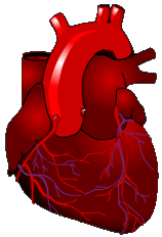




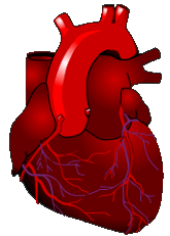
Systematic Anatomy

Locomotor system - Part 5



Introduction to myology

The muscles of head, neck and trunk



肌学总论，头颈躯干肌



Prof.& Ph.D 张红旗

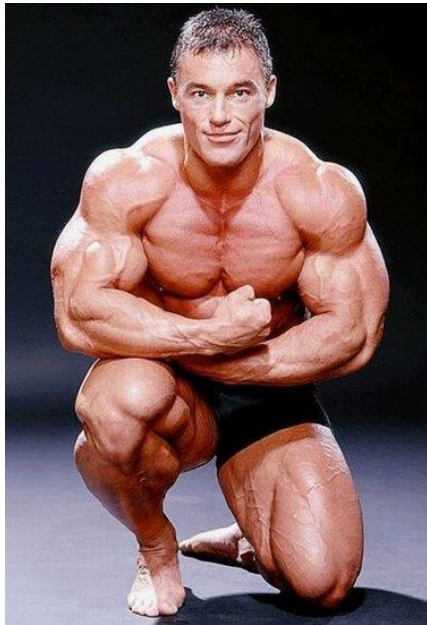
复旦大学基础医学院解剖与组织胚胎学系

复旦大学枫林校区

English words quiz

1. Promontory
 2. Ischium
 3. Greater sciatic notch
 4. Obturator foramen
 5. Gluteal tuberosity
 6. 大转子
 7. 半月板
 8. 交叉韧带
 9. 骰骨
 10. 小腿骨间膜
1. Promontory 髀骨岬
 2. Ischium 坐骨
 3. Greater sciatic notch 坐骨大切迹
 4. Obturator foramen 闭孔
 5. Gluteal tuberosity 臀肌粗隆
 6. 大转子 greater trochanter
 7. 半月板 meniscus
 8. 交叉韧带 cruciate ligament
 9. 骰骨 cuboid
 10. 小腿骨间膜 interosseus membrane of leg

Myology 肌学

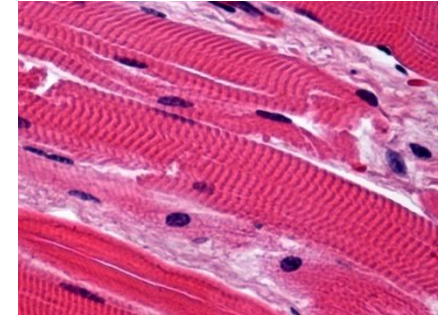


Classification of the muscle according to structure

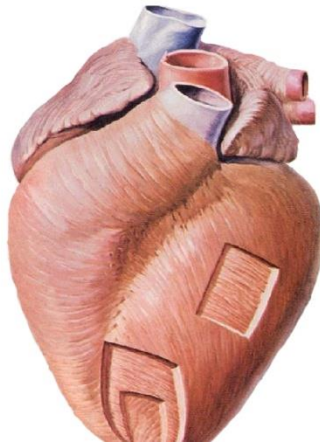


Skeletal muscle 骨骼肌
(mainly attach to bones)
收缩快速而有力

Voluntary Muscle
随意肌

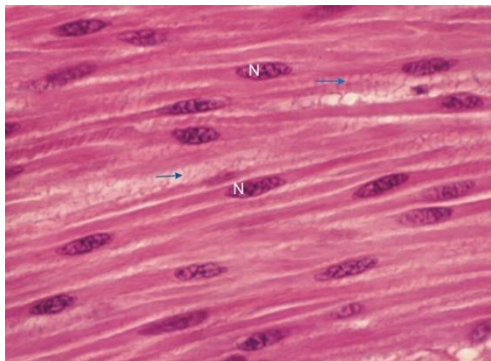


striated muscle 横纹肌
(Alternating light & dark pattern)



Cardiac muscle 心肌
(in heart) 自律性和同步收缩

Involuntary muscle 不随意肌



Smooth muscle 平滑肌
(within the walls of vessel & viscera)
收缩缓慢而持久

General description of skeletal muscles

- ◆ The skeletal muscles are the muscles **attached to the bone**, fascia or skin.
- ◆ Muscles occupy about **40%** of body weight.
- ◆ More than **600** muscles in the whole body (**640BBC**)
- ◆ Each muscle possess a definite **shape, structure, location, blood supply & nerve innervation**.
- ◆ Each muscle is regarded as a **living organ**.
- ◆ **Necrosis**坏死 (if lost blood supply), **Paralysis**麻痹 (if lose nerve control), **Atrophy**萎缩 (don't use for a long time).

Classification of the muscle according to position

◆ Head muscle

◆ Neck muscle

◆ Trunk muscle →

Muscles of back 背肌

Muscles of thorax 胸肌

Diaphragm 膈

Muscles of Abdomen 腹肌

Perineal muscles 会阴肌

◆ Muscles of upper limb

Muscles of shoulder 肩肌

Muscles of arm 臂肌

Muscles of forearm 前臂肌

Muscles of hand 手肌

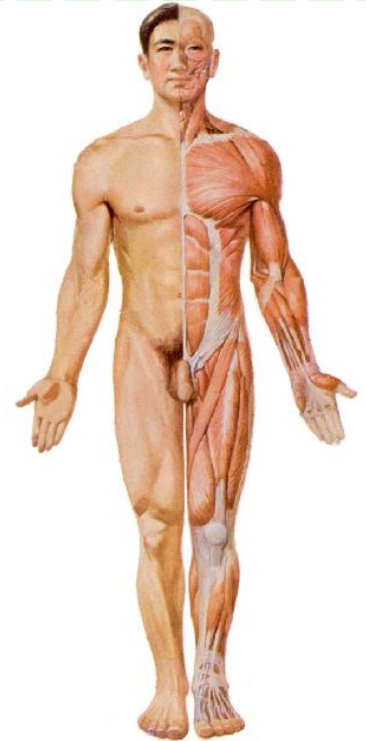
◆ Muscles of lower limb →

Muscles of hip 髋肌

Muscles of thigh 大腿肌

Muscles of leg 小腿肌

Muscles of foot 足肌



Classification of muscle according to shape

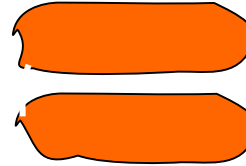
Classification

Long muscle 长肌

Short muscle 短肌

Broad muscle 阔肌

Orbicular muscle 轮匝肌



Short m.



Broad m.



Orbicular m.
Annual ring 年轮

Long
muscles

Pennate
羽状的



Biceps
二头肌

Unipennate
单羽肌

Bipennate
双羽肌

Multipennate
多羽肌

Digastric
Muscle
二腹肌

Rectus abdominis
腹直肌

Multibelly m. 多腹肌

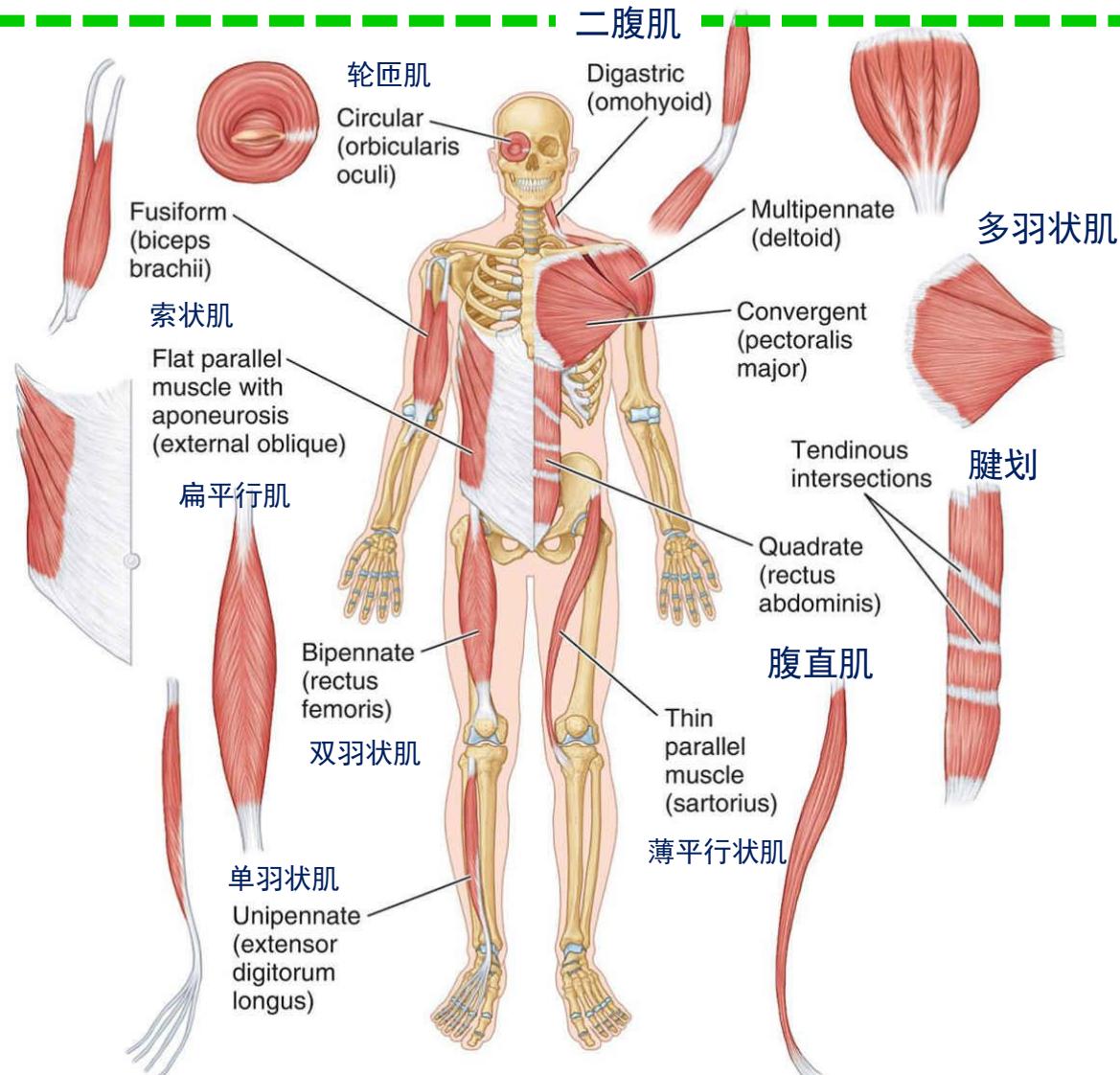
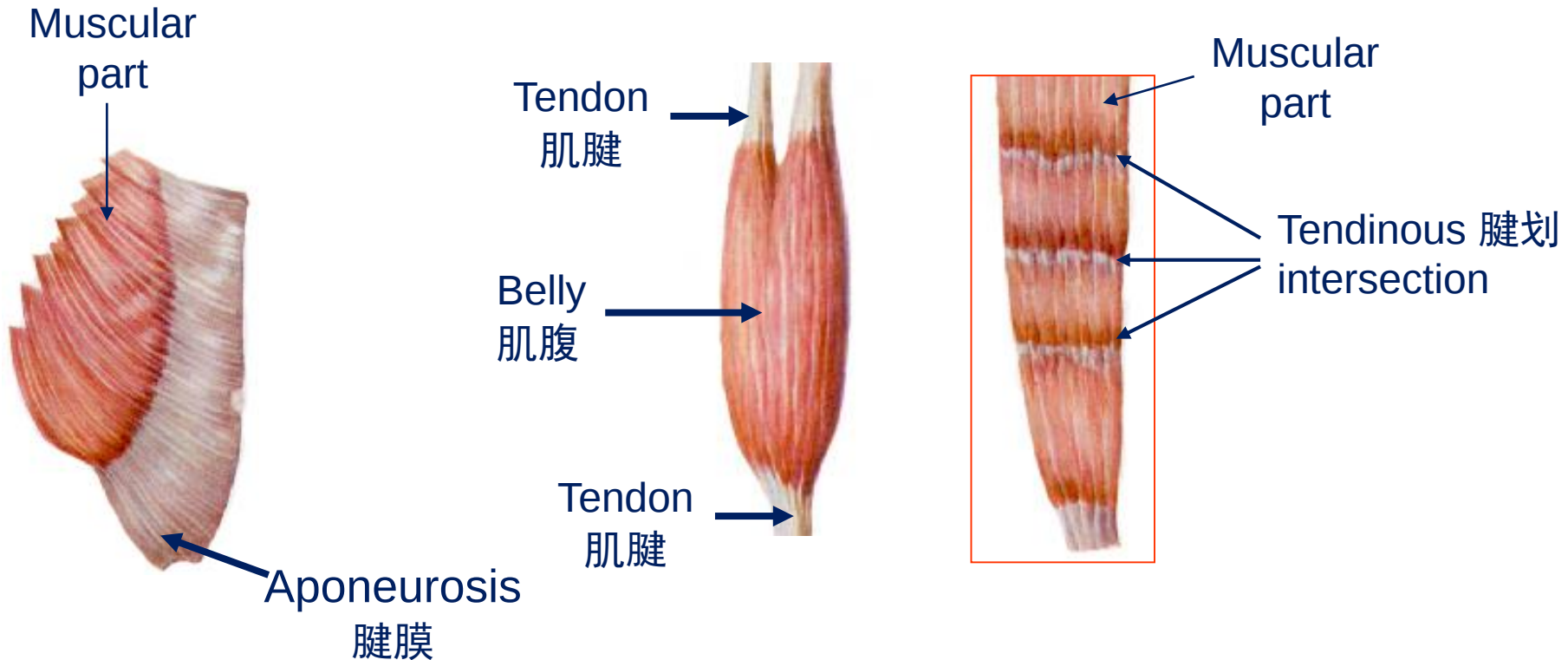


FIGURE 1.18. Architecture and shape of skeletal muscles. The architecture and shape of a skeletal muscle depend on the arrangement of its fibers.

Structure of skeleton muscle

Muscular part 肌性部 & tendinous part 腱性部



Belly-contract 收缩

Tendon-don't contract

Muscle attachment 肌肉的附着

- 1-Origin 起点
- 2-Belly 肌腹
- 3-Tendon 肌腱
- 4-Insertion 止点

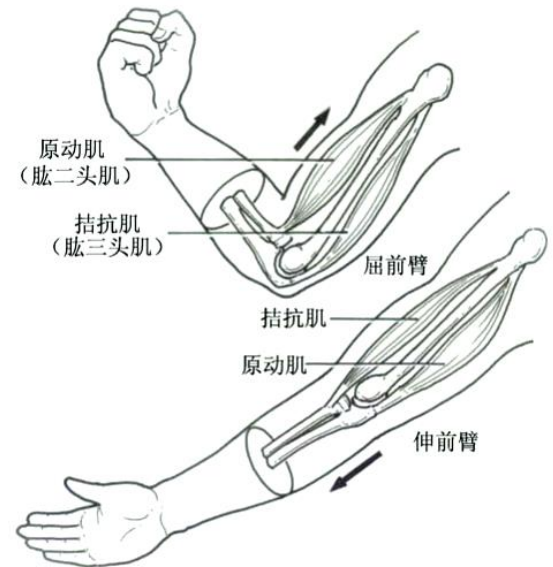
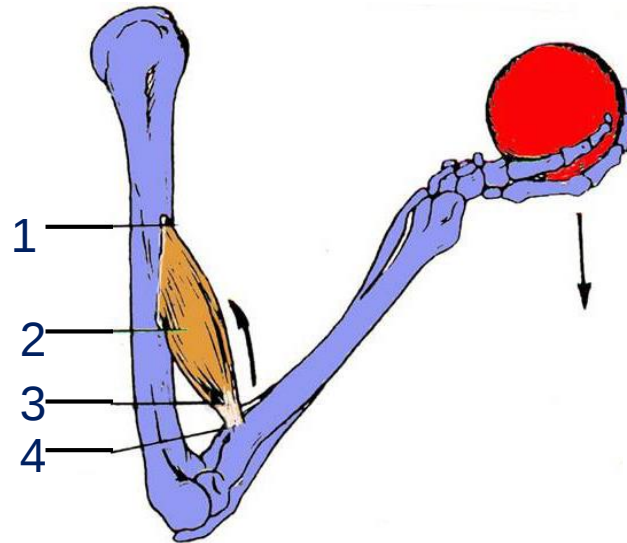


图 3-3 原动肌与拮抗肌作用示意图

- 1. Usually muscle distribute paired 成对分布
- 2. Muscle works by functional groups 功能群
- 3. Extensor & flexor 伸肌和屈肌
- 4. Pronator & supinator 旋前肌和旋后肌
- 5. Adductor & abductor 内收肌和外展肌
- 6. Medial rotator & lateral rotator 旋内肌与旋外肌

Nomenclature of muscles 肌的命名

◆ Shape

Deltoid三角肌, trapezius 斜方肌

◆ Size

Major, minor, longus, brevis 短

◆ Location

Pectoralis major 胸大肌

Intercostal m. 肋间肌

◆ Points of attachment

Sternocleidomastoid m.胸锁乳突肌

◆ Orientation of fiber

Rectus直, oblique 斜, transverse 横

◆ Relative position

Lateral, medial. internal & external

◆ Function

Adductor内收肌, flexor屈肌, extensor伸

pronator旋前肌, adductor 展肌 etc.



Movement of muscle

◆How to analyze the motion of the muscle

According to origin & insertion of the muscle 起始点

Pass the number & direction of joint 肌肉跨过关节数量

Pass the location or direction of joint 跨过关节位置



Supplementary structures of muscle

1. Fascia 筋膜
2. Synovial bursa 滑液囊
3. Tendinous sheath 腱鞘
4. Sesamoid bone 籽骨

Accessory structure of muscle-Fascia

Superficial fascia 浅筋膜

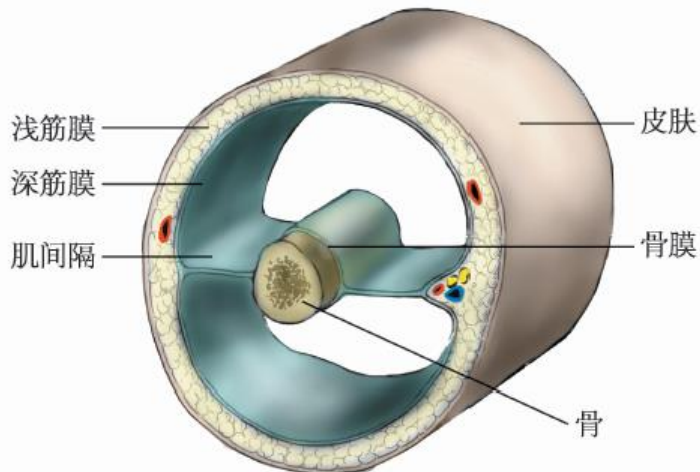
Fat, superficial vein, cutaneous n.
lymph vessel, connective tissue

Deep fascia 深筋膜

Dense connective tissue

Muscular septum 肌间隔

Blood vessel, nerve sheath

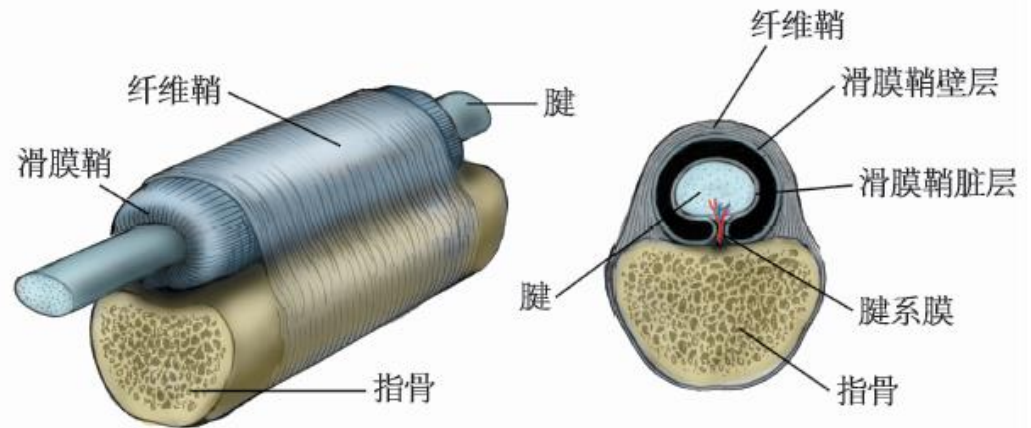


A. 筋膜和筋膜鞘

Periosteum 骨膜

Synovial sheath 滑膜鞘

Phalanx 指骨



B. 腱鞘

Tendinous sheath 腱鞘

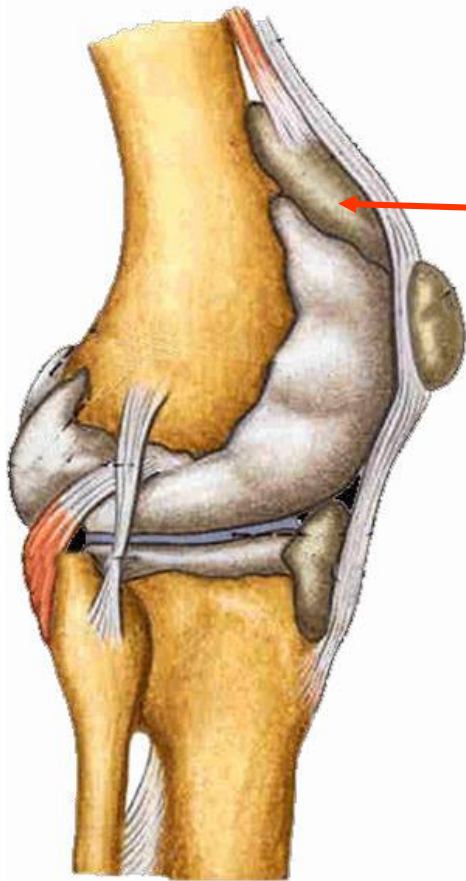
1- Fibrous sheath 纤维层

2- Synovial sheath 滑膜层

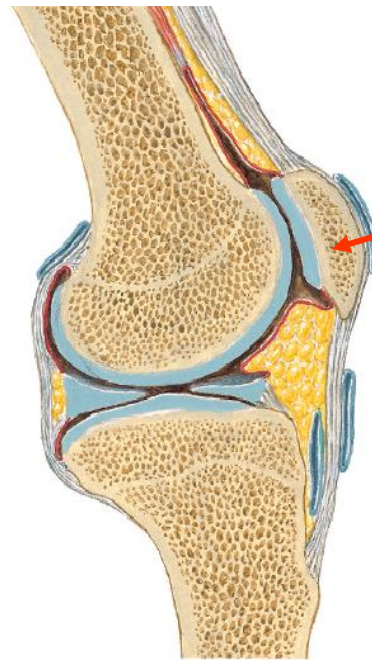
3- Mesotendon 腱系膜

Accessory structures of muscle-Synovial bursa

Synovial bursa is a extension of articular capsule,in which it contain fluid.like a water pad
Is between tendon and bone.



Synovial bursa 滑膜囊



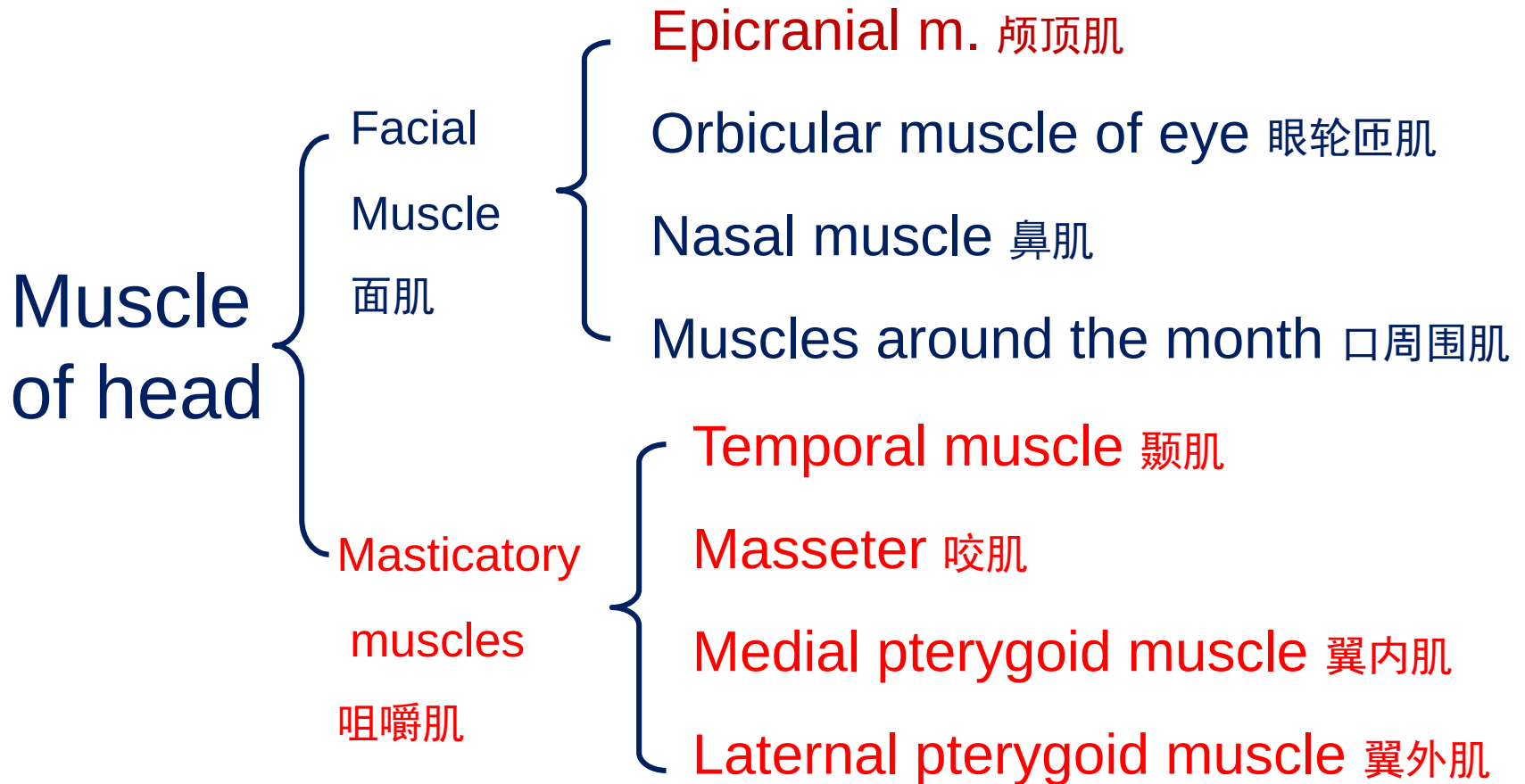
Sesamoid Bone 籽骨

Sesamoid bone generally is located in the tendon, which functions as a pad and make tendon bearing rub

Function of the skeletal muscle

1. Movement 运动
2. Heat production 产热
3. Support and protection 支持保护
4. Maintenance of posture 维持姿势

Muscles of the Head



Epicranial muscle 颅顶肌-枕额肌

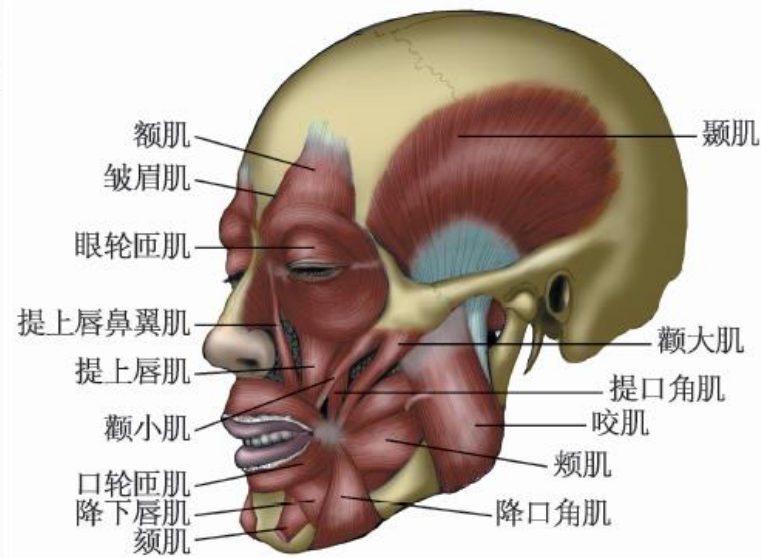
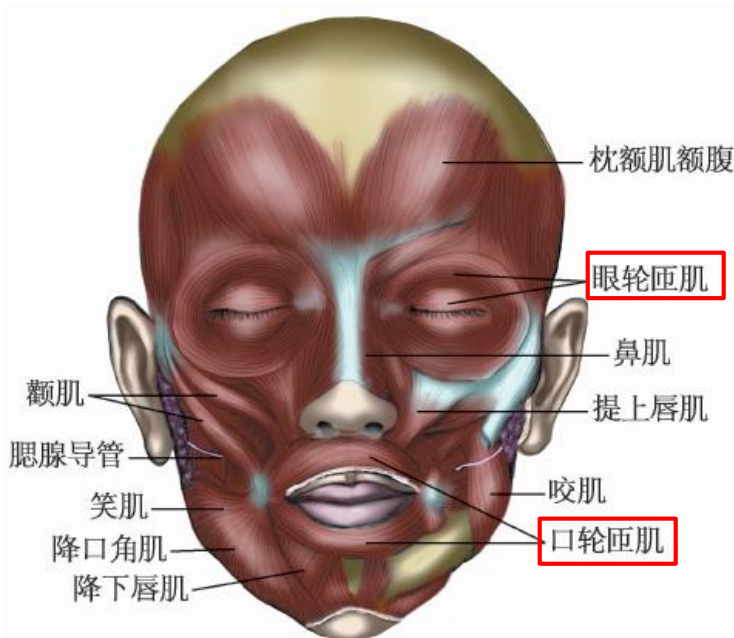
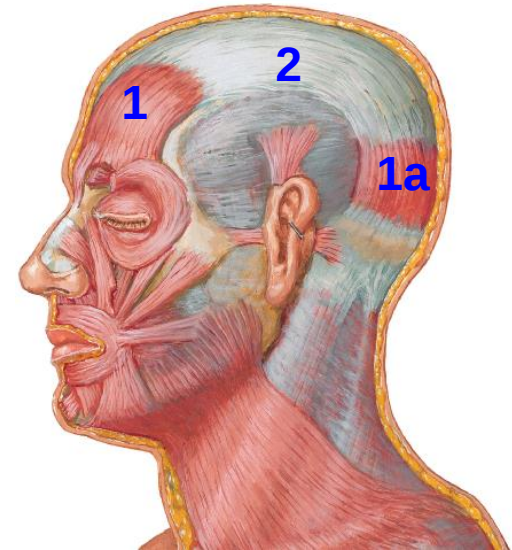
1-Frontal belly 额腹 1a occipital belly 枕腹

2-Epicranial aponeurosis 帽状腱膜

Muscle around the eye **Orbicularis oculi** 眼轮匝肌

Nasal muscle

Muscle around the mouth **orbicularis oris** 口轮匝肌



Masticatory muscles 咀嚼肌

1-Temporal muscle 颞肌

2-Masseter 咬肌

3-Lat. pterygoid m. 翼外肌

4-Med. pterygoid m. 翼内肌

Function

Open & close the mouth

Mandibular joints movement

Laterally side-to-side

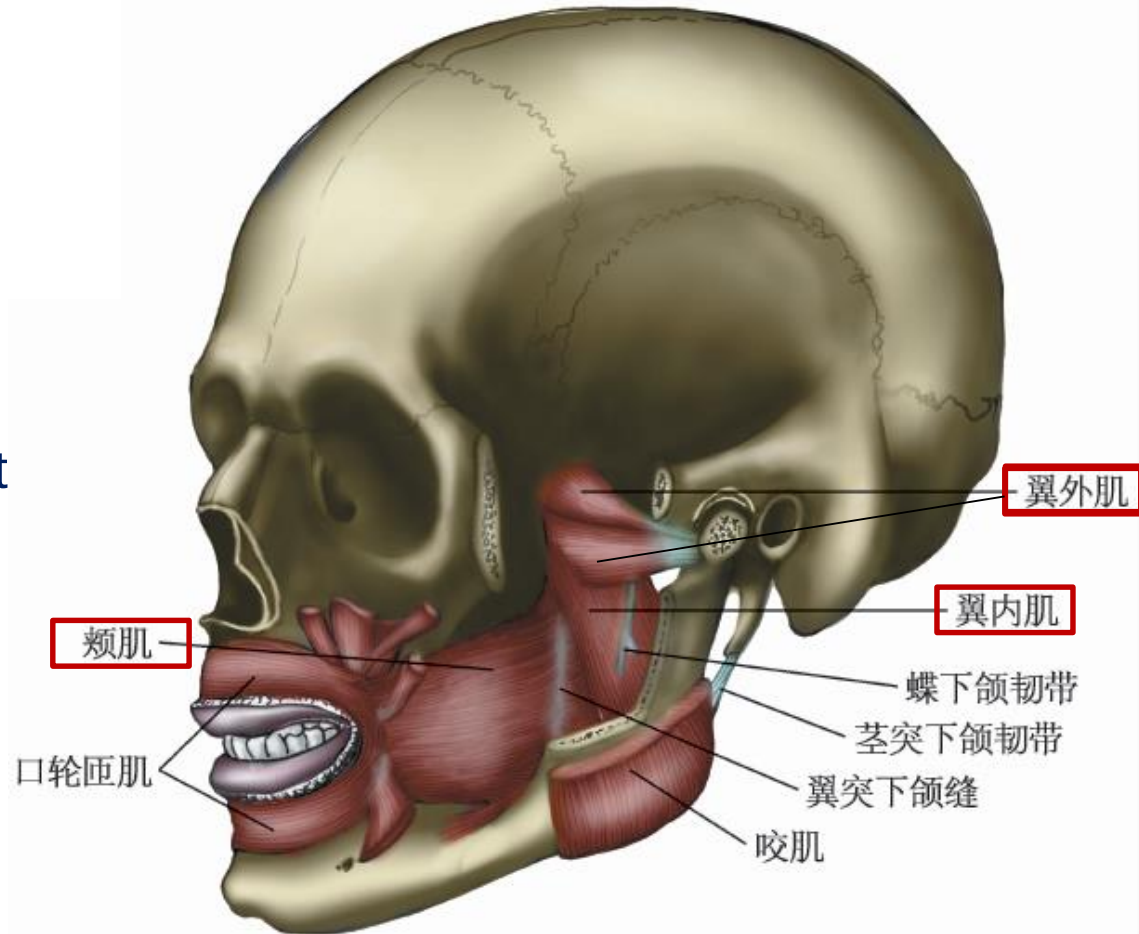
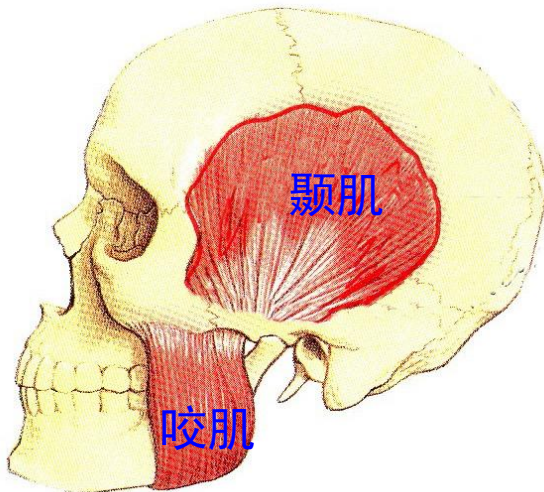
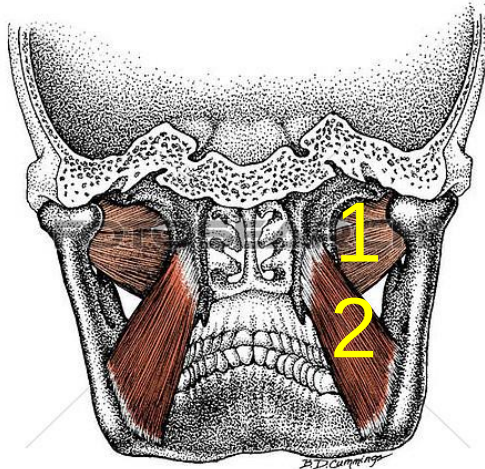
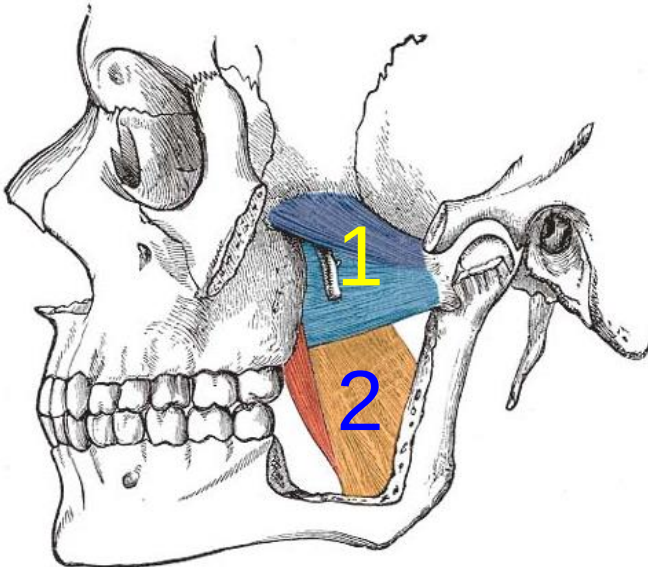
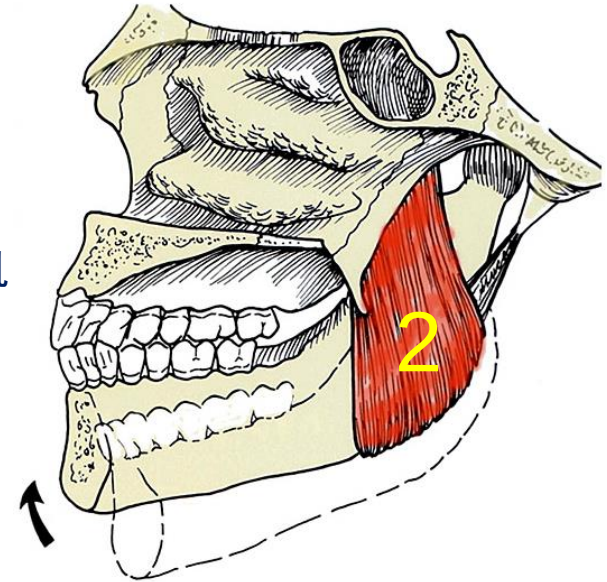


图 2-6 头肌深层



mm103015 www.fotosearch.com

1-Lat. pterygoid m. 翼外肌
2-Med. pterygoid m. 翼内肌



- | | | |
|---|--|-------|
|  | Superior head of the lateral pterygoid | 翼外肌上头 |
|  | Inferior head of the lateral pterygoid | 翼外肌下头 |
|  | Deep head of the medial pterygoid | 翼内肌深头 |
|  | Superficial head of the medial pterygoid | 翼内肌浅头 |

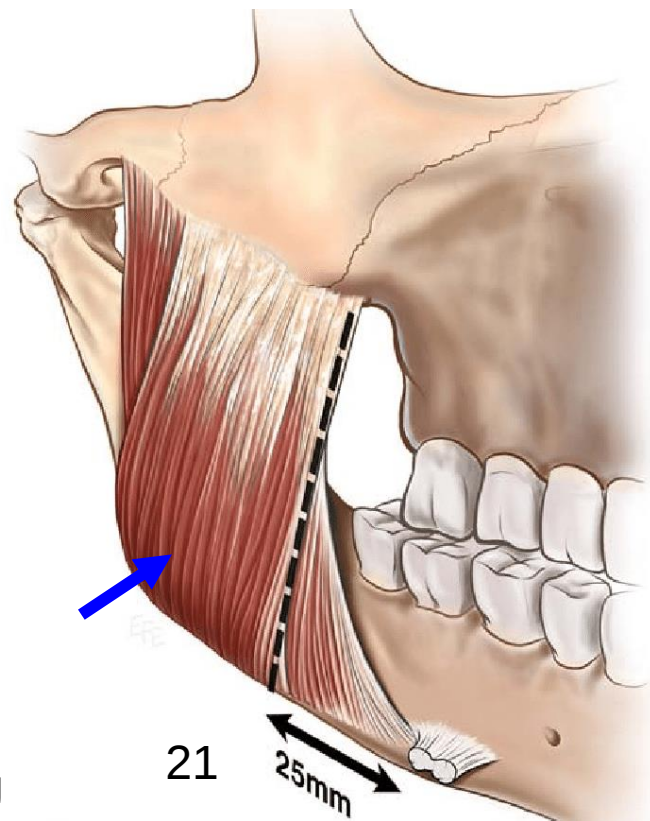
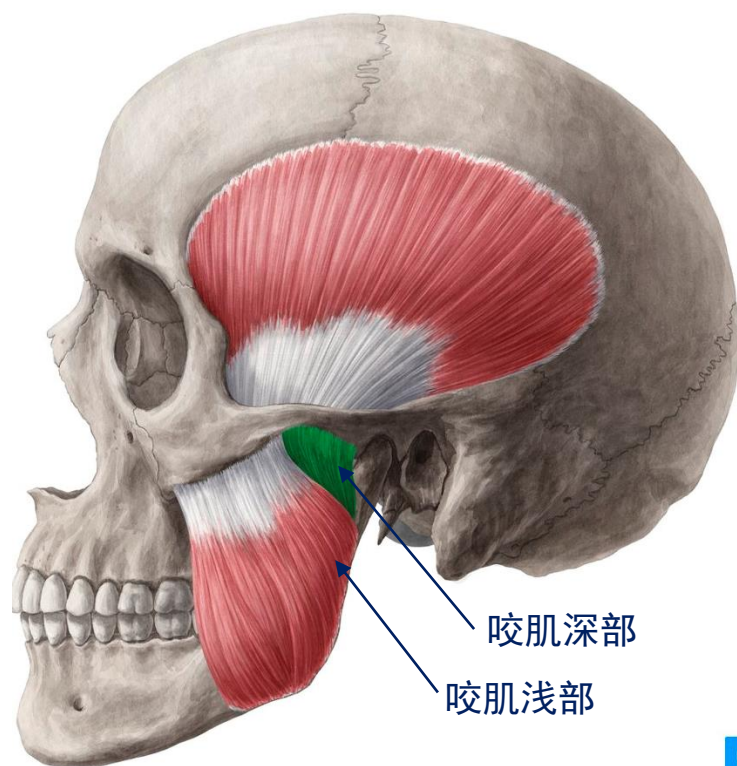
Function

Open and close the mouth
Mandibular joints move laterally
Side-to-side

【咬 肌】**浅层**：起于上颌骨颧突、颧弓前2/3，止于咬肌粗隆。

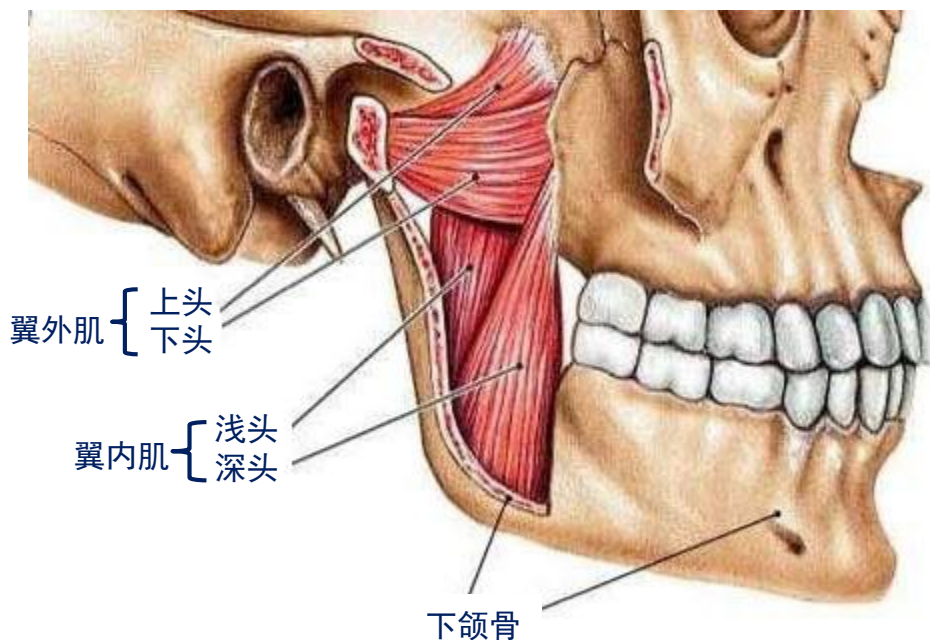
深层：起于颧弓深面，止于下颌支上部和喙突。

作用：收缩上提下颌骨，也参与下颌侧向运动及后退运动。



【**翼外肌**】 **上头**：起自蝶骨大翼的颞下面和颞下嵴。 **下头**：起自翼外板的外面。 **止于**：下颌颈翼肌窝，部分止于下颌关节囊和关节盘。 **作用**：双侧同时收缩作张口运动，单侧收缩使下颌向对侧运动。

【**翼内肌**】 **浅头**：起自上颌结节和腭骨锥突。 **深头**：起自翼外板的内侧面和腭骨锥突。 **止于**：下颌内侧面及翼肌粗隆。 **功能**：上提下颌骨。一侧收缩，产生侧向运动。

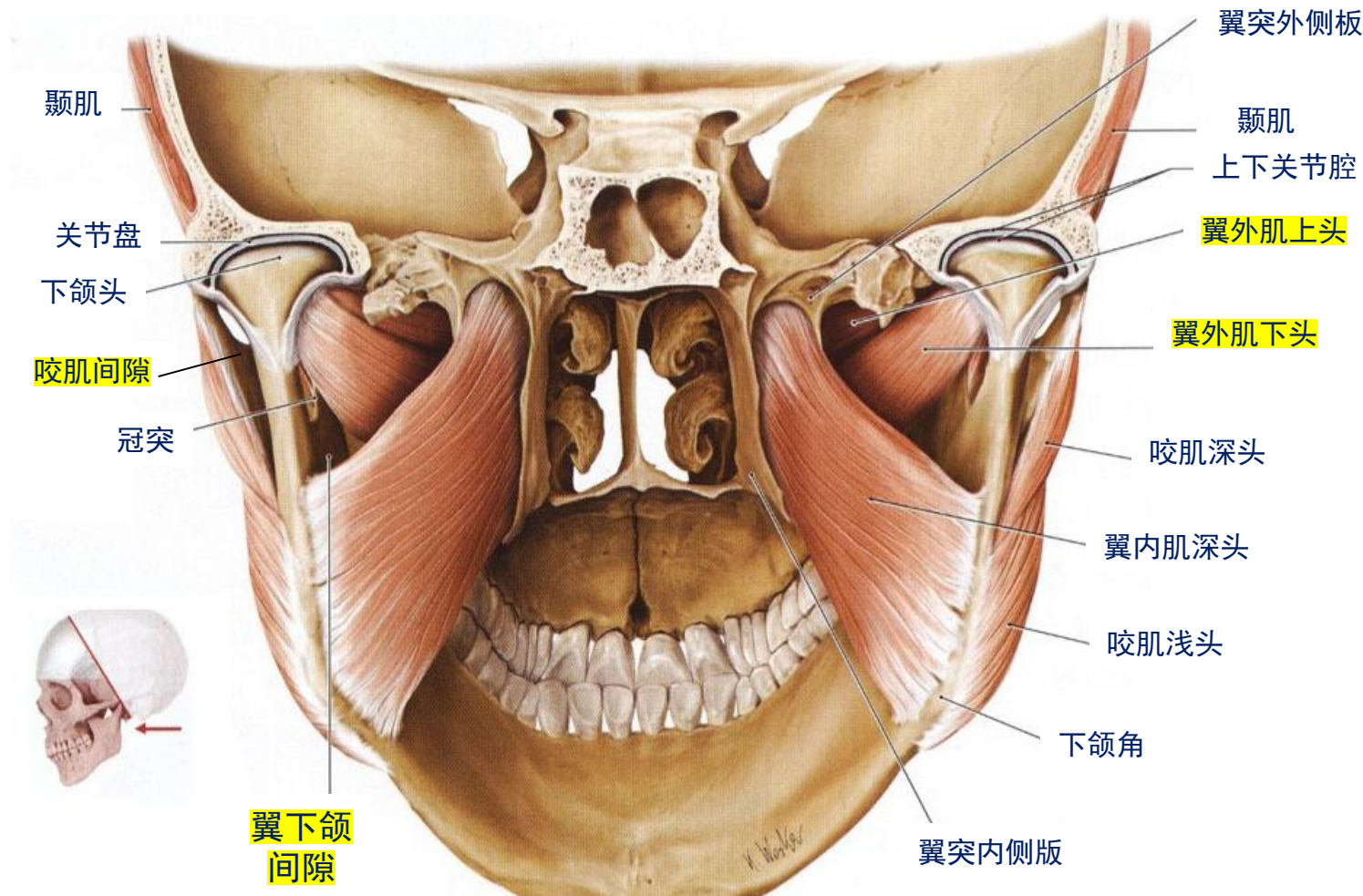


闭口肌群：

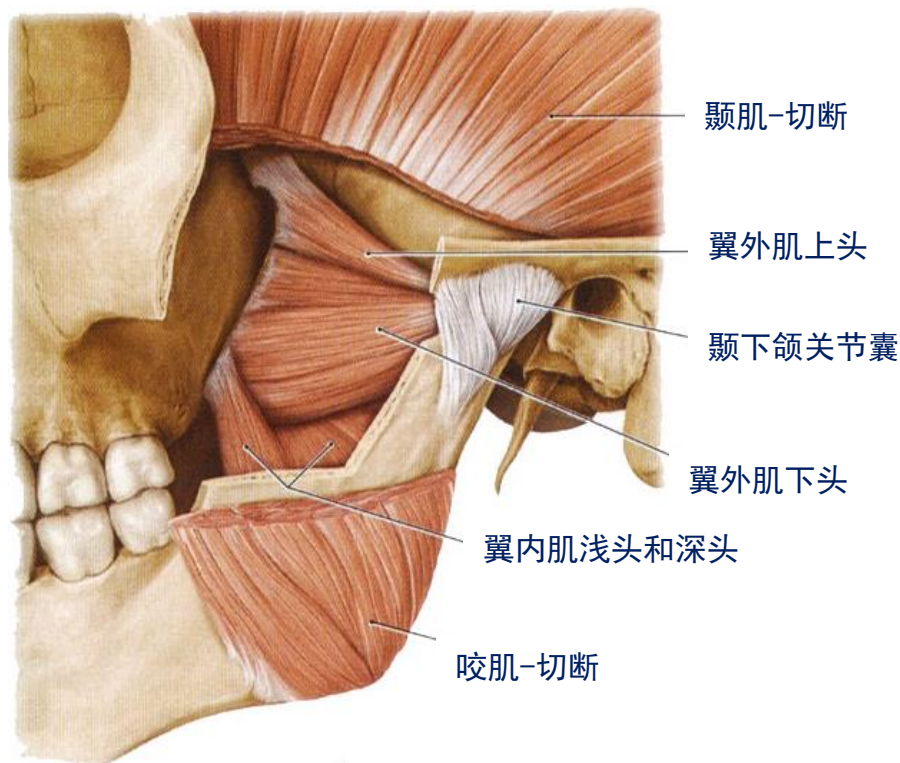
咬肌、颞肌
和翼内肌。

开口肌群：

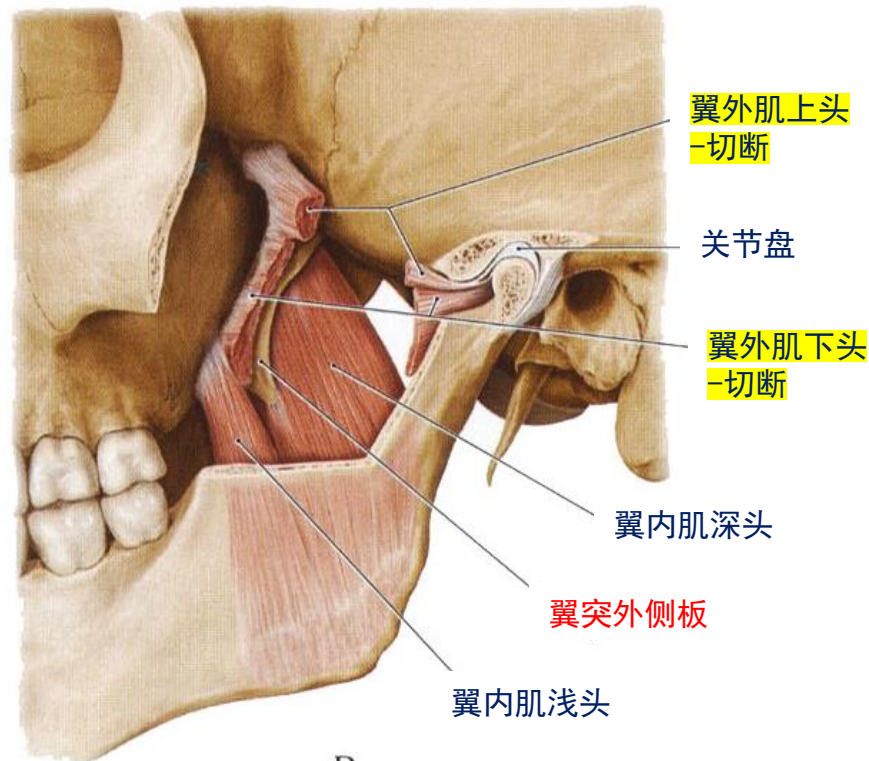
二腹肌、下颌
舌骨肌和颏舌
骨肌。



咀嚼肌悬带：咬肌与翼内肌组成一悬挂下颌骨的肌肉悬带。可以实现有力的**闭口**，并在单侧工作时实现下颌骨的**侧向运动**。下颌骨内侧界与翼内肌之间的间隙称为**翼下颌间隙**，有**重要临床意义**，是下牙槽神经**局部麻醉**的注射区域。



A

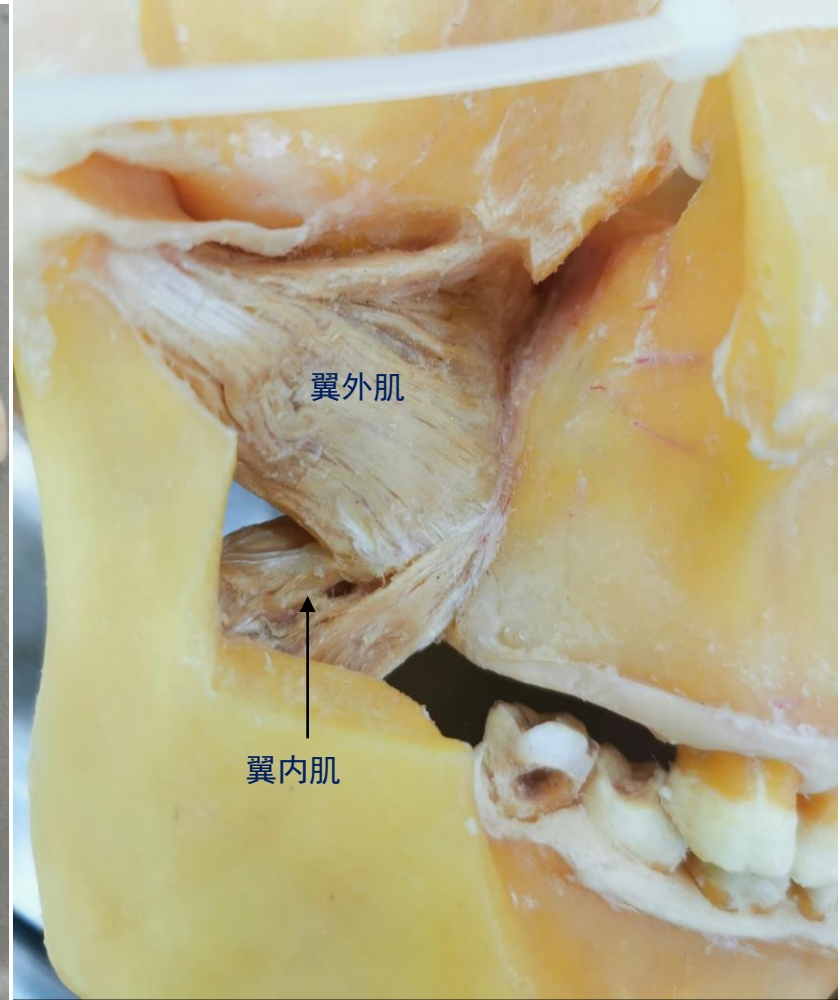
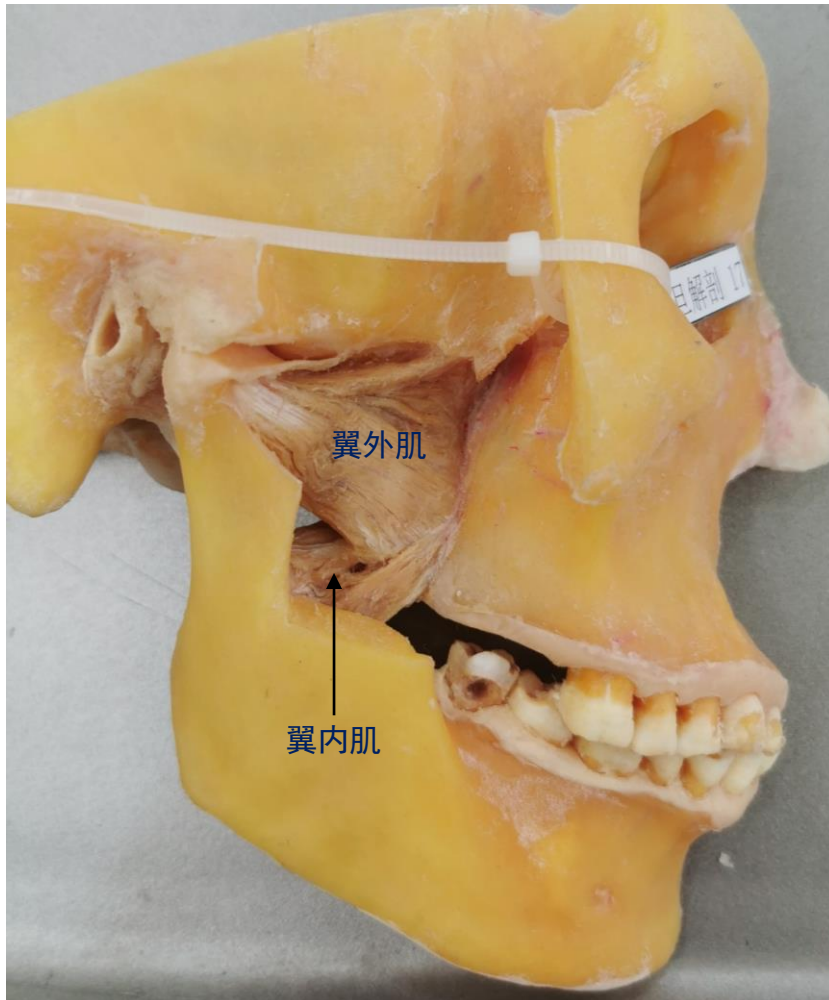


B

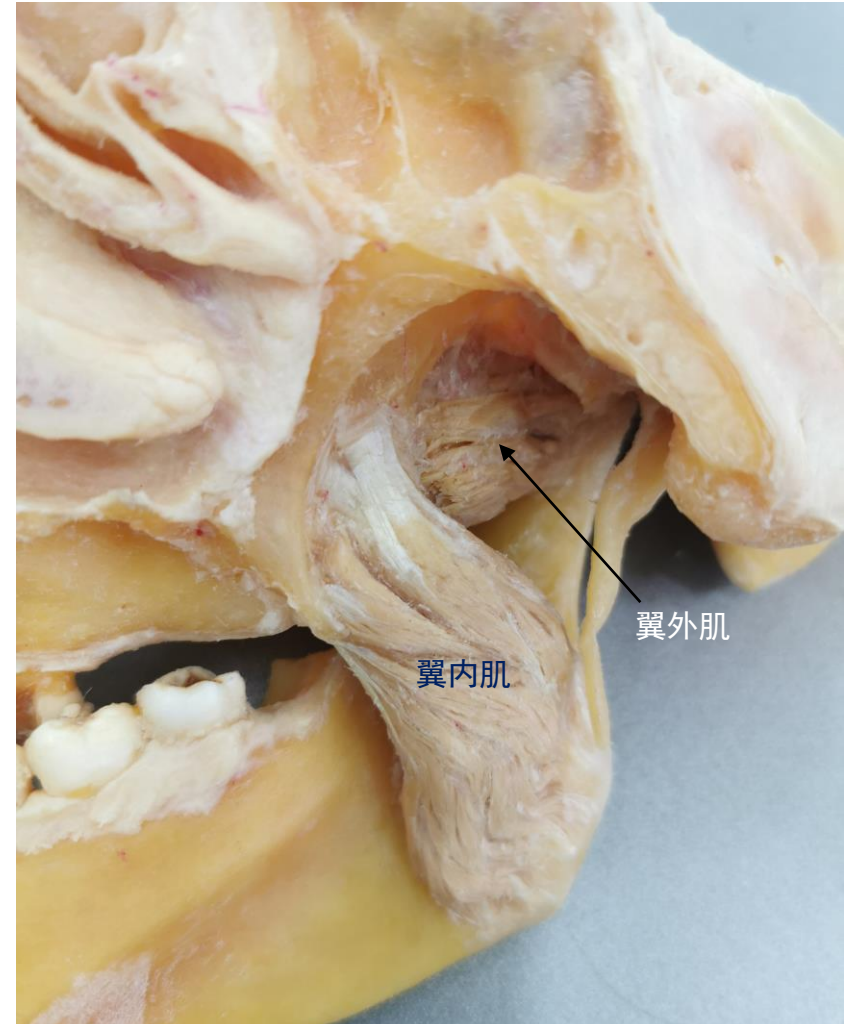
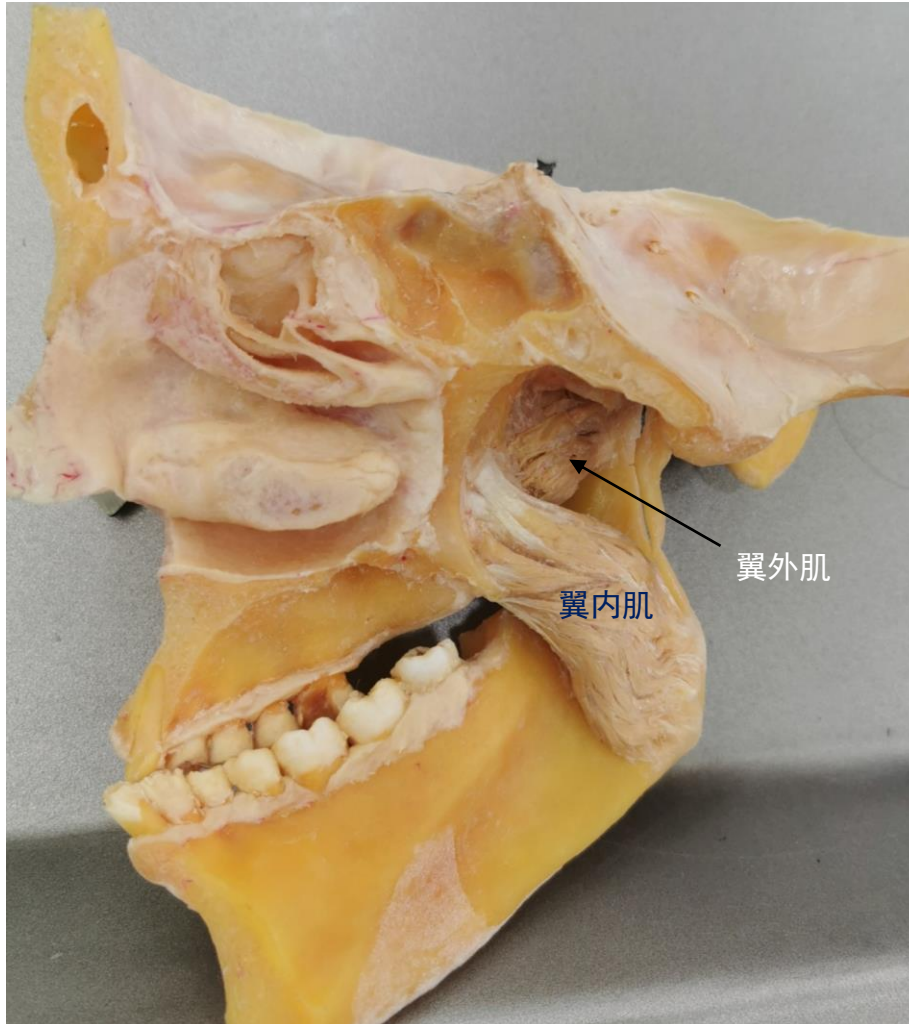
A. 移除下颌骨冠状突和颞肌下部，以便于同时观察翼内肌、翼外肌。

B. 移除颞肌，于翼外肌下头**开窗**。翼外肌启动降下颌骨运动，随后由舌骨上、下肌群和重力继续完成。打开颞下颌关节，可见来自翼外肌上头的肌纤维与关节盘相交织。翼外肌是颞下颌关节的引导肌肉。翼内肌走行与翼外肌近乎垂直，并参与构成部分包绕下颌骨的肌肉悬带。注意翼外肌下头于翼内肌两头之间发出。

咀嚼肌-翼内肌与翼外肌-外面观



咀嚼肌-翼内肌与翼外肌-内面观



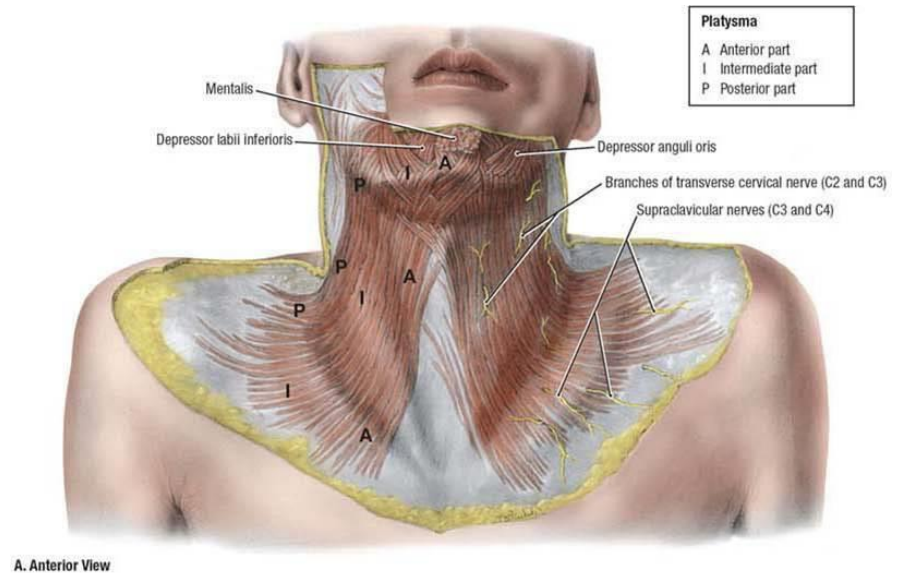
Muscles of the neck



Platysma 颈阔肌

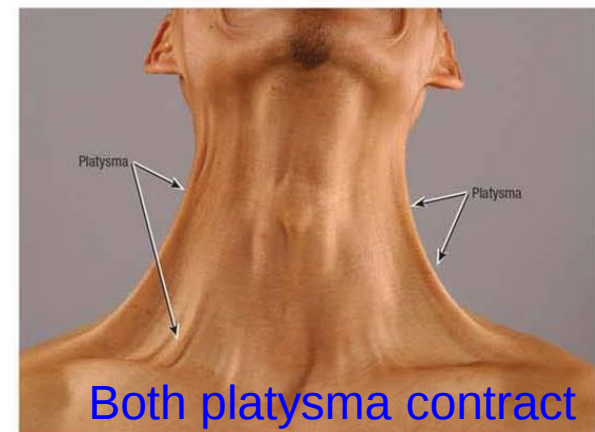
Skin muscle

Arise from the deep fascia over the pectoralis major & deltoid & **inserted** into the skin of lower part of the face.



Action

Tense the skin of neck
 Draws corners of mouth down
 Assists in depressing mandible



Superficial muscles of the neck

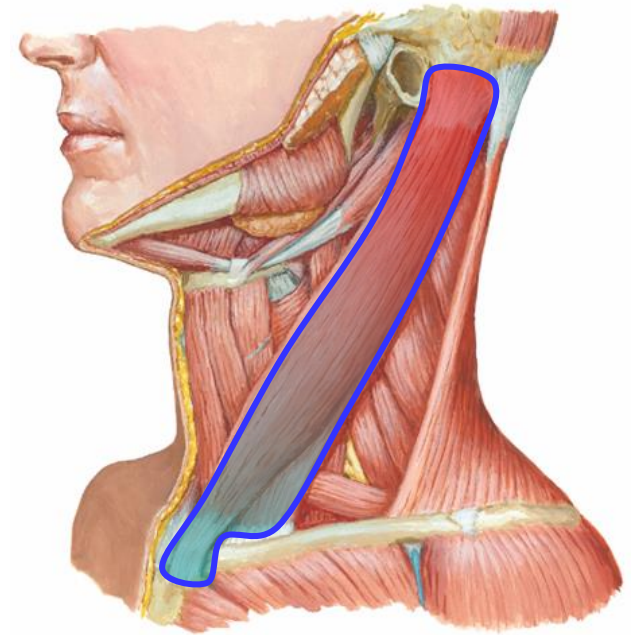
Sternocleidomastoid m. 胸锁乳突肌

Name from origin and insertion

A prominent visible landmark

Action- **Acting alone**: The head is inclined laterally & the face rotate to the opposite side

Acting together- they draw the head backward or raise the head



Muscle of neck lateral view



Both side mm. contract



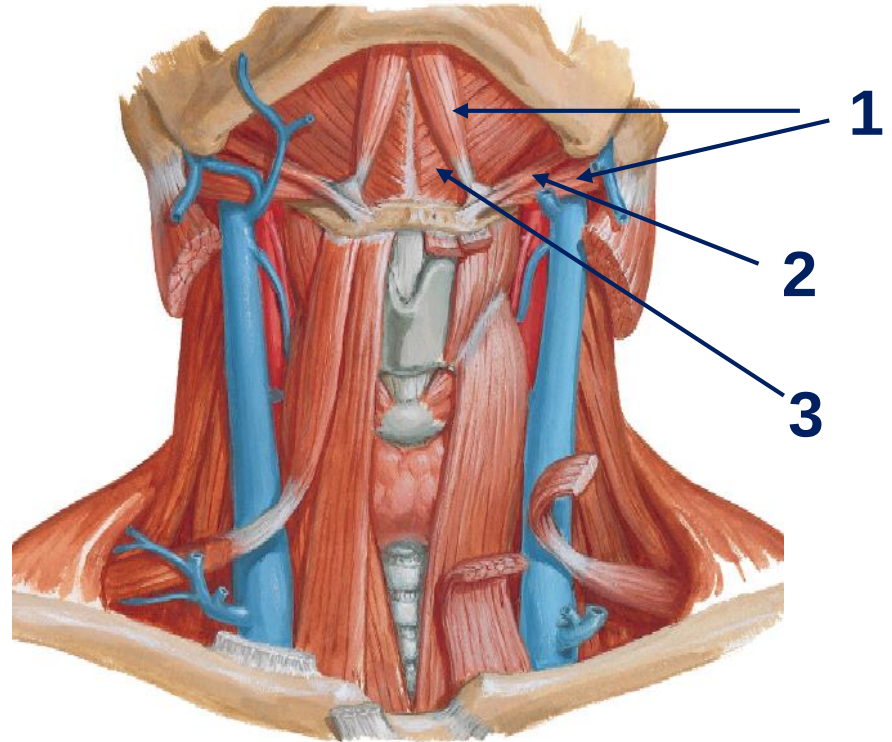
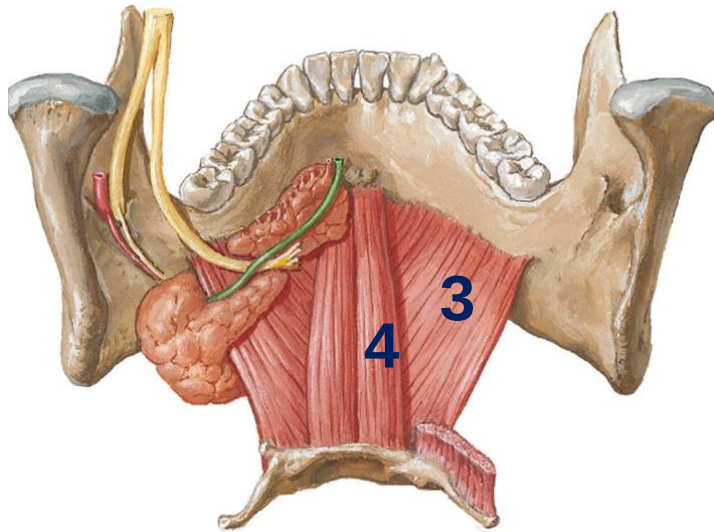
One side. contracts

1-Digastric m. 二腹肌

2-Stylohyoid m. 茎突舌骨肌

3-Mylohyoid m. 下颌舌骨肌

4-Geniohyoid m. 颏舌骨肌



Pull the hyoid upward, backward & help to depress the mandible when the hyoid is fixed

Infrahyoid muscle

Superficial layer

1-Sternohyoid m. 胸骨舌肌

2-Omohyoid m. 肩胛舌骨肌

Deep layer

3-Sternothyroid m. 胸骨甲状肌

4-Thyrohyoid m. 甲状舌骨肌

Length of muscle 1 = m 3 + m 4

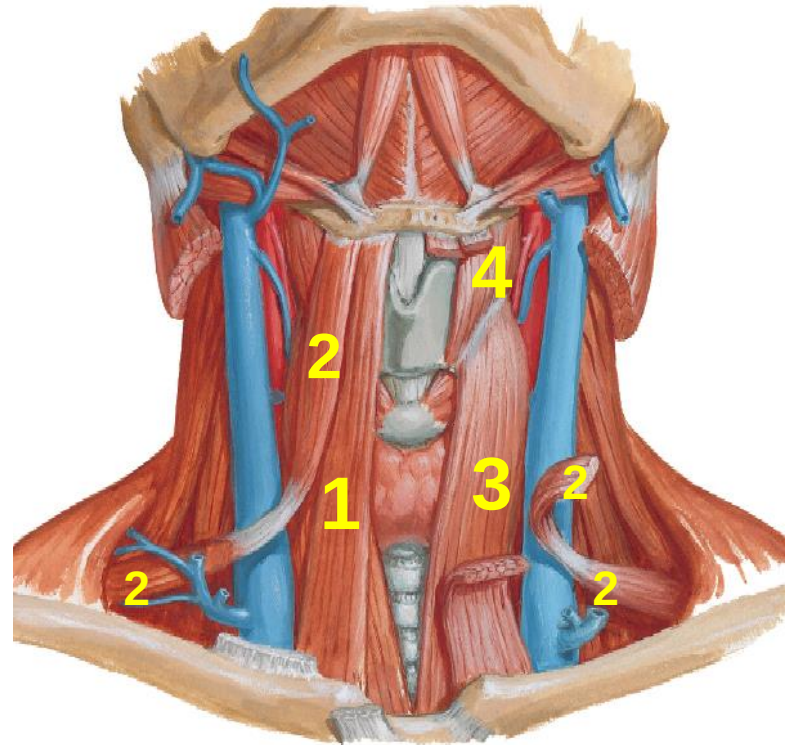
Action

1-Depresses the hyoid bone as it contracts

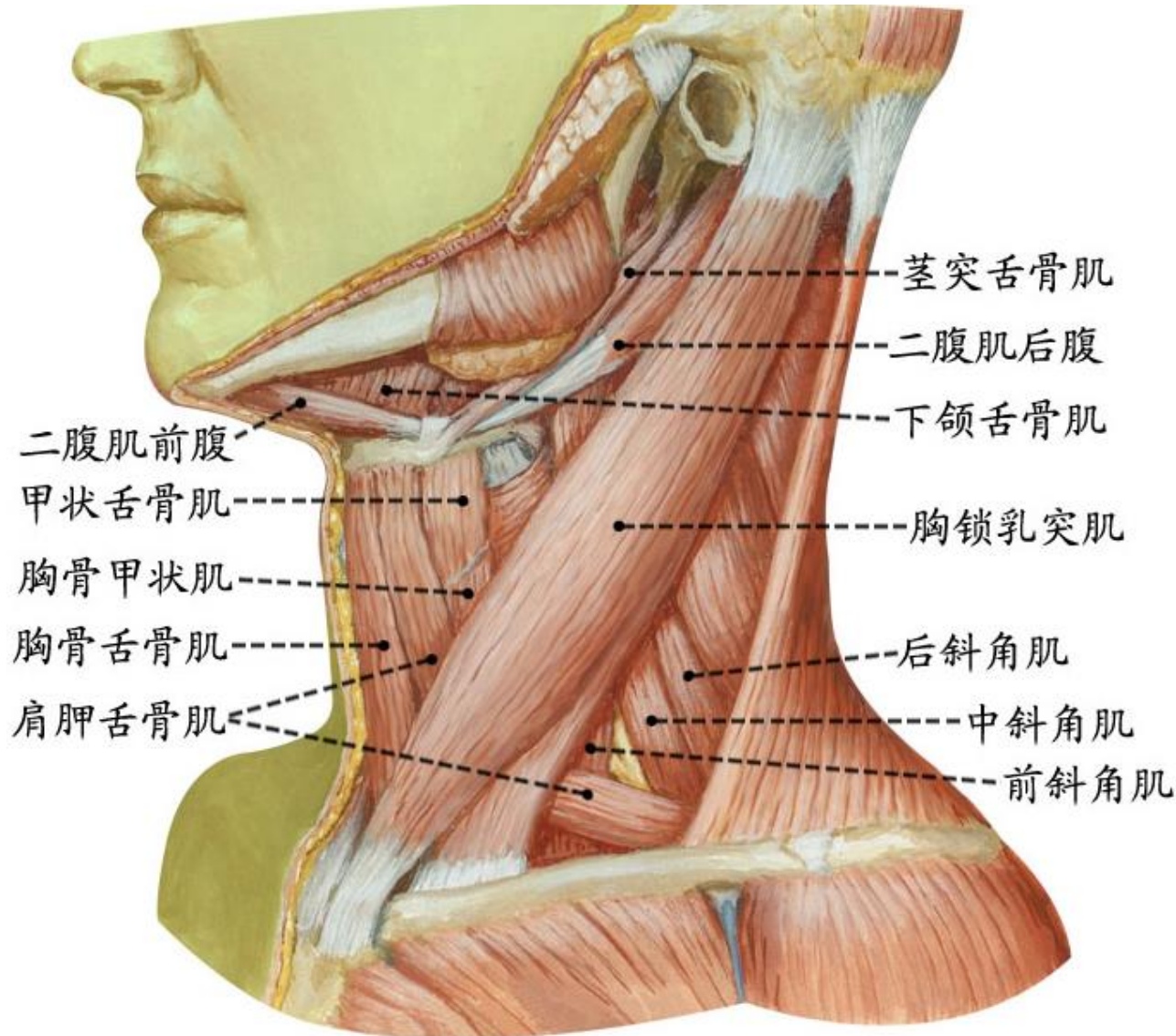
2-Larynx is pulled downward

3-Elevates the larynx and lowers the hyoid bone

4-It acts to depress the hyoid bone



Suprahyoid & infrahyoid mm. 舌骨上下肌群



Lateral groups

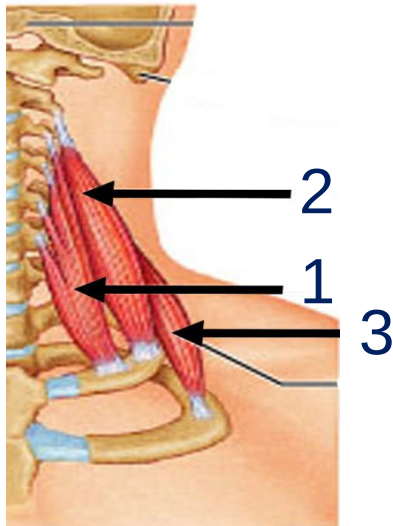
1-Scalenus anterior 前斜角肌

2-Scalenus medius 中斜角肌

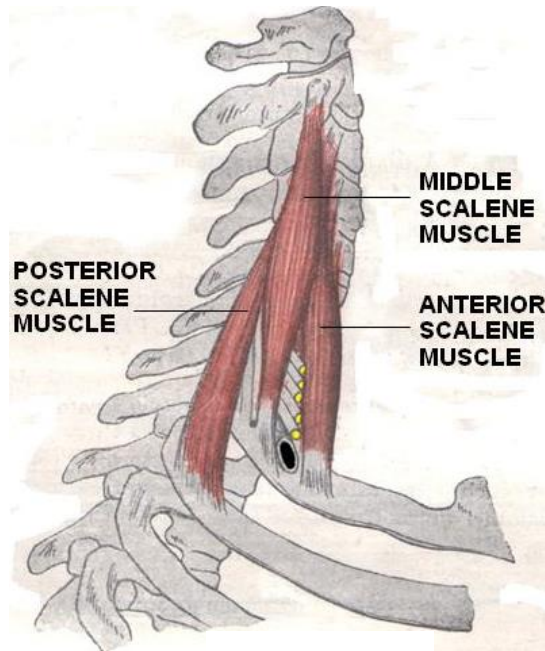
3-Scalenus posterior 后斜角肌

Action

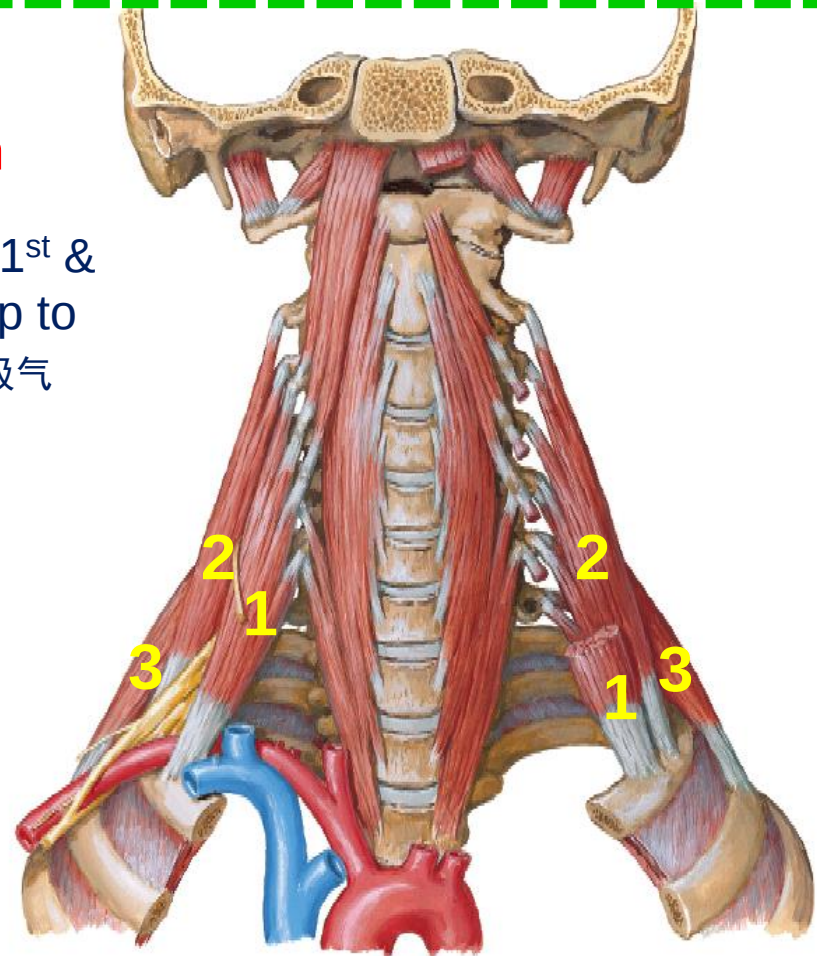
Elevate the 1st &
2nd rib & help to
inspiration 吸气



Ant.view



Lat.view



Ant.view of cervical muscles

Scalene fissure 斜角肌间隙

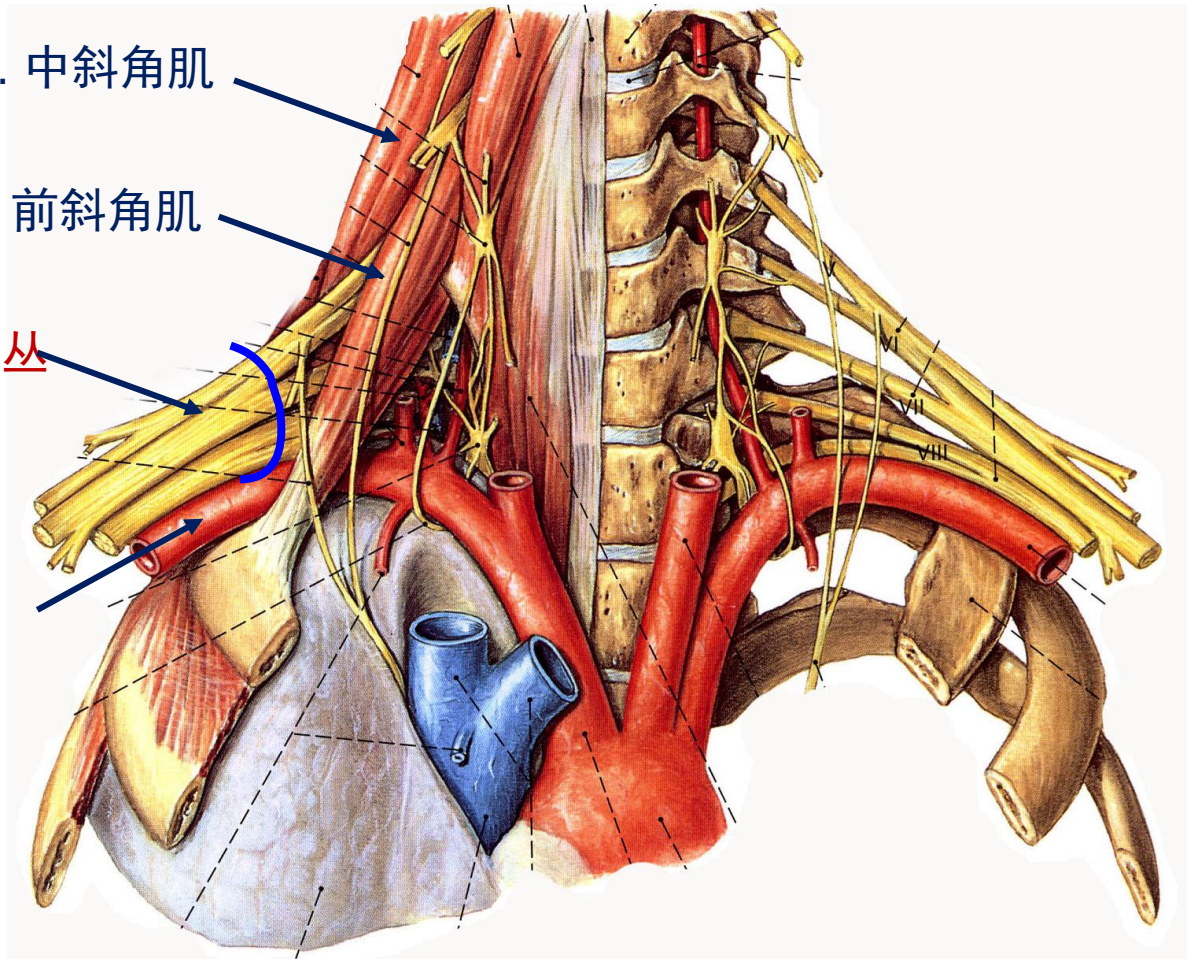
Between scalenus ant. & mid.subclavian a. & Brachial plexus pass from the fissure

Scalenus mid. 中斜角肌

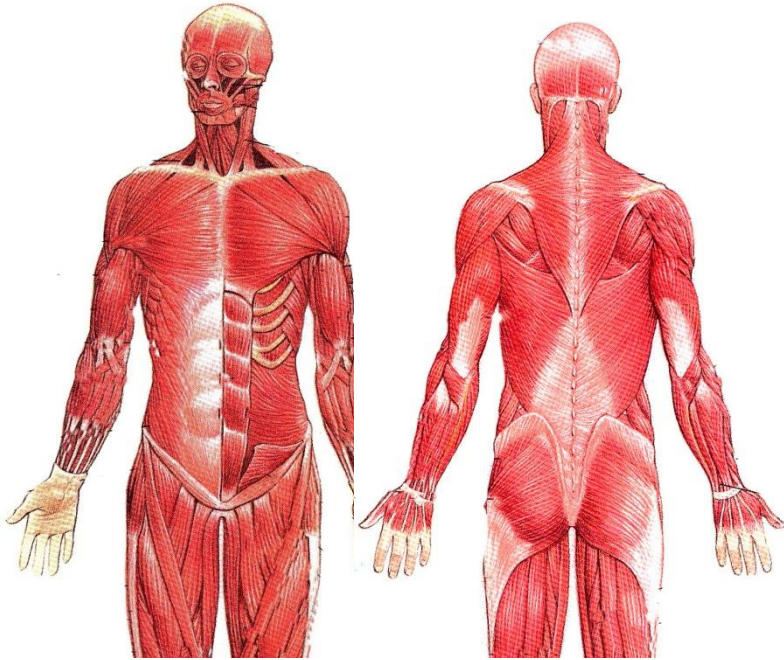
Scalenus ant. 前斜角肌

Brachial plexus. 臂丛

Subclavicular a.
锁骨下动脉

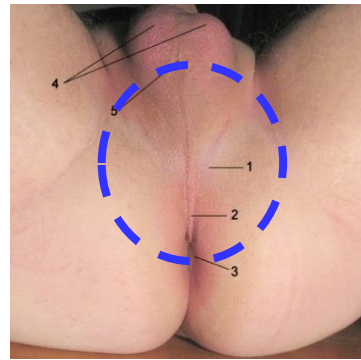


Muscles of the trunk



Thorax m.
Abdomen m.

Back m.



Perineal m.
会阴肌



Diaphragm
膈肌

Superficial muscle

1-Trapezius 斜方肌

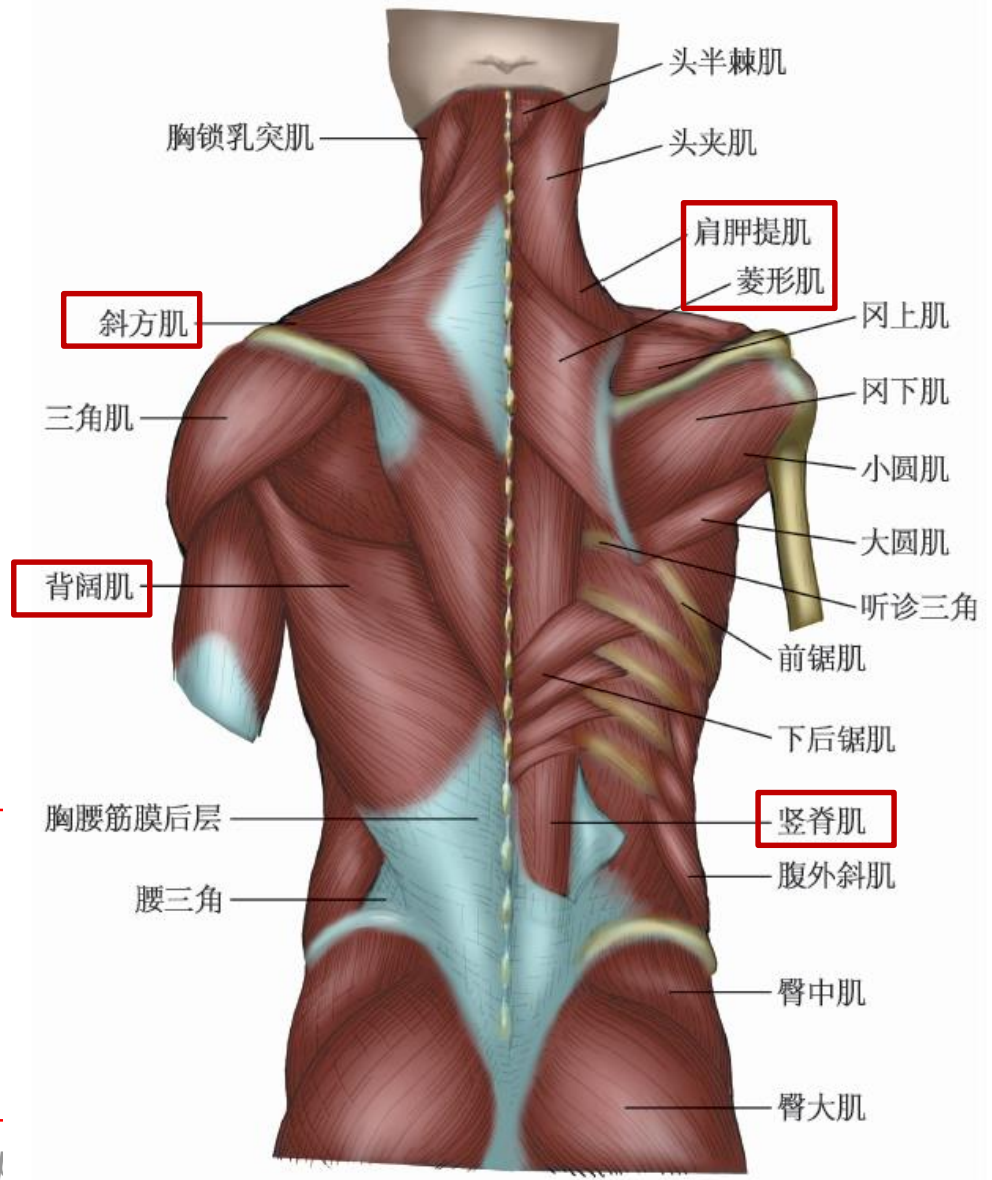
2-Latissimus dorsi 背阔肌

Deep mm.

3-Levator scapulae 肩胛提肌

4-Rhomboid m. 菱形肌

Movement of the limb

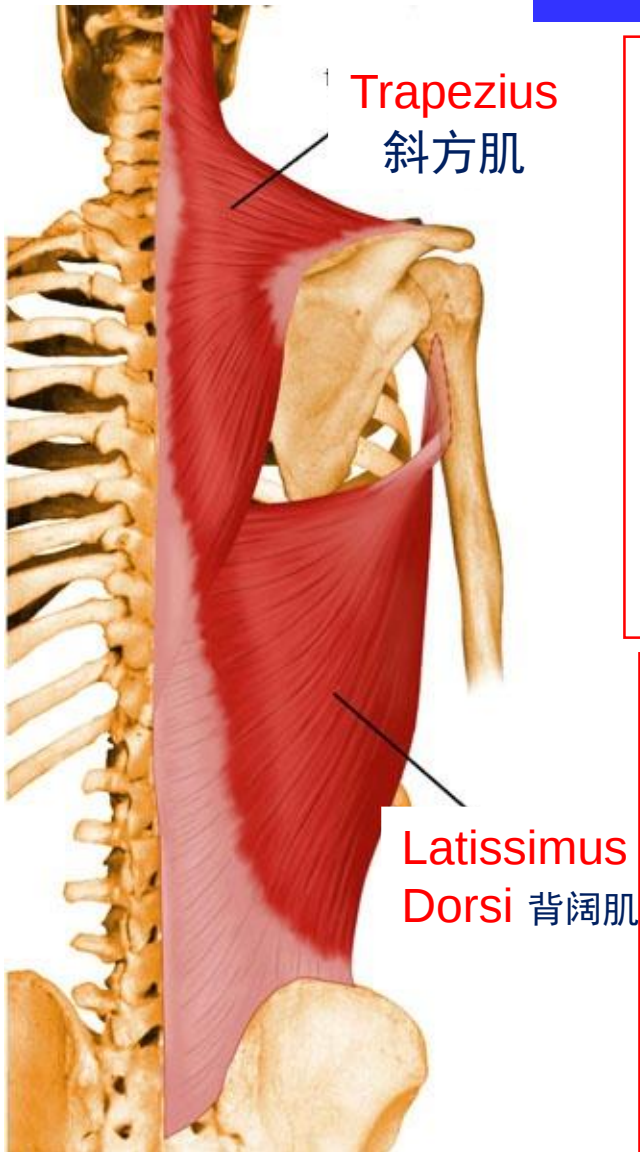


Deep muscle

Erector spinae 竖脊肌

Movement of vertebral column

Superficial muscle of back



Large triangular in neck and back

Origin: ext. occipital protuberance

Spine of 1-7 cervical vertebra

Spine of 1-12 thoracic vertebrae

Insertion

The lat. 1/3 of the clavicle

The acromion & the spine of scapula

Action: raises, descends, retracts & rotates the Scapula and extends the head

Large wide & triangular flat m. in back

Origin:

Spinous process of 7-12 thoracic vertebrae.

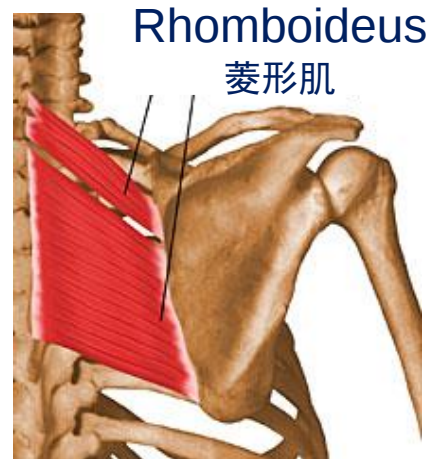
Thoracolumbar fascia, spinous process of lumbar vertebrae, iliac crest

Insertion

Crest of lesser tuberosity of humerus

Action: extends, adducts and medially rotates humerus at shoulder joint

Superficial muscle of back



Levator scapulae

A strap-like muscle

Origin: spine of 1-4 cervical vertebrae

Insertion: medial border of scapula

Rhomboideus like a rhomboid shape

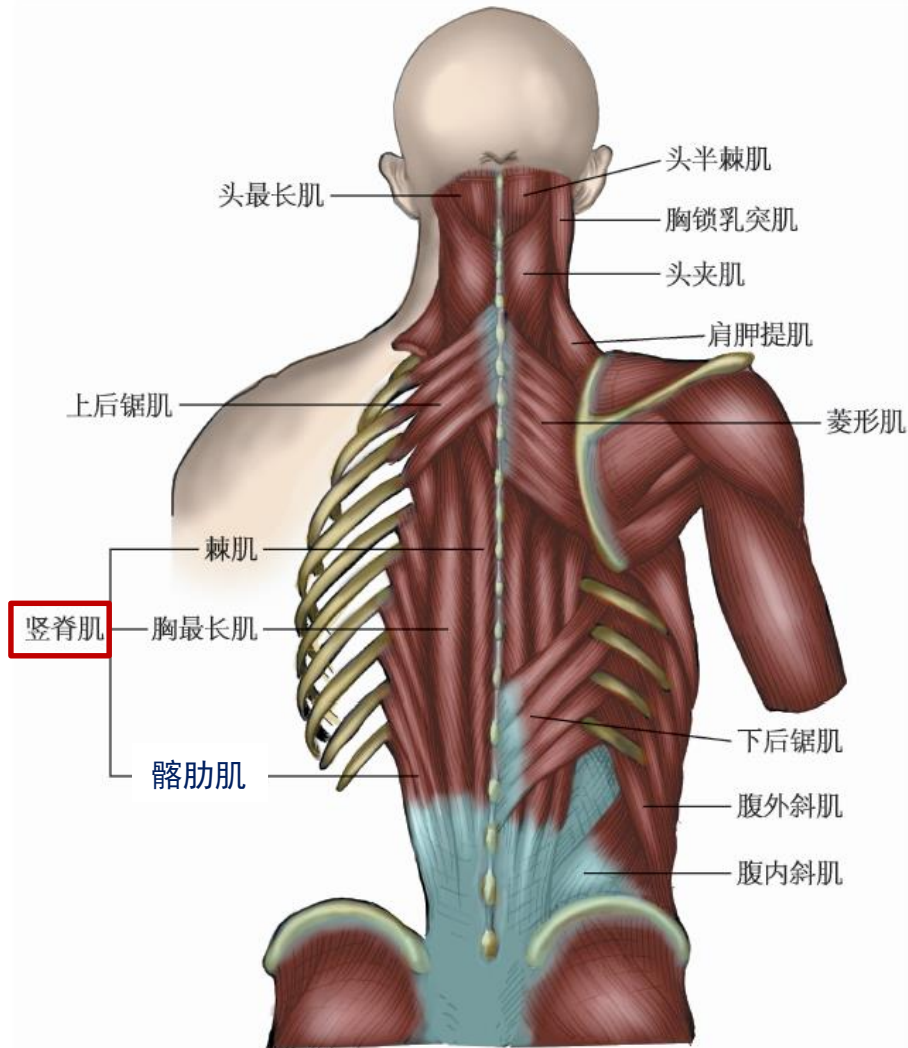
Origin: spine of C₇ & T₁₋₆

Insertion: medial border of scapula

Action:

It elevates the scapula. It may also retract & fix the scapula with the rhomboideus

Deep muscle of back



Erector spinae 竖脊肌

Origin:

Sacrum, ilium & related lig.

Insertion:

Ribs and vertebrae

Action:

When acting on one side it
Bends and rotates the spinal
Column toward the opposite side.
When acting on both sides
It extends the spinal column.

Muscles of thorax

Extrinsic m. 胸上肢肌

(origin from thoracic wall,
Insertion to upper limb bone)

Pectoralis major 胸大肌

Pectoralis minor 胸小肌

Serratus anterior 前锯肌

Intrinsic m. 胸固有肌

(both origin and insertion are
in thoracic wall)

Ext. Intercostal m. 肋间外肌

Int. Intercostal m. 肋间内肌

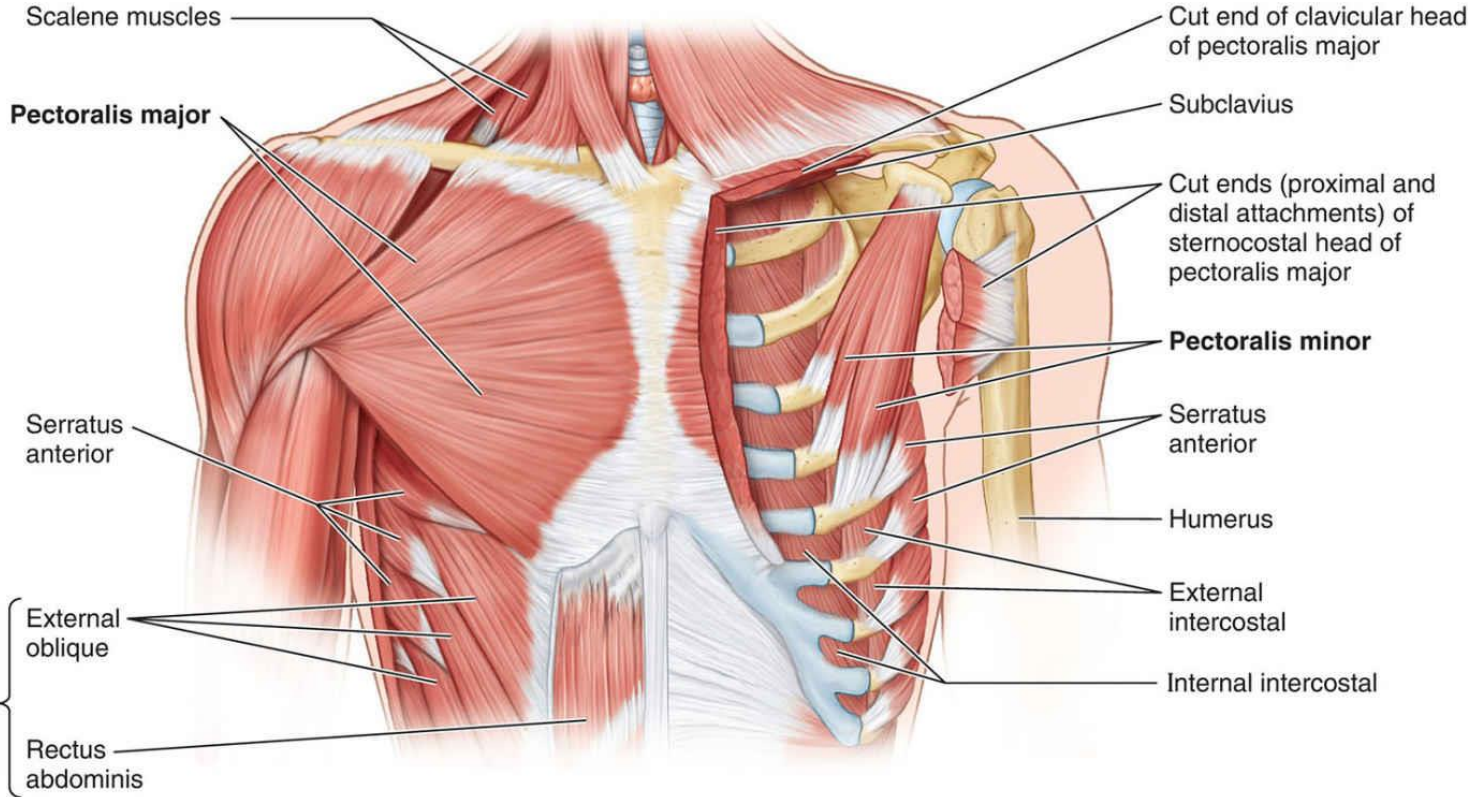
Transversus thoracis 胸横肌

Intercostales intimi 肋间最内肌

Ext. intercostal membrane 肋间内膜

Int. intercostal membrane 肋间外膜

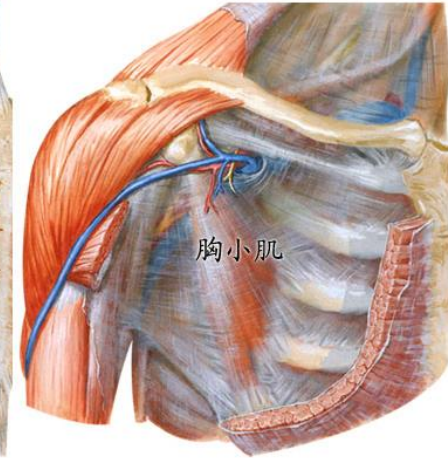
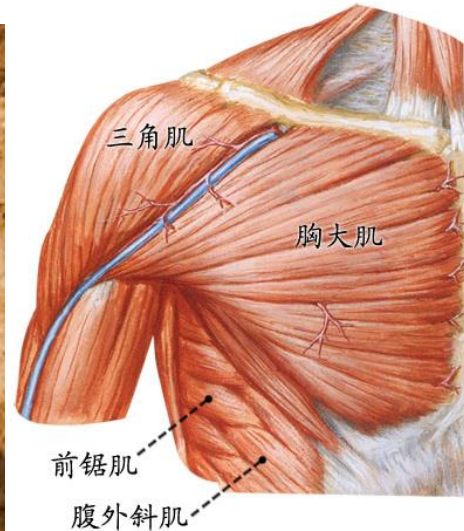
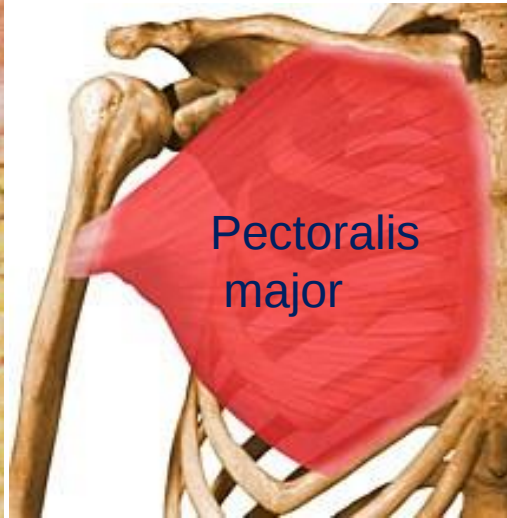
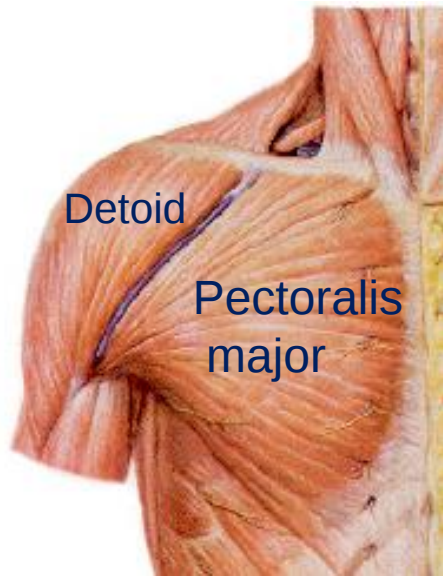
Muscles of thorax- Pectoralis major 胸大肌



Axio-appendicular, neck, and anterolateral abdominal muscles overlying thoracic wall. The pectoralis major has been removed on the left side to expose the pectoralis minor, subclavius, and external intercostal muscles. When the upper limb muscles are removed, the superiorly tapering domed shape of the thoracic cage is revealed.

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Muscles of thorax- Pectoralis major 胸大肌



Large thick fan-shaped

Origin: The medial half of the clavicle

The sternum

The upper 6 costal cartilages

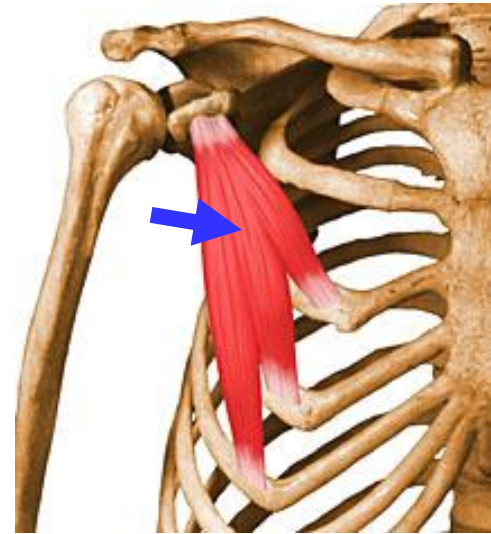
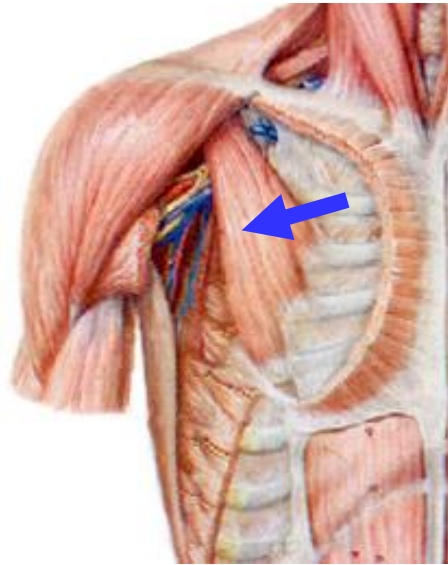
Aponeurosis of obliquus externus abdominis

Insertion: Crest of greater tuberosity of humerus

Action: Adduction, flexion & med.rotation of the arm.

When arm is fixed, draws the body upward.

Muscles of thorax- Pectoralis minor 胸小肌



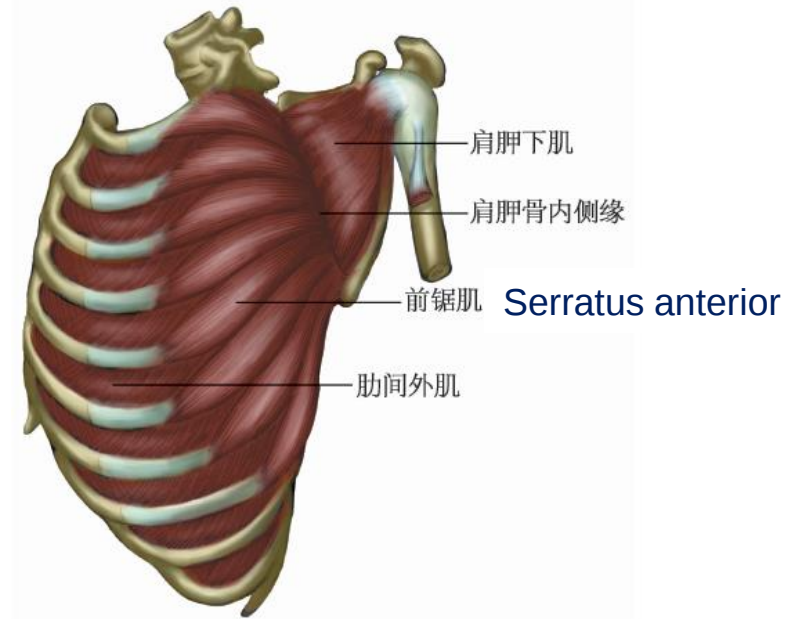
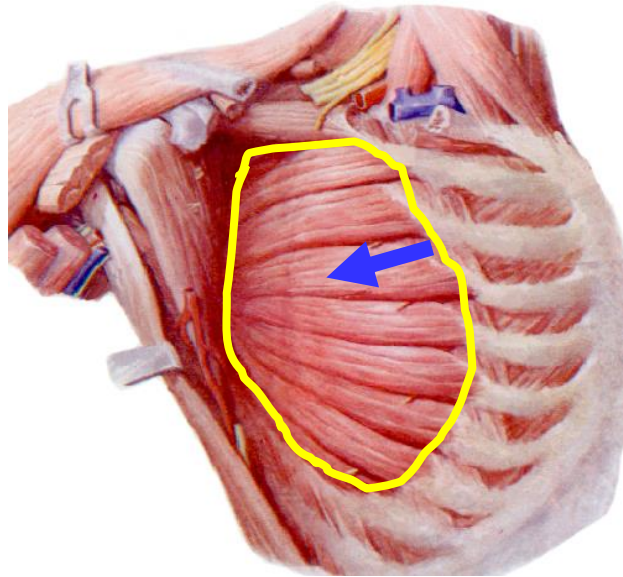
Pectoralis minor- small flat triangular m.

Origin: External surface of 3-5th ribs

Insertion: Coracoid process of scapula

Action: Stabilizes scapula by drawing it forward & downward. when the scapula is fixed, it helps the inspiration. It is also useful landmark (axilla)

Muscles of thorax- Serratus anterior 前锯肌



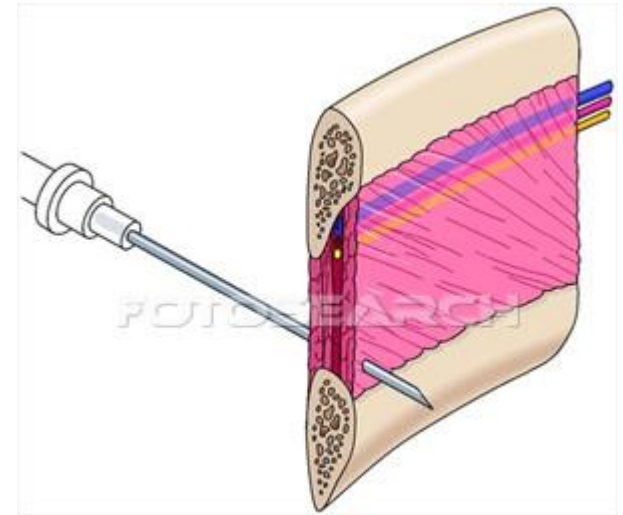
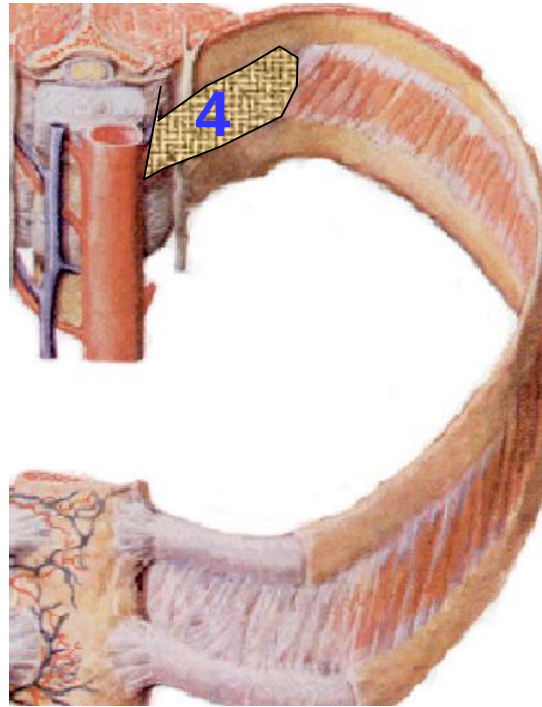
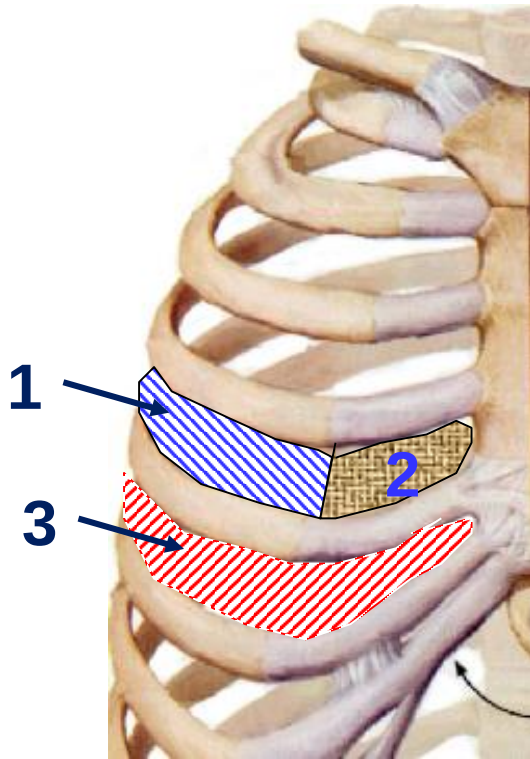
A large thin powerful in lateral part of thorax

Origin: external surface of upper 8 or 9 ribs

Insertion: internal border of the scapula

Action: Holds the scapula against the chest wall
Pulls the scapula forwards in throwing and pushing
by fixing the scapula it helps the inspiration

External & internal intercostal m.



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Puncture of thoracic wall

1-Ext.intercostal m.

2-Ext.intercostal membrane

3-Int.intercostal m.

4-Int.intercostal membrane

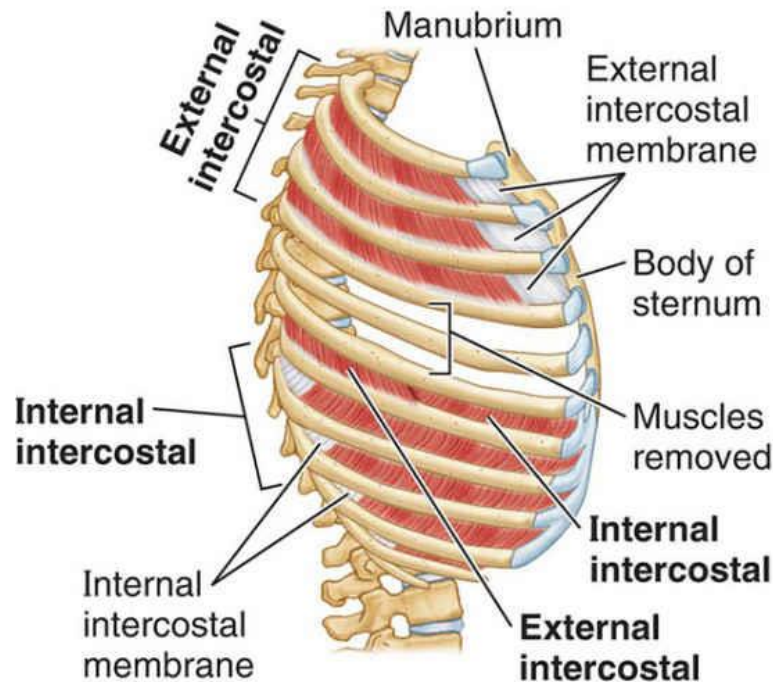
External intercostal m.

Help to inspiration

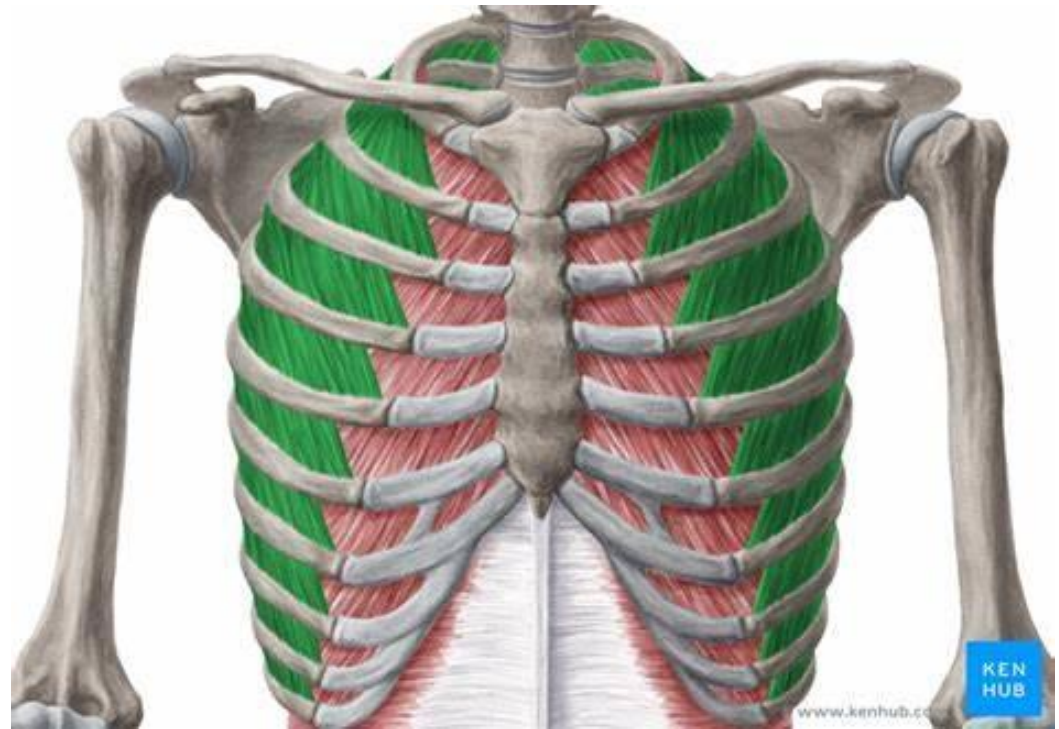
Internal intercostal m.

Help to expiration

External & internal intercostal m.



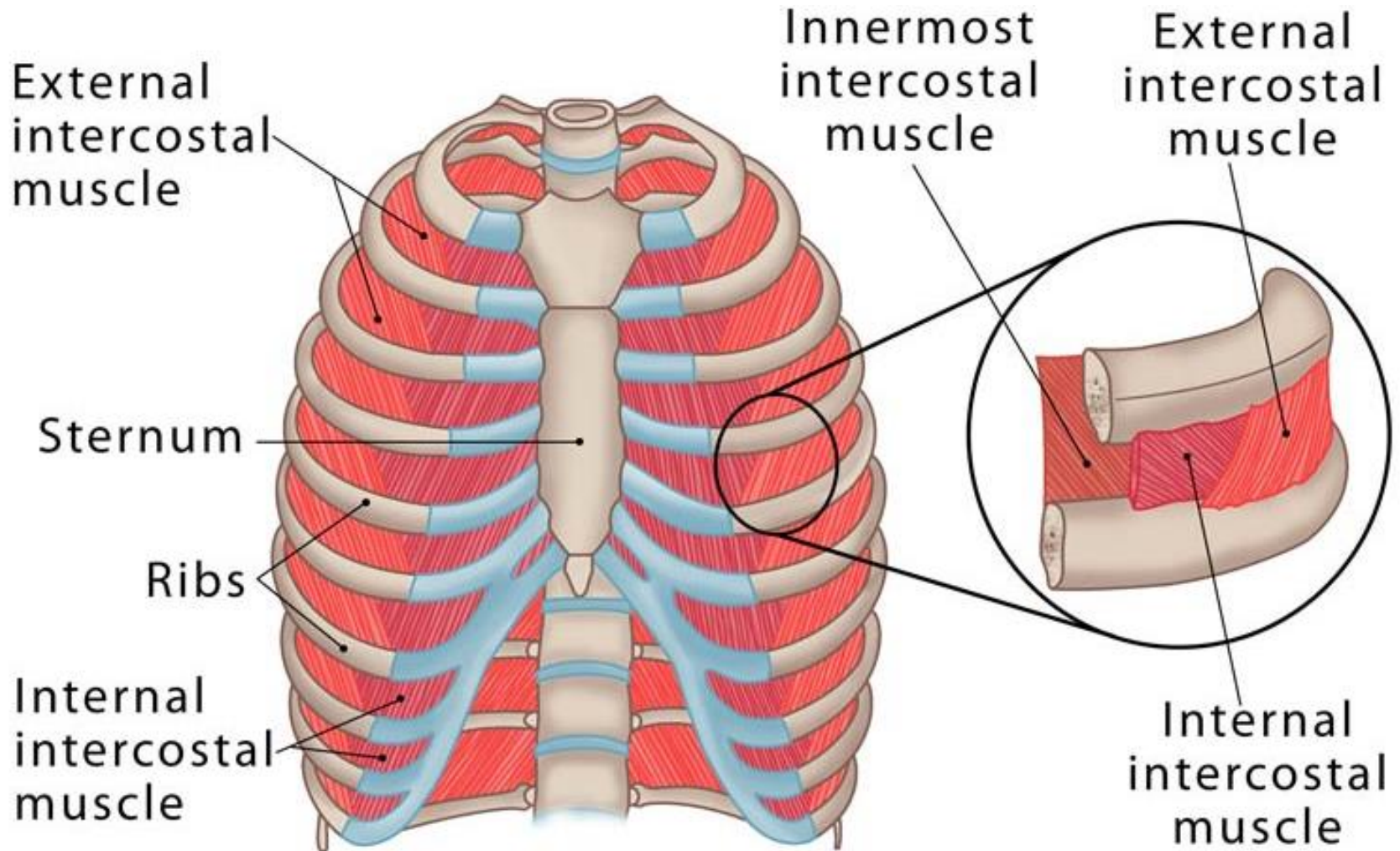
(A) Lateral view



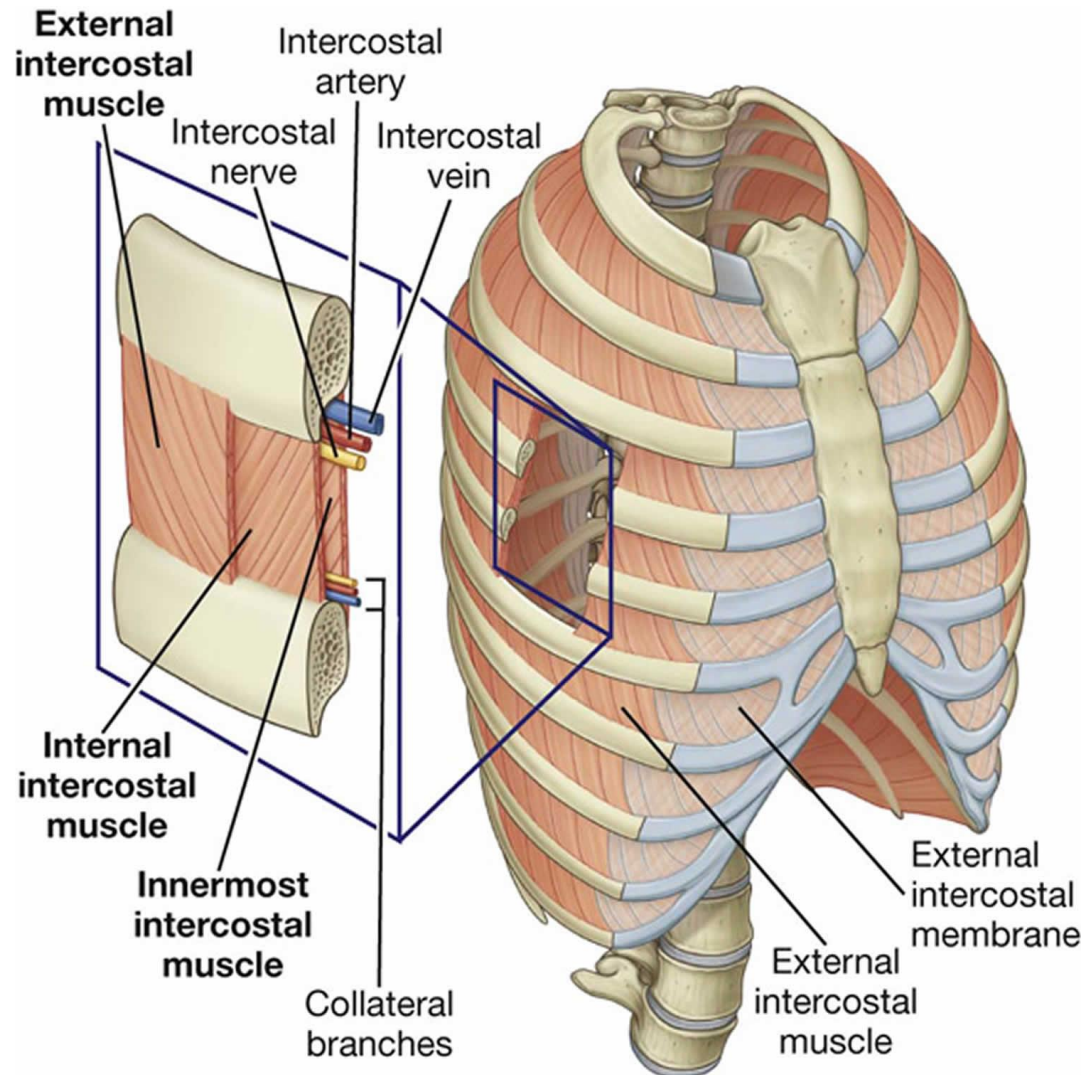
Green -external intercostal mm.

Red -internal intercostal mm.

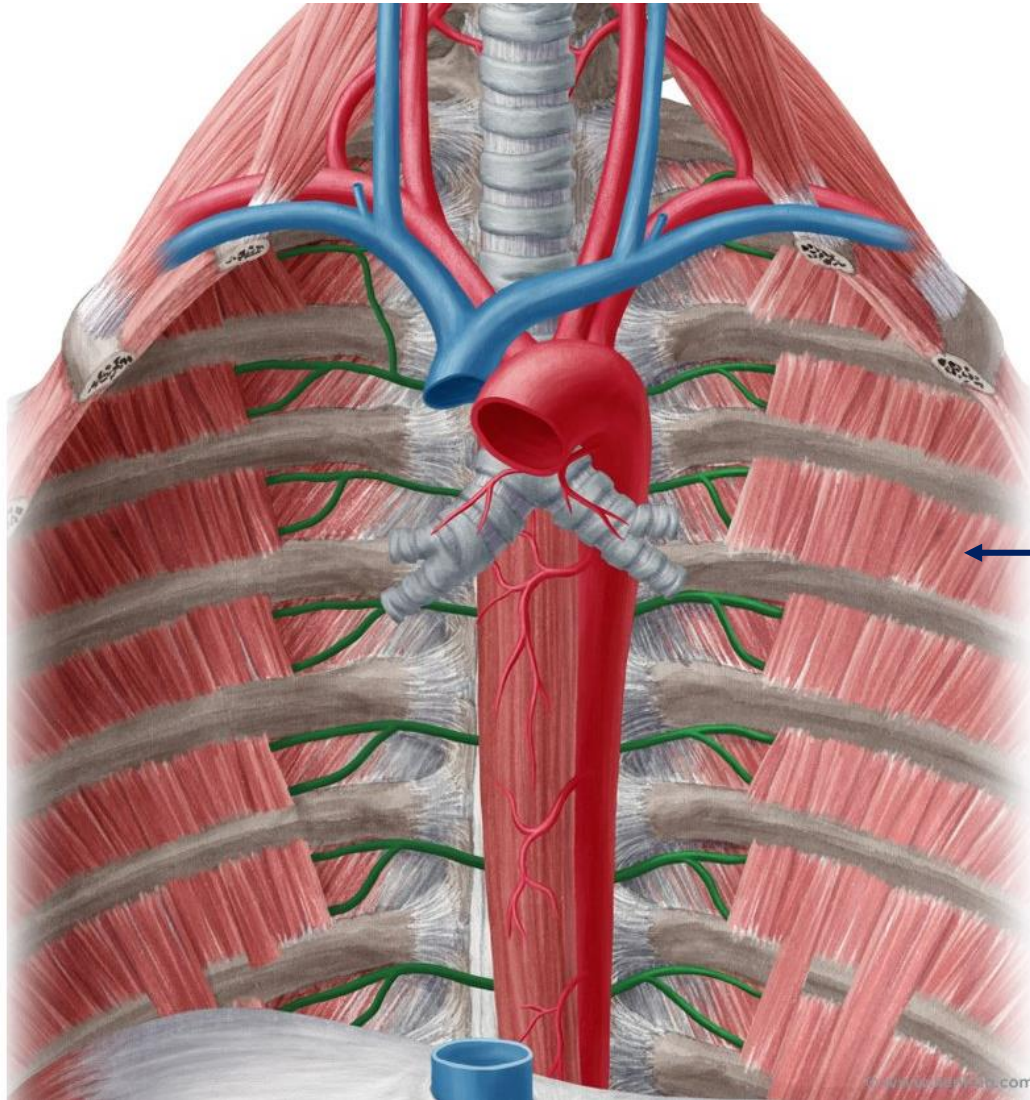
Intercostal muscles.



Intercostal muscles & blood vessels & nerves.



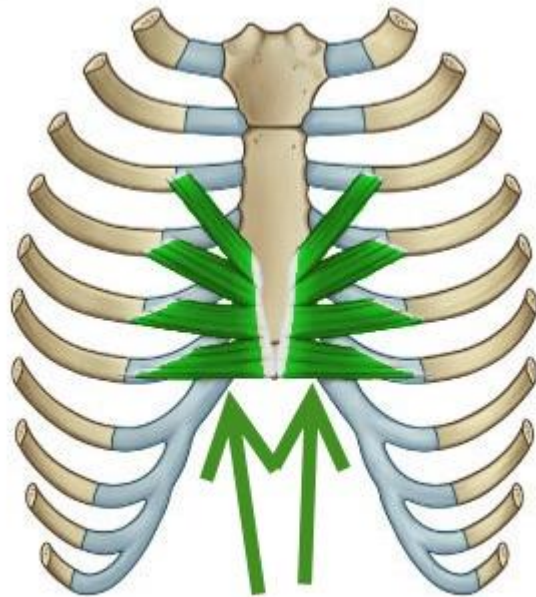
Innermost muscles



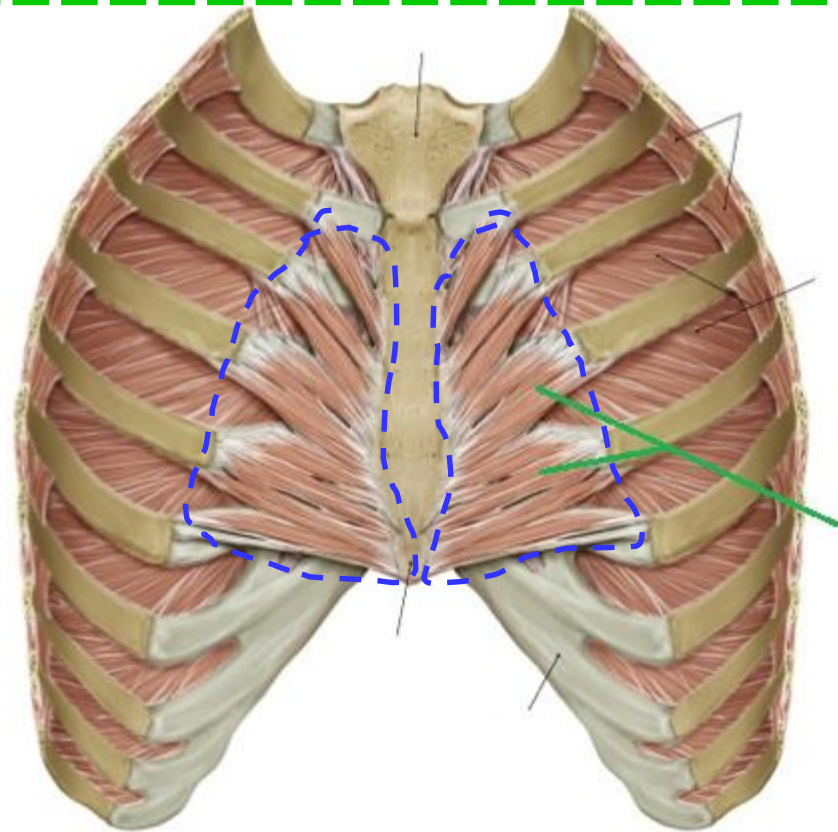
Innermost m.
肋间最内肌



Transverse thoracis 胸横肌



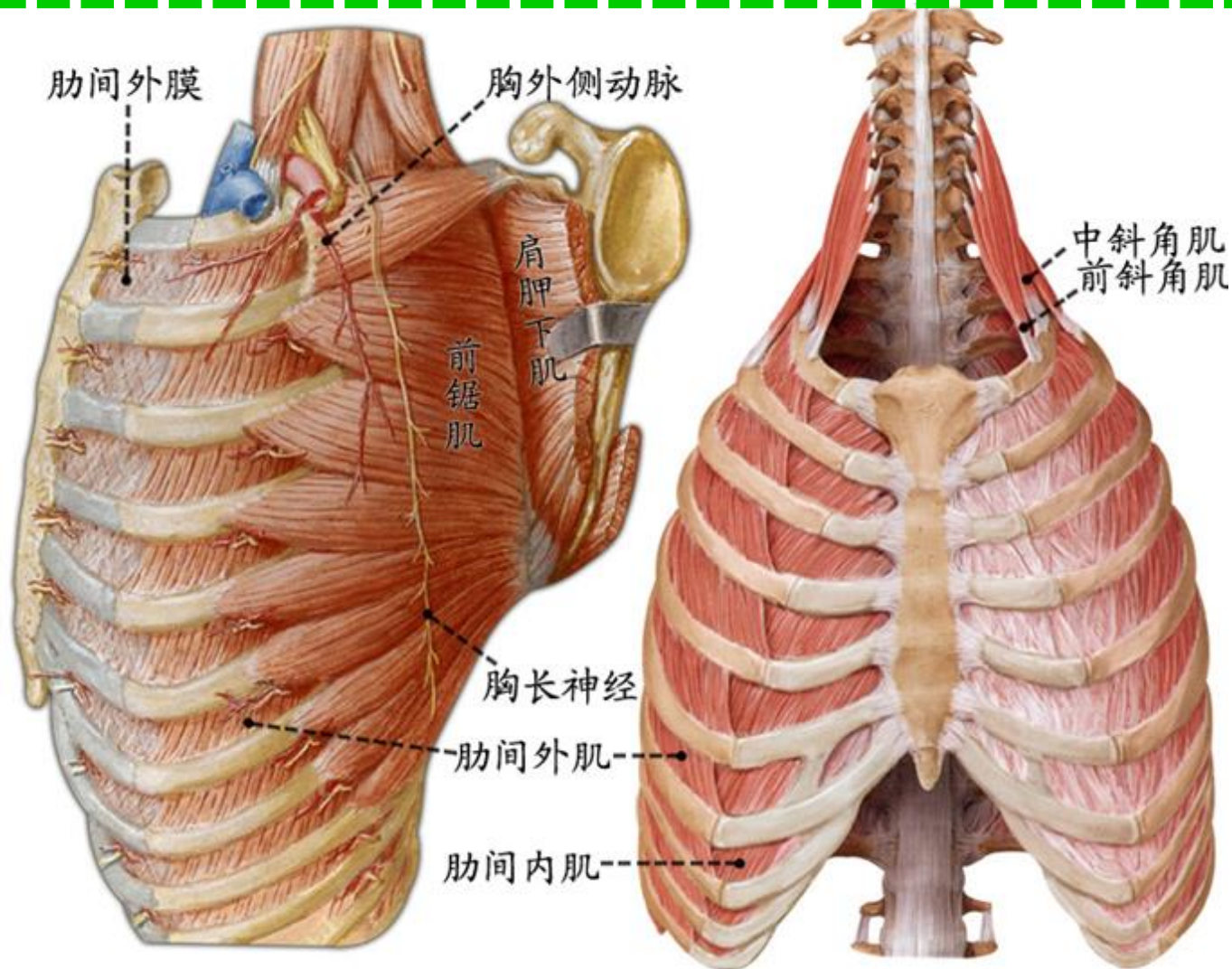
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Posterior view of ant. thoracic wall

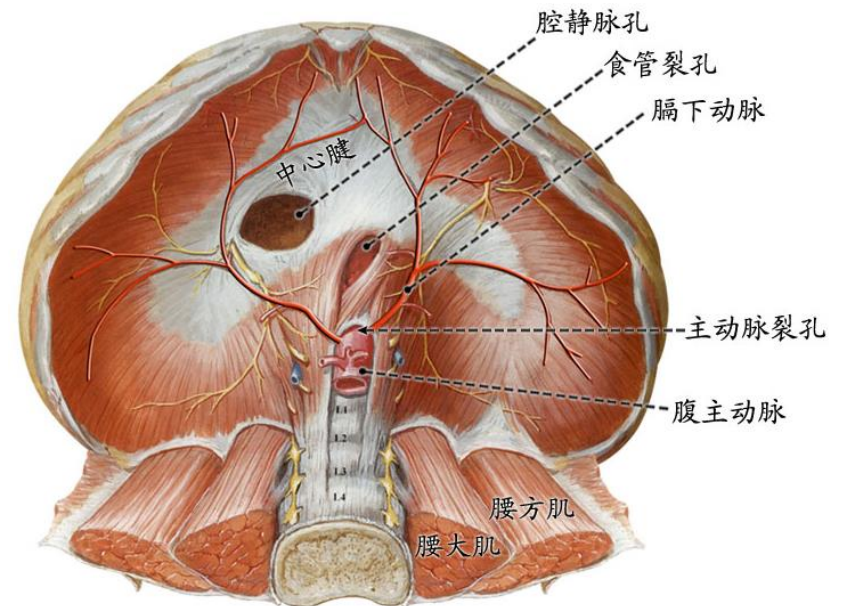
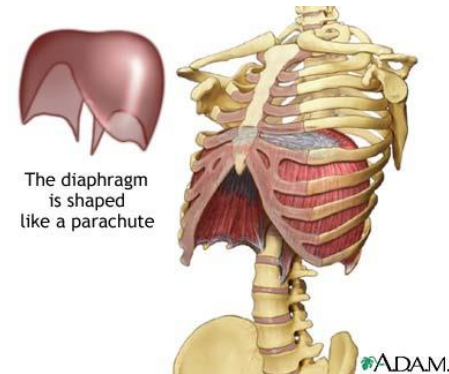
- ◆ Locate on the int. surface of ant. thoracic wall
- ◆ Originate from lower part of sternum
- ◆ Insert to int. surface of 2-6 rib
- ◆ Function: to help to expiration

Serrates anterior and intercostal mm.



Diaphragm

- ◆ The dome-shaped septum 穹隆形
- ◆ Dividing thoracic cavity and abdominal one
- ◆ The muscular fiber is around the central tendon
- ◆ 3 portions: sternal, costal & lumbar parts
- ◆ Three openings (hole)
- ◆ Vena caval foramen 腔静脉孔
- ◆ Aortic hiatus 主动脉裂孔
- ◆ Esophageal hiatus 食管裂孔
- ◆ Important respiratory muscle
- ◆ Diaphragmatic hernia 膈疝

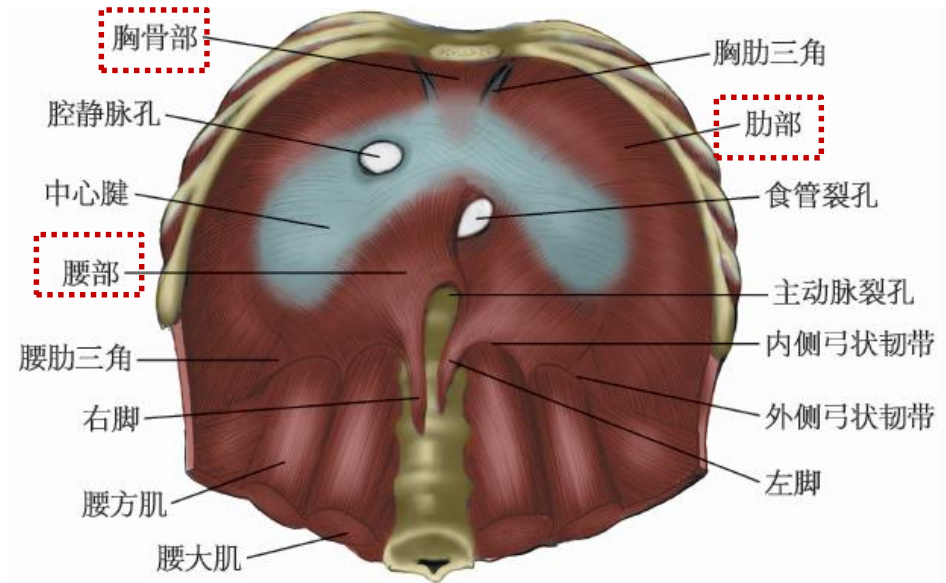


Three portions

Sternal part 胸骨部

Costal part 肋部

Lumbar part 腰部



Three foramen

1-Vena caval foramen 腔静脉孔 (T_8)

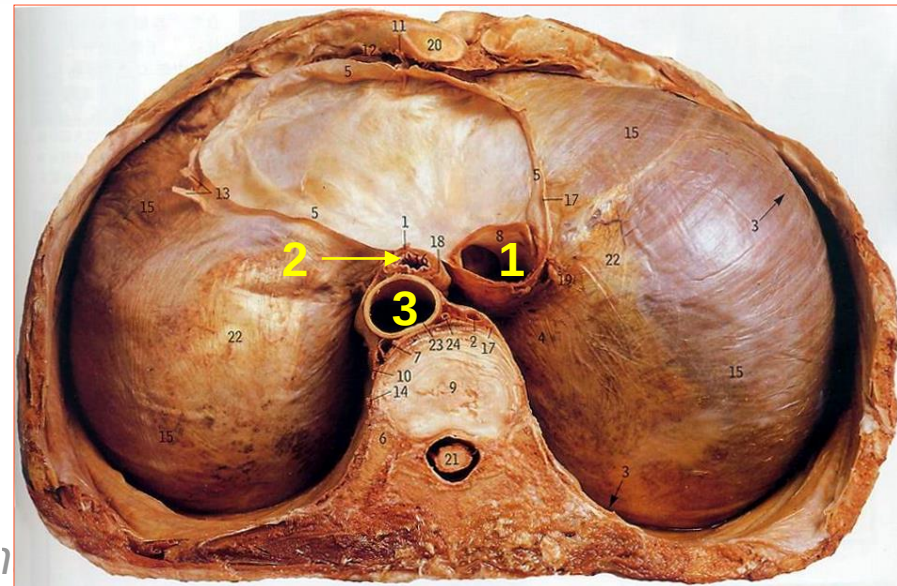
通过结构：下腔静脉

2-Esophageal hiatus 食管裂孔 (T_{10})

通过结构：食管，迷走神经-2

3-Aortic hiatus 主动脉裂孔 (T_{12})

通过结构：主动脉，胸导管



The important contents today

- ◆ Master the shape, classification and nomenclature of muscles.
- ◆ Master the accessory structures of muscle
- ◆ Master name, location and function of the masticatory muscle.
- ◆ Master the insertion, origin and function of the sternocleidomastoid & infrahyoid muscles
- ◆ Master the distribution & function of thoracic m. and back muscles.

The important English words

1. Skeletal muscle 骨骼肌
2. Tendinous intersection 腱划
3. Origin & insertion 起点与止点
4. Extensor 伸肌
5. Flexor 屈肌
6. Abductor 展肌
7. Adductor 收肌
8. Levator 提肌
9. Sphincter 括约肌
10. Tendinous sheath 腱鞘
11. Occipitofrontal m. 枕额肌
12. Masticatory m. 咀嚼肌
13. Trapezius 斜方肌
14. Latissimus dorsi 背阔肌
15. Scalenus anterior 前斜角肌
16. Temporal muscle 颞肌
17. Serratus anterior 前锯肌
18. Masseter 咬肌
19. Medial pteroid 翼内肌
20. Skeletal muscle
21. Aortic hiatus 主动脉裂孔
22. Venal caval foramen 腔静脉裂孔
23. Esophageal hiatus 食管裂孔
24. Sternohyoid 胸骨舌骨肌
25. Diaphragm 膈
26. Omohyoid 肩胛舌骨肌
27. Erector spinae 竖脊肌
28. Pectoralis major 胸大肌
29. Internal Intercostal m. 肋间内肌
30. External intercostal m. 肋间外肌

The content next lecture

The muscles of trunk (continued)

The muscles of upper limbs

See you next time!

