



Yoga

Upper Back and Neck

Dr. Steven Paredes, D.C., C.C.N., C.C.S.P.

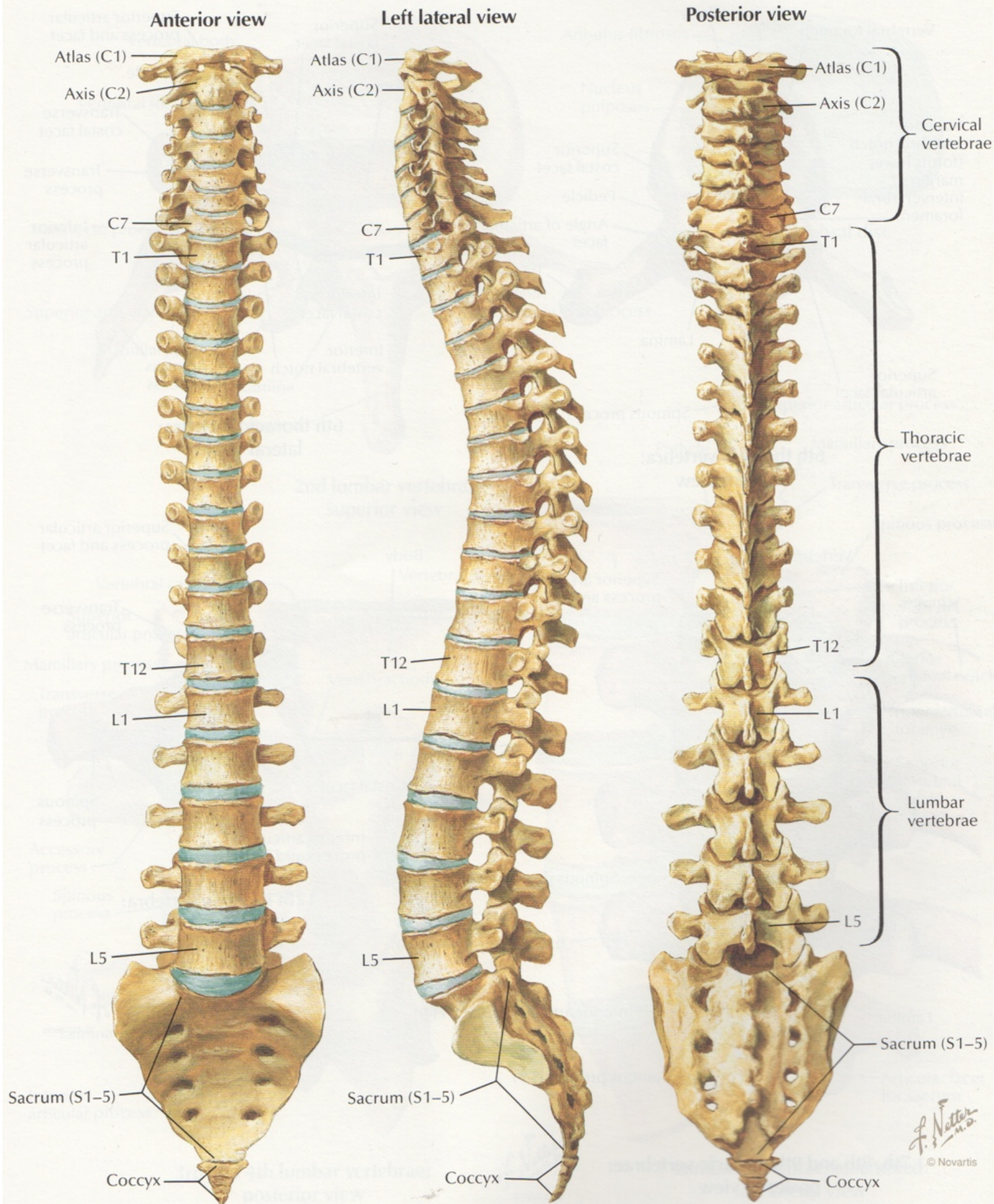
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7 Cervicals

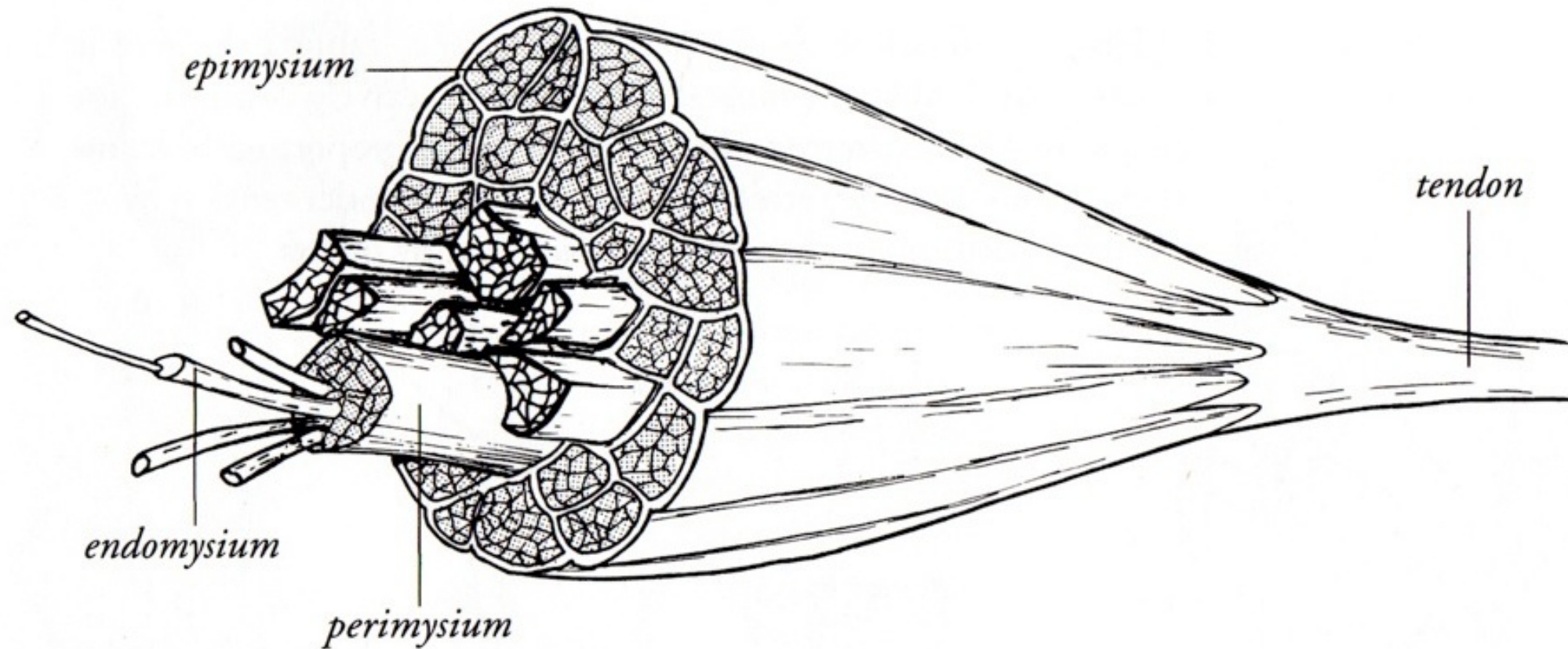
12 Thoracics

5 Lumbar

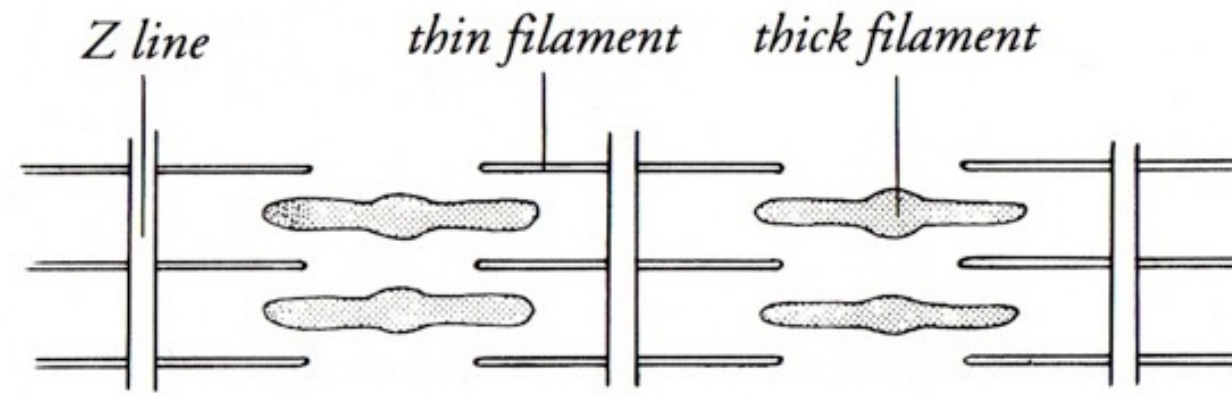
5 Sacral Segments

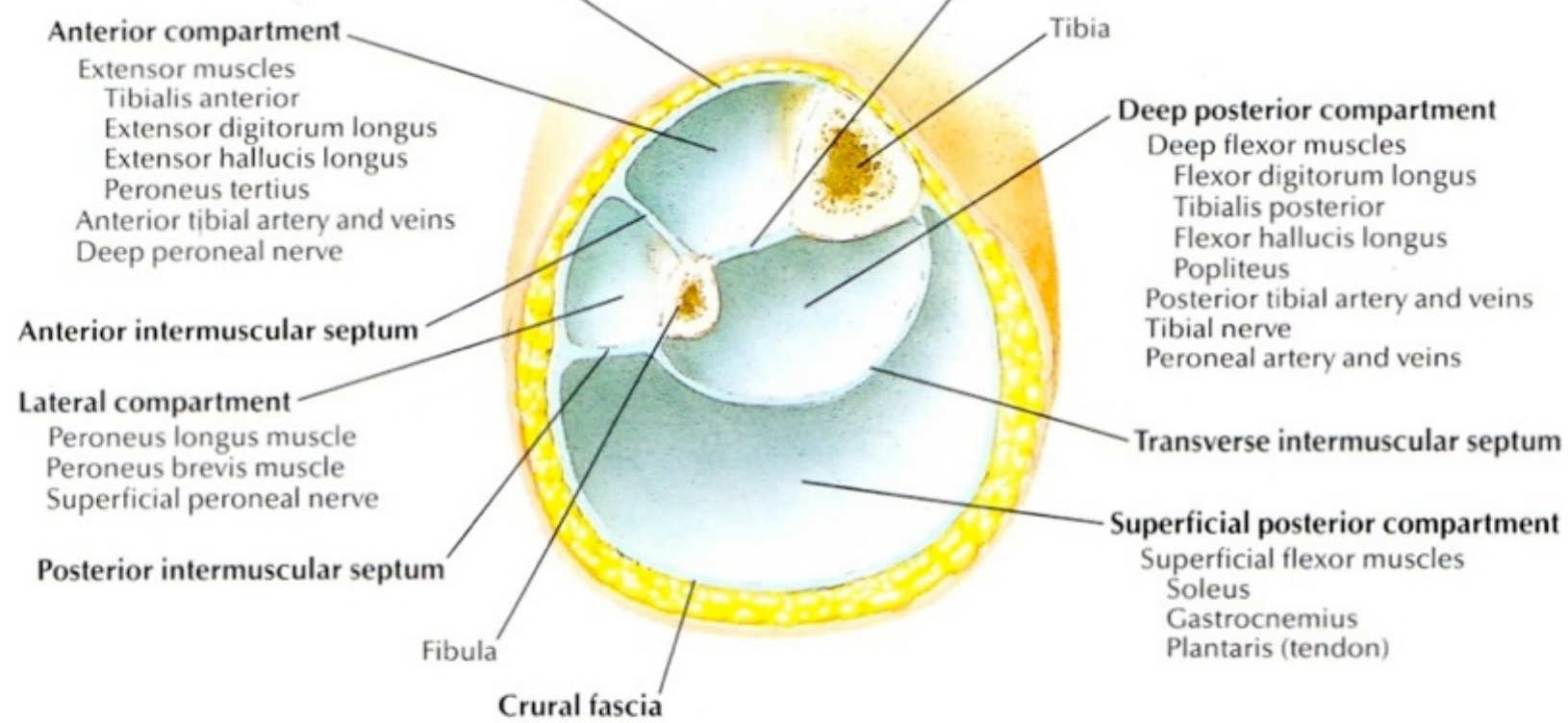
4 Coccygeal Segments

In a microscopic cross section, we see that a muscle is composed of bundles of fibers (primary, secondary, tertiary), held together and compartmentalized by fibrous partitions called (on a progressively smaller scale) deep fascia, epimysium, perimysium, and endomysium. These connective tissue partitions (which are continuous with each other) allow easy movement of one muscle or muscle group relative to another. They can be extended beyond the muscle to form a strong fibrous cord called a **tendon** which is continuous with the periosteum of a nearby bone, and serves to attach the muscle to the bone. A broad, flattened tendon is called an **aponeurosis**.



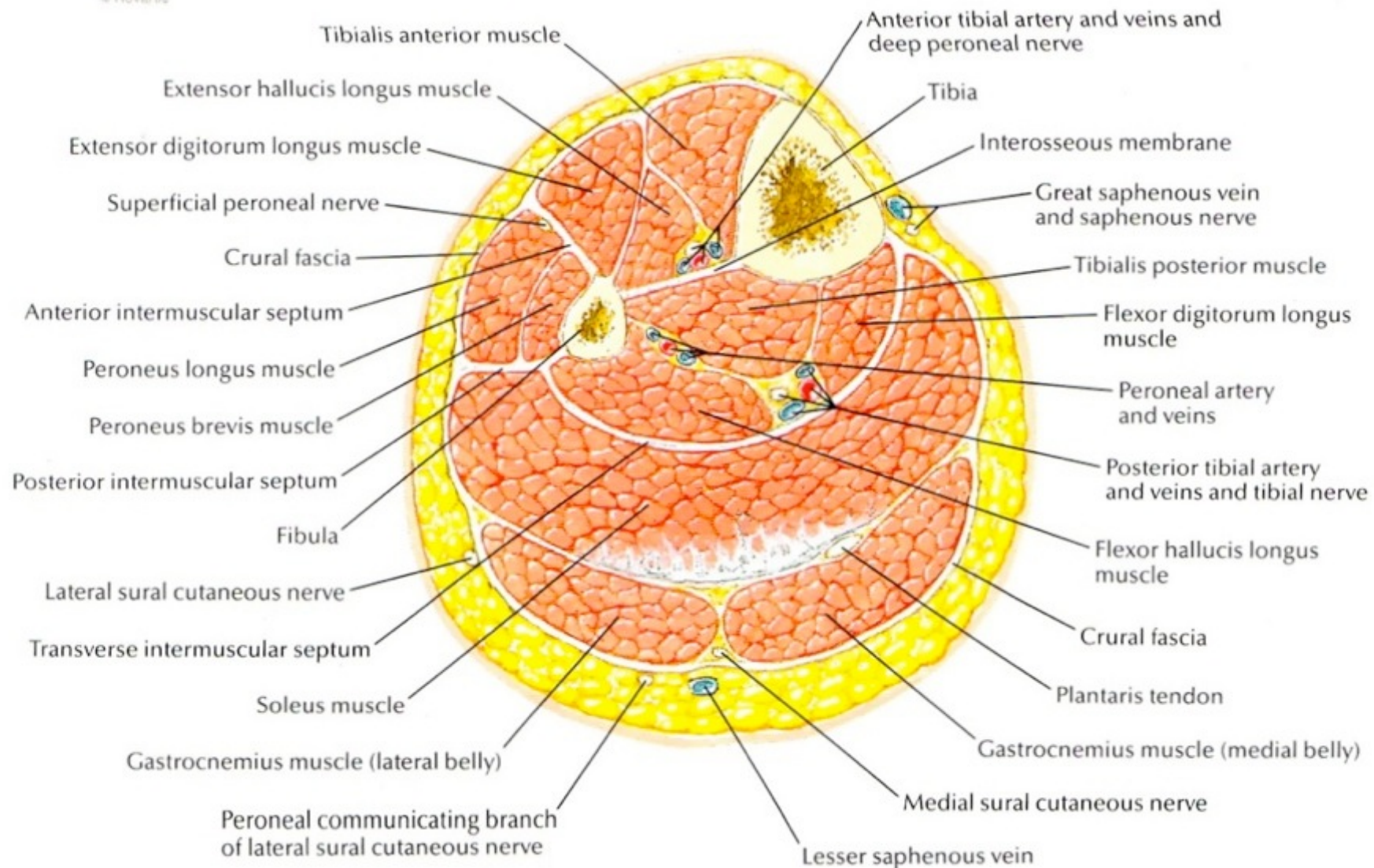
Individual muscle cells (myofibers) are extremely long and, unlike most cells, contain many nuclei. Each cell contains many functional units called **sarcomeres**, divided by boundaries called Z lines (shown as vertical bars in picture). Each sarcomere contains **thick filaments** (made of the protein myosin) and **thin filaments** (protein actin); the thin filaments are anchored to the Z lines.





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Cross section just above middle of left leg



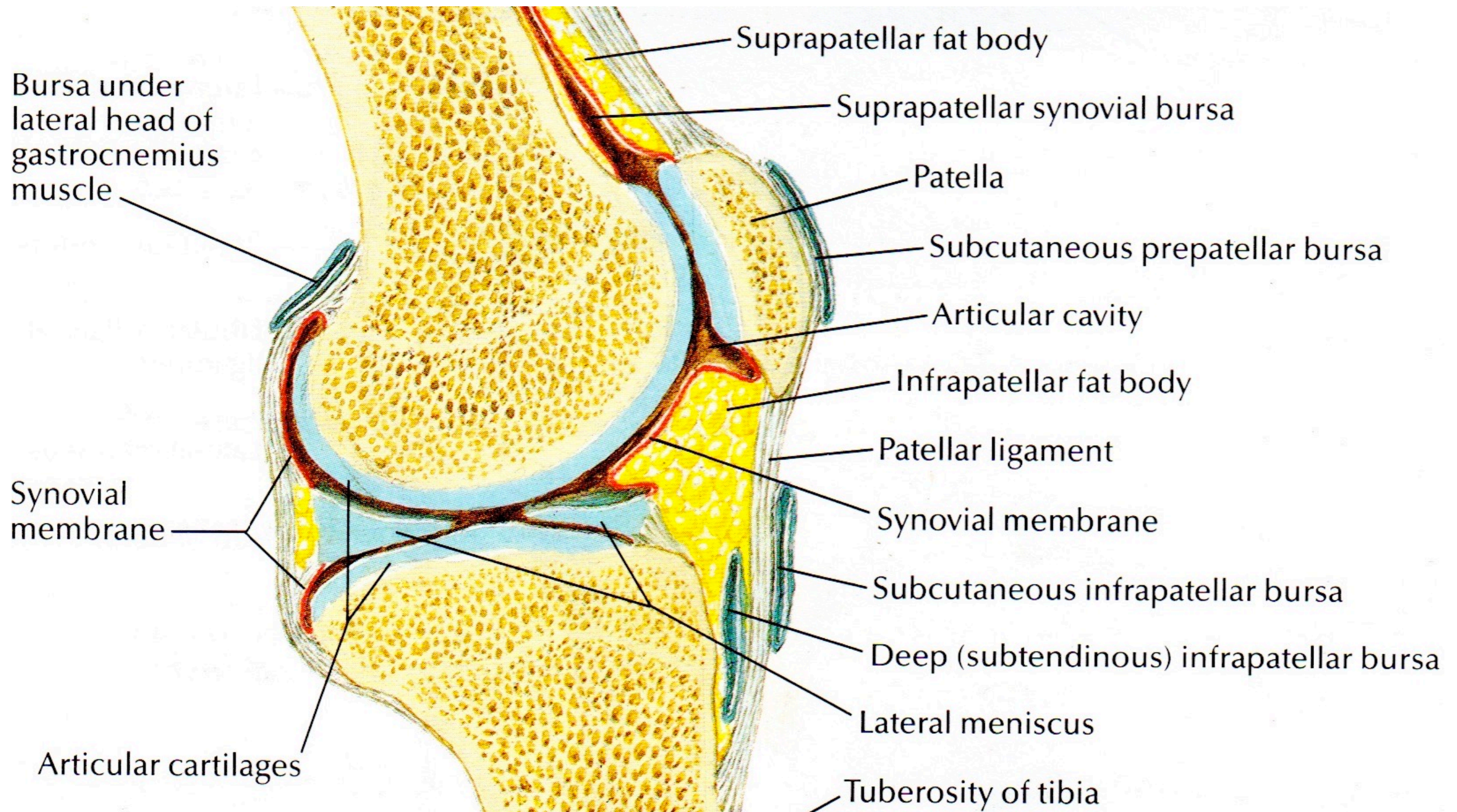
Fascia

The fascial planes are a lattice-like matrix of thin sheets of connective tissue that cover the organs and muscles. Sensory nerves are found throughout the various fascial planes and are stimulated by stretching the fascia in Yoga postures. This nerve stimulation can evoke emotional and energetic releases during the practice of Yoga.

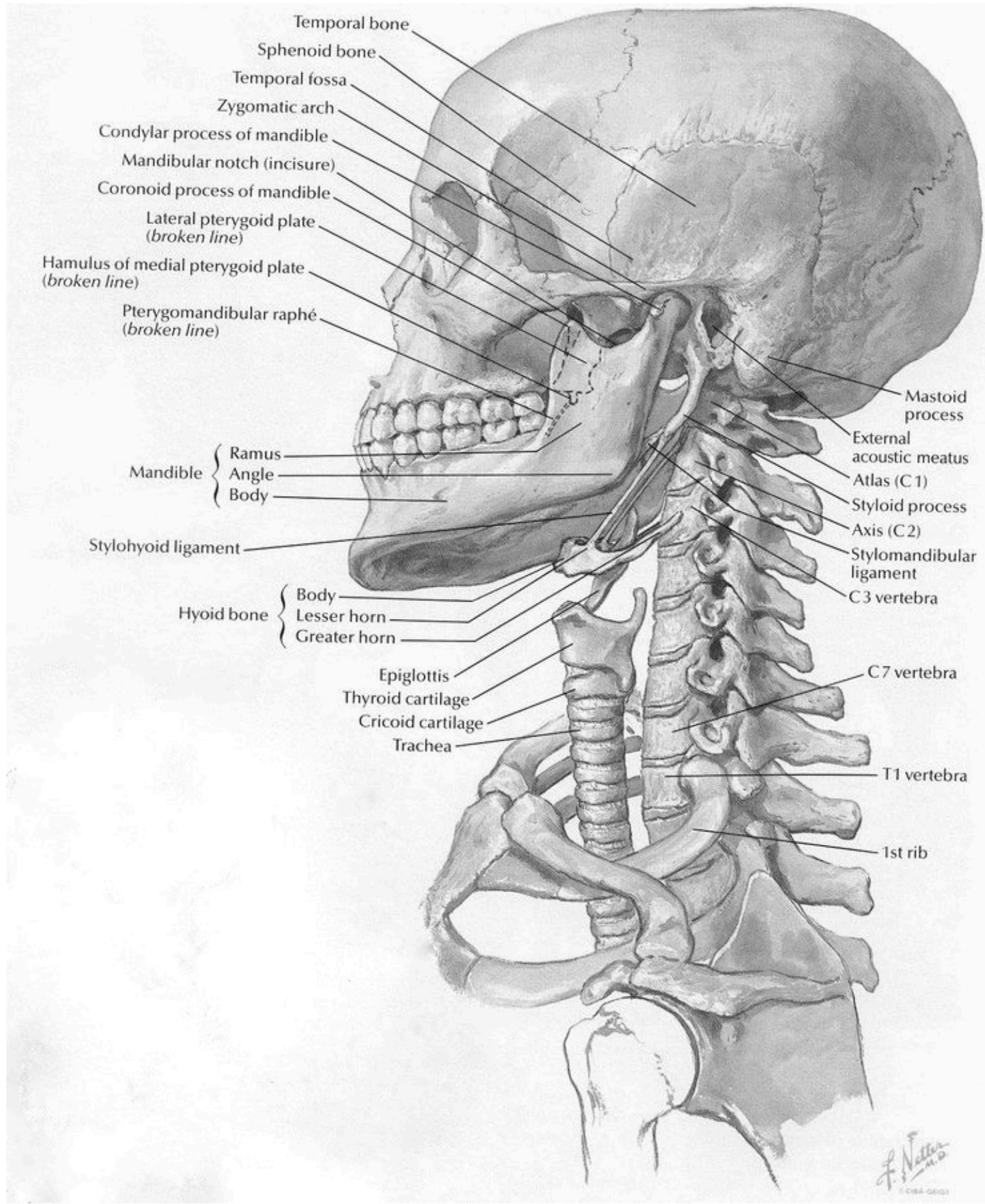
This image illustrates the fascial planes and their movement in Urdhva Mukha Svanasana.

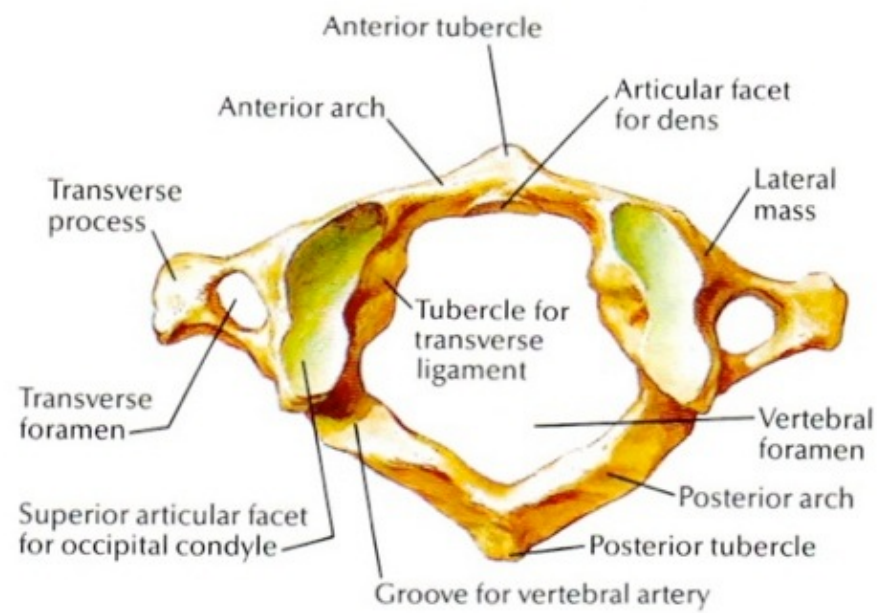


Articular Joint

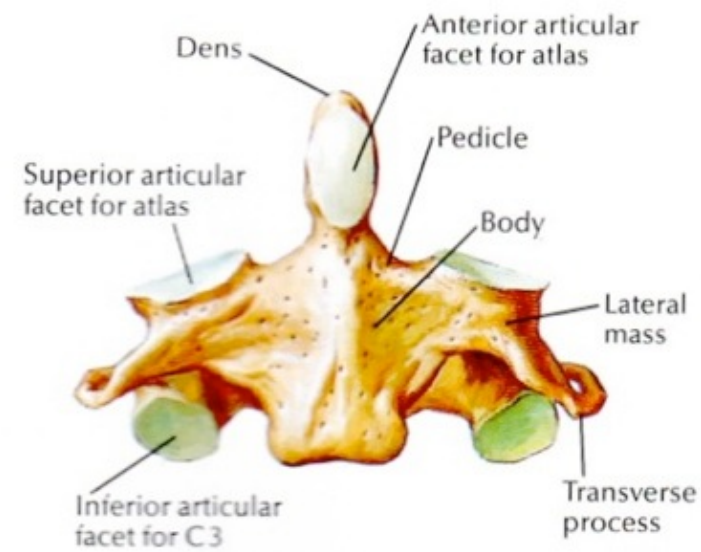


Cervical Anatomy

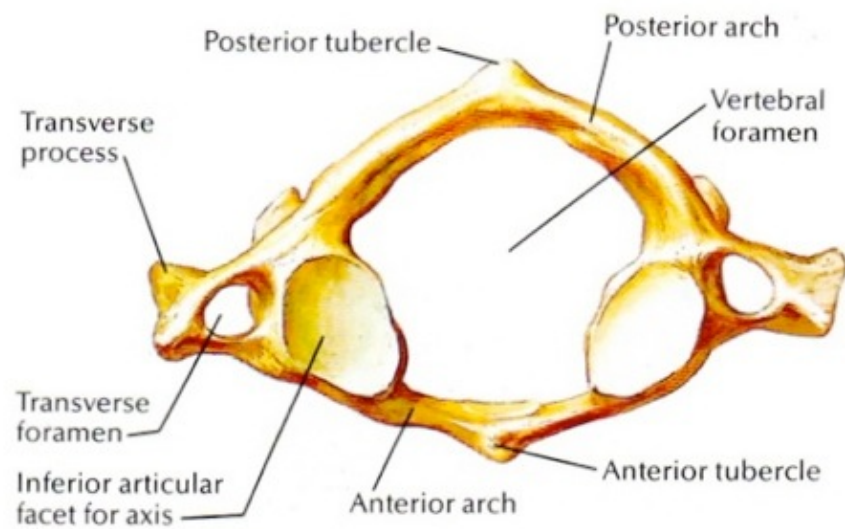




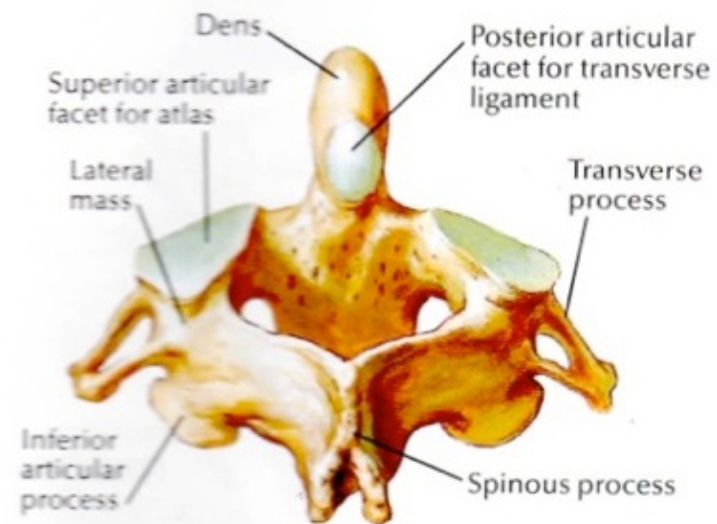
Atlas (C1): superior view



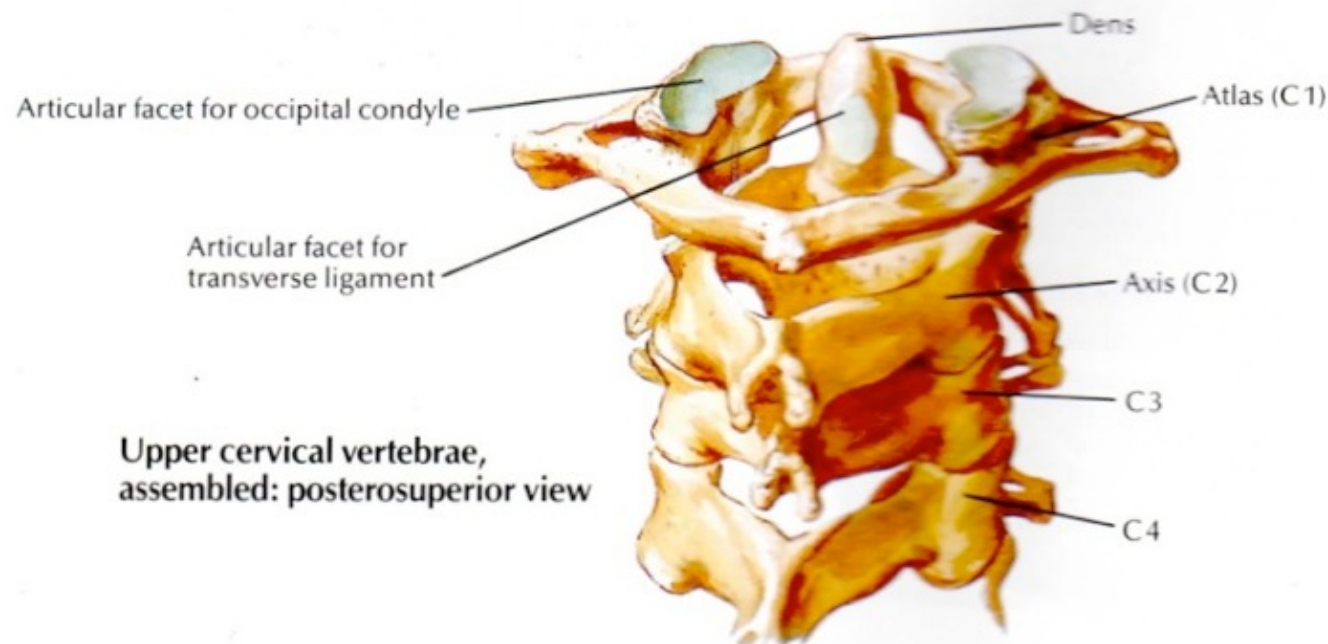
Axis (C2): anterior view



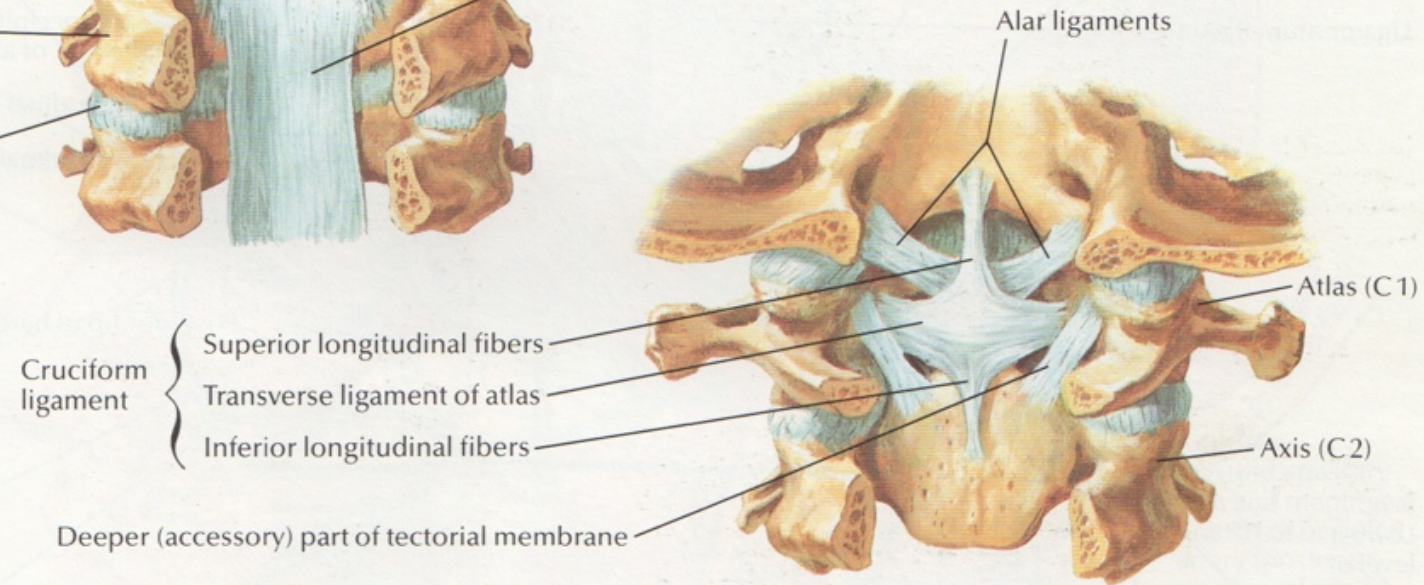
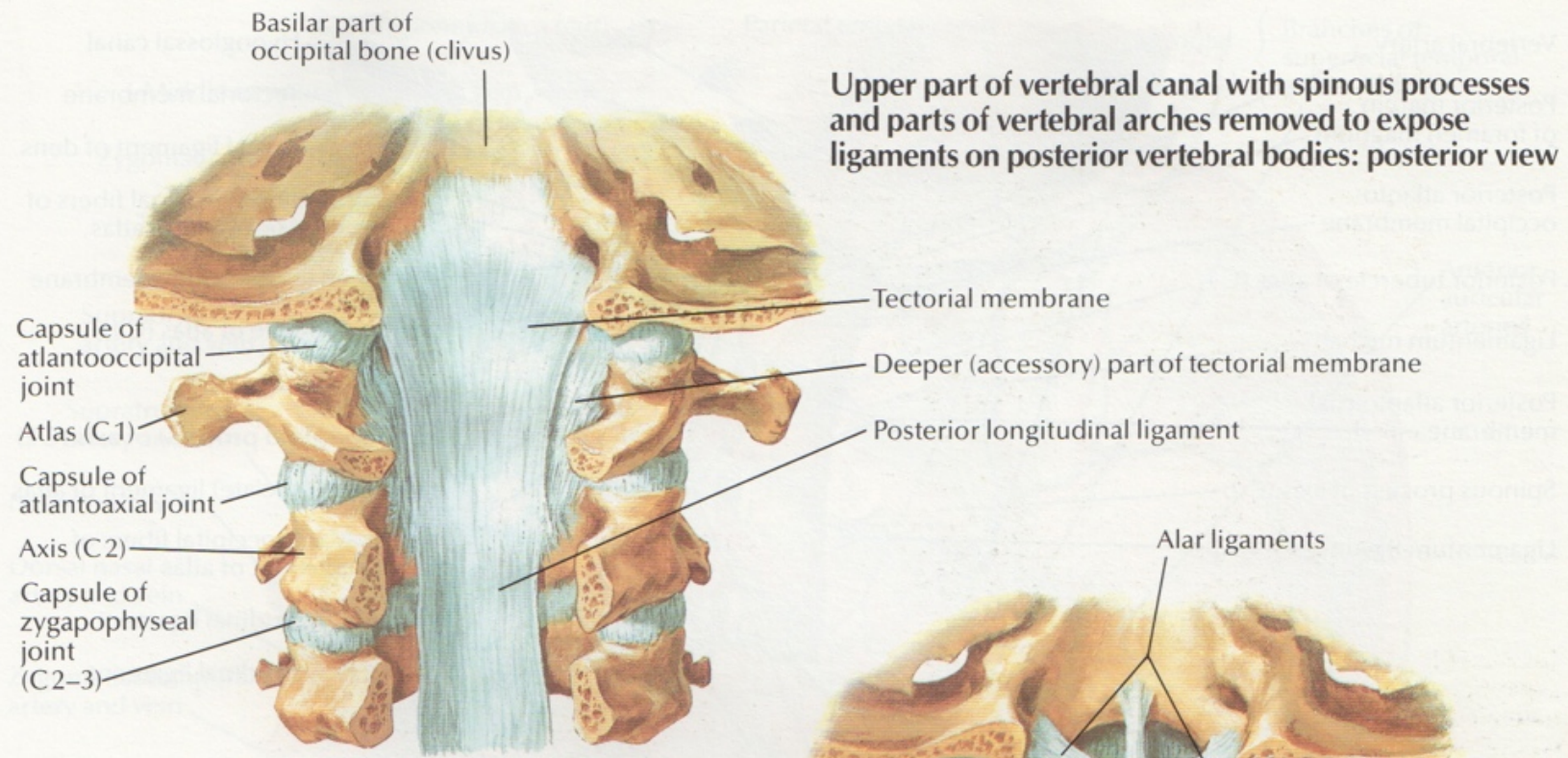
Atlas (C1): inferior view



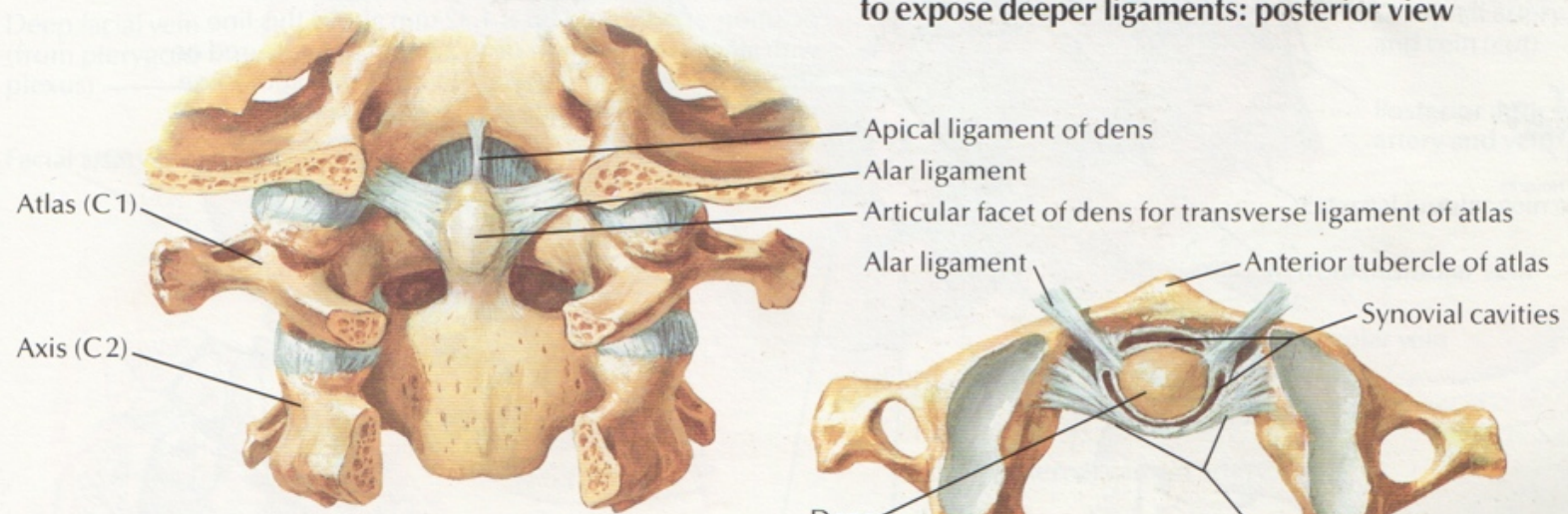
Axis (C2): posterosuperior view



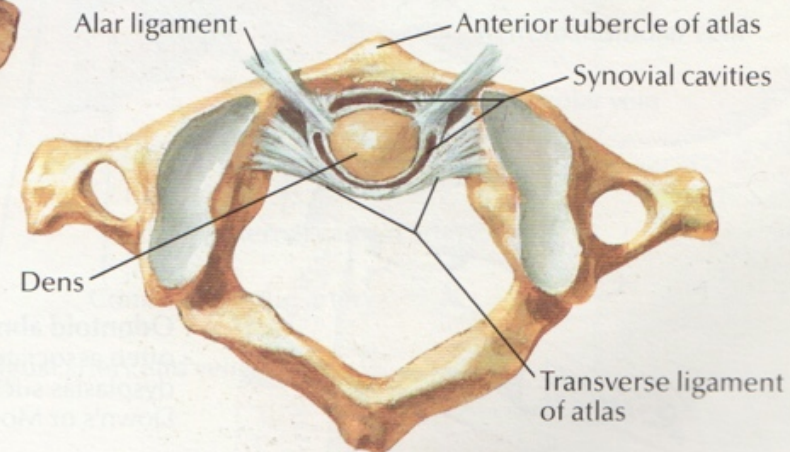
Upper cervical vertebrae, assembled: posterosuperior view



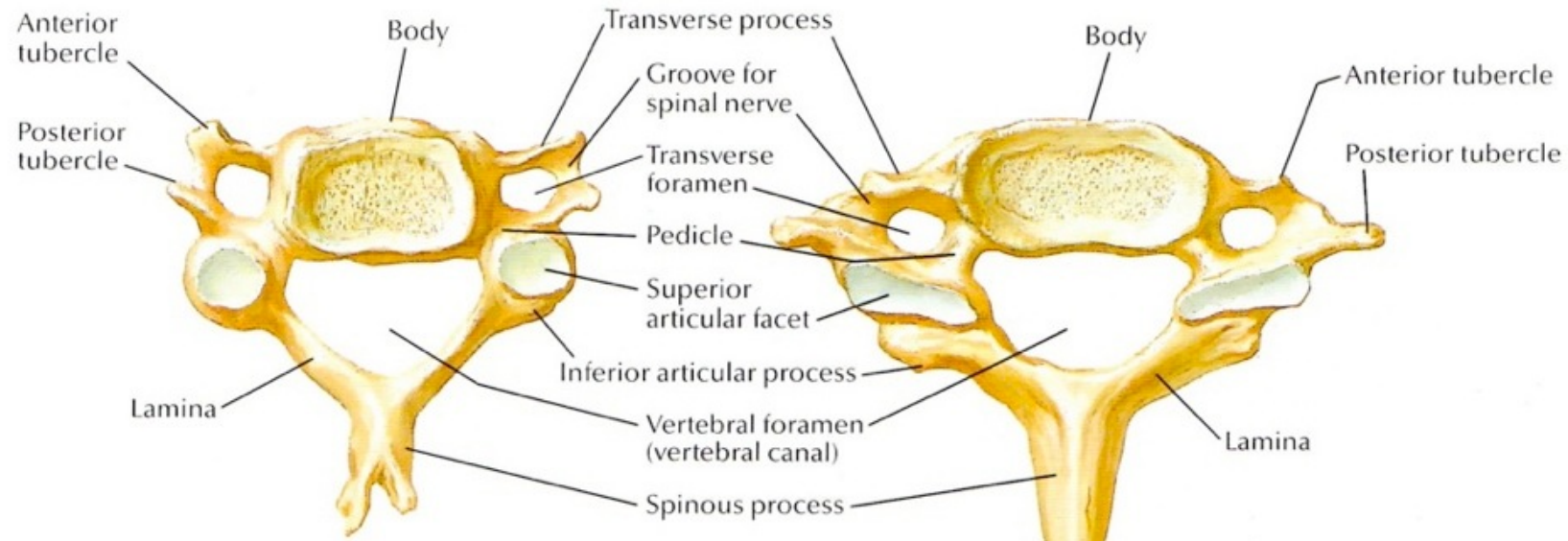
Principal part of tectorial membrane removed to expose deeper ligaments: posterior view



Cruciform ligament removed to show deepest ligaments: posterior view

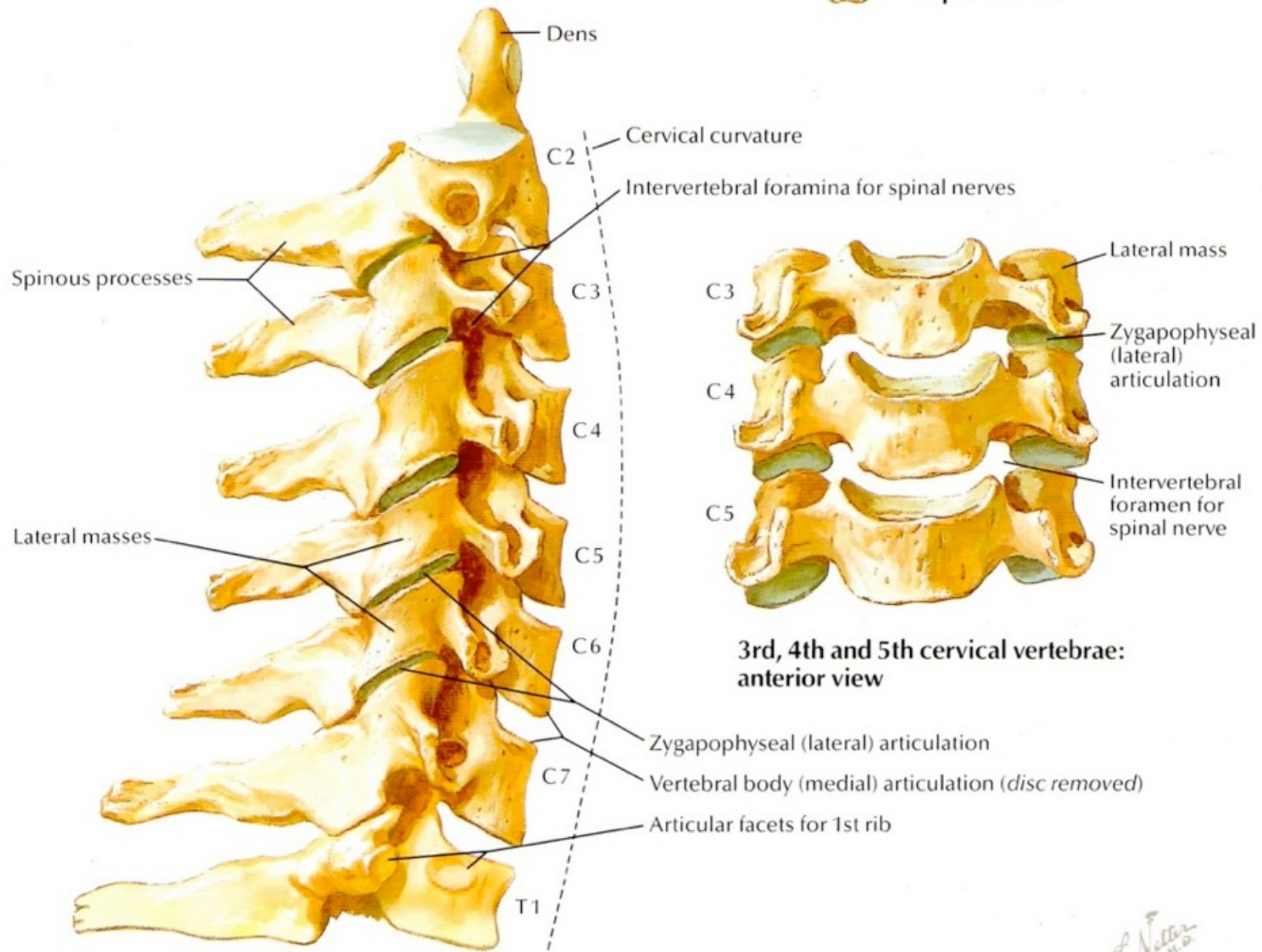


Median atlantoaxial joint: superior view



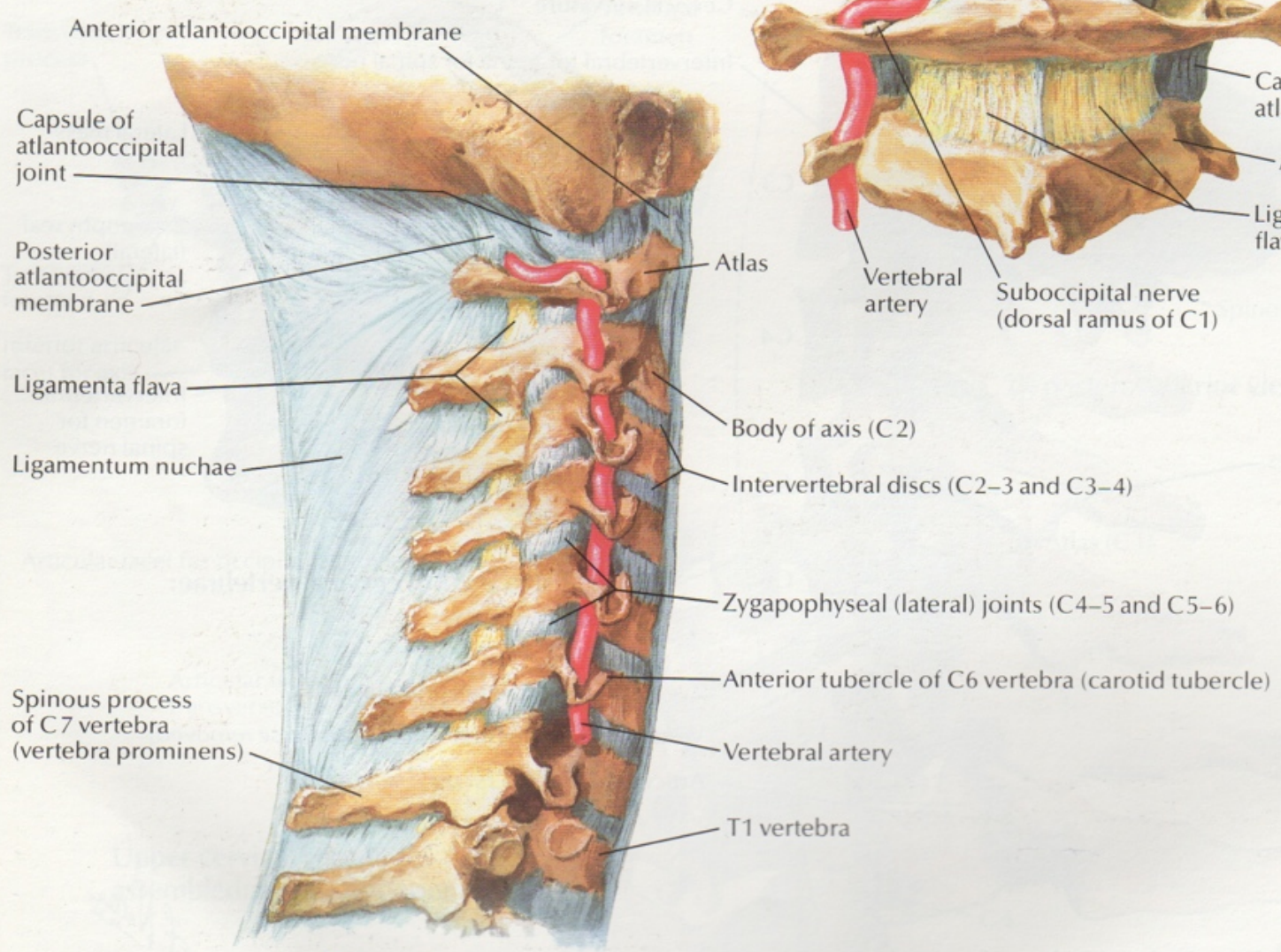
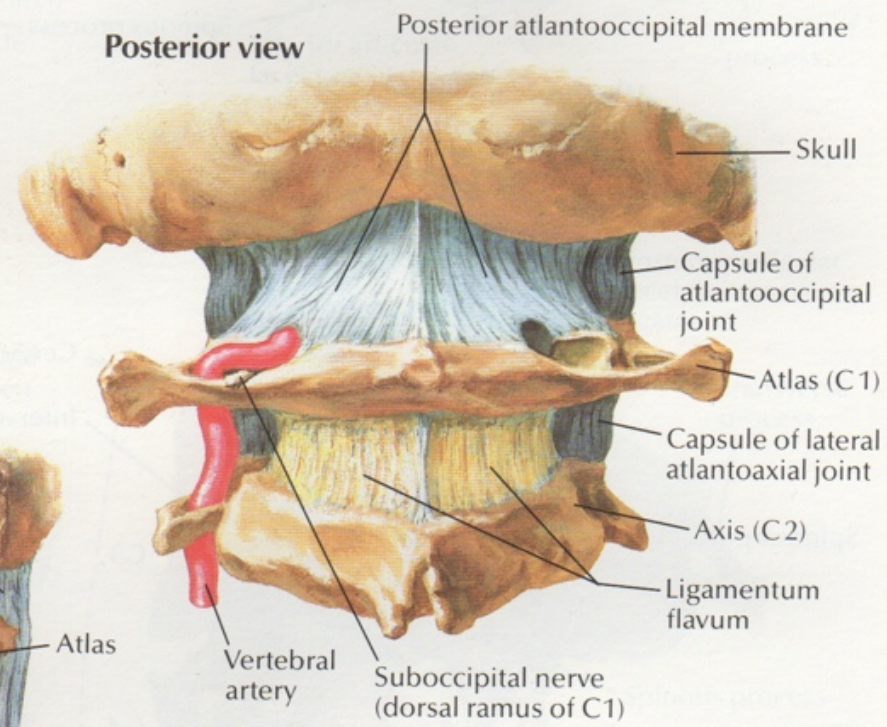
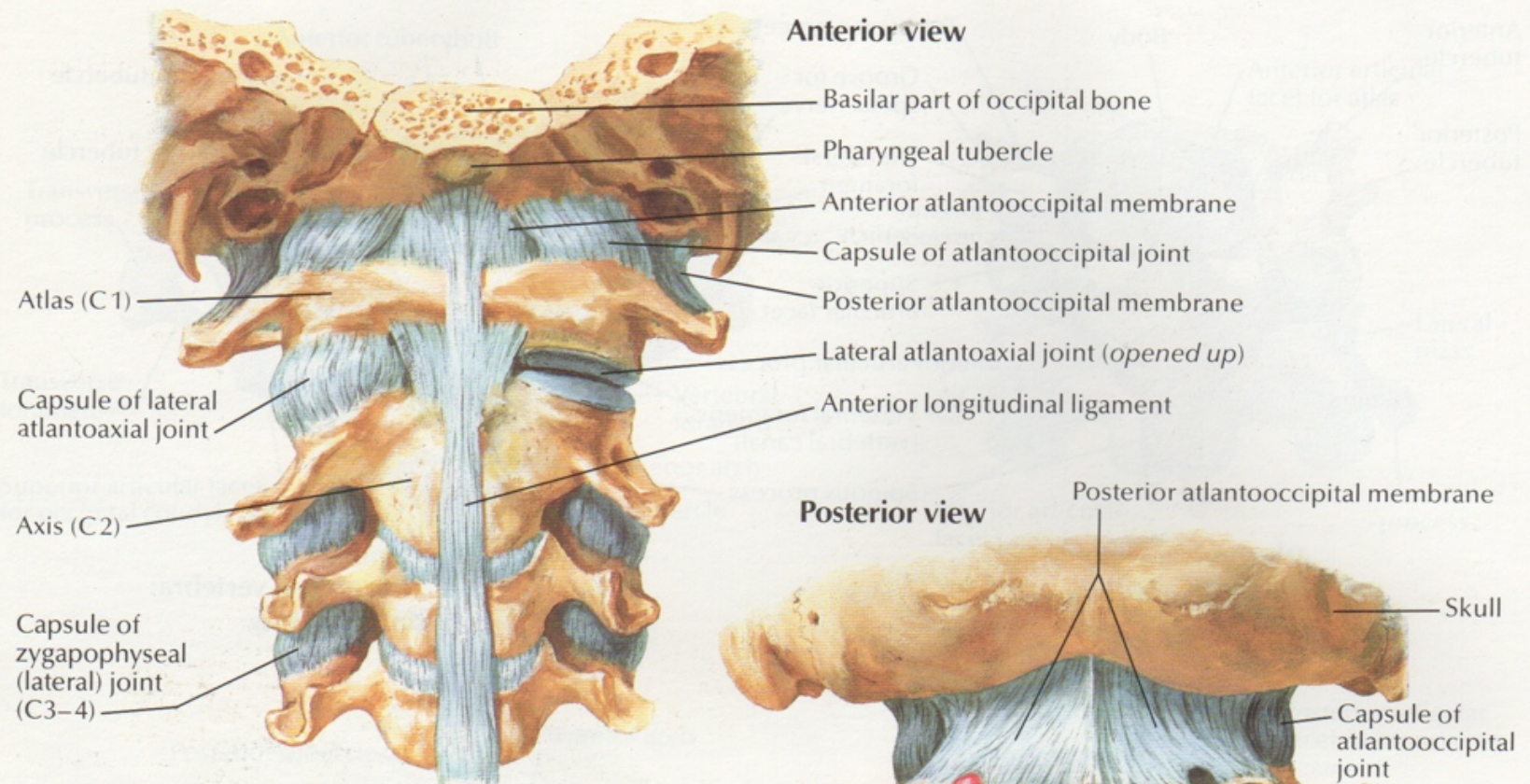
**4th cervical vertebra:
superior view**

**7th cervical vertebra:
superior view**



**2nd cervical to 1st thoracic vertebrae:
right lateral view**

**3rd, 4th and 5th cervical vertebrae:
anterior view**

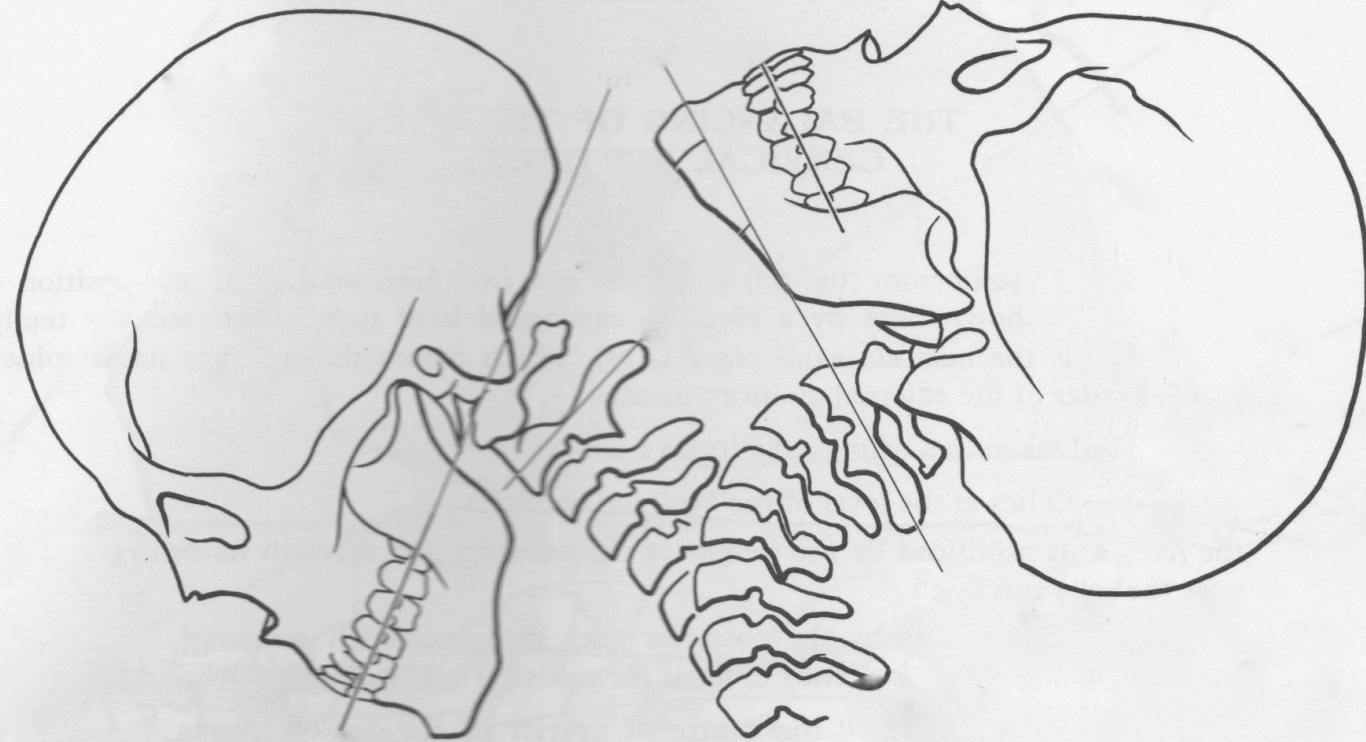


Flexion

Extension

80-90

70



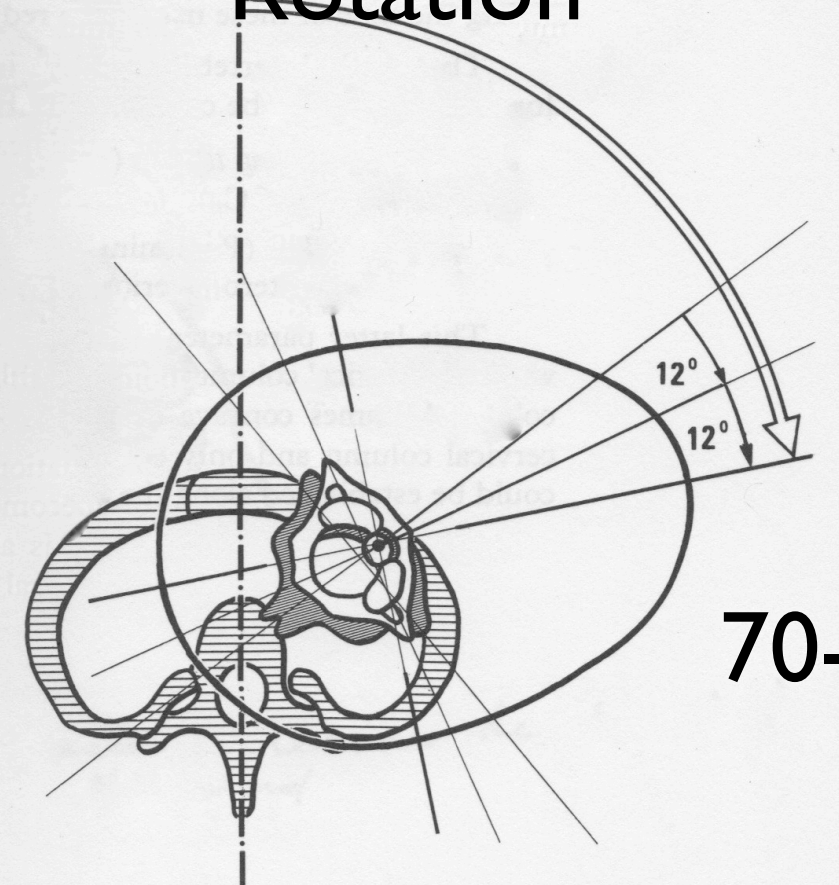
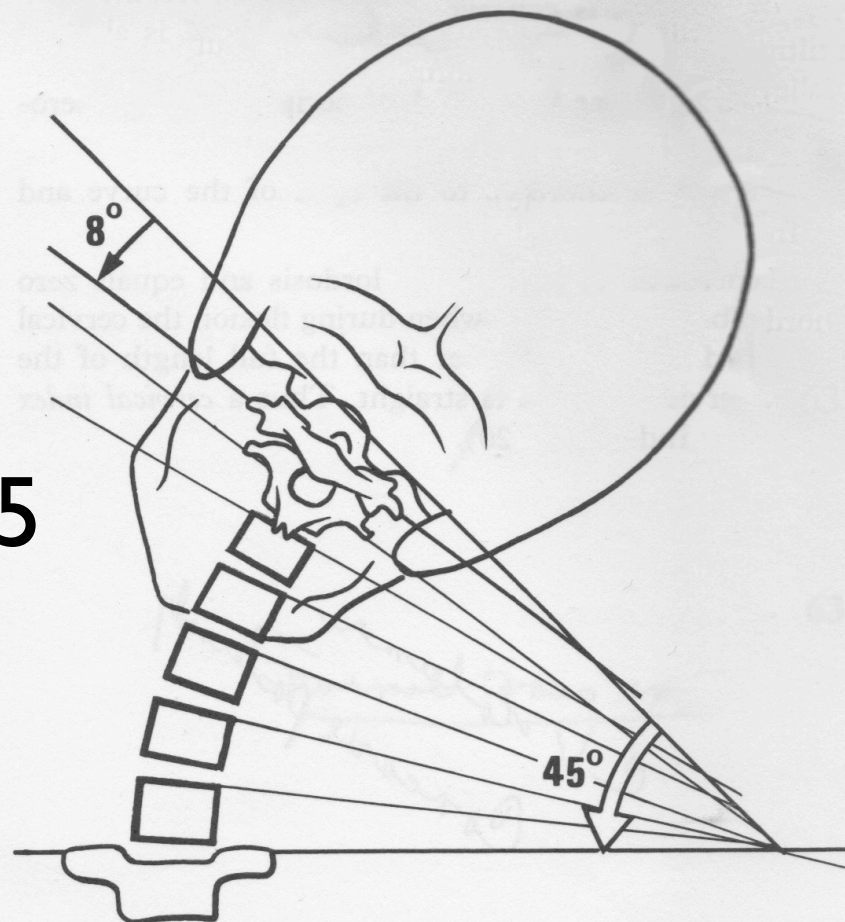
**Cervical ROM
Degrees**

Lateral Flexion

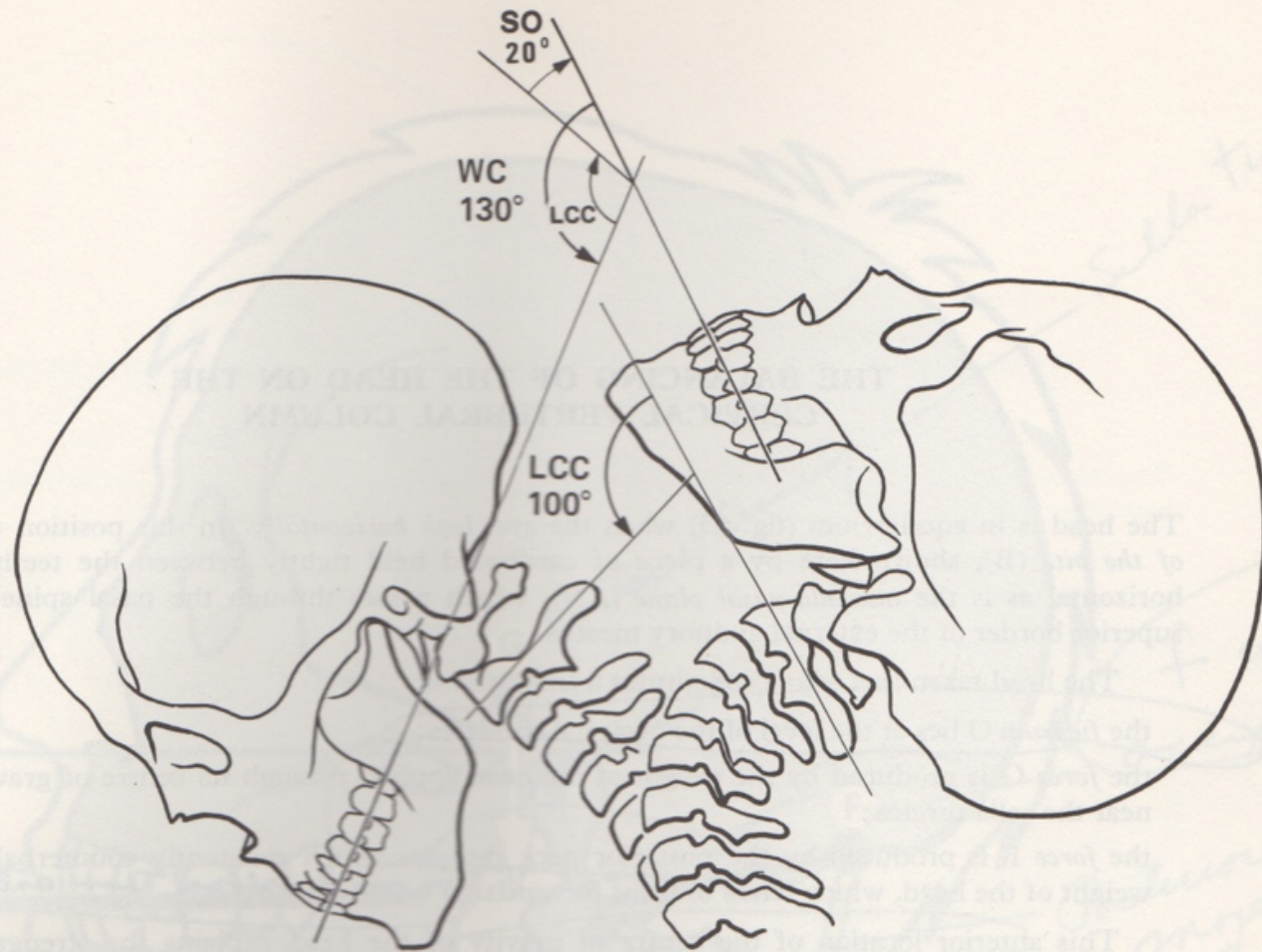
Rotation

20-45

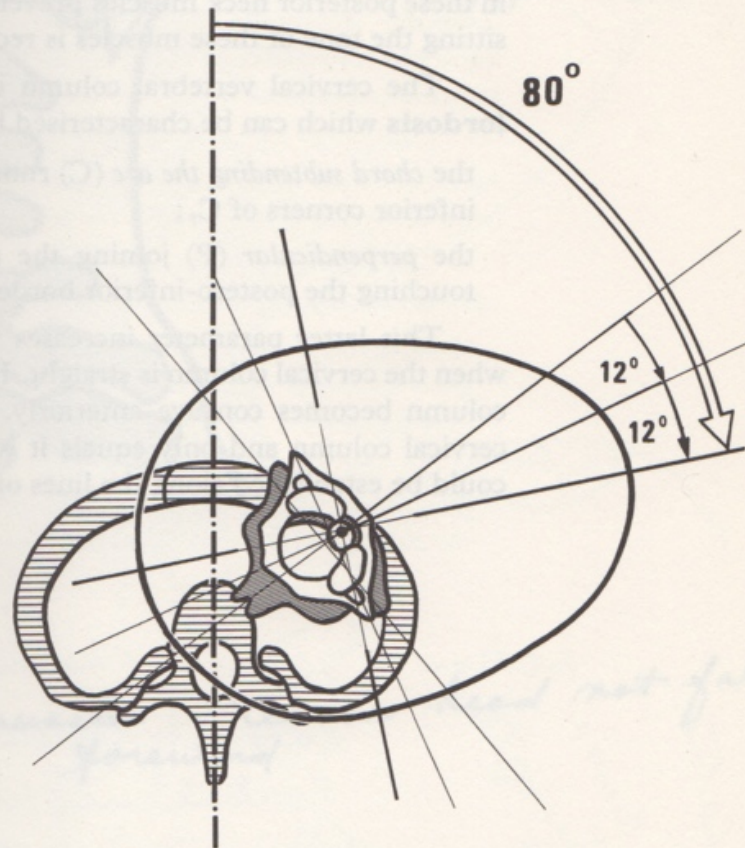
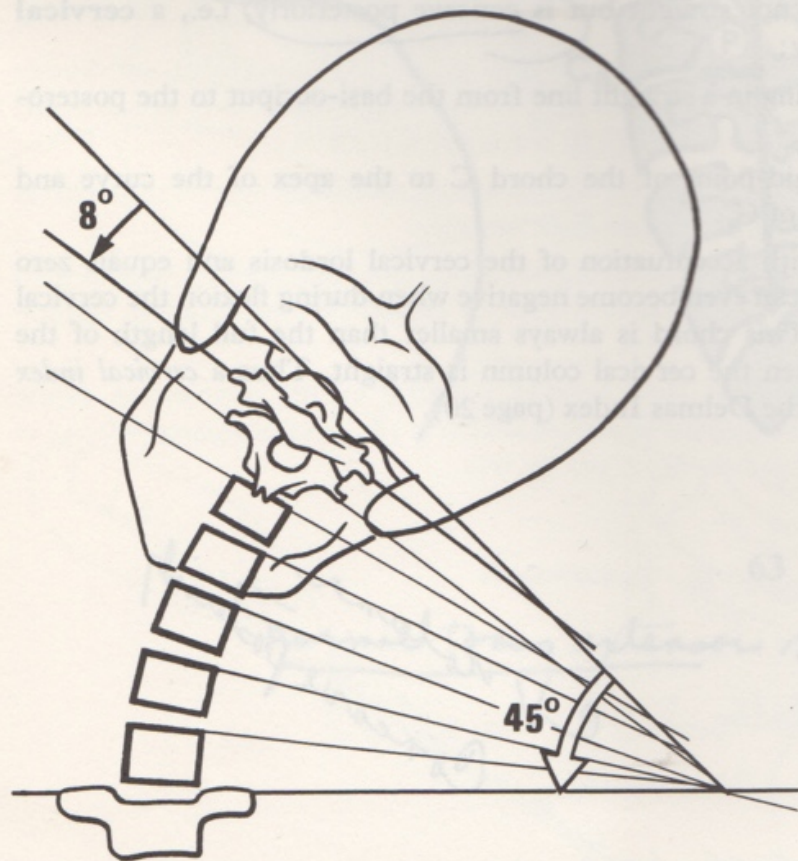
70-80



Kapandji



60

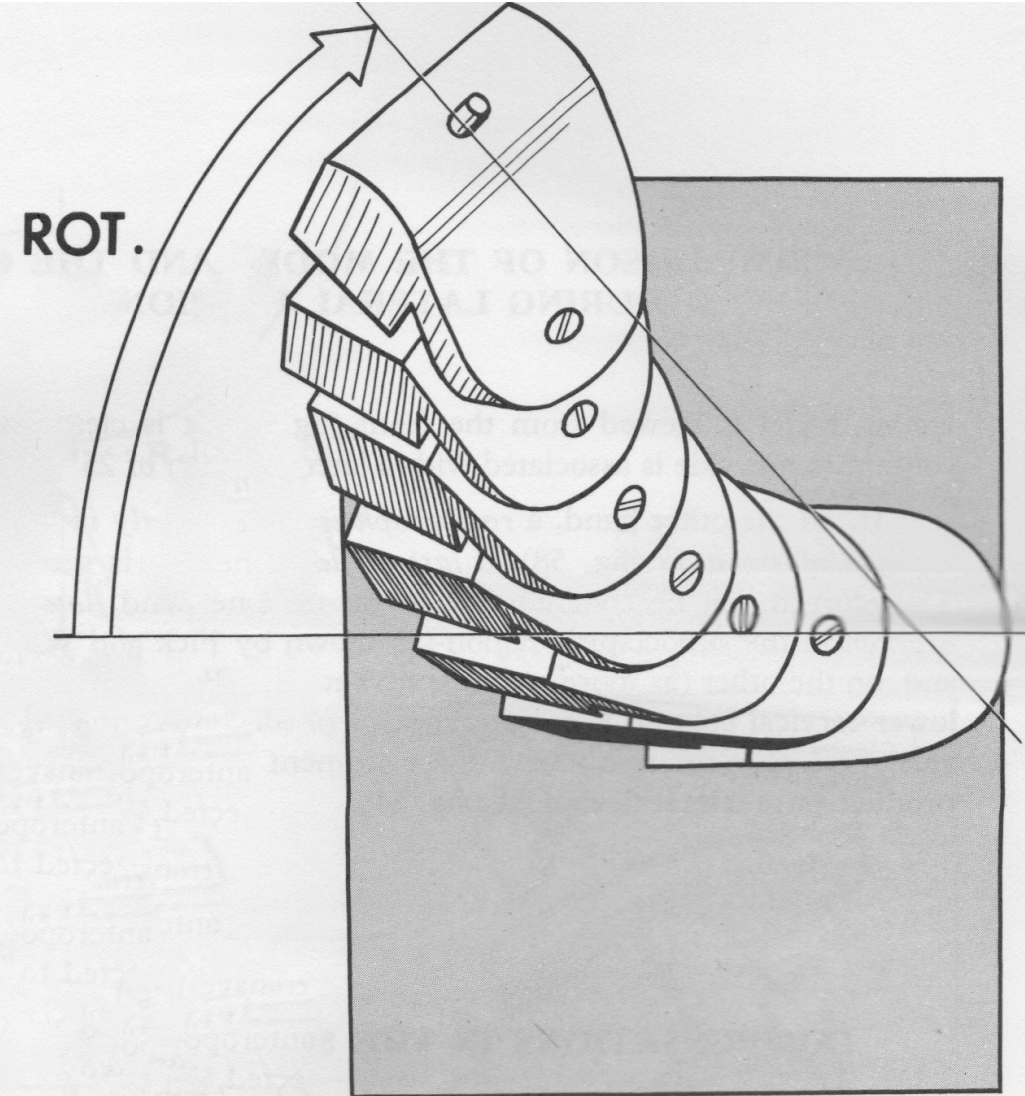
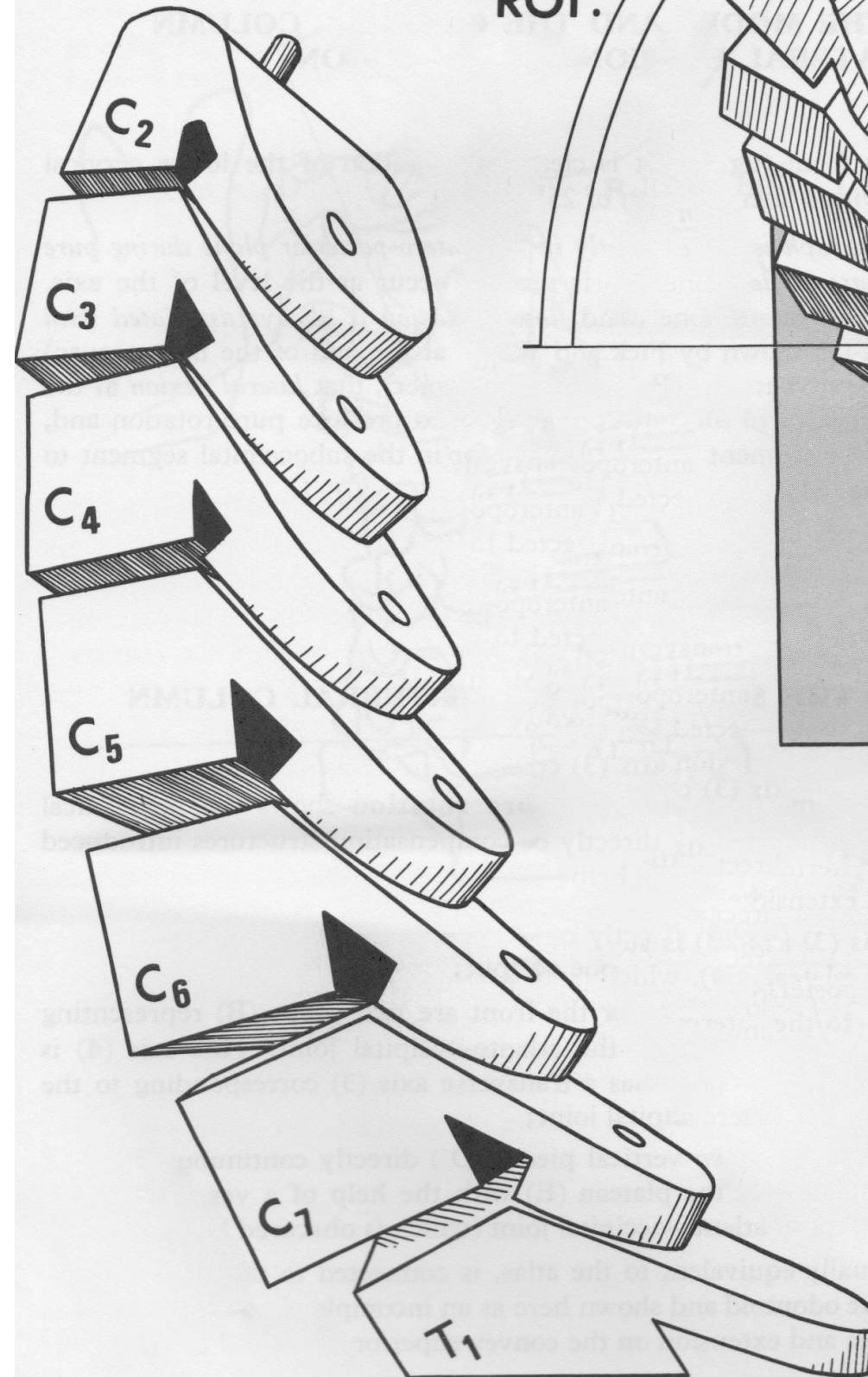


Cervical Coupled ROM

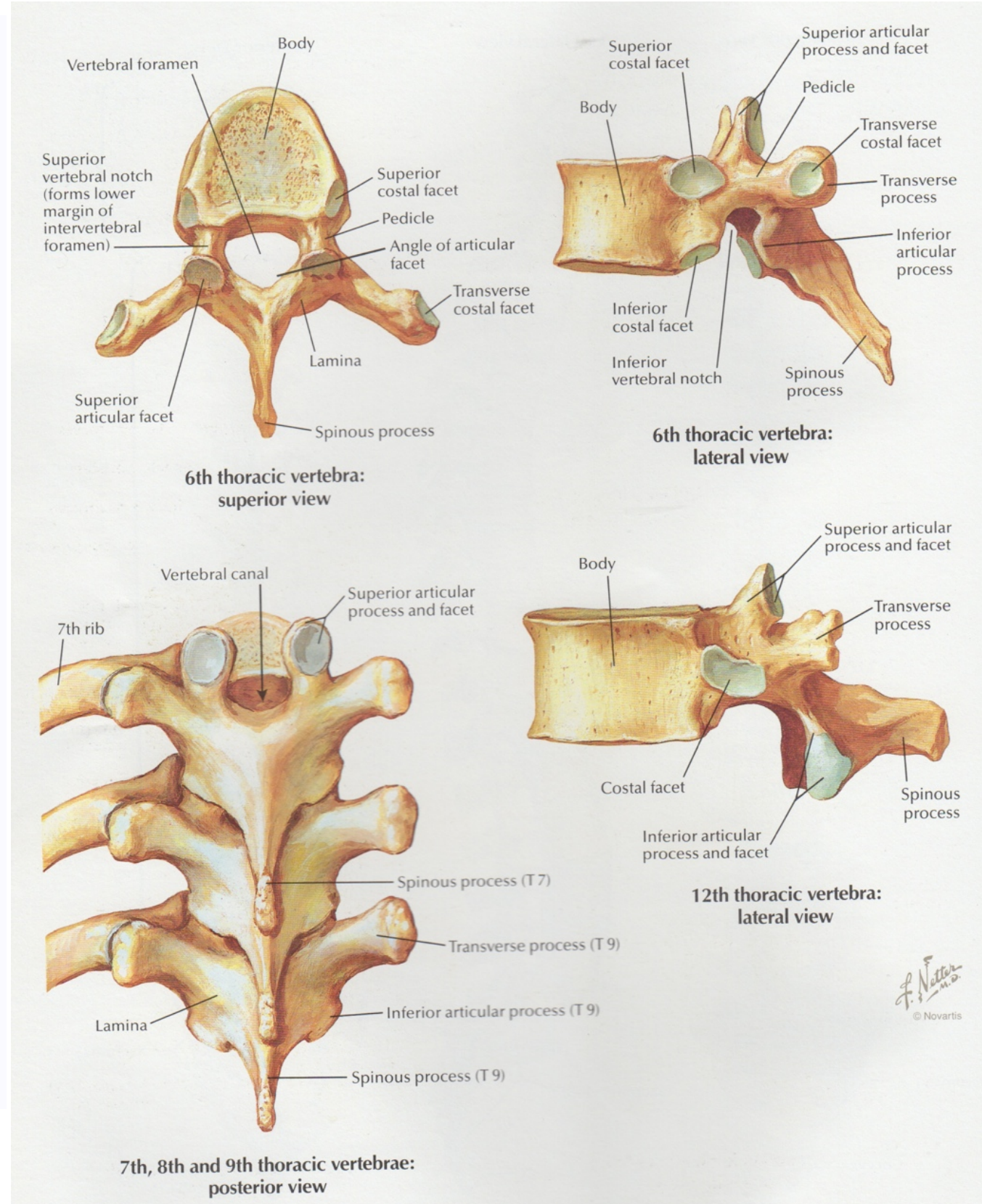
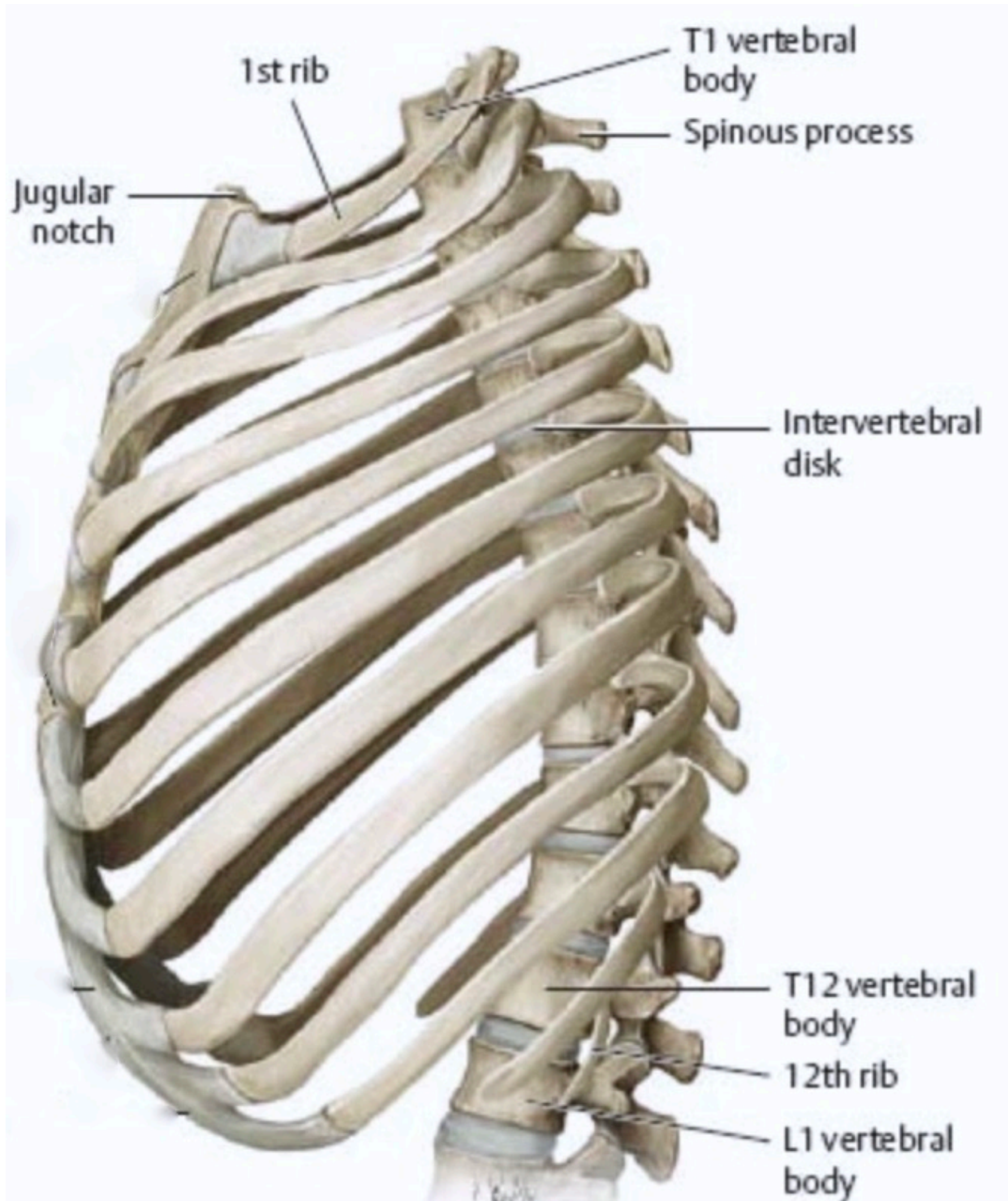
Lateral Flexion

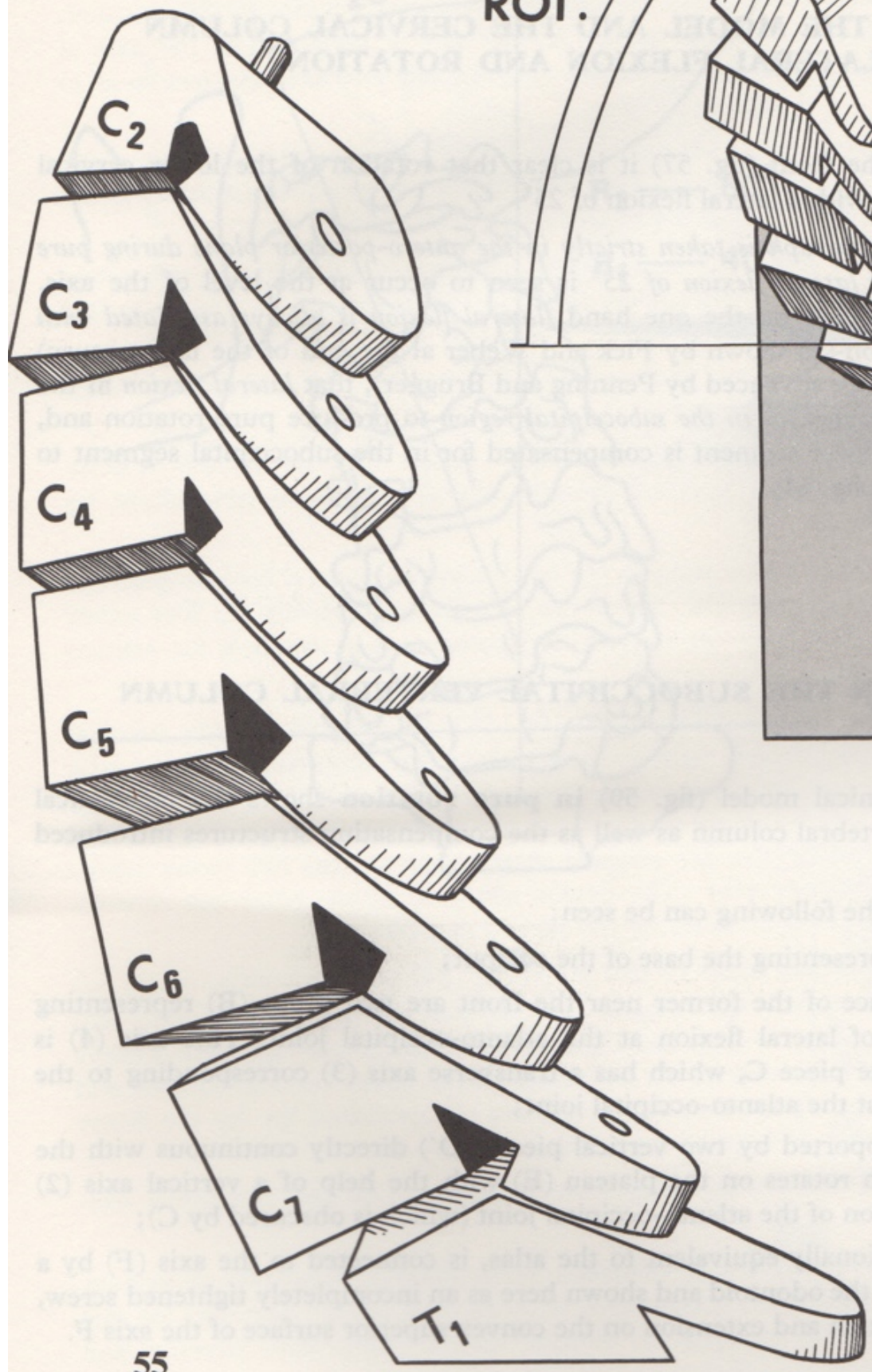
with

Rotation

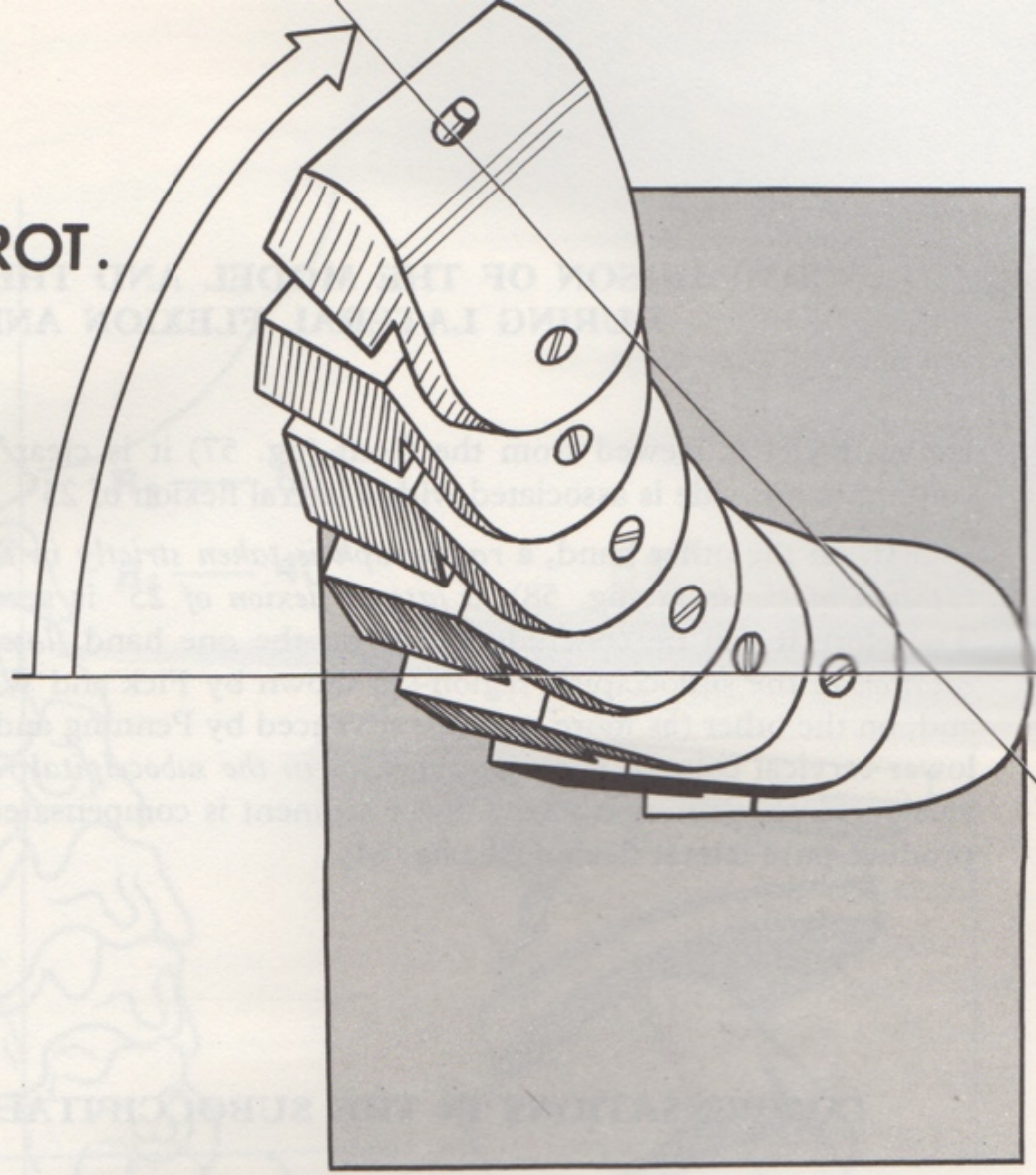


Thoracic Spine





ROT.





Utthita Trikonasana: Extended Triangle Pose

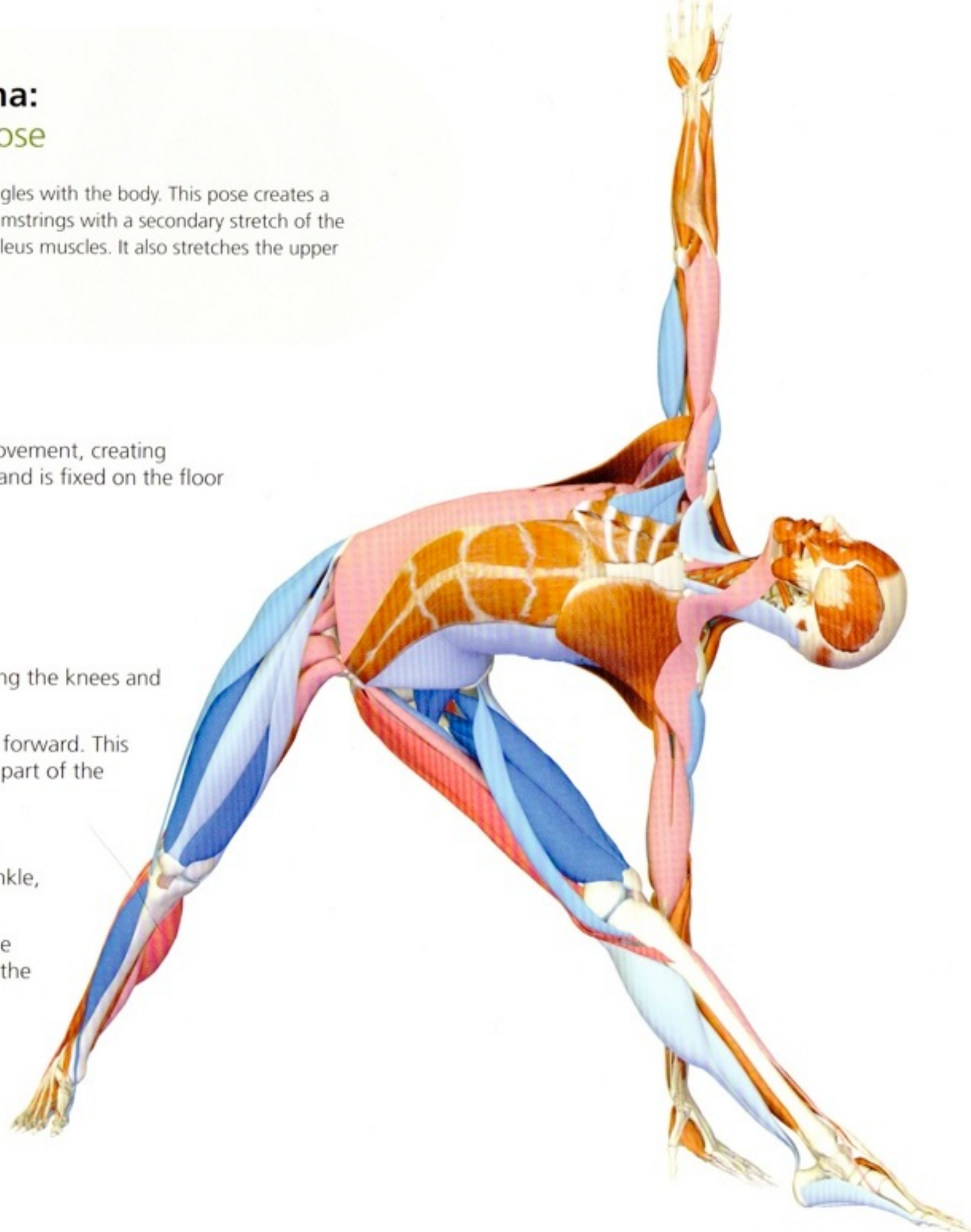
Trikonasana creates a series of triangles with the body. This pose creates a powerful stretch of the front leg hamstrings with a secondary stretch of the back leg hamstrings and gastroc-soleus muscles. It also stretches the upper side abdominal and back muscles.

The upper side shoulder and upper arms have “open chain” movement, creating proprioceptive awareness of the arm in space. The lower side hand is fixed on the floor or leg, giving leverage to open the chest.

Synergizing/Activating

Pelvis and Legs

1. The front and back leg quadriceps contract, extending the knees and stretching the lower region of the hamstrings.
2. The front leg psoas flexes the hip and tilts the pelvis forward. This tilts the ischial tuberosity back, stretching the upper part of the front leg hamstrings.
3. The back leg gluteus maximus extends the hip.
4. The tibialis anterior of the back leg dorsiflexes the ankle, drawing it towards the shin.
5. The peroneus longus and brevis on the outside of the front shin activate, pressing the ball of the foot into the floor.





Activating the psoas flexes the hips and, in concert with the quadratus lumborum, stabilizes the lumbar spine in Halasana.

Activating the biceps and brachialis muscles bends the elbows, pressing the hands into the back. Leaning into the hands stabilizes the pose and opens the chest. Activating the erector spinae muscles lifts the torso.



Sarvangasana: Shoulder Stand

The shoulder stand is a restorative inversion. Perform it near the end of your practice to relax.

As an inversion, the shoulder stand has effects that are similar to the head stand. Inverting the body stimulates control mechanisms in the heart and the arteries along the outside of the neck that monitor and adjust blood pressure. Inversions may also positively affect the flow of cerebrospinal fluid in the spinal cord and the brain, flushing regions where the fluid has pooled.

The shoulder joint is extended in the shoulder stand and the chest opens. Poses like Purvottanasana help one gain flexibility in moving the shoulders into the extended position so that the upper arms can be used to open the chest.

Synergizing/Activating

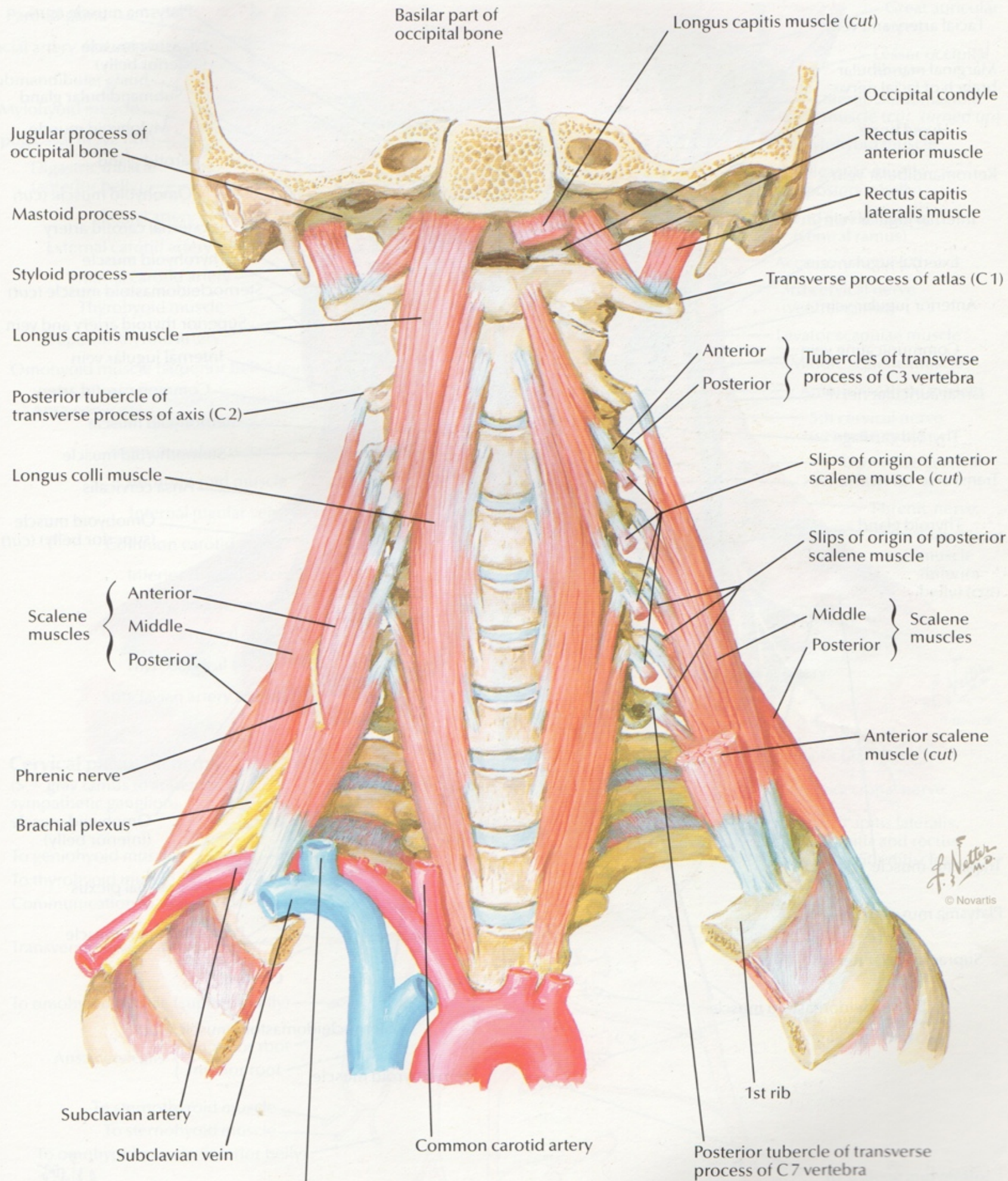
Shoulders and Arms

1. The biceps and brachialis muscles in the arms bend the elbows to press the hands into the back, supporting it and allowing the weight of the body to be shifted away from the neck. Flexor muscles in the forearm shorten to assist this process.
2. The posterior deltoids extend the shoulders away from the trunk and work to press the elbows into the floor.
3. The shoulder blades are drawn away from the neck by the lower trapezius muscle.
4. Two muscles of the rotator cuff, the infraspinatus and teres minor turn the upper arms outward.

Trunk

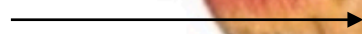
1. The erector spinae, flowing along the spine, and the rectus abdominus, from chest to pubic bone, lift the trunk.
2. The quadratus lumborum in the lower back works with the psoas major to support the lower back. Together these neurologically linked muscles wrap around the lumbar spine and stabilize it.





Sternocleidomastoid

mastoid

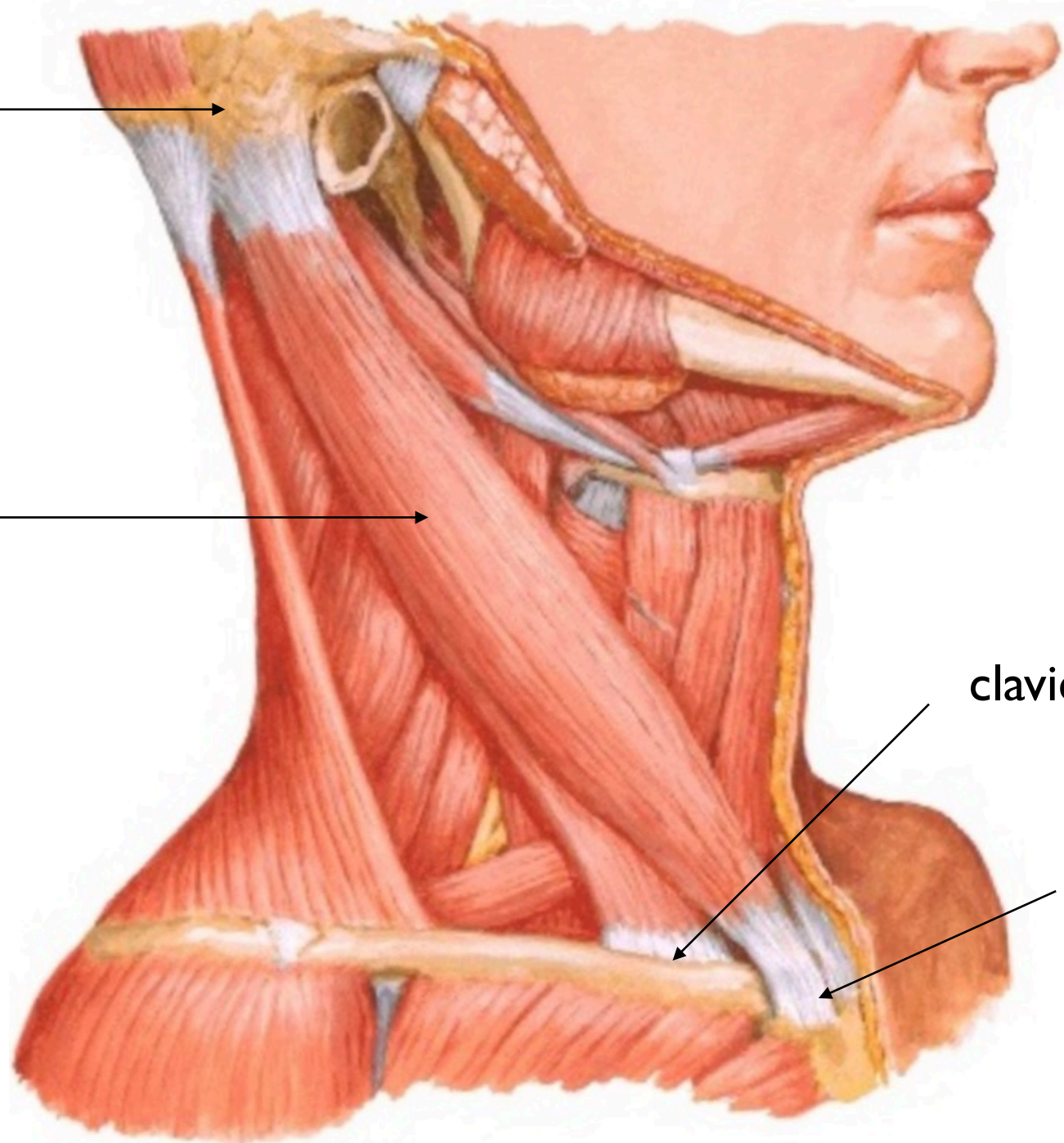


SCM



clavicle

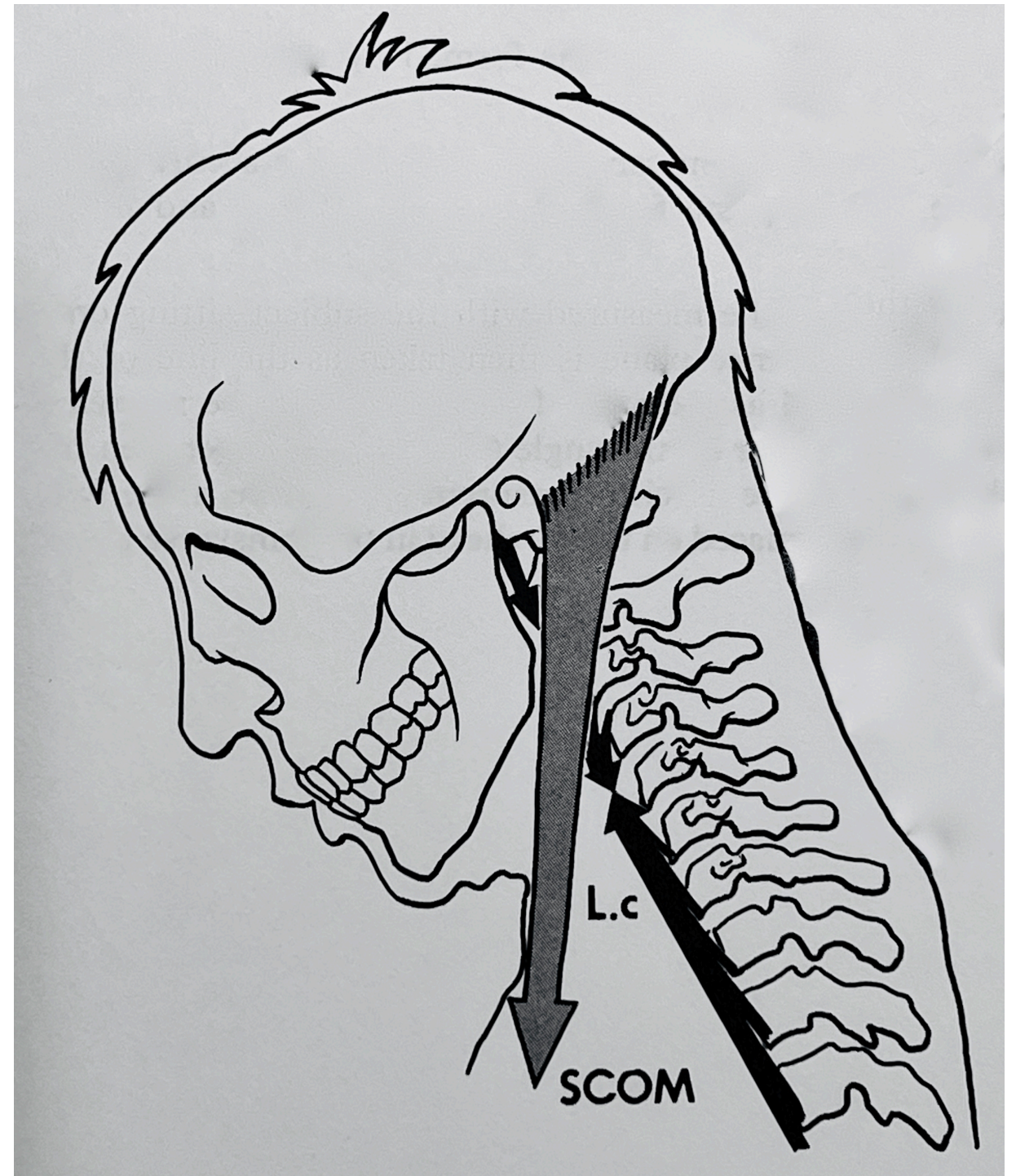
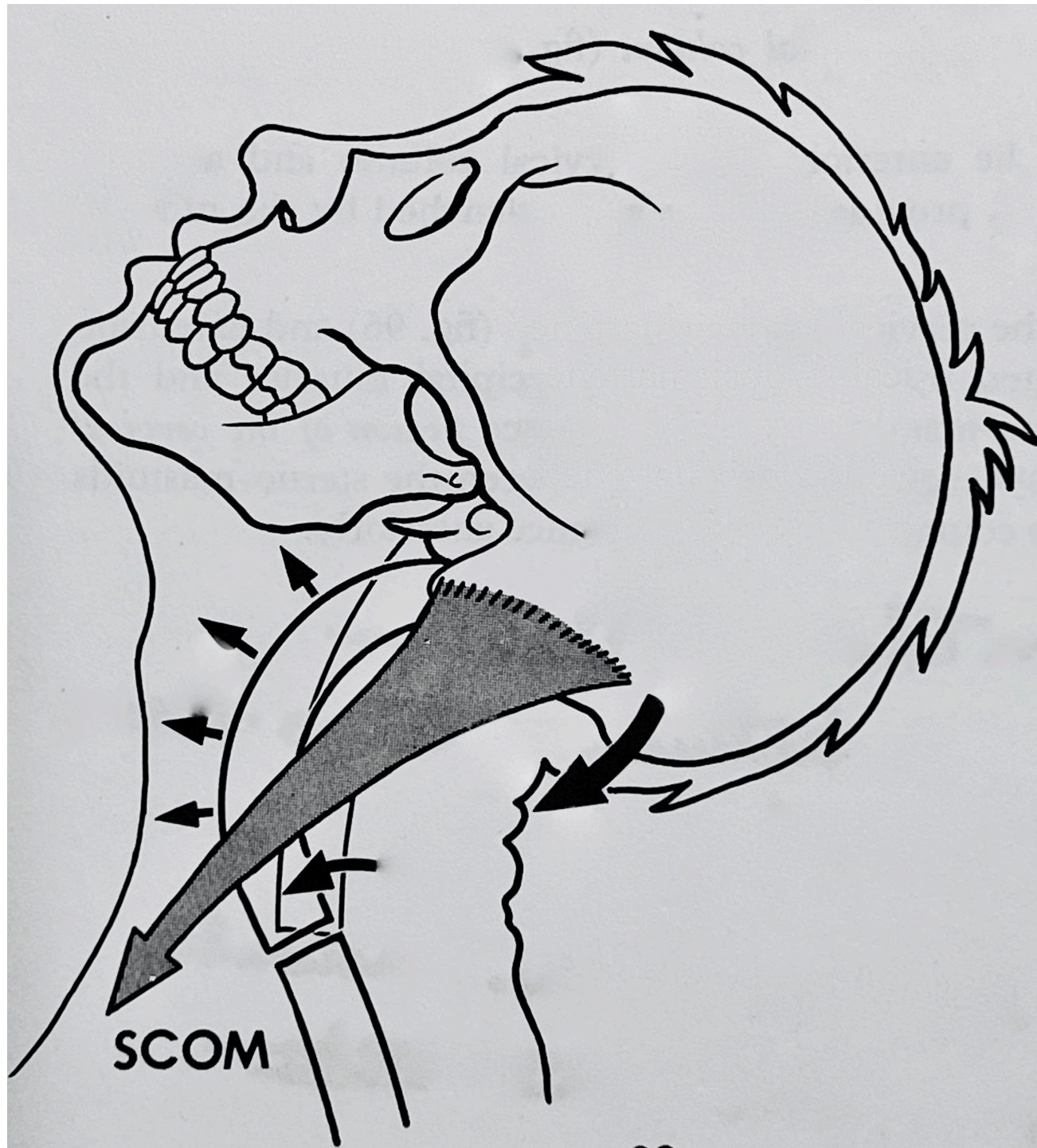
sternum

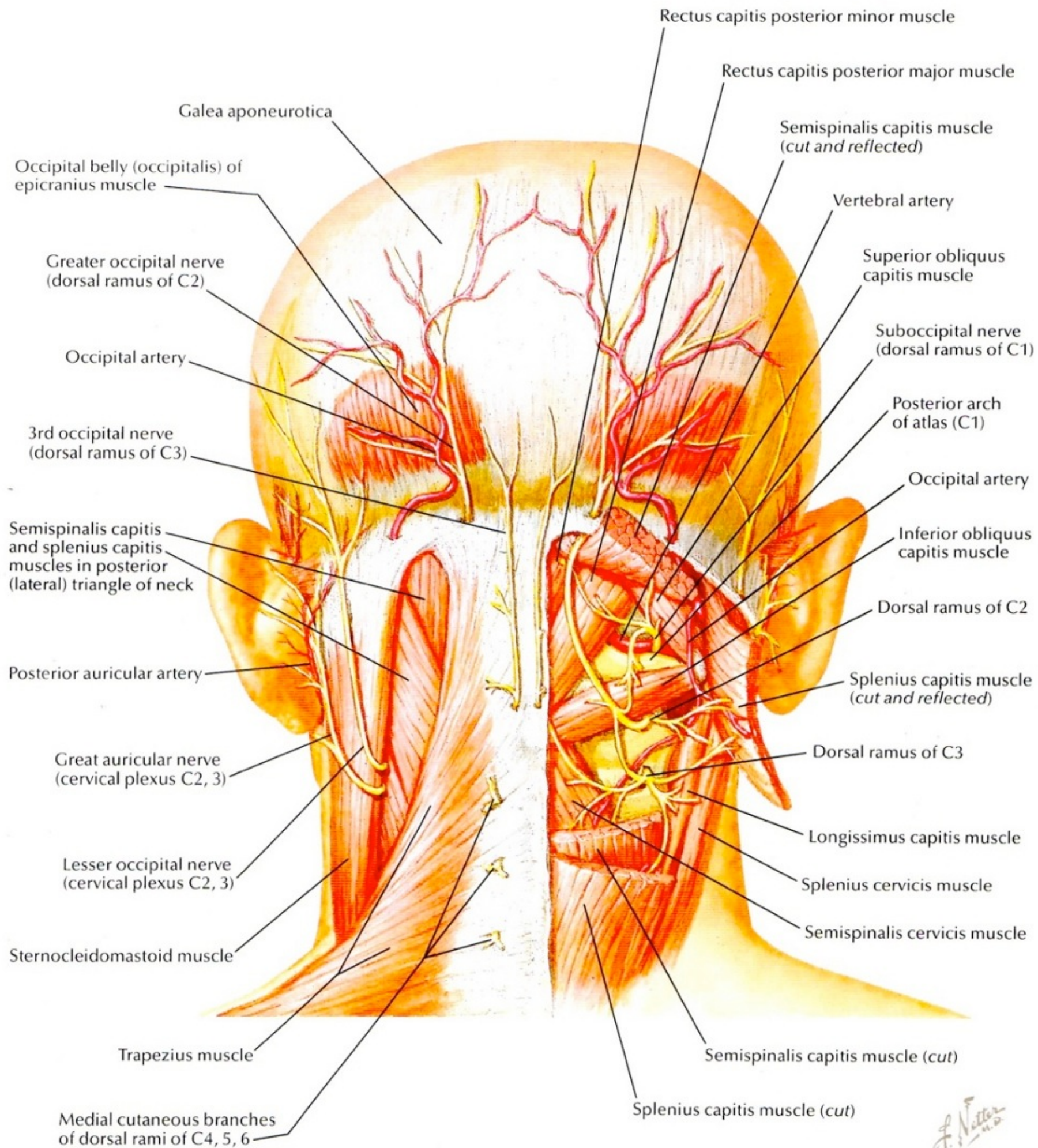


Netter

Bilateral Contraction:

1. rotates the head back as neck extends
2. rotates head forward as neck flexes





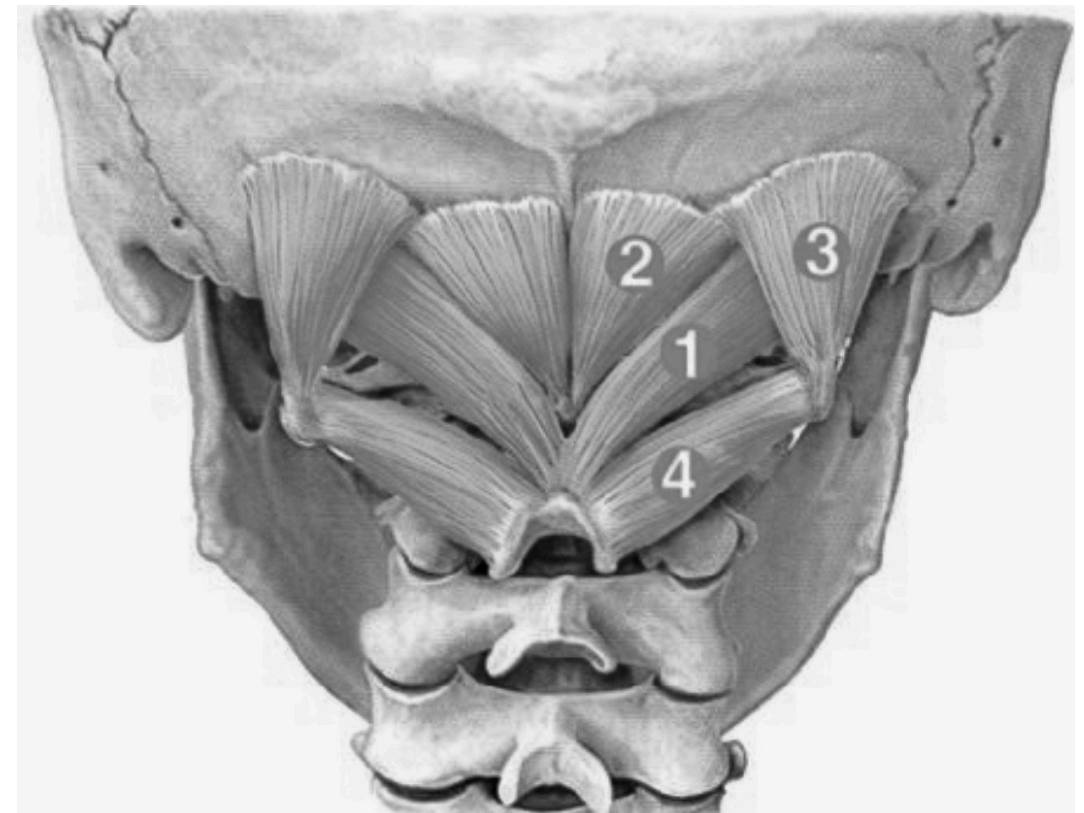
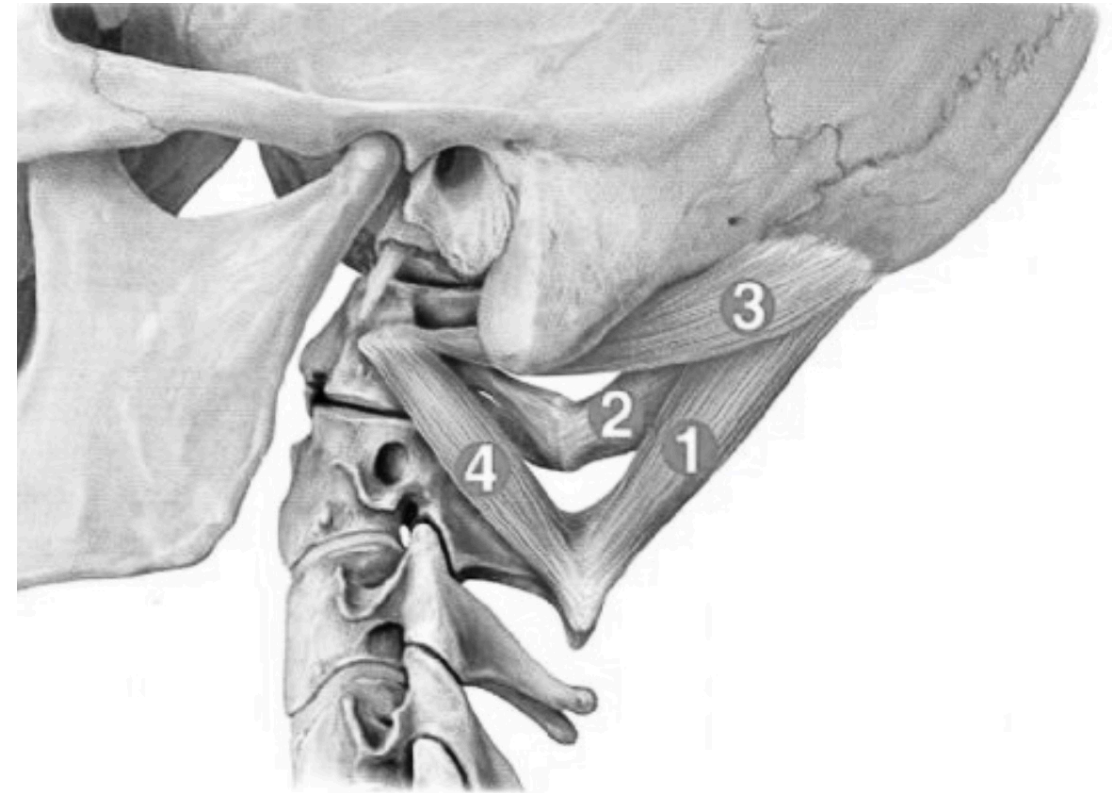
Sub Occipital Muscles

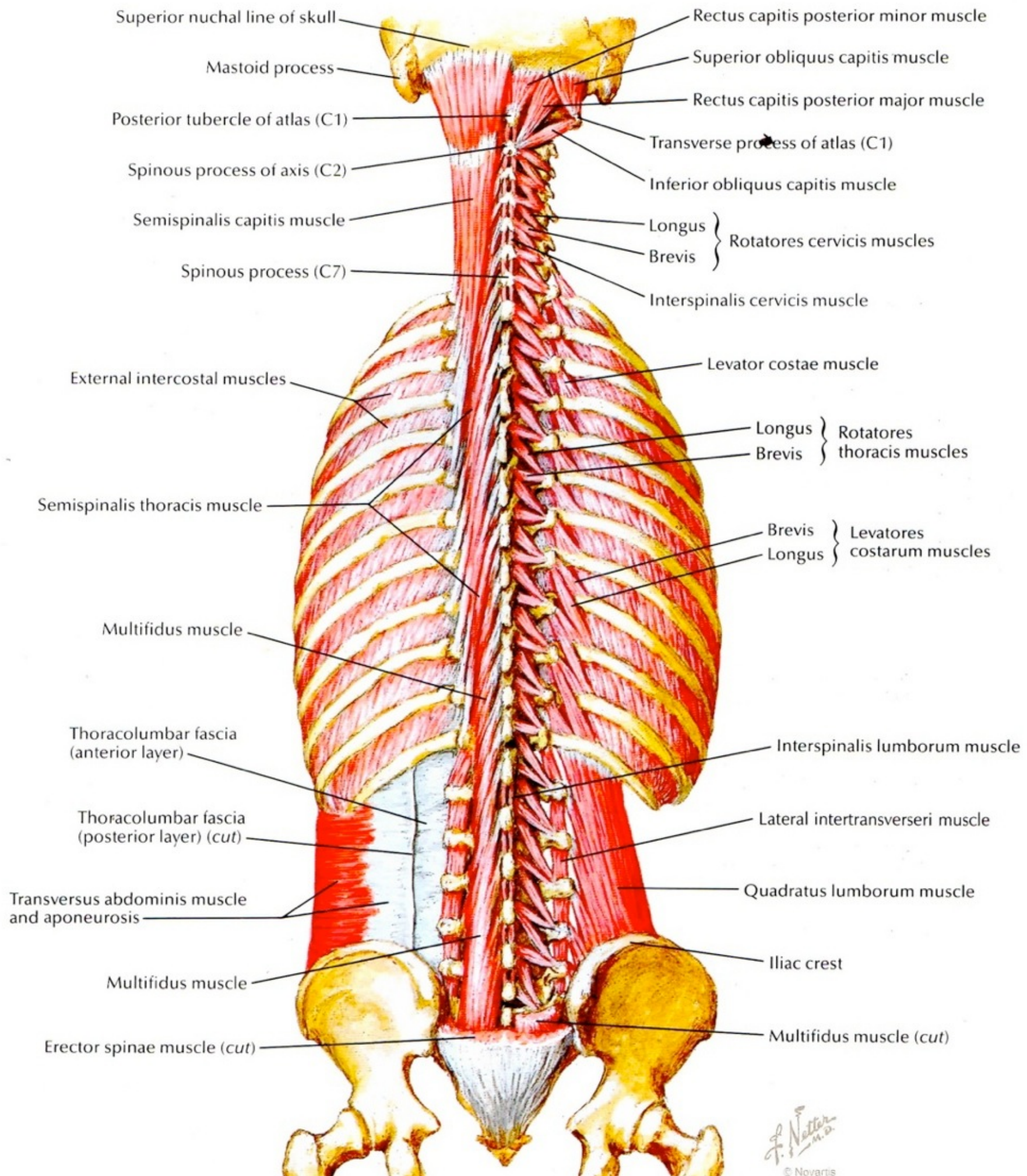
1- Rectus capitis posterior major

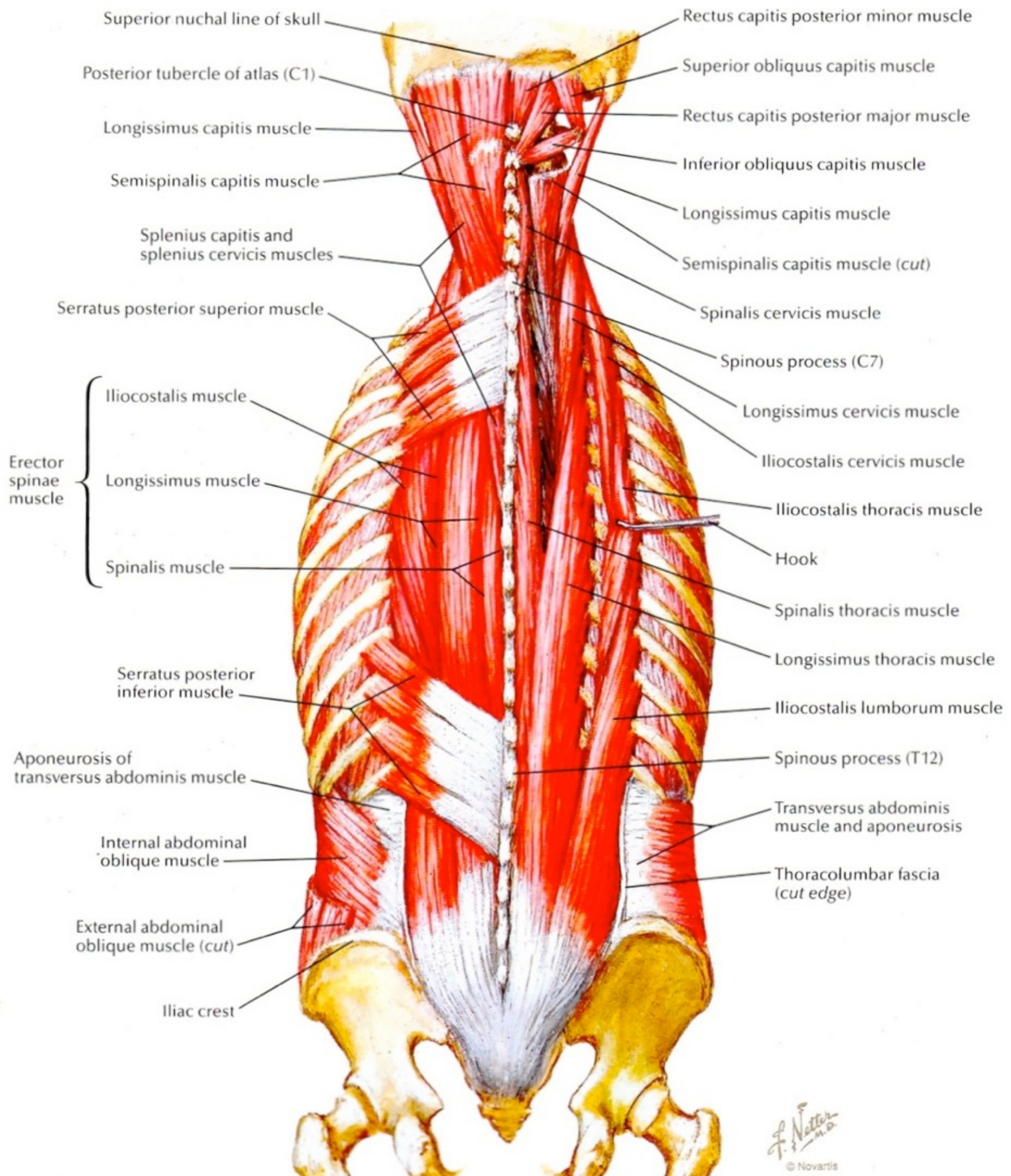
2- Rectus capitis posterior minor

3- Superior obliquus capitis

4- Inferior obliquus capitis







Nervous System

Central (brain and spinal cord) and Peripheral (somatic and autonomic)

Somatic Nervous System (motor)

- Voluntary
- Plexuses:

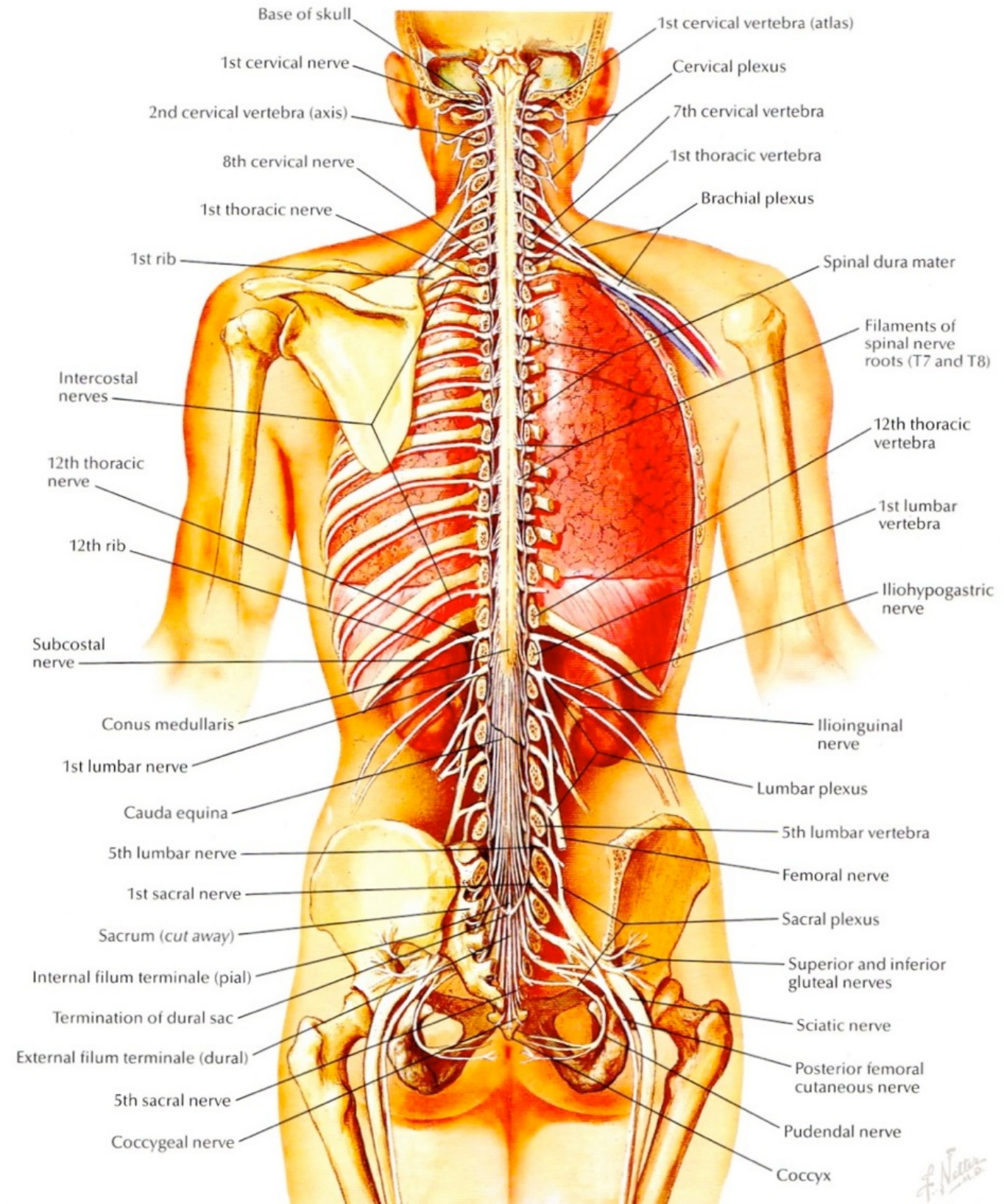
-Cervical C1-4

-Brachial C5-T1

-Intercostal T1-T12

-Femoral L2-L4

-Sciatic L4-S3



Brachial Neuralgia

(Peripheral and Central Entrapments)

Spinal nerves as they leave the central nervous system and become peripheral can be pressured AKA; entrapped, impinged or compressed at multiple sites.

Peripheral:

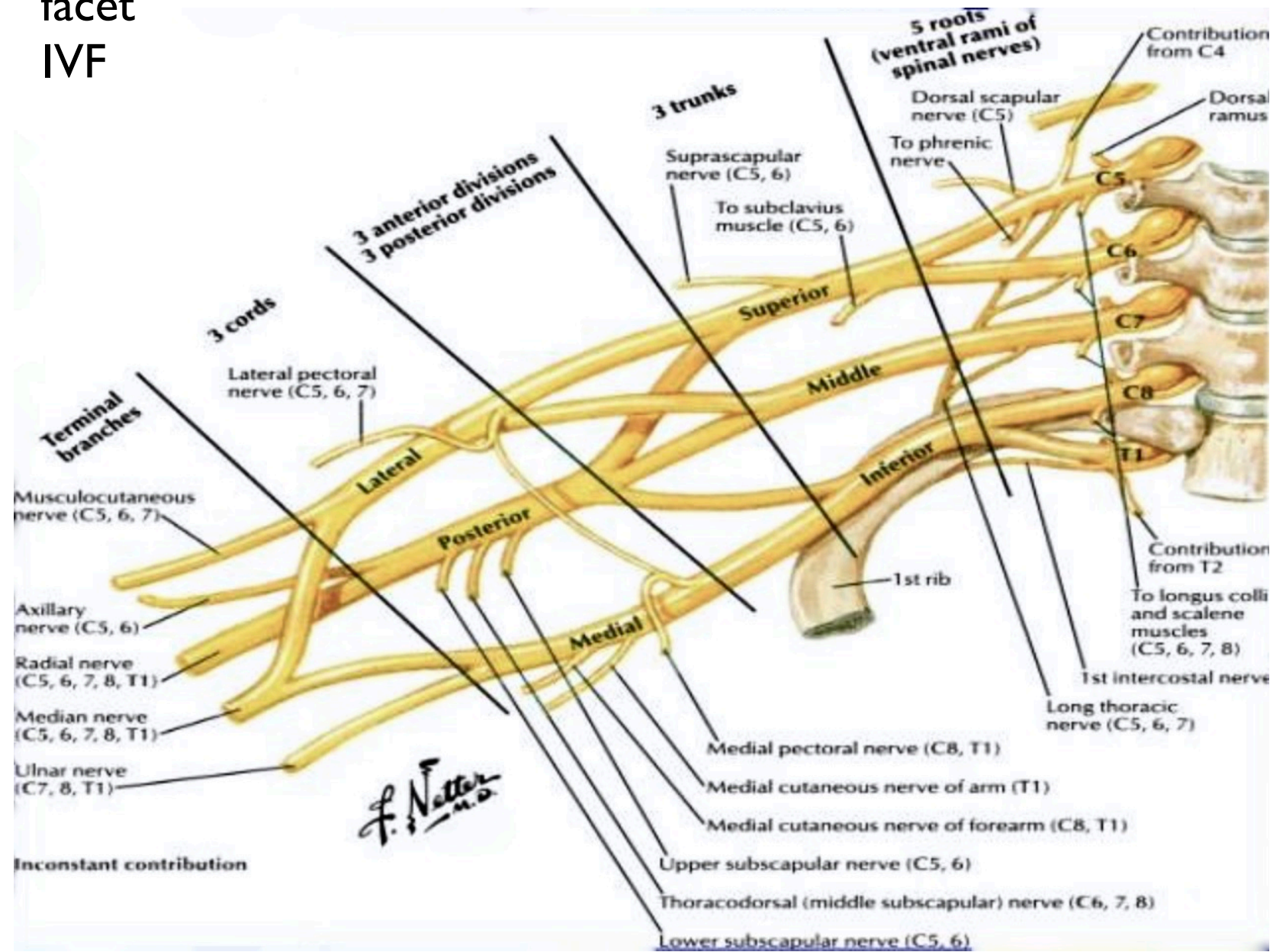
- Scalenes
- cervical rib
- sub clavicle
- pectoralis minor
- peripheral muscle spasms
- fascial adhesions

Symptoms:

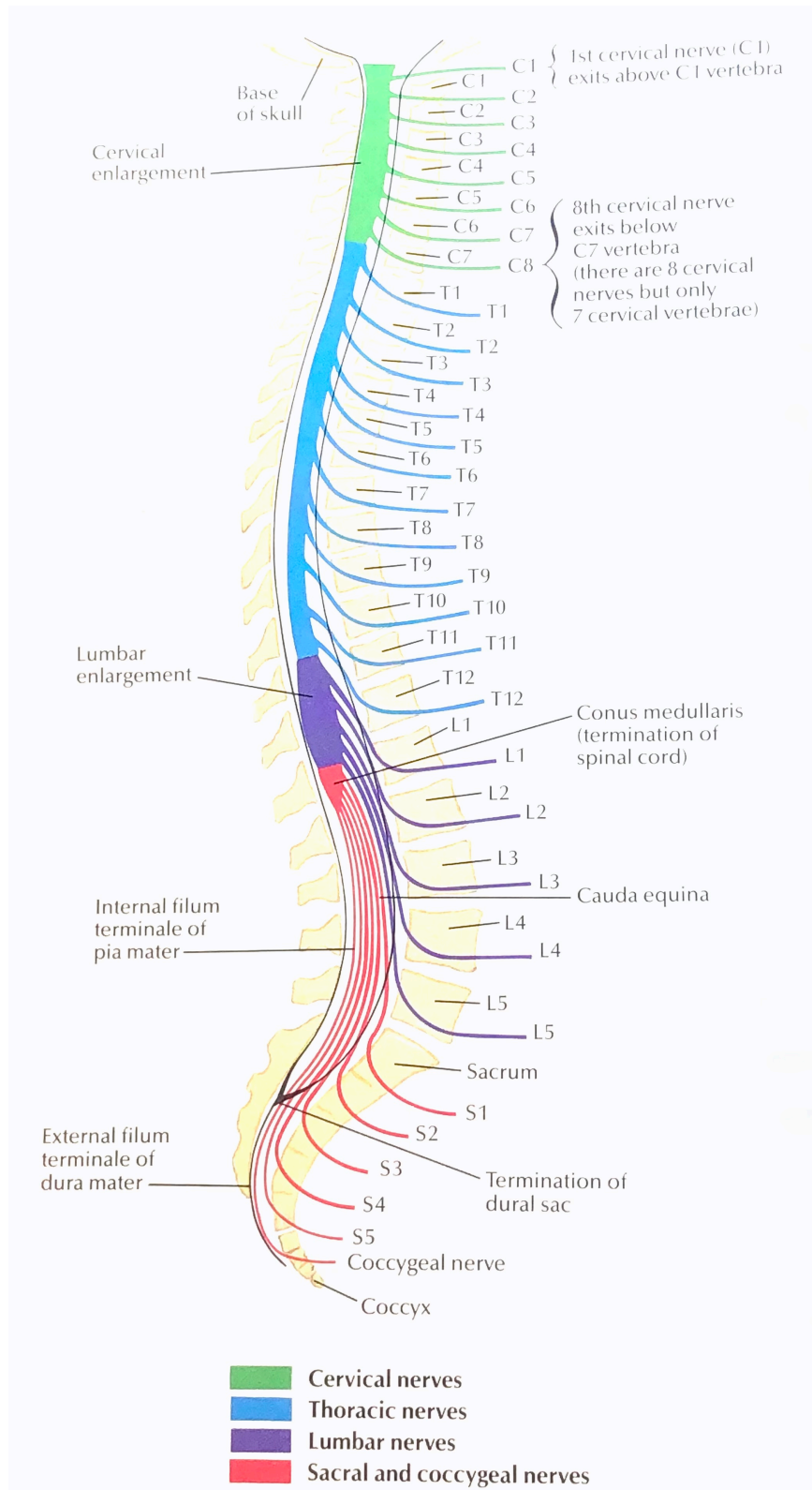
- gradual onset
- numbness
- tingling / prickling
- pain; sharp, dull, stabbing,
- throbbing burning
- occurs in extremity
- weakness, lack of coordination

Central:

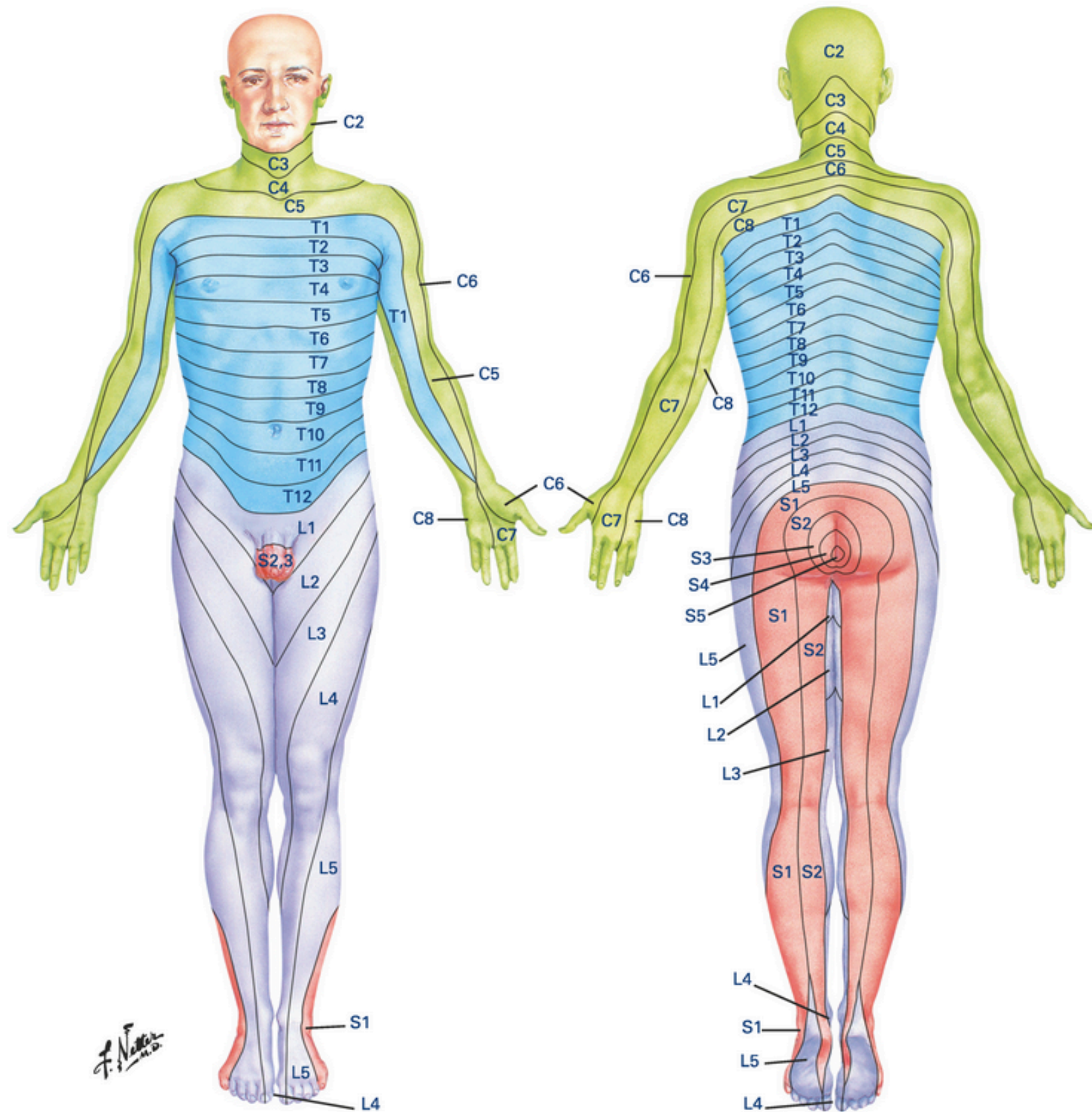
- disc
- facet
- IVF



Myotomes



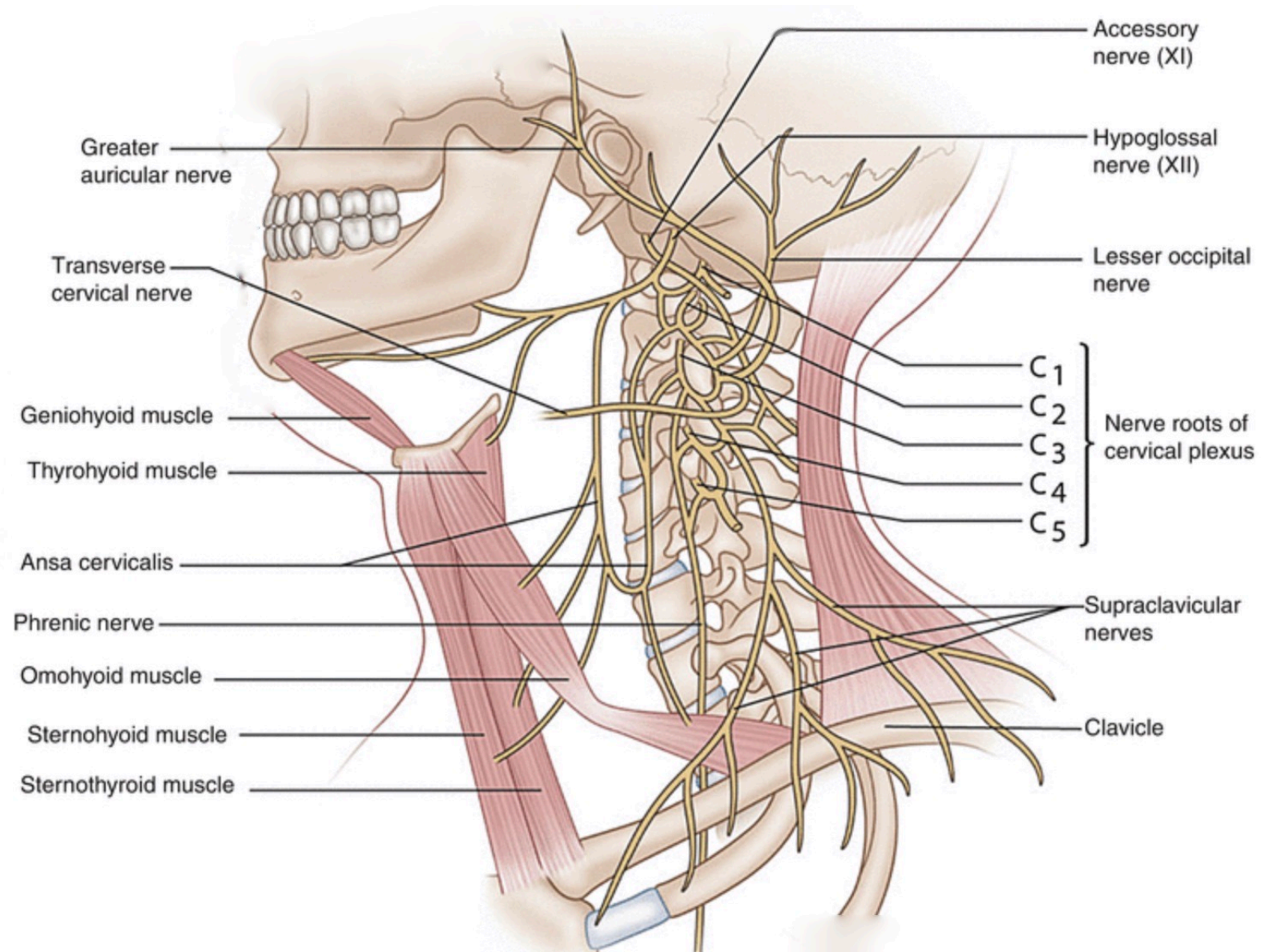
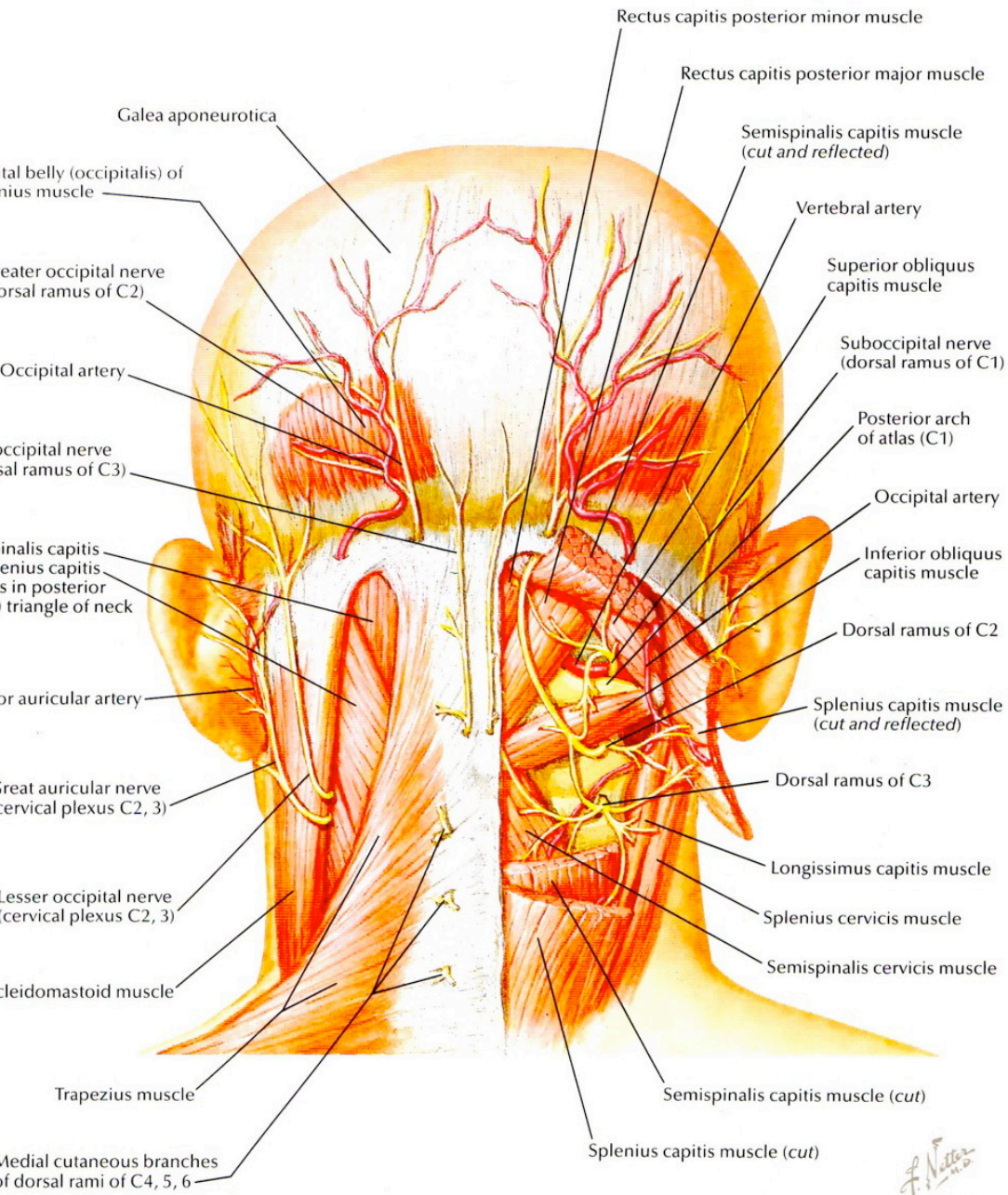
Dermatomes



Cervical Plexus

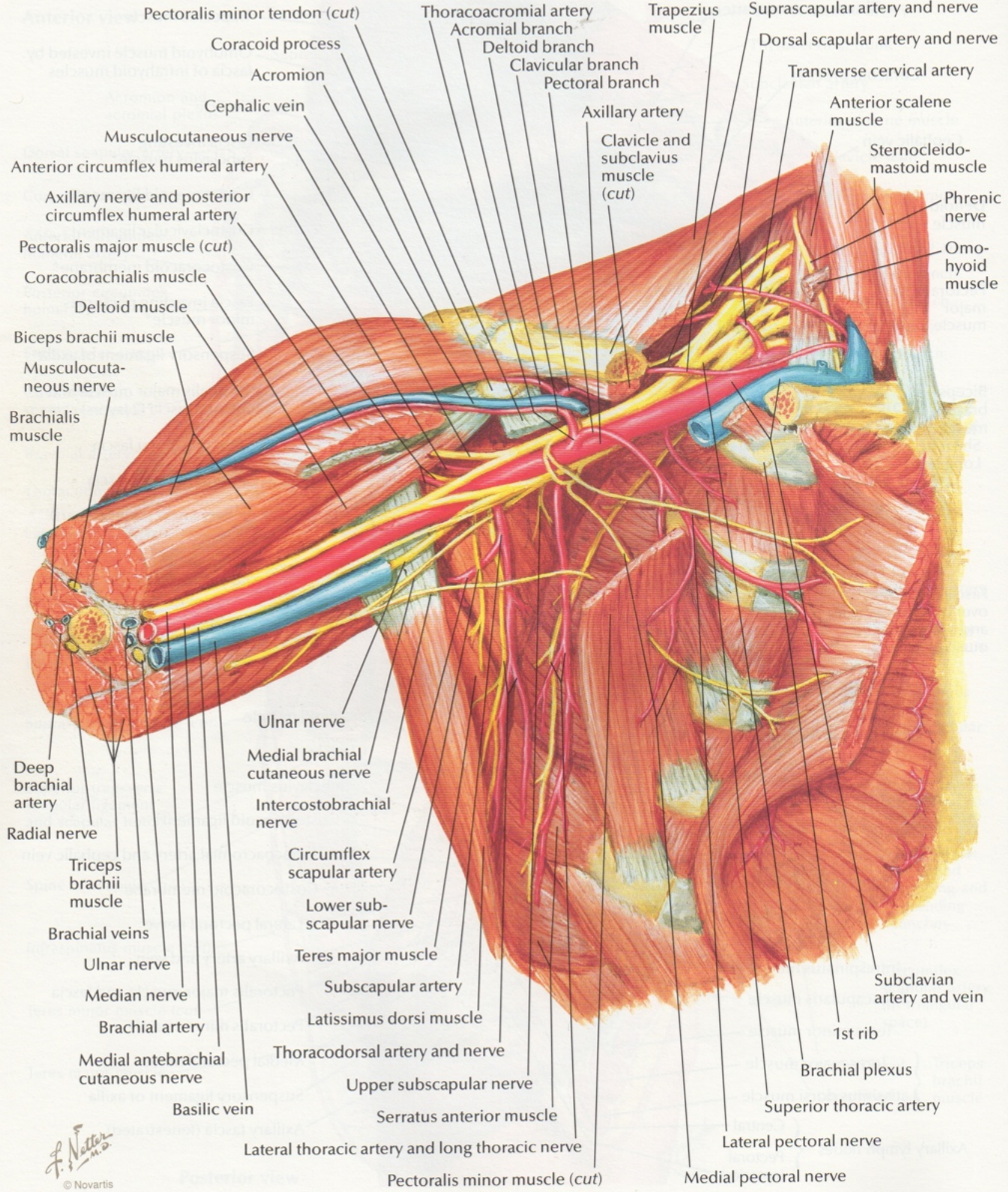
Spinal Nerves C1-C5 motor and sensory

Chewing, swallowing, breathing,
Sensory: ear, neck, upper chest and shoulders



Possible Causes of Neck and Upper Back Pain

- Disc
- Spinal nerve root
- Ligaments
- Muscle
- Tendons
- Fascia
- Facet arthropathy
- Torticollis
- Brachial Plexus
- Stenosis
- Postural syndrome
- Rib Subluxations
- Rib fractures
- Cancer/metastatic lesion
- Fractures
- Arthritis
- Inflammatory Diseases
- Osteoarthritis
- Instability
- Cervicogenic Cephalgia
- Vascular insufficiencies



Pectoralis minor tendon (cut) Thoracoacromial artery Trapezius muscle Suprascapular artery and nerve
 Coracoid process Acromial branch Deltoid branch Dorsal scapular artery and nerve
 Acromion Clavicular branch Pectoral branch Transverse cervical artery
 Cephalic vein Axillary artery Clavicle and subclavius muscle (cut) Anterior scalene muscle Sternocleido-
 Musculocutaneous nerve Anterior circumflex humeral artery Axillary nerve and posterior circumflex humeral artery Phrenic nerve
 Pectoralis major muscle (cut) Coracobrachialis muscle Deltoid muscle Biceps brachii muscle Musculocuta-
 neous nerve Brachialis muscle Ulnar nerve Medial brachial cutaneous nerve Intercostobrachial nerve
 Deep brachial artery Radial nerve Triceps brachii muscle Brachial veins Ulnar nerve Median nerve Brachial artery
 Medial antebrachial cutaneous nerve Basilic vein Circumflex scapular artery Lower sub-
 scapular nerve Teres major muscle Subscapular artery Latissimus dorsi muscle Thoracodorsal artery and nerve
 Upper subscapular nerve Serratus anterior muscle Lateral thoracic artery and long thoracic nerve Pectoralis minor muscle (cut)
 Subclavian artery and vein 1st rib Brachial plexus Superior thoracic artery Lateral pectoral nerve Medial pectoral nerve

Omohyoid, sternothyroid and sternohyoid muscles

Internal jugular vein

TOS

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Clavicle

Levator scapulae muscle

Subclavius muscle

Anterior

Middle

Posterior

Scalene muscles

Trapezius muscle

Thoracoacromial artery

Phrenic nerve

Coracoid process

Brachial plexus

Cephalic vein

Thoracic duct

Pectoralis major muscle (cut)

Subclavian artery and vein

Deltoid muscle

Axillary artery and vein

1

2

3

4

5

6

7

Intercostobrachial nerve

Superior thoracic artery

Long thoracic nerve and lateral thoracic artery

Internal thoracic artery and veins

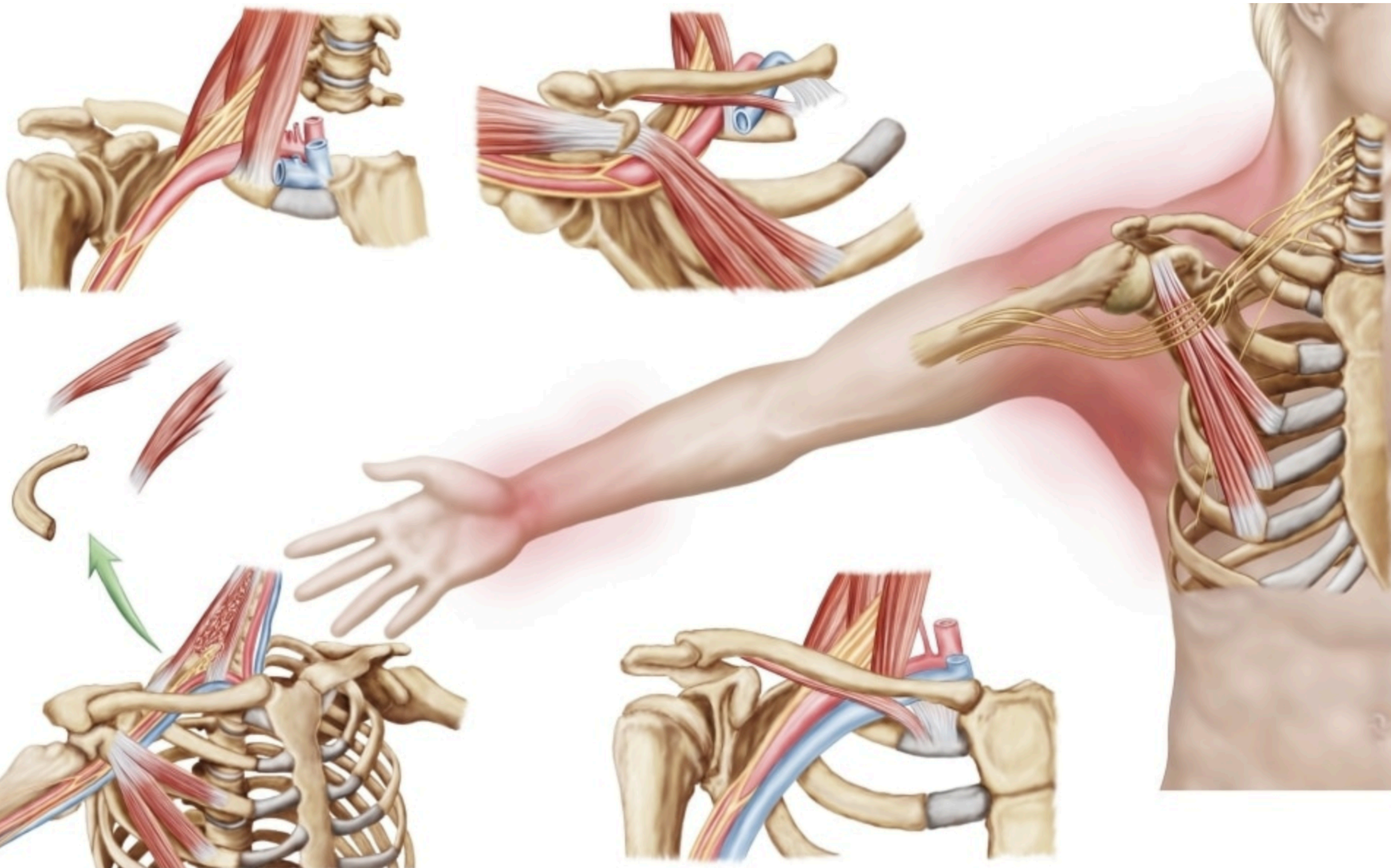
Pectoralis minor muscle

External intercostal muscle

Digitations of serratus anterior muscle

Internal intercostal muscle (cut)

Thoracic Outlet Syndrome



Cervical DJD

- loss of disc height
- reshaping of bone w osteophyte
- posterior osteophyte
- loose of cervical curve



Cervical “DJD” Degenerative Joint Disease

“OA” Osteoarthritis

OA effects all cervical structures: Intervertebral discs, Facet joints, Articular cartilage, ligaments,

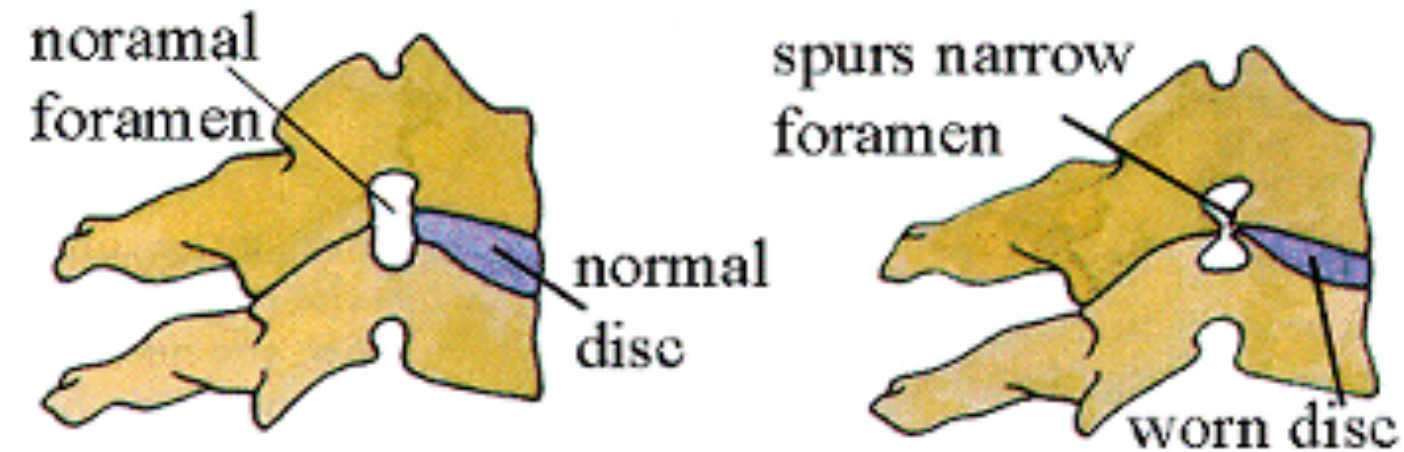
Changes: disc narrowing, bony changes: spurring (bone alternation) and eburnation (cartilage loss and subchondral bone changes), fusion (ankylosing), cervical curve straightening. Occurs over 40 years.

Causes: over 40 age, Mechanical stresses; repetitive work and static positions, posture, previous traumas.

Symptoms: Localized or referred pain, stiffness, limited ROM, crepitus, head ache,



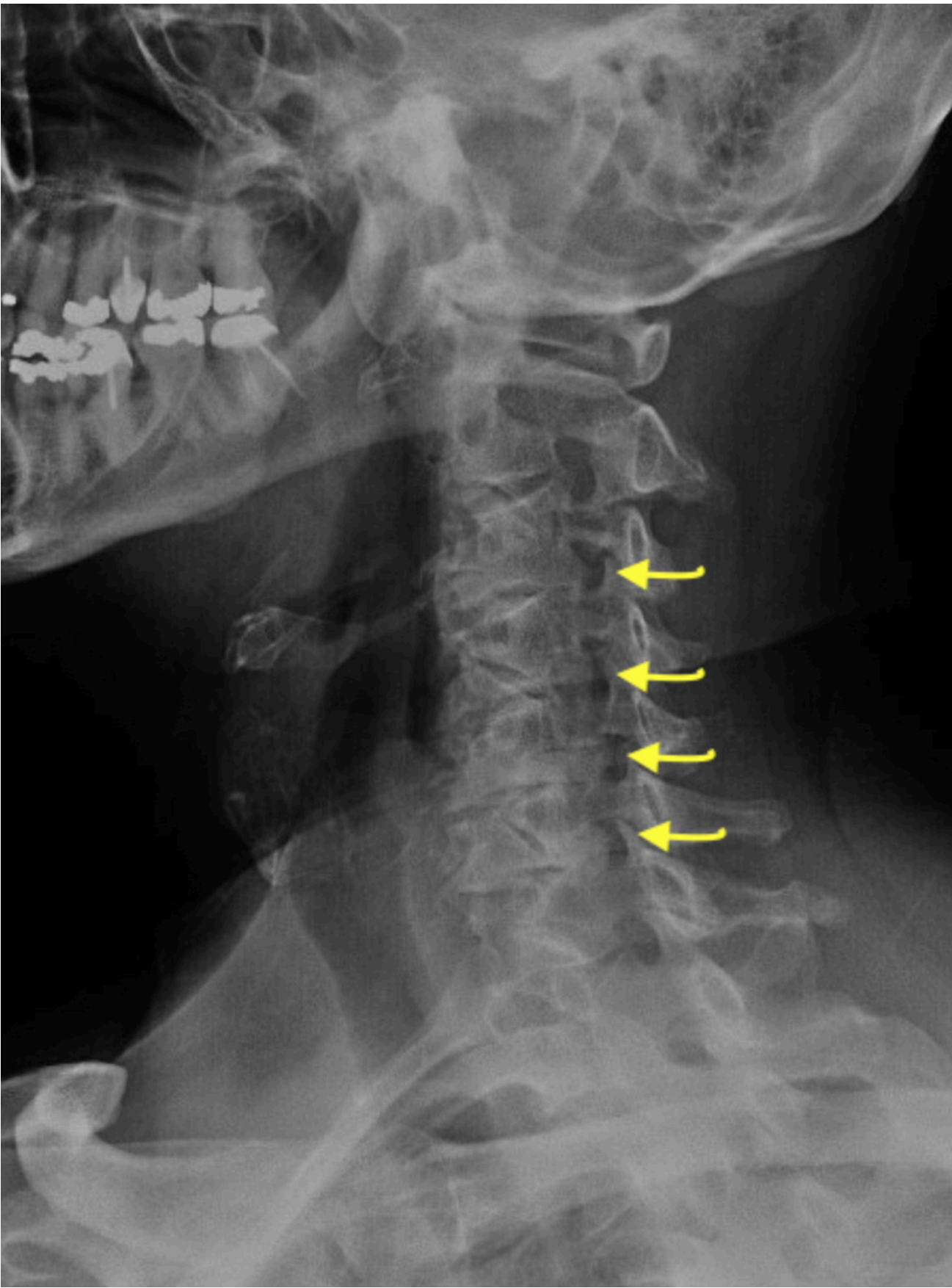
Foraminal Stenosis



- Narrowing of the intervertebral foramen (IVF) where the spinal nerve roots exit
- Caused by disc degeneration, soft tissue swelling, or disc herniation and bulging
- lateral neck pain and Peripheral neuropathy Radiation/ Numbness to arm and hand

IVF Stenosis and Disc Narrowing

Oblique x-ray



Lateral x-ray



Straight Cervical Curve AKA Military Neck Post injury

Normal Curve



Straight Curve



Postural syndrome

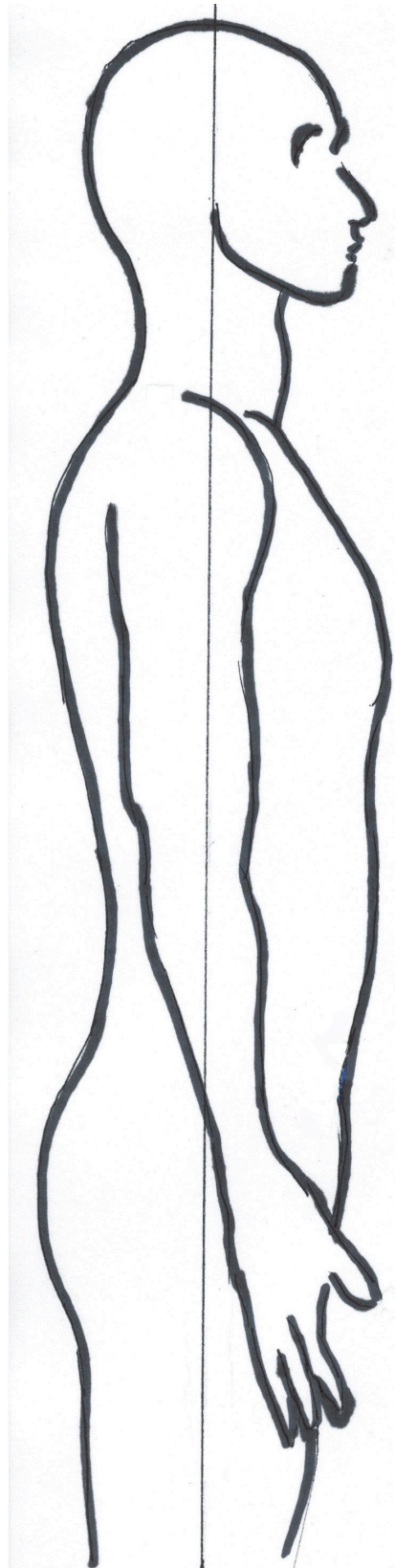
Most common source of neck pain, Postural / mechanical /cervical spondylosis.

Poor posture create biomechanics stress on nerves, bones, muscles, tendons and ligaments.

Posture is a repetitive stress injury, changing the compressive forces on the spine; shortening and spasming muscles, irritating joints, tendon and ligament insertions. Due to the increased time and frequency in use of media devices and poor sleeping positions this is a major source of upper body pathologies.

- Forward head posture: forward bending of cervical spine with cervical hyperextension
- Rounded shoulders: adduction of shoulders forward shortening chest muscles ie. clavicular aspect of pectorals major
- Internal rotated arms: shortening of primary internal rotation muscles; subscapularis, teres major and pectorals major.
- Kyphotic upper back: Hyper flexion thoracic spine, increasing forward head protrusion and traction on cervical and thoracic spine.

Normal



Poor Posture

-forward head protrusion

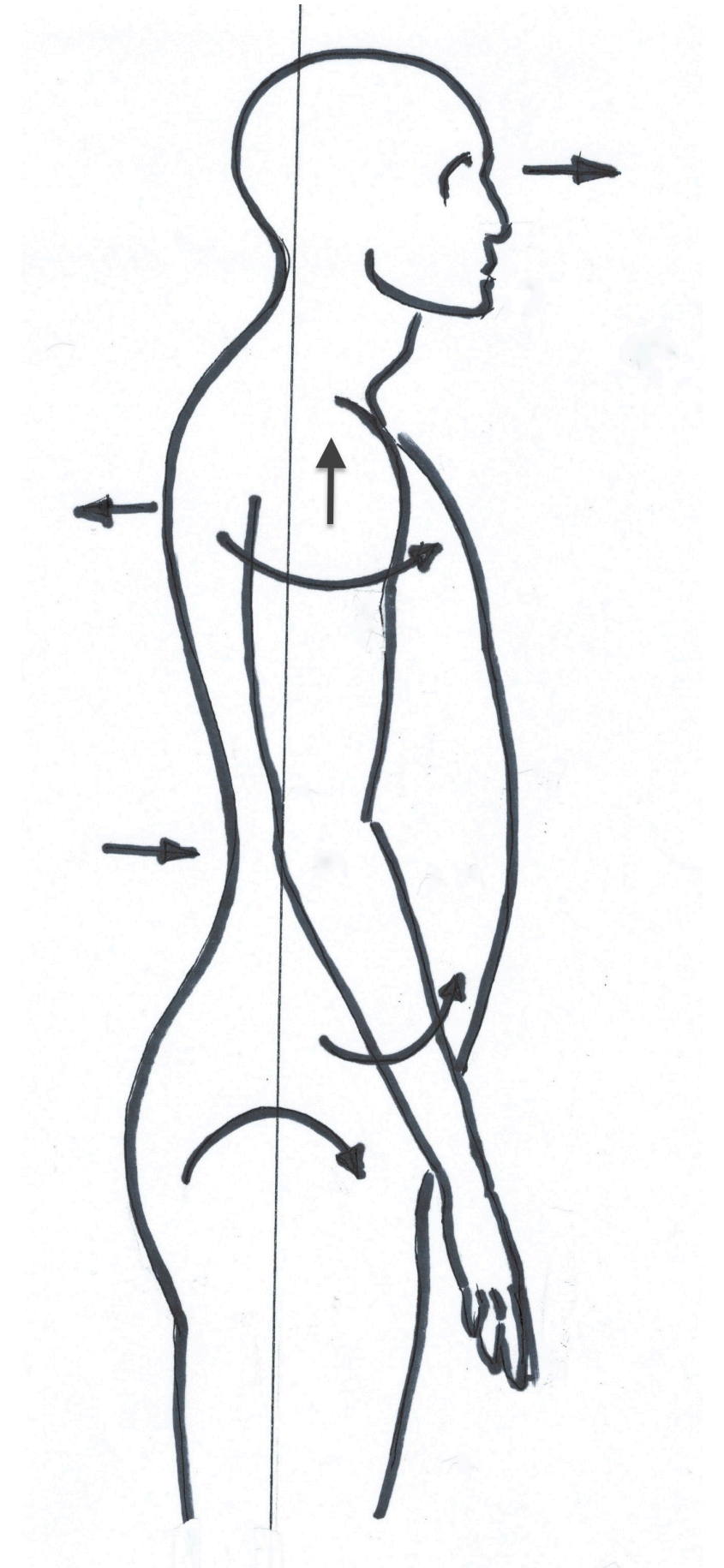
-shoulders rounded forward and elevated

-increased kyphosis

-increased lordosis

-pelvis rolls anterior

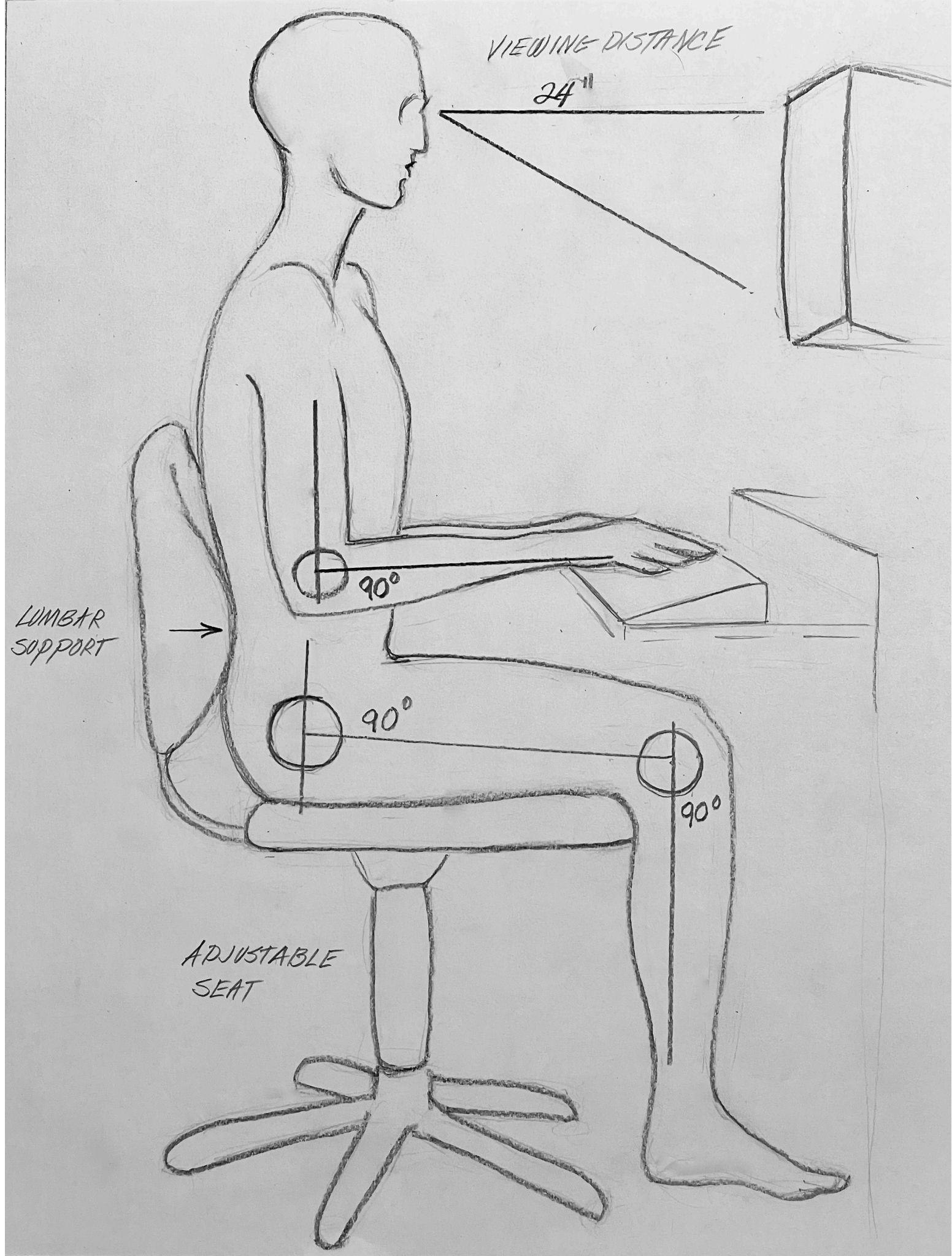
-internal rotation arm

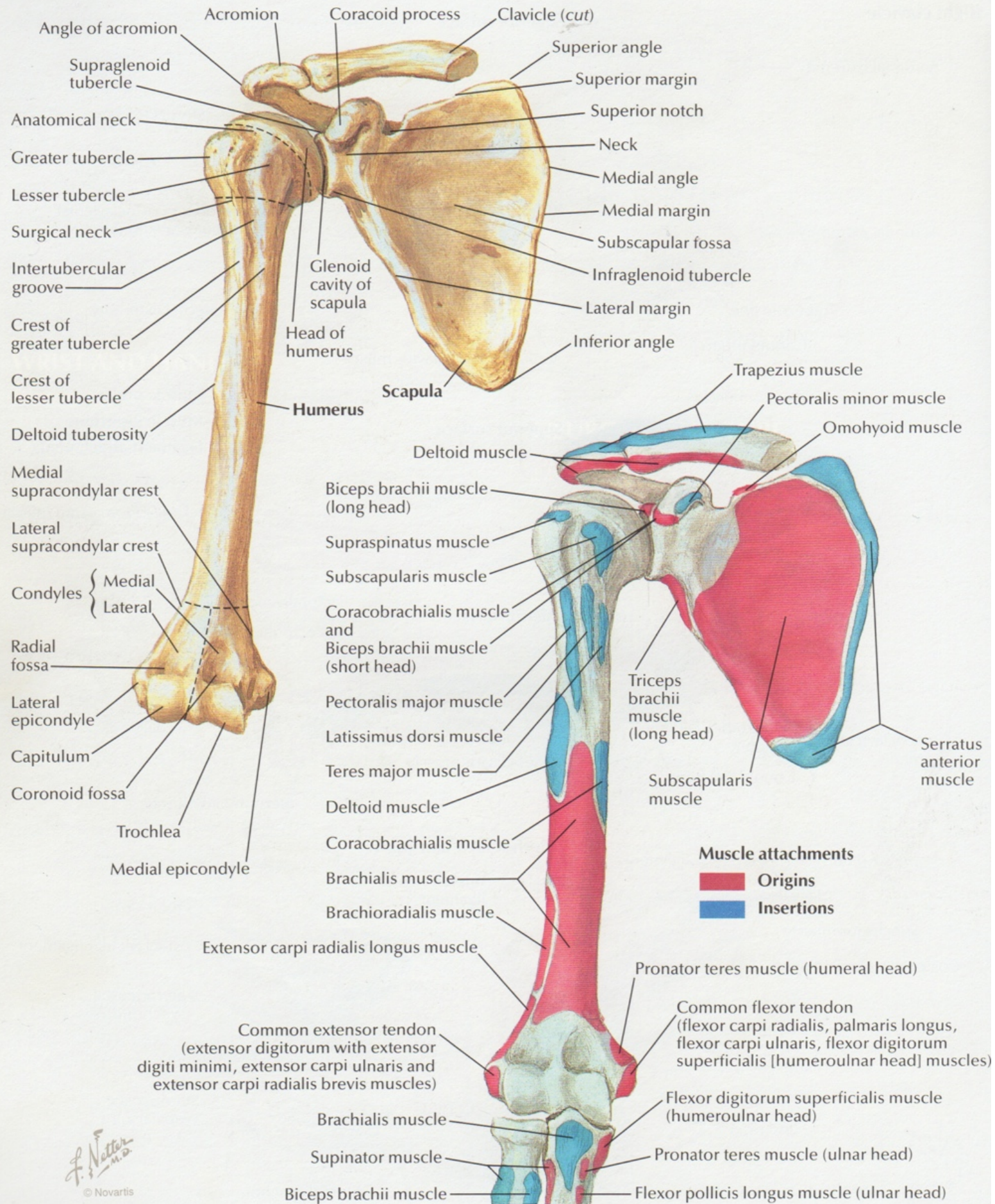


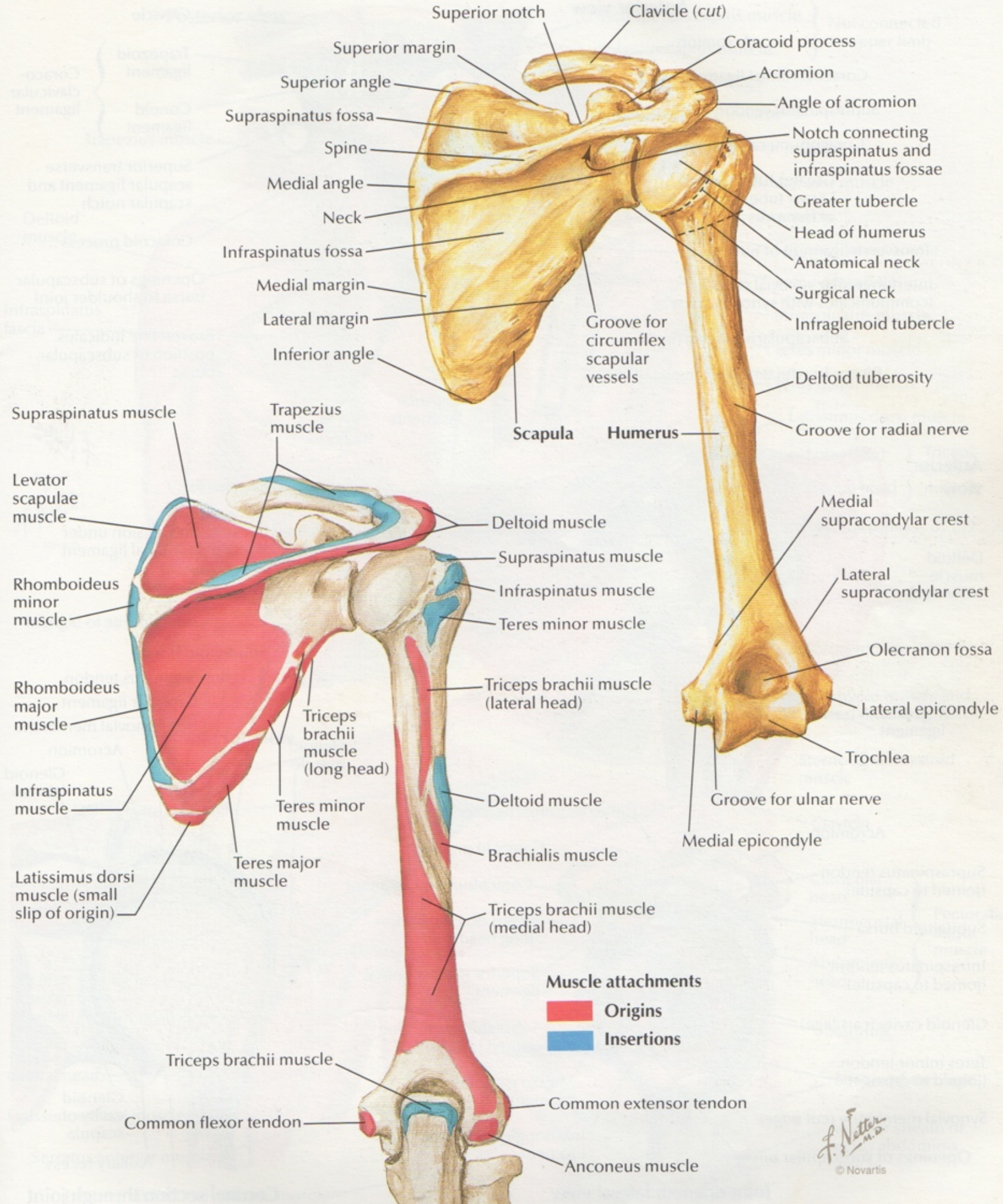
computer set up

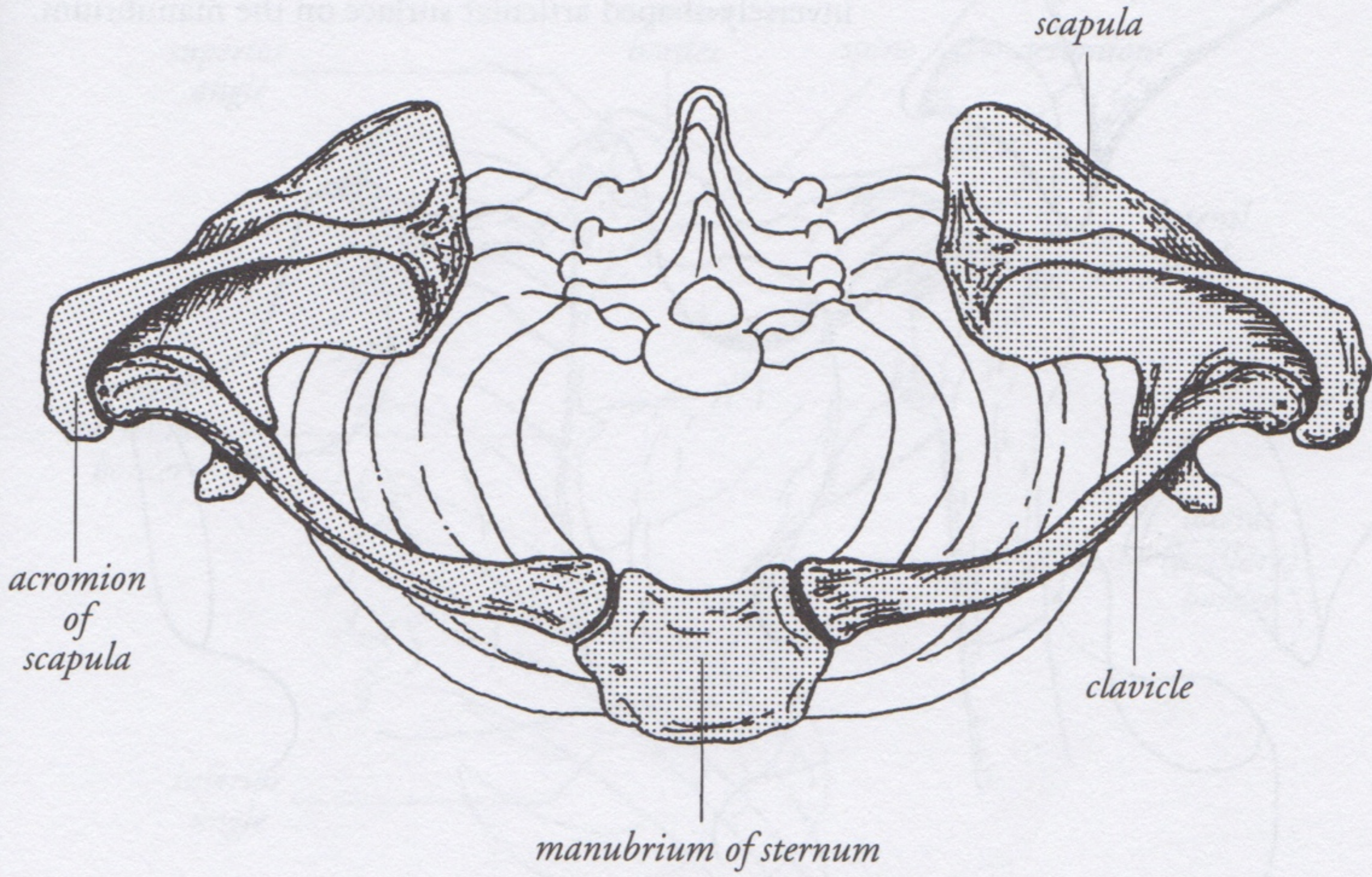


Ergonomic Computer Set Up







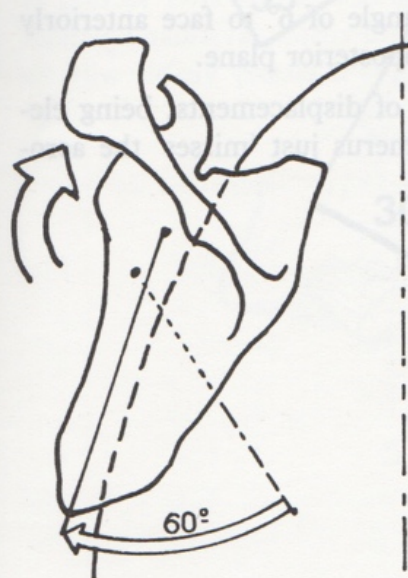
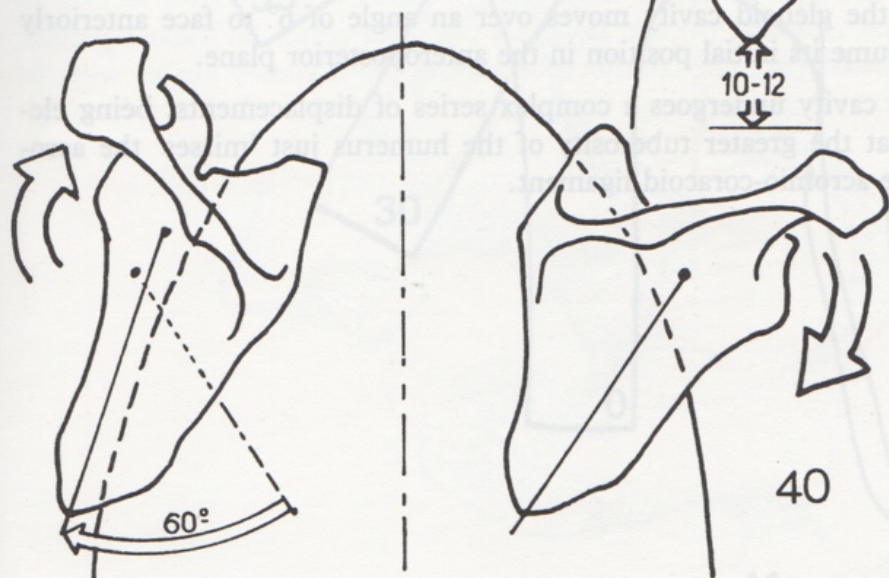
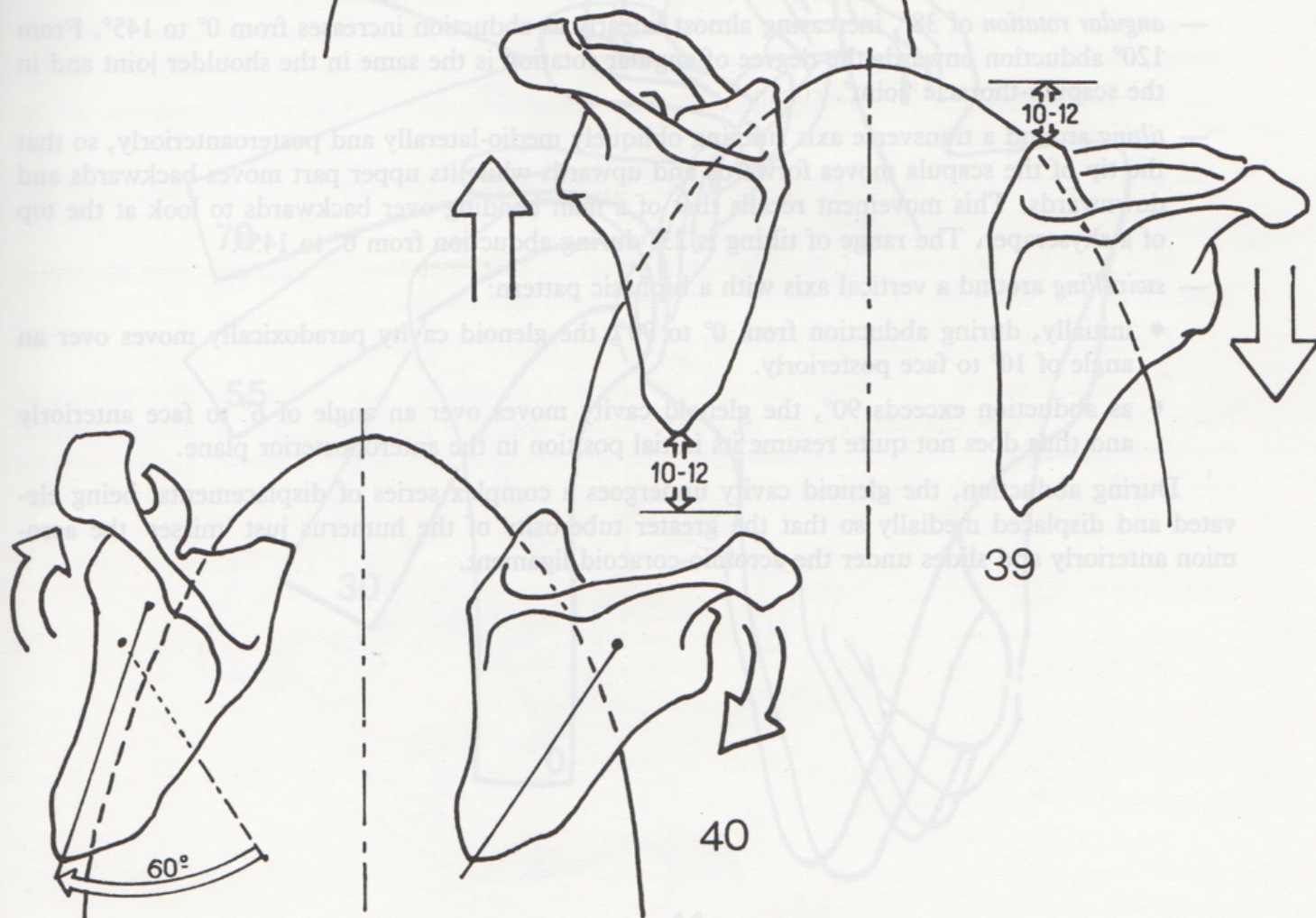
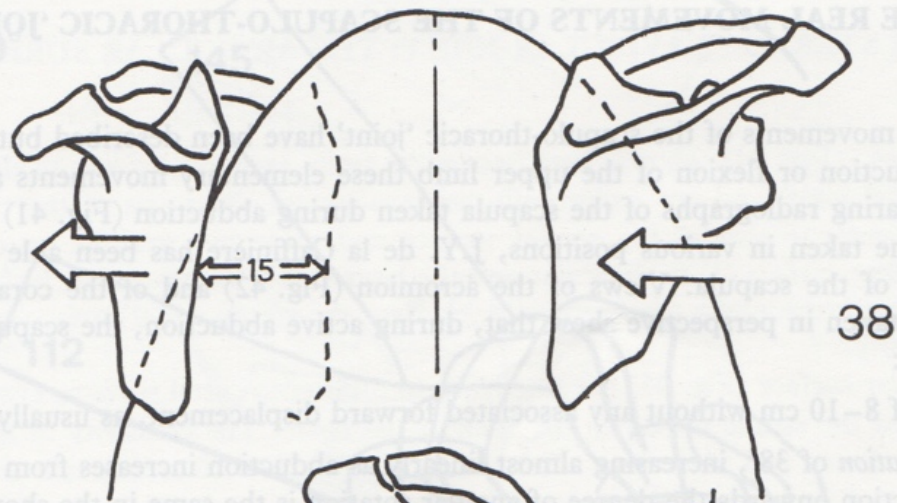
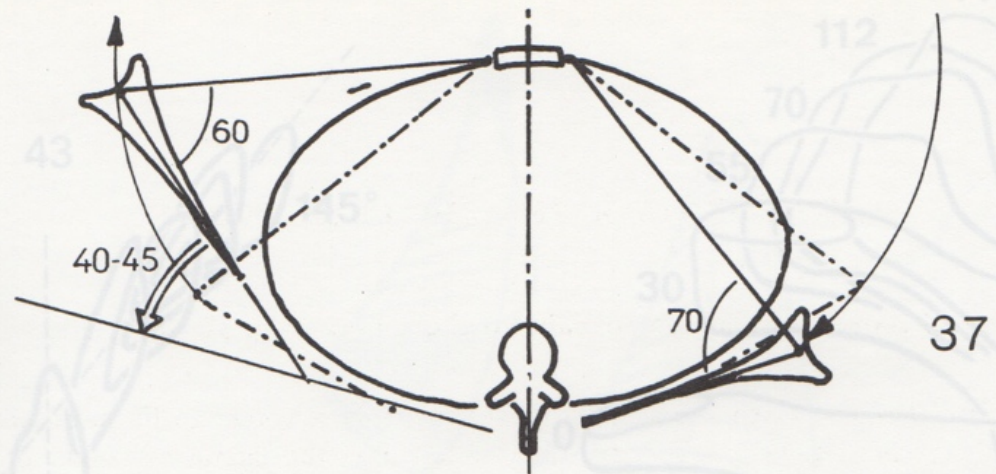


scapula

*acromion
of
scapula*

clavicle

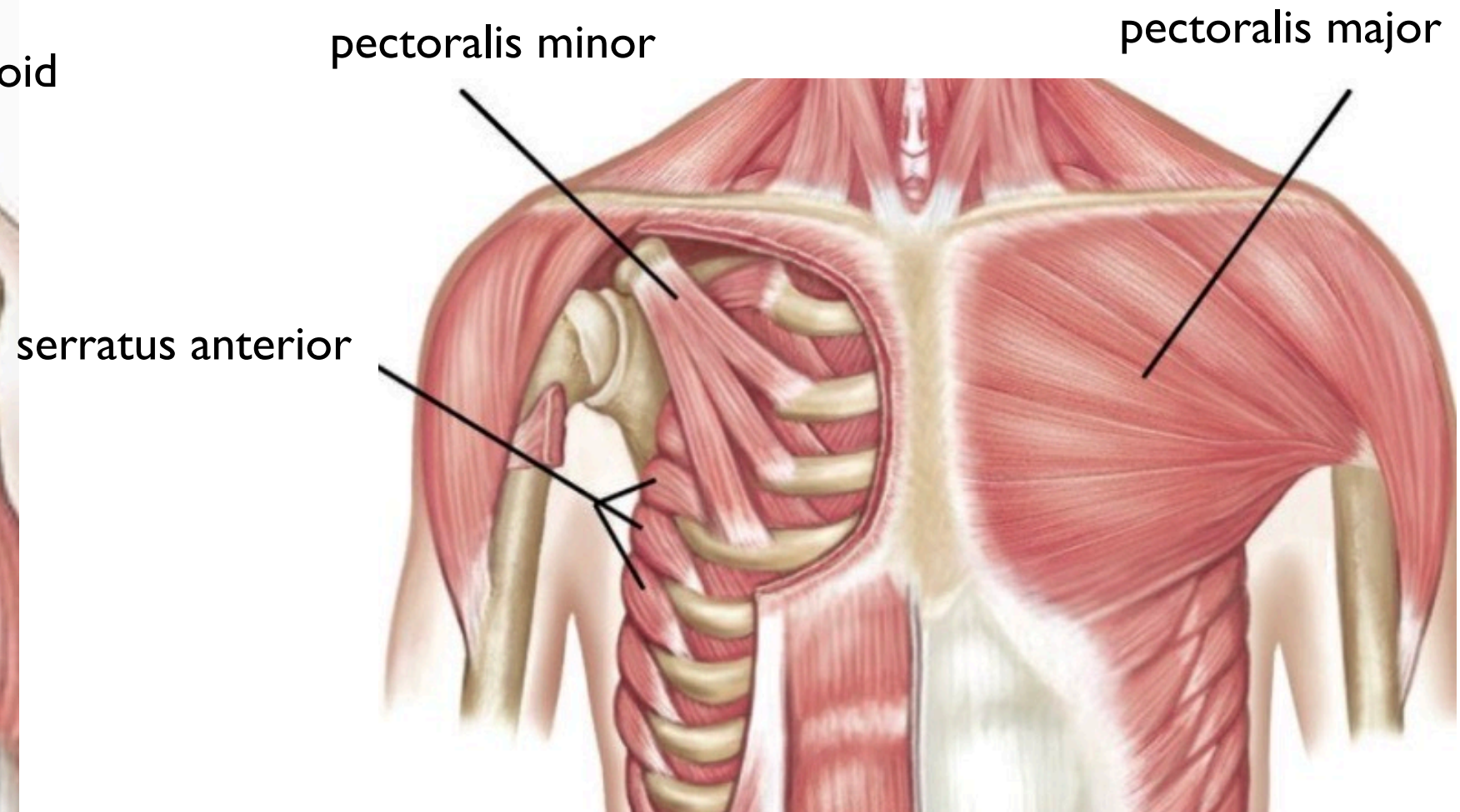
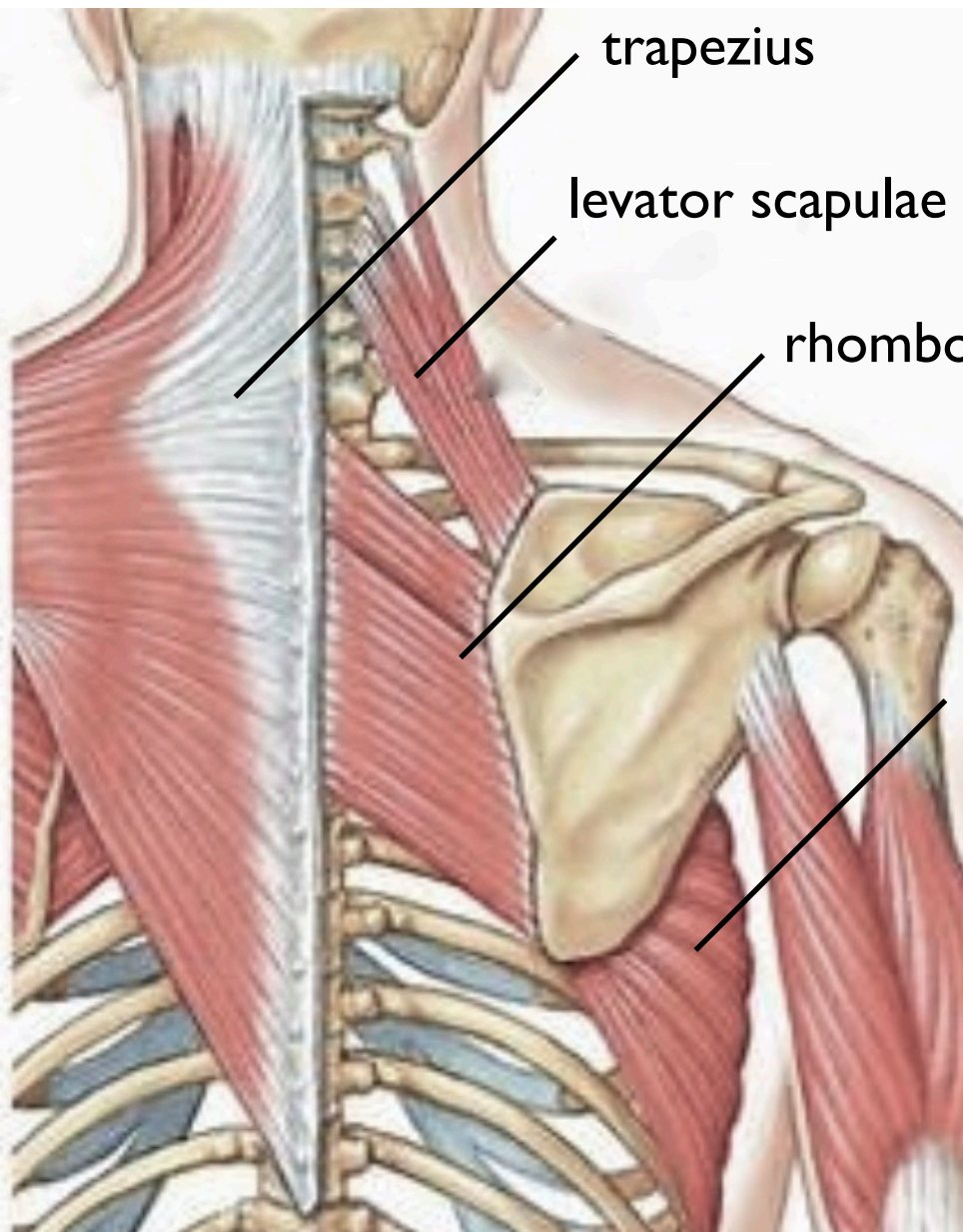
manubrium of sternum



Shoulder Girdle / Scapular Movement

scapula elevators: levator scapulae, upper trapezius, rhomboids,

scapula depressors: Lower trapezius, Latissimus dorsi, pectoralis major(sternal and costal segments, pectoralis minor

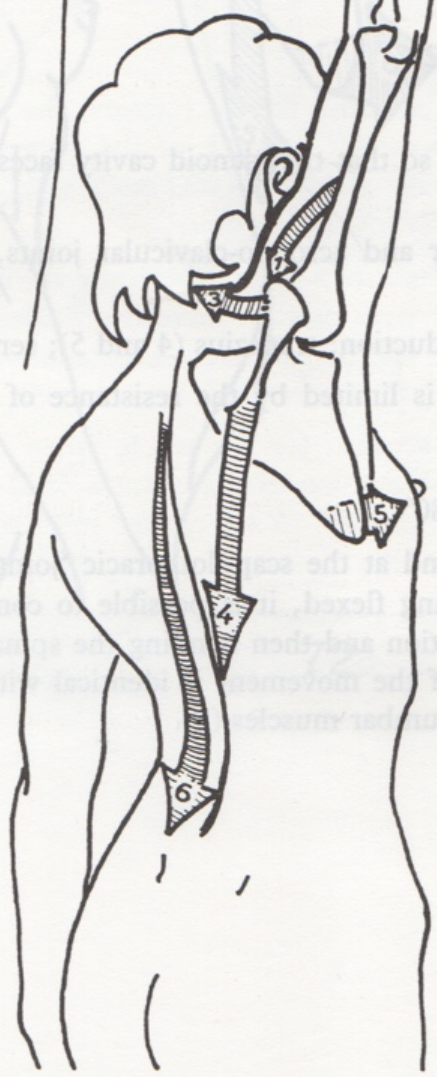




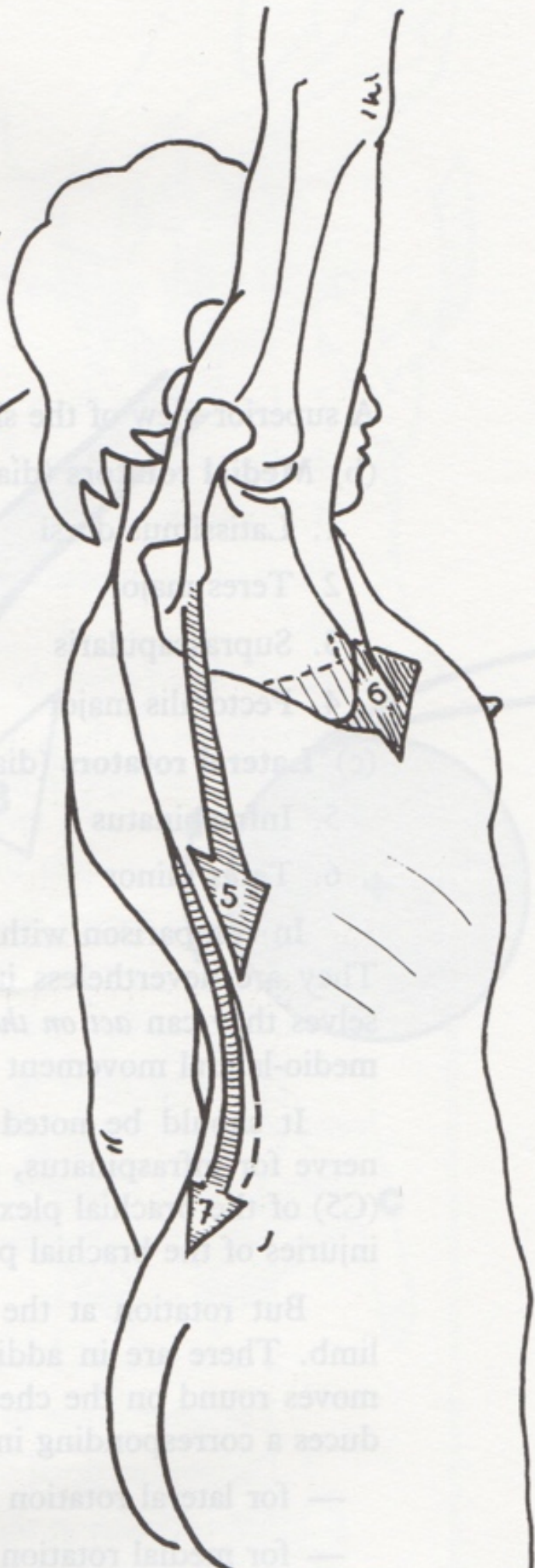
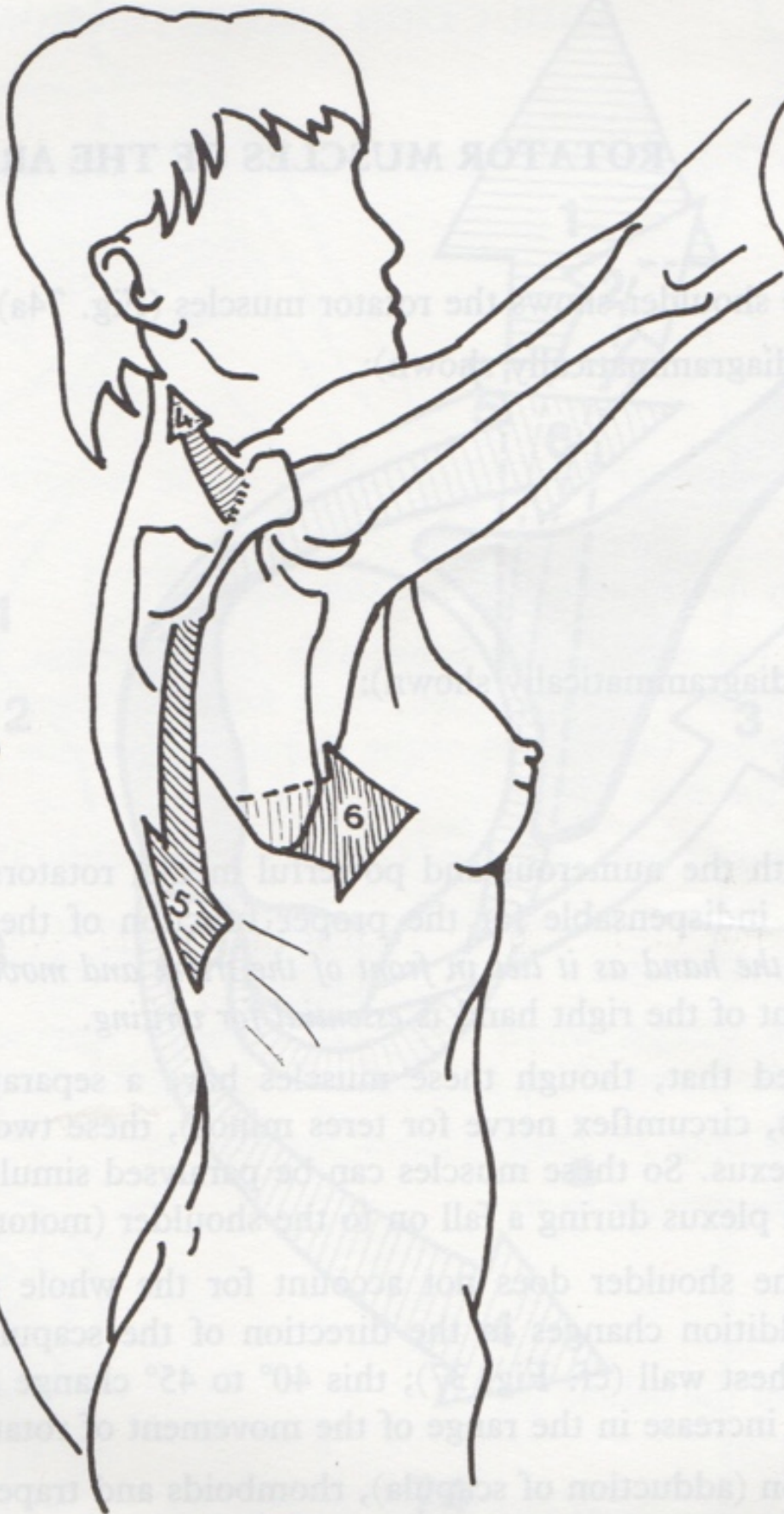
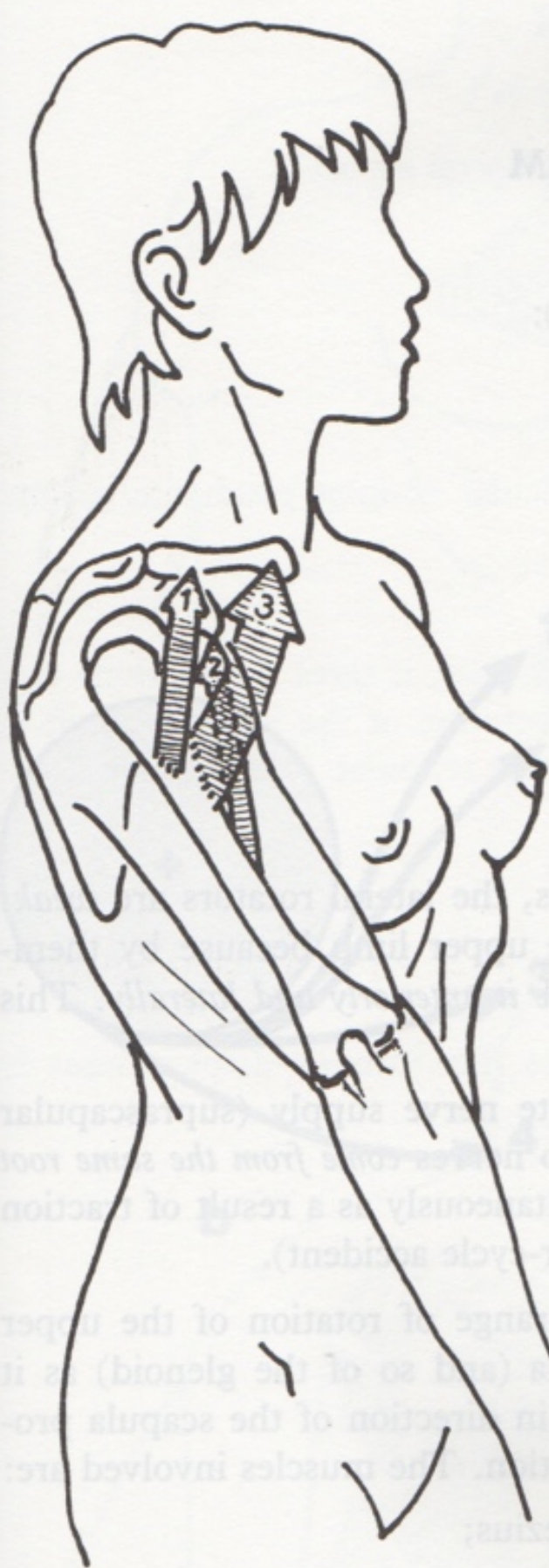
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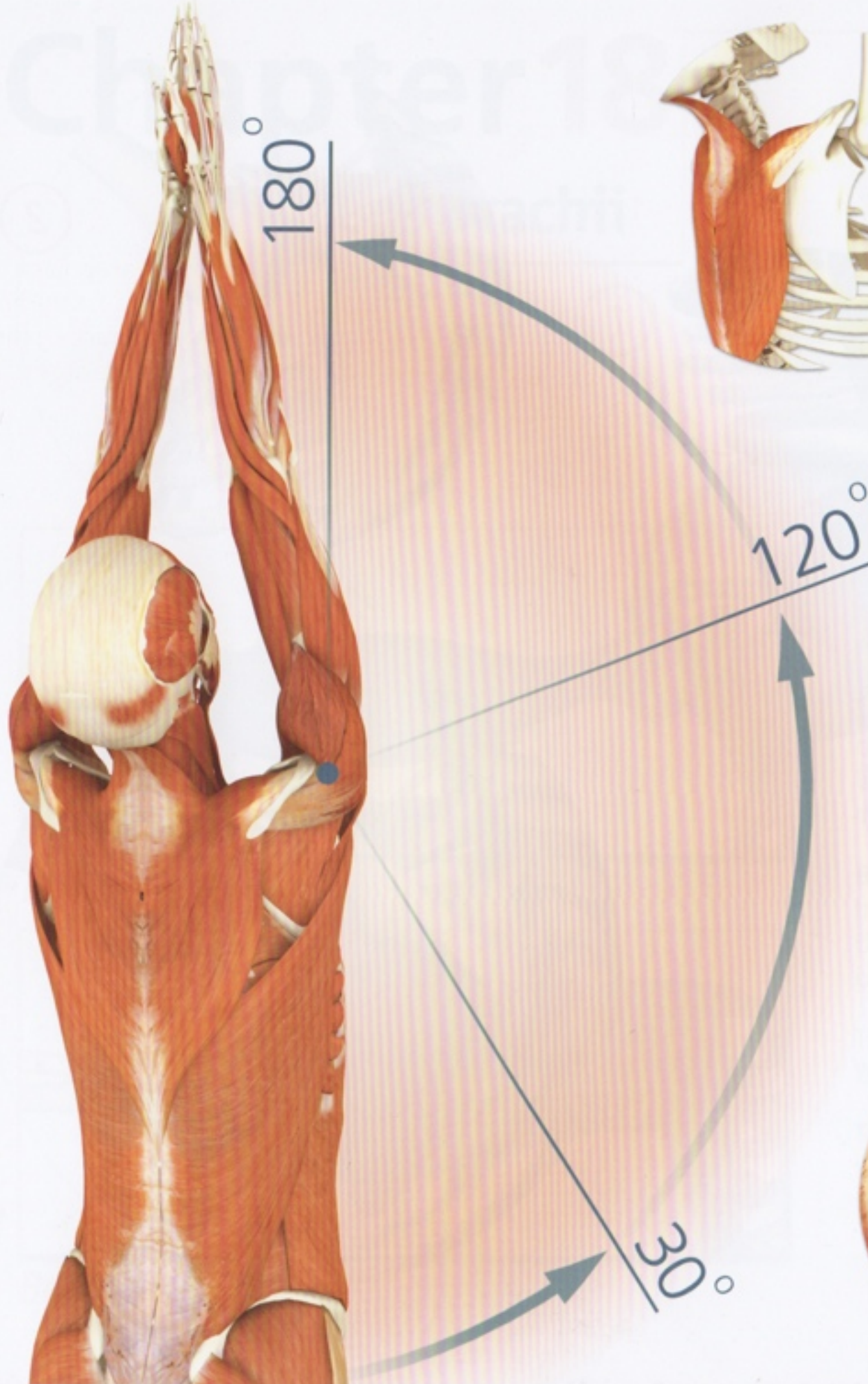


Shoulder Biomechanics

Movement of the shoulder takes place through coupling of three separate joints: the glenohumeral, scapulothoracic, and acromioclavicular joints.

Shoulder abduction and elevation of the humerus begins by stabilizing the scapula. The supraspinatus then initiates abduction at the glenohumeral joint. The deltoid sustains abduction to approximately 120° (also through glenohumeral movement). The trapezius completes abduction of the shoulder by outwardly rotating the scapula.

This movement is apparent in the various Yoga postures where the arm is elevated or abducted.



4



3

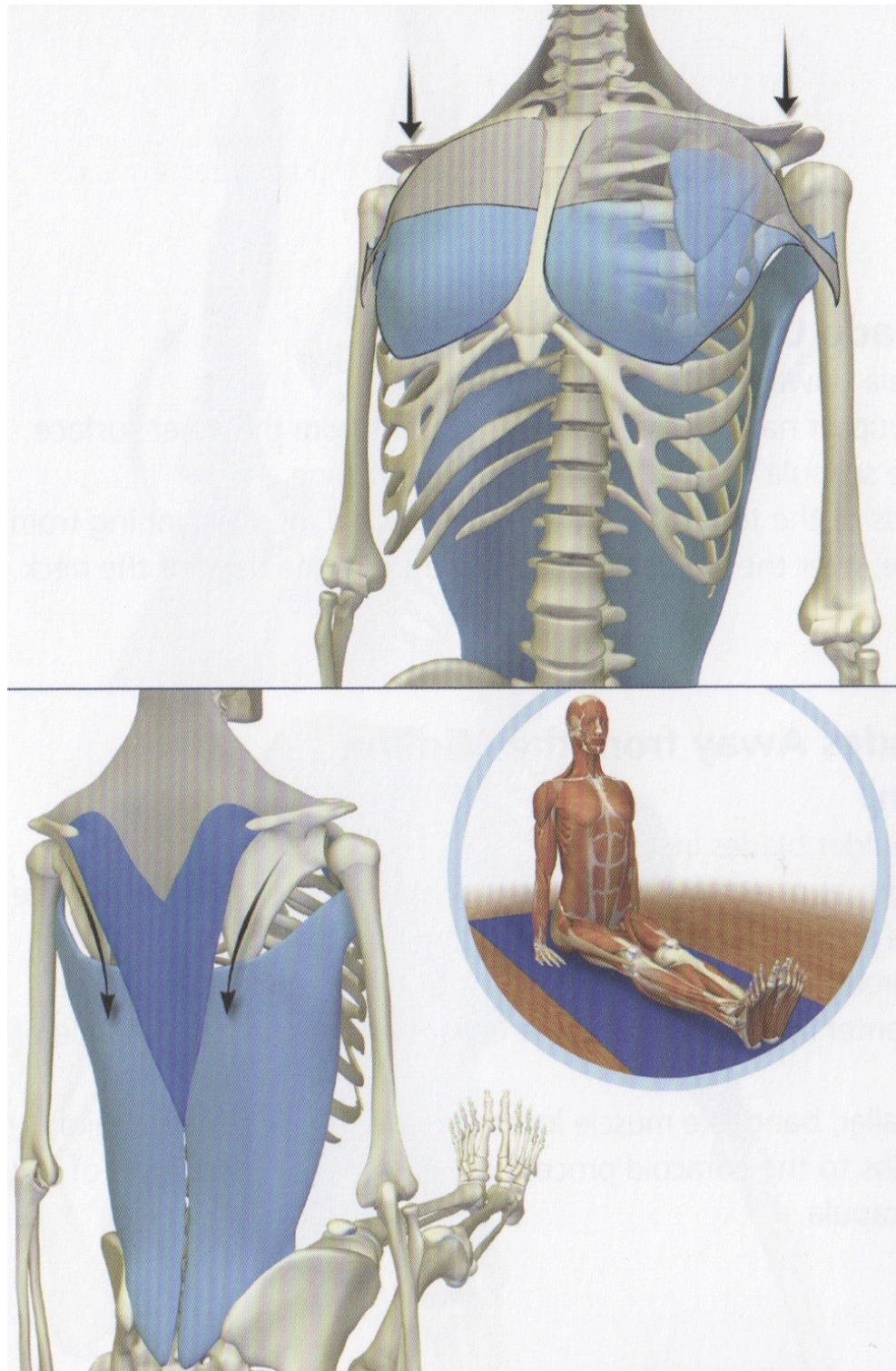


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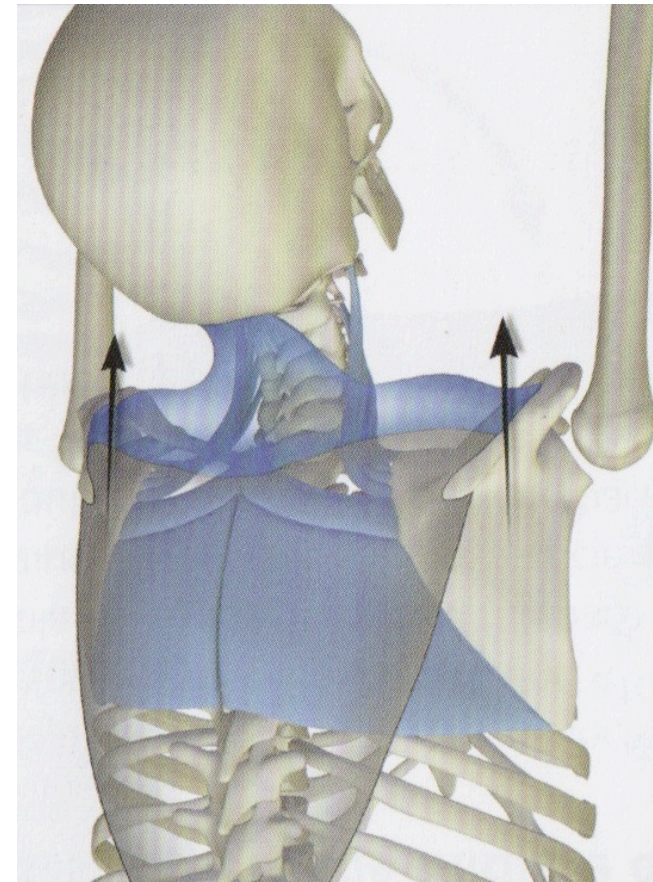
1

scapula depressors

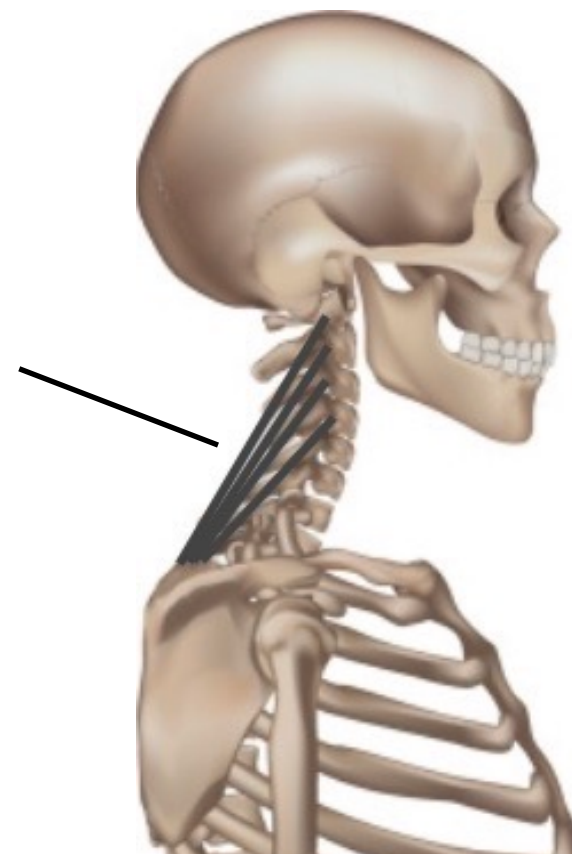


Ray Long

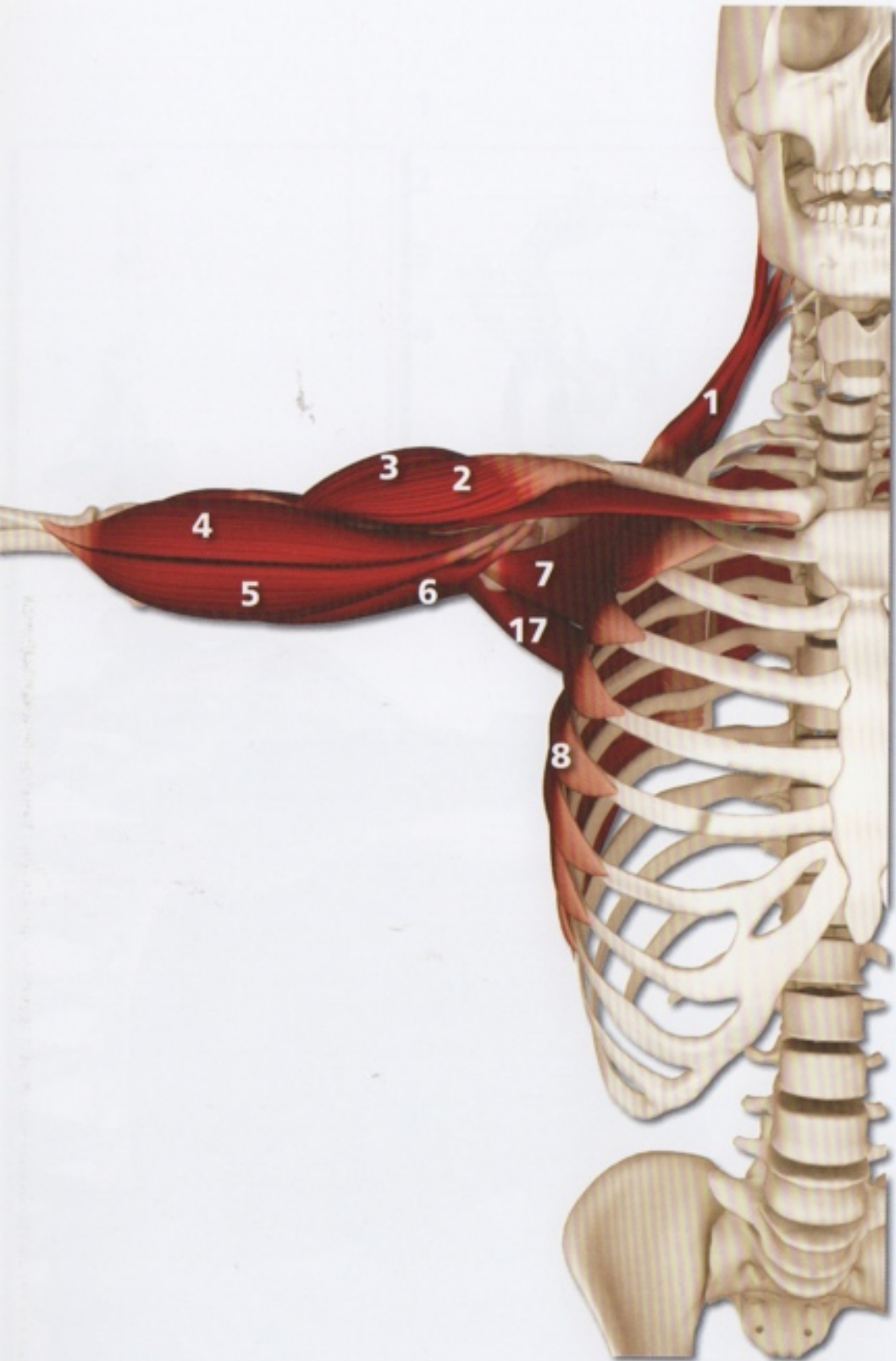
scapula elevators



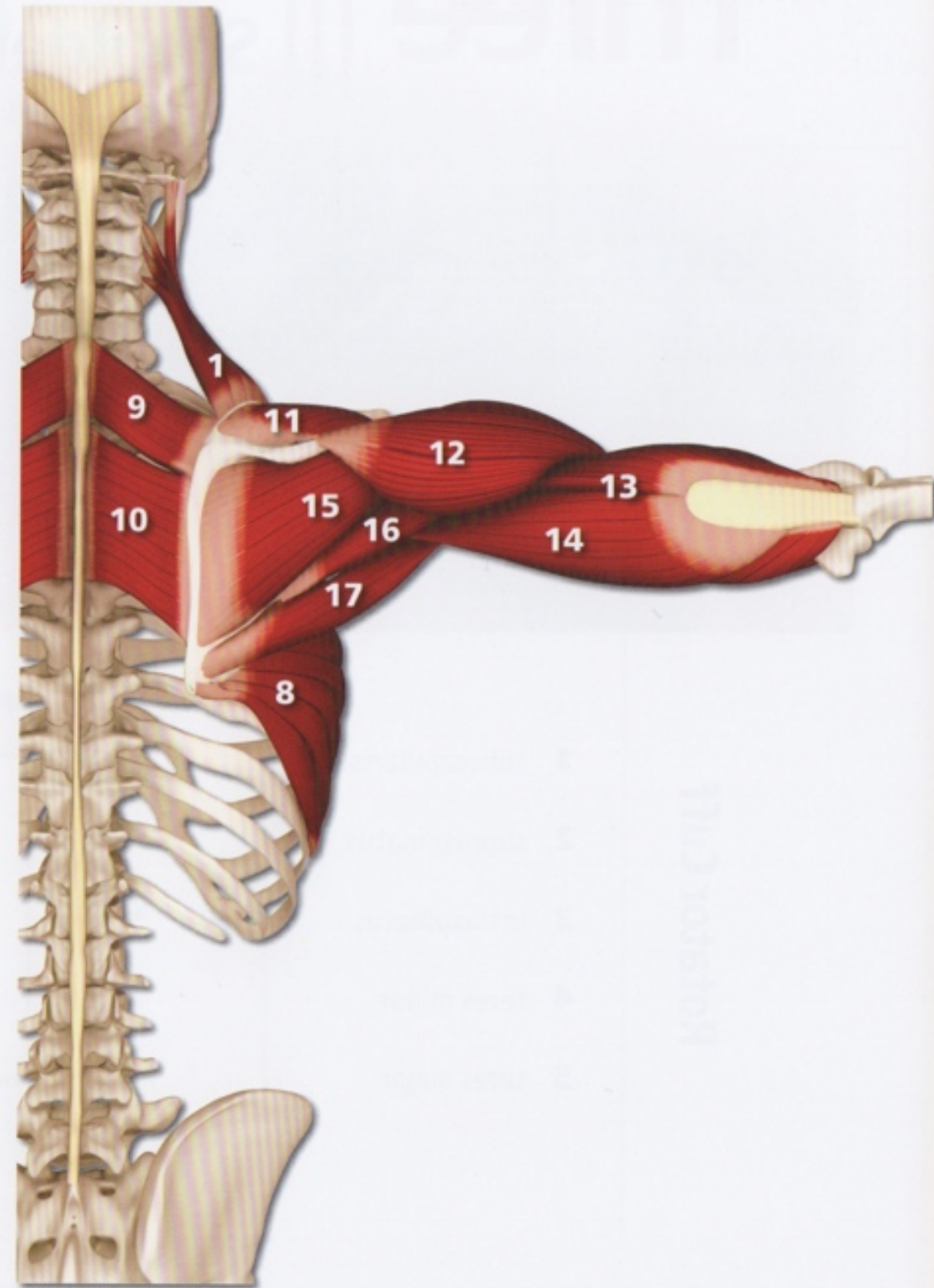
levator scapula



Shoulder Girdle & Upper Arms



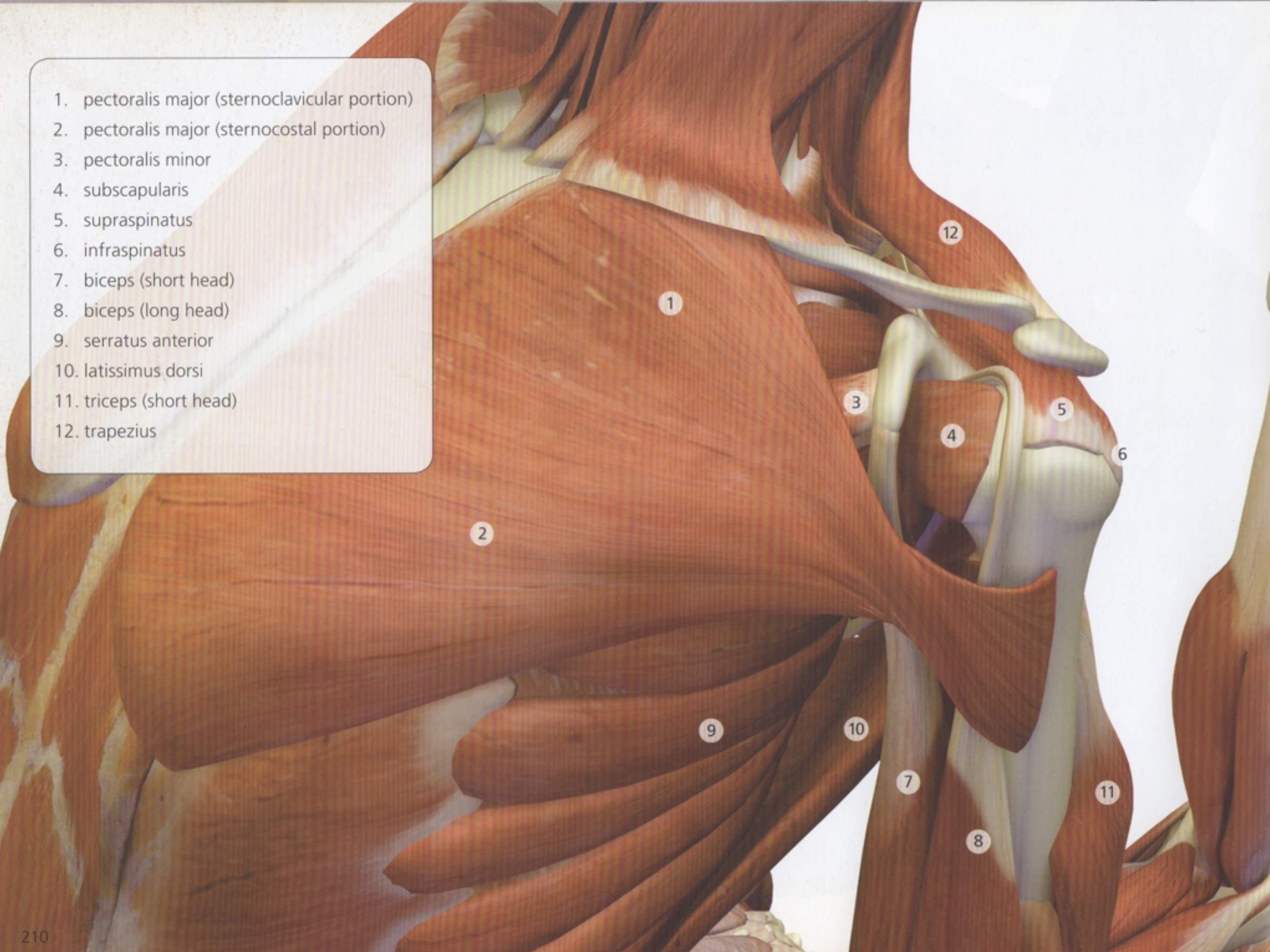
- 1** levator scapulae
- 2** anterior deltoid
- 3** lateral deltoid
- 4** biceps (long head)
- 5** biceps (short head)
- 6** coracobrachialis
- 7** subscapularis
- 8** serratus anterior
- 9** rhomboid minor
- 10** rhomboid major
- 11** supraspinatus
- 12** posterior deltoid
- 13** triceps (short head)
- 14** triceps (long head)
- 15** infraspinatus
- 16** teres minor
- 17** teres major

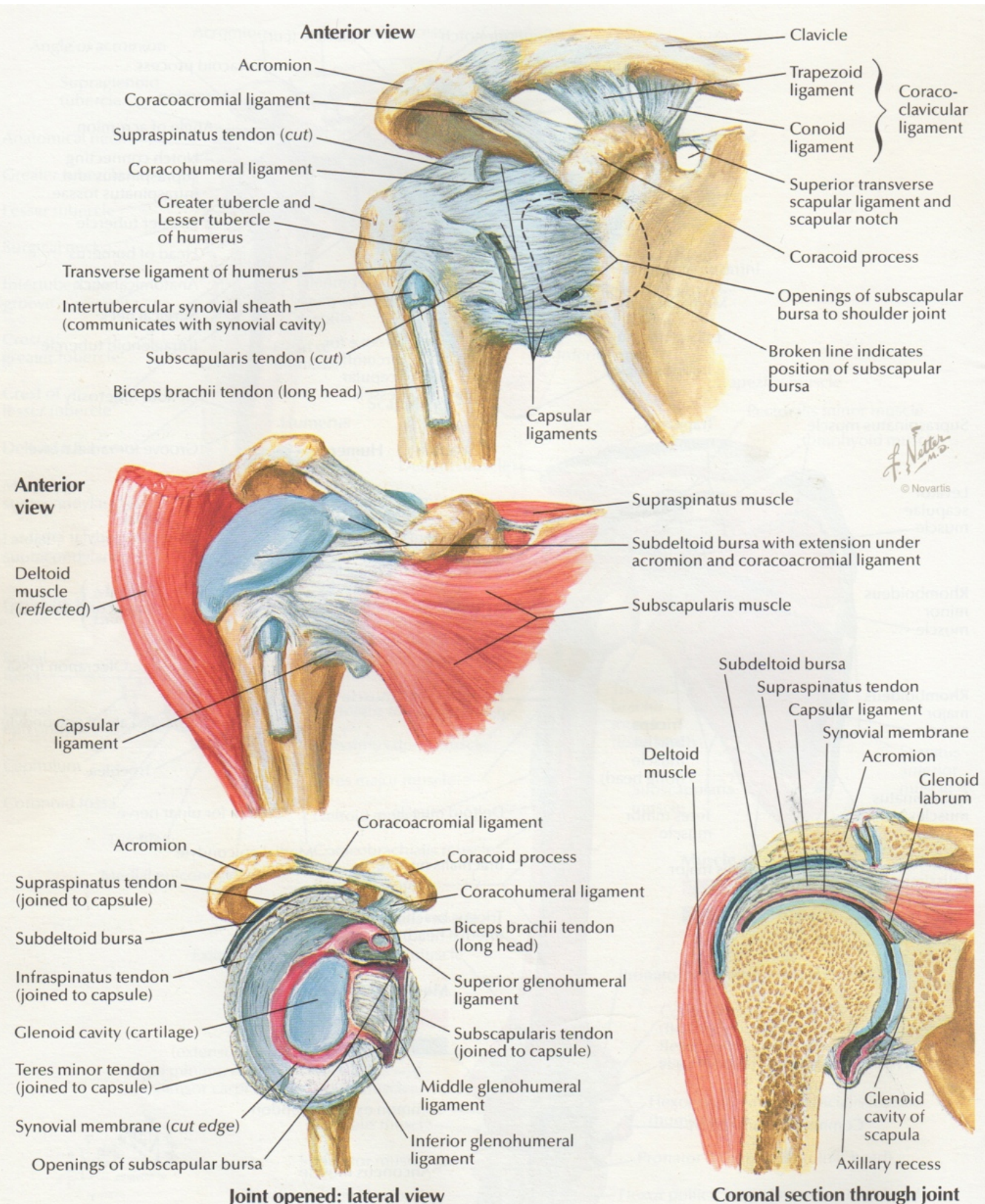


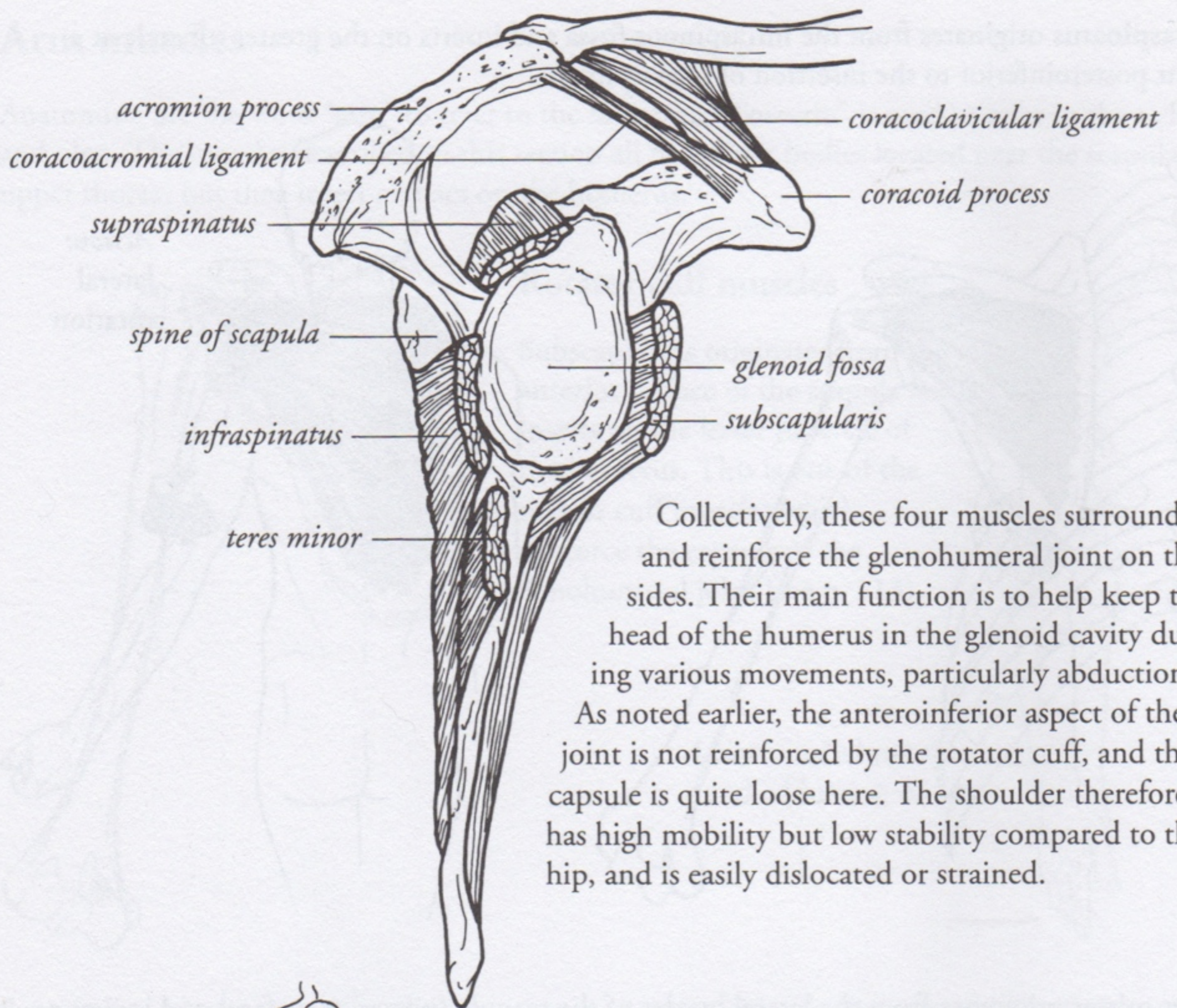
1. supraspinatus
2. infraspinatus
3. teres minor
4. teres major
5. triceps (long head)
6. triceps (short head)
7. rhomboid minor
8. rhomboid major
9. latissimus dorsi
10. levator scapulae



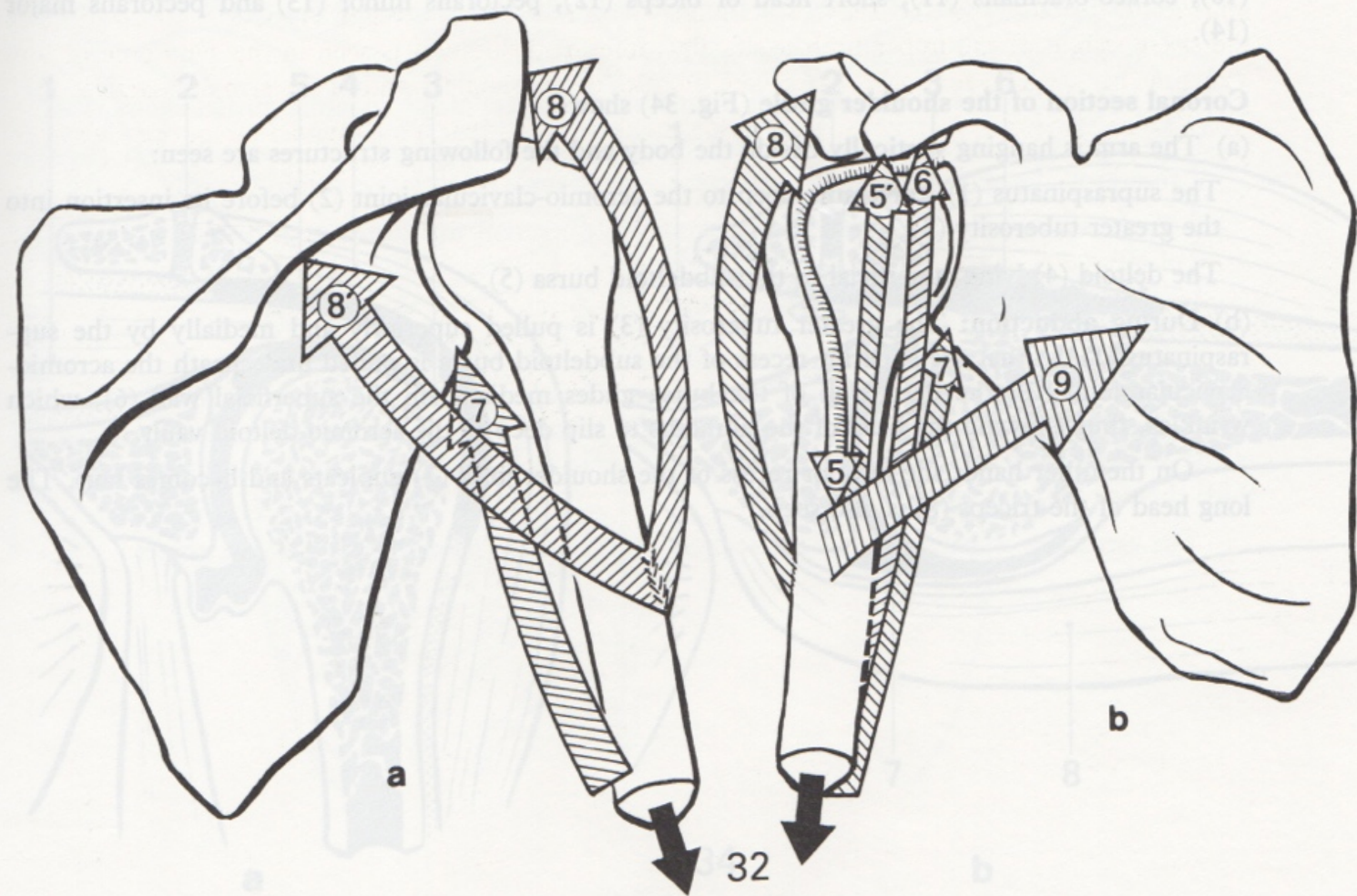
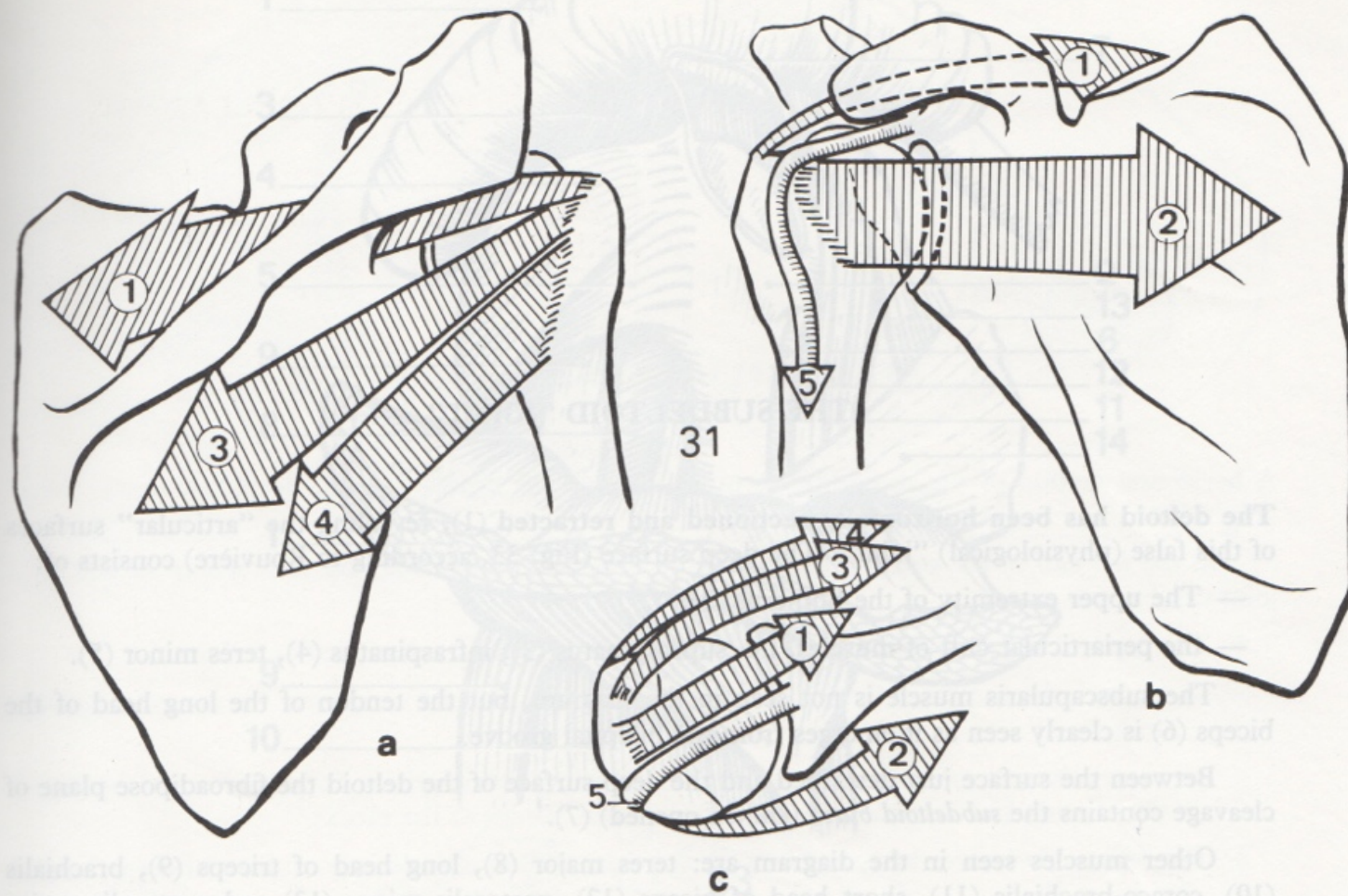
1. pectoralis major (sternoclavicular portion)
2. pectoralis major (sternocostal portion)
3. pectoralis minor
4. subscapularis
5. supraspinatus
6. infraspinatus
7. biceps (short head)
8. biceps (long head)
9. serratus anterior
10. latissimus dorsi
11. triceps (short head)
12. trapezius



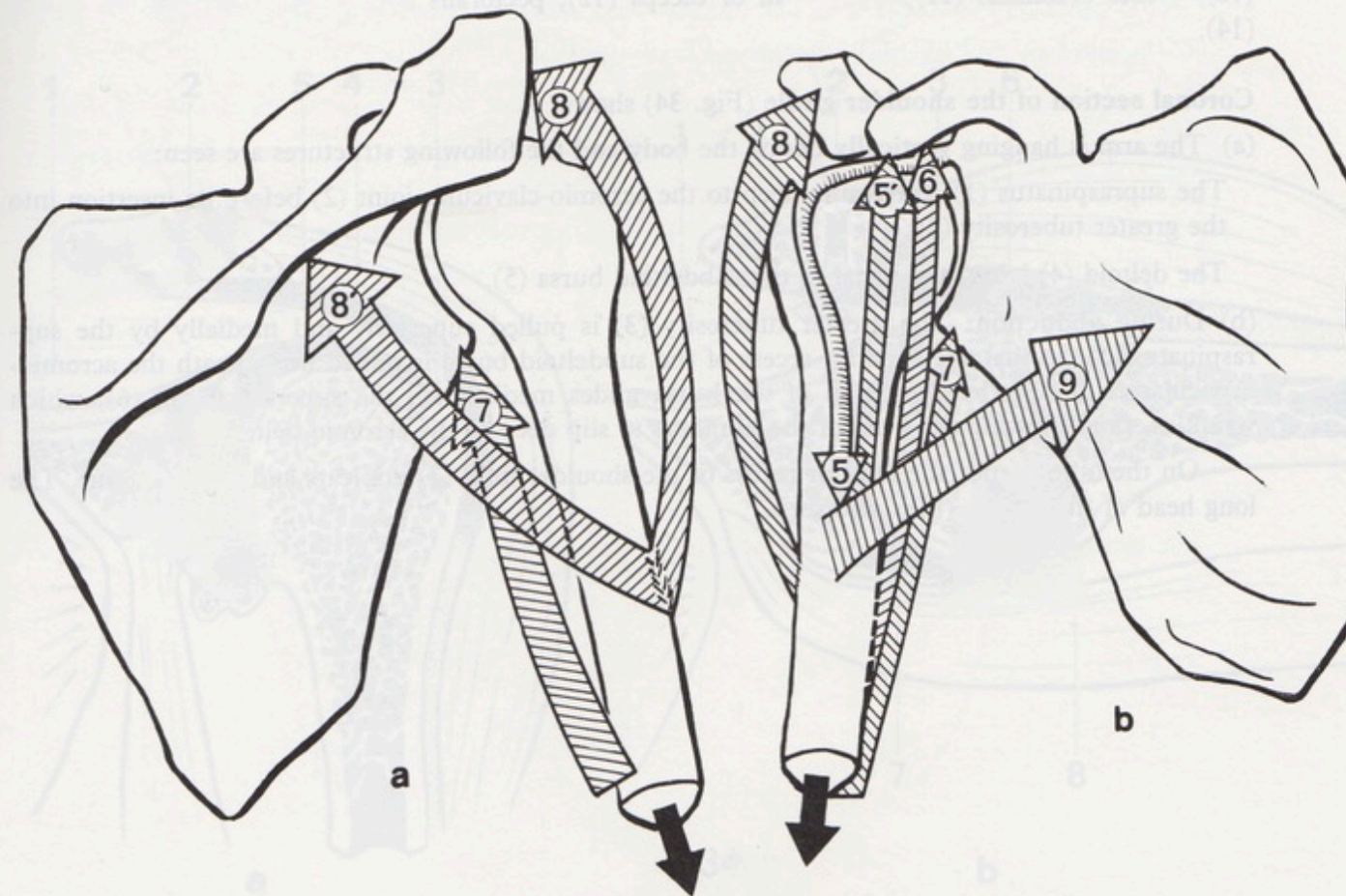
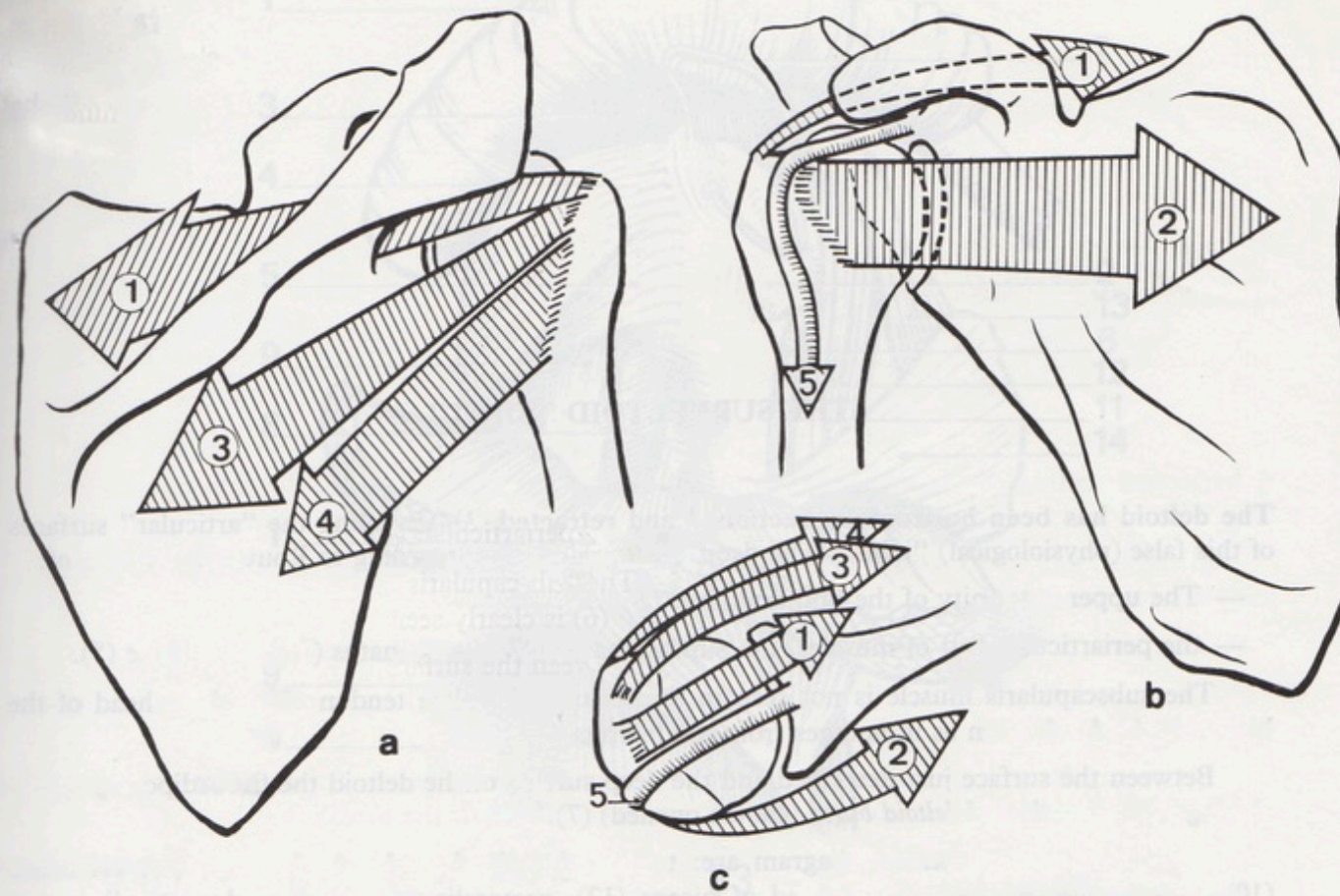




Collectively, these four muscles surround and reinforce the glenohumeral joint on three sides. Their main function is to help keep the head of the humerus in the glenoid cavity during various movements, particularly abduction. As noted earlier, the anteroinferior aspect of the joint is not reinforced by the rotator cuff, and the capsule is quite loose here. The shoulder therefore has high mobility but low stability compared to the hip, and is easily dislocated or strained.



- 1 supraspinatus
- 2 subscapularis
- 3 infraspinatus
- 4 teres minor
- 5 long head bicep
- 5' short head bicep
- 6 coracobrachialis
- 7 long head tricep
- 8 deltoid
- 9 clavicular head pectorals major



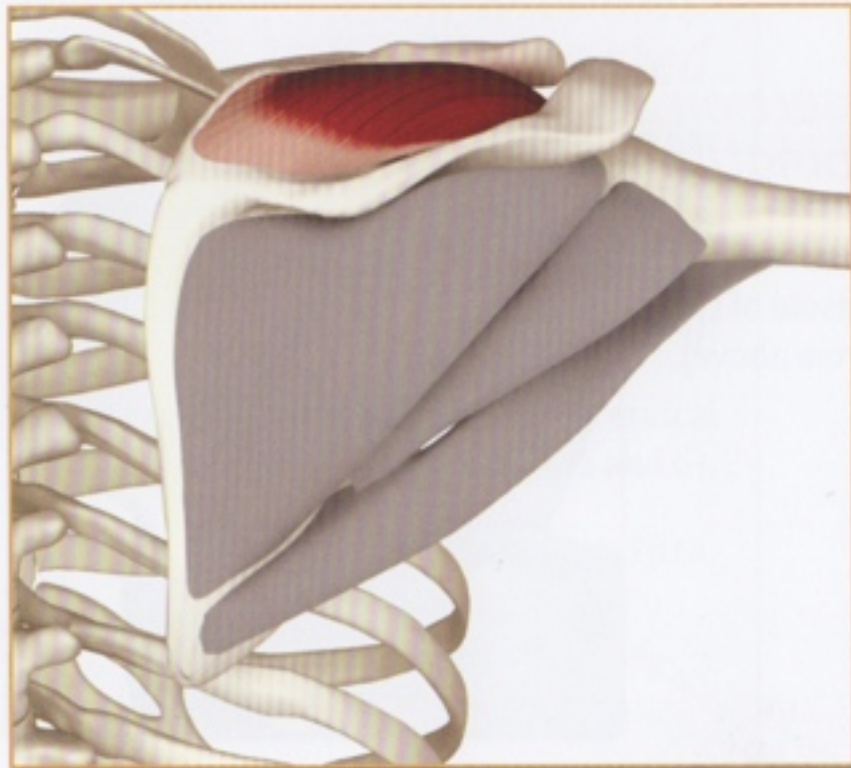
Rotator Cuff

Supraspinatus (soo-pruh-spi-NA-tus)

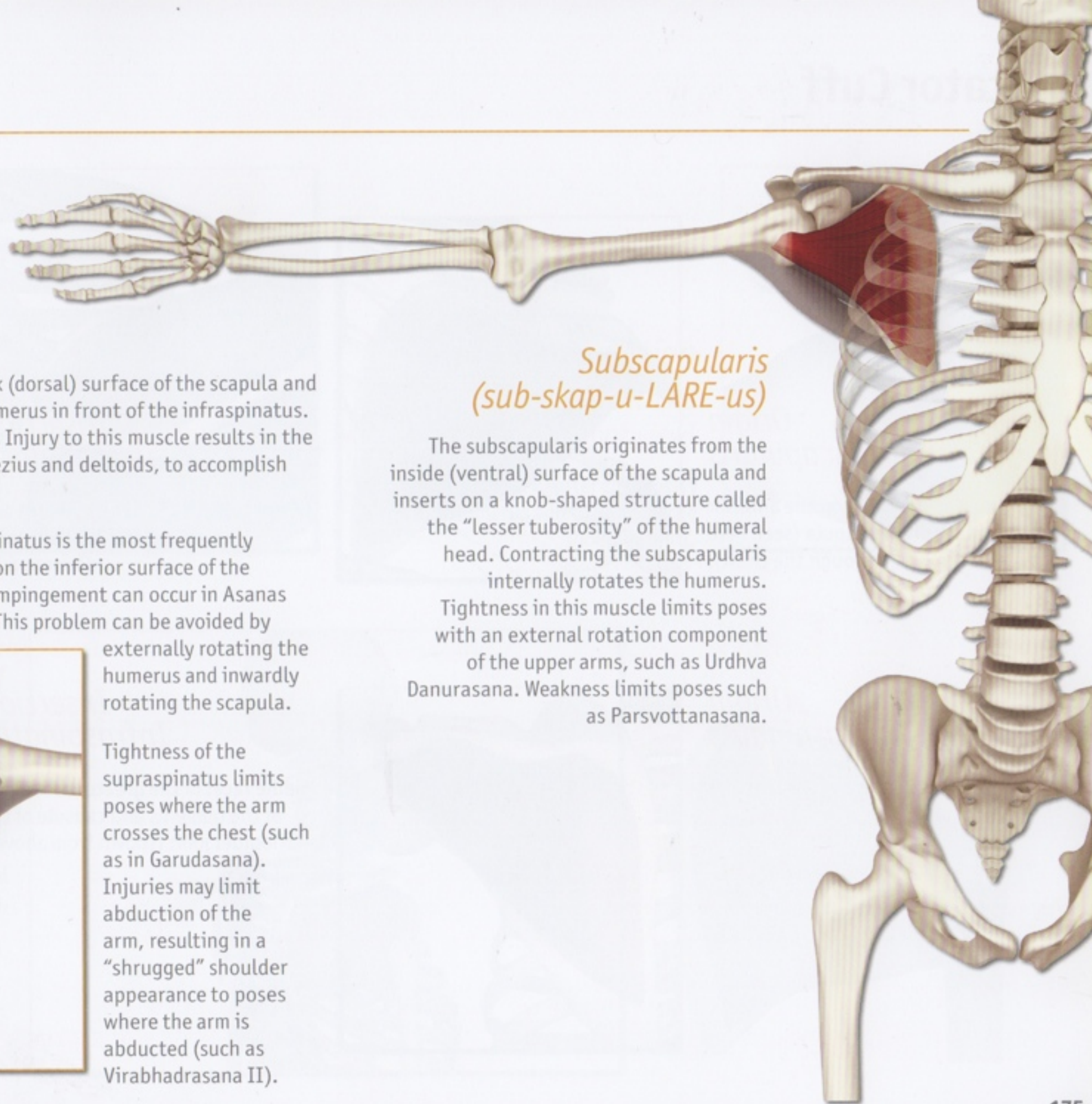
The supraspinatus originates from the back (dorsal) surface of the scapula and inserts on the greater tuberosity of the humerus in front of the infraspinatus. The supraspinatus initiates arm abduction. Injury to this muscle results in the use of accessory muscles, such as the trapezius and deltoids, to accomplish this action.

Of all the rotator cuff muscles, the supraspinatus is the most frequently injured, due to impingement of its tendon on the inferior surface of the acromion process of the scapula. In Yoga, impingement can occur in Asanas such as dog pose and Urdhva Danurasana. This problem can be avoided by externally rotating the humerus and inwardly rotating the scapula.

Tightness of the supraspinatus limits poses where the arm crosses the chest (such as in Garudaasana). Injuries may limit abduction of the arm, resulting in a “shrugged” shoulder appearance to poses where the arm is abducted (such as Virabhadrasana II).



Supraspinatus (back view)



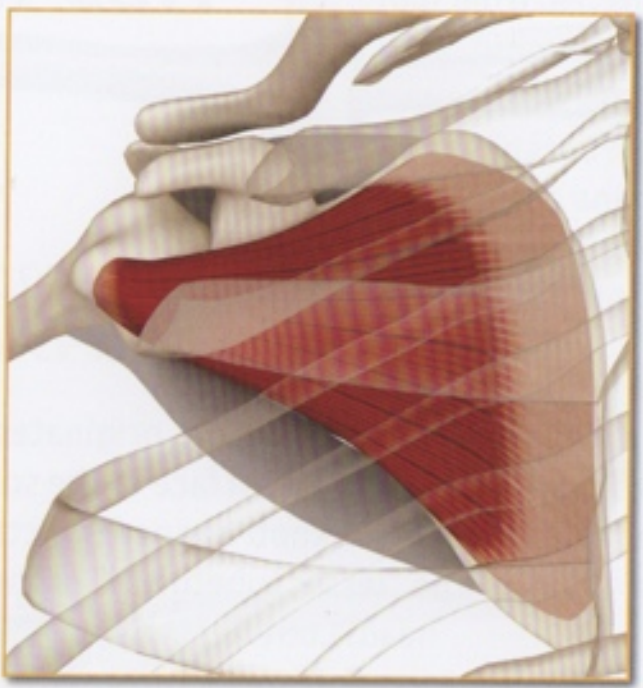
Subscapularis (sub-skap-u-LARE-us)

The subscapularis originates from the inside (ventral) surface of the scapula and inserts on a knob-shaped structure called the “lesser tuberosity” of the humeral head. Contracting the subscapularis internally rotates the humerus. Tightness in this muscle limits poses with an external rotation component of the upper arms, such as Urdhva Danurasana. Weakness limits poses such as Parsvottanasana.

Rotator Cuff

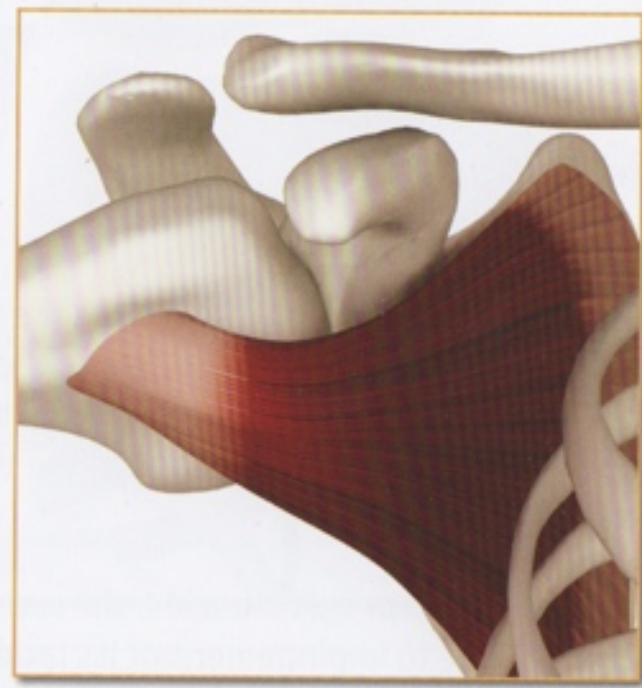
Origin Subscapularis

Subscapular fossa on the anterior surface of the scapula (seen here through the chest).



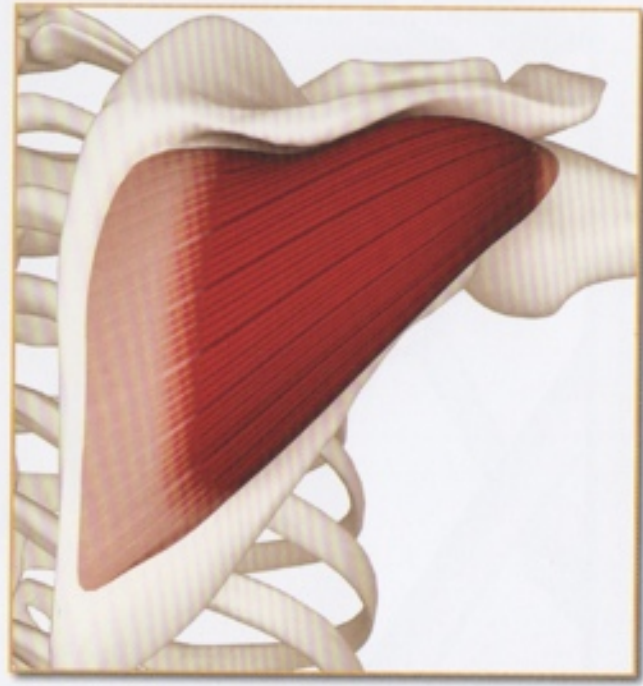
Insertion Subscapularis

Lesser tuberosity of the humerus and capsule of the shoulder joint (lower part).



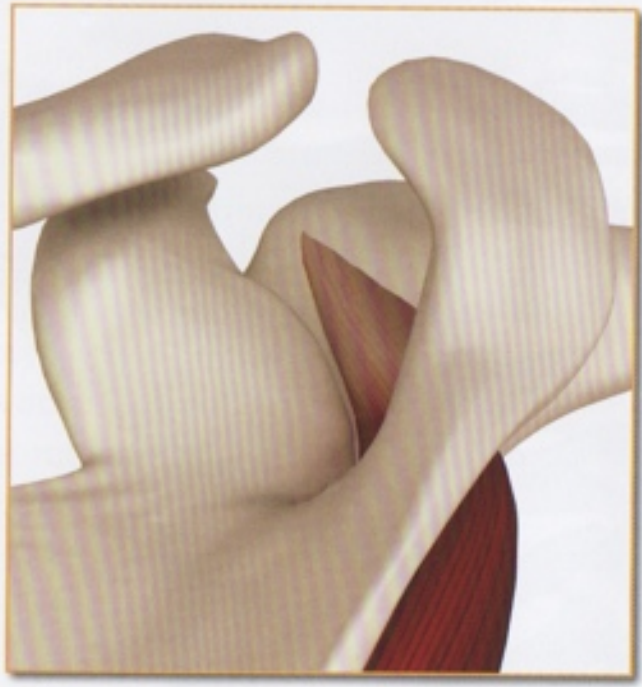
Origin Infraspinatus

Infraspinous fossa of the scapula.

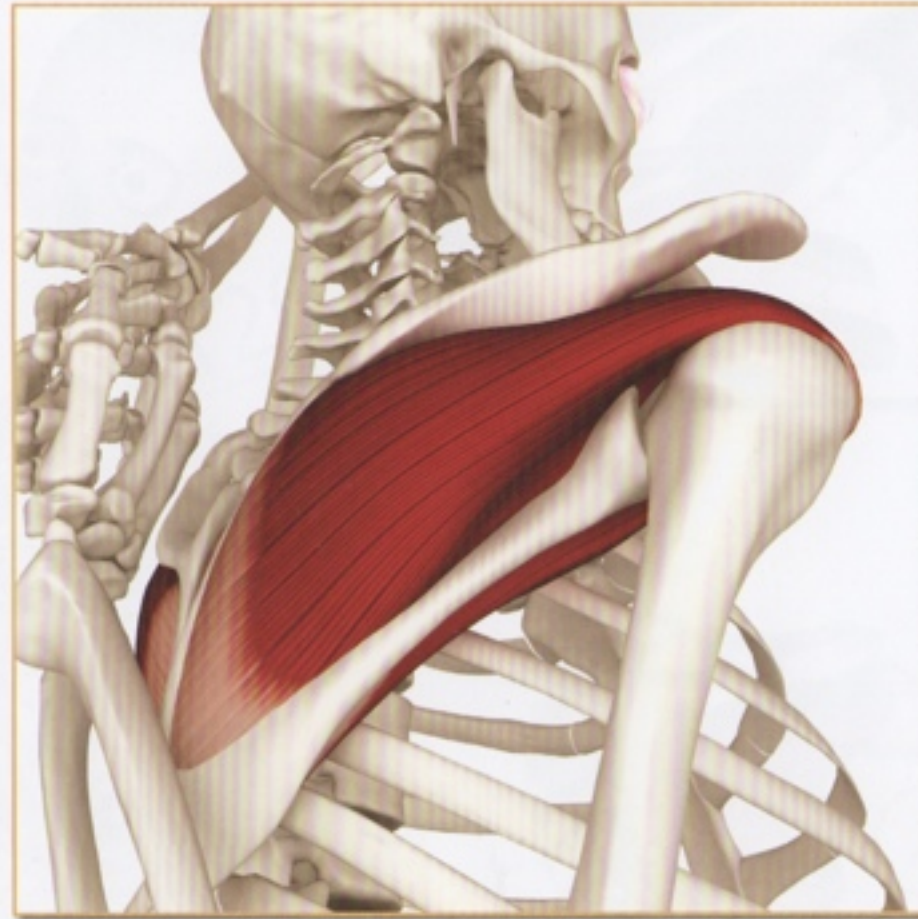
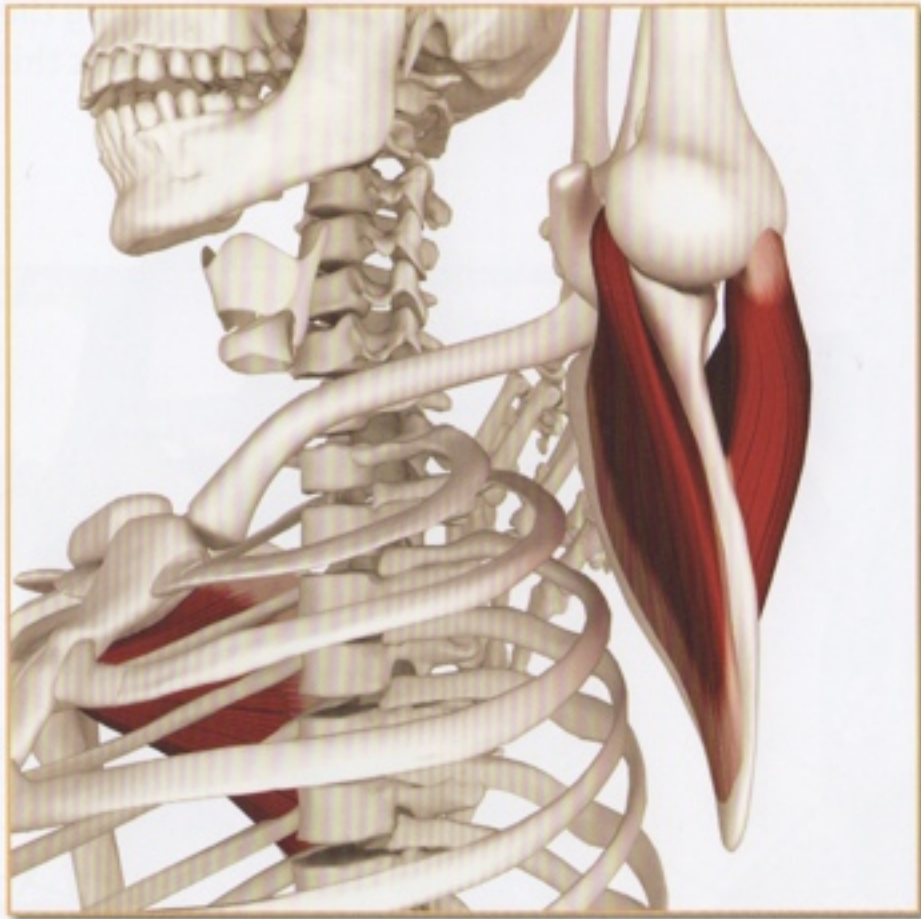


Insertion Infraspinatus

Middle facet of the greater tuberosity of the humerus and capsule of the shoulder joint (shown from above).



Subscapularis & Infraspinatus



Contracted & Stretched

Gomukhasana B: The upper arm infraspinatus contracts, stretching the subscapularis. The lower arm subscapularis contracts, stretching the infraspinatus.



Supraspinatus

Contracted

The supraspinatus abducts the arm and stabilizes the glenohumeral joint.

Contraction of the supraspinatus initiates abduction in Virabhadrasana II. The lateral section of the deltoid accentuates and sustains this action.



Stretched

The supraspinatus stretches in Vatayanasana. Drawing the upper arm further across the body toward the opposite side (by contracting the same-side pectoralis major) accentuates this action.

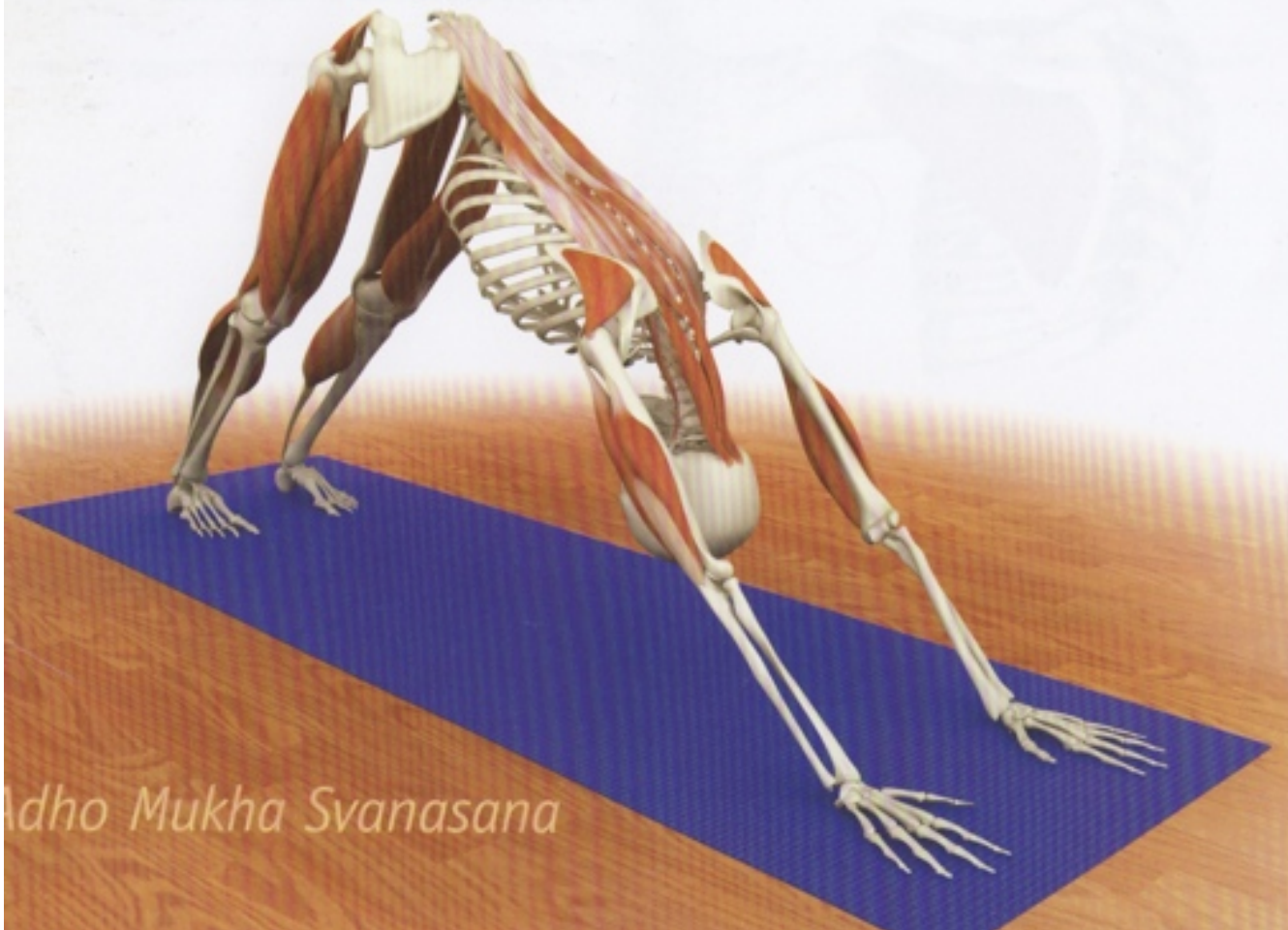
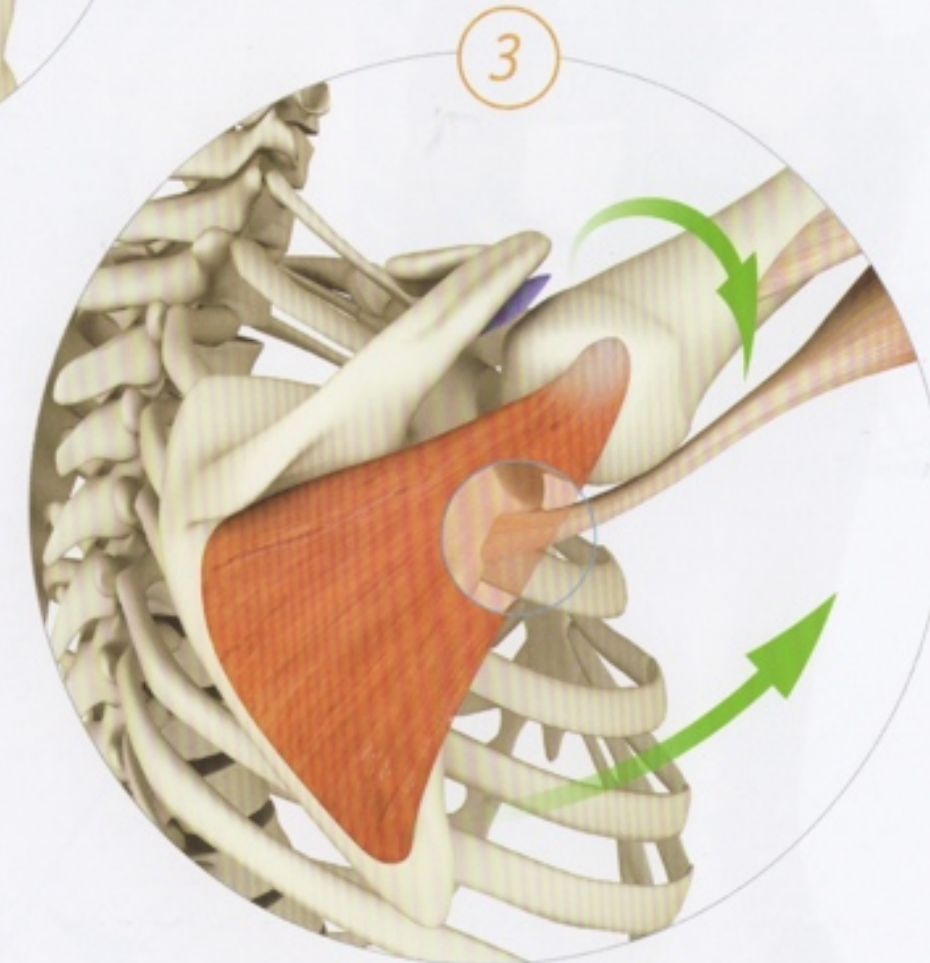
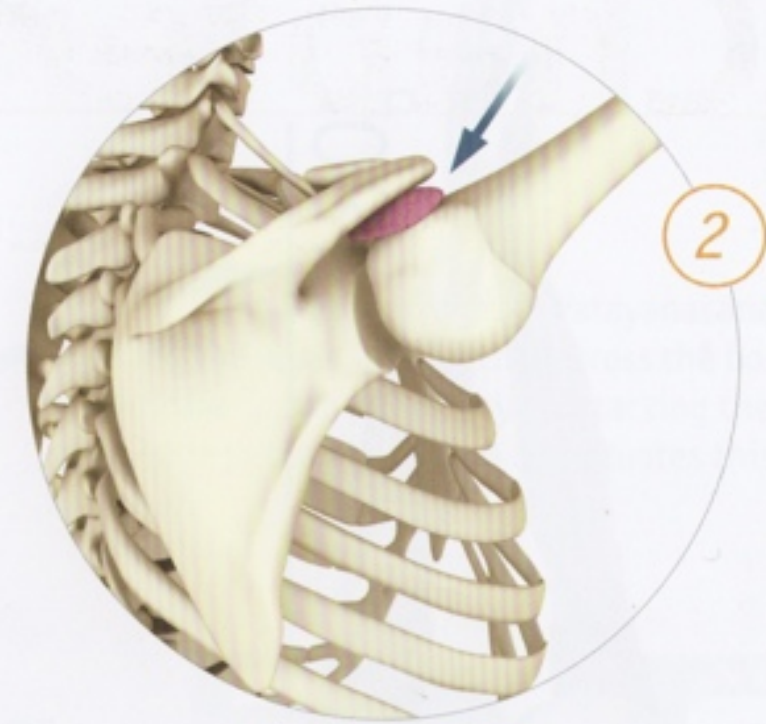
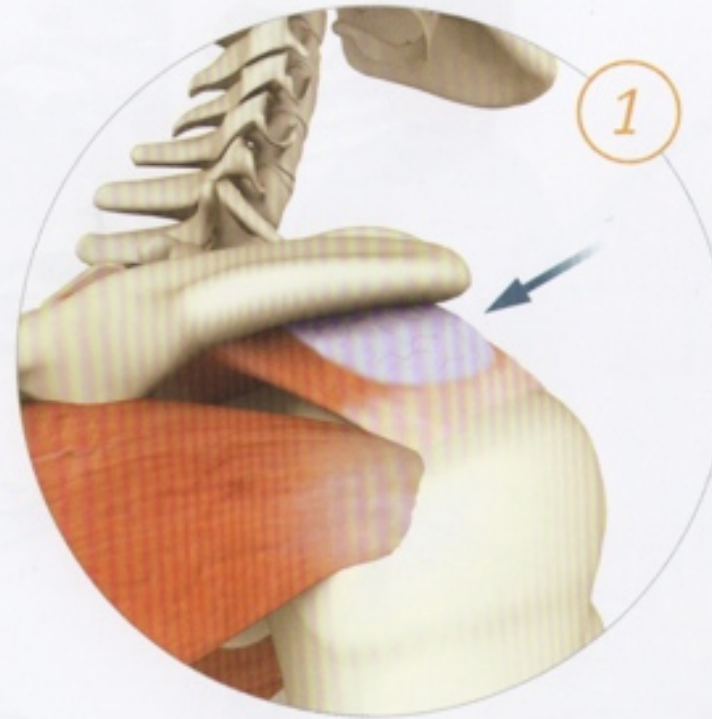


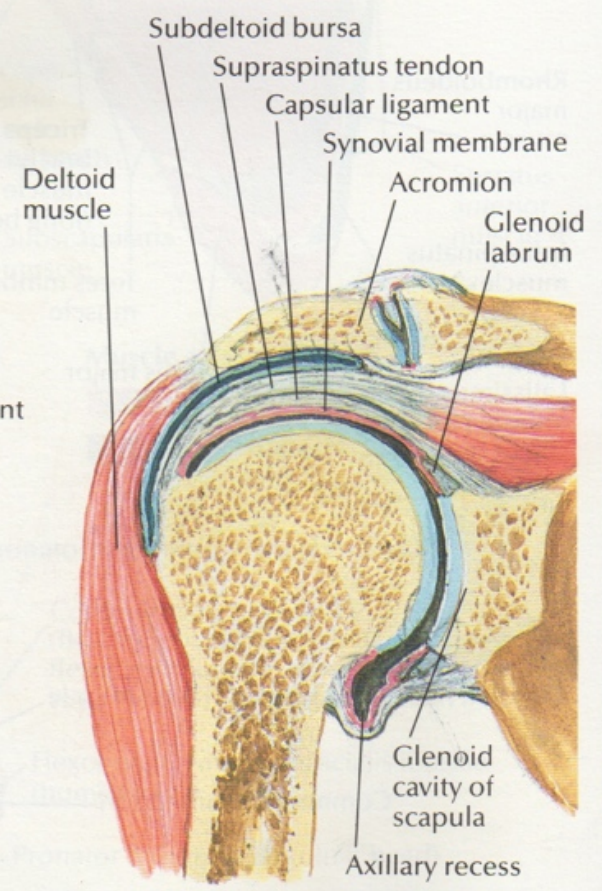
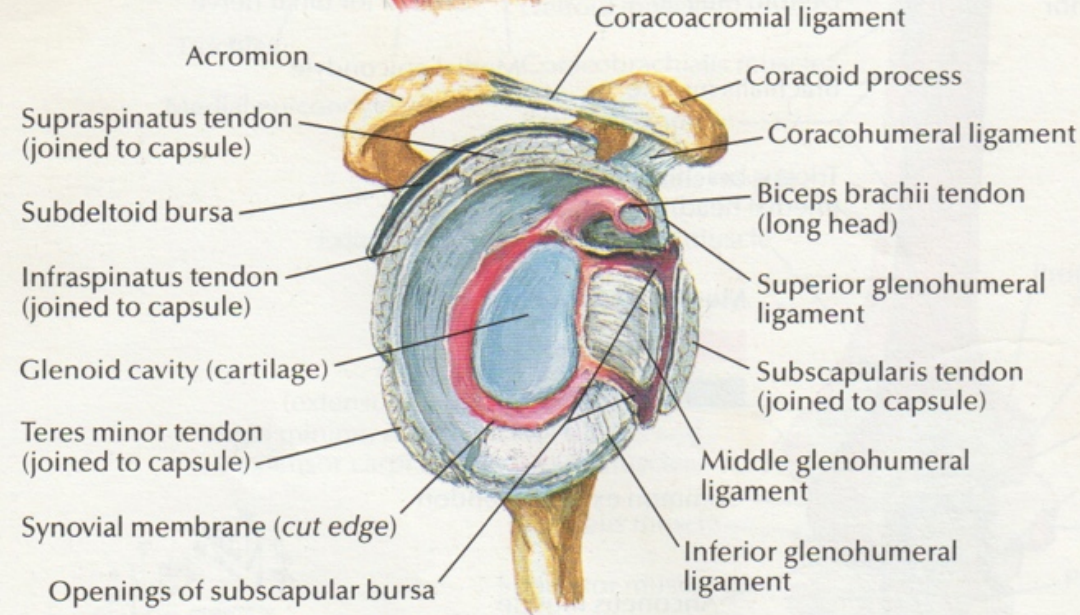
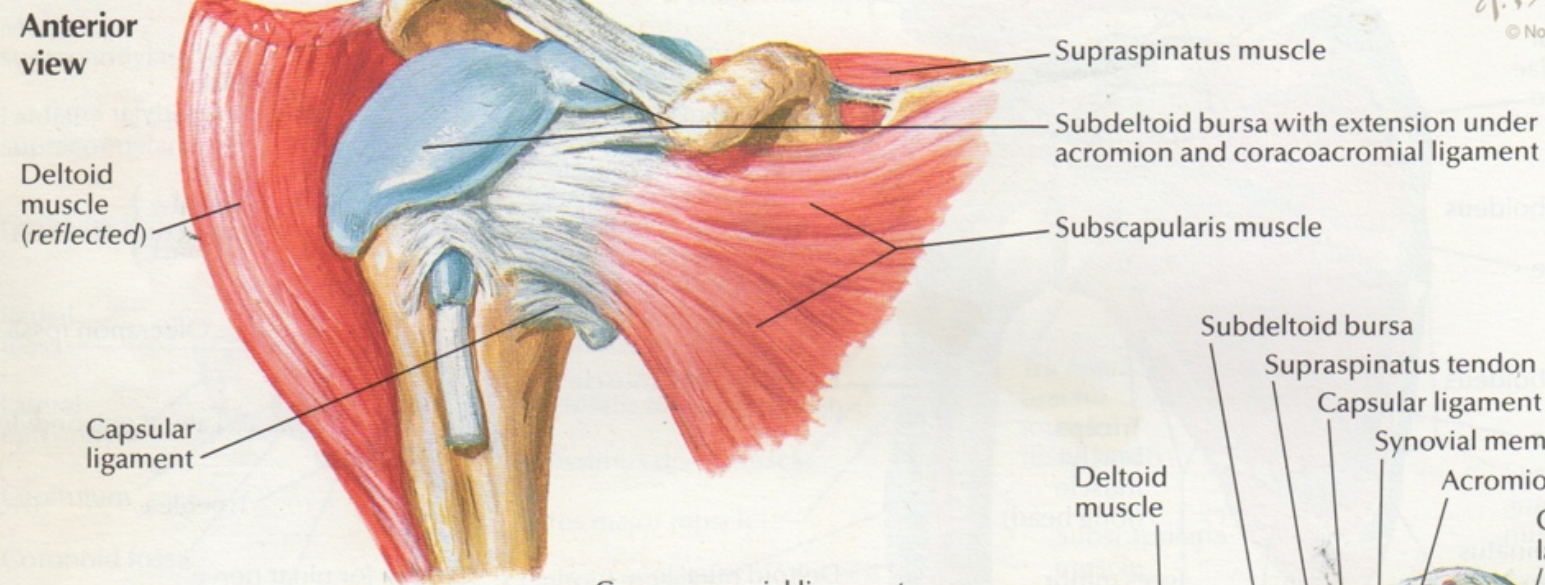
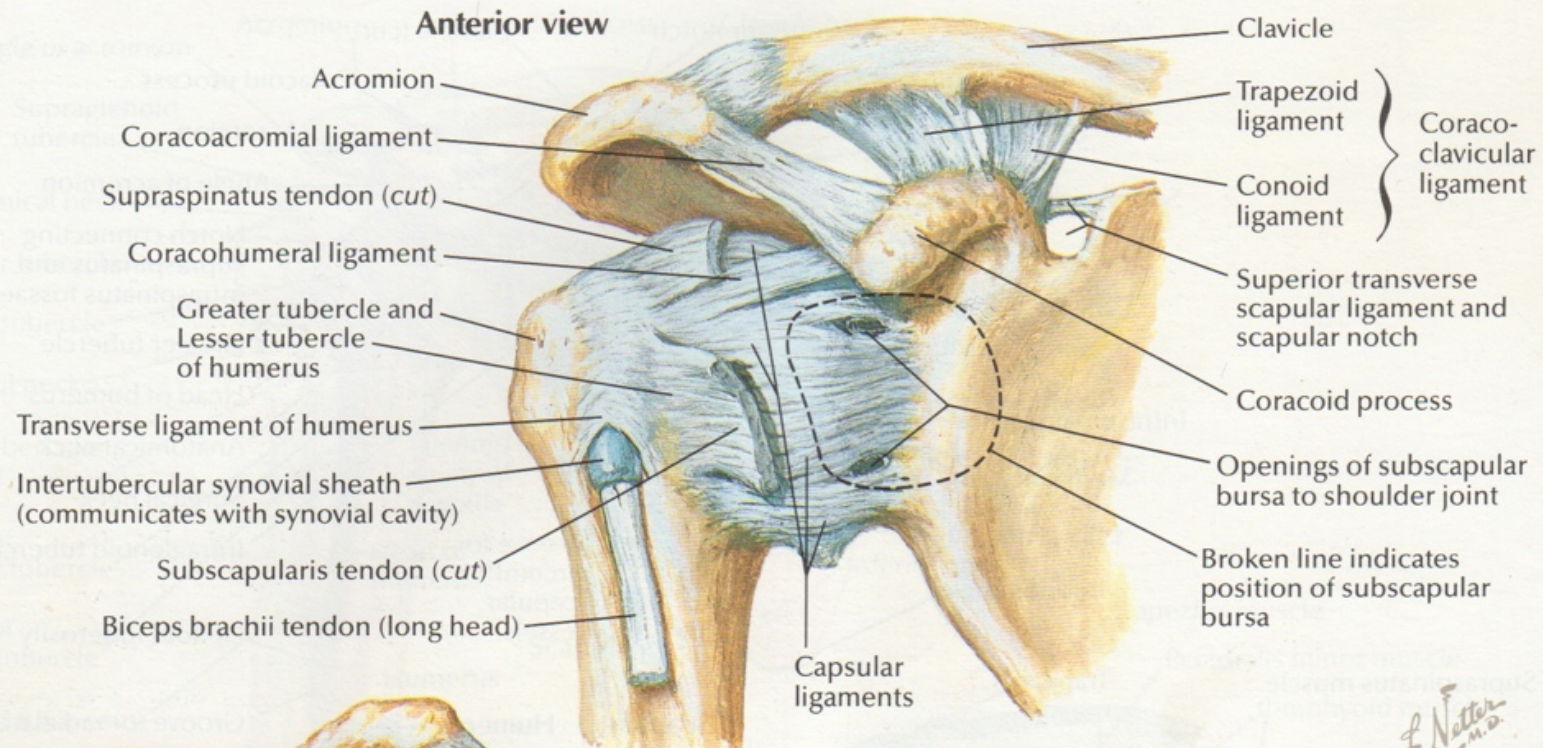
Impingement

The subacromial bursa is a sac-like, fluid-filled structure that facilitates the gliding of the rotator cuff under the acromion. Impingement involves compression of the subacromial bursa between the greater tuberosity of the humerus and the acromion. This can result in shoulder pain.

Contracting the infraspinatus externally rotates the humerus and draws the greater tuberosity away from the acromion. Contracting the long head of the triceps rotates the acromion toward the midline, away from the greater tuberosity. Contracting both of these muscles creates space between the acromion and the greater tuberosity, assisting to prevent impingement of the bursa.

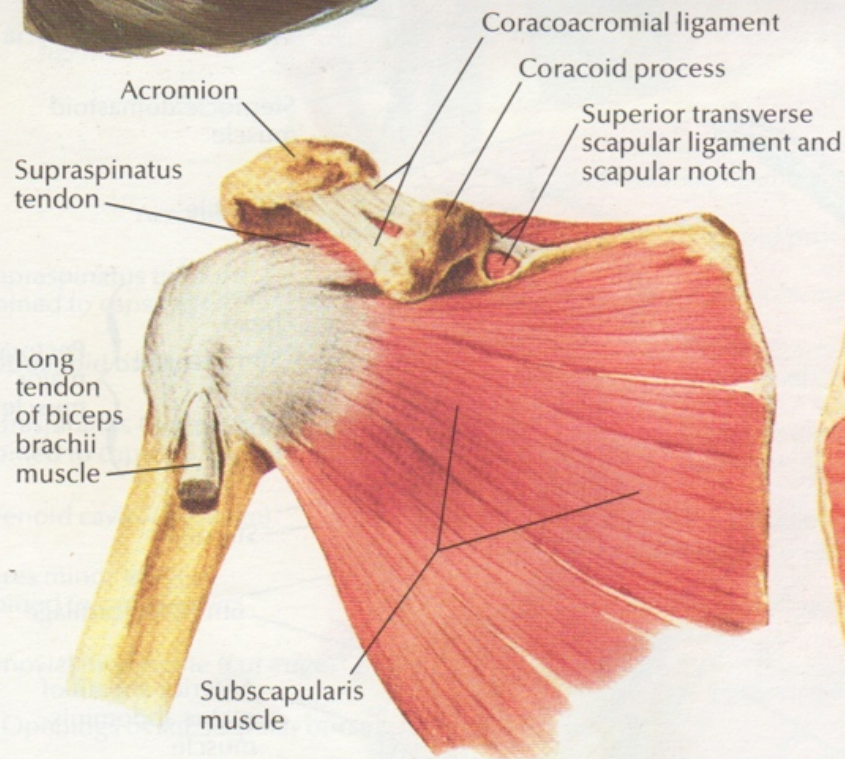
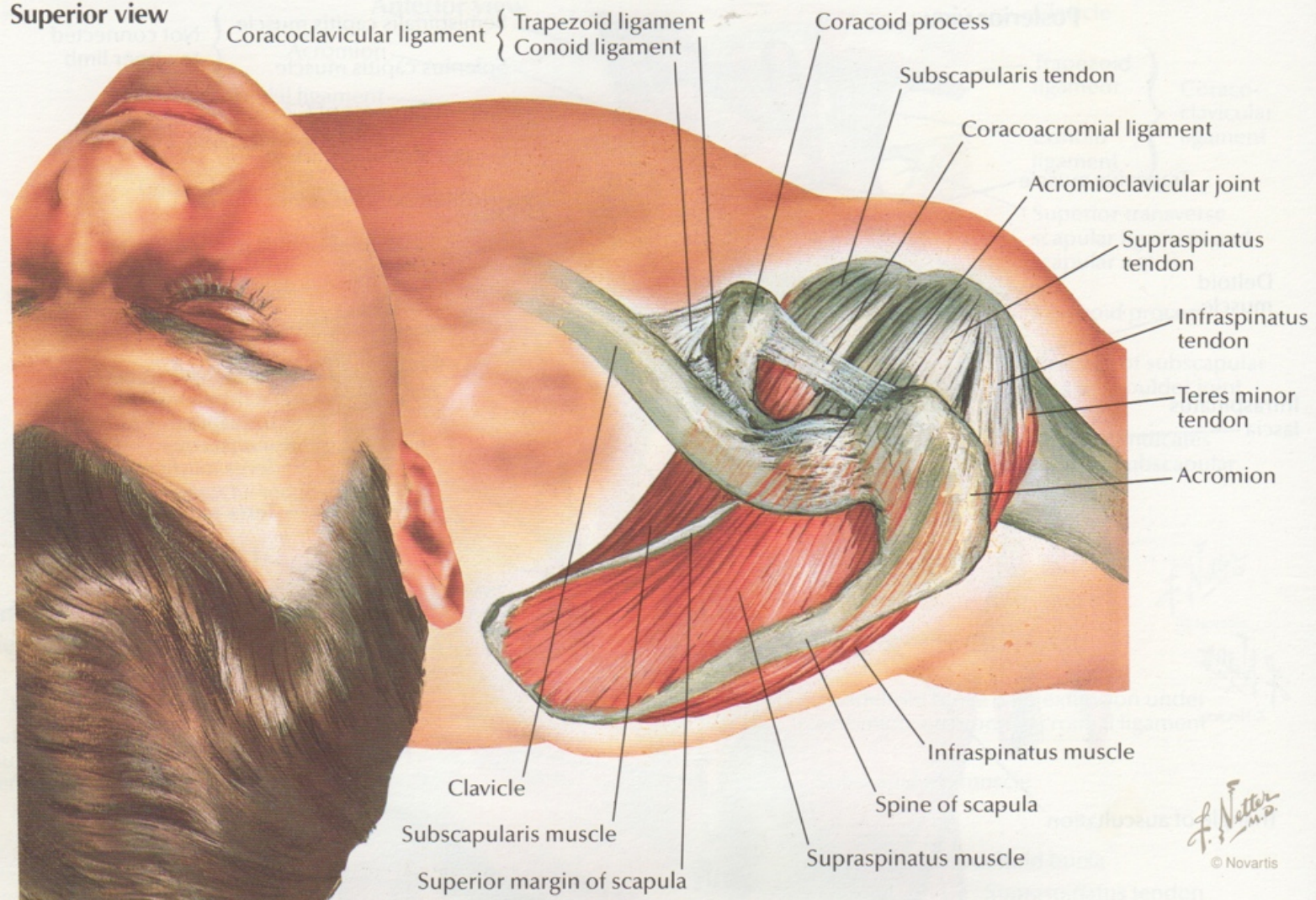
Contract these muscles to externally rotate the humerus and outwardly rotate the scapula when performing postures involving overhead movements.



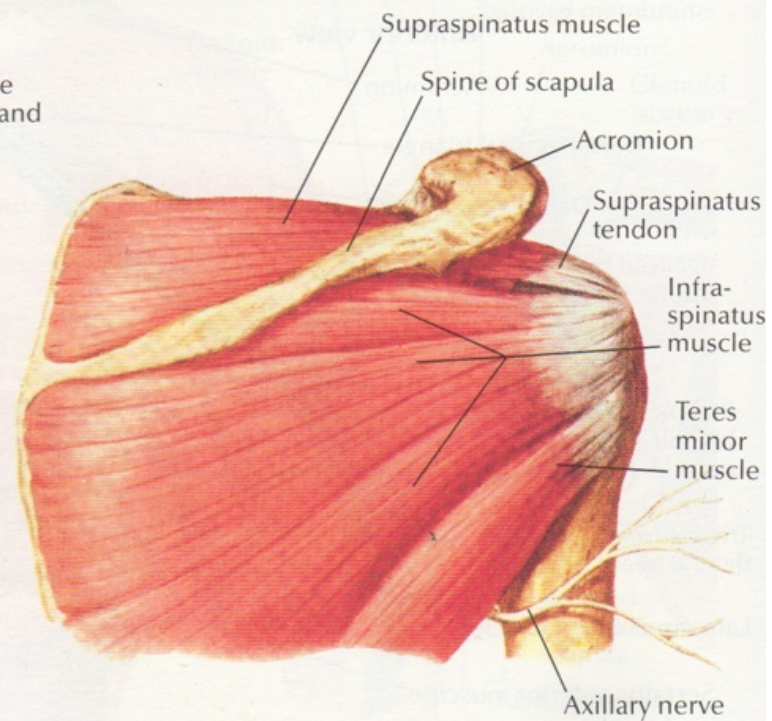


F. Netter M.D.
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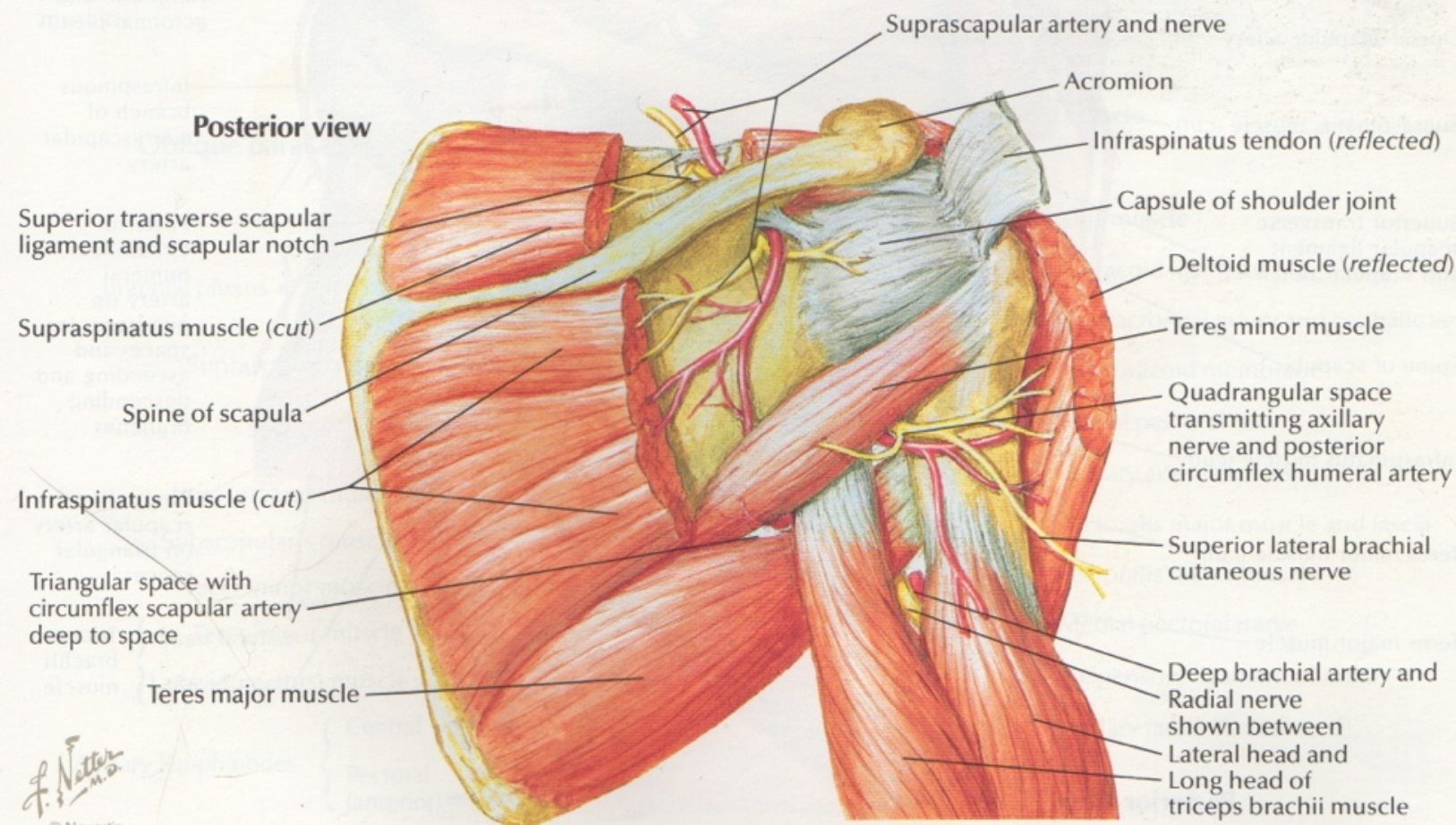
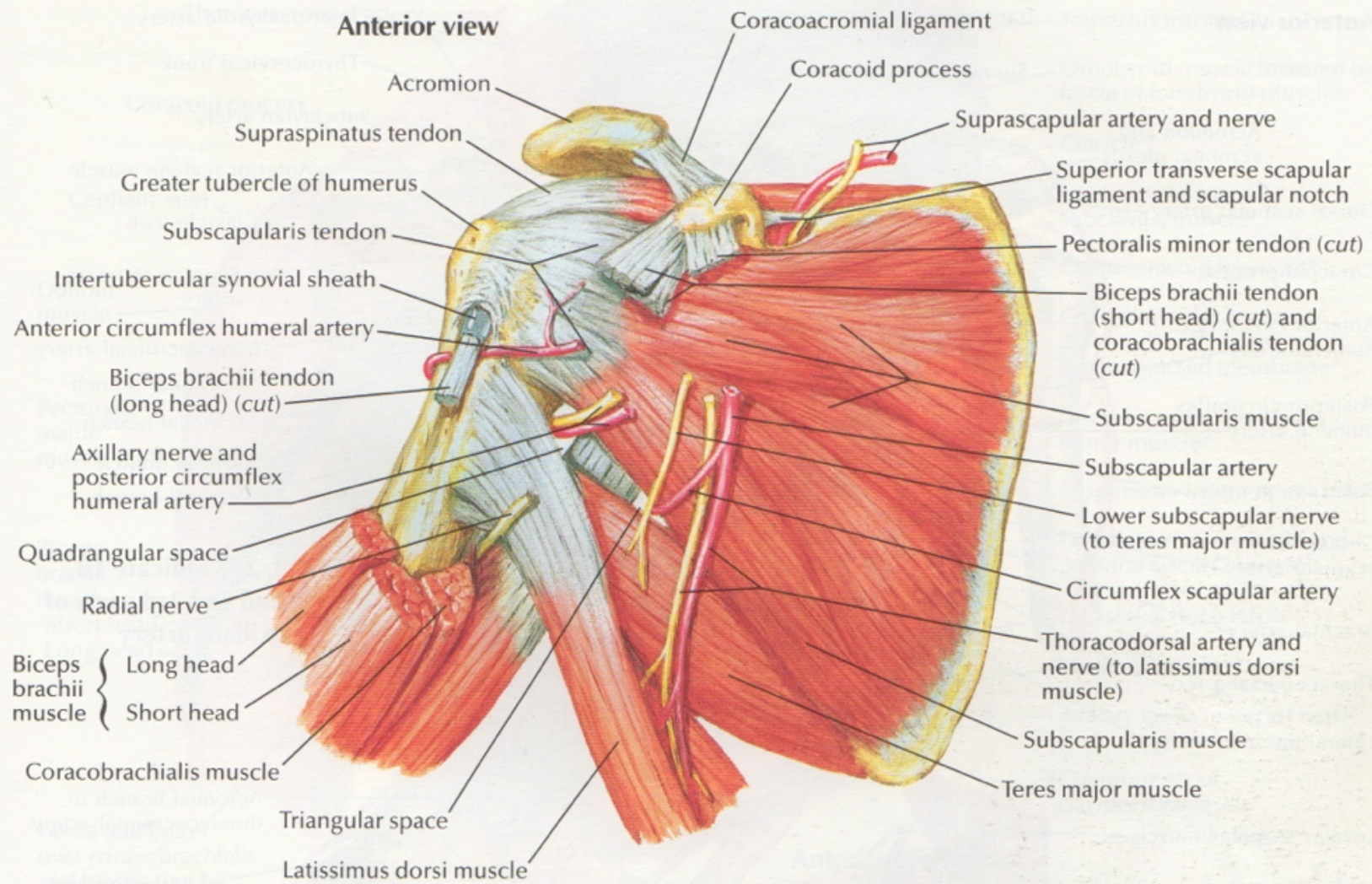
Superior view



Anterior view



Posterior view

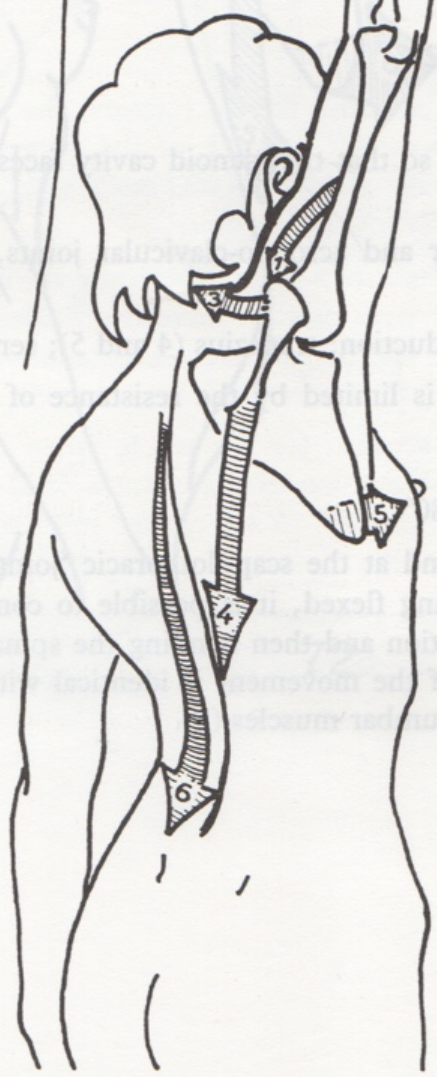




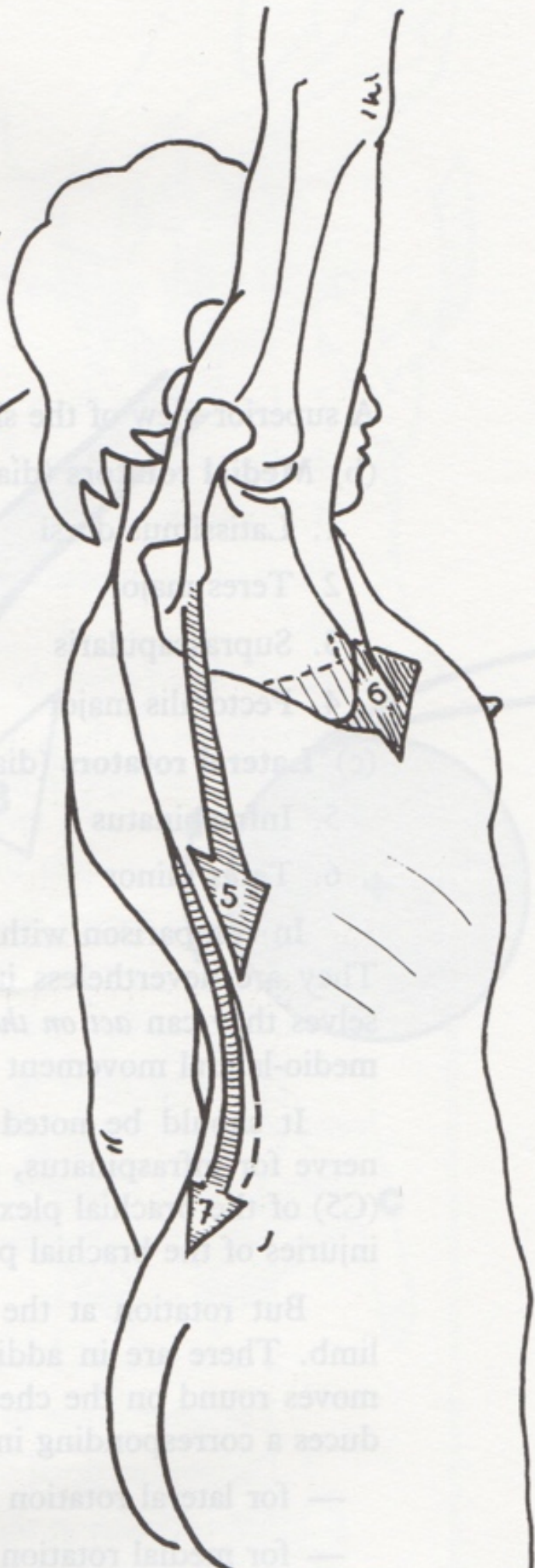
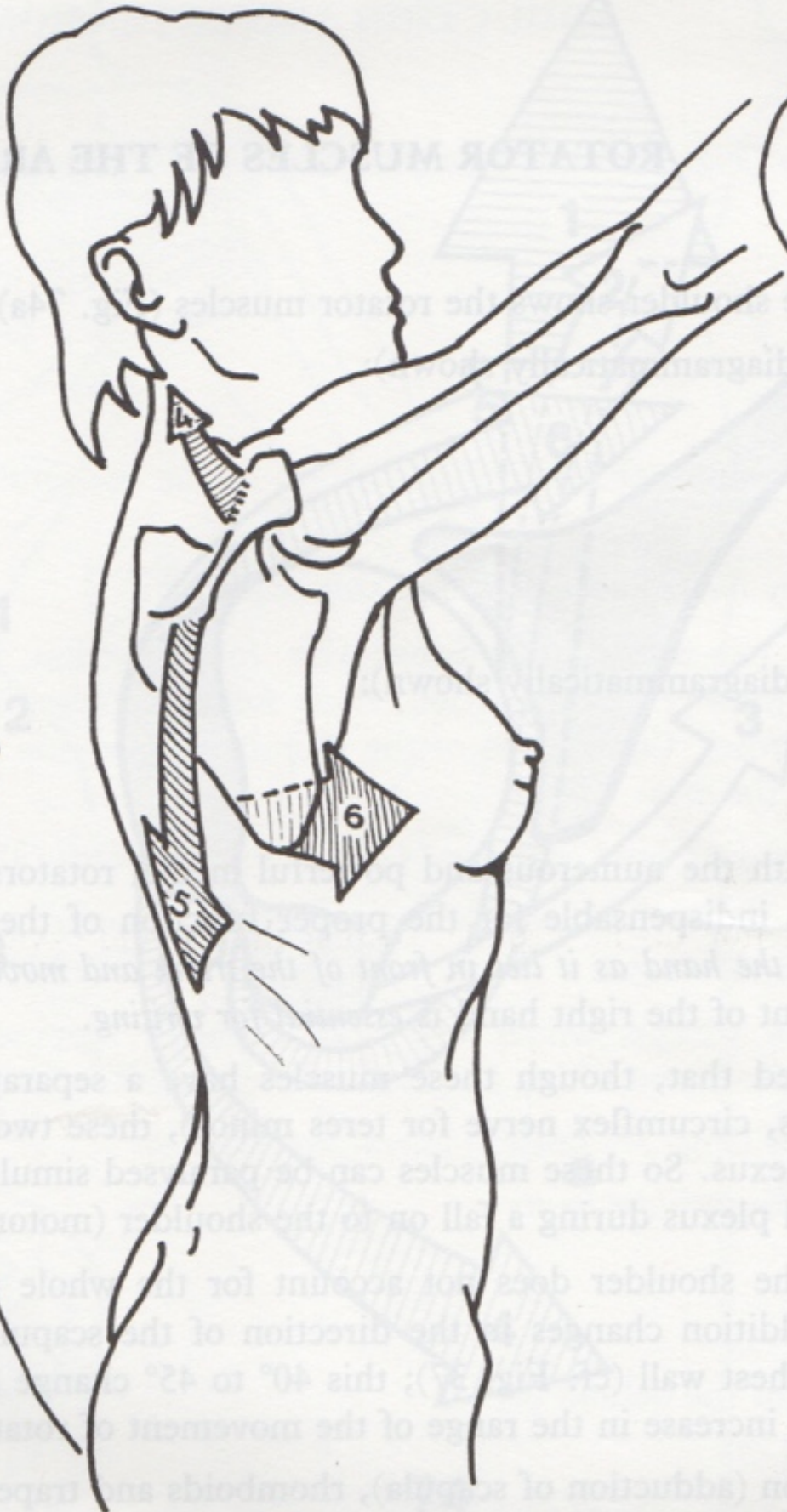
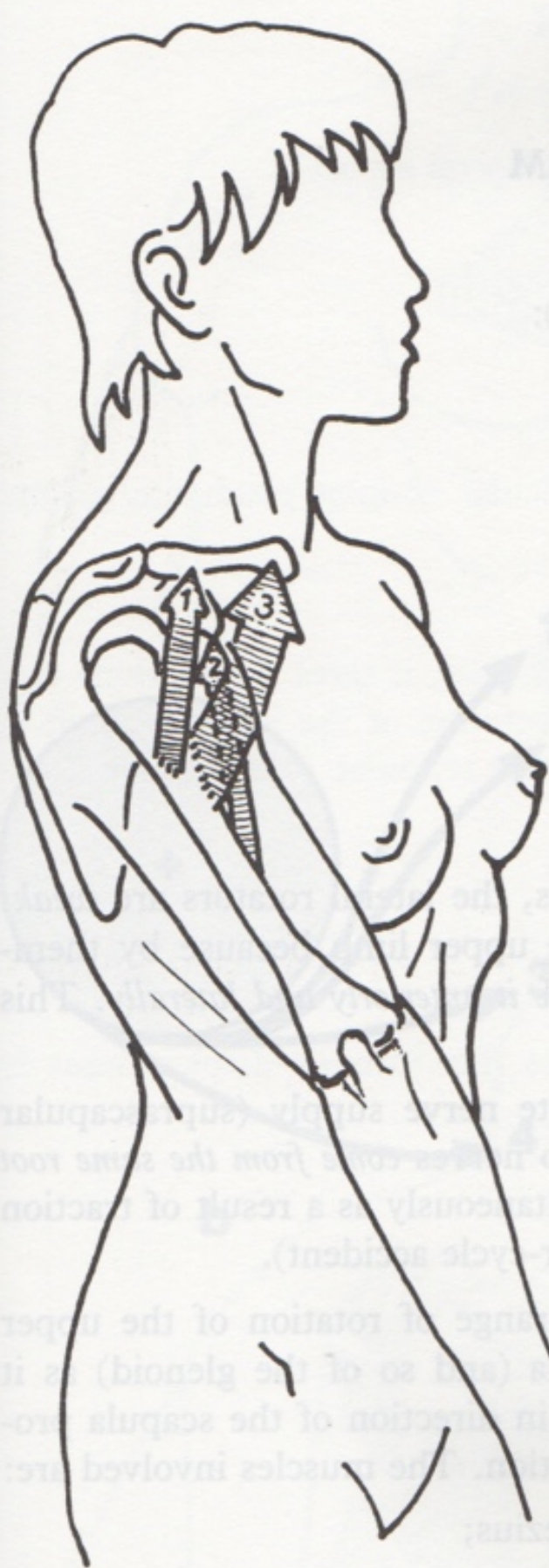
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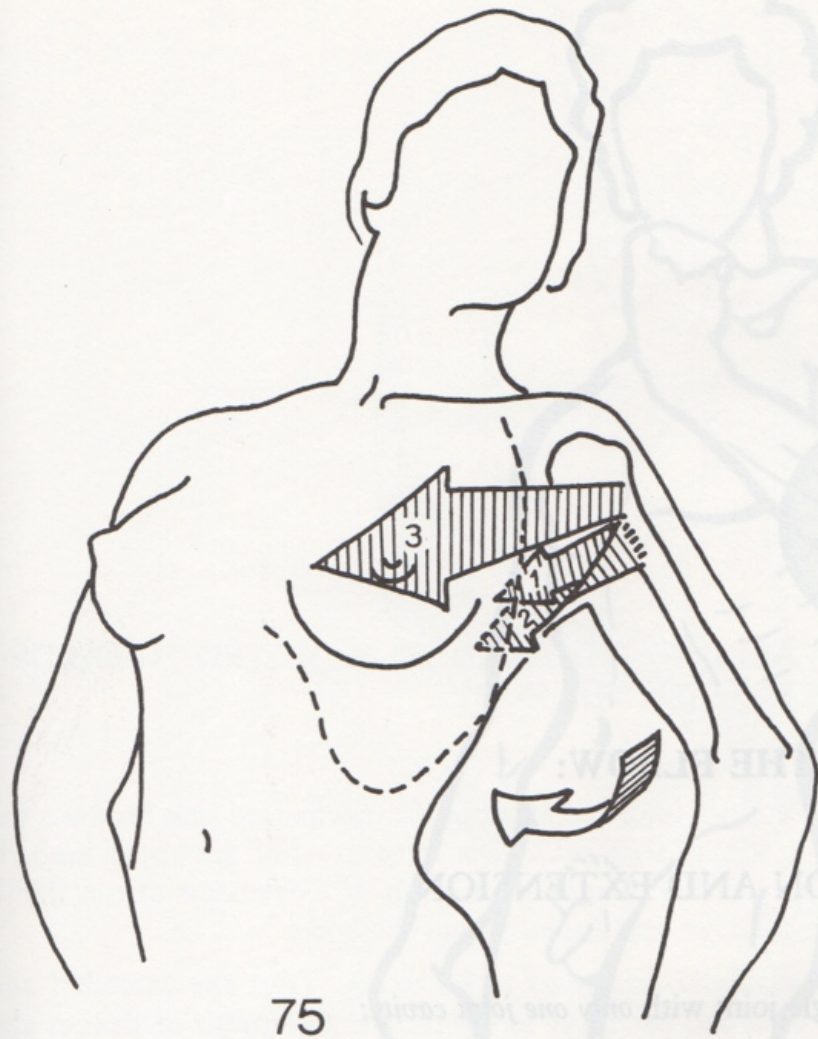


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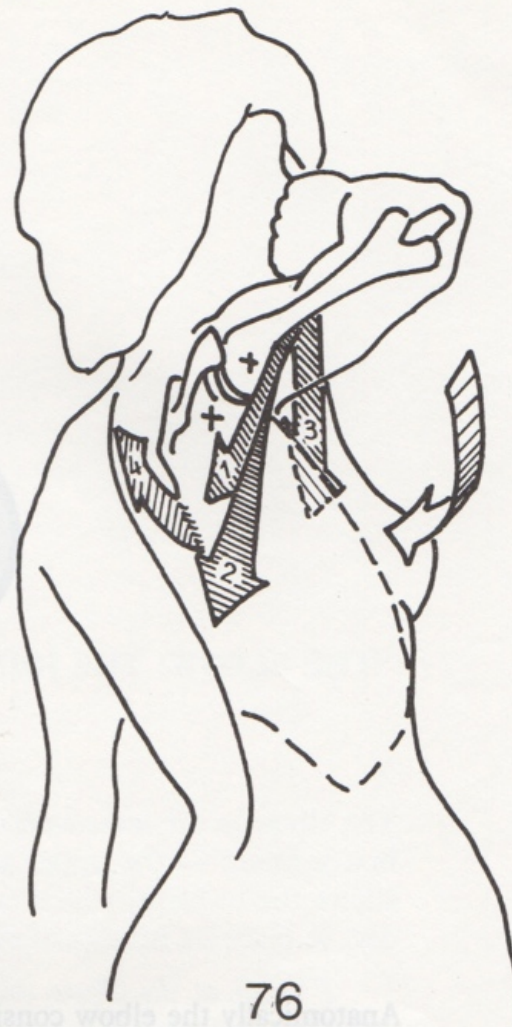


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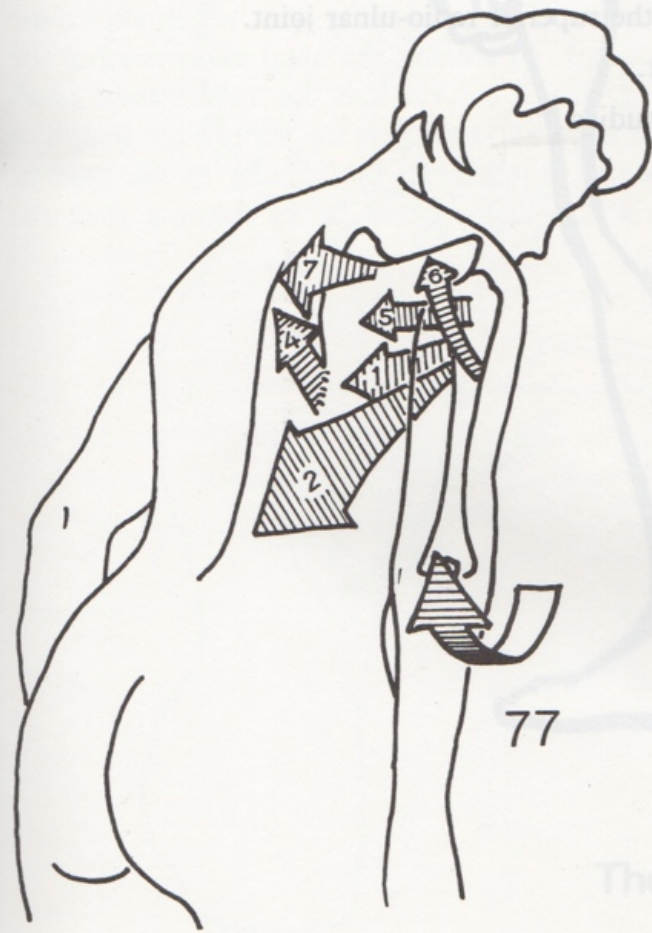




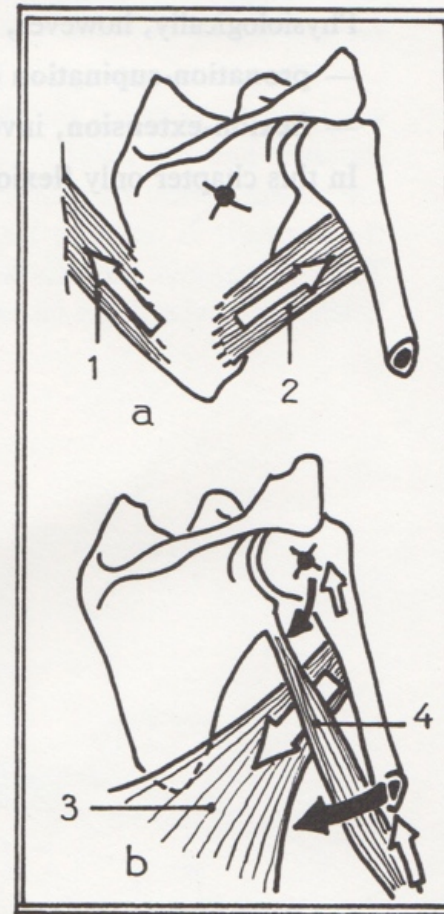
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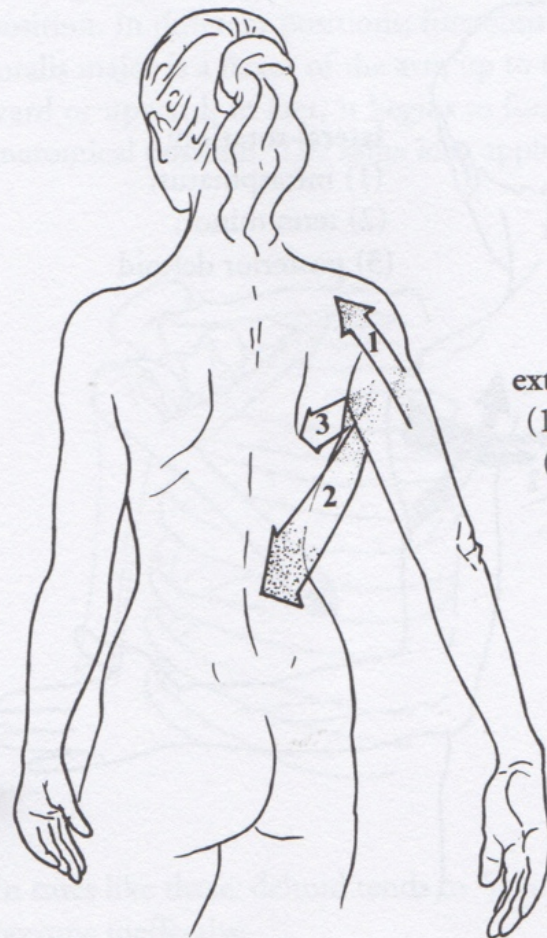
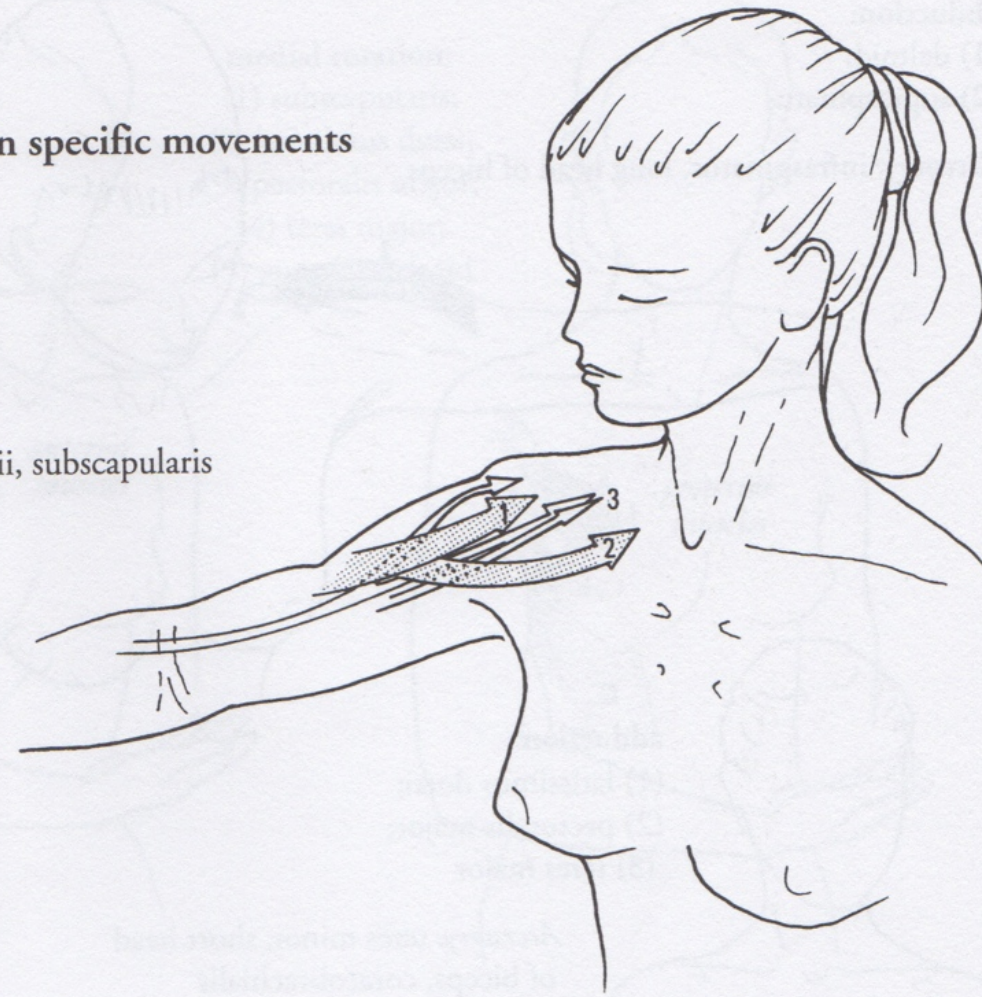


Muscles involved in specific movements of the arm

flexion:

- (1) anterior deltoid;
- (2) pectoralis major;
- (3) coracobrachialis

Accessory: biceps brachii, subscapularis



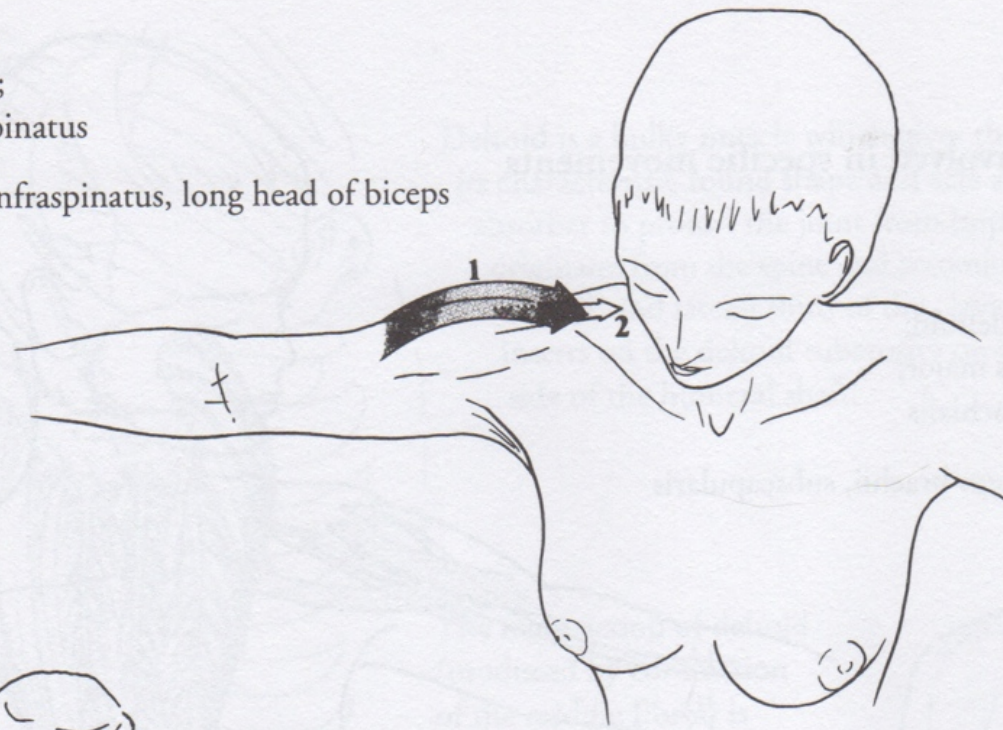
extension:

- (1) posterior deltoid;
- (2) latissimus dorsi;
- (3) teres major

abduction:

- (1) deltoid;
- (2) supraspinatus

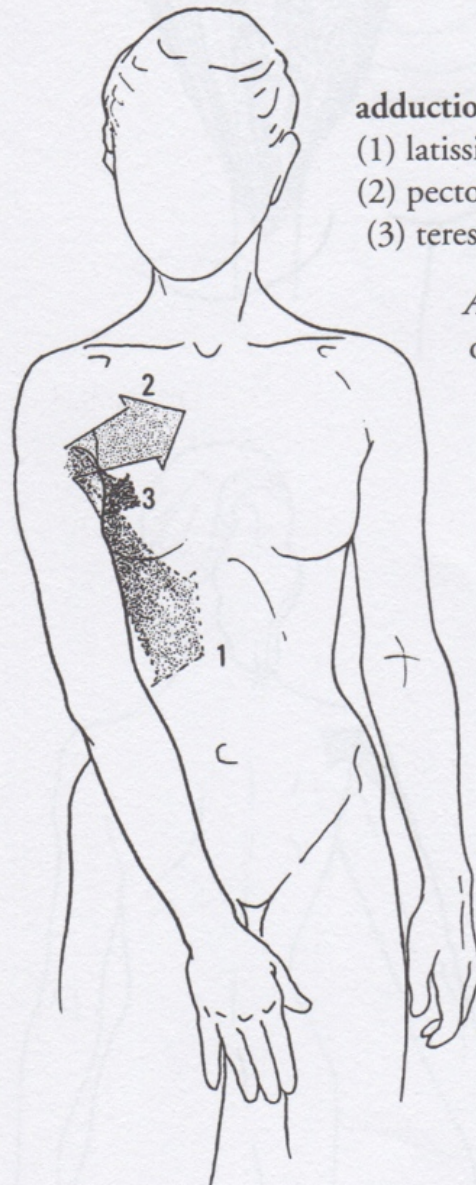
Accessory: infraspinatus, long head of biceps



adduction:

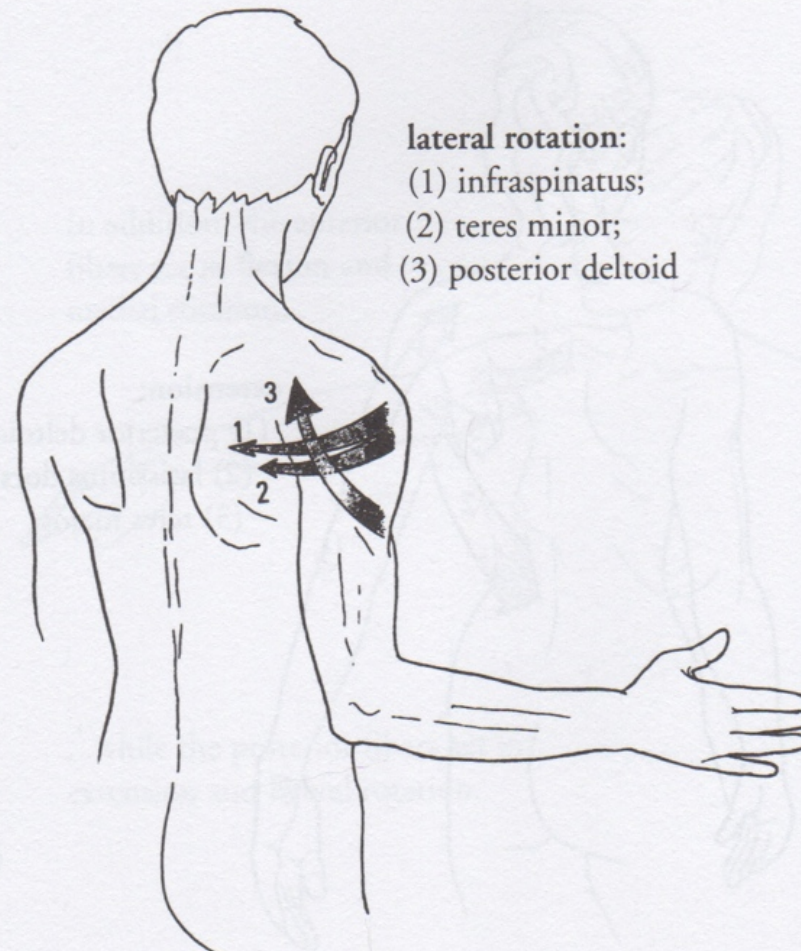
- (1) latissimus dorsi;
- (2) pectoralis major;
- (3) teres major

Accessory: teres minor, short head of biceps, coracobrachialis



lateral rotation:

- (1) infraspinatus;
- (2) teres minor;
- (3) posterior deltoid

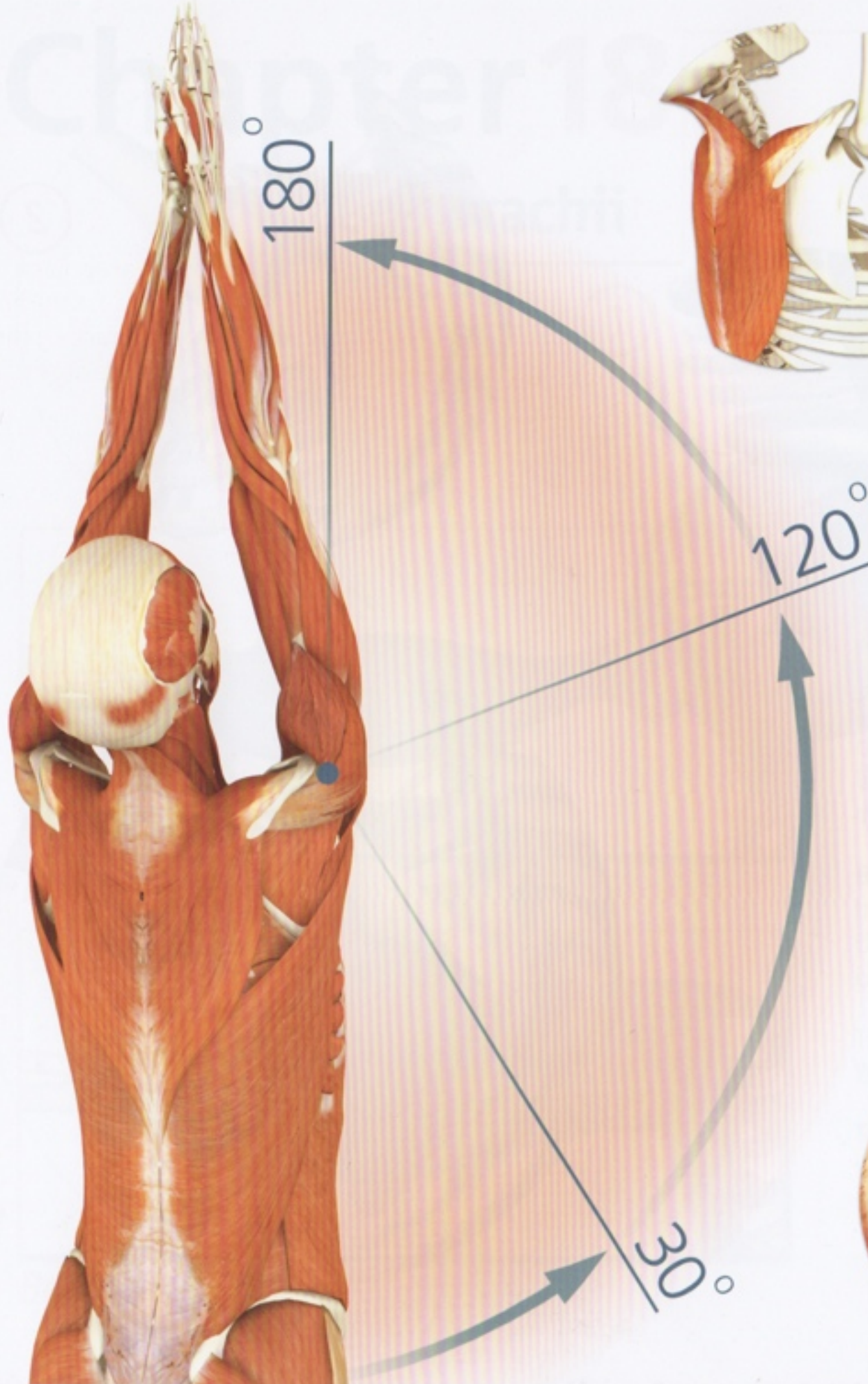


Shoulder Biomechanics

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Shoulder abduction and elevation of the humerus begins by stabilizing the scapula. The supraspinatus then initiates abduction at the glenohumeral joint. The deltoid sustains abduction to approximately 120° (also through glenohumeral movement). The trapezius completes abduction of the shoulder by outwardly rotating the scapula.

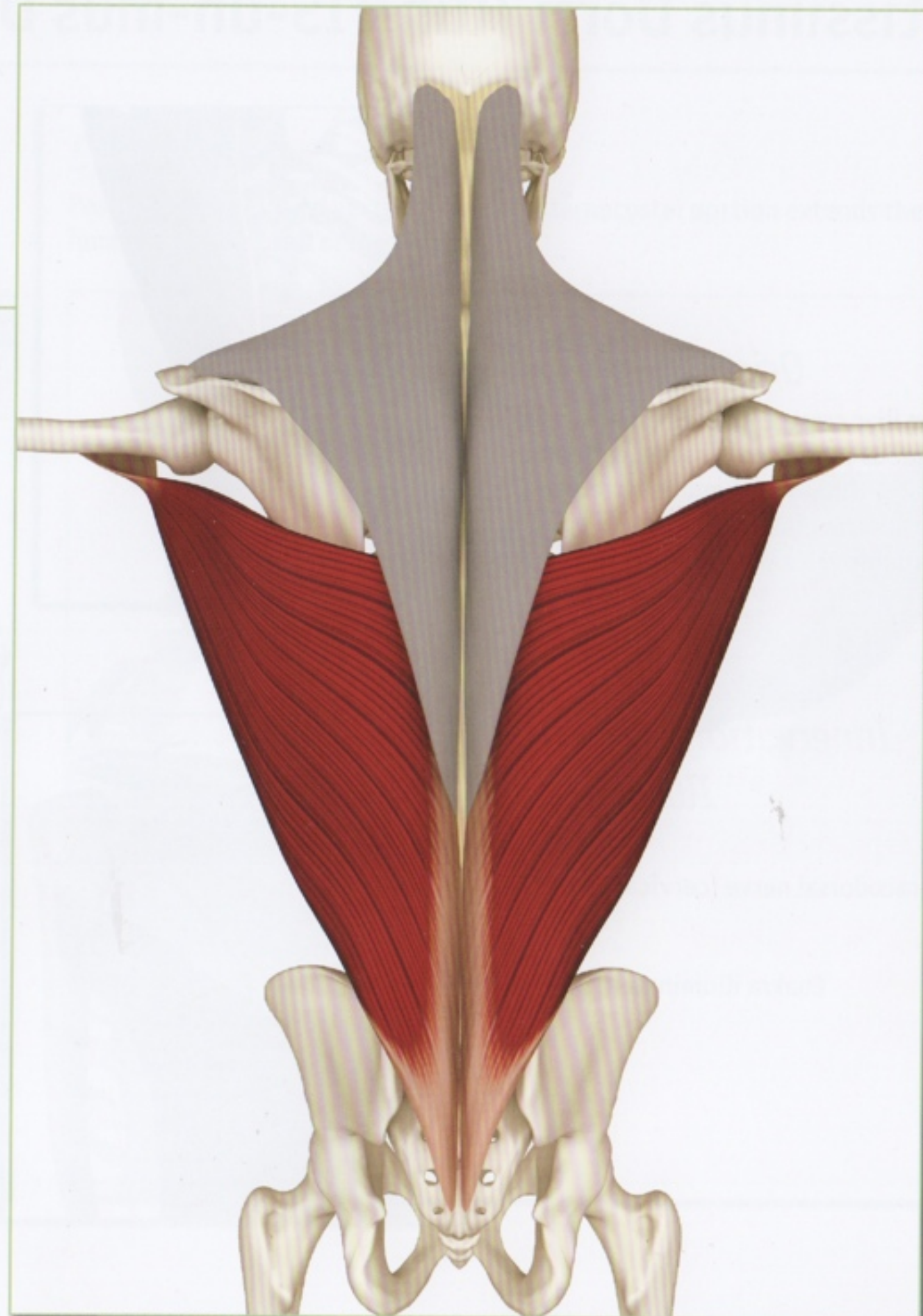
This movement is apparent in the various Yoga postures where the arm is elevated or abducted.



Chapter 11

Latissimus Dorsi

The latissimus dorsi forms two-thirds of the superficial back muscles, originating from the posterior iliac crest, sacrum, and thoracolumbar fascia, rotating 180° before inserting on the inside of the proximal humerus. This “twist” increases the torque generated by contraction of the latissimus dorsi. This muscle draws the arm down and toward the body from the overhead position, internally rotating the humerus. When the humerus is fixed (as in certain twists or in Upward Dog), contraction of the latissimus draws the chest forward and opens it. Tightness limits overhead postures such as Virabhadrasana I, Urdhva Danurasana, and Adho Mukha Svanasana.



Latissimus Dorsi (luh-TIS-uh-mus DOR-si)

Action

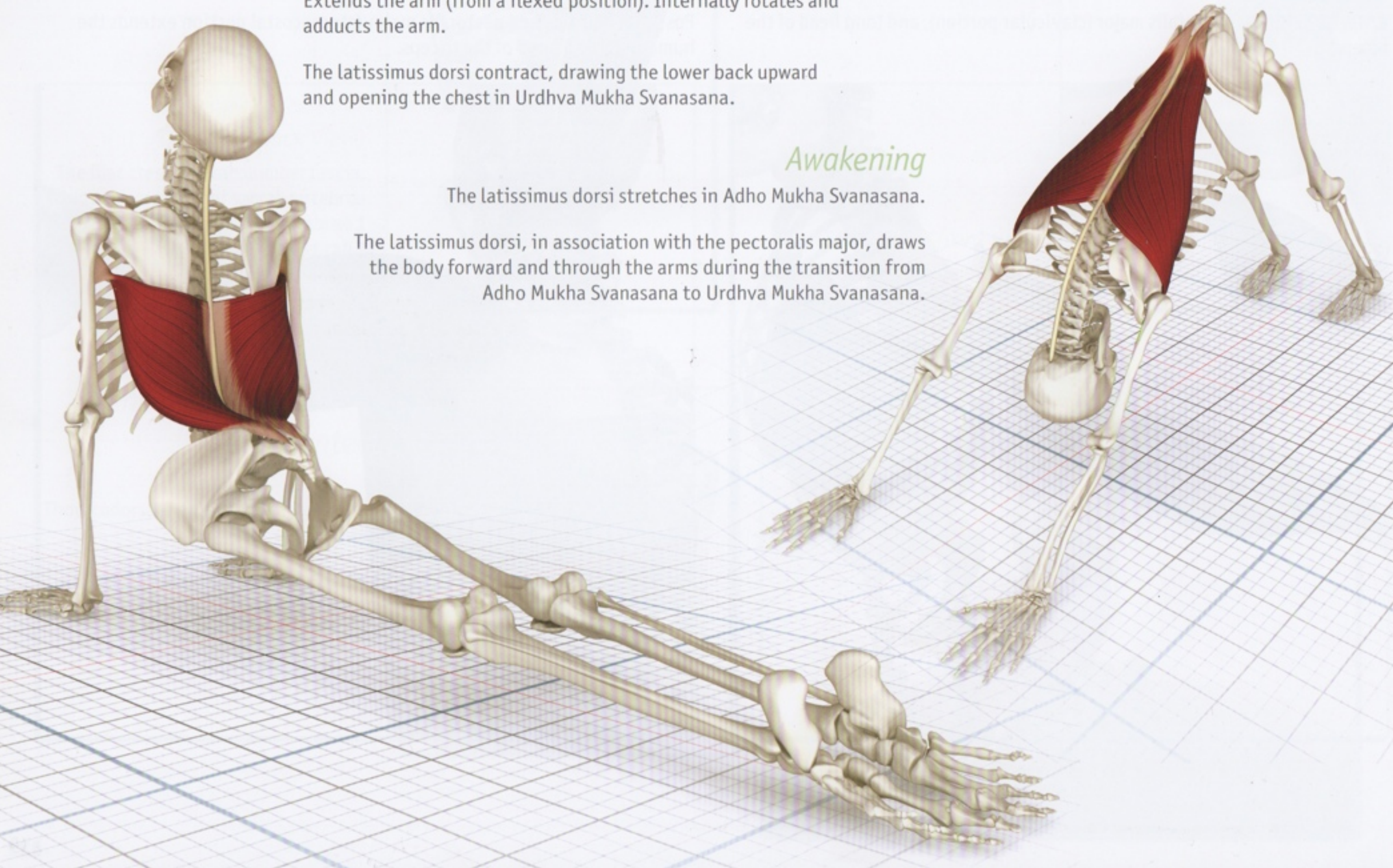
Extends the arm (from a flexed position). Internally rotates and adducts the arm.

The latissimus dorsi contract, drawing the lower back upward and opening the chest in Urdhva Mukha Svanasana.

Awakening

The latissimus dorsi stretches in Adho Mukha Svanasana.

The latissimus dorsi, in association with the pectoralis major, draws the body forward and through the arms during the transition from Adho Mukha Svanasana to Urdhva Mukha Svanasana.



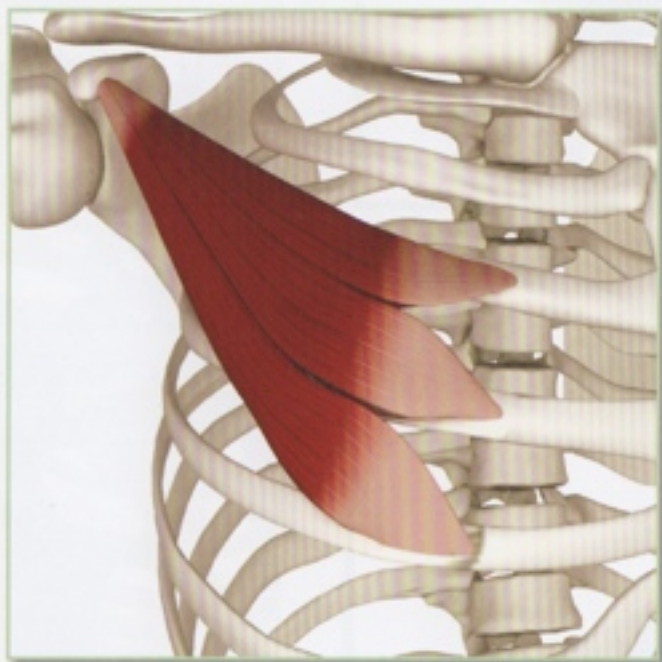
Chapter 13

Pectoralis Major & Minor

Pectoralis Minor (pek-to-RA-lis):

This is a small three-headed muscle lying deep to the pectoralis major, originating from the third, fourth, and fifth ribs and inserting on the coracoid process of the scapula. The pectoralis minor draws the scapula downward and forward in open-chain movements.

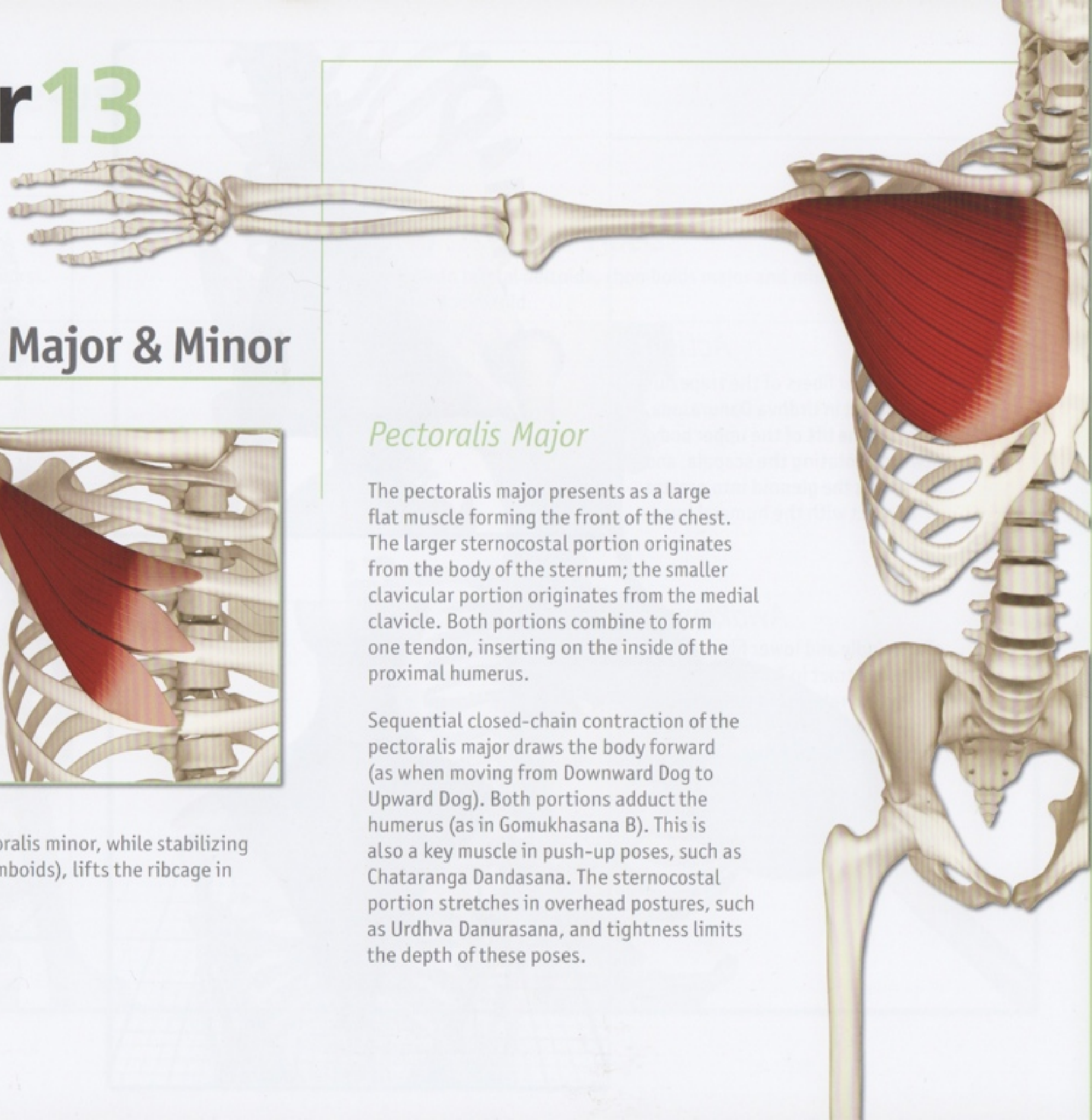
Closed-chain contraction of the pectoralis minor, while stabilizing the scapula posteriorly (with the rhomboids), lifts the ribcage in respiration.



Pectoralis Major

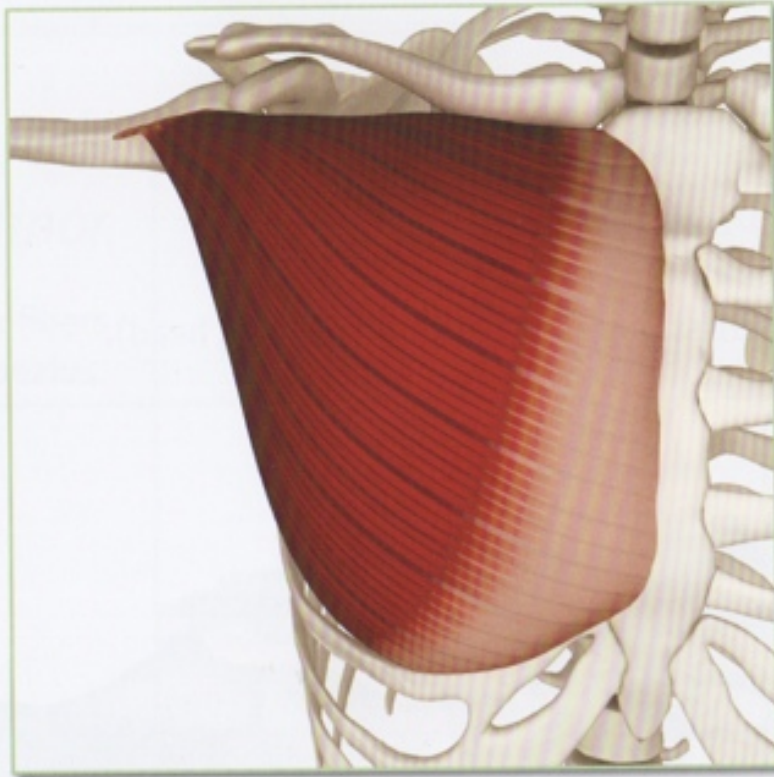
The pectoralis major presents as a large flat muscle forming the front of the chest. The larger sternocostal portion originates from the body of the sternum; the smaller clavicular portion originates from the medial clavicle. Both portions combine to form one tendon, inserting on the inside of the proximal humerus.

Sequential closed-chain contraction of the pectoralis major draws the body forward (as when moving from Downward Dog to Upward Dog). Both portions adduct the humerus (as in Gomukhasana B). This is also a key muscle in push-up poses, such as Chataranga Dandasana. The sternocostal portion stretches in overhead postures, such as Urdhva Danurasana, and tightness limits the depth of these poses.



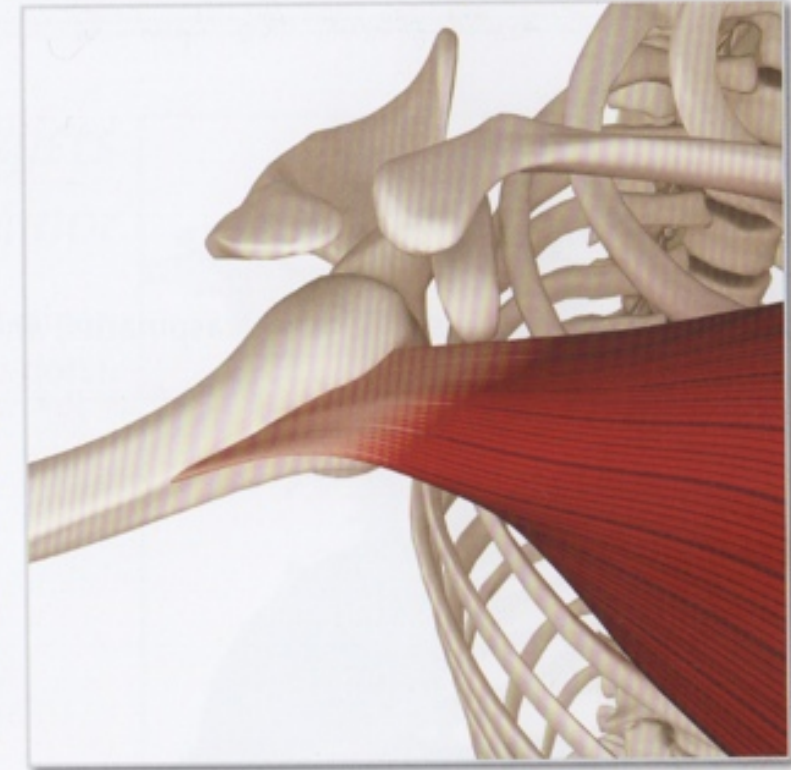
Origin
Pectoralis Major

Medial third of the clavicle,
anterior aspect of the
sternum, upper 6 costal
cartilages, and aponeurosis of
the external oblique.



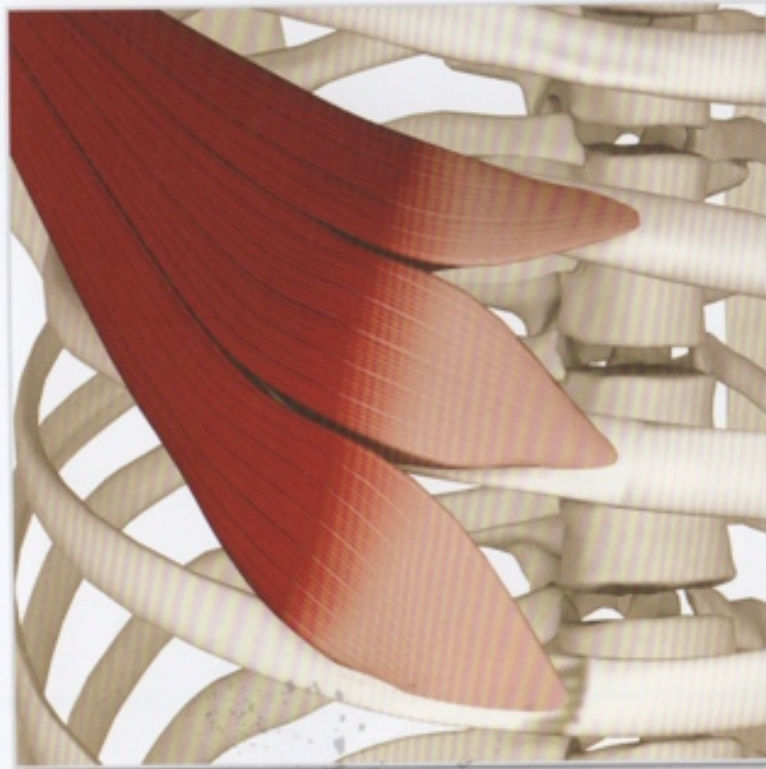
Insertion
Pectoralis Major

Lateral lip of bicipital
groove (sternal fibers, more
proximally, clavicular fibers
insert more distally).



Origin
Pectoralis Minor

Outer surface of ribs 2 through 5.



Insertion
Pectoralis Minor

Coracoid process of the
scapula.



Pectoralis Major & Minor

Action

Adducts and internally rotates the arm.

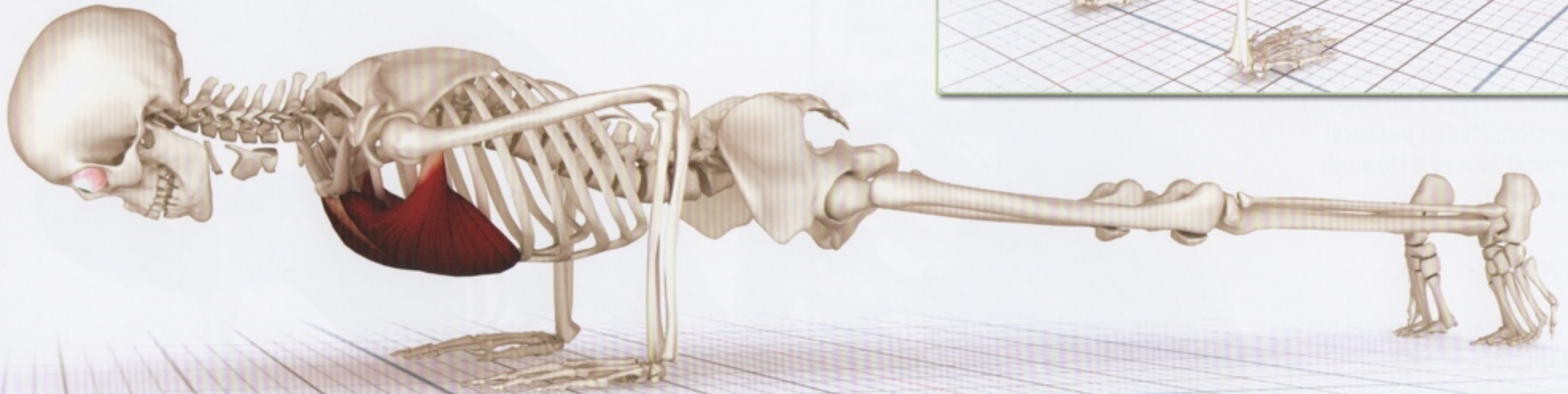
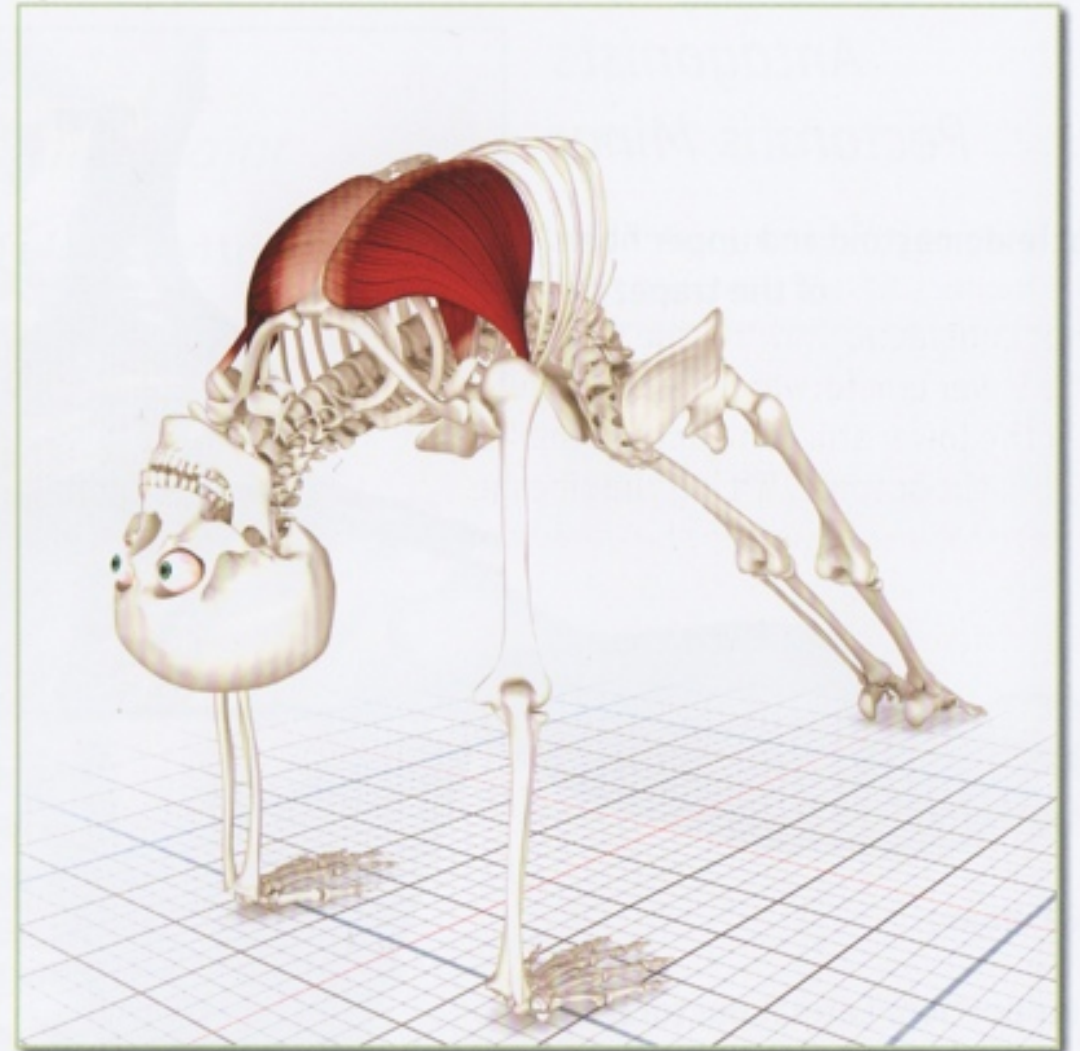
Flexes the arm from an extended position.

Depresses the arm and shoulder.

The pectoralis major and minor are stretched and awakened in Purvottanasana.

Awakening

Chataranga Dandasana: The pectoralis major and minor (in association with the serratus anterior) stabilize the upper body in this pose.



Chapter 16

Deltoids

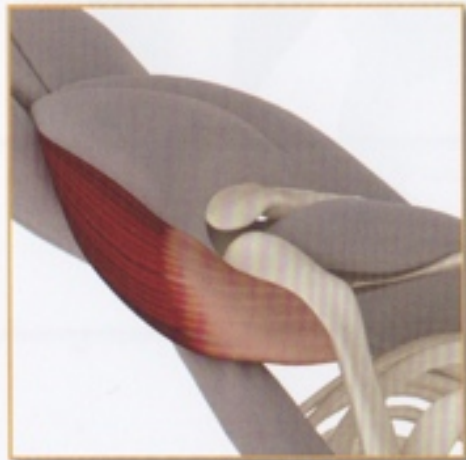
posterior deltoid



lateral deltoid

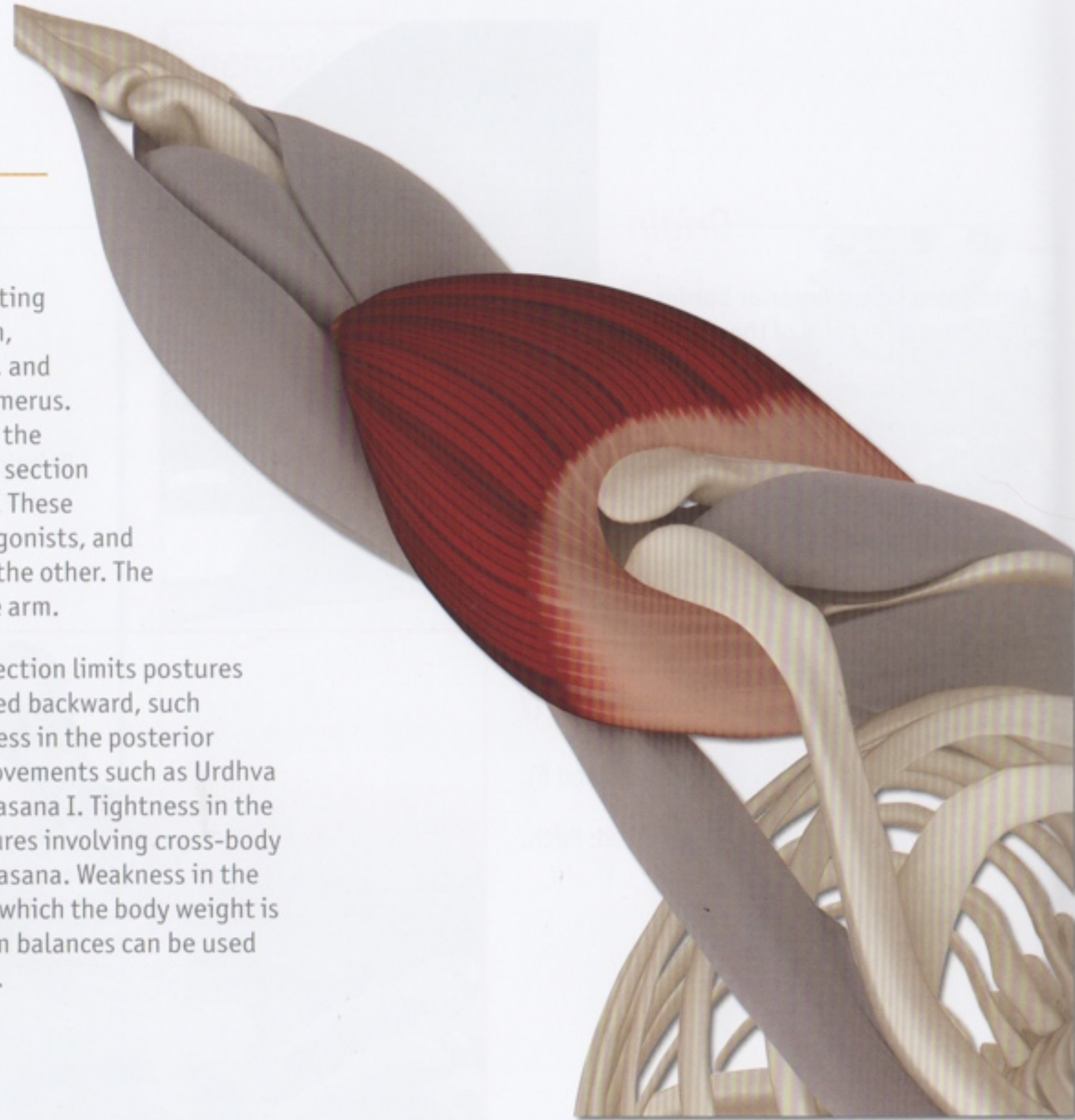


anterior deltoid



This is a three-part muscle with anterior, lateral, and posterior sections, originating from the clavicle, acromion, and scapulae, respectively, and inserting on the lateral humerus. The anterior section raises the arm forward. The posterior section extends the arm backward. These two sections are thus antagonists, and contracting one stretches the other. The lateral section abducts the arm.

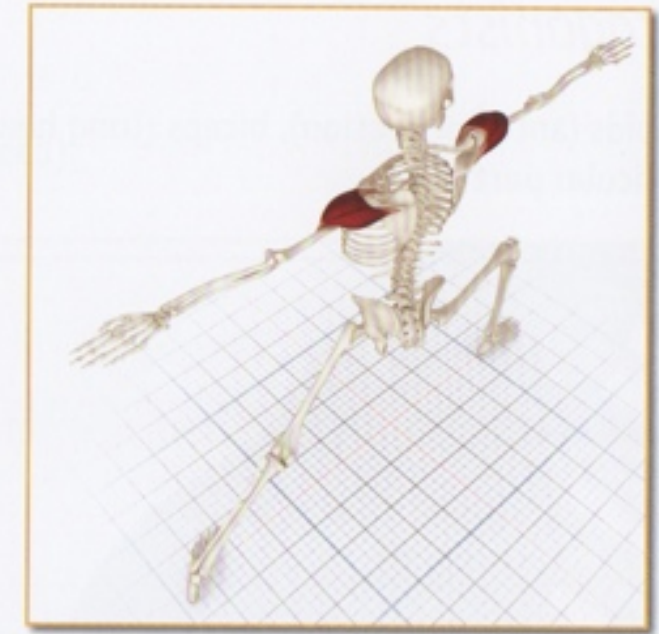
Tightness in the anterior section limits postures in which the arm is extended backward, such as Purvottanasana. Tightness in the posterior section limits overhead movements such as Urdhva Danurasana and Virabhadrasana I. Tightness in the lateral section limits postures involving cross-body movements, such as Garudasana. Weakness in the deltoids limits postures in which the body weight is supported by the arms. Arm balances can be used to strengthen the deltoids.



Deltoids (DEL-toid)

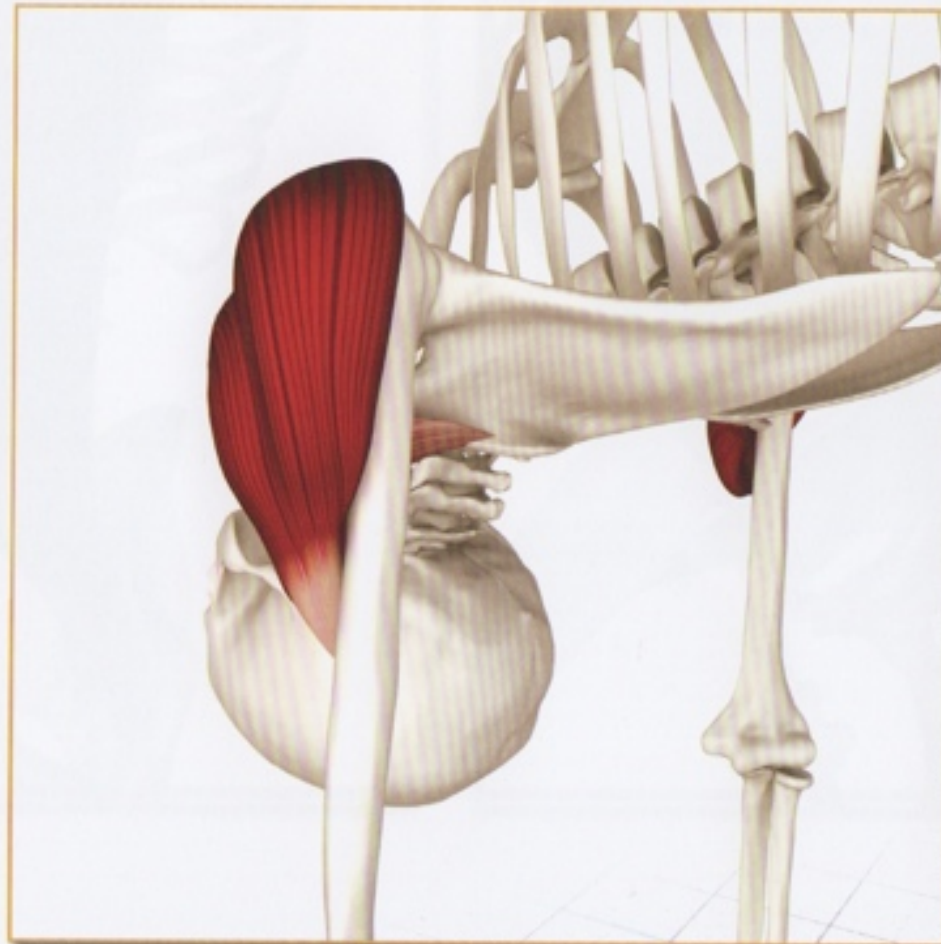
Action

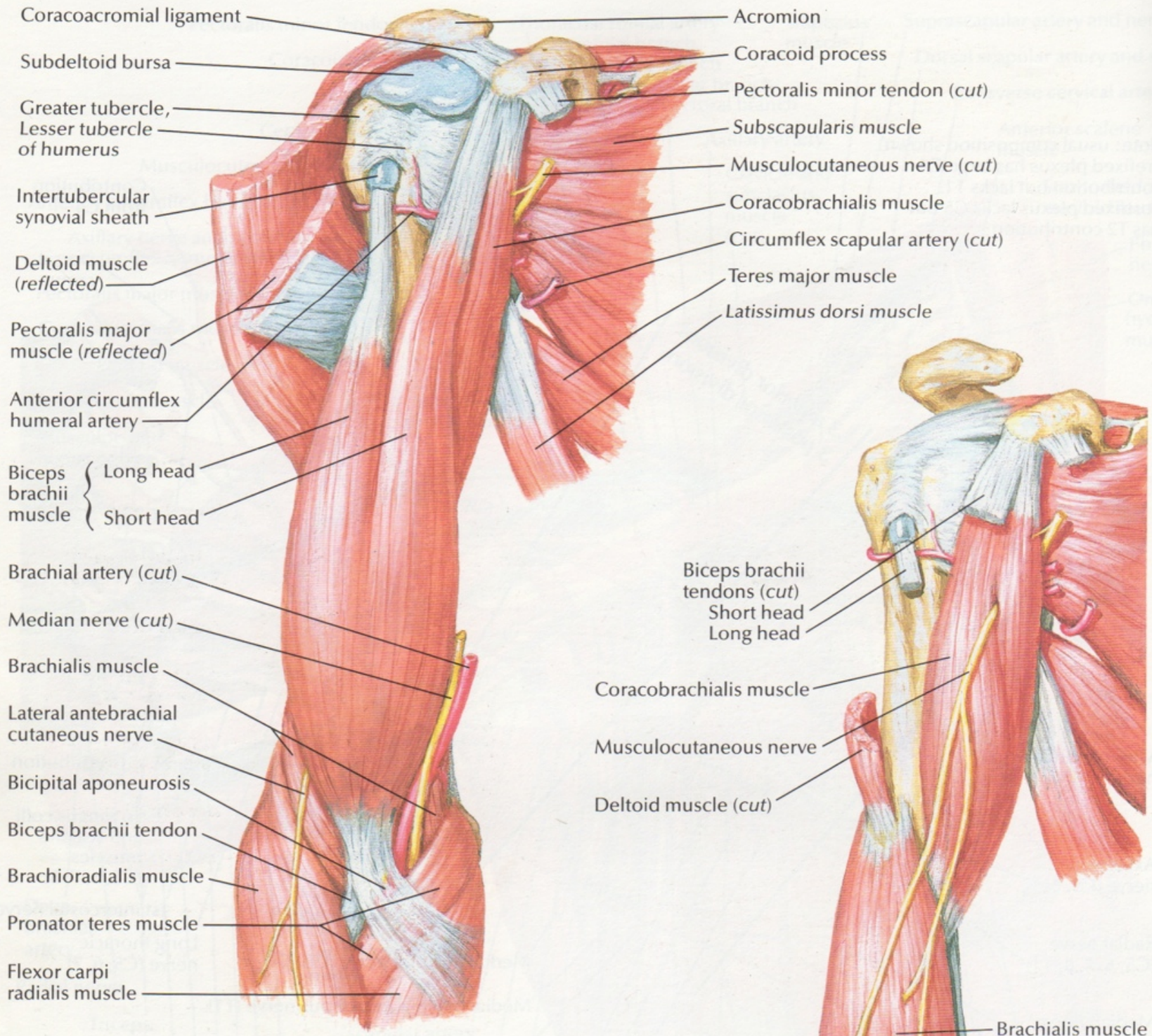
The lateral section of the deltoids contracts in Virabhadrasana II, abducting the arms. The supraspinatus muscle of the rotator cuff initiates this action.



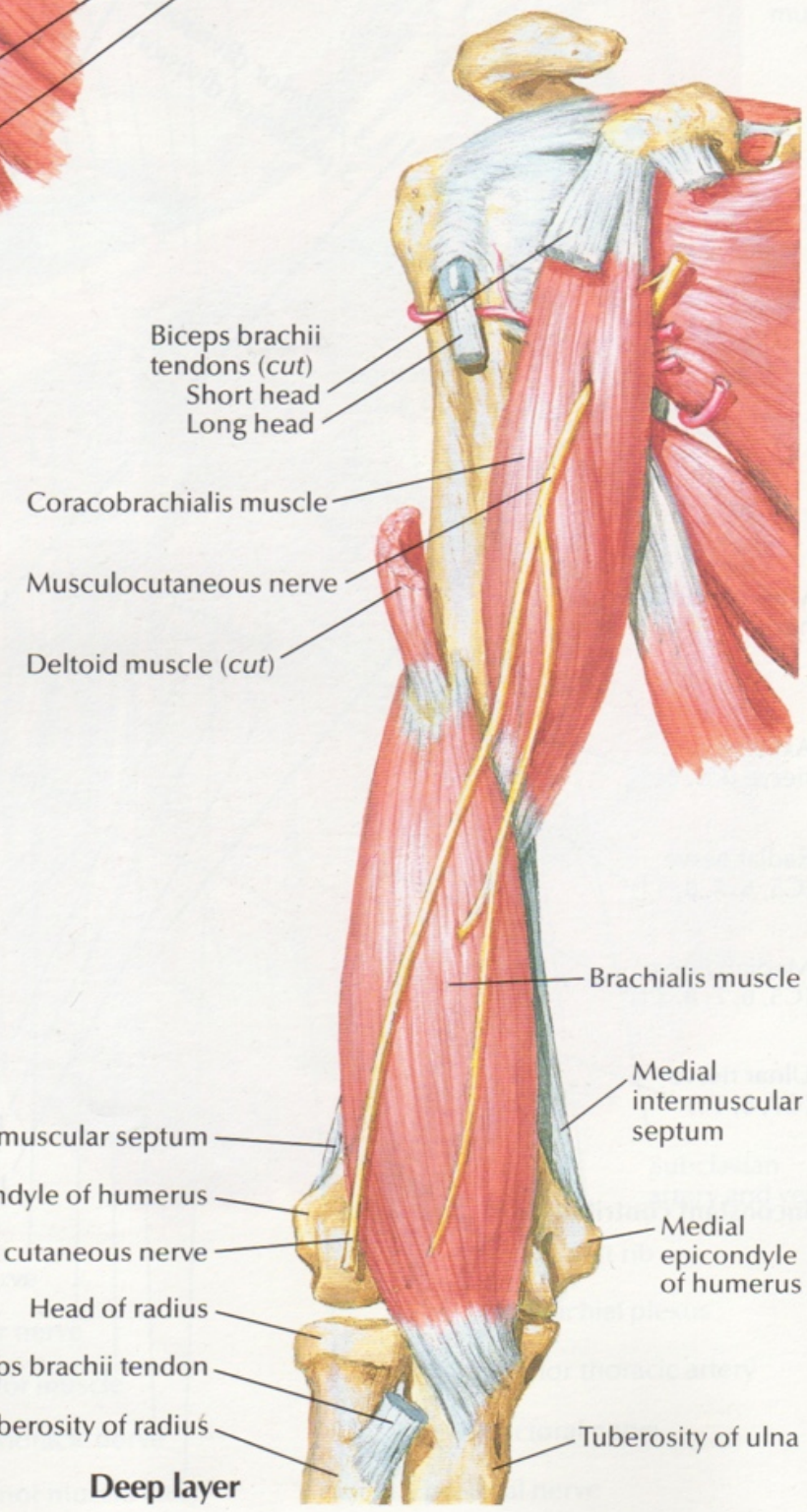
Awakening

The posterior section of the deltoids contracts, extending the arms in Purvottanasana and stretching the anterior deltoids, biceps brachii, and pectoralis major muscles.





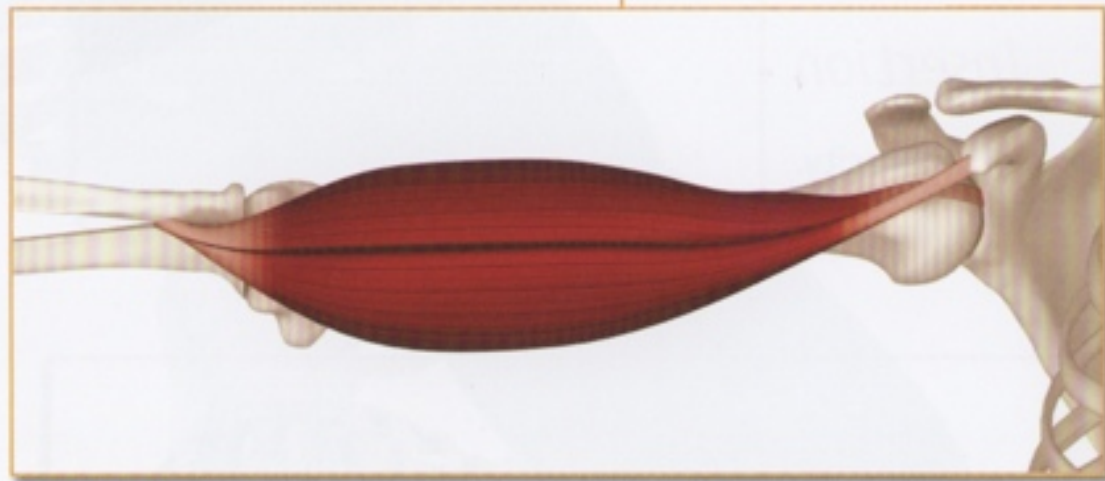
Superficial layer



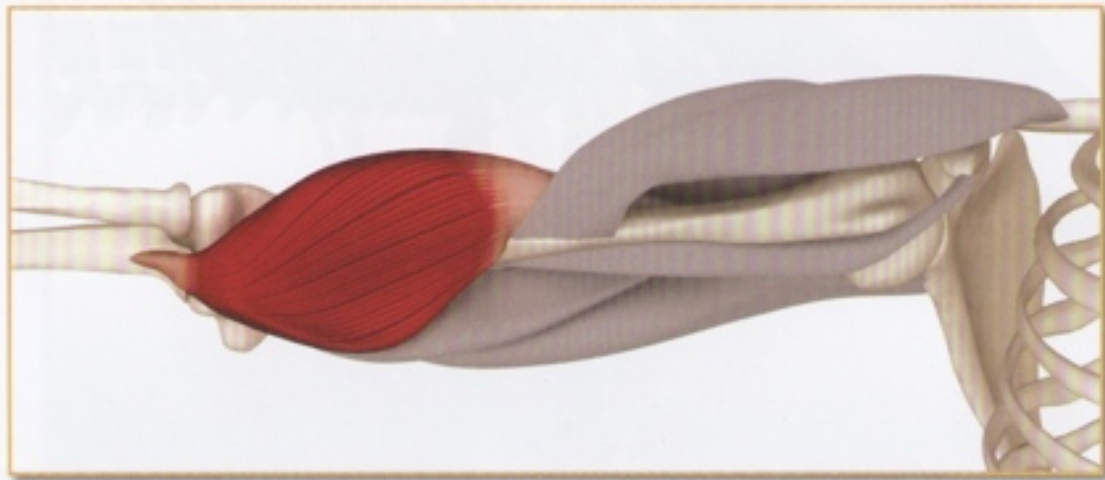
Deep layer

Chapter 18

Biceps Brachii



Biceps



Brachialis

This is a two-headed fusiform muscle. The short head originates from the coracoid (crow's beak) process of the scapula, near the insertion of the pectoralis minor. When the elbow is fixed, contracting the short head tilts the scapula forward. The long head originates from the top of the glenoid of the scapula, curving over the humeral head and into the bicipital groove (a trough into which it is tethered by a ligament). Contracting the long head with the elbow fixed depresses the humeral head, stabilizing it in the joint.

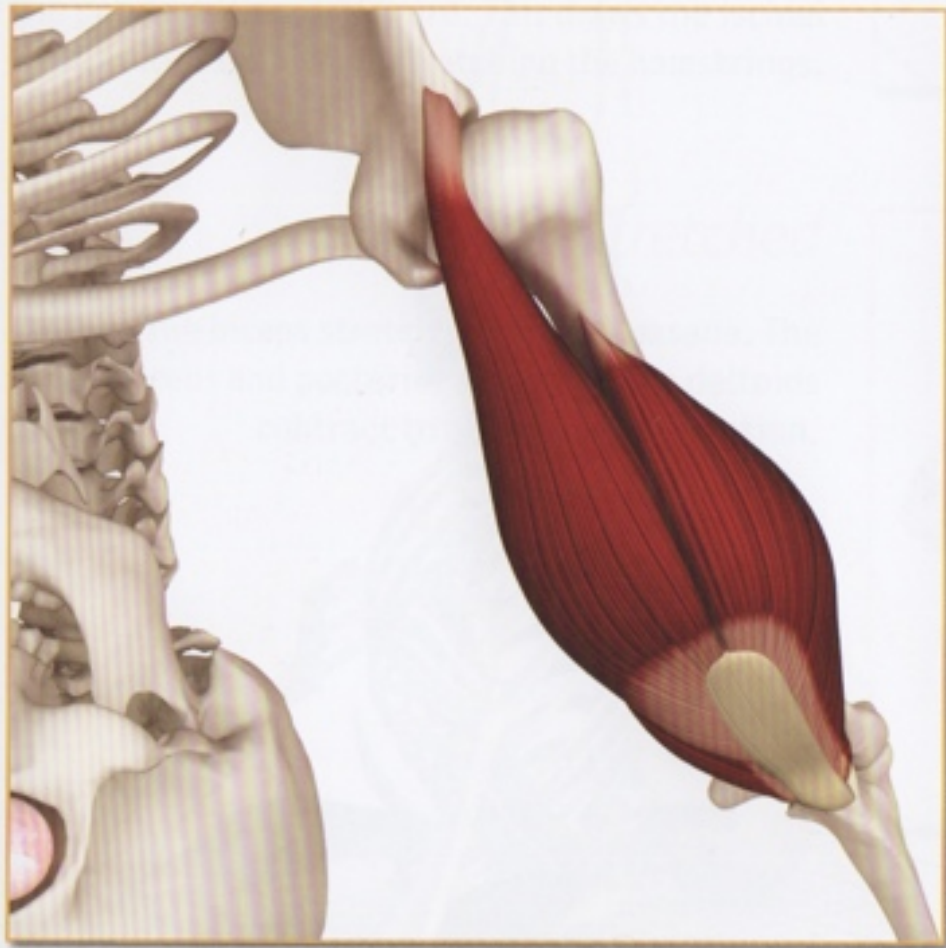
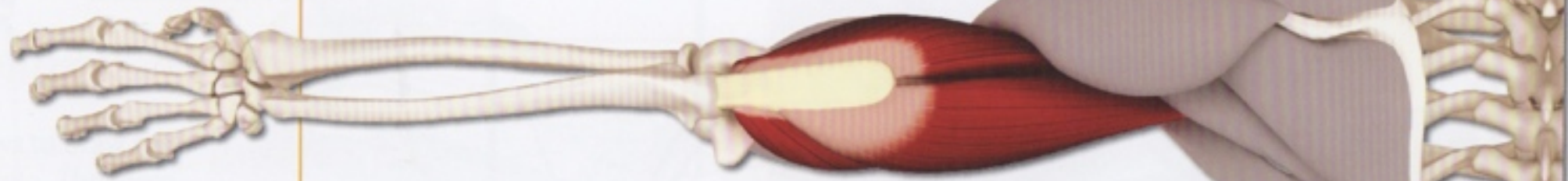
Both heads combine to form one tendon that inserts on the bicipital tuberosity of the radius. When the biceps contract, the forearm rotates into supination (palm up). Further contraction flexes the elbow.

Tightness in this muscle limits poses such as Purvottanasana. Weakness limits poses such as Sarvangasana.

The brachialis muscle acts in synergy with the biceps, flexing the elbow.

Chapter 19

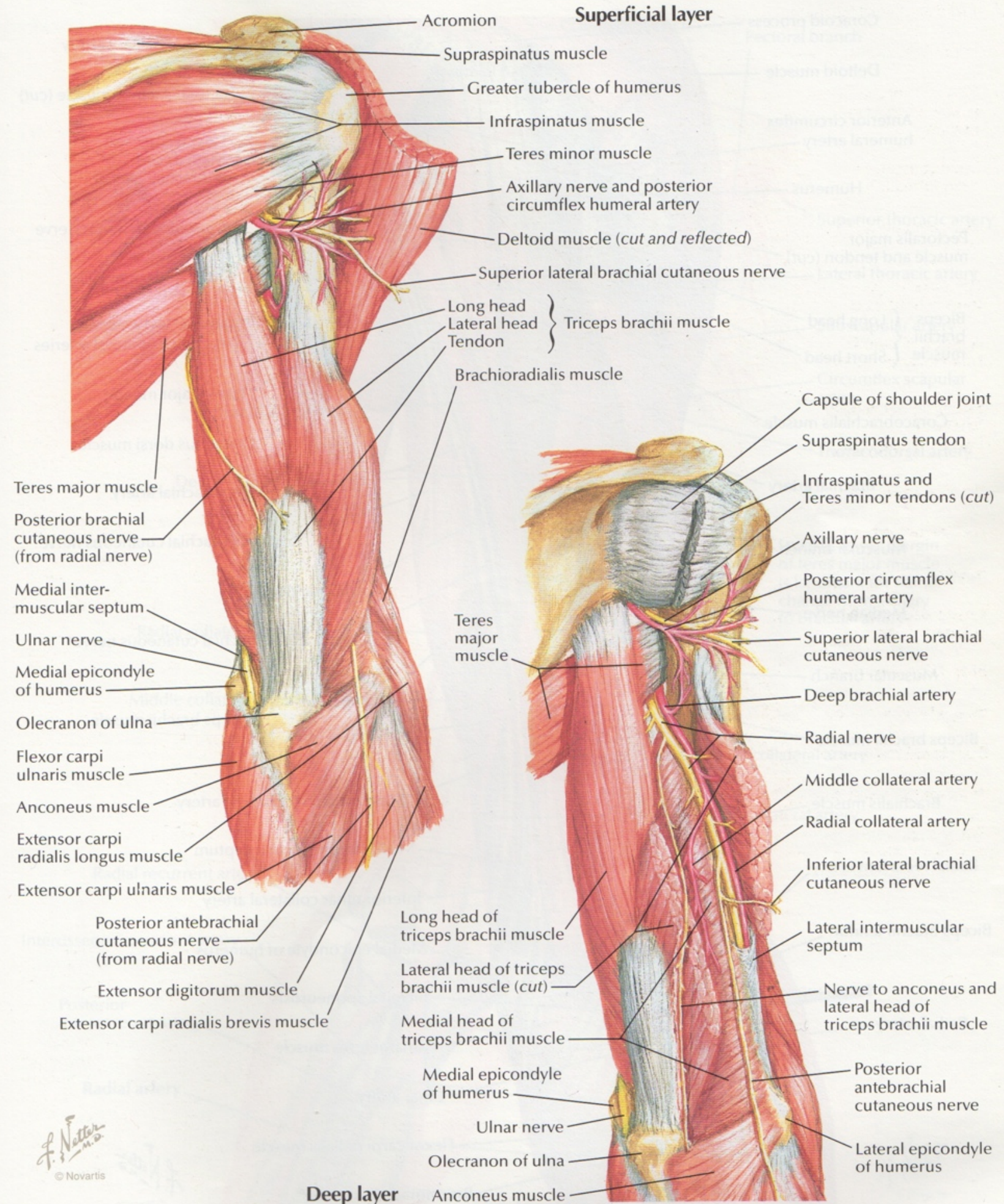
Triceps Brachii



The triceps brachii is a three-headed muscle on the back of the arm. The medial and short heads originate from the humerus. The long head originates from the inferior border of the glenoid. All three heads combine to form one distal tendon that inserts on the olecranon process of the ulna (forearm bone).

Contraction of all three heads extends the elbow (as in Downward Facing Dog pose). Contraction of the long head with the forearm fixed rotates the scapula upward (by pulling on its origin). This rotation increases contact of the humeral head with the shallow glenoid, stabilizing the joint. This contraction of the triceps also moves the acromion process medially and away from the humeral head, preventing impingement of the acromion on the humeral head. This protects the rotator cuff muscles in poses like back bends and Downward Dog.

Contraction of the triceps opens the front of the elbow (antebrachial fossa) and relieves blockages in the minor Chakra of the elbow. Weakness in the triceps limits the ability to perform various arm balances.



Triceps Brachii (TRI-seps BRA-ke-I)

Action & Awakening

The triceps contract, extending the elbows in Urdhva Danurasana.

The long head of the triceps also upwardly rotates the scapula, increasing contact between the humeral head and the glenoid. This aids to prevent impingement of the humeral head on the acromion.

The triceps contract, extending the elbows in Urdhva Mukha Svanasana. The force produced by this action assists in extending the knees and stretching the hamstrings.

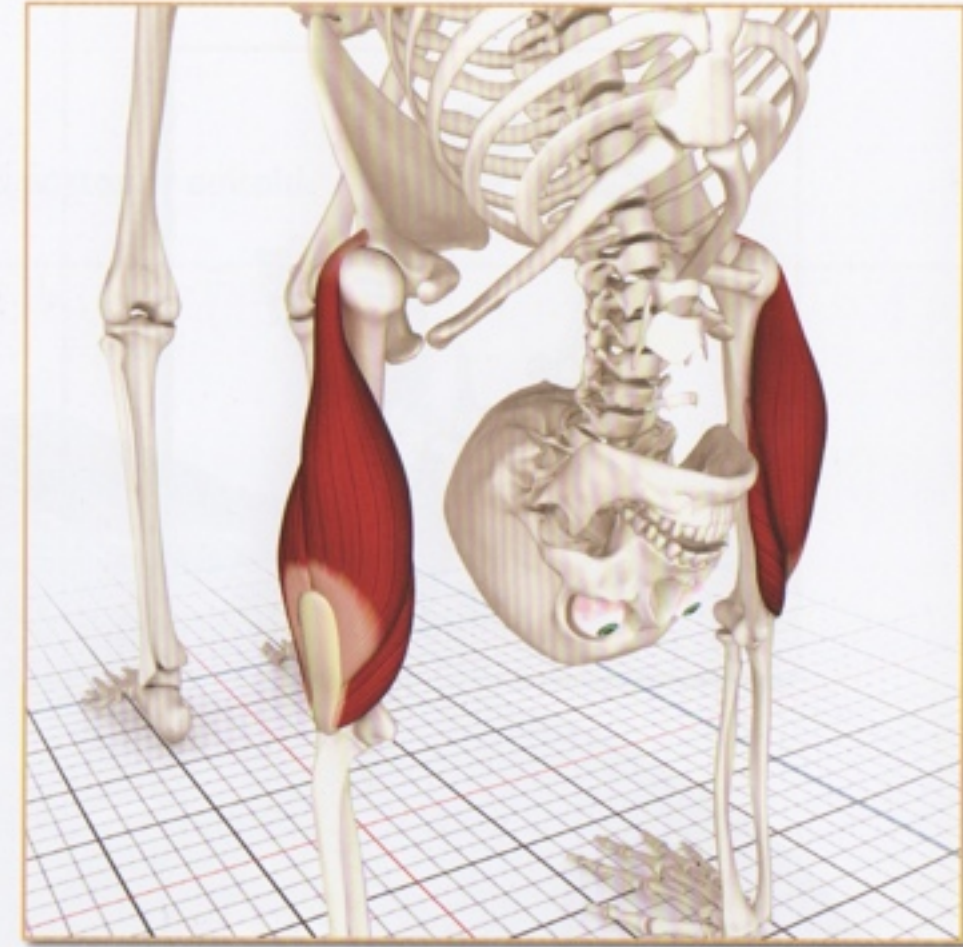




Figure 1:

Rotating the Shoulder Blade Upward

The muscles that rotate the scapula upward include:

- The serratus anterior: a group of narrow, flat muscles that run from the inner surface of the medial border of the scapula to the front part of the rib cage.
- The upper and middle thirds of the trapezius: a trapezoid-shaped muscle running from the top of the lumbar spine, over the shoulder blades, and up to the back of the neck.

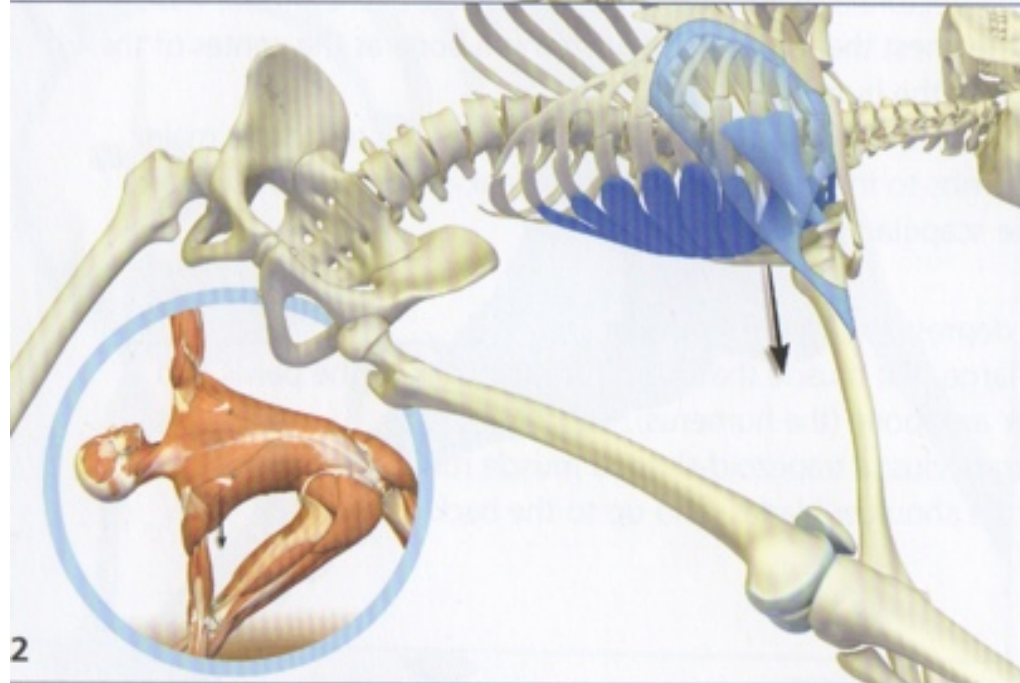


Figure 2:

Moving the Shoulder Blades Away from the Midline (Protraction or Abduction)

The muscles that protract the shoulder blades include:

- The serratus anterior: the group of narrow flat muscles that run from the inner surface of the medial border of the scapula to the front part of the rib cage.
- The pectoralis major: the broad, flat muscle on the front of the chest that runs from the sternum bone at the center of the chest and the collar bone to the upper inside of the humerus.
- The pectoralis minor: a smaller, band-like muscle located under the pectoralis major that runs from the upper ribs to the coracoid process, a beak-shaped protrusion of bone on the front of the scapula.

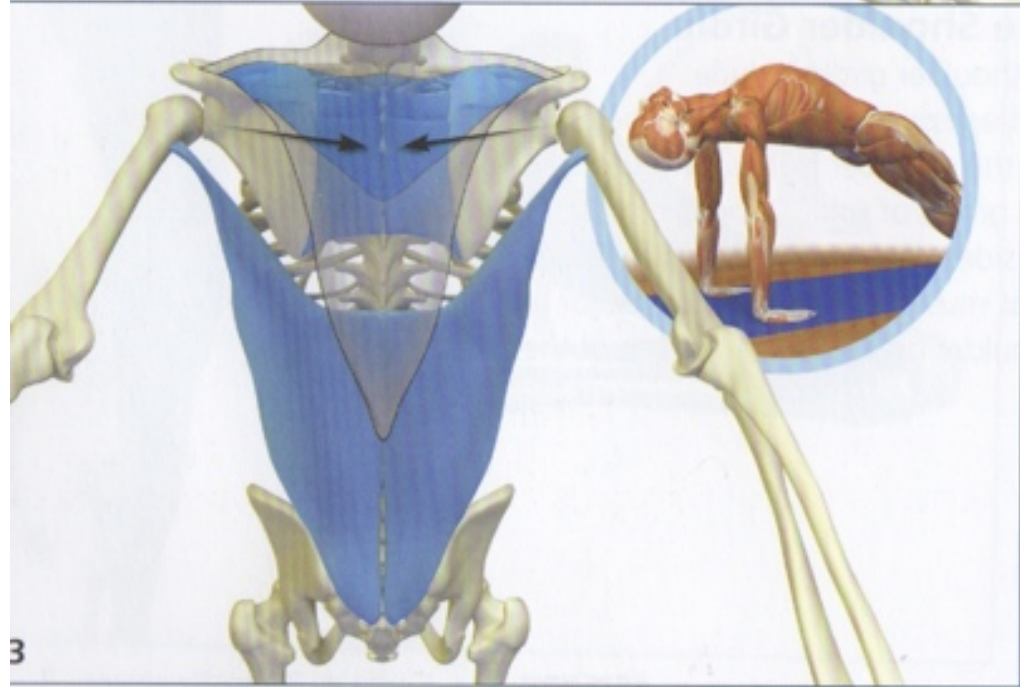
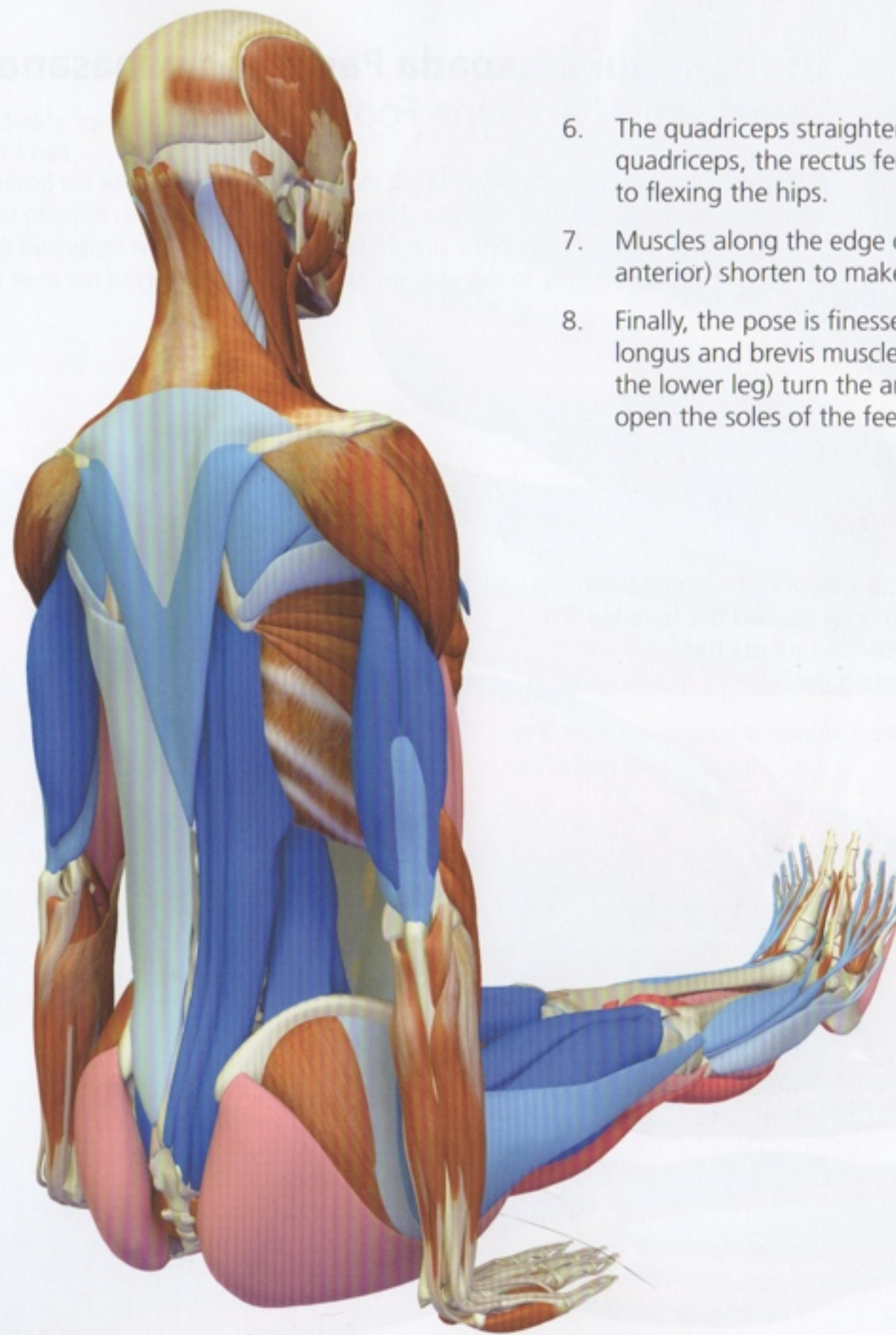


Figure 3:

Drawing the Shoulder Blades Toward the Midline of the Back (Retraction)

The muscles that retract the shoulder blades toward the midline include:

- The rhomboids: two flat muscles, the rhomboid major and minor, that run from the inner border of the shoulder blades to the midline of the back at the spine.
- The middle third of the trapezius: a trapezoid-shaped muscle running from the top of the lumbar spine, over the shoulder blades, and up to the back of the neck.
- The latissimus dorsi: the large, flat muscle that runs from the back of the pelvis and lower back to the upper arm bone (the humerus).



6. The quadriceps straighten the knees. One of the quadriceps, the rectus femoris, also contributes to flexing the hips.
7. Muscles along the edge of the shins (tibialis anterior) shorten to make "right-angle ankles."
8. Finally, the pose is finessed as the peroneus longus and brevis muscles (along the outside of the lower leg) turn the ankles slightly outward to open the soles of the feet.

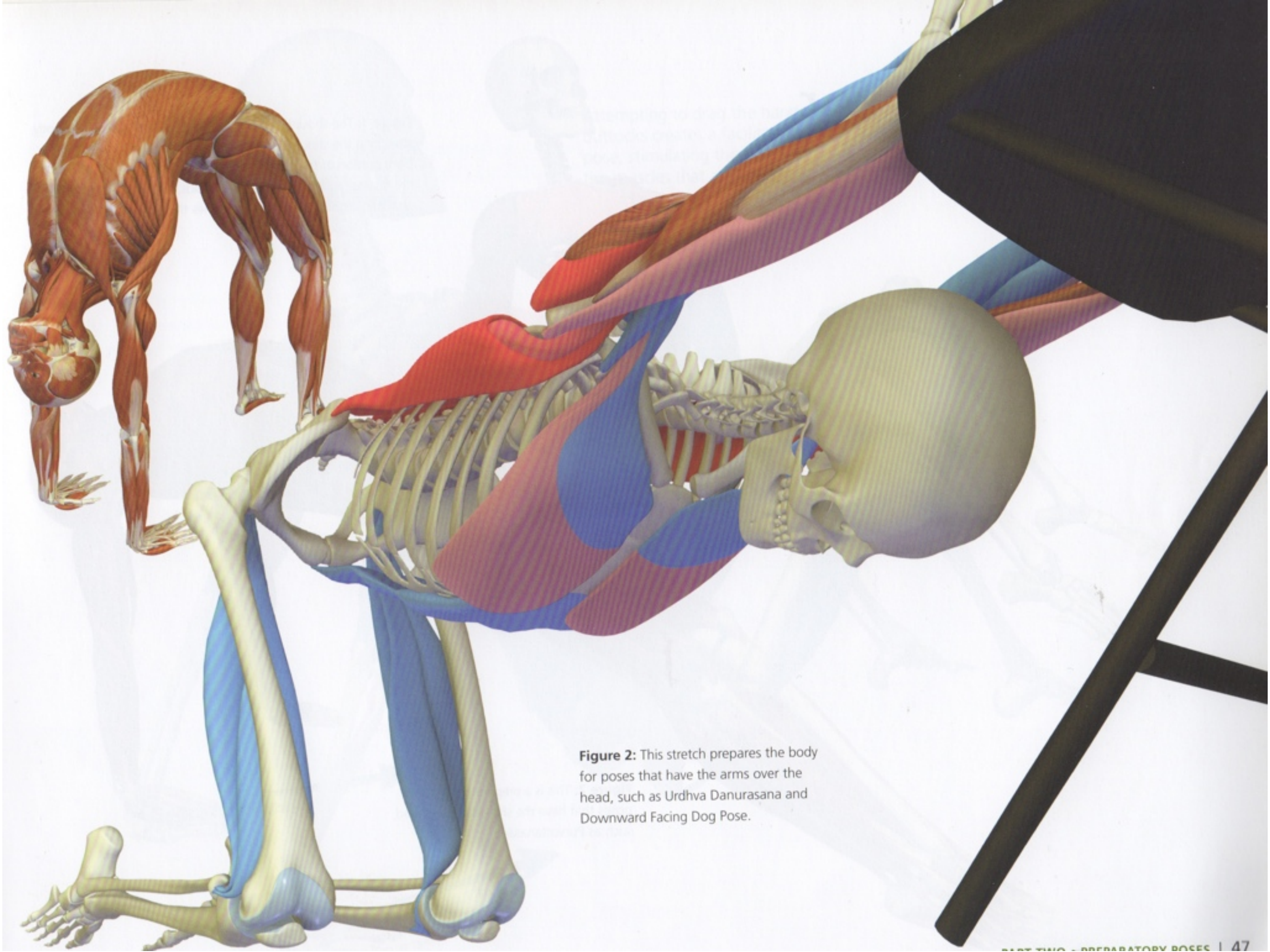
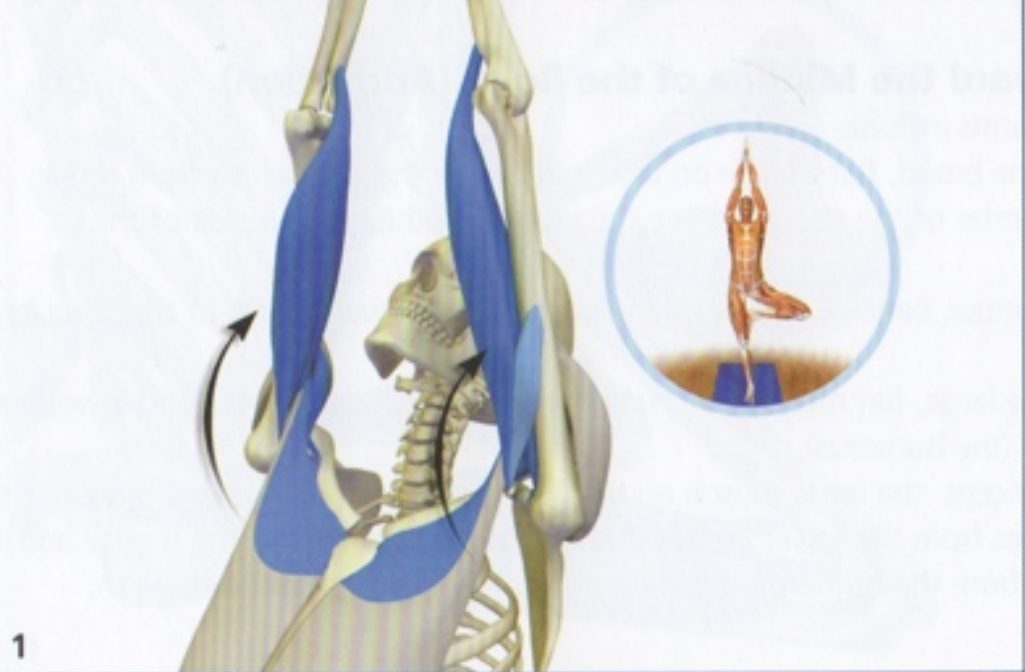


Figure 2: This stretch prepares the body for poses that have the arms over the head, such as Urdhva Danurasana and Downward Facing Dog Pose.



Shoulder and Upper Arms

Figure 1:

Raising the Arms Above the Head (Flexion)

The muscles that flex the arms include:

- The anterior portion of the deltoids: the large muscle that covers the shoulders and runs from the top of the shoulder blade and clavicle to the outside of the humerus.
- The biceps: the large muscle on the front of the upper arms.
- The coracobrachialis: the thin tube-like muscle running from the coracoid process to the mid portion of the humerus.
- The pectoralis major (sternoclavicular or upper portion): the broad, flat muscle on the front of the chest that runs from the sternum bone at the center of the chest and the collar bone to the upper inside of the humerus.



Figure 2:

Moving the Arms Backward (Extension)

The muscles that extend the arms include:

- The triceps (long head): the large muscle on the back of the upper arms has three heads. The long head originates from the lower border of the shoulder socket, inserting on the olecranon process of the ulna (forearm bone).
- The latissimus dorsi: a large, flat muscle that runs from the back of the pelvis and lower back to the upper arm bone (the humerus).
- The posterior third of the deltoid: the large muscle that covers the shoulders and runs from the top of the shoulder blade and clavicle to the outside of the humerus.

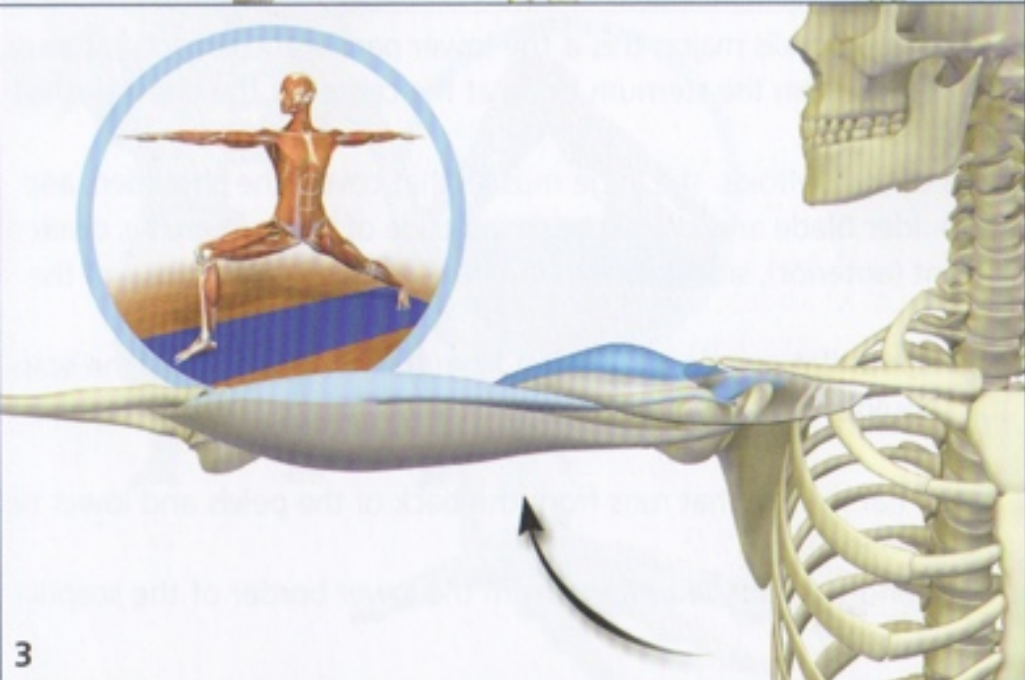


Figure 3:

Moving the Arm from the Midline (Abduction)

The muscles that abduct the arms include:

- The lateral portion of the deltoids: the large muscle that covers the shoulders and runs from the top of the shoulder blade and clavicle to the outside of the humerus is divided into thirds. These are the front (anterior), the side (lateral), and back (posterior) portions of the muscle.
- The long head of the biceps: the large muscle on the front of the upper arms has a long and a short head. The long head originates from the top of the shoulder socket (glenoid) and the short head originates from the beak-like coracoid process at the front of the scapula. Both heads combine to insert onto the radius bone of the forearm.
- The supraspinatus: the muscle running from a depression on the back of the shoulder blade above the spine of the scapula to the head of the humerus initiates abduction of the upper arm.

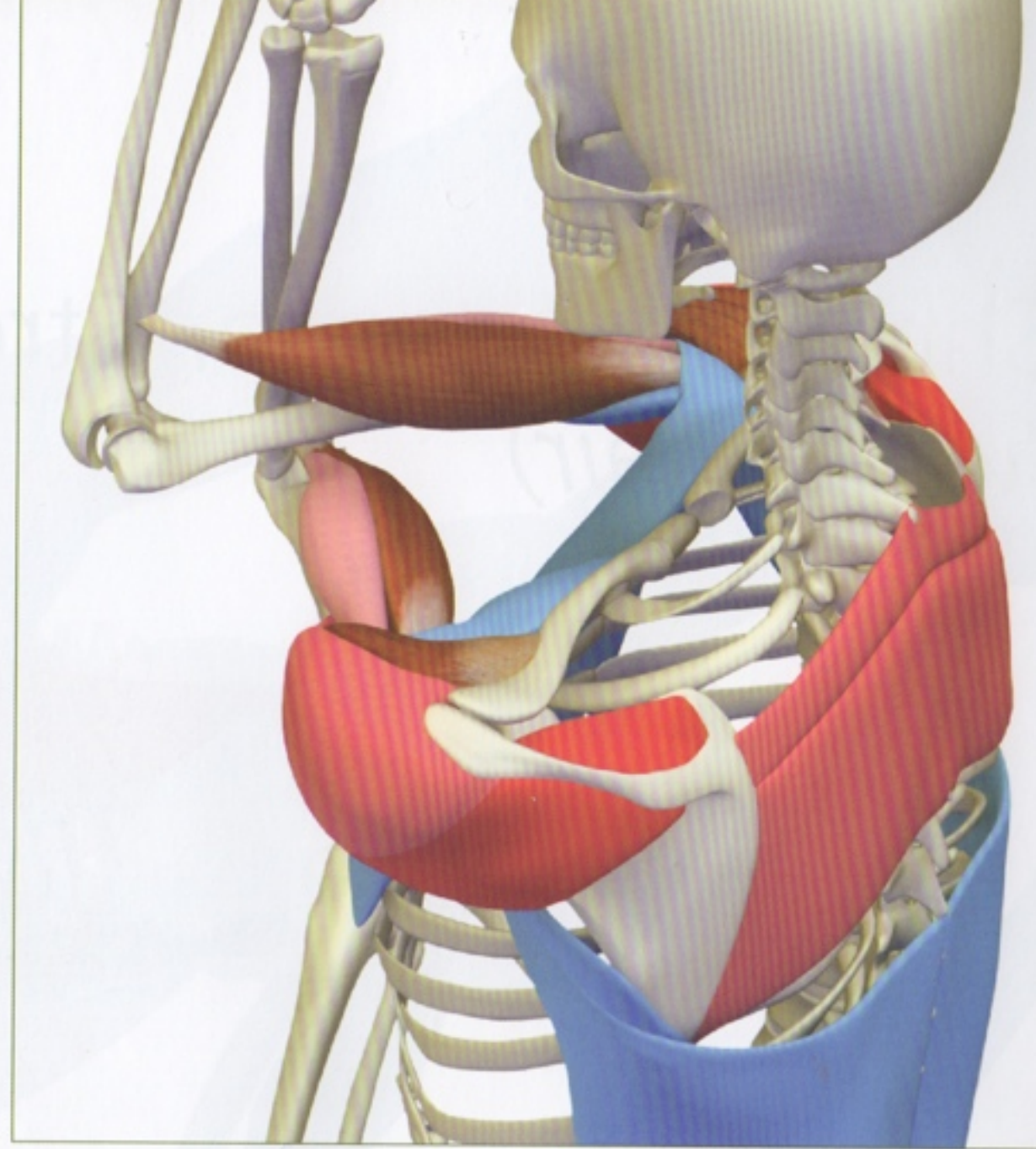
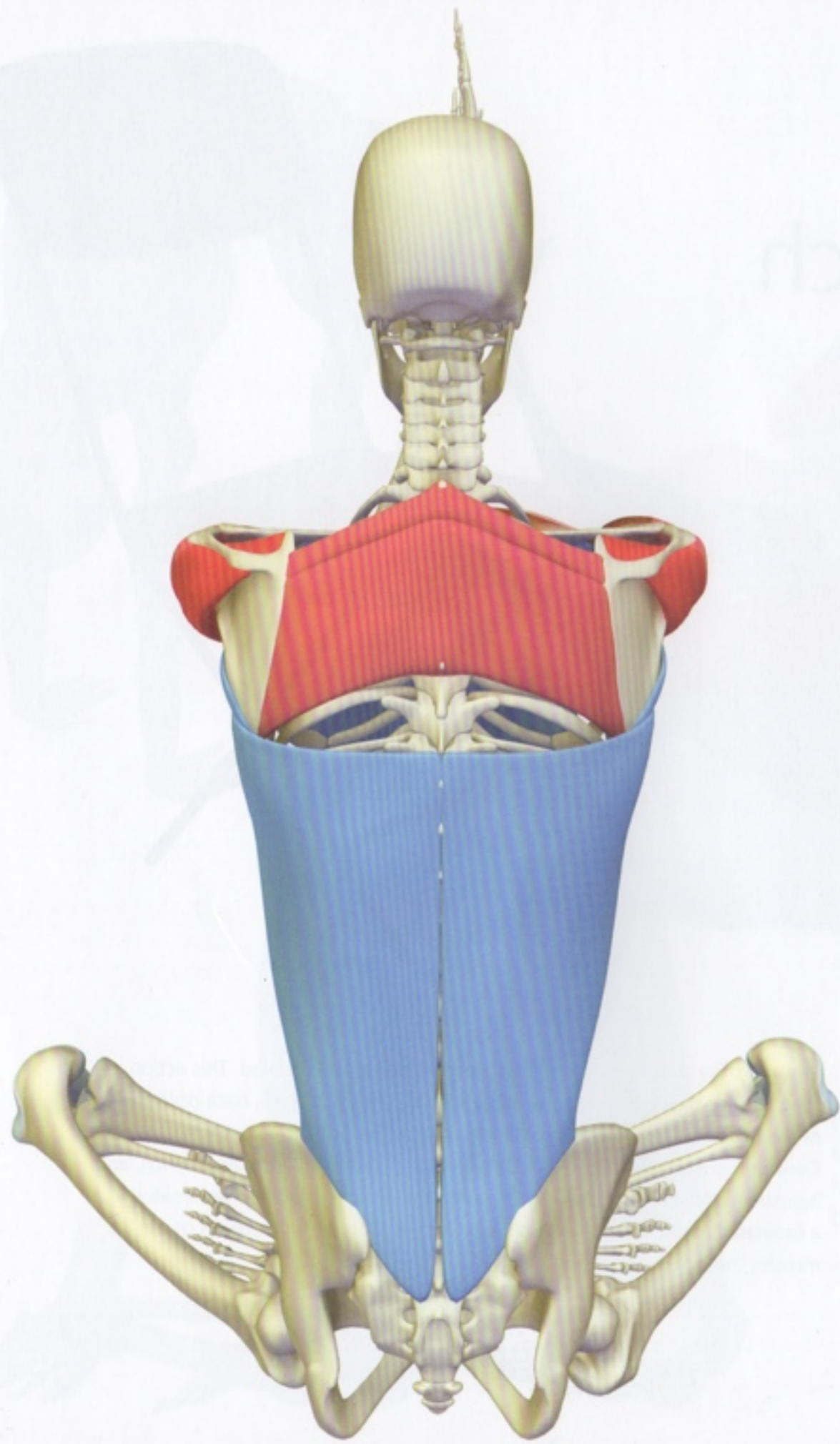


Figure 2: The shoulders reach across the front of the body (adduct), stretching the back portions of the deltoids, supraspinatus, and rhomboids. Contracting the pectoralis major, latissimus, and teres major intensifies this stretch. Pressing the elbows together for a few moments creates a facilitated stretch in this pose, stimulating the Golgi tendon organs of the muscles that are stretching.

Scoliosis

- Idiopathic abnormal spinal curvature on all planes. Most common females at early adolescence.
- Posture related pain from poor ergonomics sustained positions and core weakness
- Presents with upper and mid thoracic pain
- Responds to many exercise therapies. Yoga, swimming, pilates, physioball, gyrotonics.

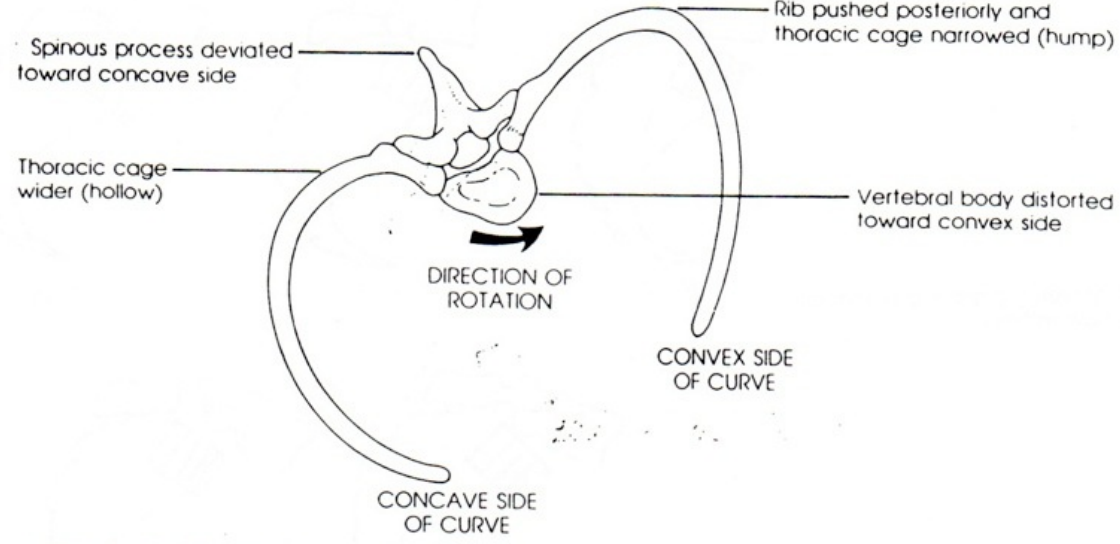


Figure 7-12. Pathologic changes in the ribs and vertebra with idiopathic scoliosis in the thoracic spine.

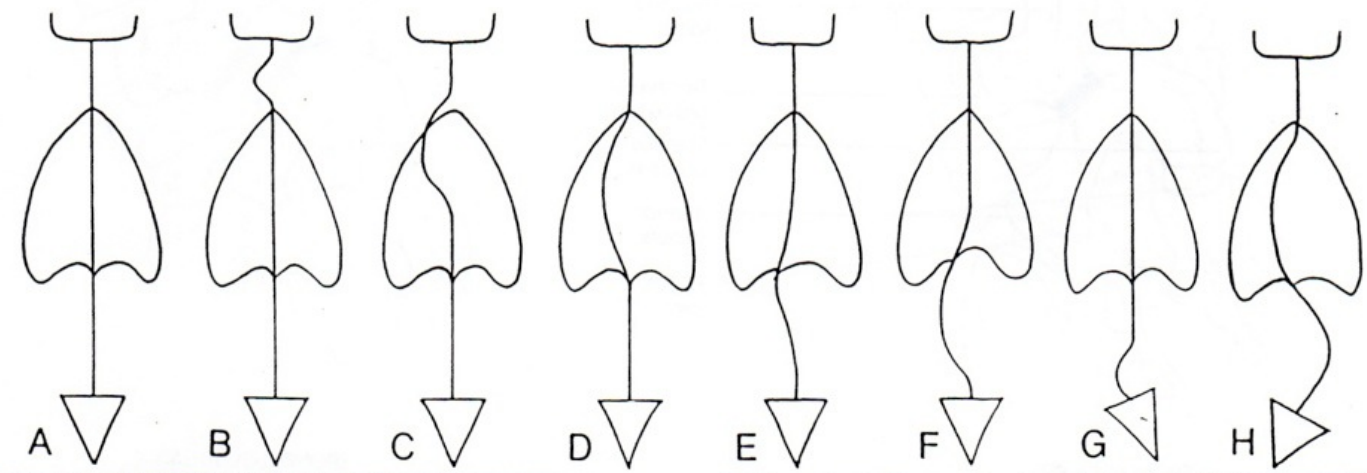


Figure 4.1. CLASSIFICATION OF SCOLIOSIS ACCORDING TO LOCATION. A. Normal Spine. B. Cervical. C. Cervicothoracic. D. Midthoracic. E. Thoracolumbar. F. Lumbar. G. Lumbosacral. H. Double Lumbar and Thoracic.

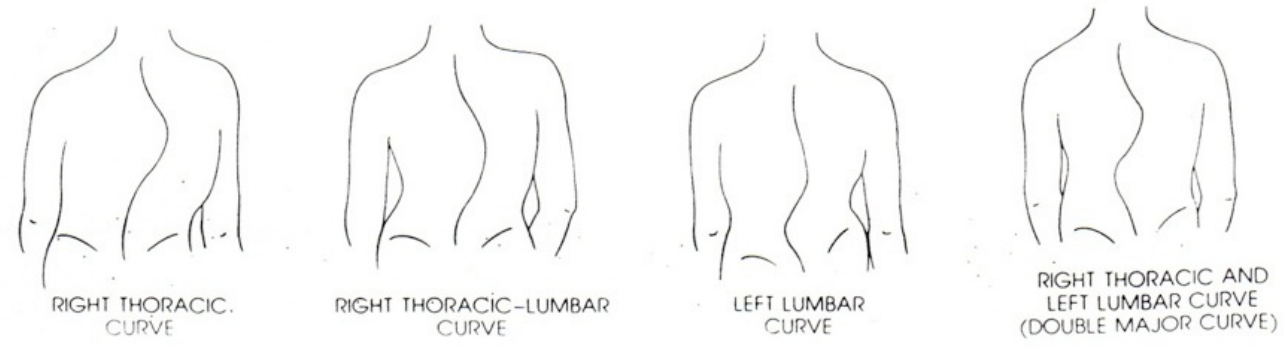


Figure 7-11. Examples of scoliosis curve patterns.

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thoracolumbar scoliosis



Adam's forward bend test



Attempting to drag the hands toward the buttocks creates a facilitated stretch in this pose, stimulating the Golgi tendon organs of the muscles that are stretching.

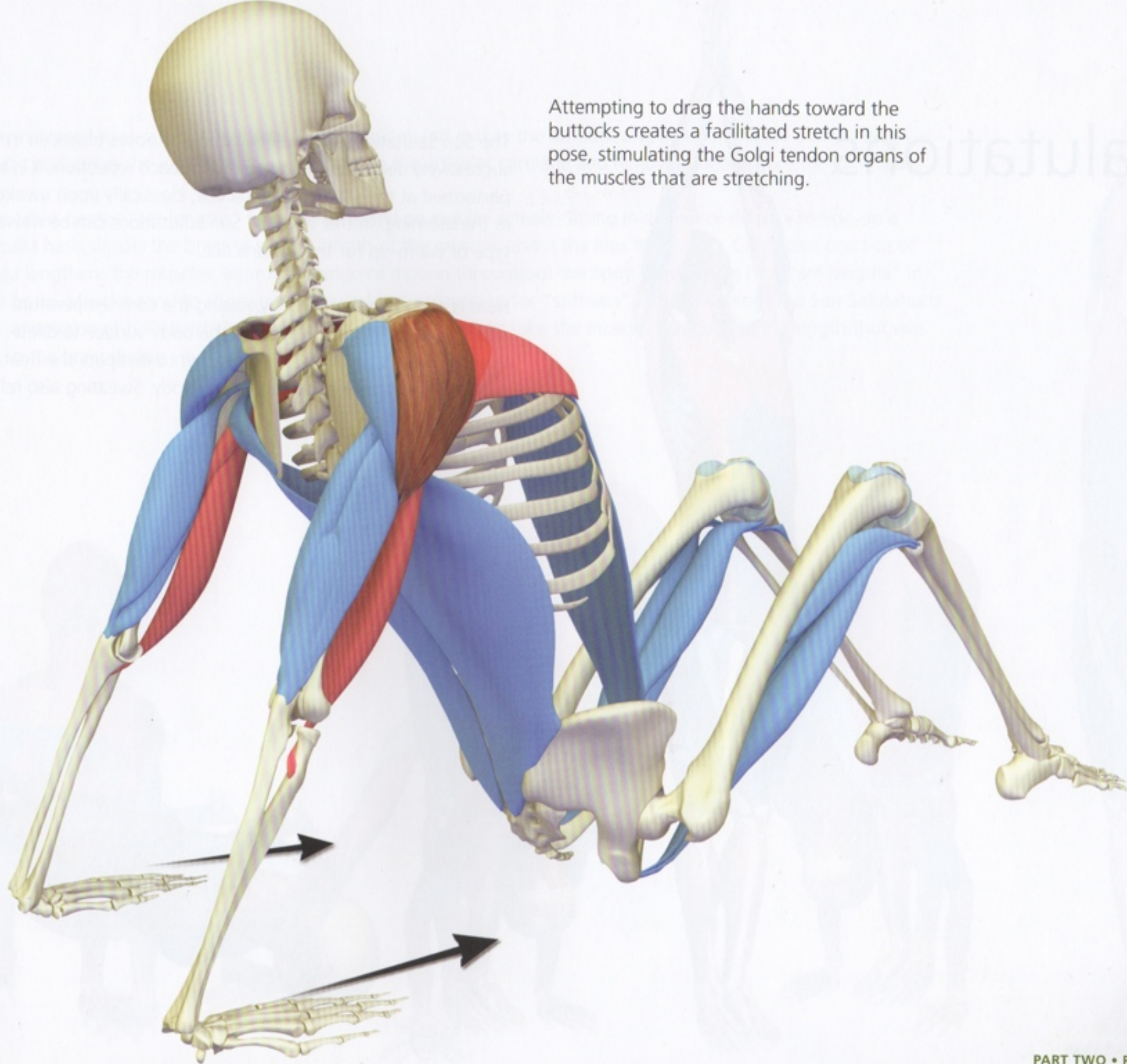
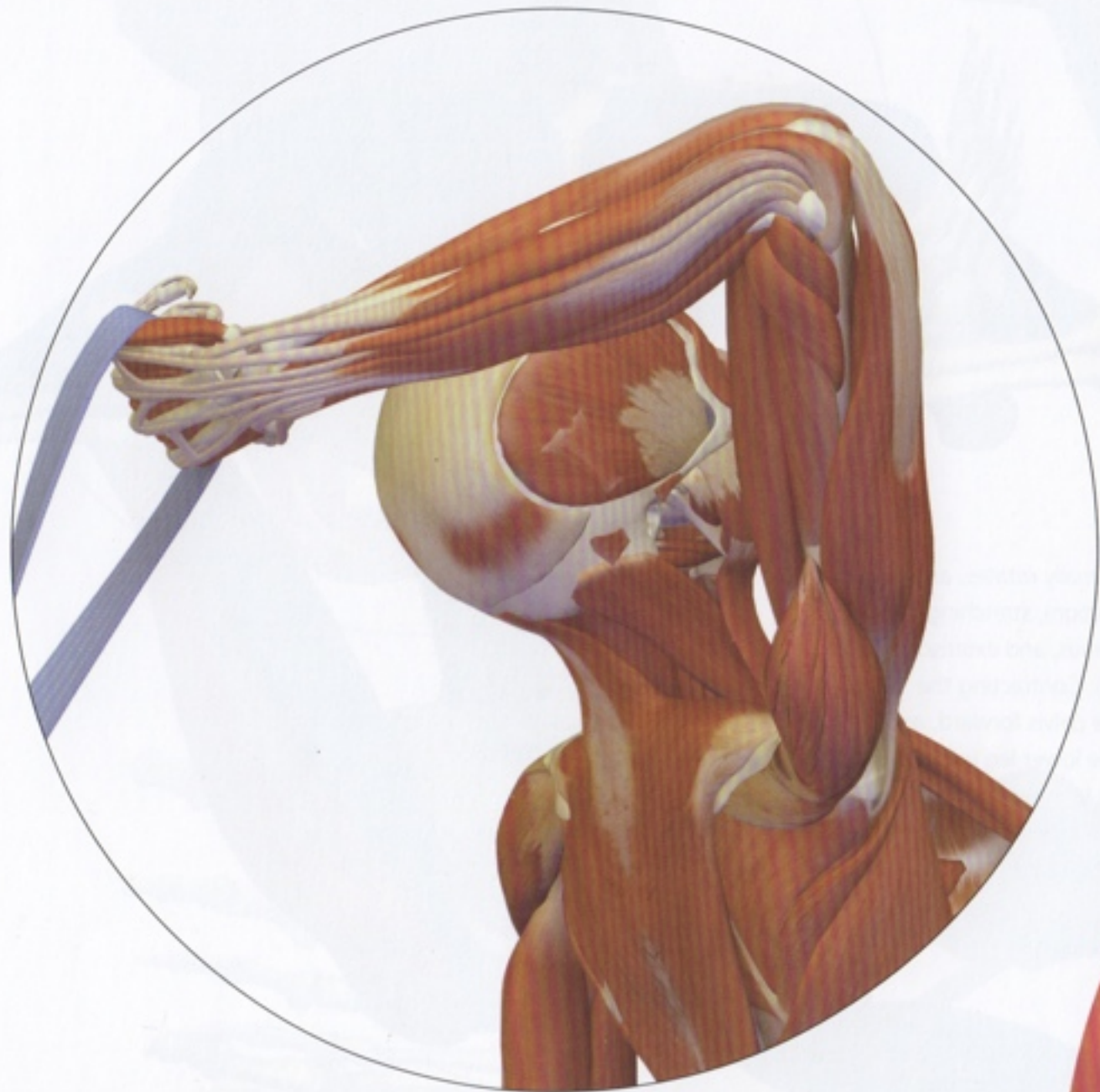
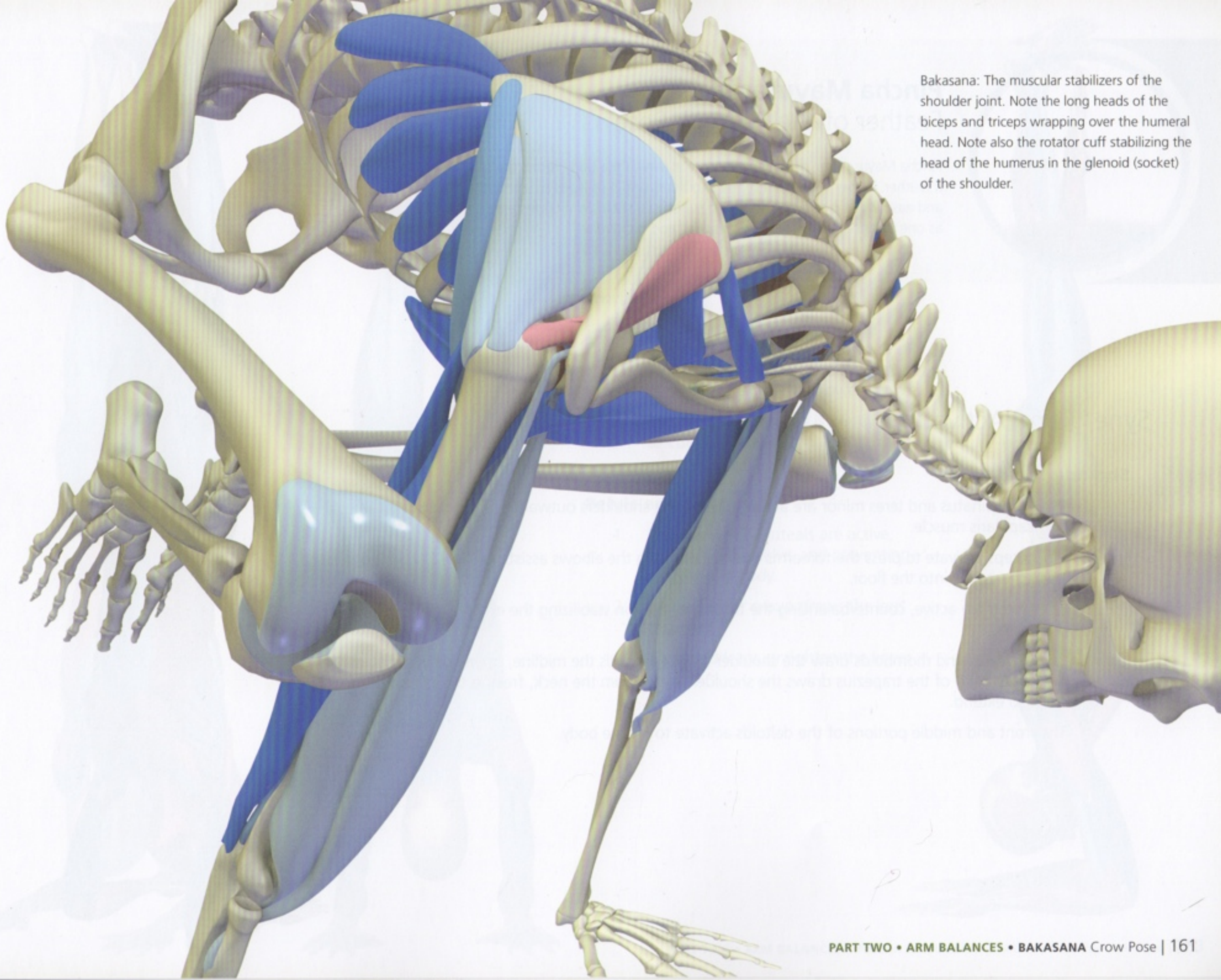
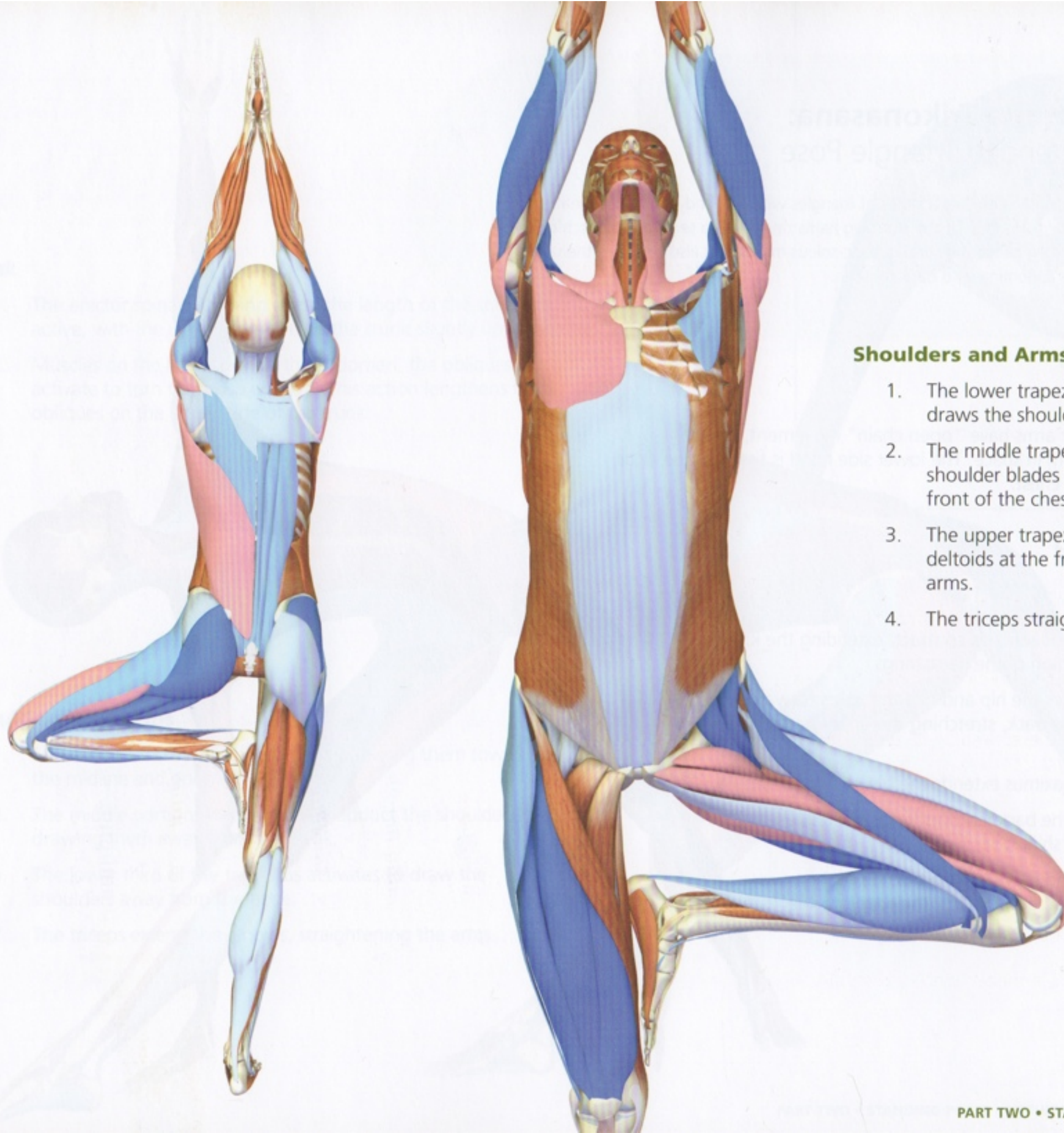


Figure 5: The upper shoulder flexes and turns outward (externally rotates), stretching the teres major, latissimus dorsi, pectoralis major and the subscapularis muscles. Contracting the infraspinatus, teres minor, and anterior (front) part of the deltoid draws the hands closer, intensifying the stretch. Attempting to draw the hands apart for a few moments facilitates the stretch by stimulating the Golgi tendon organs. The hands can then be drawn closer together.





Bakasana: The muscular stabilizers of the shoulder joint. Note the long heads of the biceps and triceps wrapping over the humeral head. Note also the rotator cuff stabilizing the head of the humerus in the glenoid (socket) of the shoulder.



Shoulders and Arms

1. The lower trapezius, which spans the back, draws the shoulders downward.
2. The middle trapezius and rhomboids draw the shoulder blades toward the spine, opening the front of the chest.
3. The upper trapezius in the back and the anterior deltoids at the front of the shoulders lift the arms.
4. The triceps straighten the elbows.

Suggested Reading List:

The Key Muscles of Yoga by Ray Long MD	Bandhayoga
The Key Poses of Hatha Yoga by Ray Long MD.	Bandhayogq
Anatomy of Movement by Calais-Germain	Eastland
Atlas of Human Anatomy by Frank Netter	Novartis
The Physiology of the Joints by I.A. Kapandji	Churchill Livingstone
Anatomy of Yoga by Paul Grilley	Pranamaya