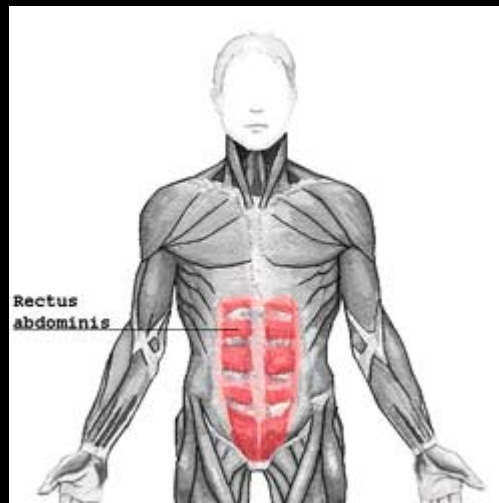
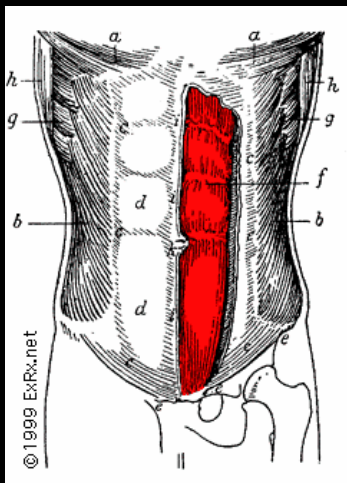


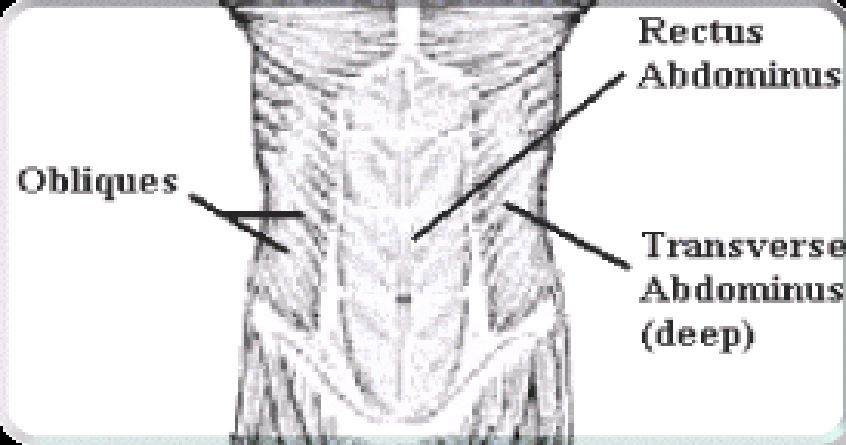
• **Rectus abdominis***. The primary action of this muscles is to flex the vertebral column. Rectus abdominis controls the tilt of the pelvis and curvature of the lower spine. It also tilts pelvis forward improving the mechanical positioning of the erector spinae. There are two parallel muscles, separated by a band of connective tissue called the linea alba (white line). It extends from the pubic symphysis inferiorly to the xiphisternum and lower costal cartilages superiorly.

• It is contained in the Rectus sheath.

• The Rectus is crossed by fibrous bands, three in number, which are named the tendinous inscriptions. If well-defined, the rectus abdominis is colloquially called a "six-pack."

The origin is on the pubis, and the insertion is on the xiphoid process and some of the costal cartilages.

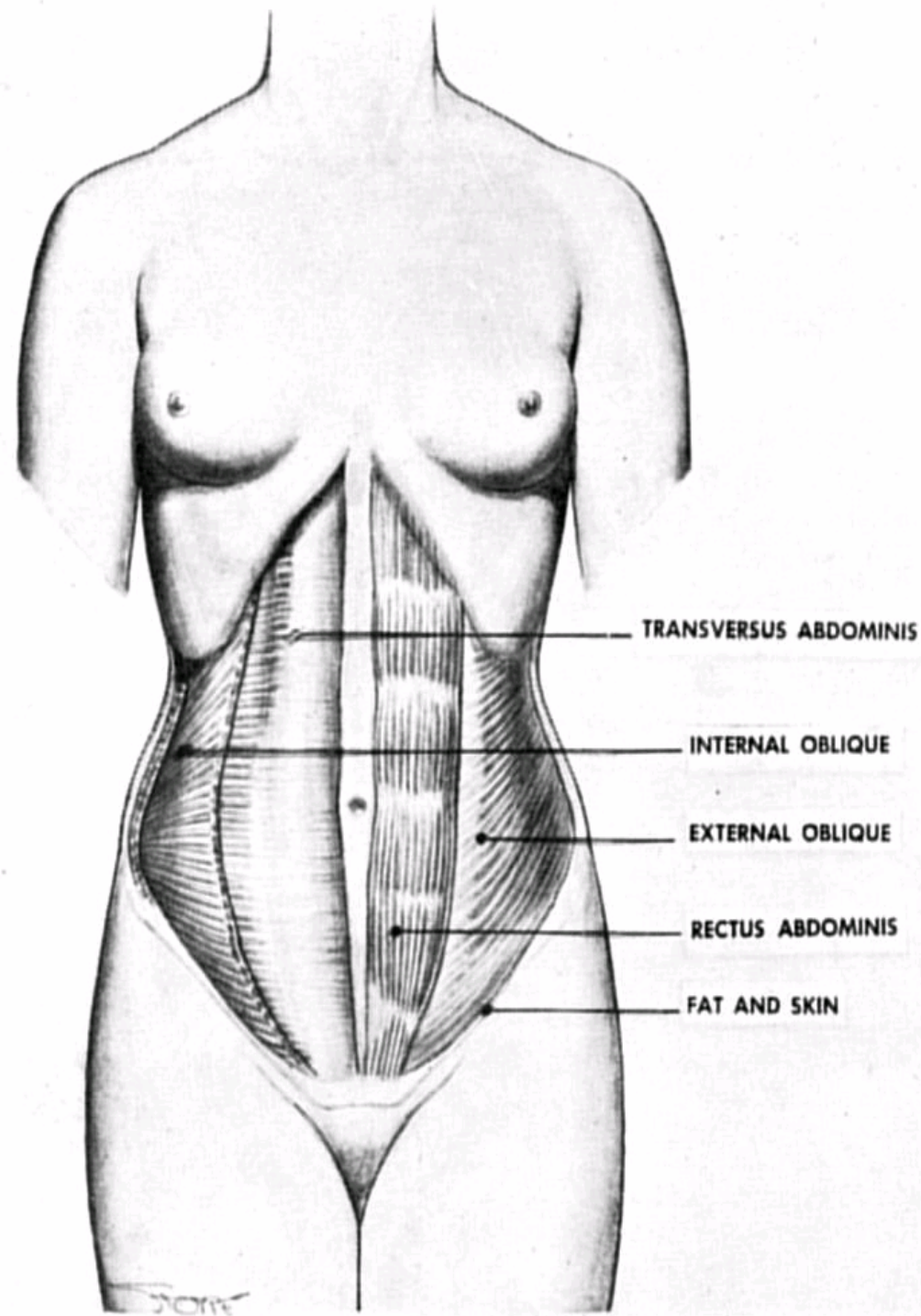




Rectus Abdominus :Flex the spine (bringing the rib cage closer to the pelvis). This is seen in the abdominal crunching movement.

Transverse Abdominus Acts as a natural weight belt, keeping your insides in. This muscle is essential for trunk stability.

Internal and External Obliques Work to rotate the torso and stabilize the abdomen.





the rectus abdominus

The Crunch - lift head and shoulders up to a 45 degree angle, leaving lower back on the ground in a neutral position.



the external obliques

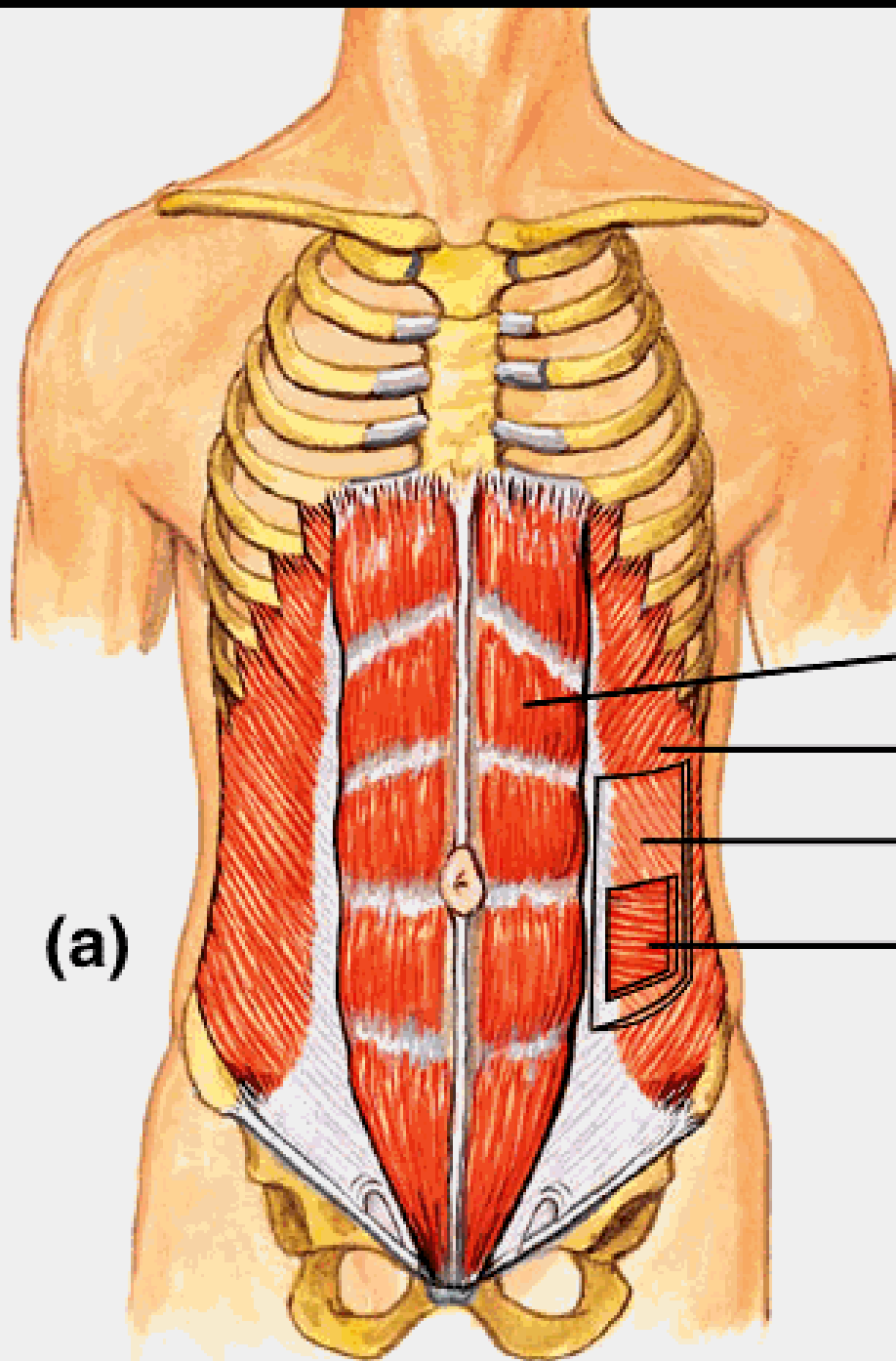
Crunch - bringing the shoulder towards the opposite knee



the internal obliques

Lift into a crunch and hold - bring elbow sideways towards the hip on the same side.

Abdominal Wall Muscles (1)



(a)

Rectus abdominis

External oblique

Internal oblique

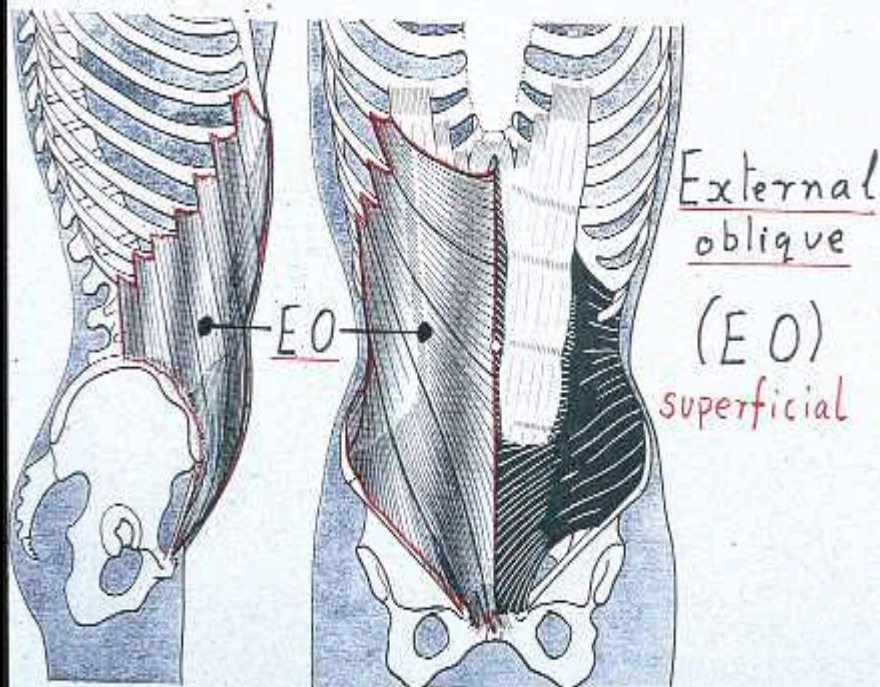
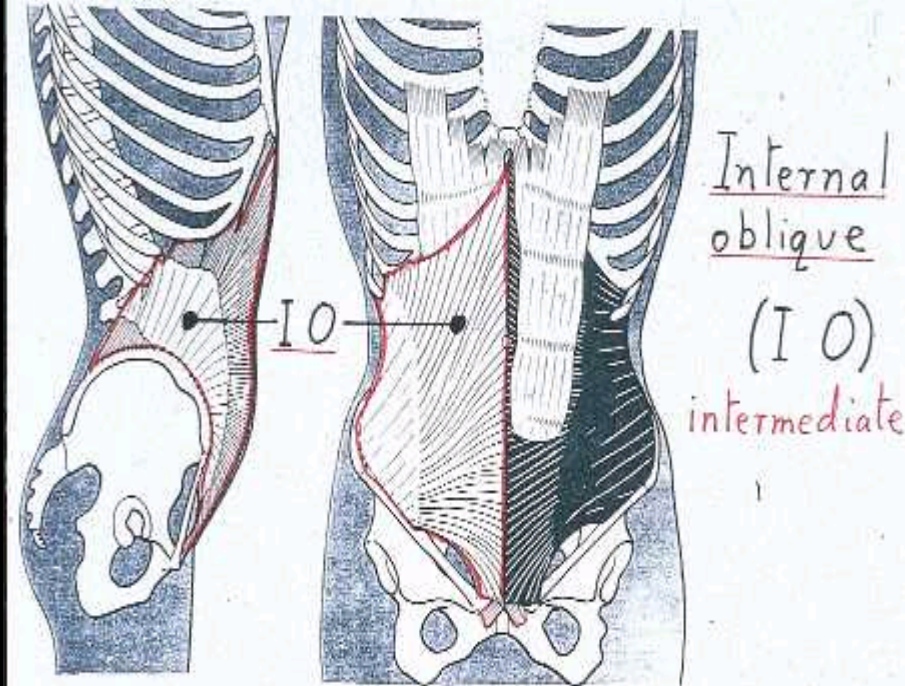
Transversus abdominis

Abdominal muscles.

- **rectus abdominis** (medial) 2 vertical straps, from ribs/sternum to pubis; separated by linea alba; 6 pack effect- tendinous inscriptions

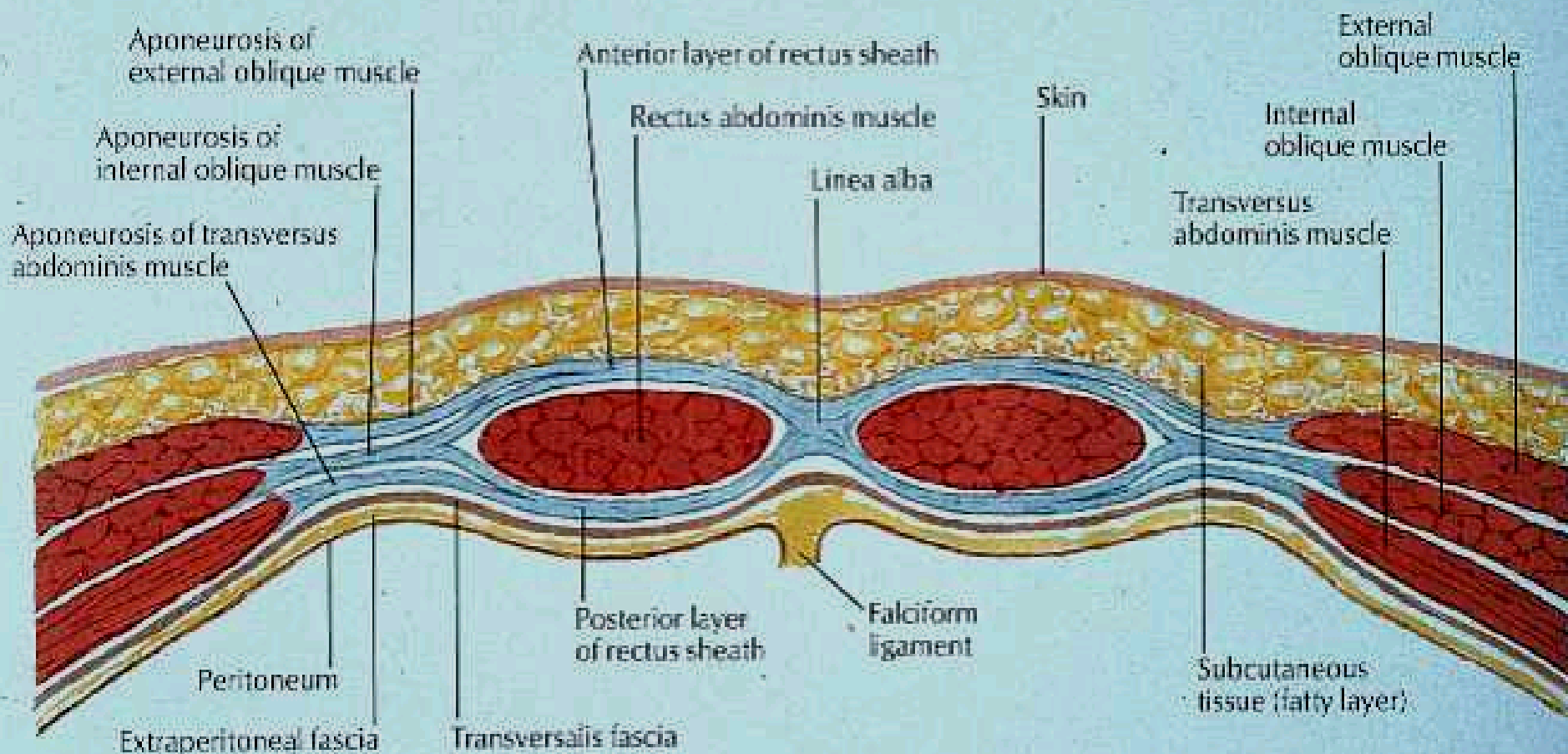
- **external oblique** (lateral, superficial) from ribs to pubis/rectus sheath superior/lateral to inferior/medial

- **internal oblique** (intermediate) from ribs/rectus sheath to pelvis/inguinal ligament; opposite direction



Rectus Sheath: Cross Sections

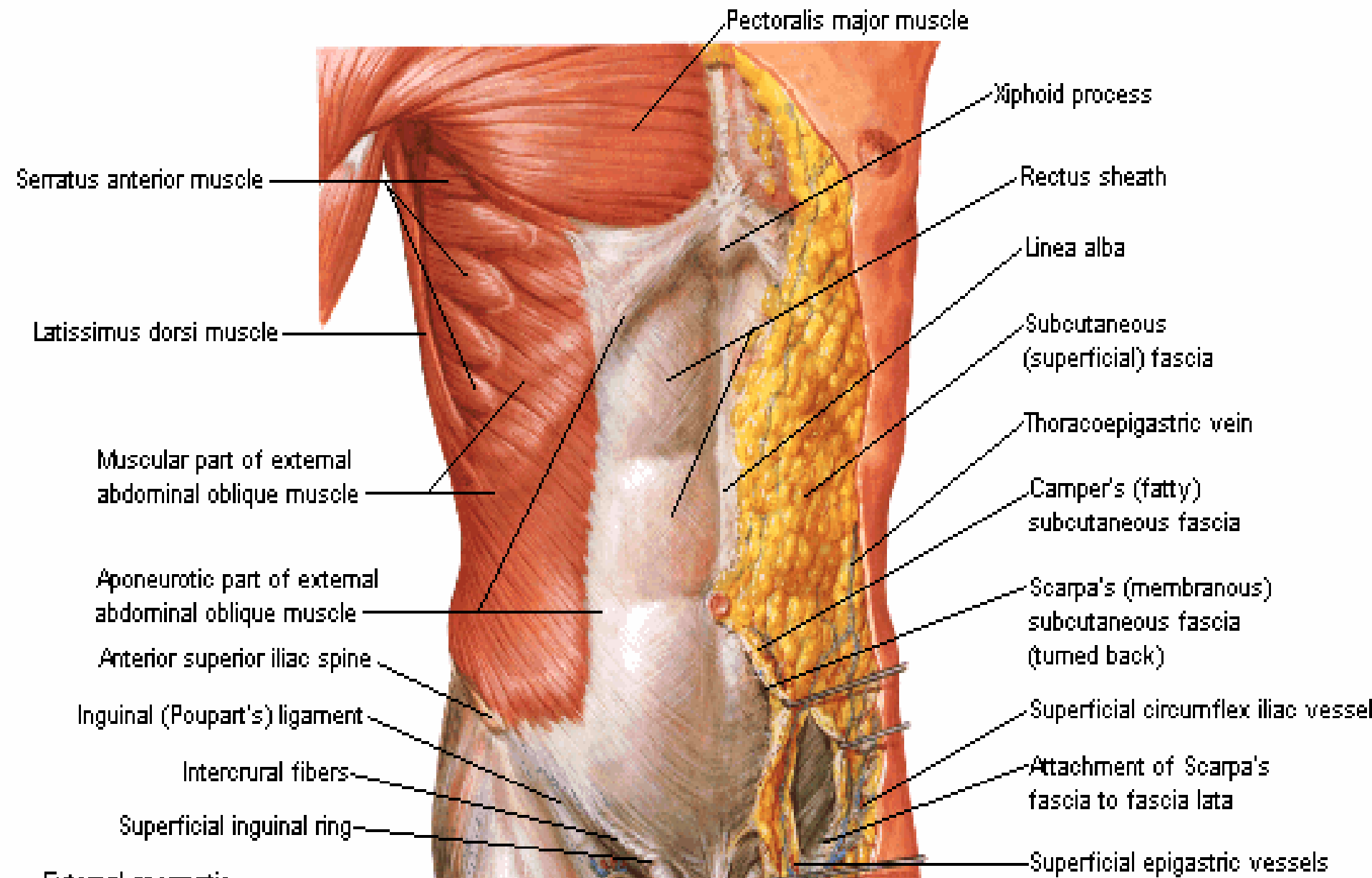
Section above arcuate line



Aponeurosis of internal oblique muscle splits to form anterior and posterior layers of rectus sheath. Aponeurosis of external oblique muscle joins anterior layer of sheath; aponeurosis of transversus abdominis muscle joins posterior layer. Anterior and posterior layers of rectus sheath unite medially to form linea alba

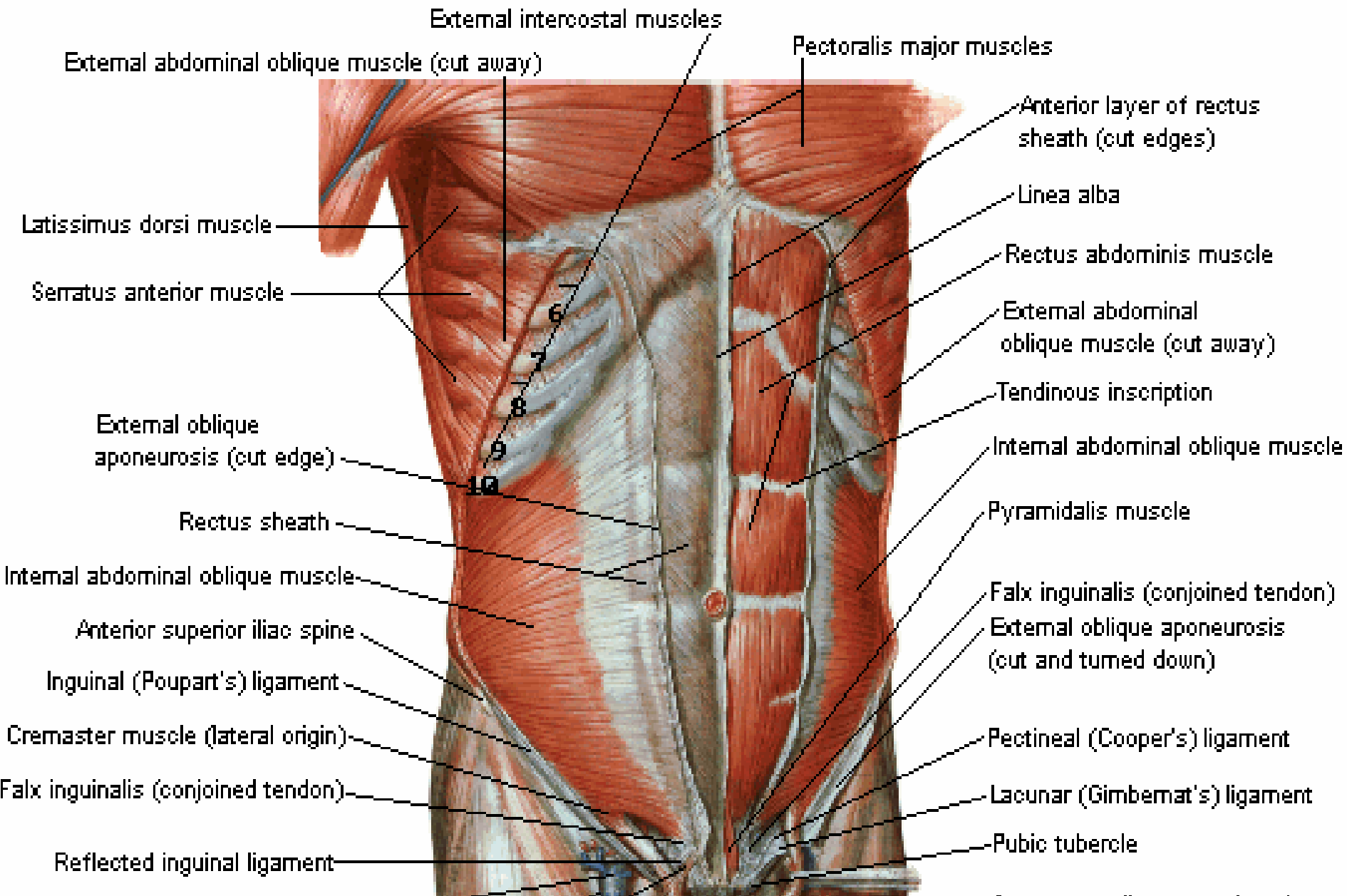
Anterior Abdominal Wall

Superficial Dissection



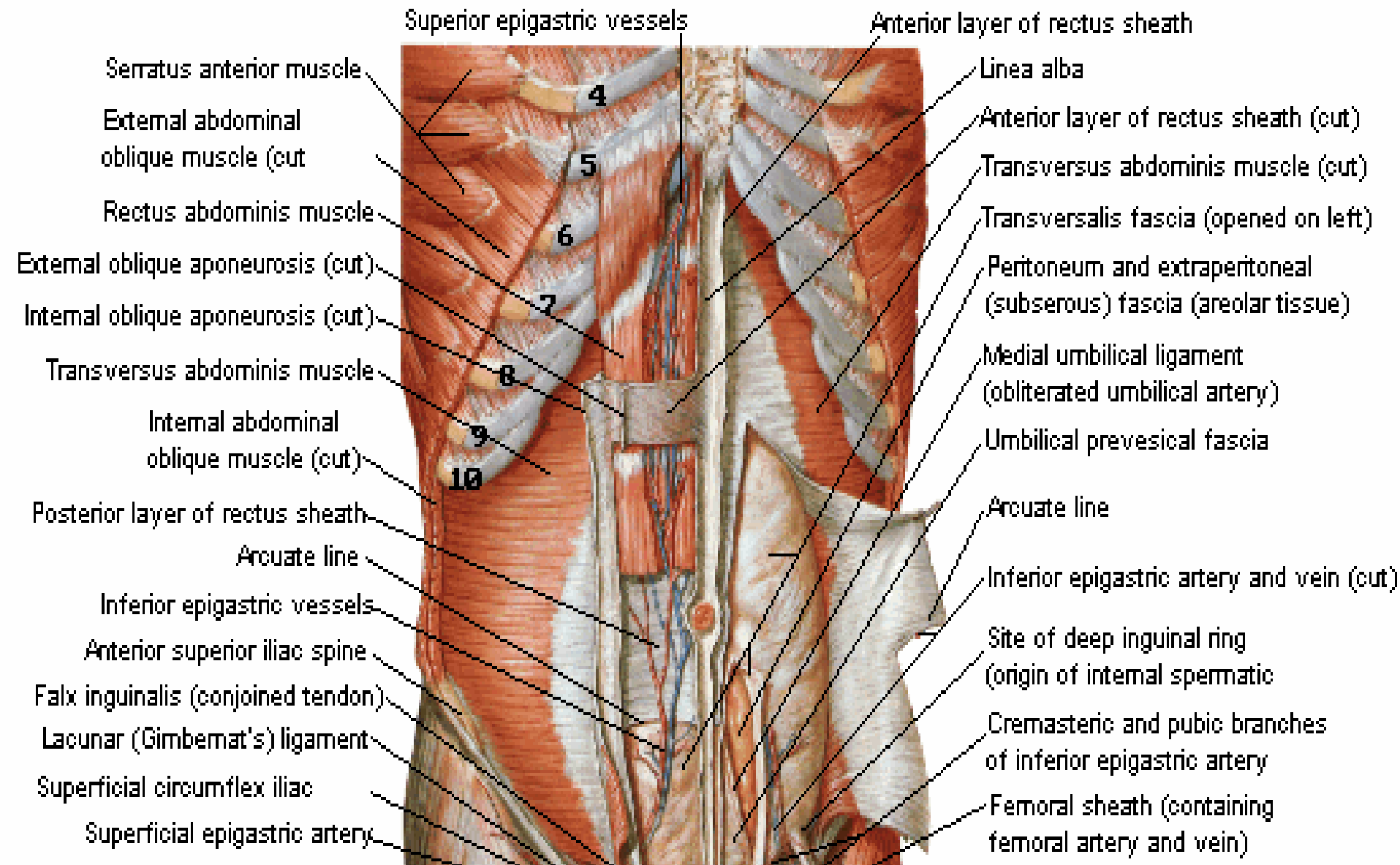
Anterior Abdominal Wall

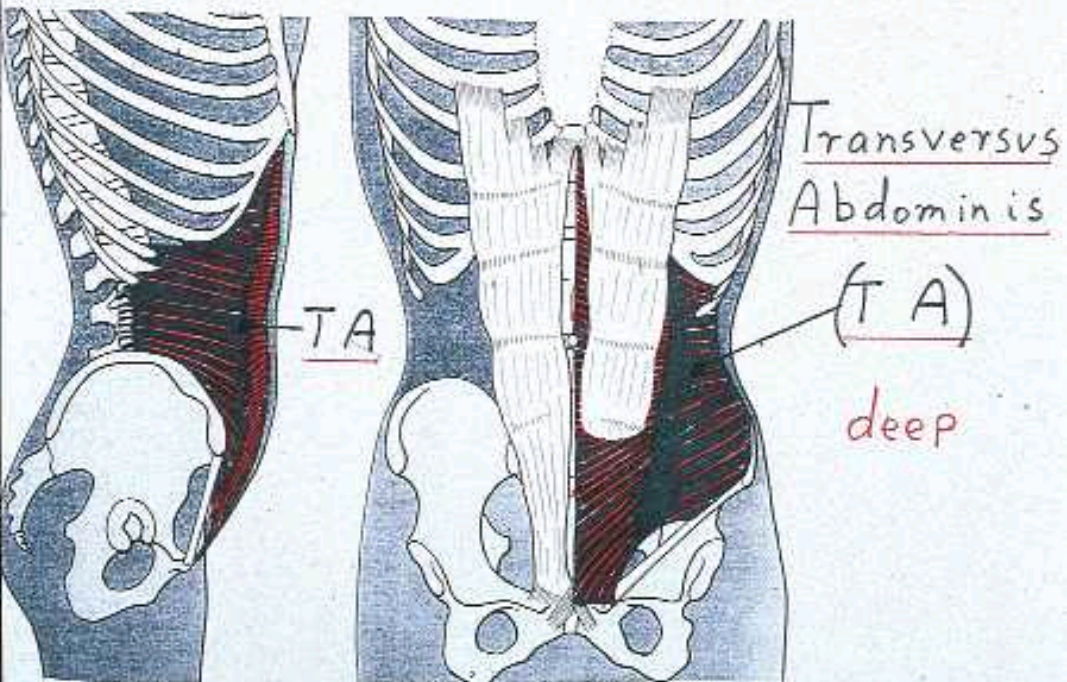
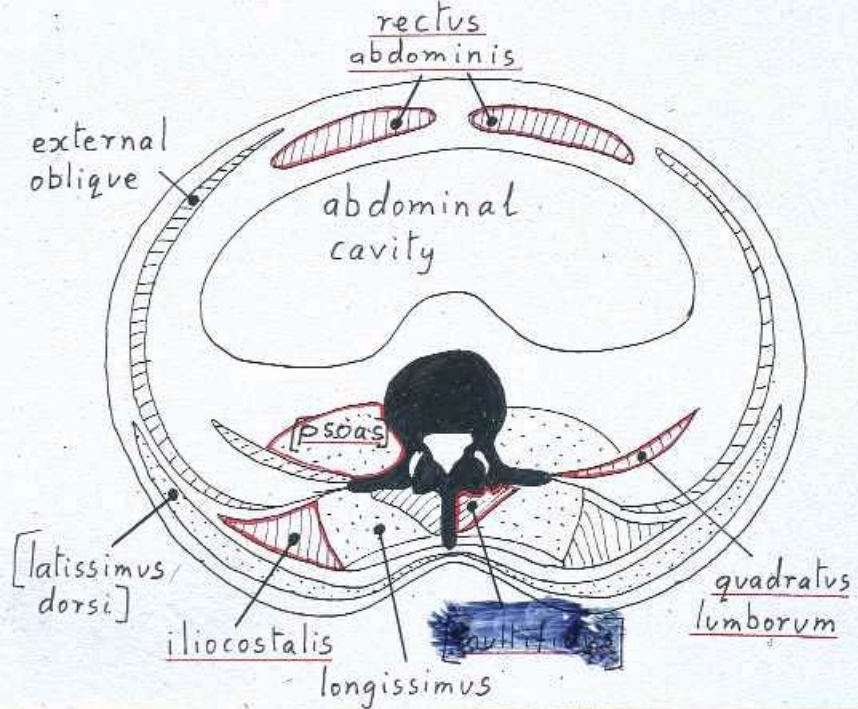
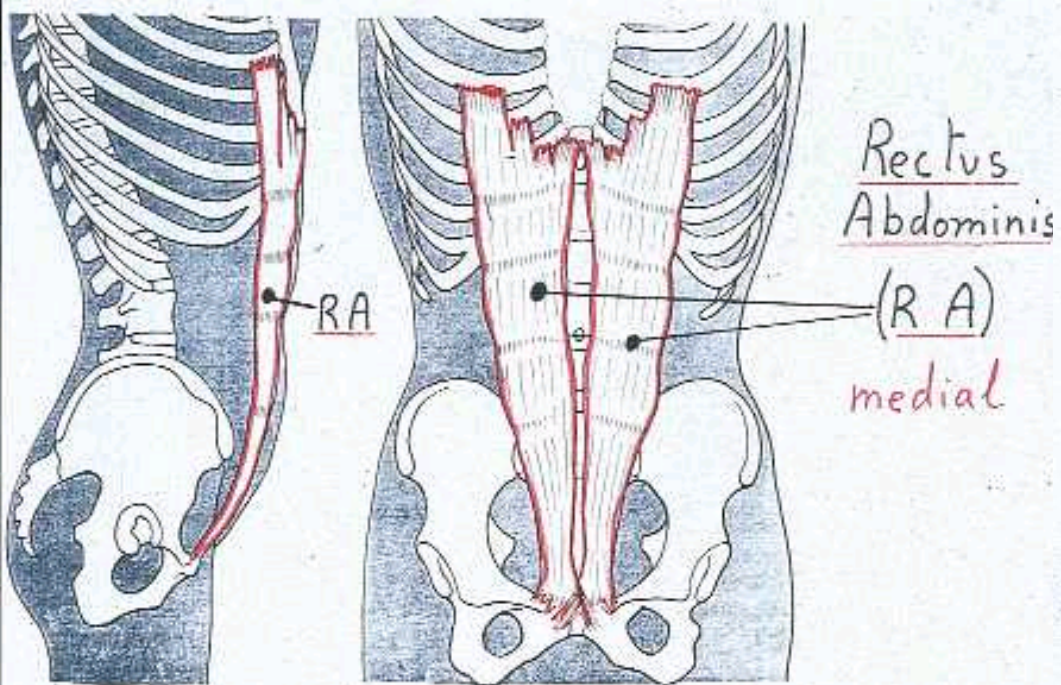
Intermediate Dissection



Anterior Abdominal Wall

Deep Dissection





Good link

<http://www.getbodysmart.com/ap/muscularsystem/backabdomen/menu/menu.html>