Articulo-Musculo-Skeletal

Skeleton -- Introduction

Bone Surface Markings	
Depressions/Openings	
Foramen	**Opening through which blood vessels, nerves or ligaments pass, e.g., infraorbital foramen of maxilla.**
Meatus	**Tubelike passageway running within a bone, e.g., external auditory (acoustic) meatus of temporal bone.**
Groove/sulcus	**A furrow or depression that accommodates a soft structure such as a blood vessel, nerve or tendon, e.g., intertubercular sulcus of the humerus.**
Fossa	**A depression in or on a bone, e.g., the glenoid fossa of the scapula.**
Processes that form joints	
Condyle	**A large, rounded articular prominence, e.g., medial condyle of the femur.**
Head	**A rounded articular projection supported on the constricted portion (neck) of a bone, e.g., the head of the humerus or femur.**
Facet	**A smooth flat surface, e.g., vertebral facet**
Processes to which tendons, ligaments and other connective tissues attach	
Tubercle	**A small rounded process, e.g., greater tubercle of the humerus.**
Tuberosity	**A large rounded, usually roughened, process, e.g., ischial tuberosity.**
Trochanter	**A large blunt projection found only on the femur, e.g., greater or lesser trochanter.**
Spinous process	**A sharp, slender process, e.g., vertebral.**
Epicondyle	**A prominence above a condyle, e.g., medial epicondyle of the femur.**

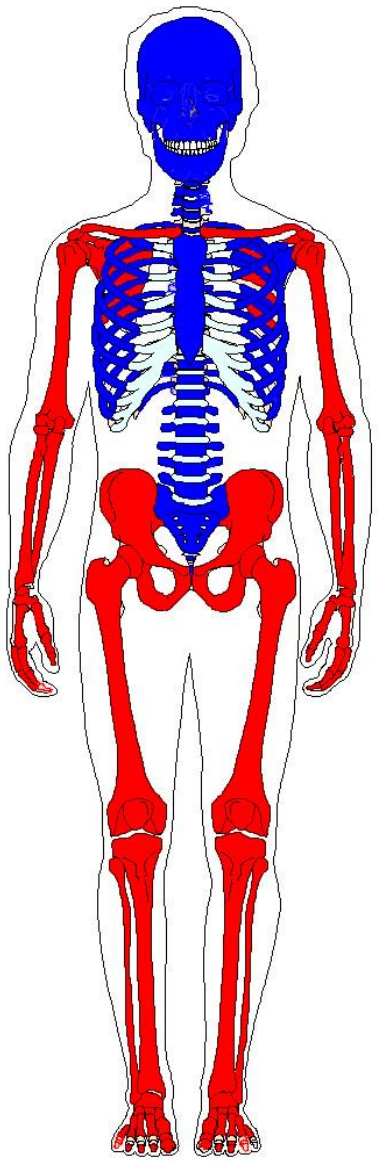
Types of Bones

- Long bones are longer than they are wide.
  - They have 1 diaphysis and at least 2 epiphyses.
  - They are found, e.g., in the arms and legs.
  - They are slightly curved for strength.
- Short bones are about as long as they are wide.
  - They contain more spongy bone and make up, e.g., the carpals and tarsals.
- Flat bones are thin.
  - They are constructed of 2 parallel plates of compact bone separated by spongy bone.
  - The “sponginess” is called diploë (die PLOE ee).
- Irregularly shaped bones have a complex shape as well as a variable ratio of compact to spongy bone.
  - Examples include the vertebra and the os calcis (calcaneus).
- Sutural, or Wormian, bones are small bones between the joints in the cranium.
  - A good place to find these is in the lambdoidal suture.
- Sesamoid bones are small bones in tendons where considerable pressure develops.
  - They may be found about the wrist, hand, foot, patella.

Skeletal Divisions

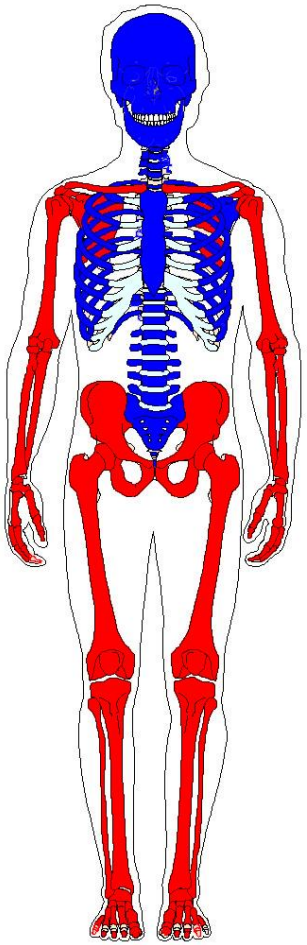
There are two divisions of the skeleton: the axial and the appendicular skeletons.

- The axial skeleton is the center or longitudinal part of the skeletal system and runs a straight (mid-sagittal) line (unless you have scoliosis) through the body's center of gravity.
- It consists of the ribs, breast bone (sternum), hyoid, skull bones, back bone – it consists of 80 bones.



Skeletal Divisions

- The appendicular skeleton consists of everything else EXCEPT for the bones of the inner ear.
- These are the bones of the free appendages (upper and lower extremities) and the girdles that connect the extremities to the axial skeleton.
- It consists of 126 bones



Skeletal Divisions: Girdles

- The pectoral girdle holds the arms to the axial skeleton and consists of the clavicle and scapula.
- The pelvic girdle holds the legs to the axial skeleton and consists of the os coxae – 2 of these make the pelvis.

Articulations

With Movements

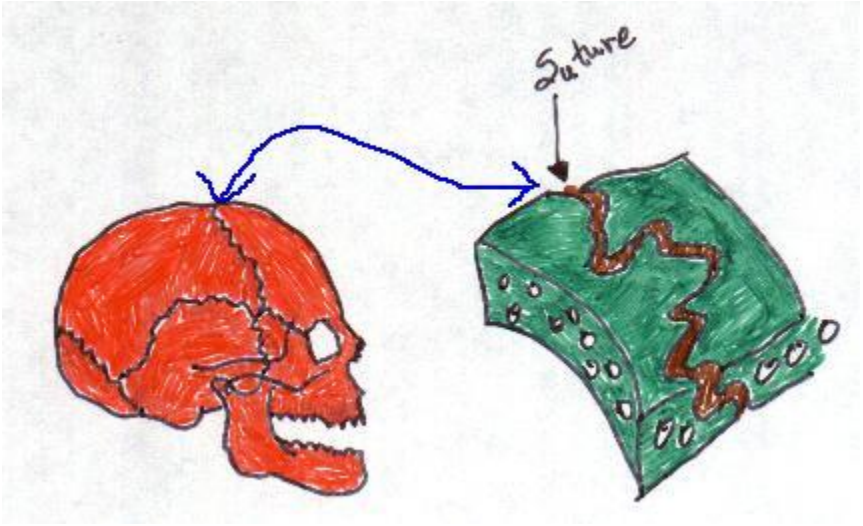
Fibrous Joints

Have no synovial cavity

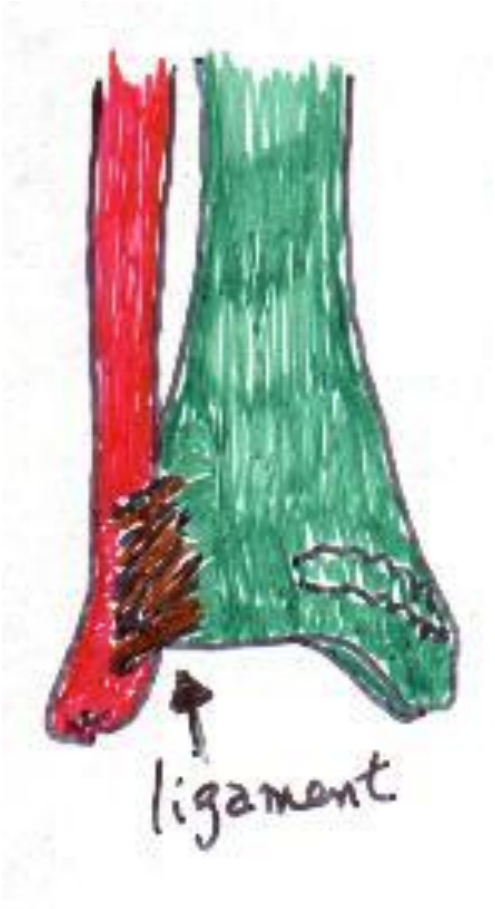
Have little or no movement

Joint Type -- 1

- Synarthrosis
- E.g., sutures between the skull
- Become synostoses when the sutural cartilage is replaced by bony tissue in the adult
- A sub-type of synarthrosis is the gomphosis (gawm FOE siss).
- In this type of joint, a cone-shaped peg fits into a socket, e.g., teeth roots in alveoli of maxilla and mandible.



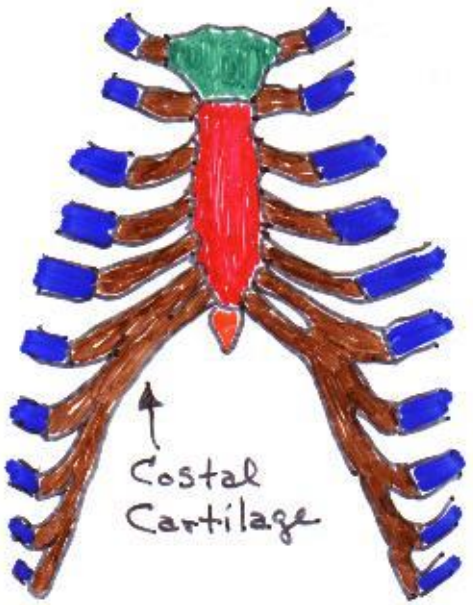
- Another sub-type of this sort of joint is the syndesmosis (sinn dess MOW siss).
- In this type of joint, the uniting fibrous connective tissue (fct) present is greater than in sutures, but the fit between the bones is not as tight.
- The fct becomes a ligament, which allows for slight movement, e.g., the distal articulation between the tibia and fibula.



Amphiarthrosis

- In these joints, the articulating bones are tightly connected by cartilage and have little to no movement.
- There are two sub-types that we're interested in: the synchondrosis (sinn konn DROW siss) and the symphysis (SIMM fuh siss).

- The former contains hyalin cartilage as the connective tissue.
- Examples of synchondroses include the epiphyseal (ee PIH fih SEE ull -- OR eppuh FIZZ ee ull) plate (or metaphysis -- meh TAH fih suss).
- This portion of a GROWING bone is between the epiphysis (ee PIH fih suss; end of the growing bone) and diaphysis (dye AH fih suss; shaft of the bone).
- This joint becomes a synostosis as the bone ceases linear growth to become the epiphyseal line.
- Another joint of the synchondrosis type occurs between the first rib and sternum, as well.



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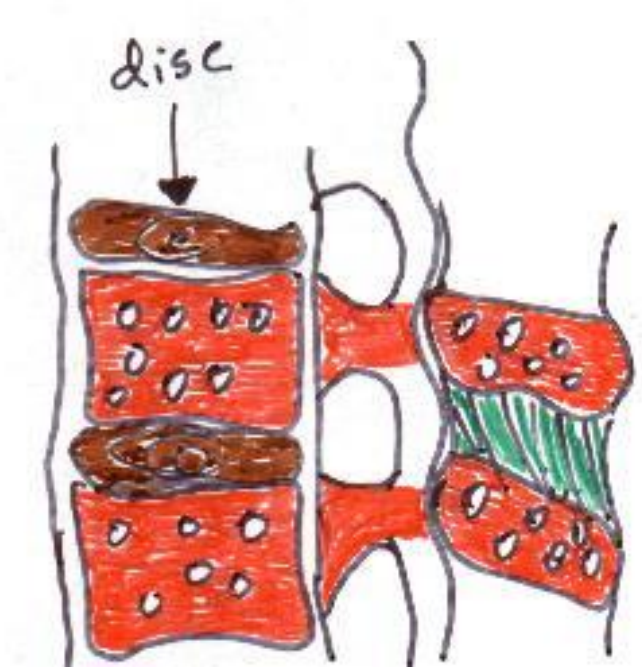
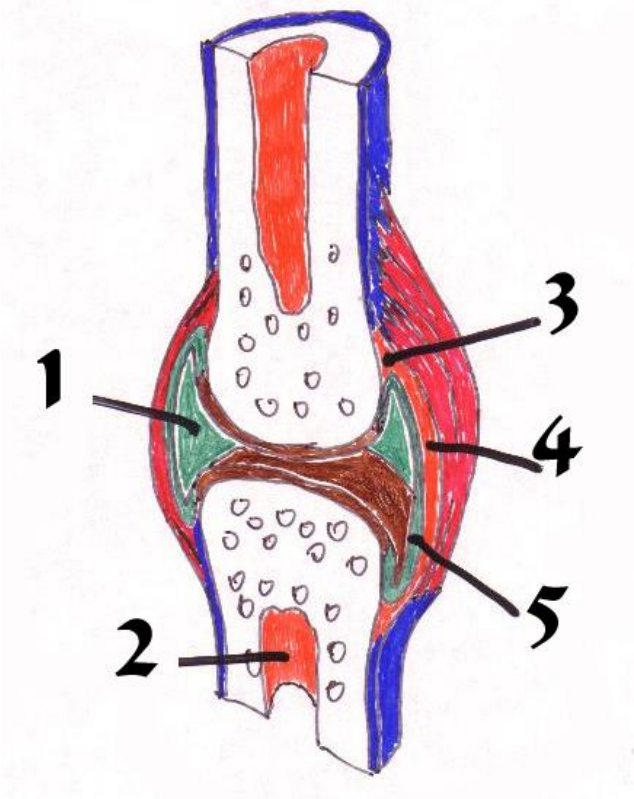
- A symphysis contains a broad flat disc of fibrocartilage as are found between the vertebra and in the symphysis pubis.



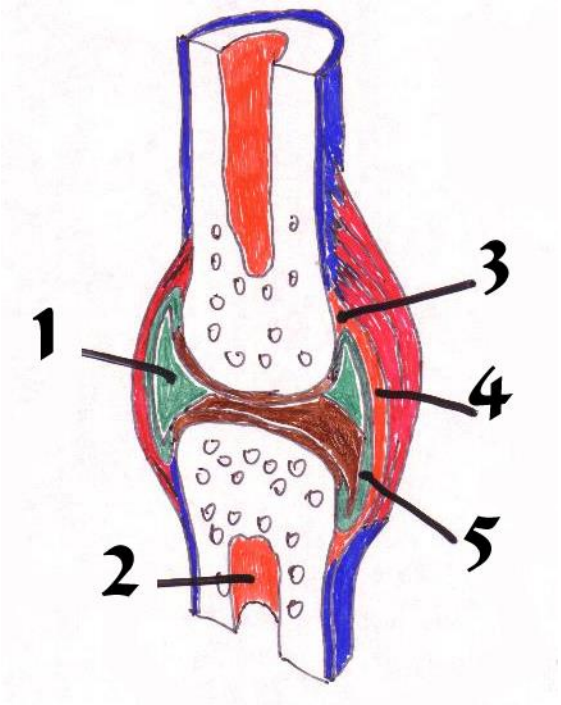
Synovial Joints, aka Diarthrotic Joints

- Are the type of joints found in the shoulder, elbow, hip and knee.
- Bones are covered by a layer called the periosteum.
- The periosteum between bones is the anchor site for ligaments, extensions of the fibrous capsule,
  - that holds the joints together; some form parallel bundles to resist strain and are called ligaments.
  - The fibrous capsule is flexible for movements and contains collagen (CALL uh junn).
- The distance between attachments of the fibrous capsule and periosteum varies greatly throughout the body (3).



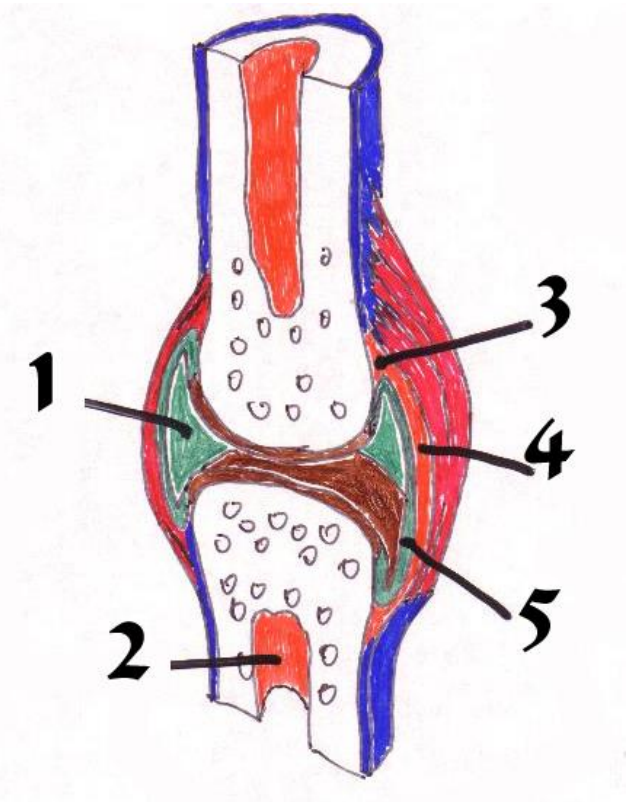
Synovial Joints, aka Diarthrotic Joints

- On the ends of the bones is articular cartilage.
- This tissue acts as a shock absorber and friction reducer.
- In addition to the shock absorbing ability of the articulating cartilage, each joint cavity (1) in a diarthrotic joint contains a thin film of synovial fluid (sinn OH vee ull FLEW idd) synthesized and released by the synovial membrane -- in the knee, it is normally about 3.5 mL (about what an eating teaspoon holds).
- Contains areolar and adipose tissue.



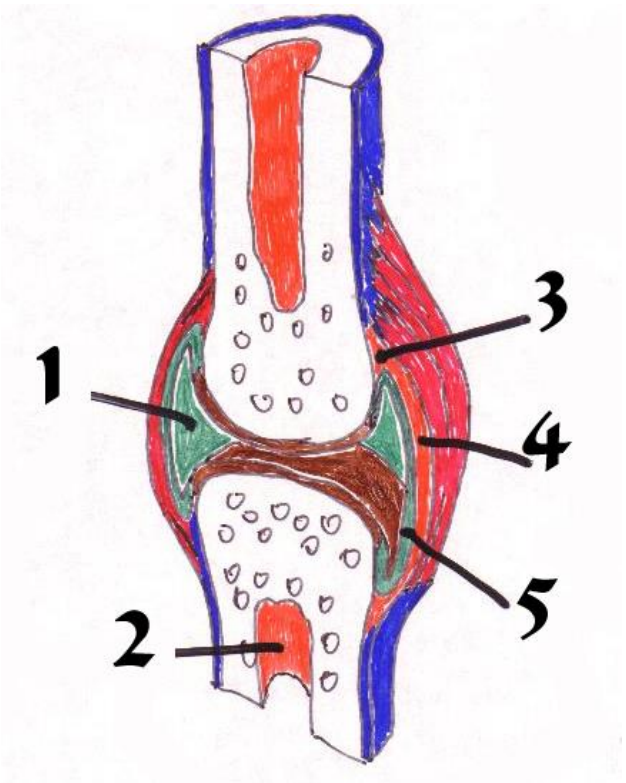
Synovial Joints, aka Diarthrotic Joints

- Many synovial joints contain accessory ligaments: intracapsular or extracapsular.
  - Intracapsular ligaments are inside the articular capsule, but EXCLUDED from the synovial cavity, e.g., the cruciates of the knee.
  - Extracapsular ligaments are outside the articular capsule.



Synovial Joints, aka Diarthrotic Joints

- In some joints, fibrocartilaginous (fye broe karr tih LAJJ inn uss) pads are between the articular surfaces of bones and are attached by their margins to the fibrous capsule.
- These are called articular discs or menisci (menn ISS kye).
- Discs subdivide the synovial cavity (joint cavity) into 2 separate spaces and allow 2 bones of different shapes to fit tightly by modifying the shape of the joint surfaces of the articulating bones.
- Discs also help to maintain the stability of the joint and direct the flow of synovial fluid to areas of greatest friction.
- The synovial membrane and fibrous capsule make up the articular capsule – a sort of sleeve unit.

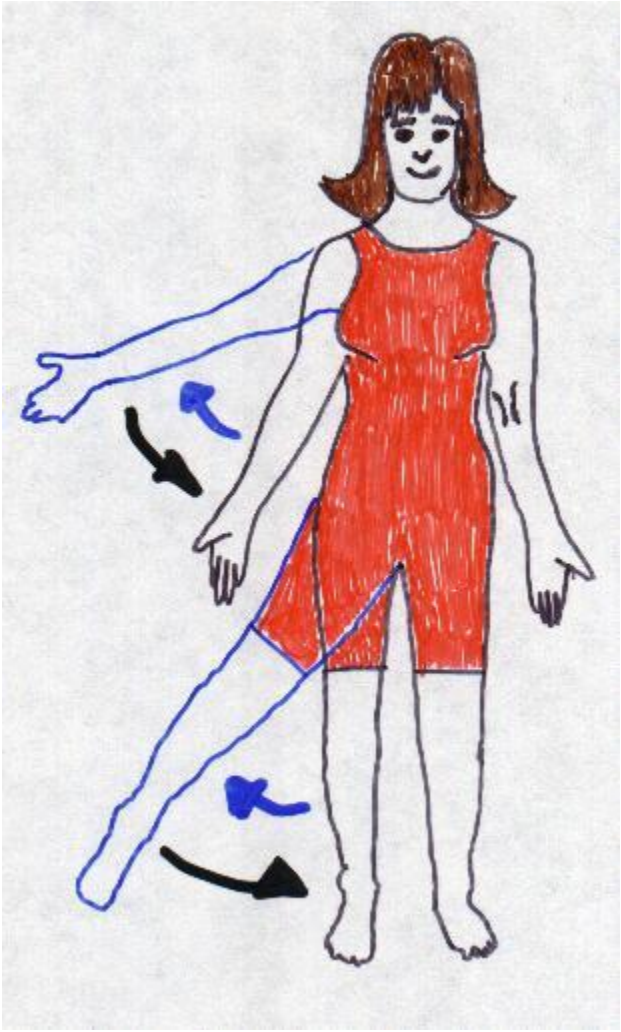


Synovial Joints, aka Diarthrotic Joints

- The different movements create friction between the moving parts.
- To decrease friction, sac-like structures called BURSAE (BRRRR suh) are situated in body tissues.
- They resemble joint capsules due to the fact that their walls consist of connective tissue lined by a synovial membrane.
- They are also filled with a fluid similar to synovial fluid.
- The bursa are located between the skin and bone where skin rubs over bone.
- They are also found between tendons and bones, muscle and bones and ligaments and bones.
- The bursa cushion the movement of one part of the body over the other. Inflammation of the bursa causes bursitis.
- In synovial joints, the articular surfaces are kept in contact with each other by several factors:
  - 1) the fit of the articulating bones, e.g., hip (the femoral head and the acetabulum [ass uh TABB you lumm]),
  - 2) the strength and tension (tautness) of the joint ligaments and
  - 3) arrangements and tension of the muscles around the joint.

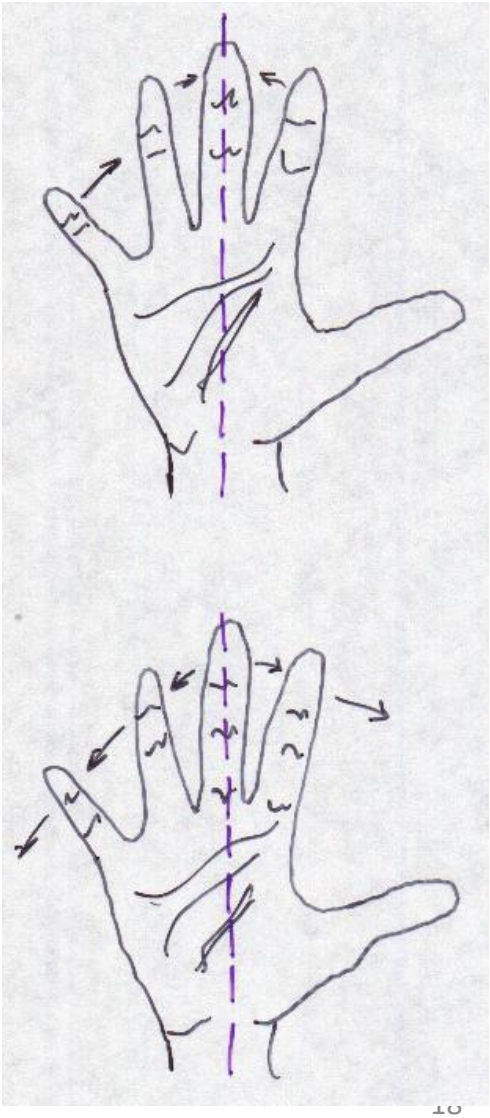
Movements

- Illustration of the concepts of abduction (ABB duck shun) and adduction (AH duck shun):
- The former is when an extremity moves away from the body core (the "b" in abduction can be remembered as "bye-bye" as the extremity leaves the body).
- The latter is the return of the extremity to the core (the "add" in adduction can be remembered as the extremity "adding" back to the body).



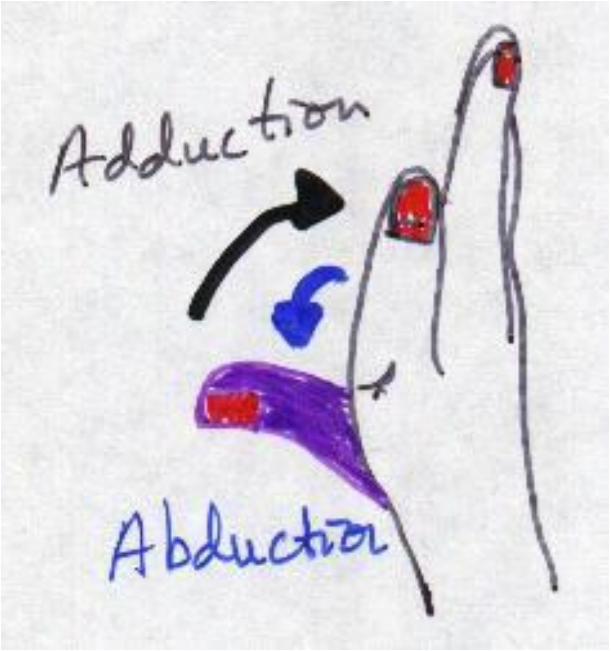
Abduction and Adduction

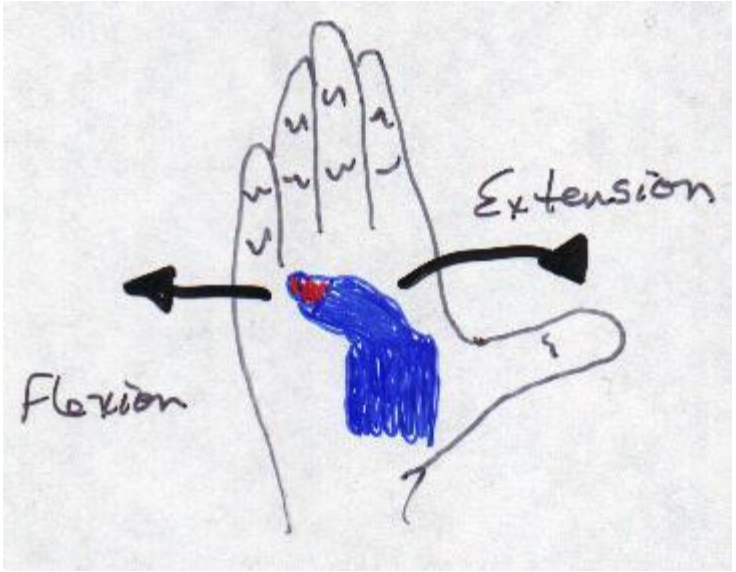
- Figure illustrates the same concept about the hand: when the fingers spread away from the 3d digit (society finger), that is abduction (bottom); when the fingers squeeze upon the 3d digit, that is adduction (top).



Abduction and Adduction

- Figure shows that the thumb adducts and abducts.



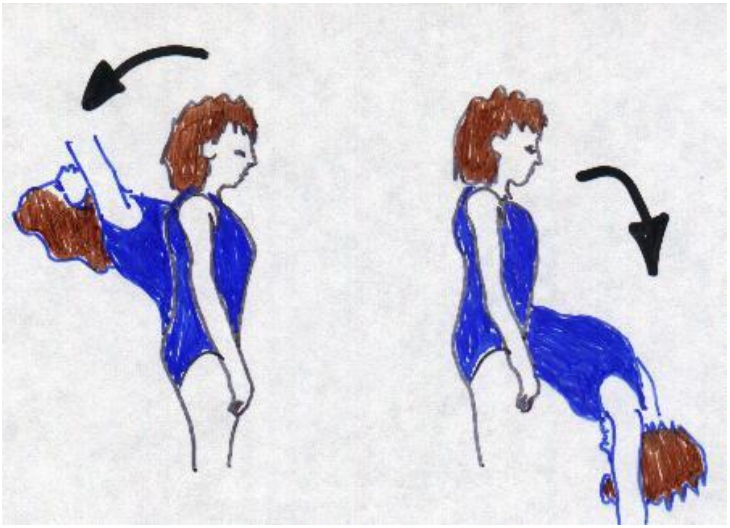


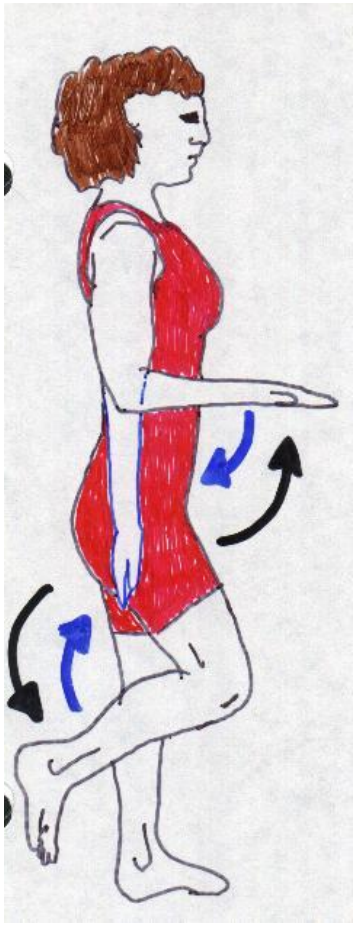
- The thumb, likewise, can flex and extend.

Flexion and Extension

Flexion and Extension

- Right Figure illustrates flexion (FLECK shun) and extension (ecks TEN shun). The forearm extends away from the upper arm, the calf extends away from the thigh.
- The forearm flexes on the upper arm as the hand gets closer to the shoulder and the calf flexes on the thigh as the foot gets closer to the buttocks.





- Left Figure shows flexion of the body (on the right) and extension of the body (on the left of the figure).
- Middle Figure illustrates lateral flexion.

Supination and Pronation

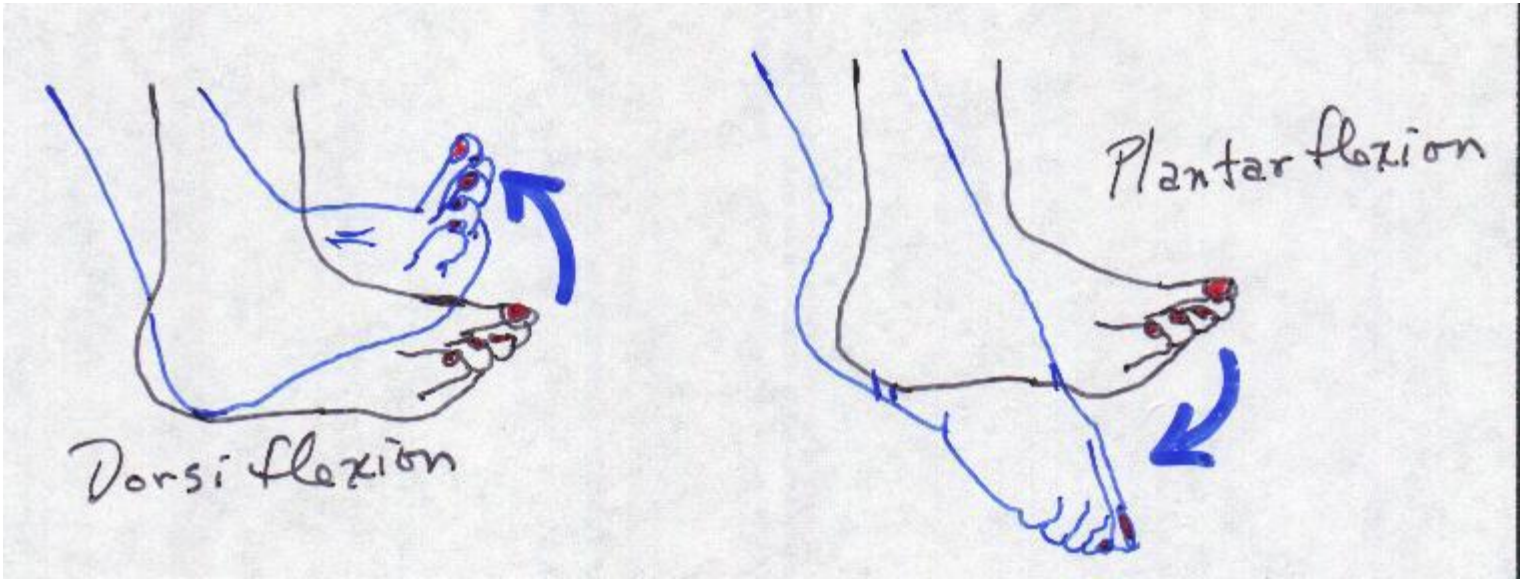
- Figure illustrates supination (SOUP inn AE shun) and pronation (proe NAY shun).
- The former can be remembered by thinking of your palm turned up to "hold soup" and the latter is the opposite.

Medial and Lateral Rotation

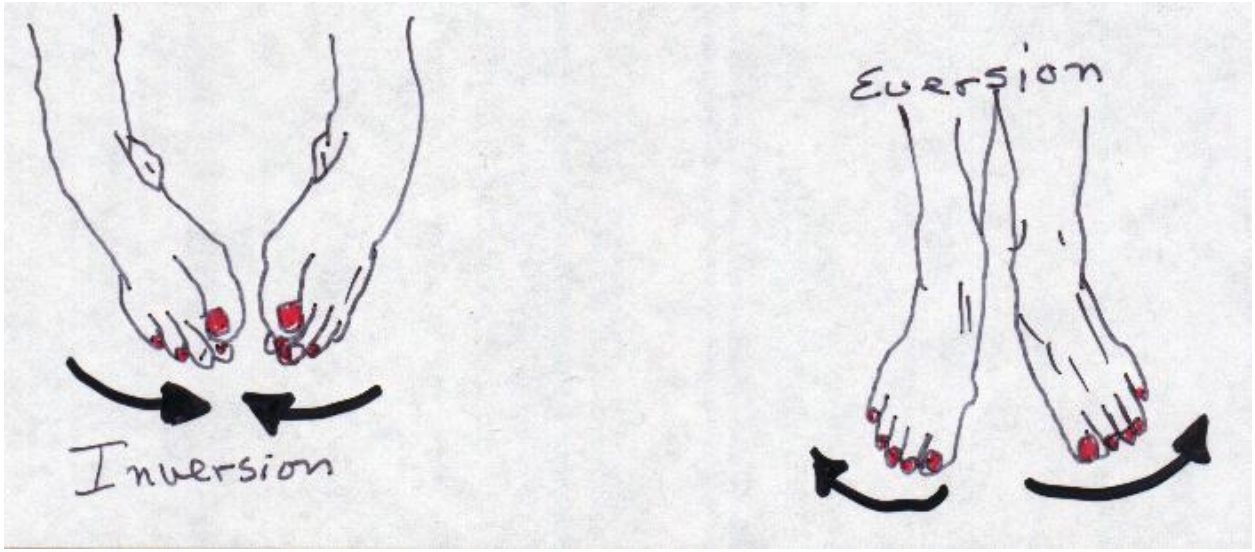
- Figure shows medial and lateral rotation (movement of a bone around its own longitudinal axis; circumduction occurs when a bone describes a cone in the air and is 360° rotation).

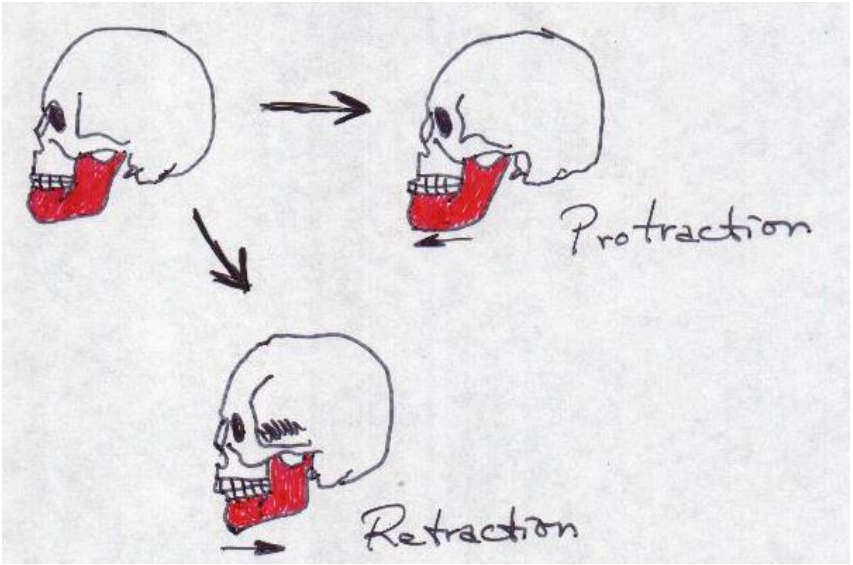
Feet Movements

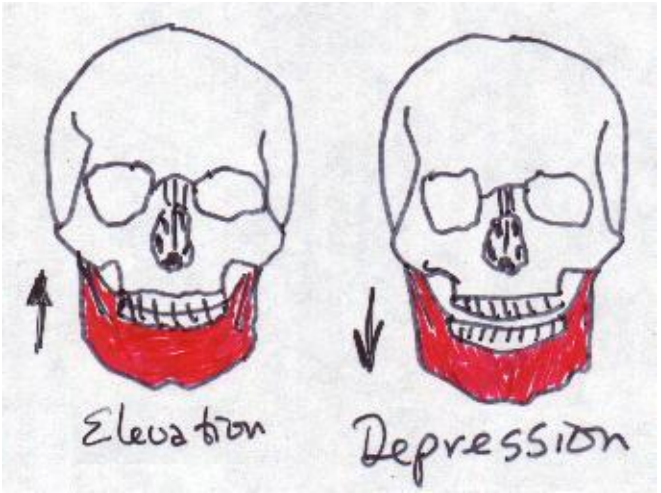
- Dorsiflexion and plantarflexion of the feet. These are difficult terms to keep clear as the name of the movement doesn't really match what it is they do. Memorize them as fact, though.



- Figure illustrates inversion and eversion of the feet. Shoe sales persons often refer to the former as supination and the latter as pronation. While this is a misuse of the terms, it is nevertheless being used more and more.

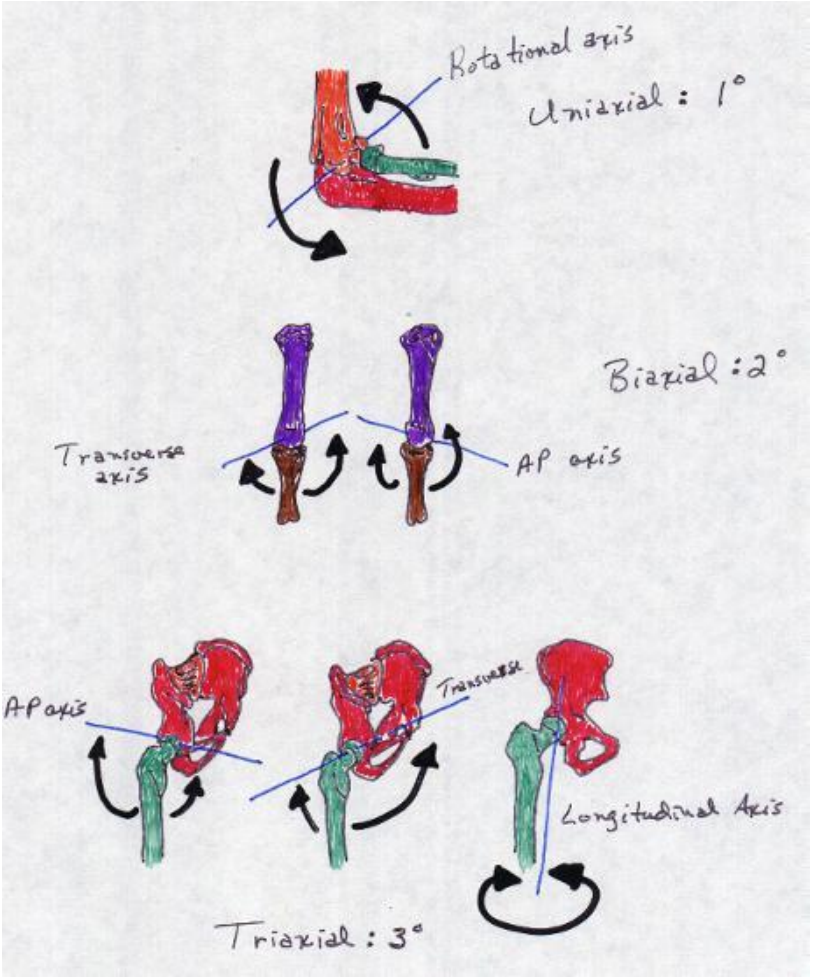






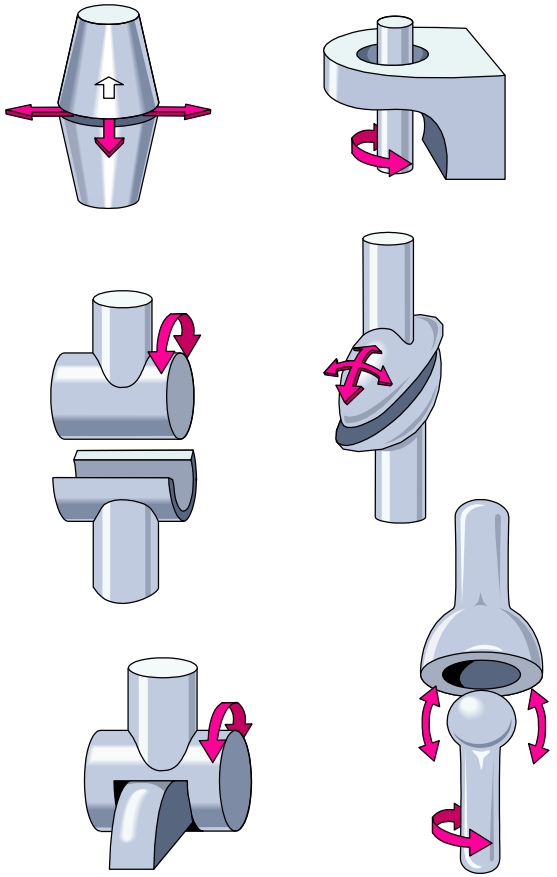
- Protraction and retraction are illustrated in the left Figure.
- Keep in mind that these movements also occur in the shoulder girdle on a plane parallel to the ground.
- The right Figure illustrates elevation and depression, using the mandible as an example.

- Before discussing the 6 subtypes of synovial joints, let's first examine the sorts of movements we'll encounter by virtue of the movement around the joint's axis.
- The Figure illustrates the three sorts of movements:
- 1) uniaxial (first degree) -- movement about one rotational axis (top);
  - **uniaxial movement is the elbow's hinge joint**
- 2) biaxial (second degree) -- movement about two rotational axes (middle);
  - **biaxial movement includes the metacarpo-phalangeal articulations**
- 3) triaxial (third degree) -- movement about three rotational axes (bottom).
  - **triaxial movement includes the hip joint**



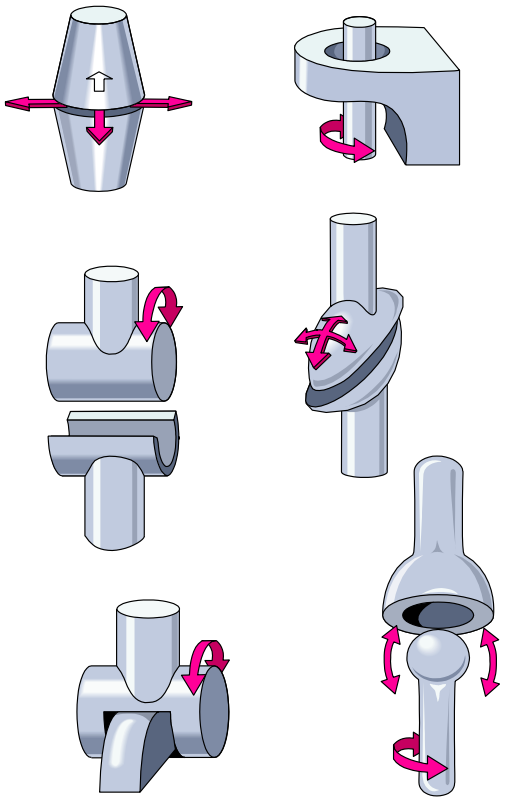
6 Subtypes of Synovial Joints

- The first of the 6 subtypes of synovial joints is the gliding joint, top left. This occurs between flat bones and gives side-to-side and back-n-forth movements. Occurs between the carpals and tarsals. This is NON-AXIAL movement.
- The middle left illustrates the hinge joint. In this joint, the convex surface of one bone fits into the concave surface of another bone. The movements include flexion and extension (1st degree). Examples of this kind of joint are the elbow and knee.
- Bottom left, shows the saddle joint. In this joint, the articular surface of one bone is saddle shaped; the other articular surface is shaped like a rider sitting in the saddle. This gives side-to-side and back-n-forth movement (2d degree). An example is the articulation between the trapezium and the first metacarpal.

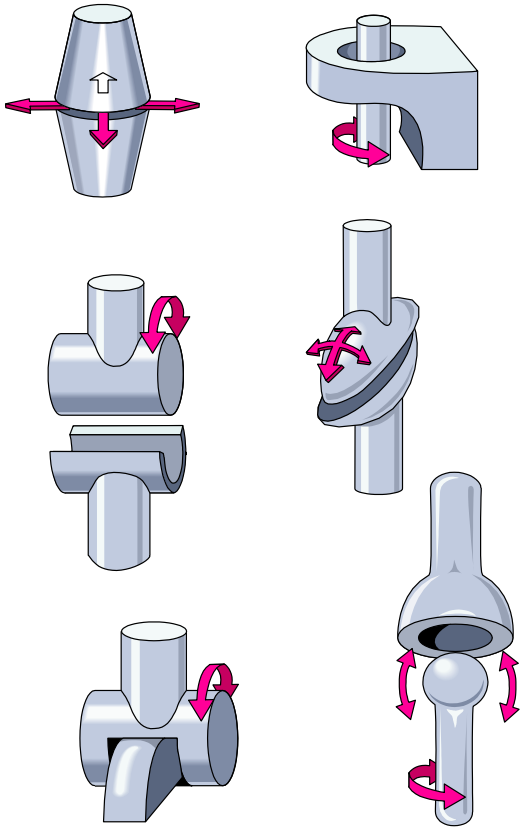


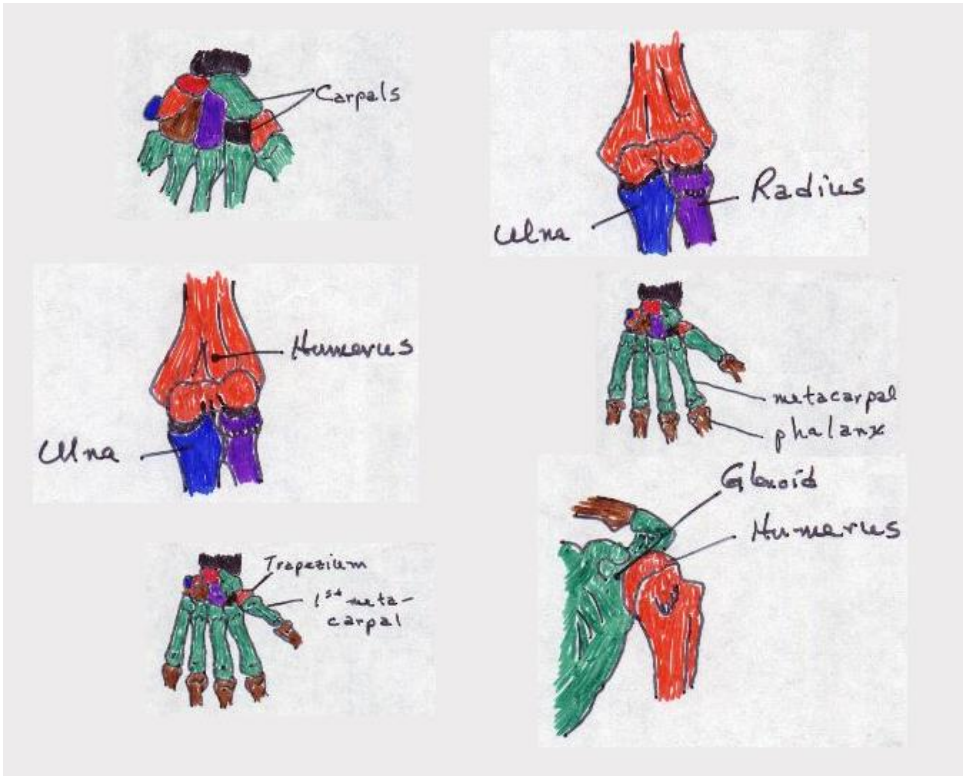
6 Subtypes of Synovial Joints

- The top right graphic illustrates the pivot joint. In this joint, a rounded, pointed or conical surface of one bone articulates within a ring formed partly by another bone and partly by a ligament. This is a 1st degree joint and permits rotation. Examples include the radius and ulna and the atlas on the axis.
- Middle right, shows the ellipsoidal articulation. It is also known as the condyloid articulation. It contains the oval-shaped condyle of one bone fitting into an elliptical cavity of another bone. This gives side-to-side and back-n-forth movement (2d degree). An example is the articulation between the radius and the carpals.
- Bottom right, illustrates the ball and socket joint. In this joint, a ball-like socket is fitted into a cup-like depression of the second bone. The movements are flexion/extension, abduction/adduction and rotation/circumduction (3d degree). Examples include the shoulder and hip.



Gliding, hinge, saddle joints, top left to bottom left, both figures

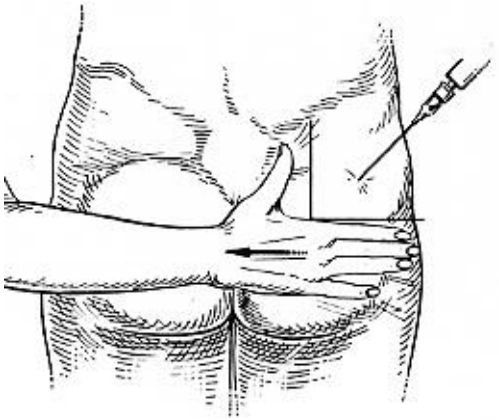


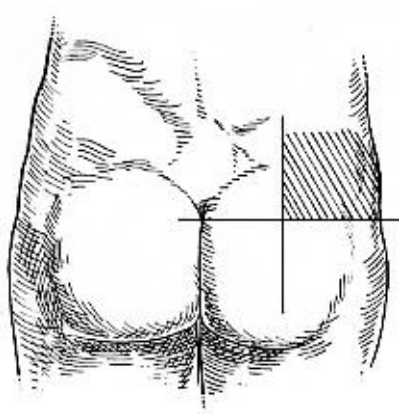


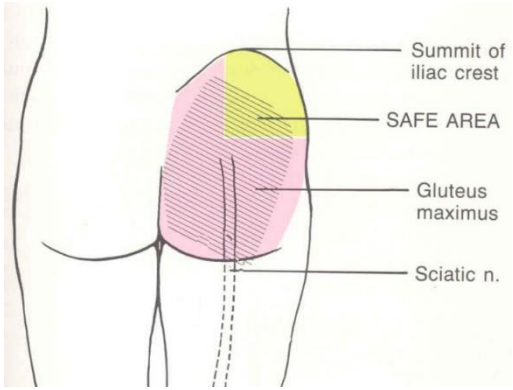
Pivot, ellipsoidal, ball-n-socket joints, top right to bottom right, both figures.

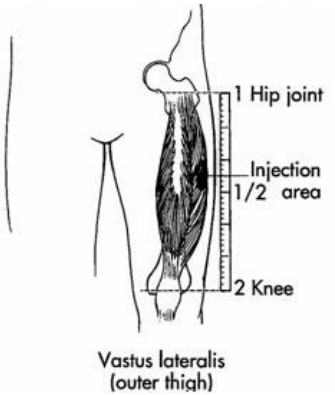
Introduction to Muscles

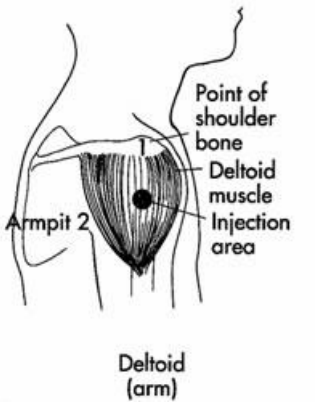
- Bones and articulations do not move themselves. In order to be moved, they require something to make the articulations bend or twist or turn and they require something to stimulate that which makes them move. The something that stimulates something else to make articulations move is the nervous system.





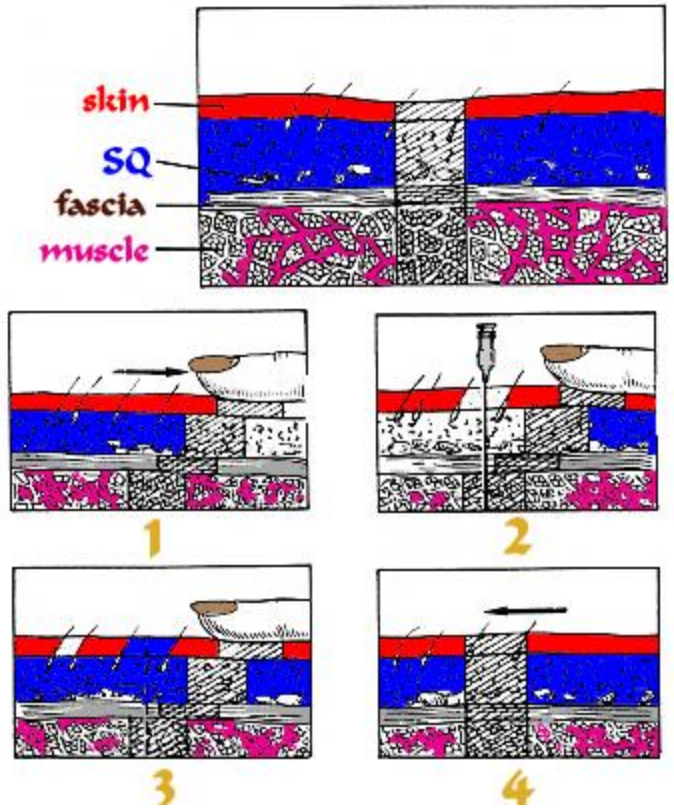






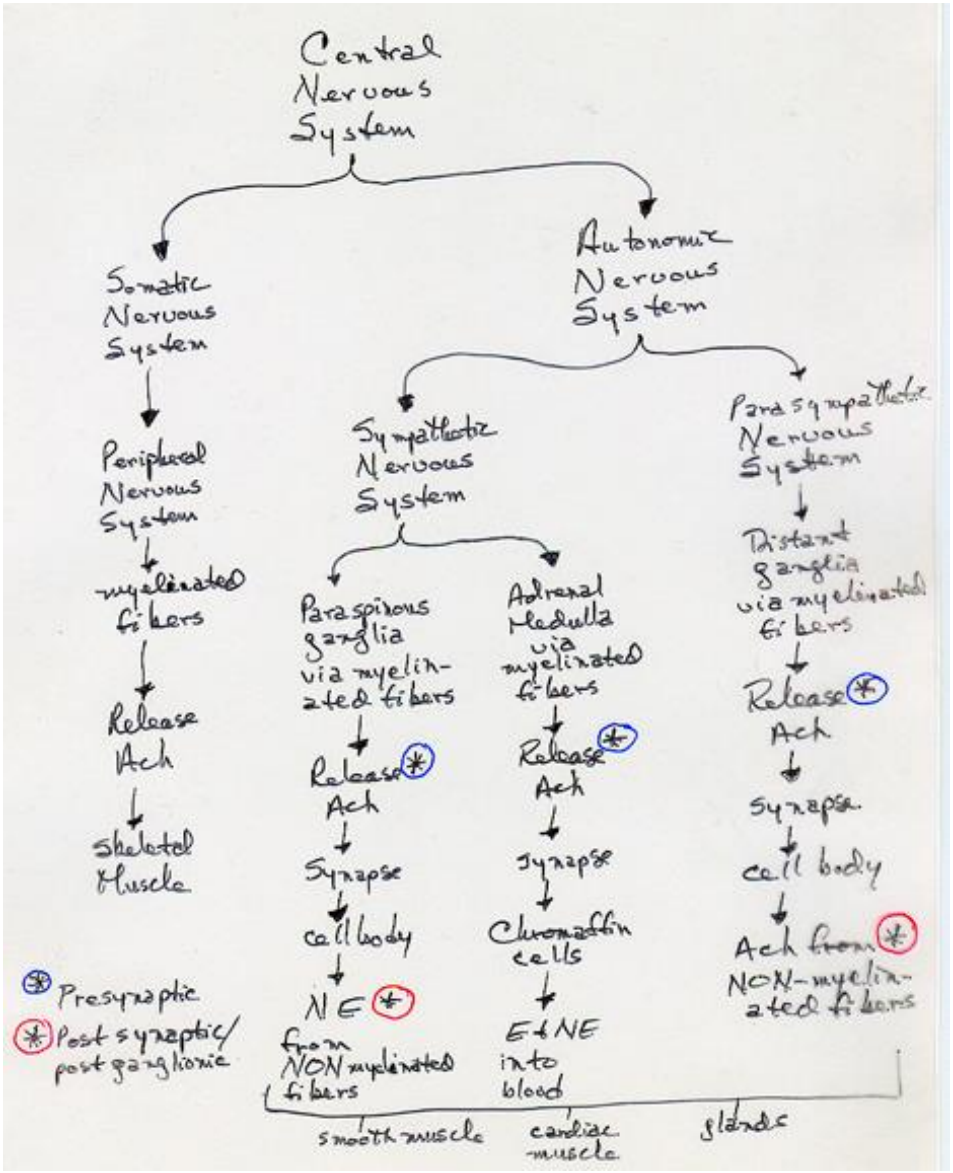
Why You Need to Know The Muscular System -- 1

Why You Need to Know The Muscular System -- 2

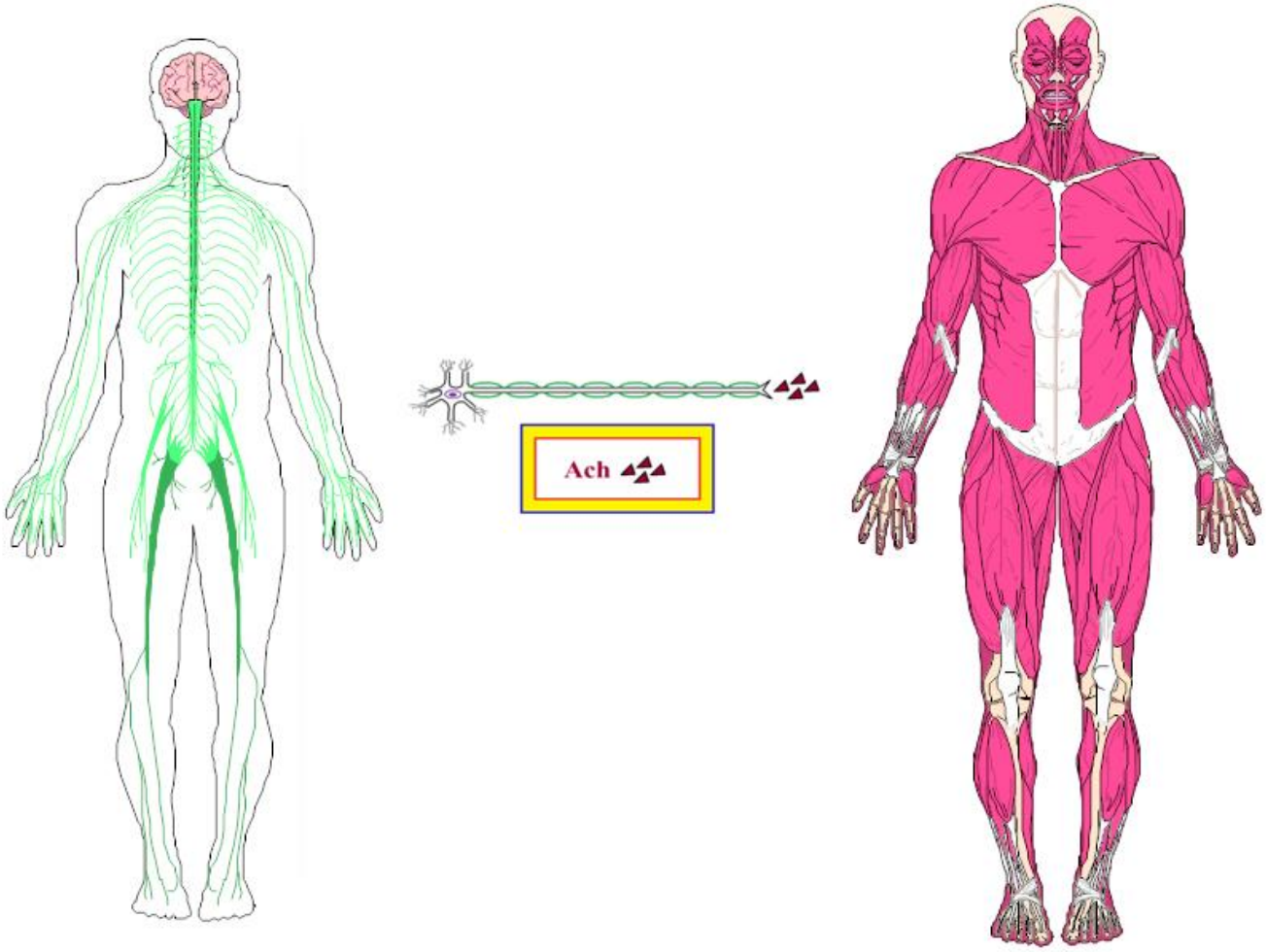


1. Pull skin
2. Inject
3. Wait 10 seconds (or per manufacturer's label)
4. Release skin
5. E.g., Rhus toxin and Z-track

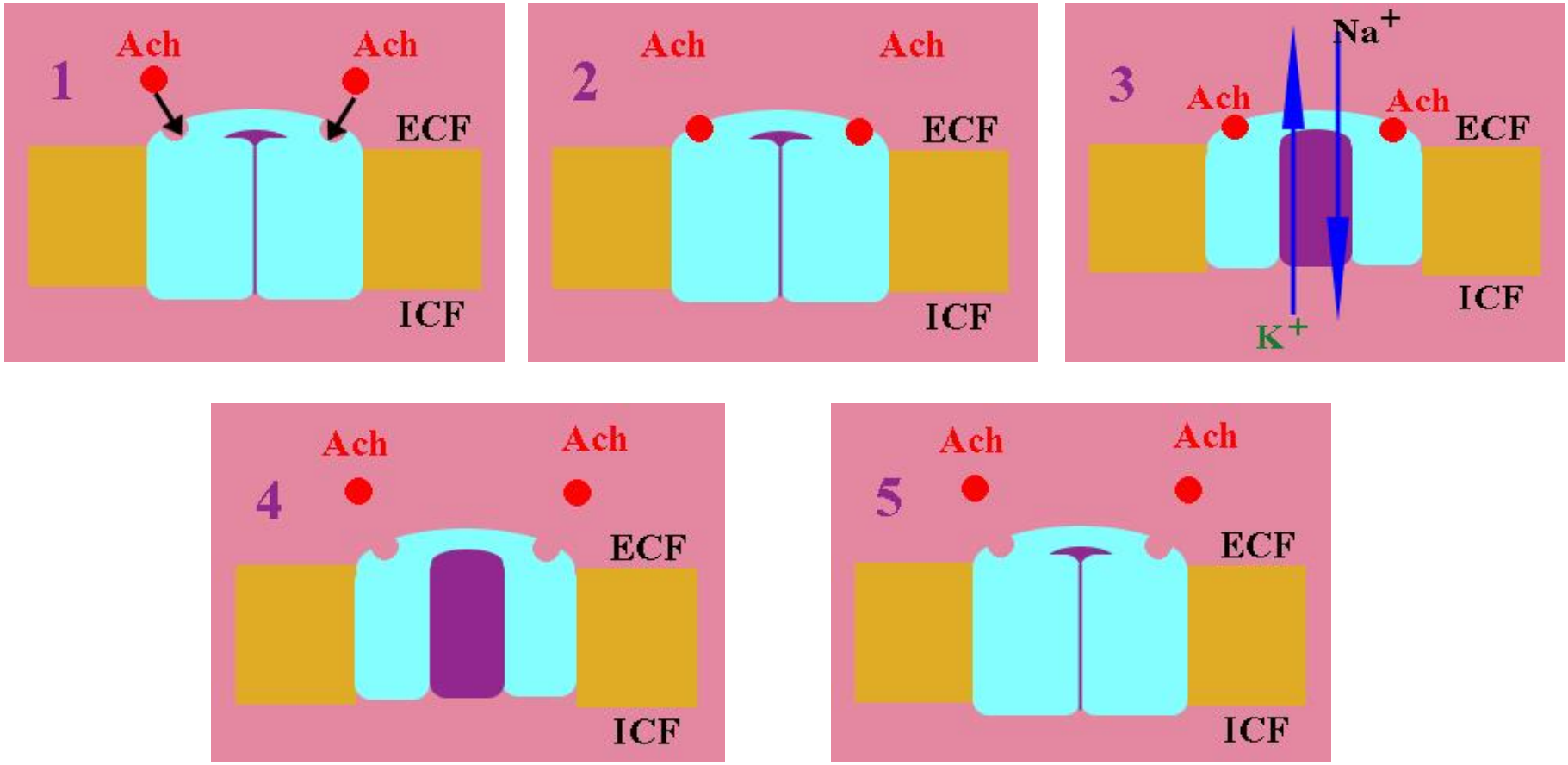
Nervous System Overview: FOCUS Peripheral Nervous System



PNS – Neurotransmitter – Muscular System



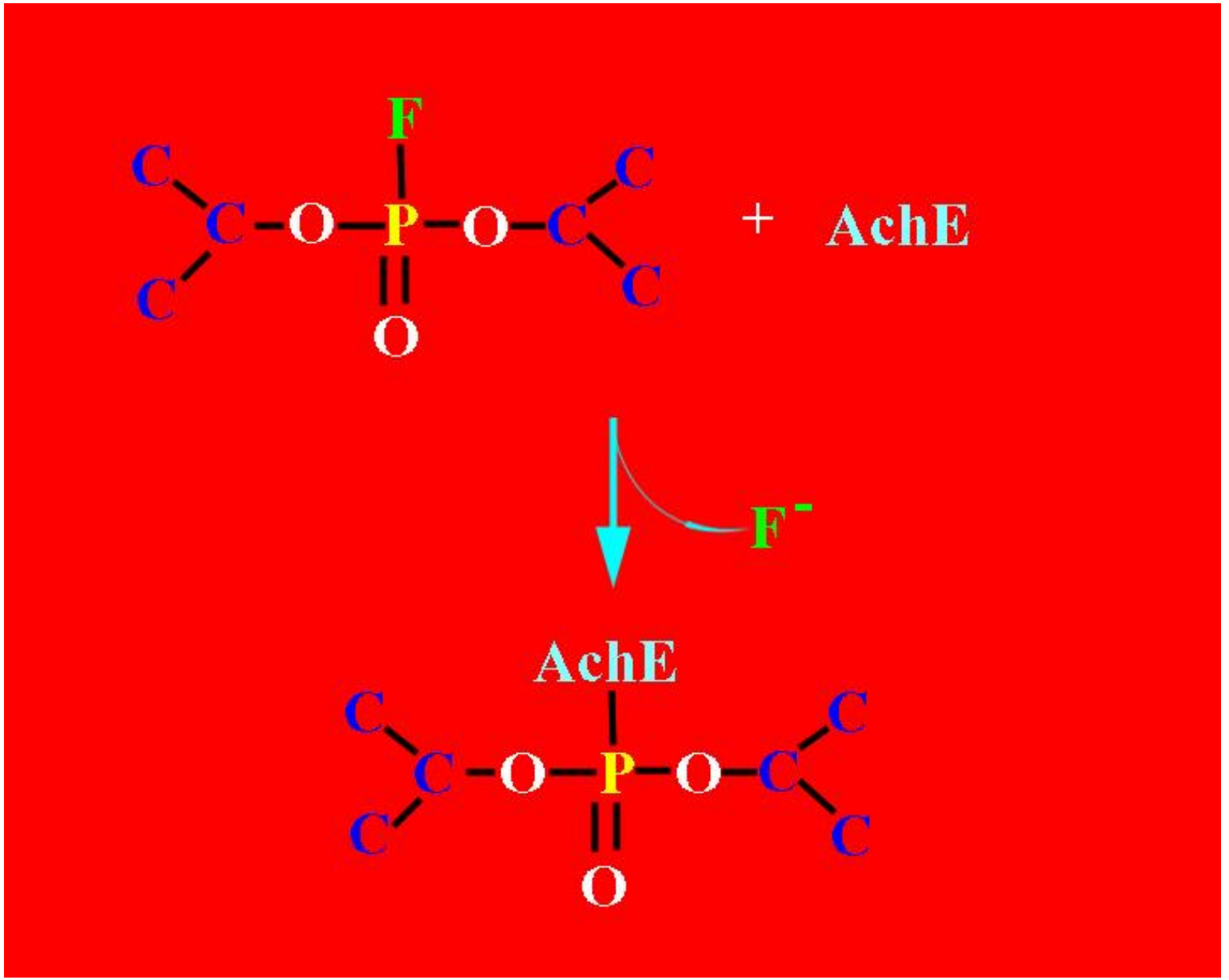
Ach Mechanism of Action -- 1



Ach Mechanism of Action -- Notes

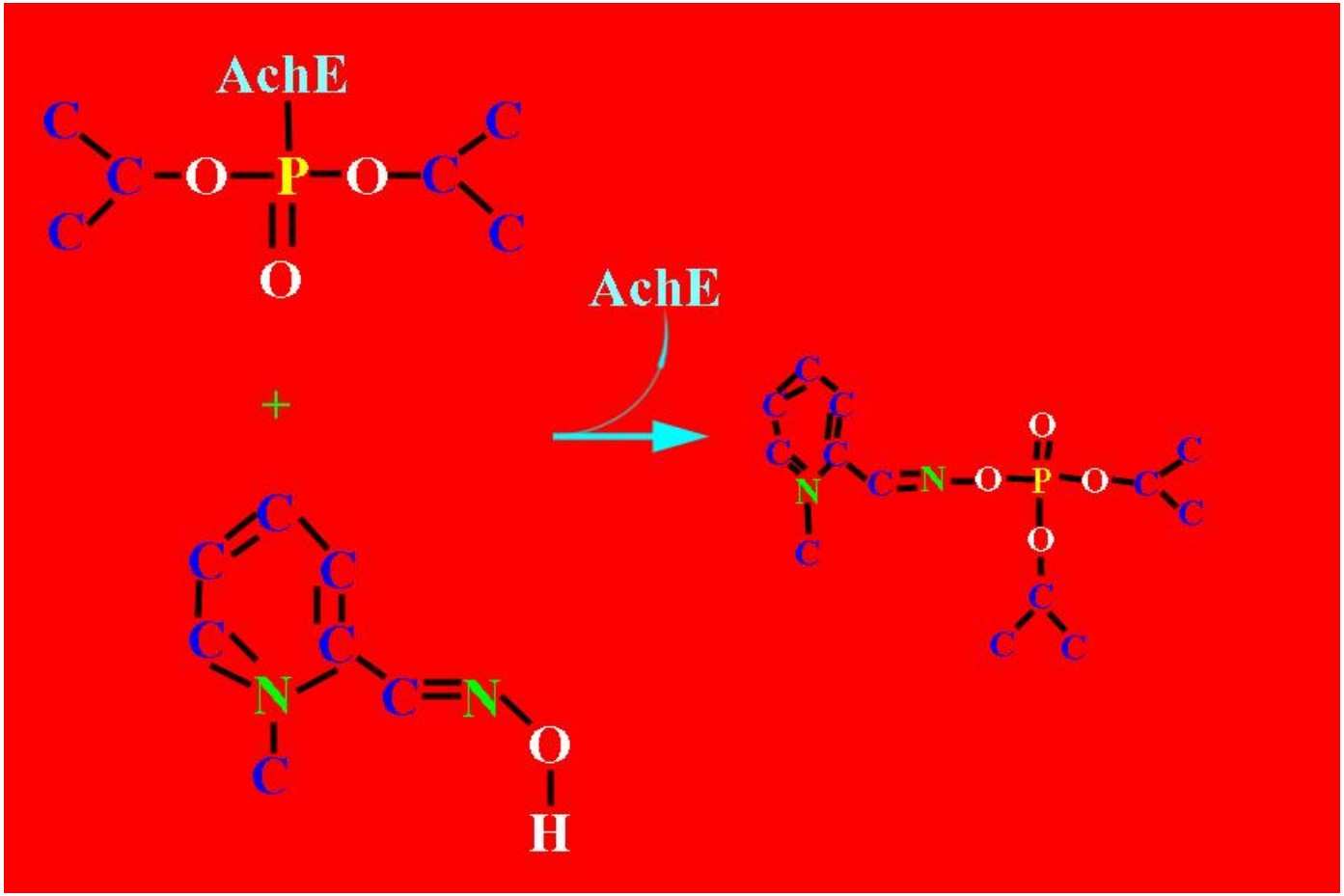
1. Old data suggested simultaneous – albeit disproportionate -- movement of Na^+ (ECF to ICF) and K^+ (ICF to ECF)
2. Ach alters the permeability of the cell membrane to Na^+ primarily – K^+ secondarily
3. New data indicates that the movement of K^+ is not at the magnitude once believed
4. However, when extracellular K^+ is high enough, it will cause a Ca^{2+}-dependent end plate current (aka spasm)
5. Mg^{2+} blocks the end plate current by reducing Ca^{2+} availability – e.g., pre-term labor

Organophosphate Inhibition of AchE - 1



S/S Organophosphate Poisoning

1. S
2. L
3. U
4. D



Organophosphate Inhibition of AchE - 2

Un-Inhibition of AchE Due to Organophosphate Poisoning

1. 2-PAM – pralidoxime -- reverses the inhibition – in spite of the fact that this inhibition is uncompetitive
2. NO SLUD
3. 2-PAM must be given within a few hours of poisoning for maximal effect
4. Atropine used to ease breathing
5. Valium used for muscle spasms

Nicotinic Acetylcholine Receptors (NACHR's) in the CNS

- REM sleep (associated with high degree of dreaming) associated with NAchR activation
- ? May explain why smokers don't awaken in the night to smoke ?
- Dopaminergic/Nicotinic systems are close to each other.
- This suggests that smoking a cigarette provides a "reward" to the smoker neuroelectrically, similar to the "self-medication" undertaken by many drug addicts (includes alcohol and nicotine) and carbohydraholics.

N_1 receptors	N_2 receptors
At NMJ	At ganglia
Mixed cationic channels	
Na^+/K^+ – fast: NO 2d messenger	
Ca^{2+}/Cl^- – ?? Intermediate??	
Ca^{2+}/K^+ – slow: requires 2d messenger	

Nicotine facilitates:

- ☞Ach release
- ☞5-HT, NE and dopamine release
- ☞PRL, AVP, ACTH, corticosterone release
- ☞increased brain carbohydrate metabolism

Nicotine causes affects on behavior:

☞Locomotor activity

☞Schedule-controlled behaviors (OCD)

☞Attention span

☞Processing information

☞Short-term memory

Nicotine appears to enhance cognitive functioning and seems to increase attention to the task at hand which all lead to "information storage", i.e., memory,

BUT

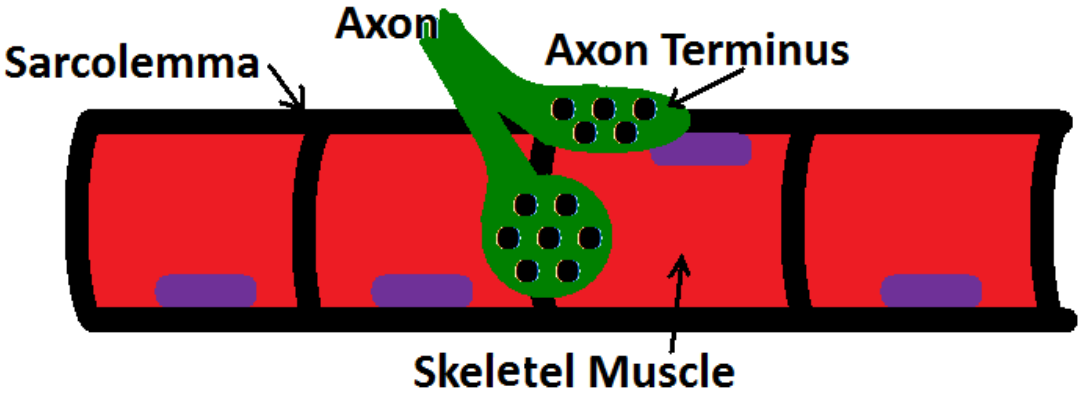
results on the effects of nicotine and memory, proper, are mixed.

NAchR's mediate rapid excitatory responses

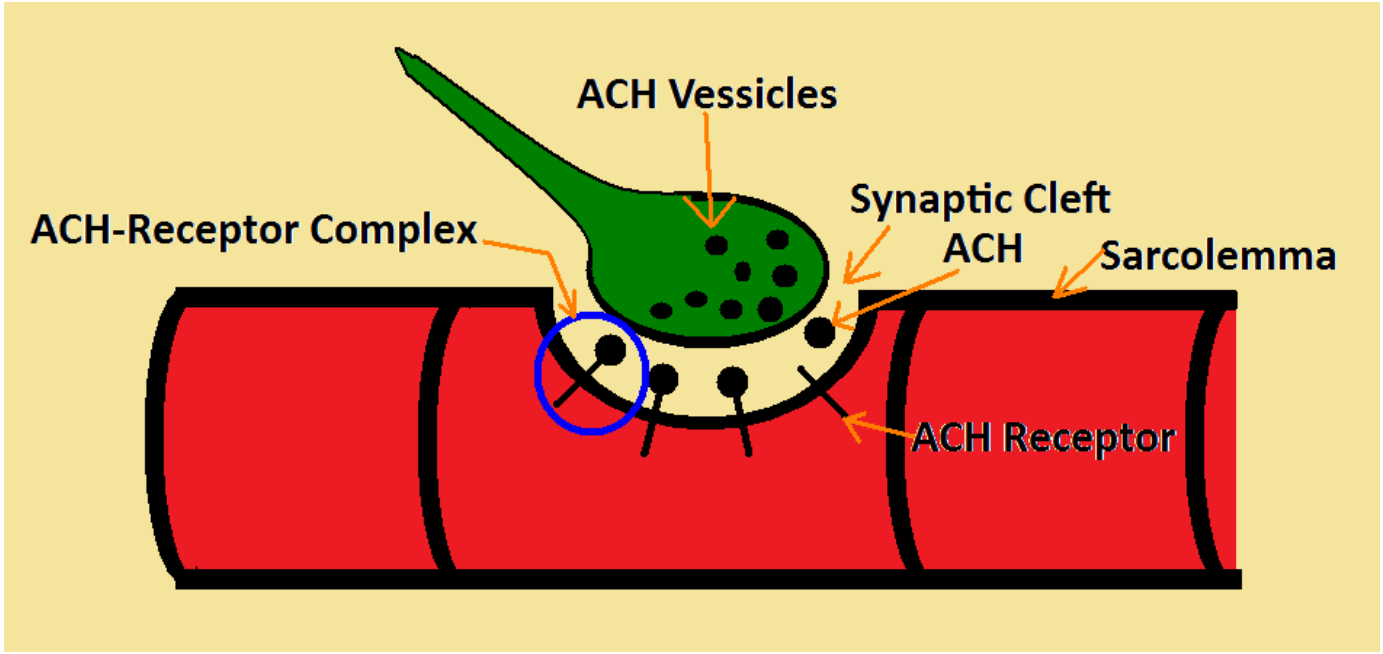
Nerve and Muscle Supply: the Neuro-Muscular Junction (NMJ)

Term	Description
Acetylcholine (Ach)	**The neurotransmitter released into the synapse.**
Motor end plate	**The portion of the muscle membrane directly under the end of the axon.**
Polarized	**In a muscle at rest, there is an electrical potential difference (voltage) maintained between the inside of the fiber and the ECF's around it. This is due to active transport systems that keep Na^+ outside the fiber and K^+ inside the fiber. Also means relaxation.**
Depolarized	**Is the permeability of that muscle membrane to Na^+ and K^+ and is followed by a loss of potential. Also means contraction.**
Troponin	**Binds actin with myosin; a contractile protein. ATP is bound to myosin cross-links (keeps muscle relaxed).**
Myosin	**Another contractile protein. In the presence of Ca^{2+} it acts as an enzyme to hydrolyze ATP to ADP and P_i.**
Actin	**Another contractile protein. It cross-links with myosin after ATP is hydrolyzed and causes contraction.**

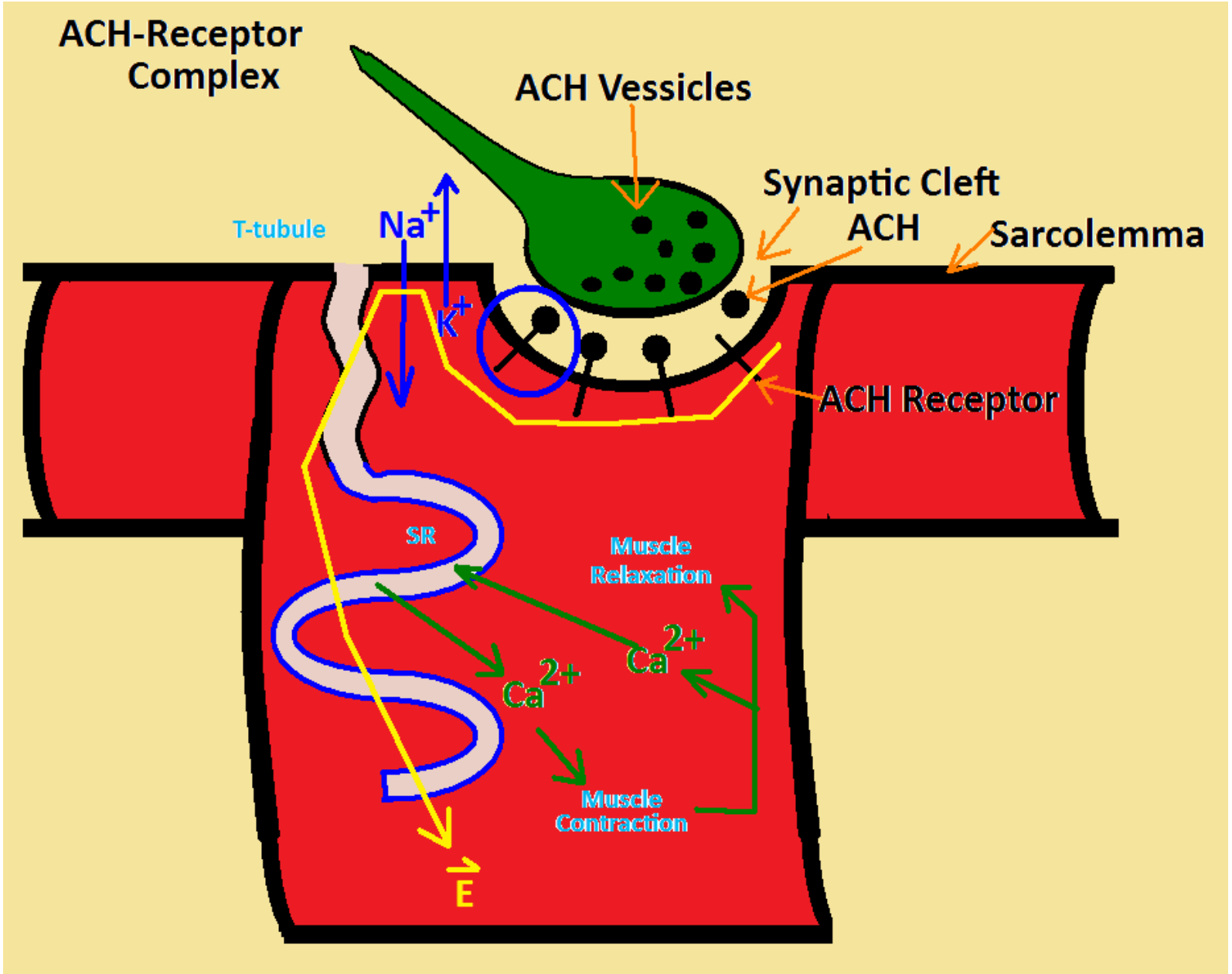
The NMJ.



The relationship of the axonal pad to the motor endplate and the synapse.



The best simple way to describe this graphic is that energy flows into the muscle cell, causing it to contract.



Excitation-Contraction Coupling Mechanism

- There are several theories "out there" that try to explain muscle contraction. As usual, I suspect that it's probably not one of the individual theories, but the sum of the theories that actually explains how muscle contracts.

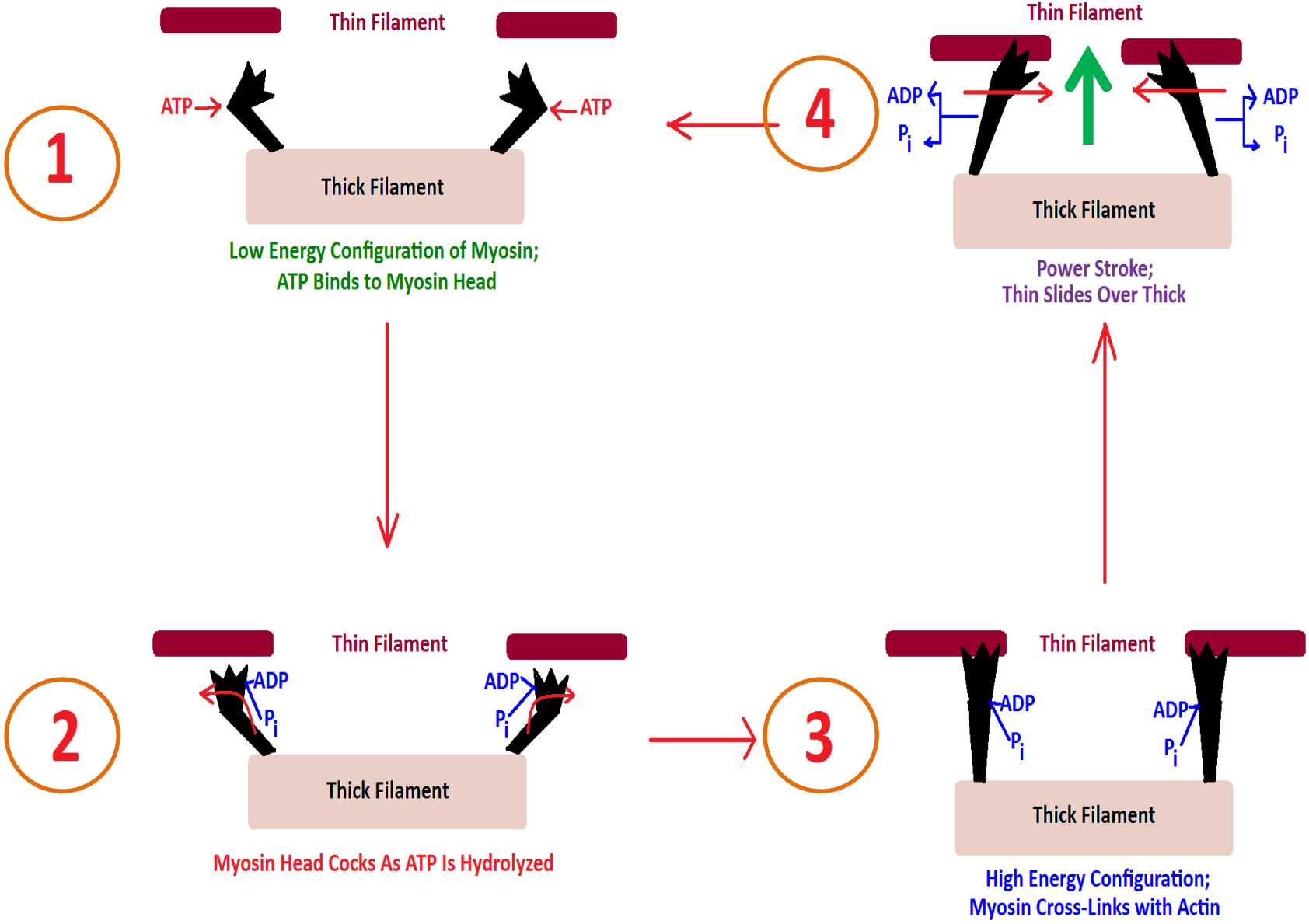
•The more scientific manner is as follows: when the Ach is released into the synaptic cleft, it then binds with an Ach receptor on the motor endplate. That causes the sarcolemma to depolarize. This depolarization alters the membrane's permeability to Na^+ and K^+, causing the former to leak into the cell and the latter to leak out of the cell. This, in turn, causes the T tubule to depolarize which causes the sarcoplasmic reticulum (SR) to depolarize.

•When the SR is depolarized, it causes Ca^{2+} to be released from the SR. The Ca^{2+} binds to contractile proteins (troponin). The troponin changes shape and exposes the actin binding sites.

•Myosin heads attach to actin binding sites. The head tilts and pulls the actin molecules together. The tilt exposes ATP binding sites on the head and ATP binds to it. The head detaches and ATP is hydrolyzed to ADP, Pi and energy. The energy cocks the myosin and it attaches to a new site on actin.

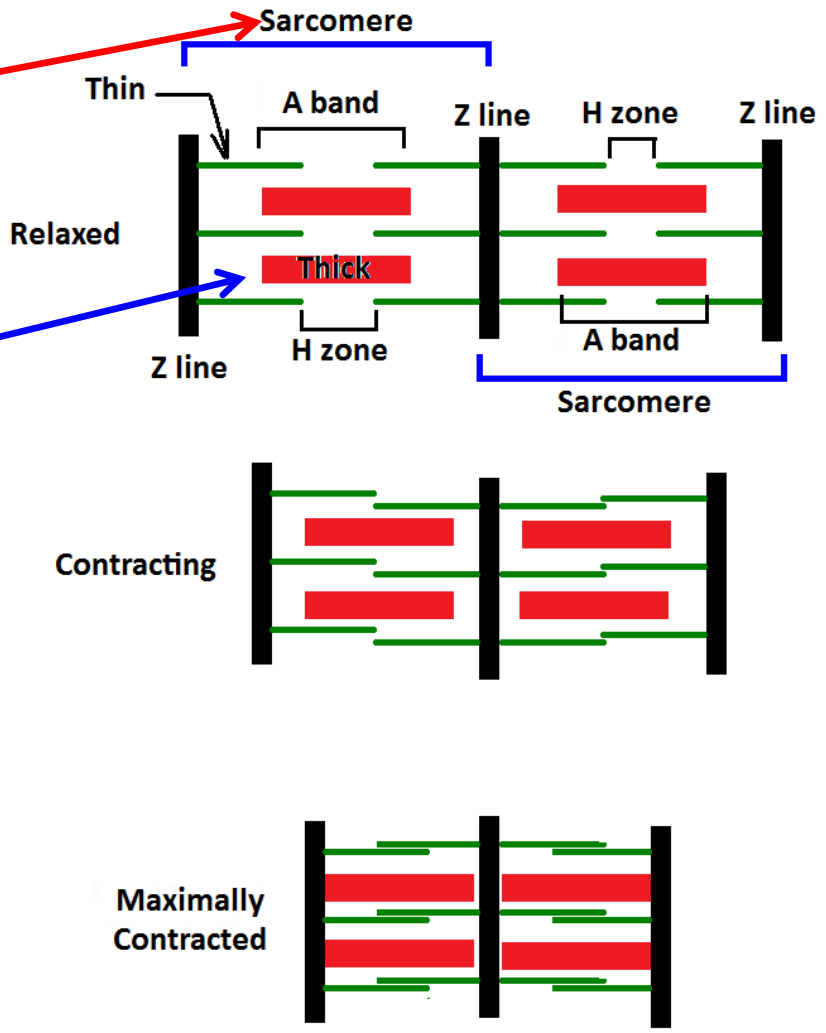
•As long as the steps in red continue, this will cause the muscle to contract. Once the action potential (depolarization/repolarization cycle remember the "wave" some of you did in class during neuro?) stops, the Ca^{2+} is released from the contractile proteins and pumped back into the SR. The muscle relaxes.

•When viewing the steps, **above**, on the following slide, think of this contraction mechanism as being very much like a very rapid rachet mechanism, similar to that on a wrench or on straps for tie downs on a truck.


1
Thin Filament
ATP
ATP
Thick Filament
Low Energy Configuration of Myosin;
ATP Binds to Myosin Head
2
Thin Filament
ADP
Pi
ADP
Pi
Thick Filament
Myosin Head Cocks As ATP Is Hydrolyzed
3
Thin Filament
ADP
Pi
ADP
Pi
Thick Filament
High Energy Configuration;
Myosin Cross-Links with Actin
4
Thin Filament
ADP
Pi
ADP
Pi
Thick Filament
Power Stroke;
Thin Slides Over Thick

The Sliding Filament Theory of Muscle Contraction

- It seems to me that the previous mechanism just doesn't work without this mechanism. This mechanism says that relaxed muscles consist of sarcomeres that are separated by Z lines.
- There are thick and thin fibers (filaments) in each sarcomere.
- The thick fibers make up the A bands and the gaps between the thin filaments make up the H zone.
- As the muscle contracts, the thin filaments cock to a side to accommodate their sliding over each other until the A bands are in contact with the Z lines at maximal contraction.



Energy Sources from Intermediary Metabolism

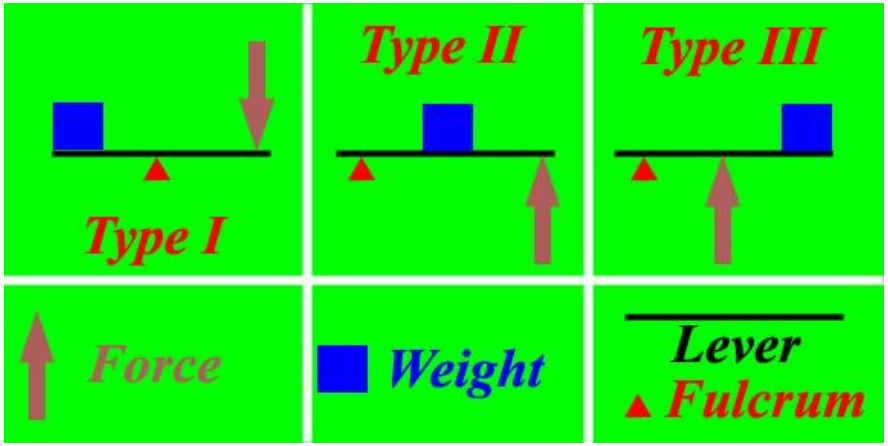
- So how do our cells get additional energy?
- The first system is the phosphagen system. In this system, the source of the energy is ATP. Remember that during muscular contraction, ATP is hydrolyzed to ADP, P_i and energy. When this happens, there is only enough energy for 5-6 seconds (some sources say up to 10 seconds).
- Our cells get the energy via a compound called phosphocreatine (PCr). The concentration of PCr is about 2-3 times greater than the concentration of ATP. When PCr is available, it is hydrolyzed to Cr and P_i and energy. The P_i is used to re-phosphorylate ADP to make more ATP.
- This gives us about 15 seconds of maximal contractions and is used for short bursts. Covered in BIOL 190 (and/or BIOL 190 Review).
- EMP gives enough ATP for about 30 seconds to 2 minutes. Covered in BIOL 190 (and/or BIOL 190 Review).
- TCA > 2 minutes – as long as there are nutrients – and no muscle fatigue -- lesser intensity. Covered in BIOL 190 (and/or BIOL 190 Review).

- Key to understanding muscles is that they **ALWAYS PULL -- the NEVER push.** Bones and joints and muscles are levers. Muscles function between agonists and antagonists, i.e., one muscle or set of muscles lets your body move one way (agonists) and another (set) acts in the exact opposite way (antagonists).

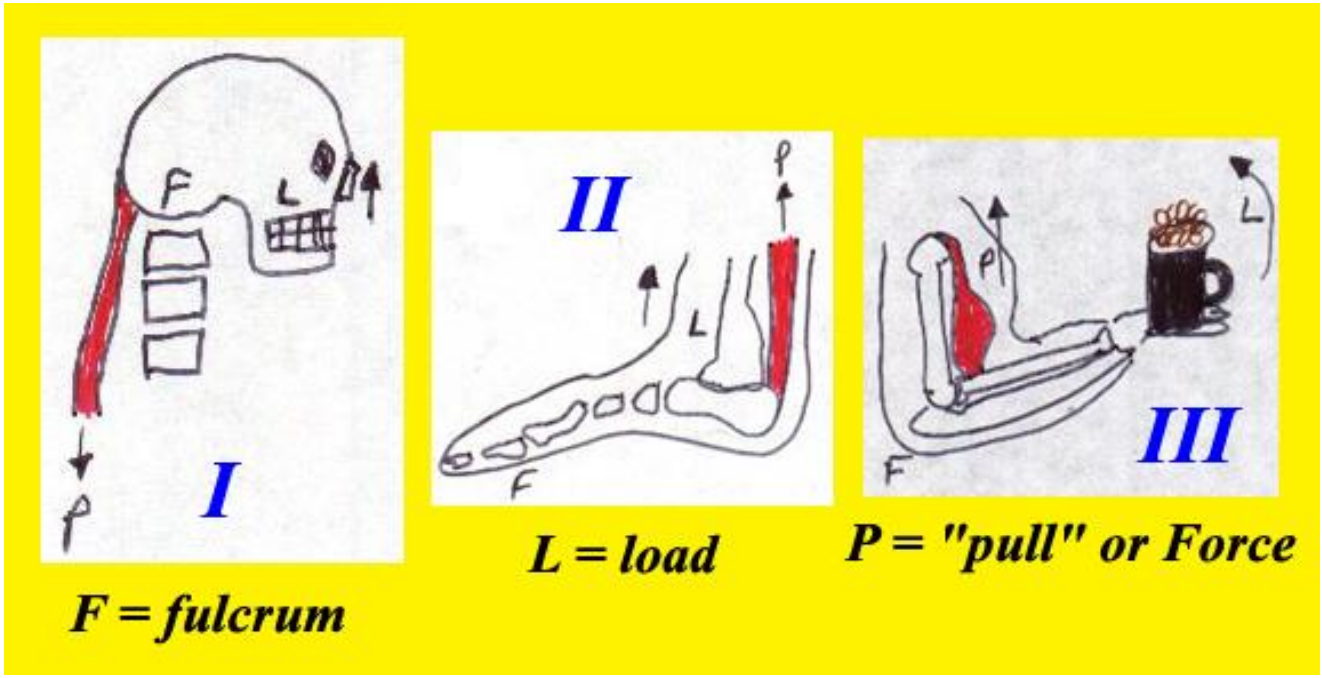
- Bones, ligaments and muscles (and tendons -- coming later) make the body move under neurological stimulation. To move, our body is put together as a series of levers. There are 3 types of levers:

LEVERS

Class I	Class II	Class III
In the case of a Class I lever, the fulcrum (F) is between the load (L) and the moving force (P). One example is a teeter totter; another is the articulation between the head and cervical spine that allows us to nod our heads.	In the case of a Class II lever, the load (L) is between the fulcrum (F) and the moving force (P). One example is a wheel barrow; another is the articulation between our tibia and talus that allows us to plantarflex our foot as we step off.	In the case of a Class III lever, the moving force (P) is between the fulcrum (F) and the load (L). One example is carrying a loaded shovel; another is the articulation between the humerus and ulna that allows us to bend our elbow when we have a drink of something.

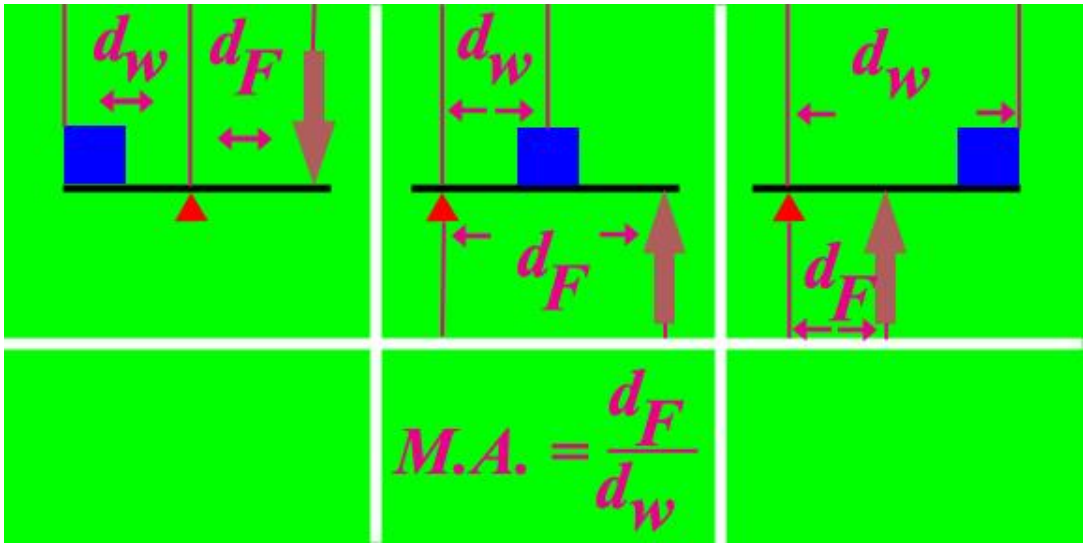


Biological and Practical Levers



- Other Type I's: scissors, teeter totter, forearm extension
  - Other Type II's: wheelbarrow
- Other Type III's: forceps, tweezers, carrying loaded shovel

Mechanical Advantage -- MA



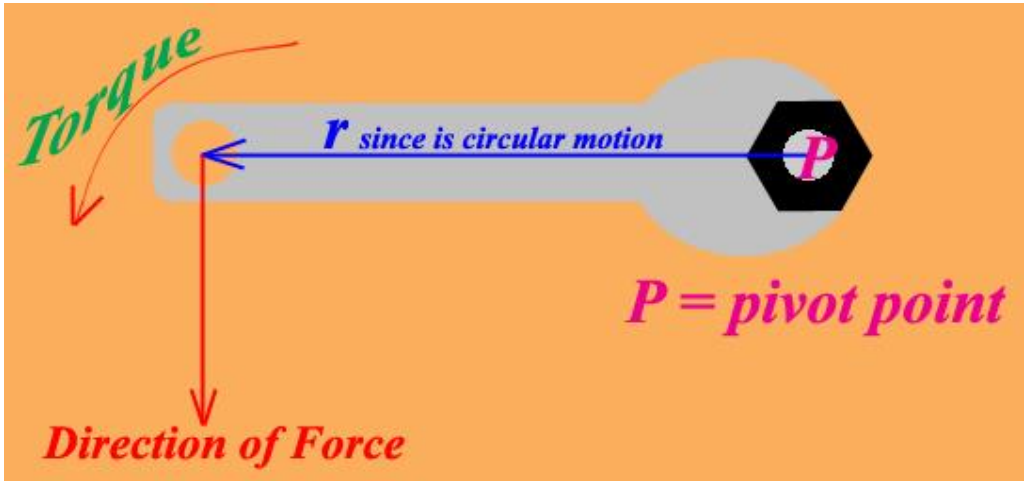
- The less the MA, the faster the lever

  [horse foreleg = 0.08 (runner!)]

- The greater the MA, the stronger the lever [armadillo foreleg = 0.25 (digger!])
  - Type I is > OR < 1; Type II > 1 and Type III <1

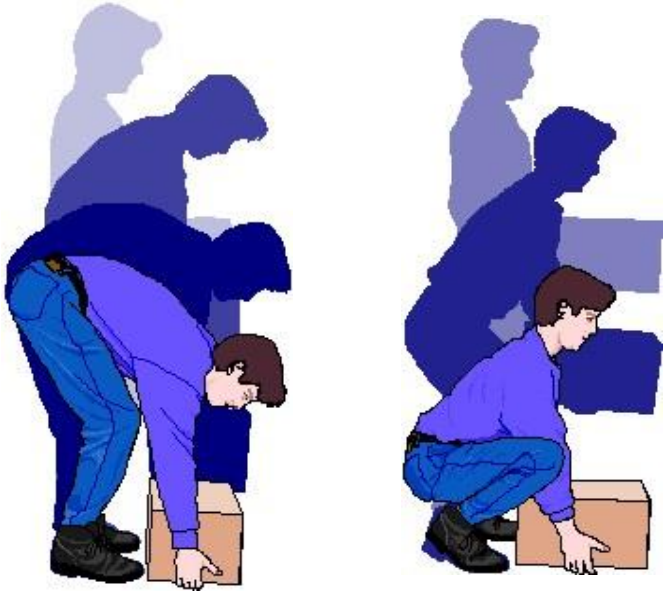
Torque

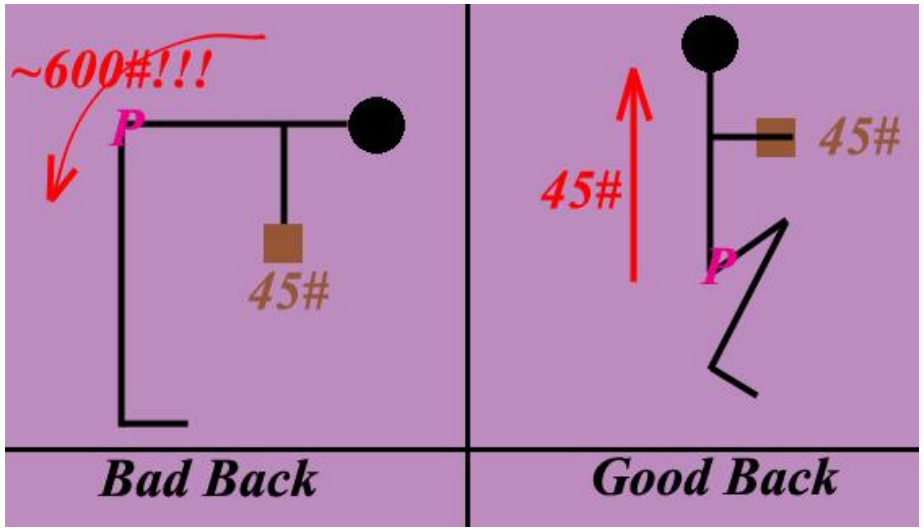
- Is the ability of a force to cause rotation



If Force goes WITH or AGAINST the same direction as radius, there is no torque – this is due to equation (trigonometric) requirements, as well as intuition.

Torque and Lifting – 45# box





- Bad back: E. spinae tension = 608.7#; vertebral compression = 595.5# -- ~13 X > the original weight!!!!!!!! == back injury!!!!!!!!
- Good back: E. spinae tension = 45#; vertebral compression = 45# -- original weight!!!!!! == NO back injury!!!!!!!!

Perspective

Even a 6# weight causes 325# of tension and 317# of compression when lifted incorrectly in a 150# person.

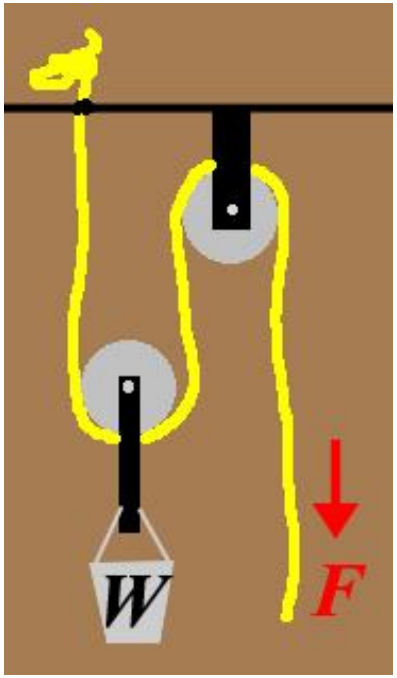
Pulleys

- Are combinations of levers and torques
- 1 pulley can change the direction of a force
- Multiple pulleys can reduce the Force needed to lift a heavy load
- Key: The MA equals the number of parallel ropes wrapped around the pulleys –

NOT including the anchoring rope

- That means that if there are 2 parallel ropes, it'll be like lifting half the weight of the object

MA = 2 Pulleys MA = 6

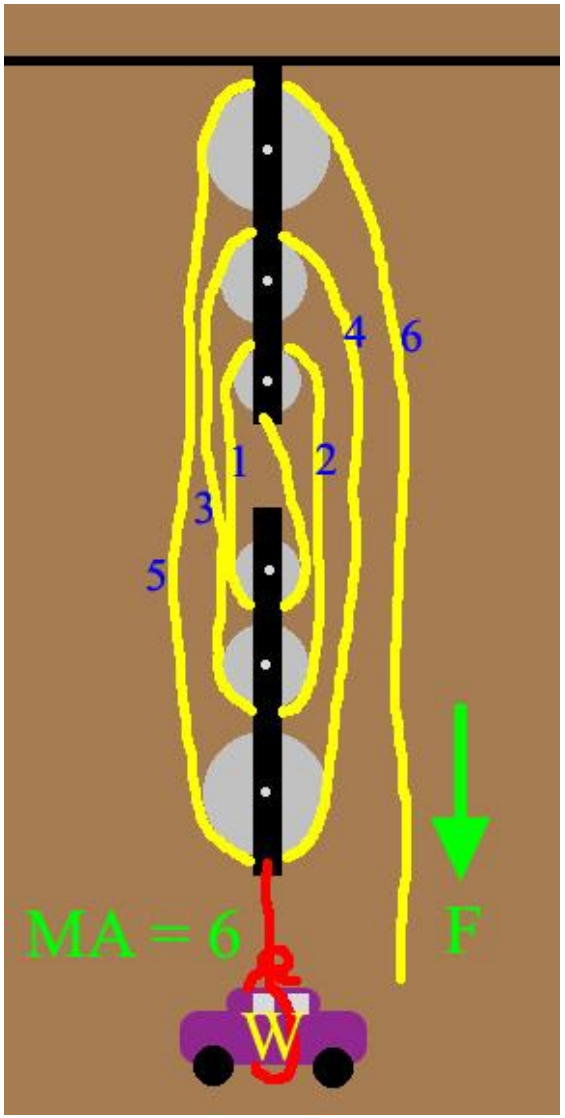


The force exerted is as follows:

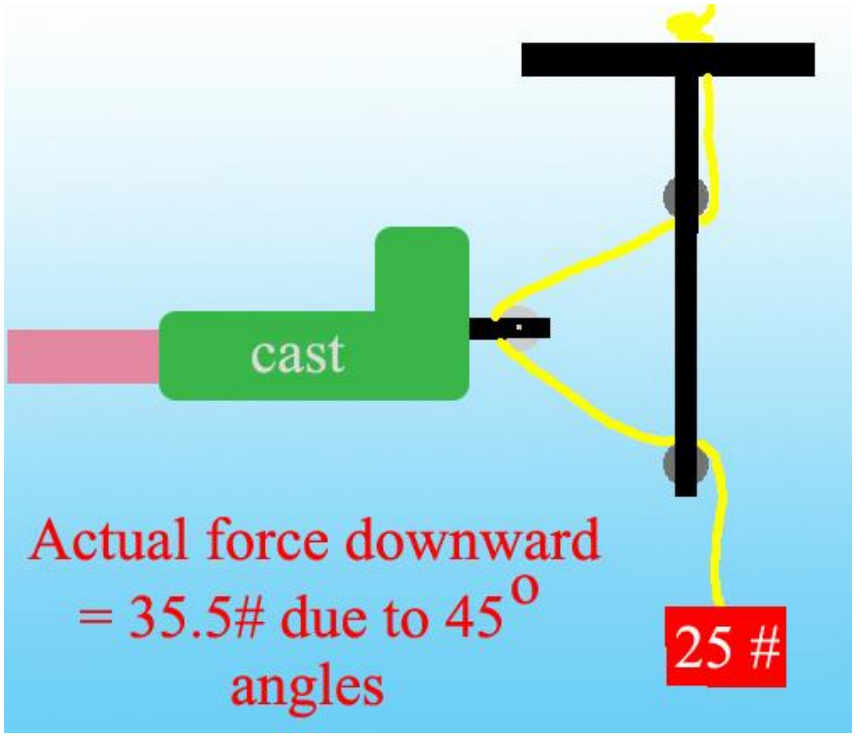
$$F = \frac{Wt}{2}$$

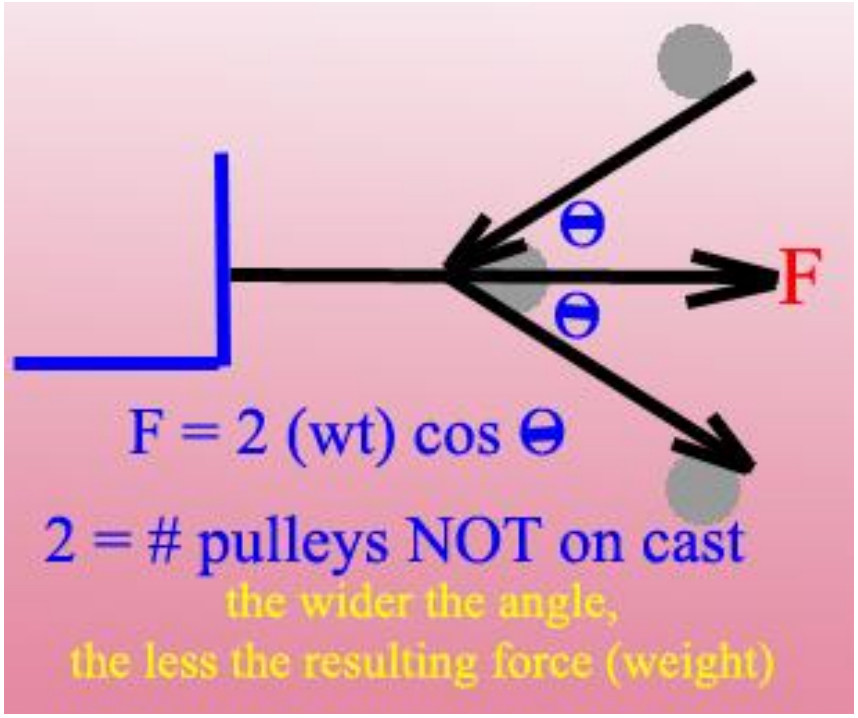
And the MA is as follows:

$$MA = \frac{Wt}{F} = 2 \, or = 6$$

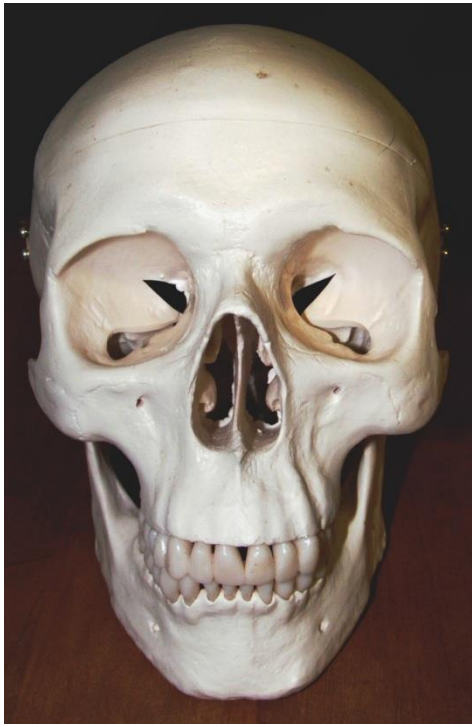


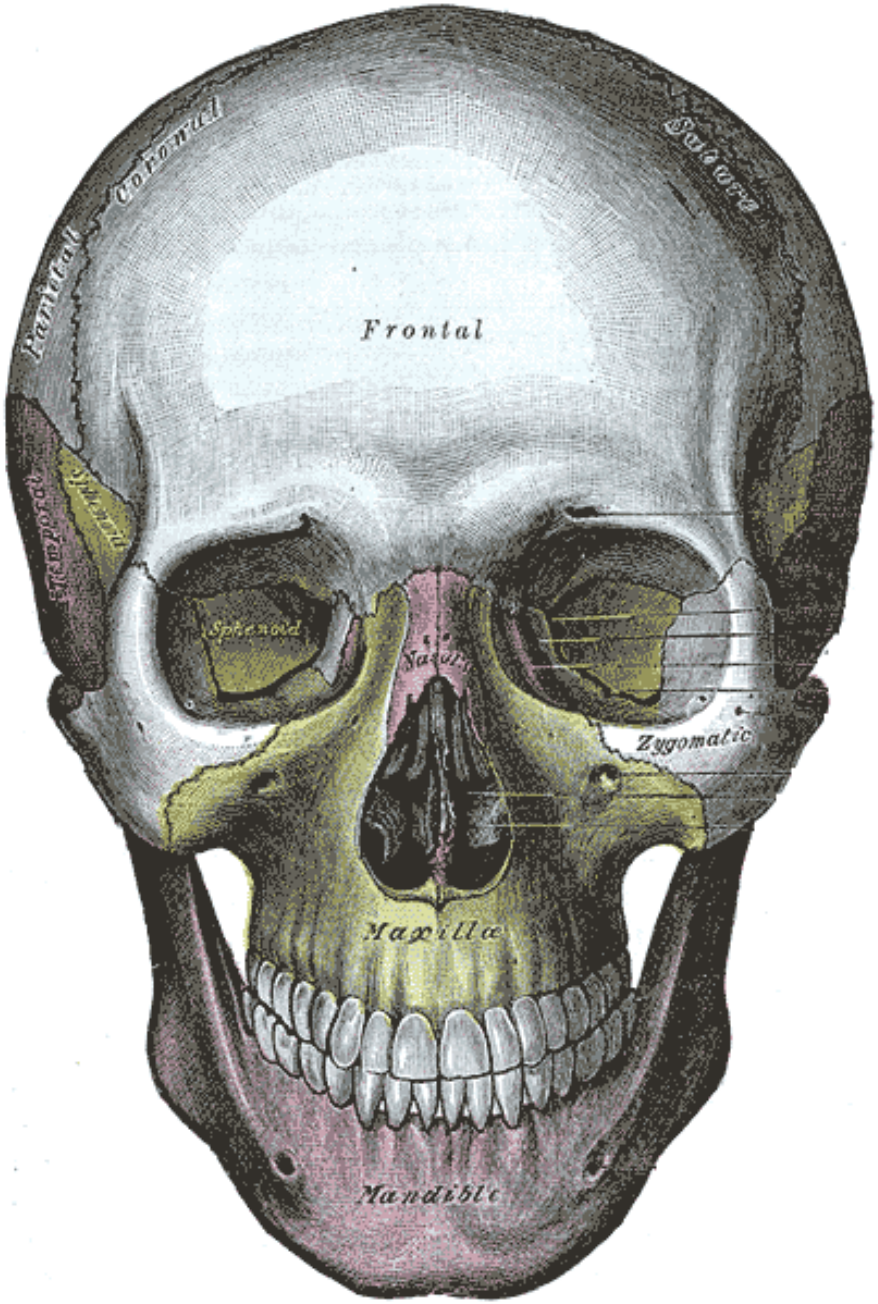
Traction – Pulley Application





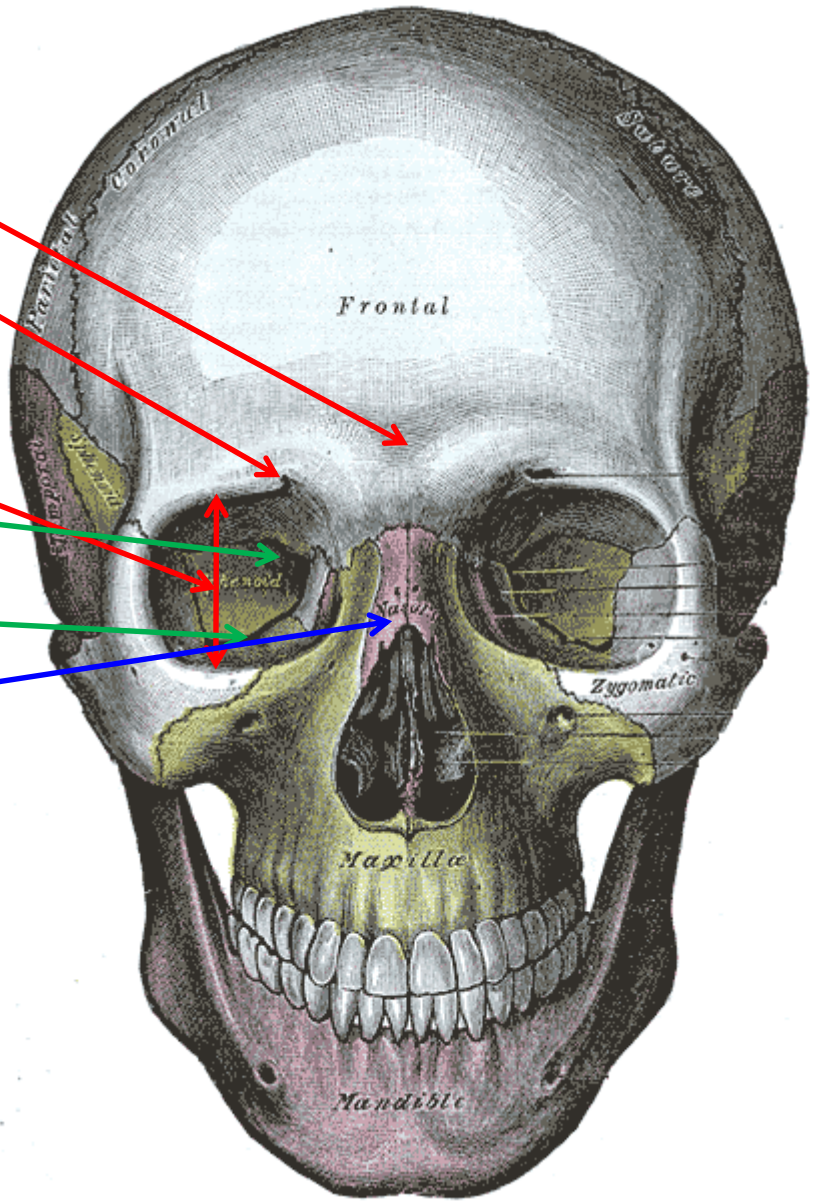
Articulo-Musculo-Skeletal by Region





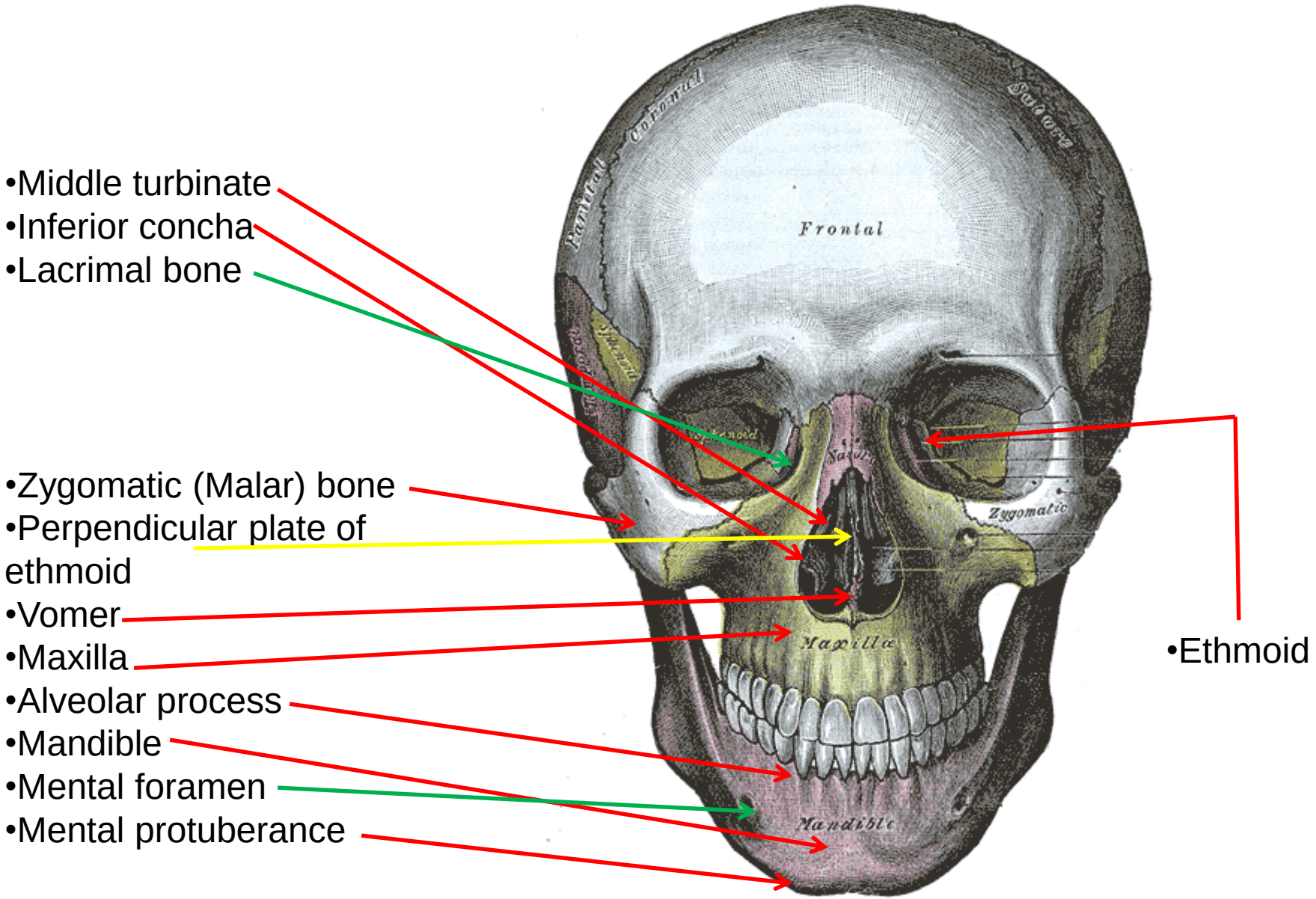
Head and Neck

- Glabella
- Supra-orbital foramen (notch)
- Orbit
- Supra-orbital fissure
- Infra-orbital fissure
- Nasion



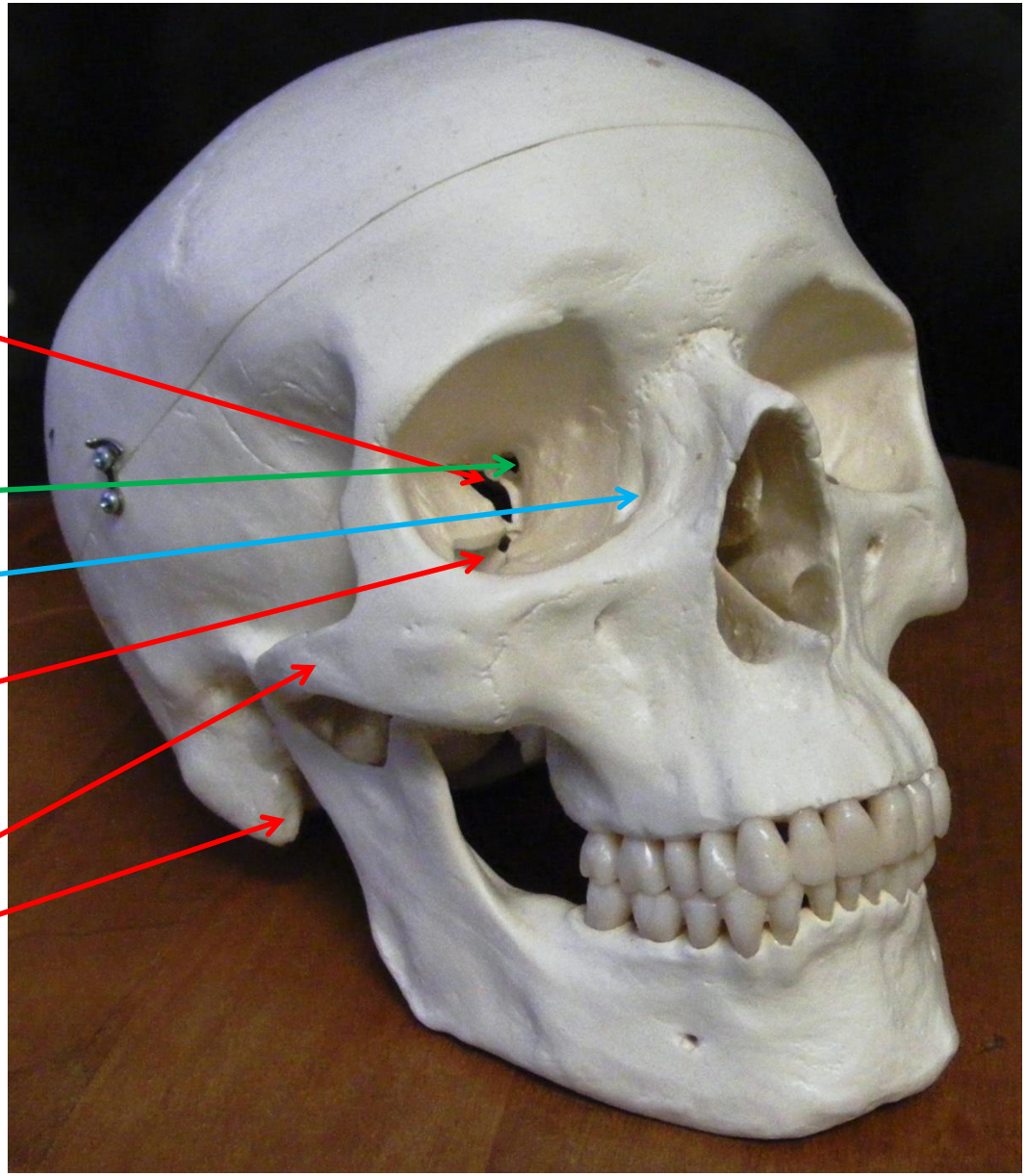
•Supraorbital foramen: artery, vein, nerves

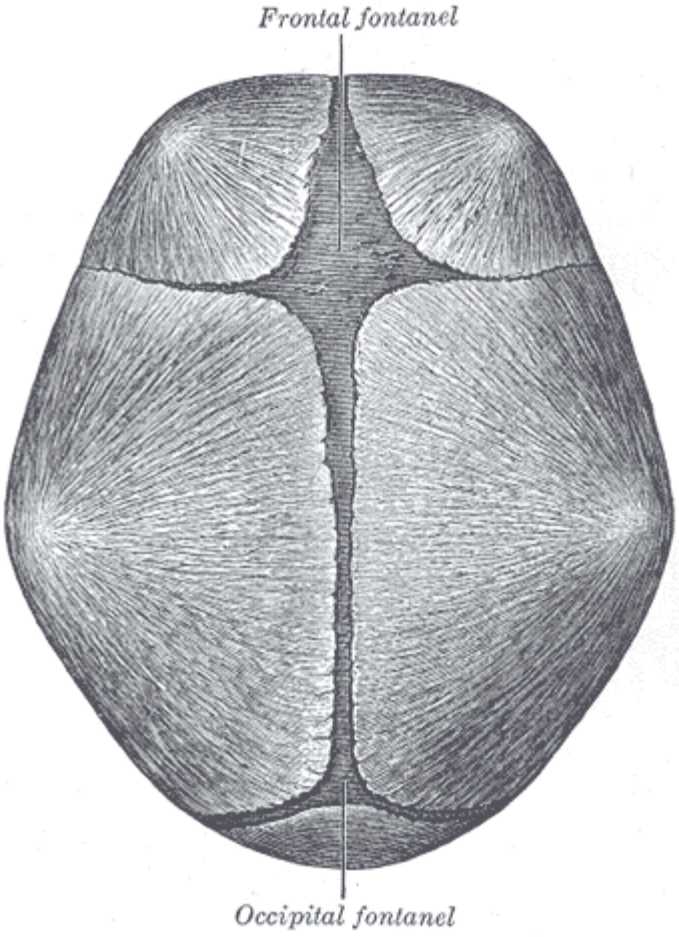
•Infraorbital foramen: vessels and nerves

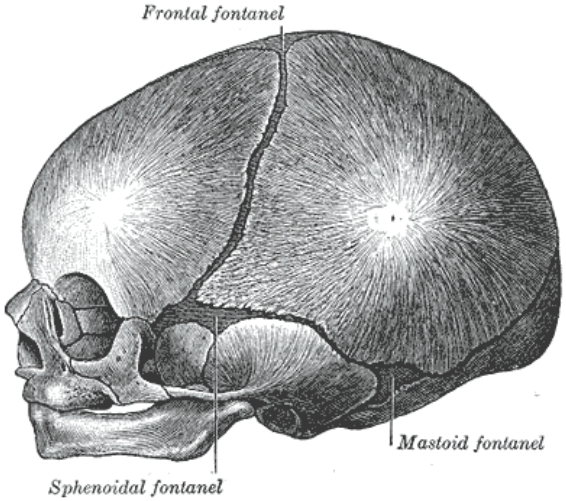

•Middle turbinate
•Inferior concha
•Lacrimal bone
•Zygomatic (Malar) bone
•Perpendicular plate of ethmoid
•Vomer
•Maxilla
•Alveolar process
•Mandible
•Mental foramen
•Mental protuberance
•Ethmoid
Frontal
Zygomatic
Maxilla
Mandible

•Cranial II exits from the optic foramen

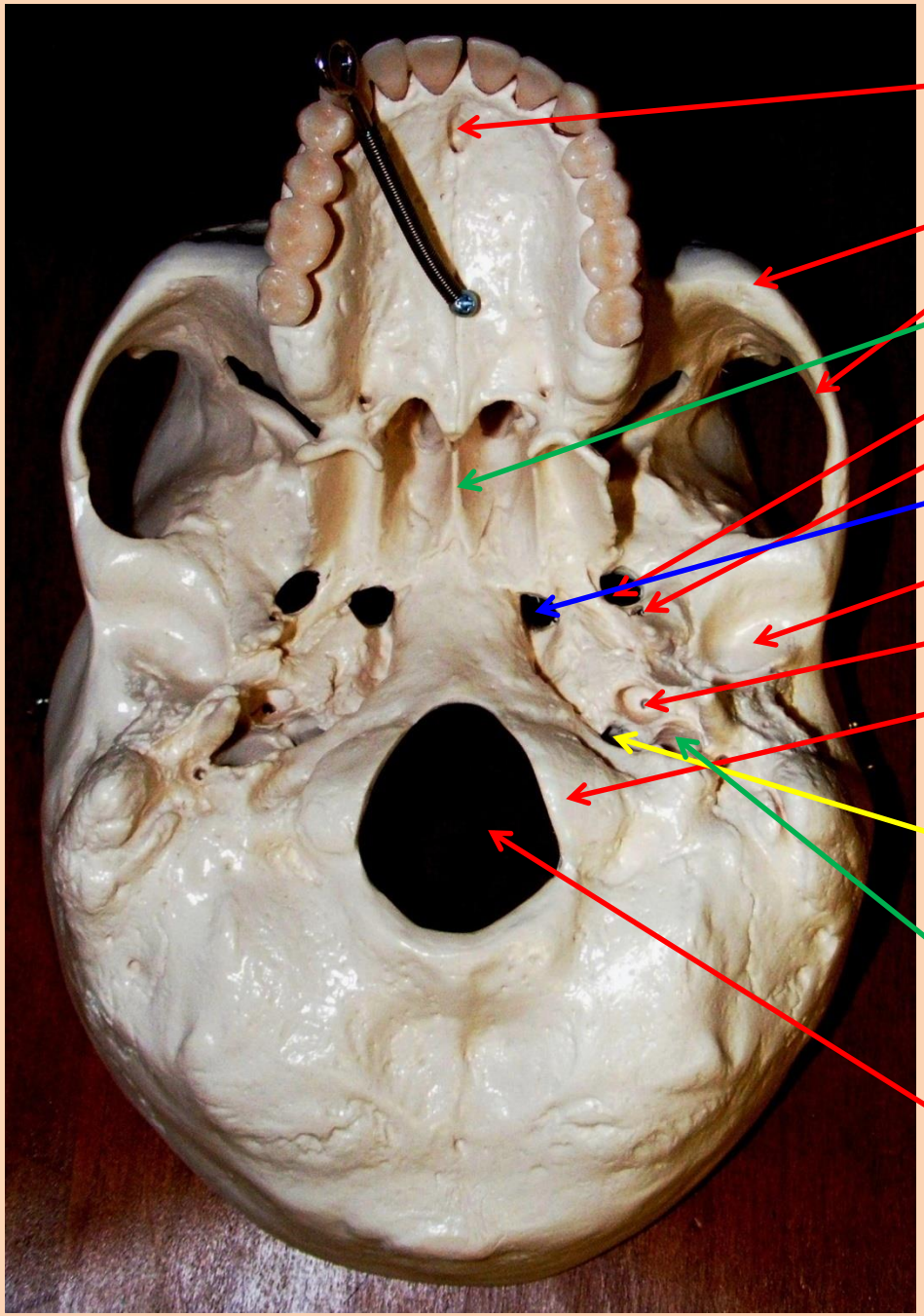
- Supra-orbital fissure
- Optic foramen
- Lacrimal canal
- Infra-orbital fissure
- Zygomatic arch
- Mastoid process



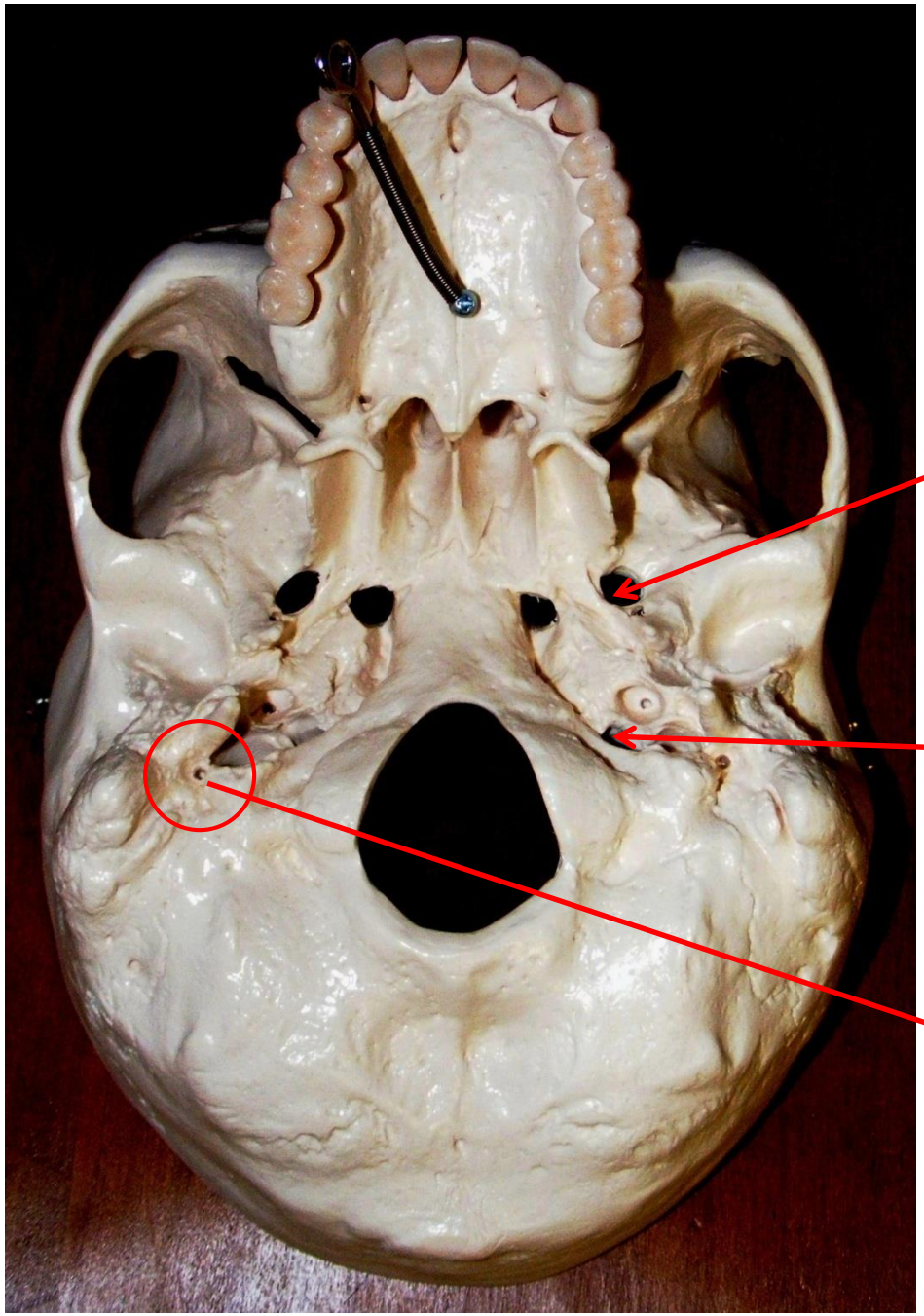

Frontal fontanel
Occipital fontanel



- Zygomatic process
- External auditory meatus
- Styloid process
- Mastoid process
- Occipital protuberance



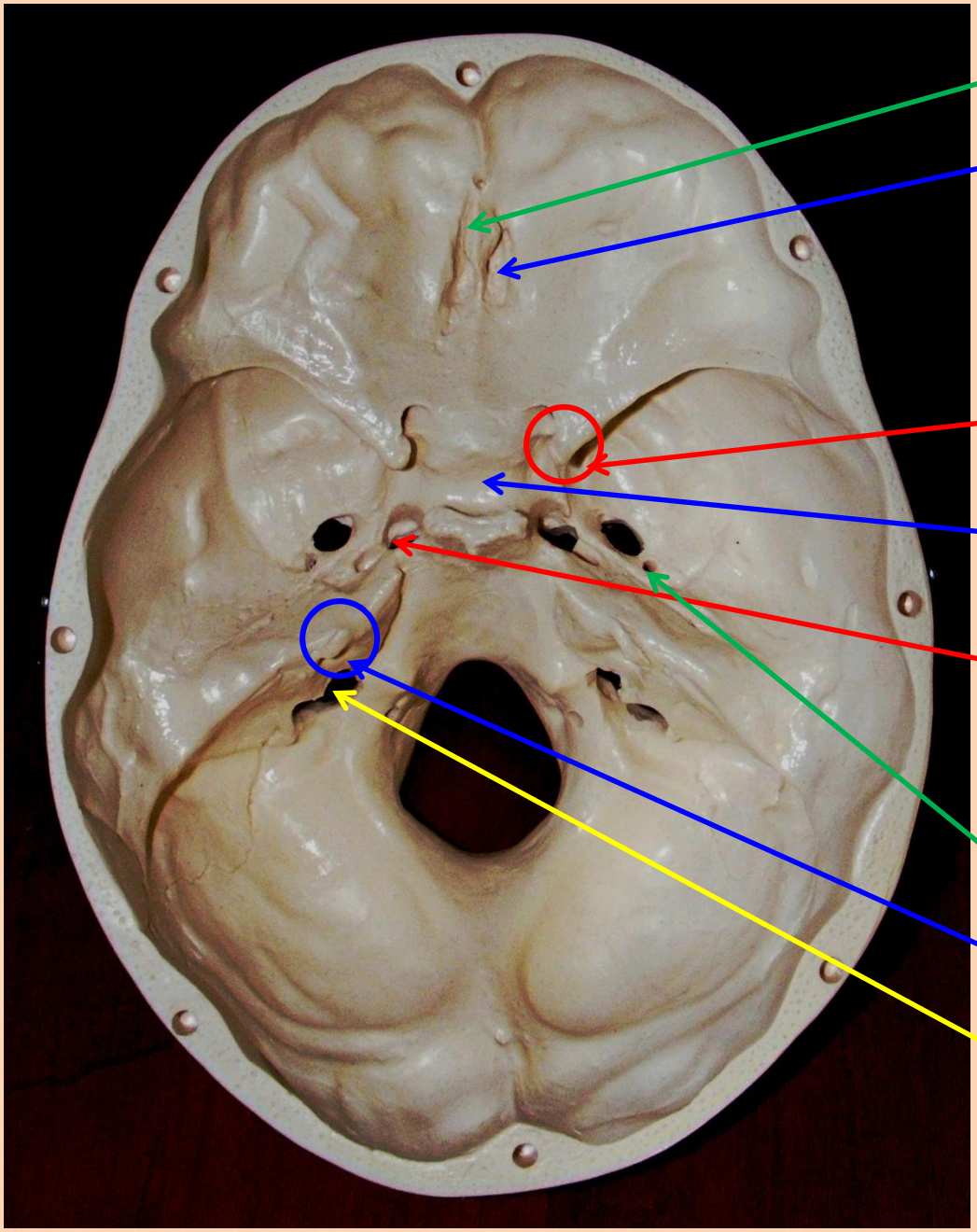
- Incisive fossa
- Zygomatic arch
- Vomer
- Foramen ovale
- Foramen spinosum
- Foramen lacerum
- Mandibular fossa
- Carotid canal
- Occipital condyles (pre-and post- condyle are the anterior (hypoglossal) and posterior condyloid foramen)
- Jugular foramen
- Spinal cord exits via foramen magnum



•Cranial V exits foramen ovale (3d division)

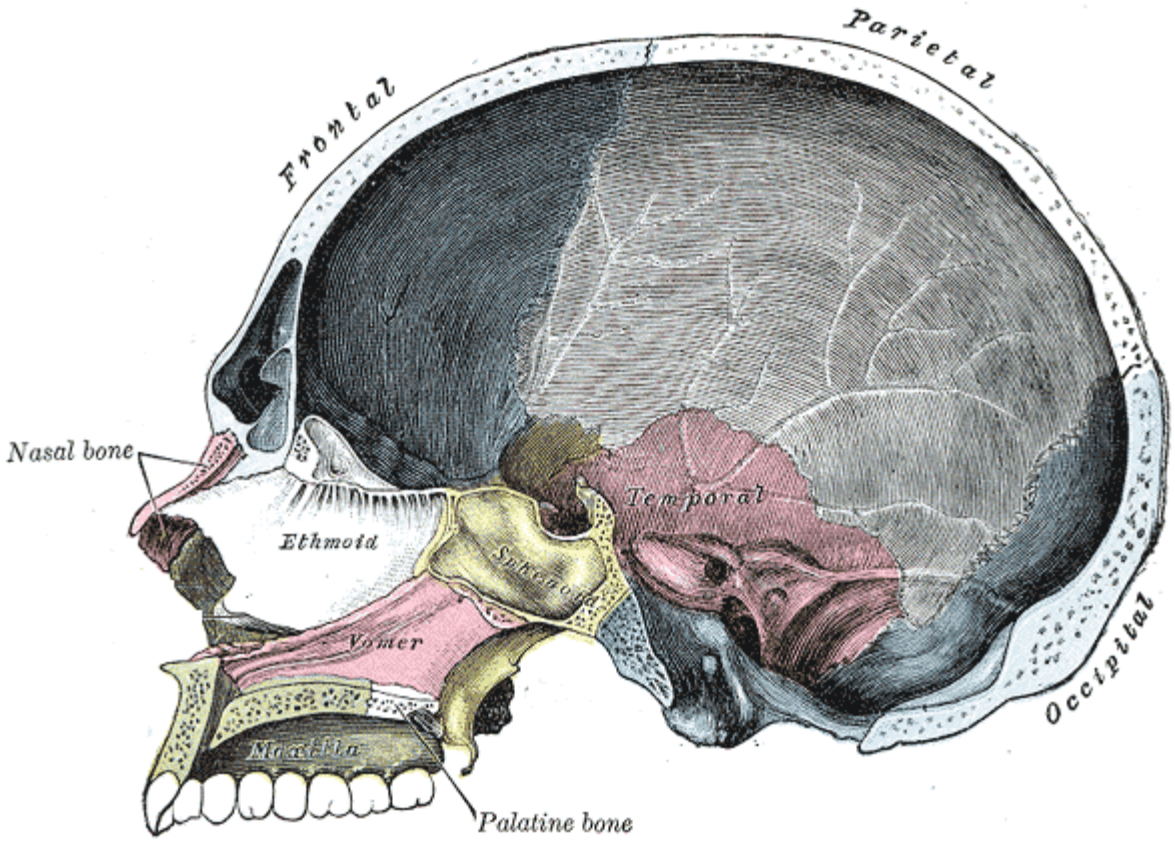
•Cranial XII exits anterior condyloid foramen

•Cranial VII and artery exit stylomastoid foramen



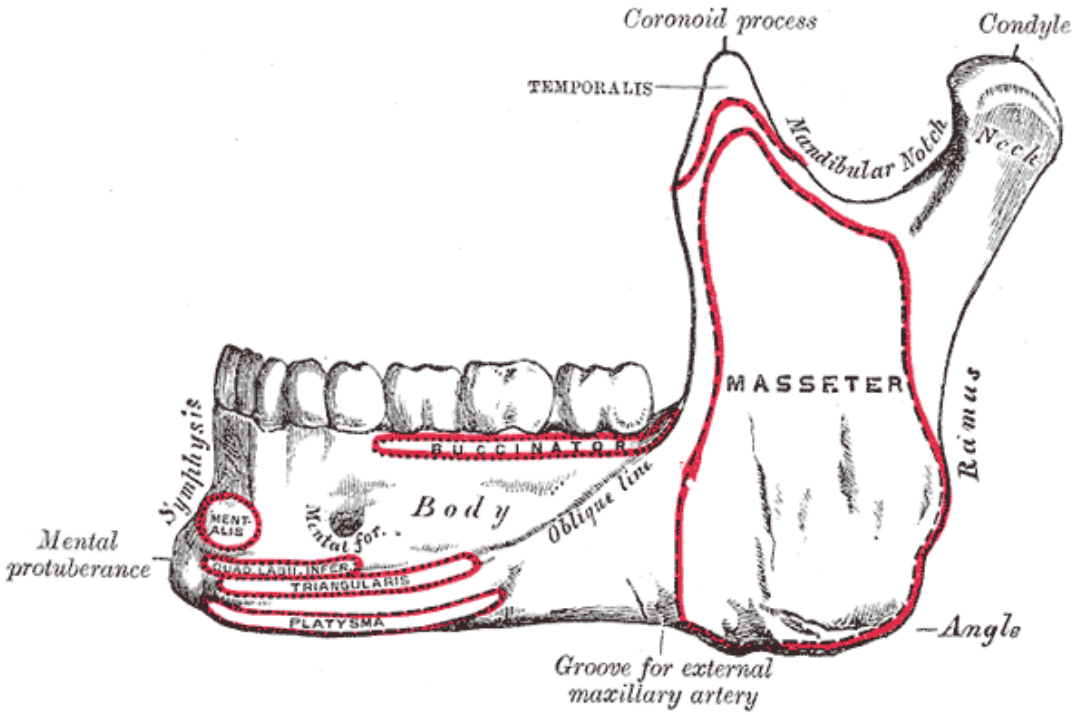
- Crista galli
- Cribriform plate

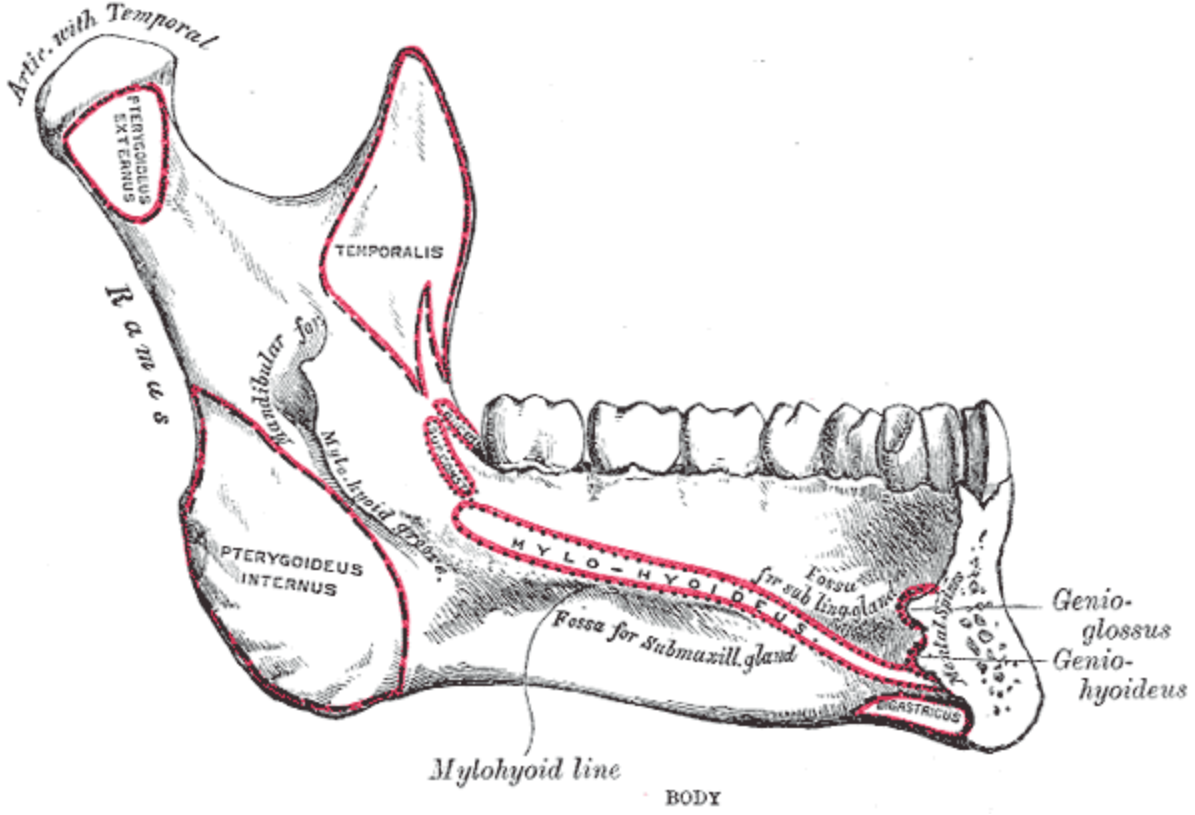
- Cranial V (2^{d} division) exits via foramen rotundum
- Sella turcica
- Cranial III-VI exit foramen lacerum
- Middle meningeal artery enters via foramen spinosum
- Internal auditory meatus
- Jugular foramen


Frontal
Parietal
Nasal bone
Ethmoid
Sphenoid
Temporal
Vomer
Maxilla
Palatine bone
Occipital

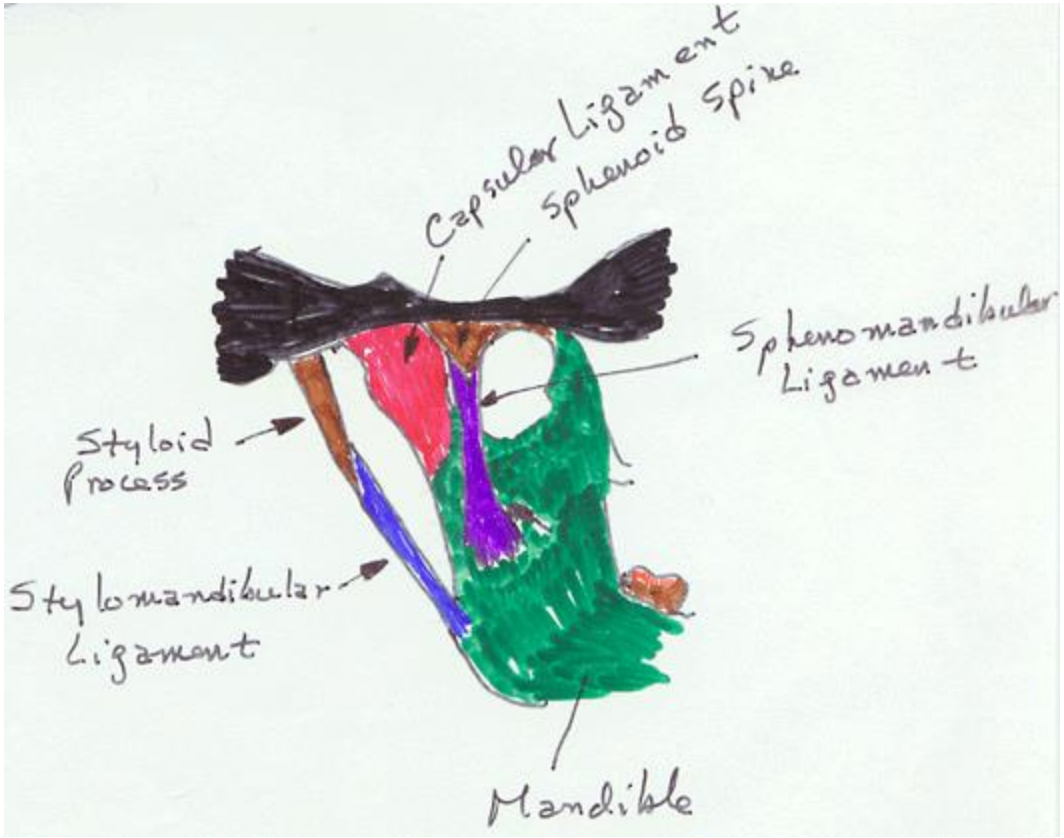
Tempero-Mandibular Joint (TMJ)

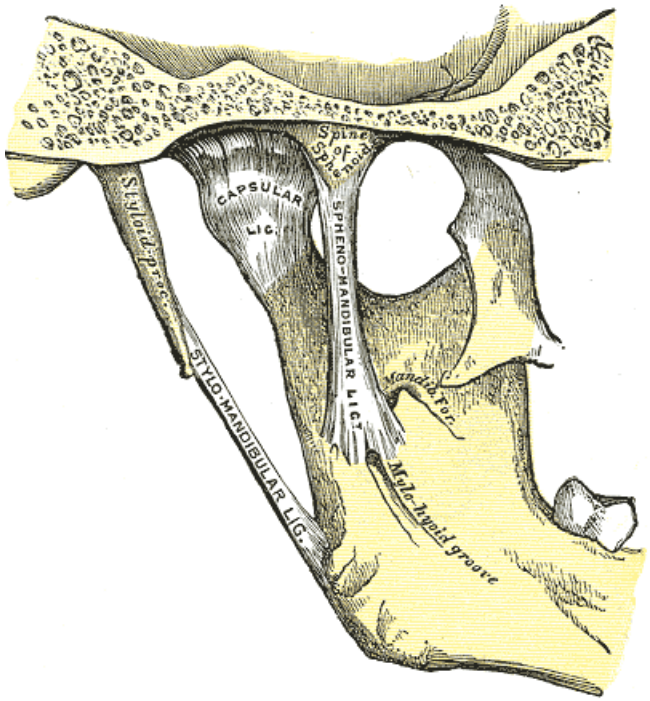
- Consists of the temporal bone and mandible bilaterally



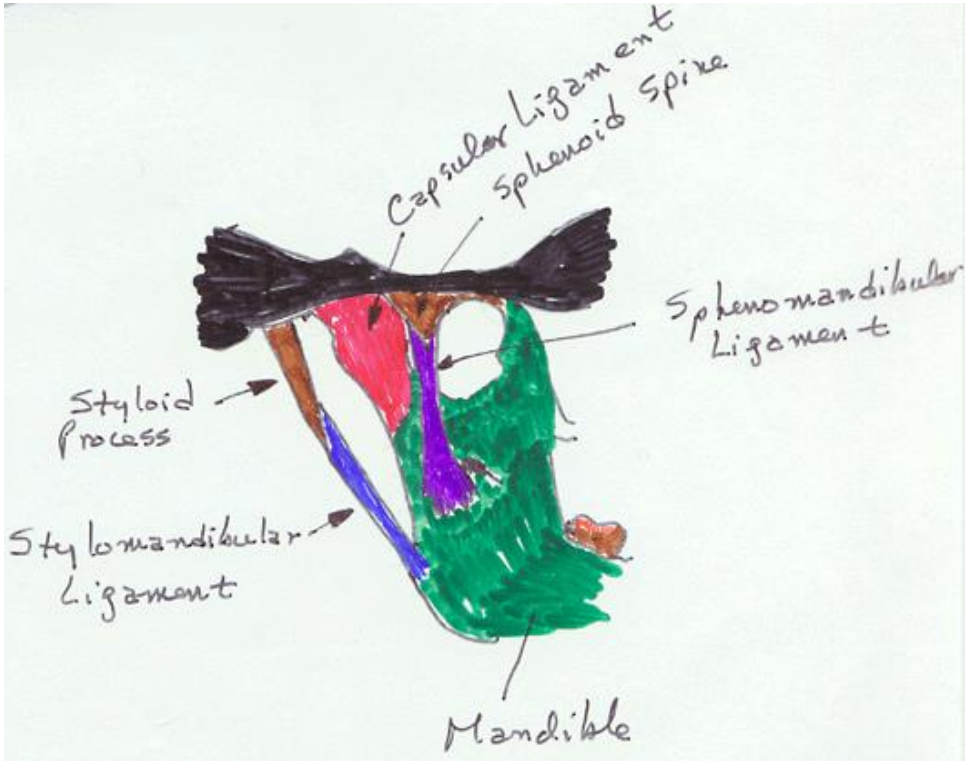

Artic. with Temporal
PTERYGOIDEUS EXTERNUS
TEMPORALIS
Ramus
Mandibular for.
Mylohyoid groove
PTERYGOIDEUS INTERNUS
MYLO-HYOIDEUS
Fossa for sub lingual gland
Fossa for Submaxill. gland
Mental Spines
DIGASTRICUS
Genio-glossus
Genio-hyoideus
Mylohyoid line
BODY

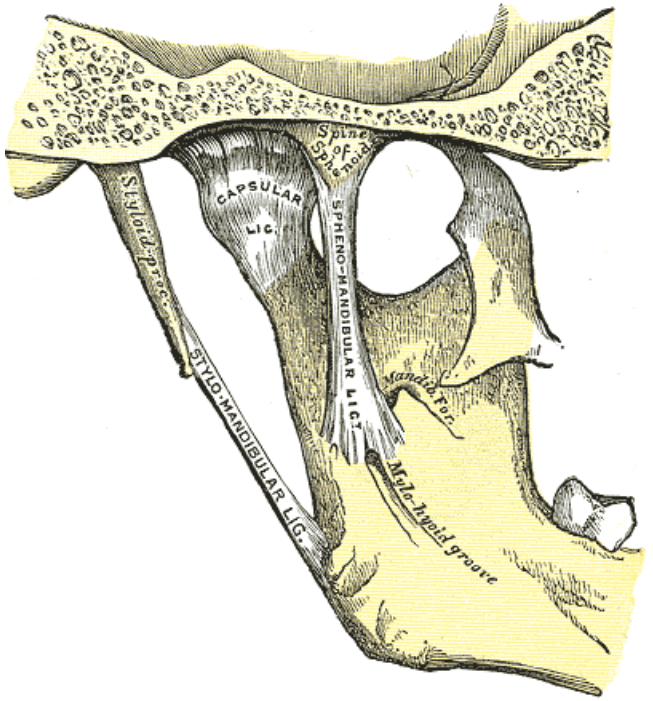
Ligament	Comments
Articular capsule (capsular)	Attaches about the circumference of the mandibular and articular fossa through to the neck of the mandibular condyle.





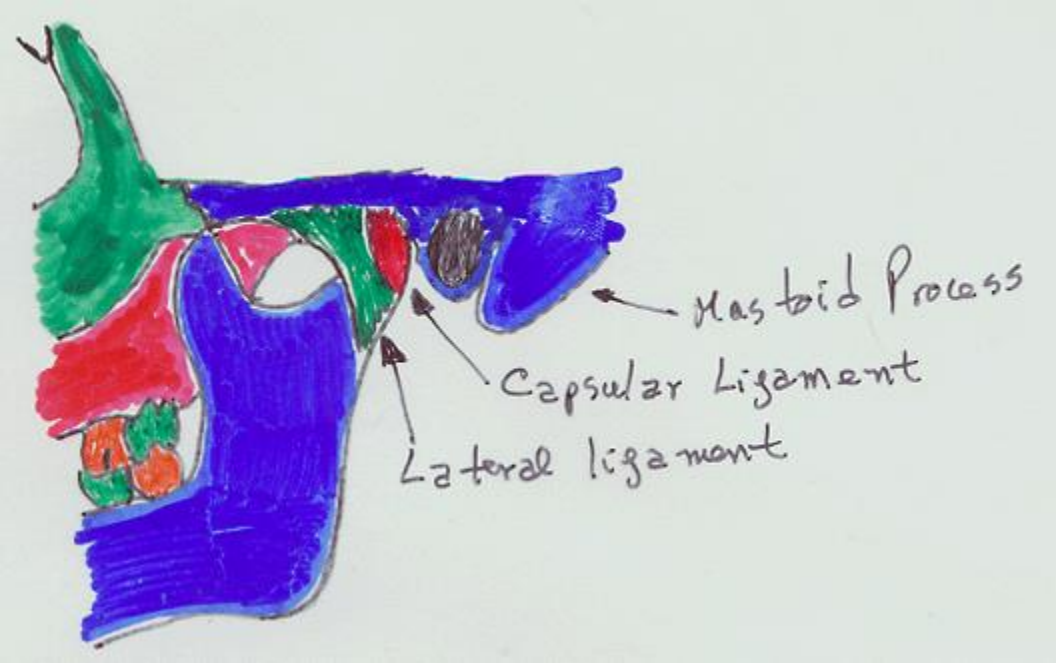
Ligament	Comments
Sphenomandibular	Attaches to the spine of the sphenoid bone posterior to the mandibular neck.

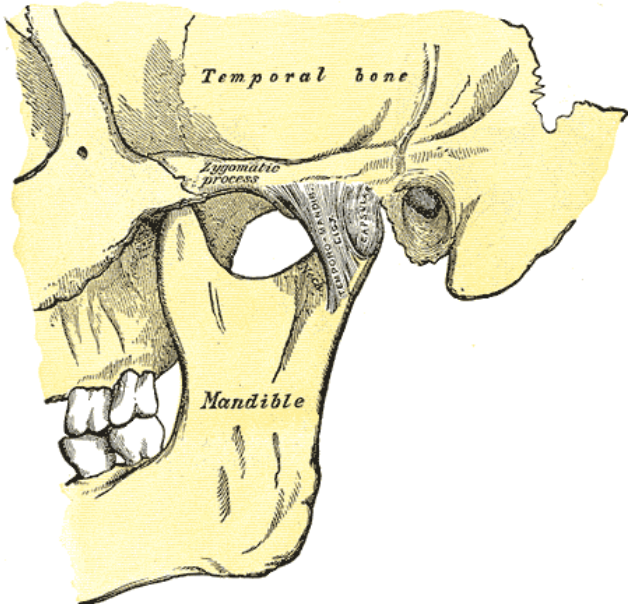


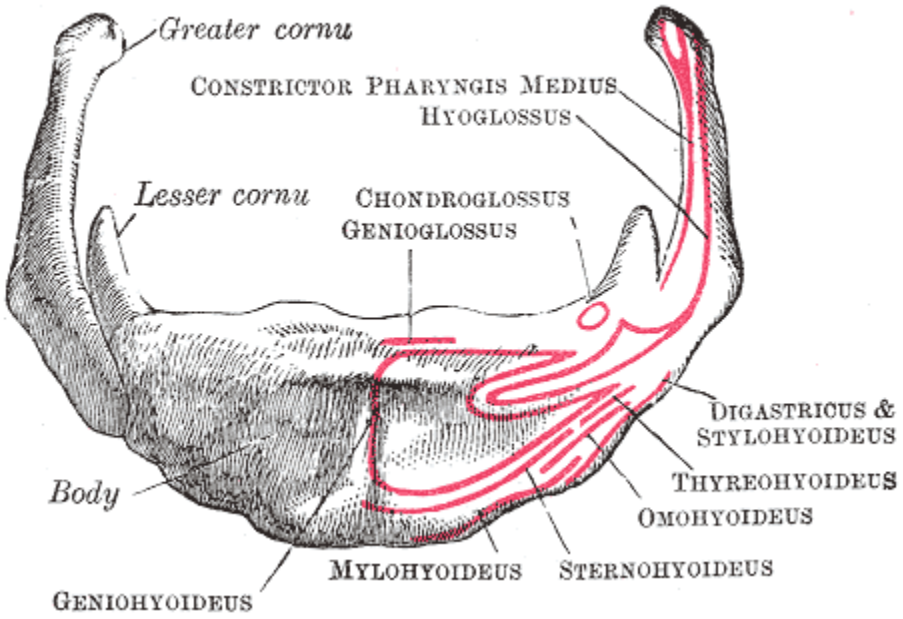


Ligament	Comments
Articular disk (not visible in this view)	A thin oval plate between the mandibular fossa and articular tubercle (condyle); divides the joint into 2 cavities – each of which has its own synovial membrane.
Stylomandibular	Attaches to the apex of the styloid process; and to the angle and posterior border of the mandibular ramus – not a major ligament.

Ligament	Comments
Tempero-mandibular (lateral ligament)	Attaches to the lateral surface of the zygomatic arch and tubercle along to the postero-lateral surface of the mandibular neck. It consists of 2 short, narrow fasciculi and is covered by the parotid gland.

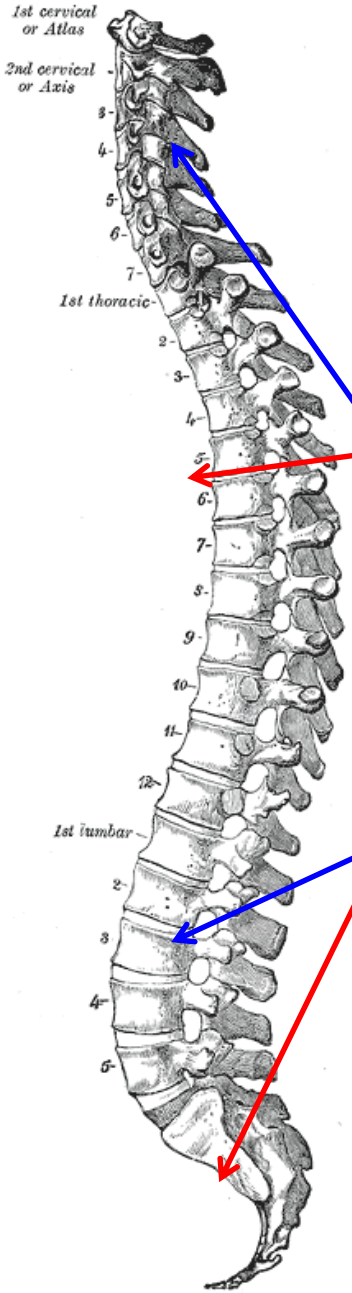




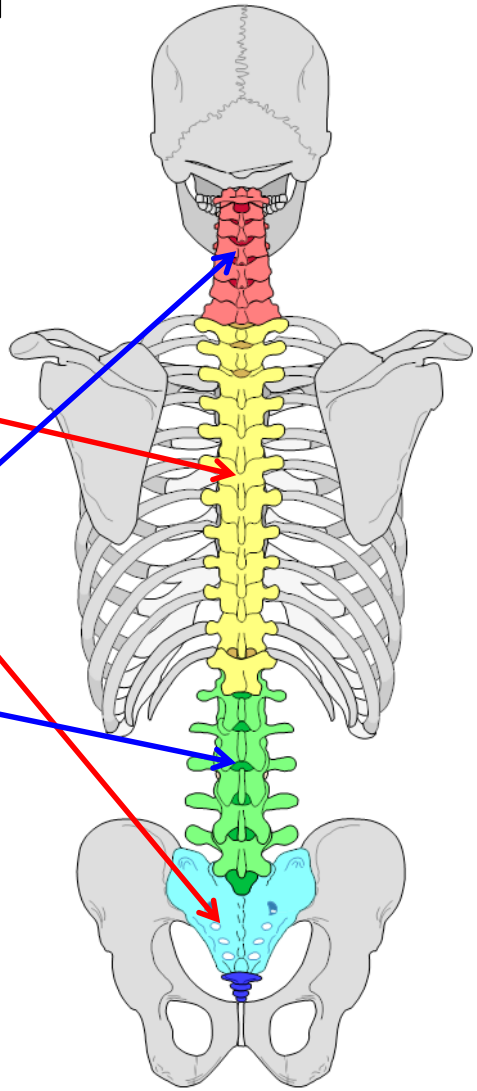


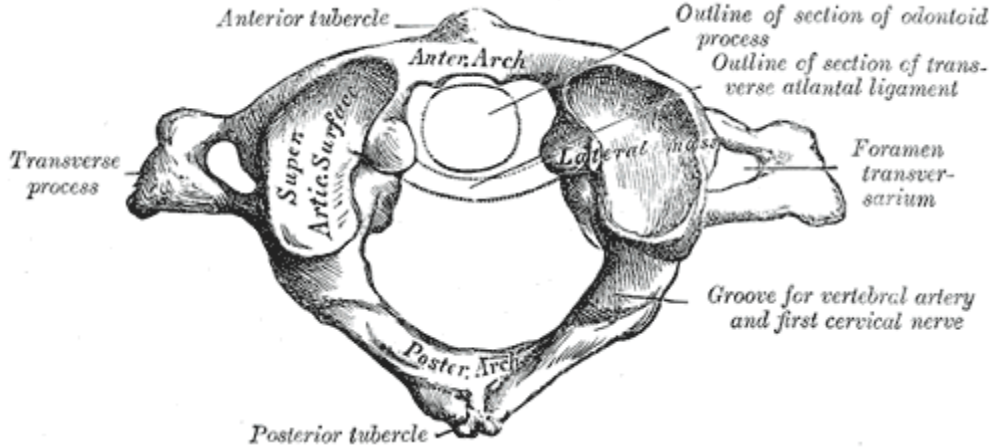
•Tongue anchored to hyoid bone

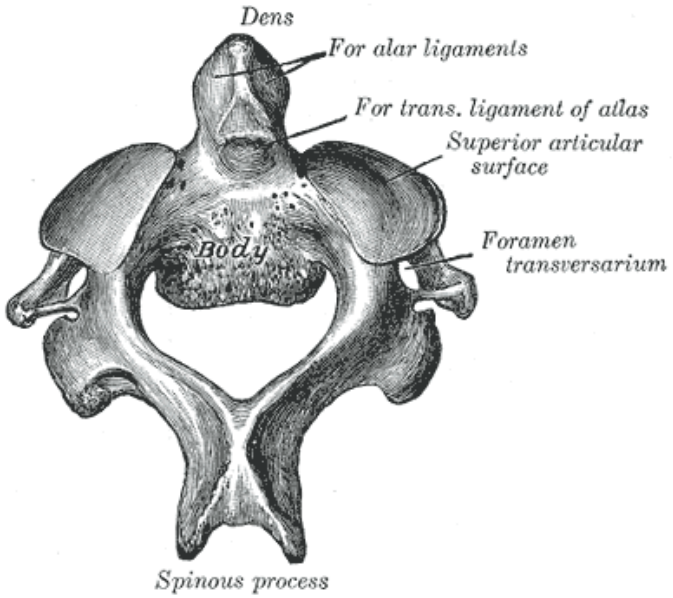
Spinal Column

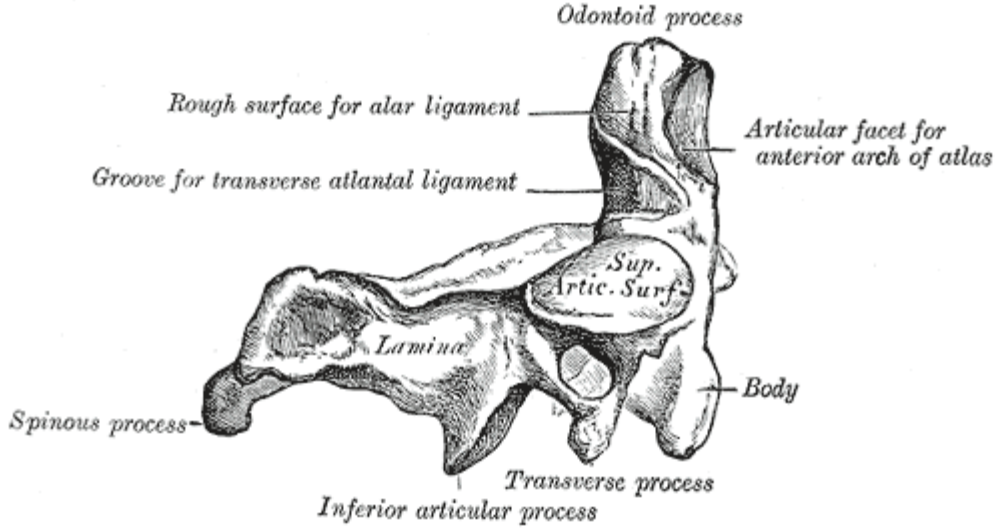


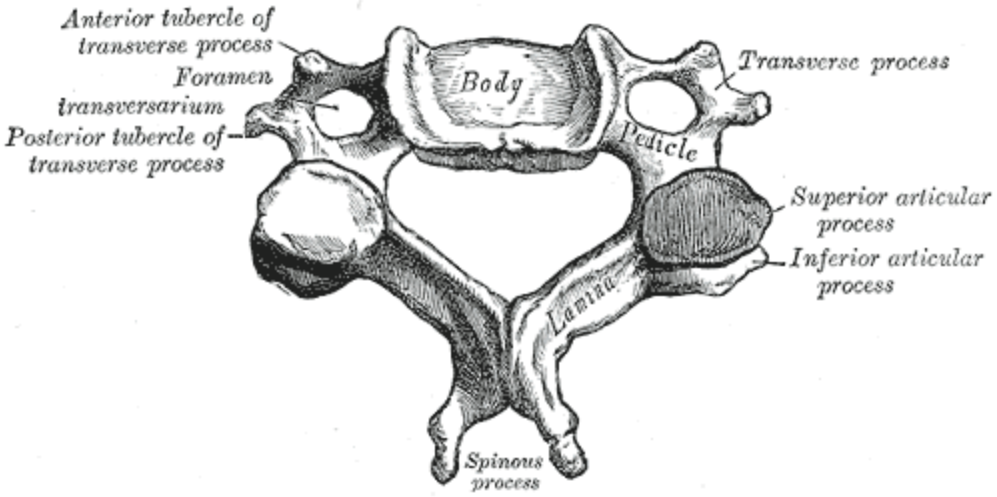
- Primary (1°) Curvature born with
- Secondary (2°) Curvature comes after we learn to sit and stand

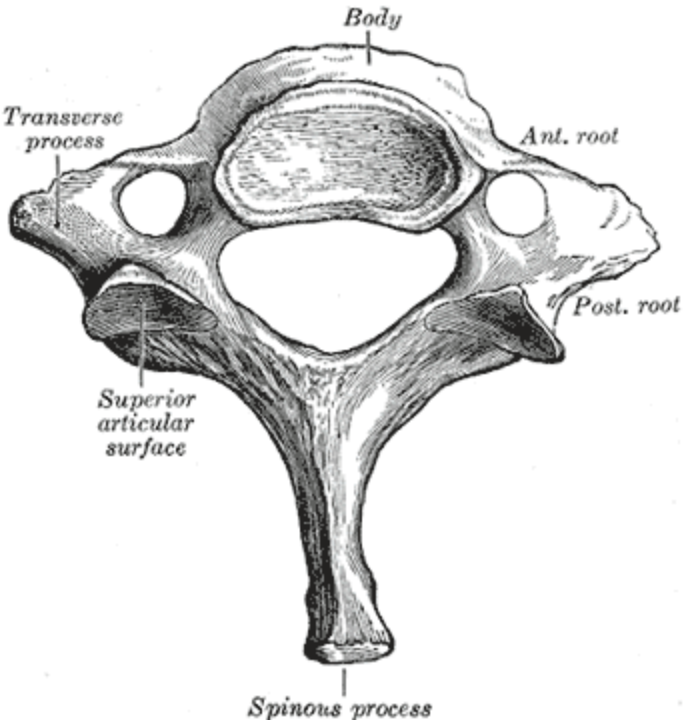


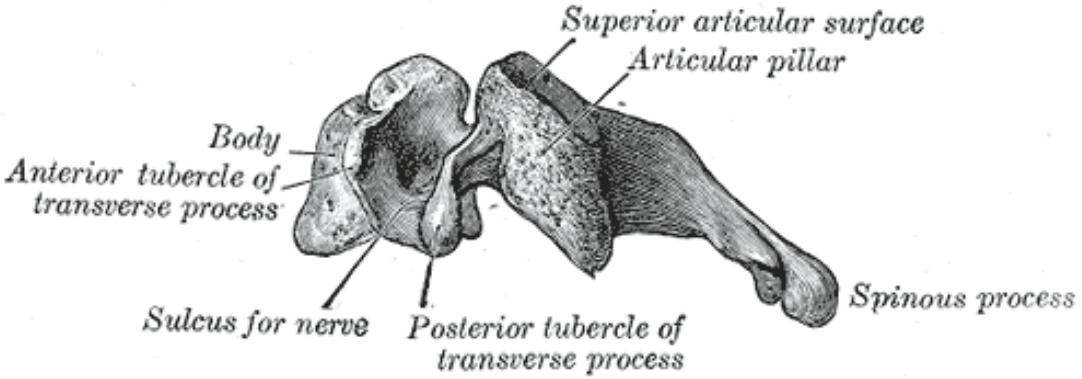

Anterior tubercle
Outline of section of odontoid process
Anter. Arch
Outline of section of transverse atlantal ligament
Transverse process
Super. Artic. Surface
Lateral mass
Foramen transversarium
Groove for vertebral artery and first cervical nerve
Poster. Arch
Posterior tubercle


Dens
For alar ligaments
For trans. ligament of atlas
Superior articular surface
Body
Foramen transversarium
Spinous process

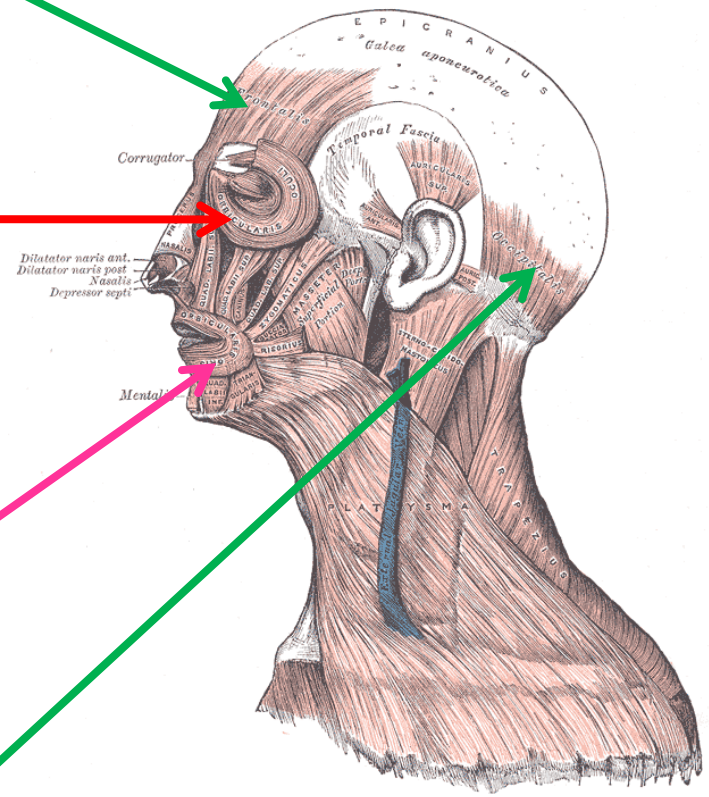

Odontoid process
Rough surface for alar ligament
Articular facet for anterior arch of atlas
Groove for transverse atlantal ligament
Sup. Artic. Surf.
Lamina
Body
Spinous process
Transverse process
Inferior articular process


Anterior tubercle of transverse process
Foramen transversarium
Posterior tubercle of transverse process
Body
Transverse process
Pedicle
Superior articular process
Inferior articular process
Lamina
Spinous process

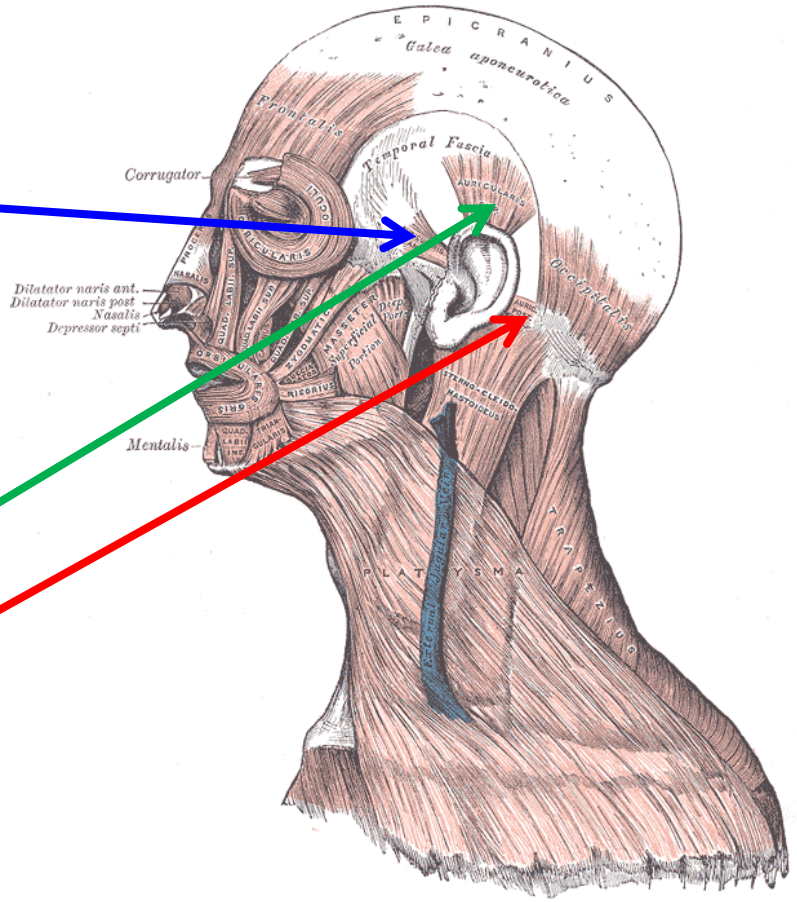

Body
Transverse process
Ant. root
Post. root
Superior articular surface
Spinous process

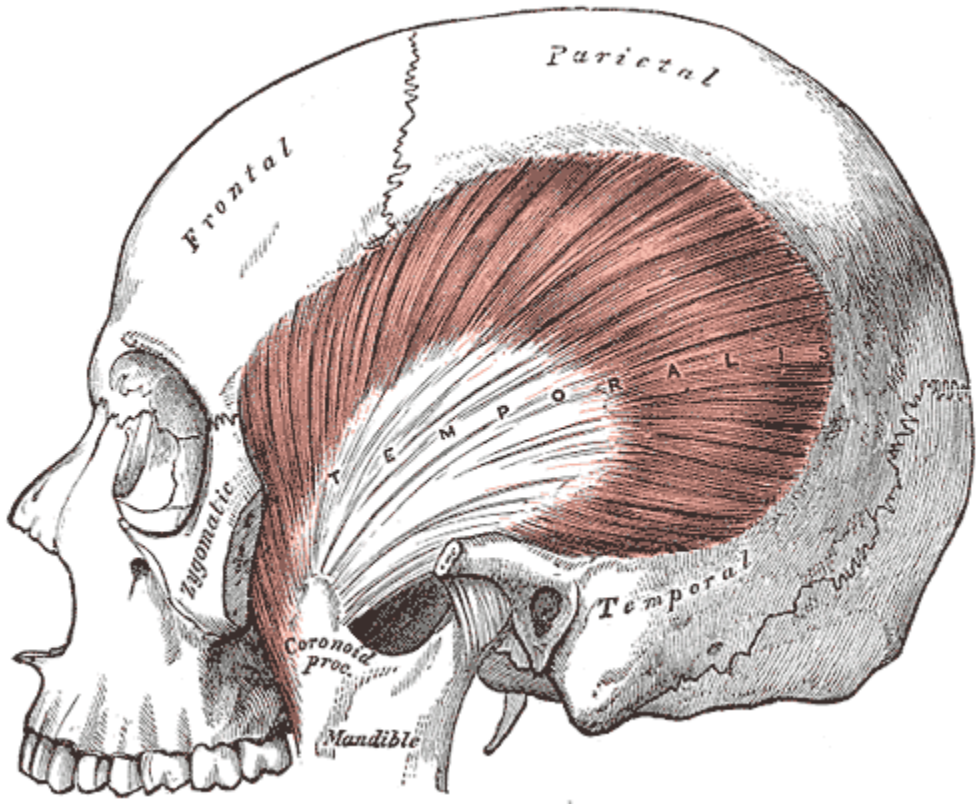

Superior articular surface
Articular pillar
Body
Anterior tubercle of transverse process
Spinous process
Sulcus for nerve
Posterior tubercle of transverse process

MUSCLE	ORIGIN	INSERTION	ACTION
Frontalis	Galea aponeurotica	Frontal and nasal bones	Raises eyebrows; draws scalp forward
Orbicularis oculi	Frontal bone and maxilla	The origin	Closes eyelids gently as in sleep or blinking involuntarily and firmly, voluntarily
Orbicularis oris	Muscle fibers surrounding the mouth	Skin at corners of mouth	Brings lips together, shapes lips during speech, kissing muscle
Occipitalis	Galea aponeurotica	Occipital bone and mastoid process	Draws scalp backwards



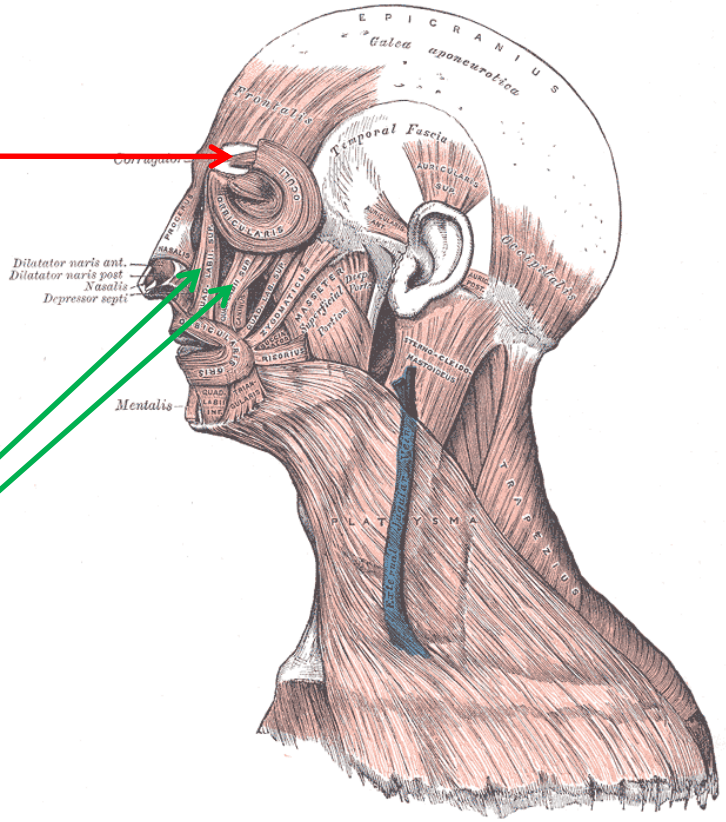
MUSCLE	ORIGIN	INSERTION	ACTION
Attrahens auriculam	Galea aponeurotica	Front of helix – fold of ear	Draws ear upward and forward
Attolens auriculam	Galea aponeurotica	Upper part of pinna (outer ear)	Slightly raises ear
Retrahens auriculam	Mastoid portion of temporal bone	Lower part of concha (opening into meatus)	Lower part of concha (opening into meatus)
Superficial muscles			



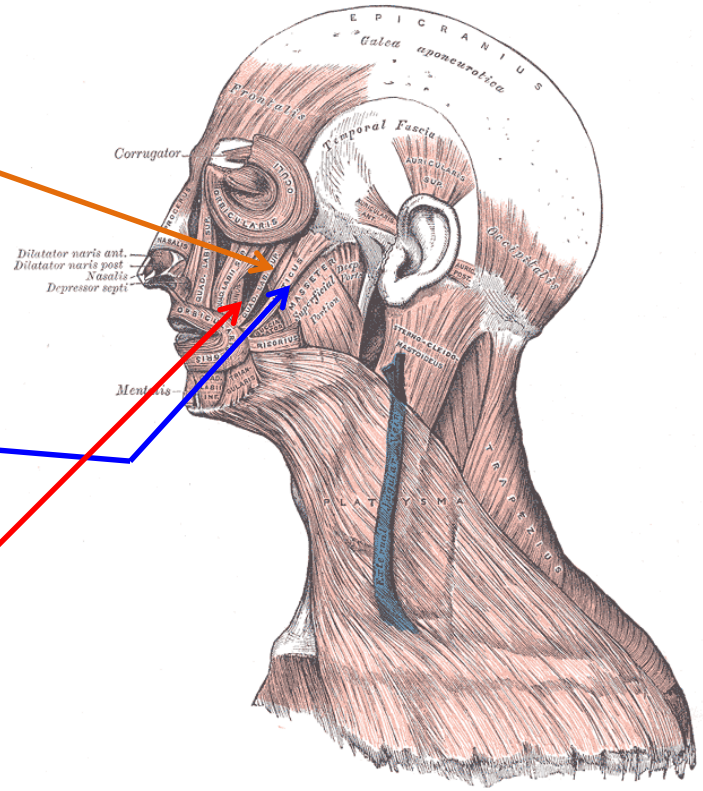


MUSCLE	ORIGIN	INSERTION	ACTION
Temporalis	Frontal, parietal, temporal and sphenoid bones	Coronoid process of mandible	Assists in jaw closure
Deep Muscle			

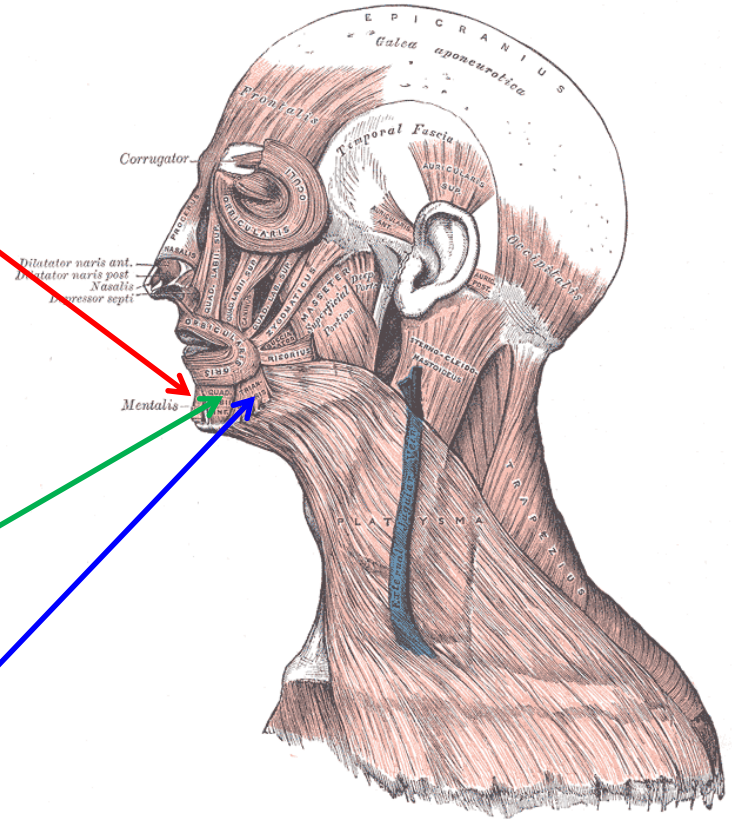
MUSCLE	ORIGIN	INSERTION	ACTION
Corrugator supercilii	Frontal bone and maxilla	Deep skin, superiorly and laterally	Passes between two fascicles of the O. oculi – frowning muscle
Levator labii superioris et alaquae nasi	Maxilla and above infraorbital foramen	Ala of nose and upper lip	Sneer muscle -- Elvis
Depressor alae nasi – not shown, here	Incisive fossa of maxilla (over central/ lateral incisors)	Nasal septum and posterior ala	Constricts the nares



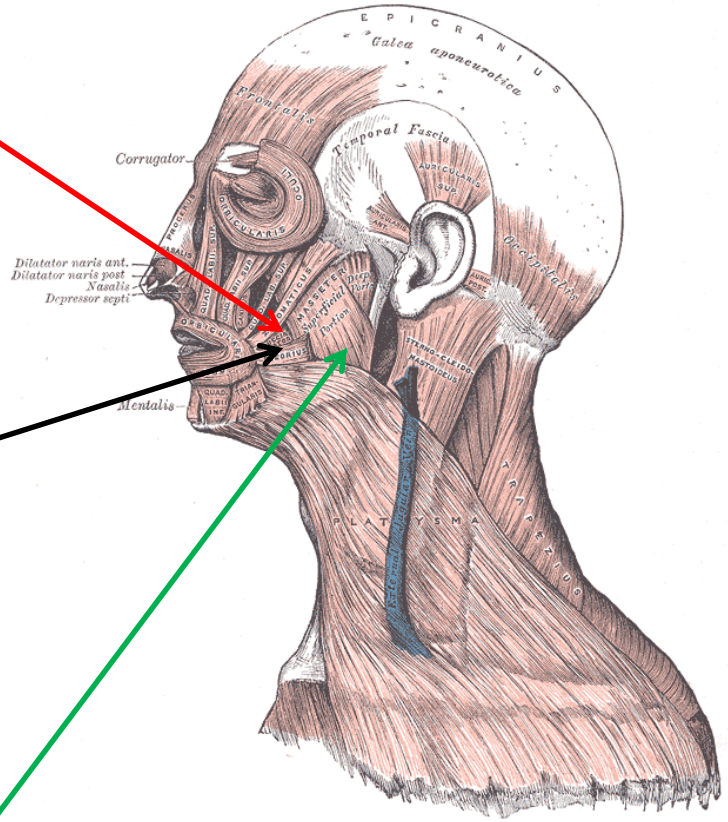
MUSCLE	ORIGIN	INSERTION	ACTION
Zygomaticus minor	Malar bone, posterior to maxillary suture	Angle of mouth	Moves mouth backwards, upward and out as in sadness
Zygomaticus major	Malar bone, anterior to zygomatic suture	Angle of mouth	Moves mouth backward and upward as in laughing
Levator anguli oris	K-9 fossa below infraorbital foramen	Angle of mouth	Raises angle of mouth



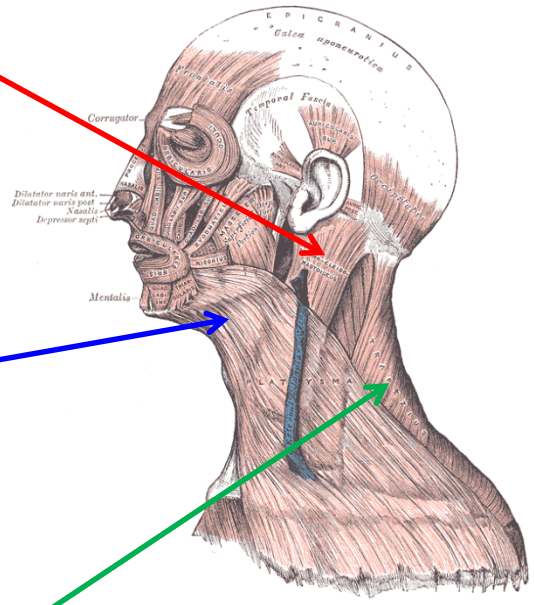
MUSCLE	ORIGIN	INSERTION	ACTION
Levator menti (Mentalis)	Incisive fossa lateral to mandibular symphysis	Skin of chin	Protrudes lower lip forward; doubt/disdain
Depressor labii inferioris (quadratus menti)	Between mandibular symphysis and mental foramen	Skin of lower lip	Draws lip down and out; irony
Depressor anguli oris (triangularis menti)	Same as Q. menti	Angle of mouth	Depresses angle of mouth

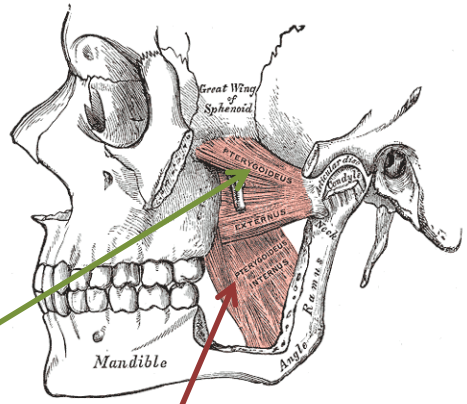


MUSCLE	ORIGIN	INSERTION	ACTION
Buccinator	1st, 2d and 3d molar alveolar processes – upper & lower	Angle of mouth	Compresses cheeks; sucking muscle; Dizzy Gillespie
Risorius	Fascia over the masseter	Skin at the angle of the mouth	Retracts the angles of the mouth; produces the sardonic expression
Masseter	Malar process of maxilla; zygomatic arch	Angle/ramus of jaw and coronoid process	Elevates the mandible as in closing the mouth; walnut cracking muscle

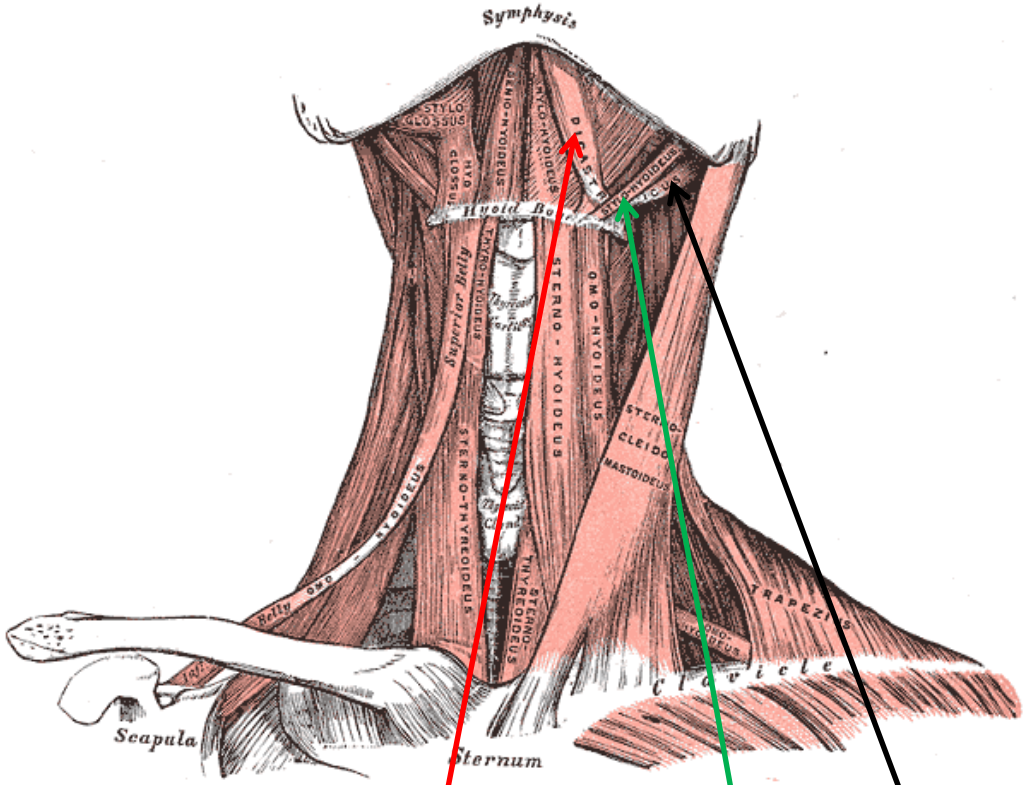


MUSCLE	ORIGIN	INSERTION	ACTION
Sternocleidomastodeus (SCM)	Sternum (manubrium) and clavicle)	Outer surface of mastoid process and occipital bone	Rotates head to opposite side; draws head to same side
Platysma	Fascia covering upper chest and shoulders	Skin of face and about angle of mouth	Draws down lower lip; expression of melancholy
Trapezius	Inner third of occipital bone and protuberance; thoracic vertebra	Posterior border of clavicle; inner margin of acromion; crest of scapular spine	Retracts scapula; braces shoulder; rotates scapula; draws head backward



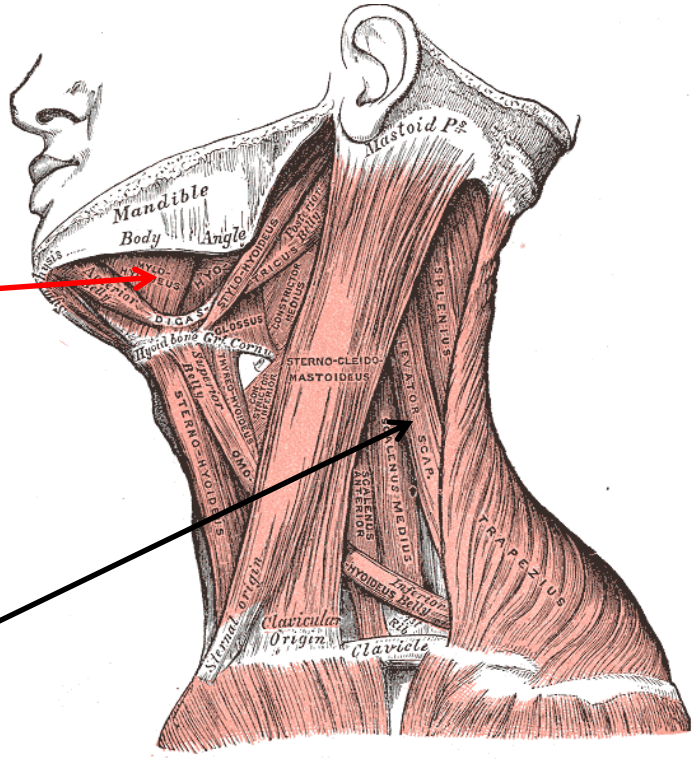


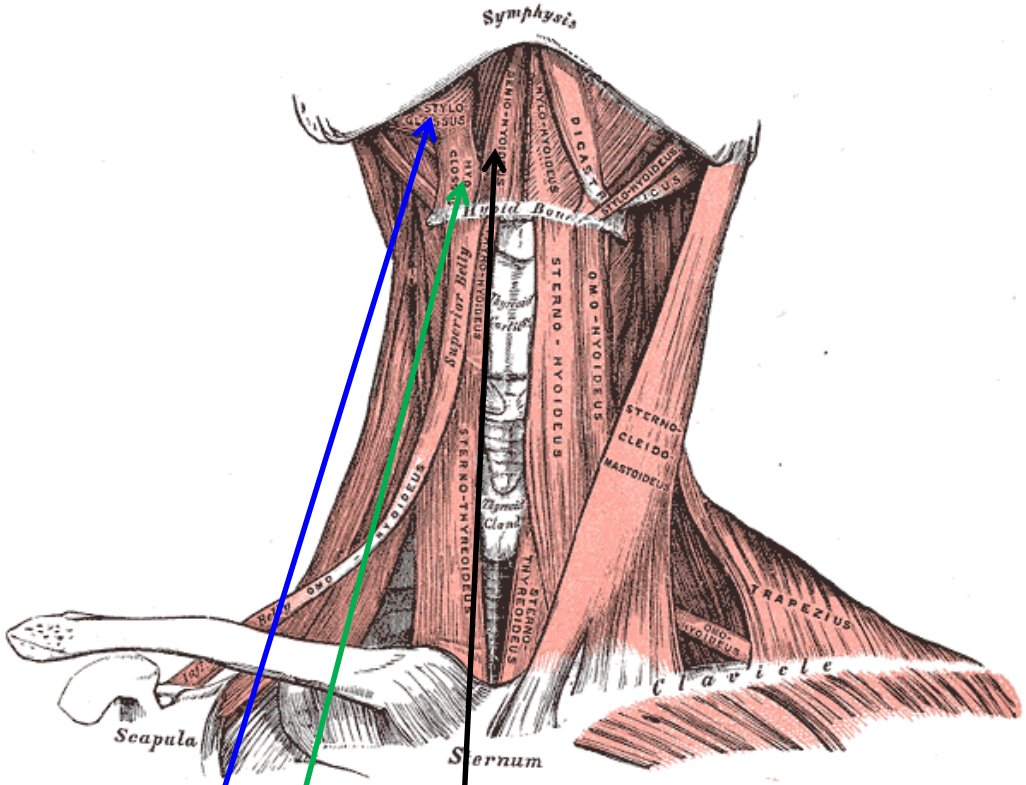
MUSCLE	ORIGIN	INSERTION	ACTION
Pterygoideus externus	great wing of the sphenoid	neck of the condyle of the mandible	Protrudes mandible
Pterygoideus internus	lateral pterygoid plate and the pyramidal process of the palatine bone	ramus and angle of the mandible, as high as the mandibular foramen	Raises mandible with masseter and temporalis



MUSCLE	ORIGIN	INSERTION	ACTION
Posterior digastricus belly	Inner mastoid	Hyoid bone	Prevents return of morsel into mouth after swallowed
Stylohyoid	Styloid process	Body of hyoid	As with above
Anterior digastricus belly	Mandibular symphysis	Hyoid bone	Pushes tongue against roof of mouth in swallowing

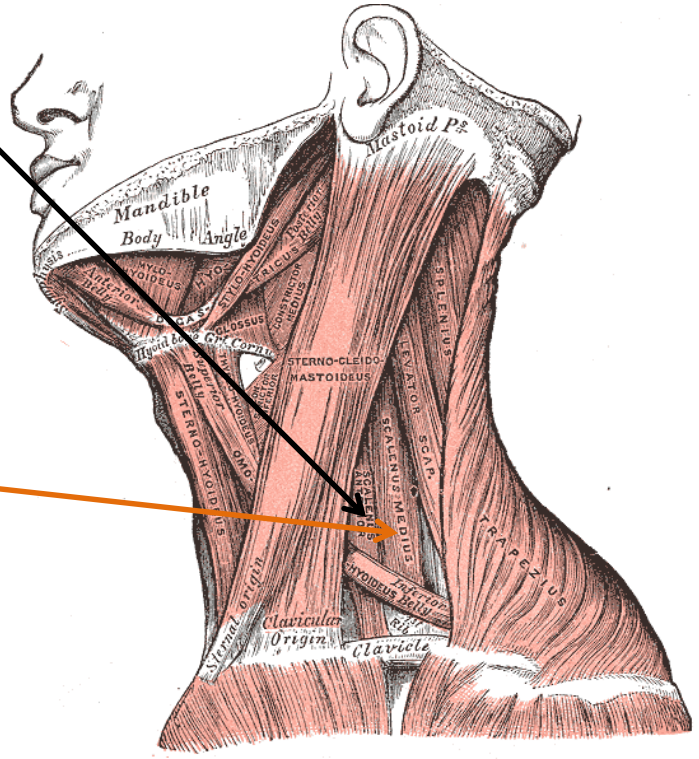
MUSCLE	ORIGIN	INSERTION	ACTION
Mylohyoid	Mandibular symphysis to last molar	Body of hyoid	Pushes tongue against roof of mouth in swallowing – like ant. digastricus
Levator anguli scapula	Transverse processes of C1-4	Posteromedial border of scapula	Shrugs shoulders



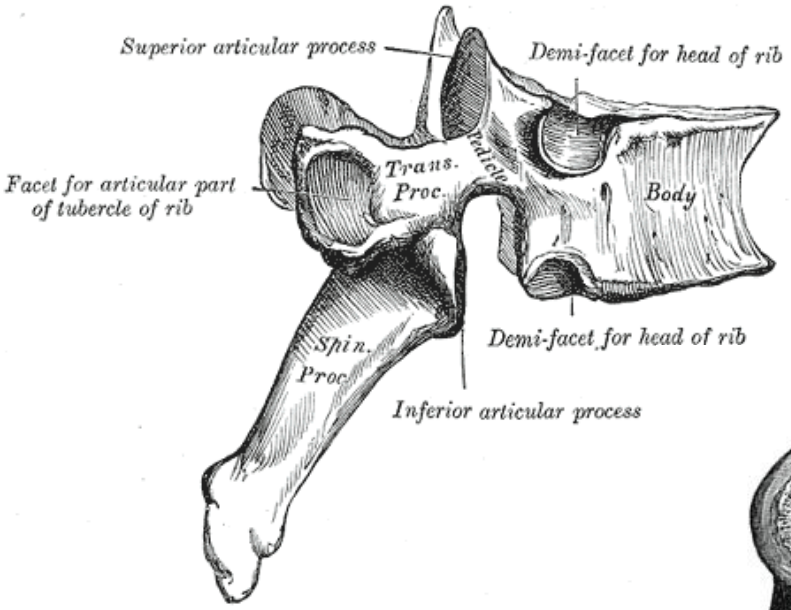


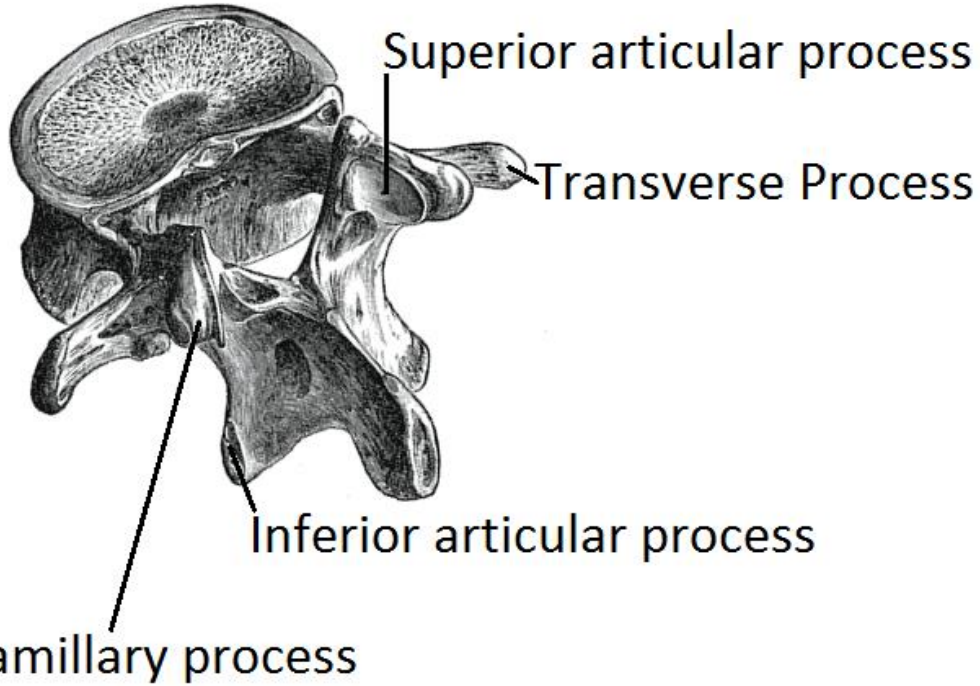
MUSCLE	ORIGIN	INSERTION	ACTION
Styloglossus	Styloid process	Anterior/tip of tongue	Curls tongue backwards
Hyoglossus	Hyoid bone	Middle of tongue	Rolls tongue
Geniohyoid	Inner mandibular symphysis	Body of hyoid	As with ant. Digastricus: tongue against roof of mouth

MUSCLE	ORIGIN	INSERTION	ACTION
Scalenus anticus	Tranverse processes of C vertebra	Inner and upper surface of rib 1	Cone shaped; elevates first two ribs: inspiration
Scalenus medius	Transverse processes of C2-7	Upper surface of rib 1	Largest of the three; elevates first two ribs: inspiration
Scalenus posticus	Transverse processes of C5-7	Outer surface of rib 2	Deepest of the three; elevates first two ribs: inspiration
Bend vertebral column laterally and medially; slight flexion; when acting antagonistically, there is NO lateral movement of the vertebral column			

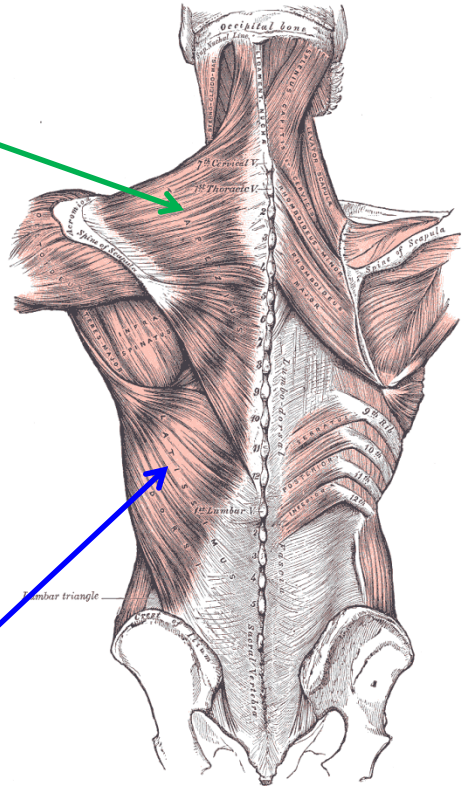


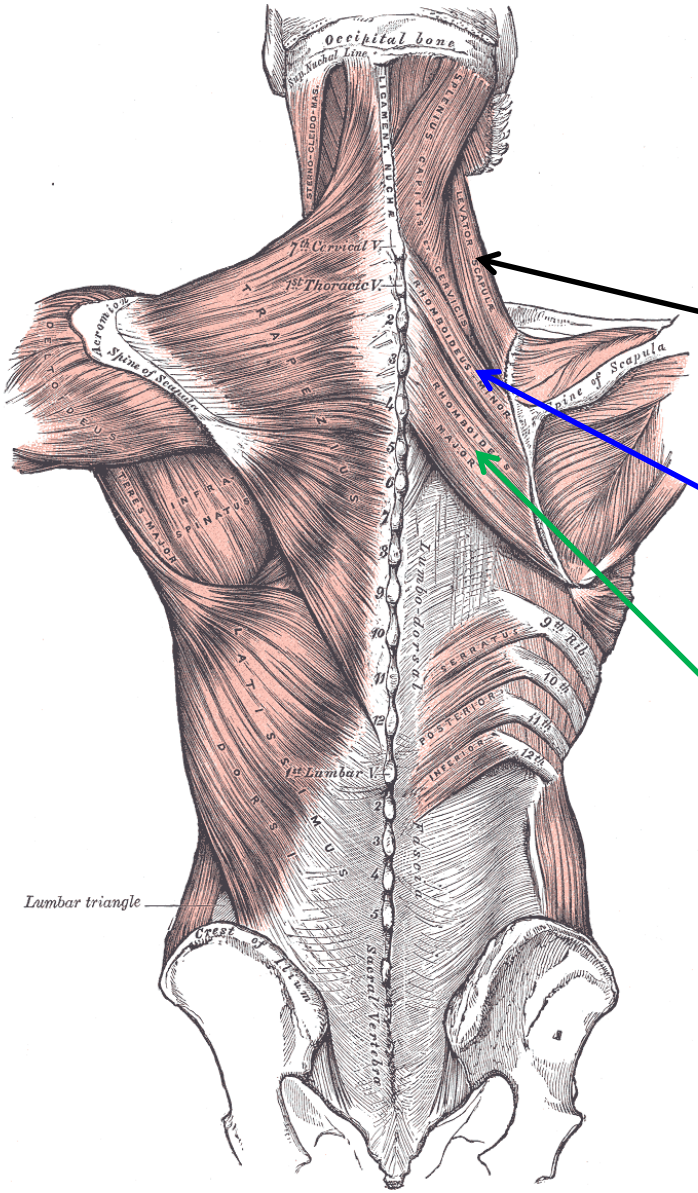
Posterior Thoraco-Lumbar



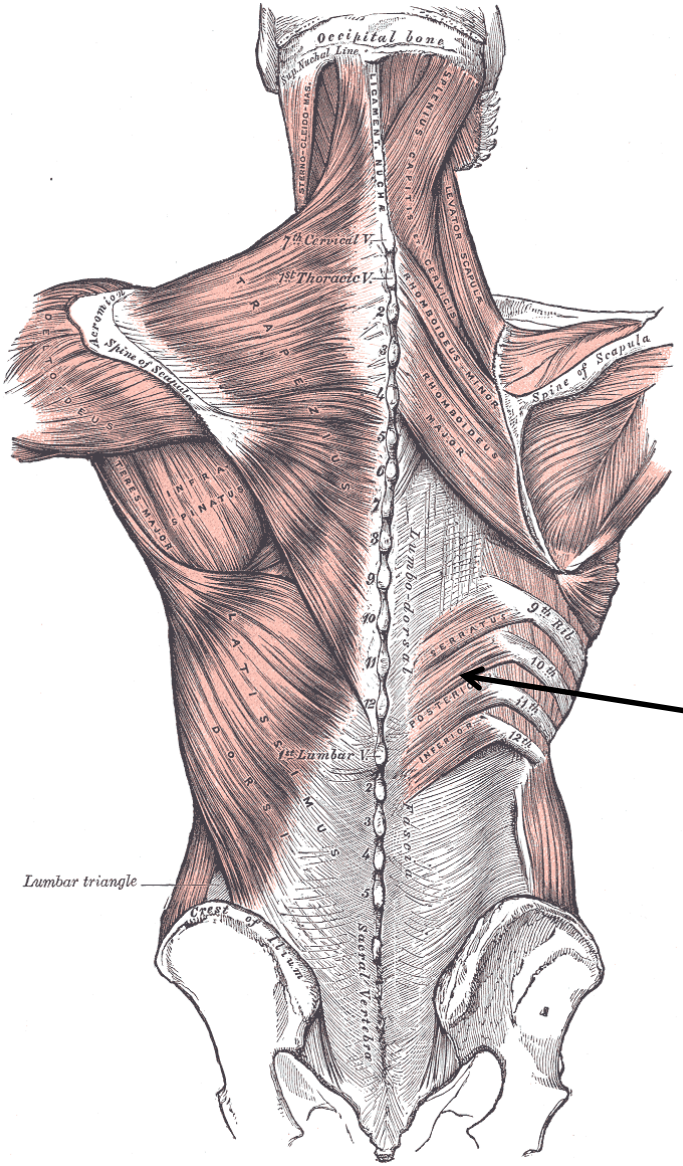


MUSCLE	ORIGIN	INSERTION	ACTION
Trapezius	Inner third of occipital bone and protuberance; thoracic vertebra	Posterior border of clavicle; inner margin of acromion; crest of scapular spine	Retracts scapula; braces shoulder; rotates scapula, draws head backward
Latissimus dorsi	T6-S5; iliac crests; ribs 9-12	Lower half of intertubercular groove	Twisted upon itself; depresses humerus; draws humerus backwards; adducts humerus; rotates humerus inward; involved primarily in downward blow of arm



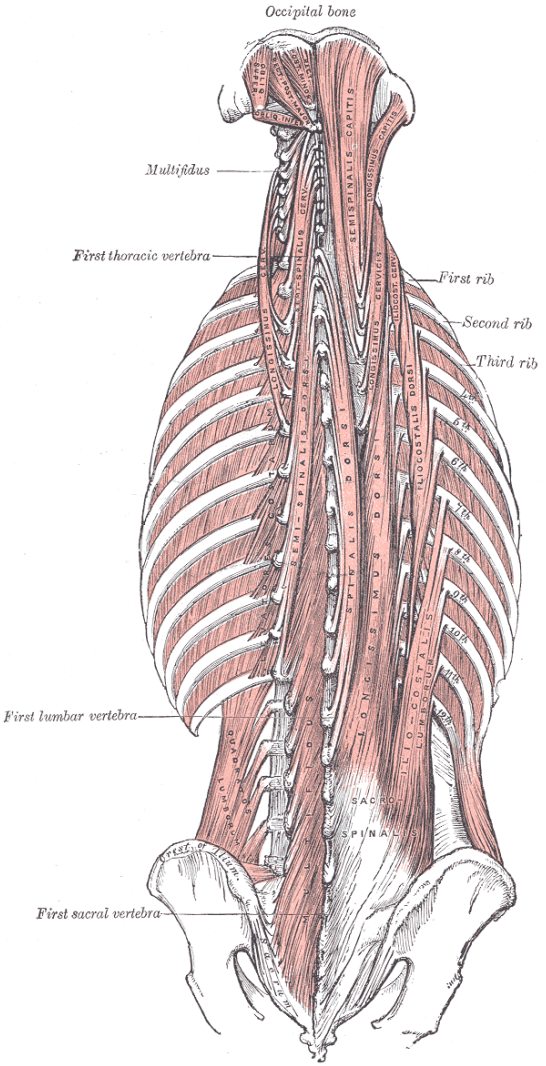


MUSCLE	ORIGIN	INSERTION	ACTION
Levator anguli scapuli	Transverse processes of C1-4	Posteromedial border of scapula	Shrugs shoulders
Rhomboideus minor	C7 and T1	Root of scapular spine	Rotates scapula
Rhomboideus major	T1-4 or 5	Lower root of scapular spine and inferior angle	Rotates scapula backward and upward

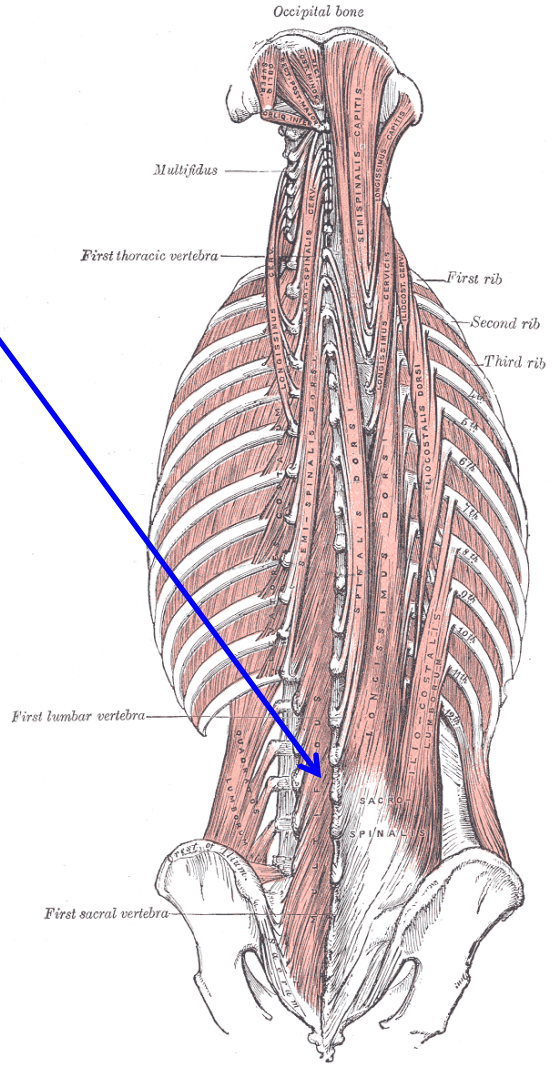


MUSCLE	ORIGIN	INSERTION	ACTION
Serratus posticus superioris	C7-T3 spinous processes	Upper borders of ribs 2-4	Elevates the ribs on inspiration; beneath Rhomboids
Serratus posticus inferioris	T11-L2 or3	Lower borders of ribs 9-12	Draws lower ribs downward in inspiration

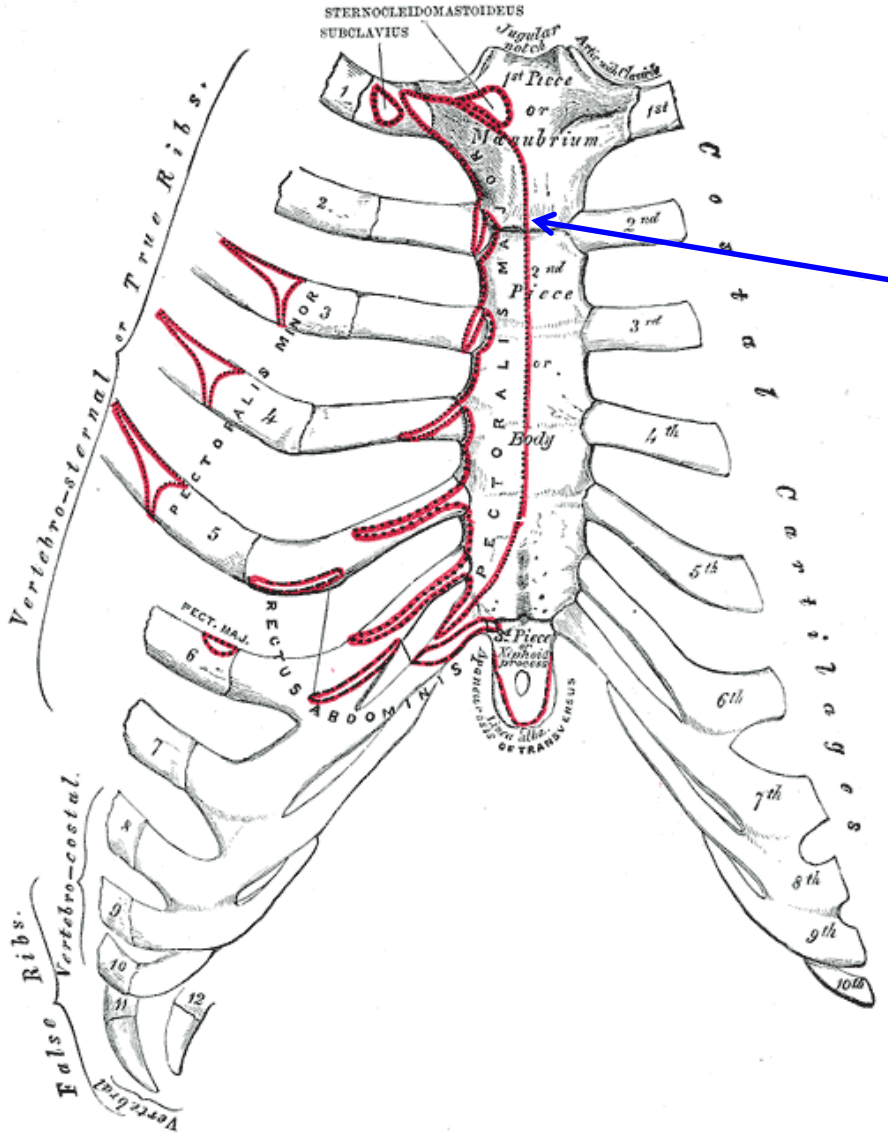
MUSCLE	ORIGIN	INSERTION	ACTION
Erector spinae (sacrospinalis) – superficial layer of the deep muscles	Mid-sacral crest; spinous processes of L1-5 and T 11-12; to rough ridge on inner lip of iliac crests superior to auricular surface	"9-way split"	Extends vertebral column and bends vertebral column to one side.



MUSCLE	ORIGIN	INSERTION	ACTION
Multifidus spinae	S4 foramen; medial PSIS; all mammillary processes in T spine; articular processes of C4-7	Obliquely ascend to spinous processes from C5-L5	Extends vertebral column and rotates to opposite side
Rotatores spinae	Transverse process of one vertebra	Base of the spinous process of the vertebra above it	Extends vertebral column and rotates to opposite side; longi: crosses obliquely breves: crosses horizontally

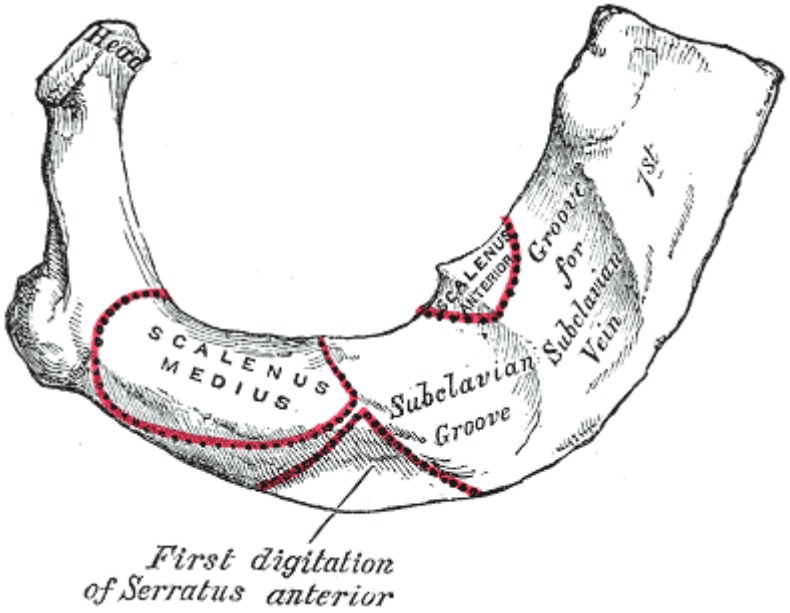


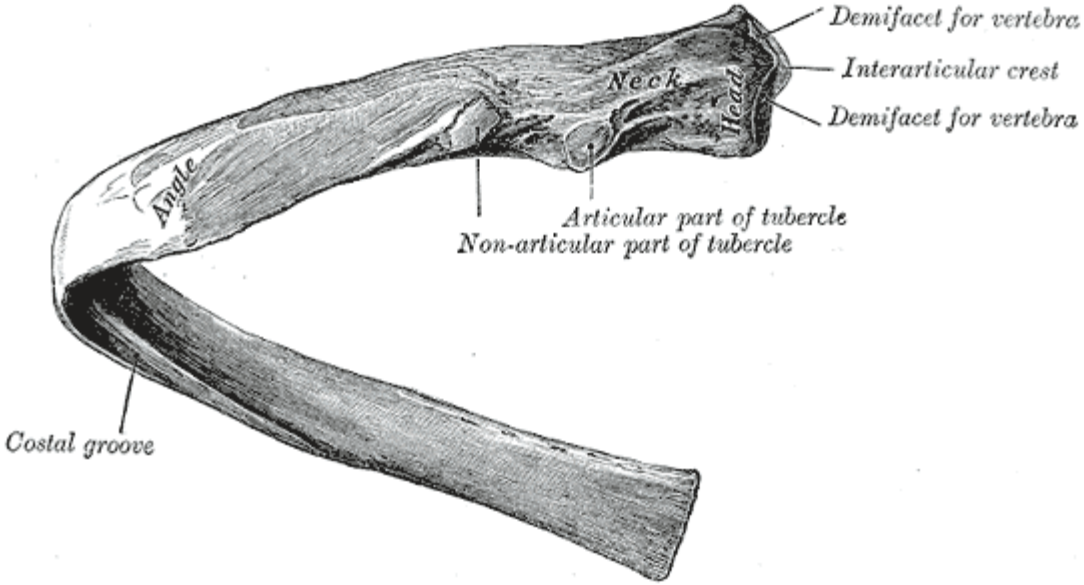
Chest and Upper Extremity: Sternocostal Articulation



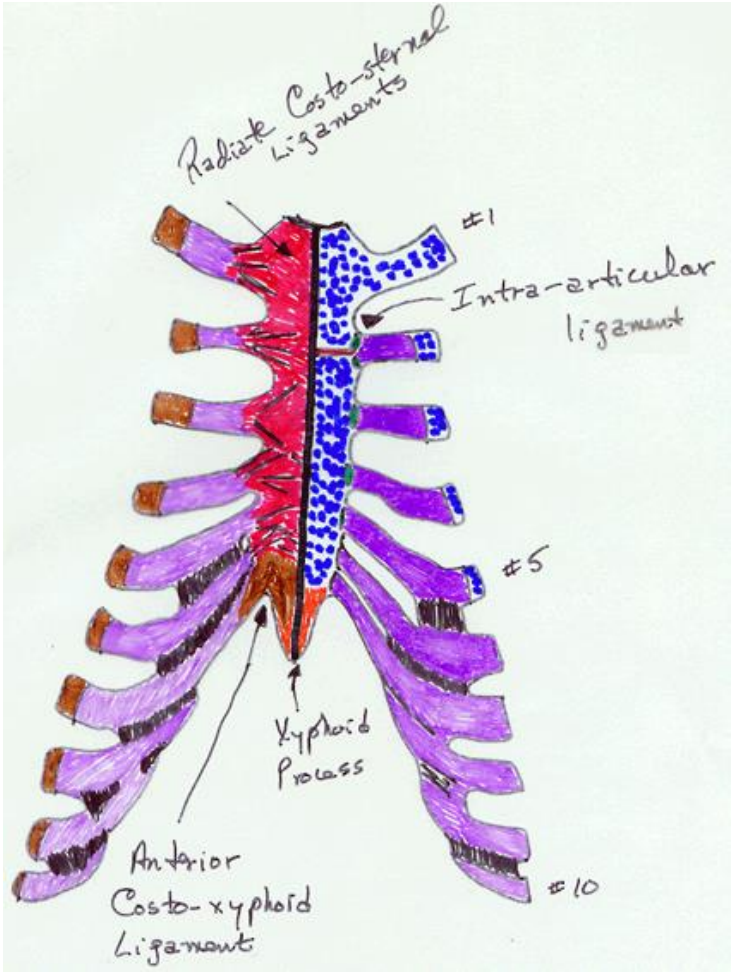
•Angle of Louis

Consists of articulations between the sternum and ribs

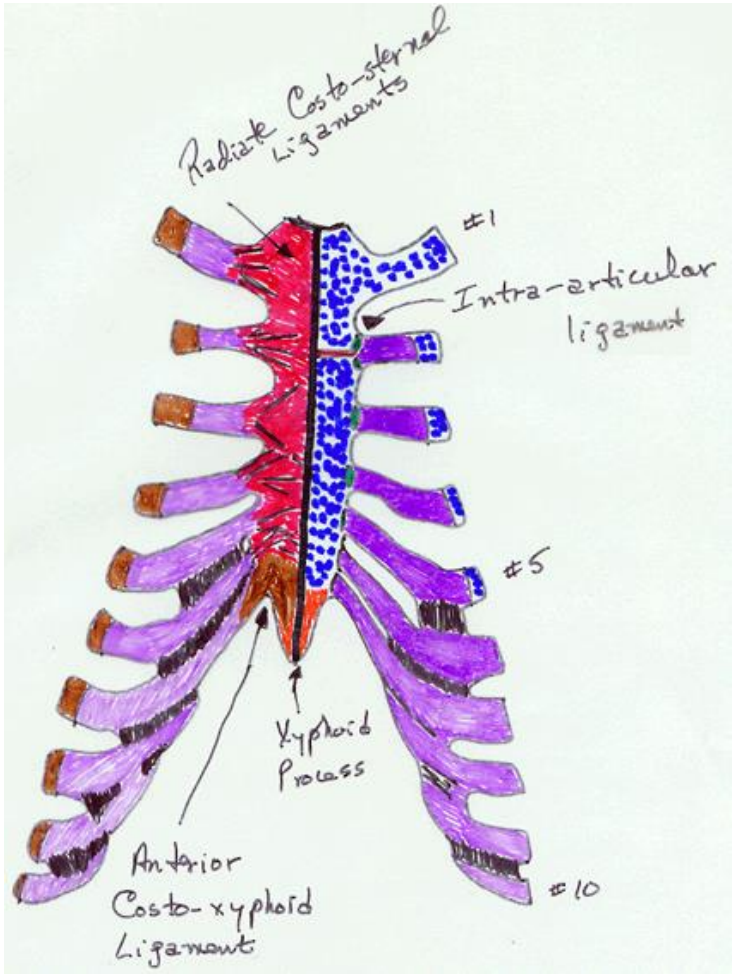

Head
SCALENUS ANTERIOR
Groove for Subclavian Vein
1st
SCALENUS MEDIUS
Subclavian Groove
First digitation of Serratus anterior

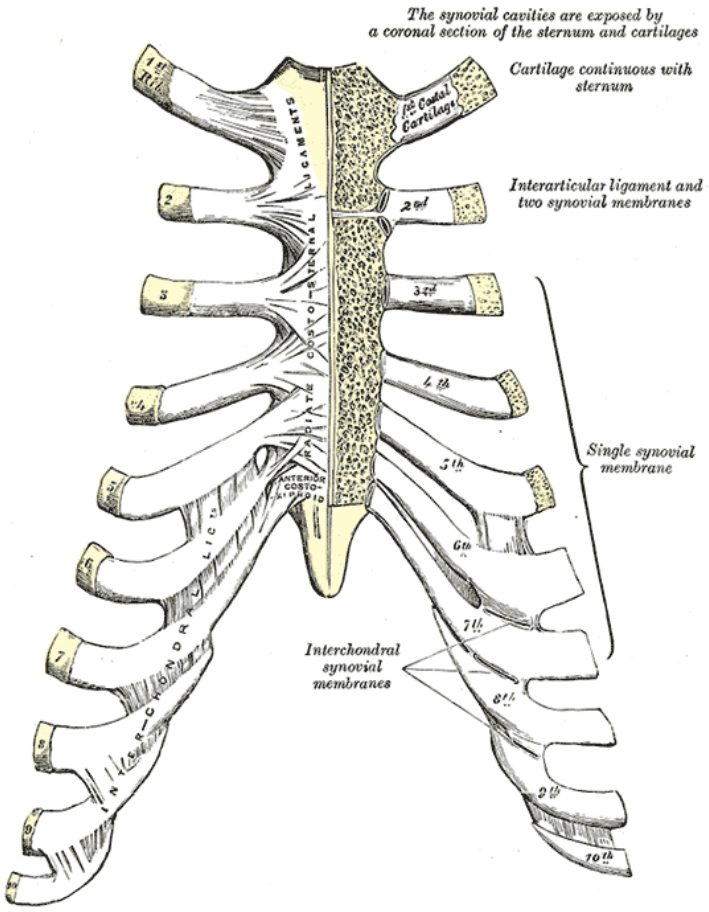

Demifacet for vertebra
Interarticular crest
Demifacet for vertebra
Neck
Head
Angle
Articular part of tubercle
Non-articular part of tubercle
Costal groove

Ligament	Comments
Articular capsule (not in view)	Surrounds the joints between the cartilage of the true ribs and sternum; it is thin and intimately blended with radiate sternocostal ligaments.

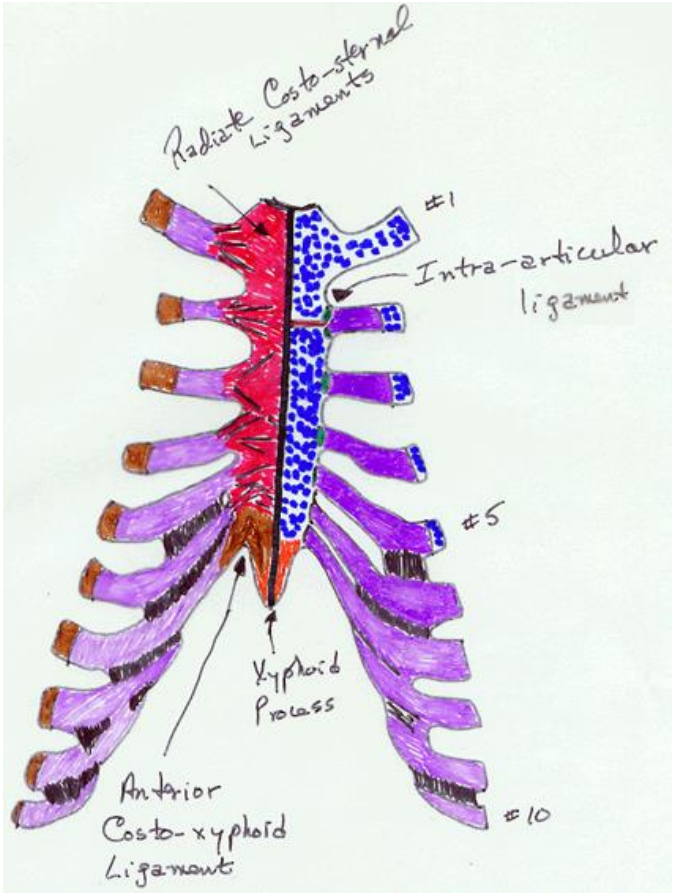


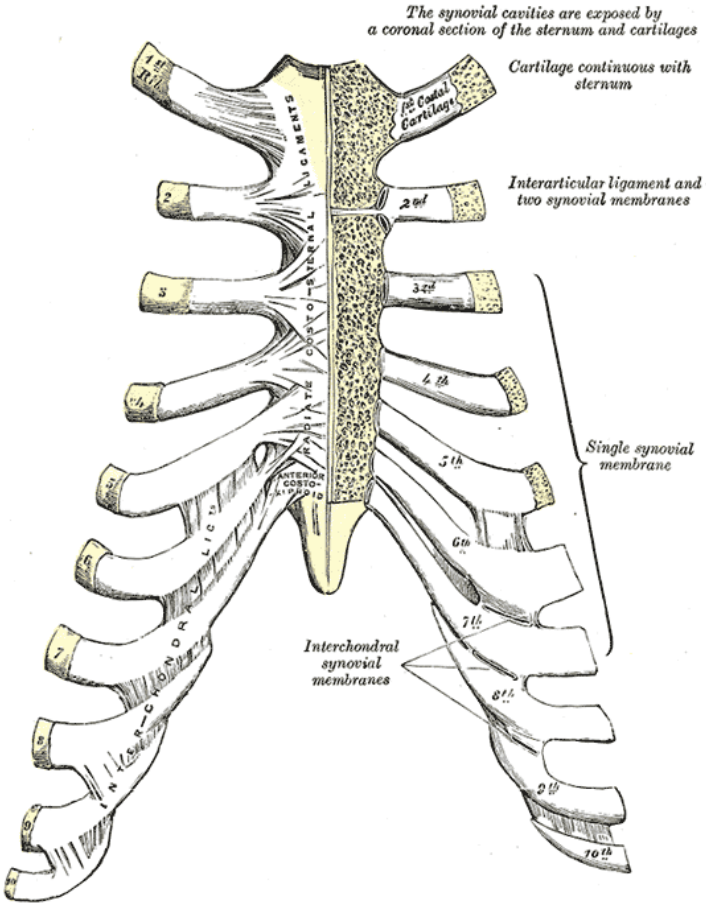
Ligament	Comments
Radiate sternocostal	Attaches to the ventral and dorsal surfaces of the sternal ends of the cartilages of the true ribs across to the anterior/posterior surface of the sternum; has three fasciculi: superior (fibers ascend abliquely), middle (fibers run horizontally) and inferior (fibers descend obliquely).





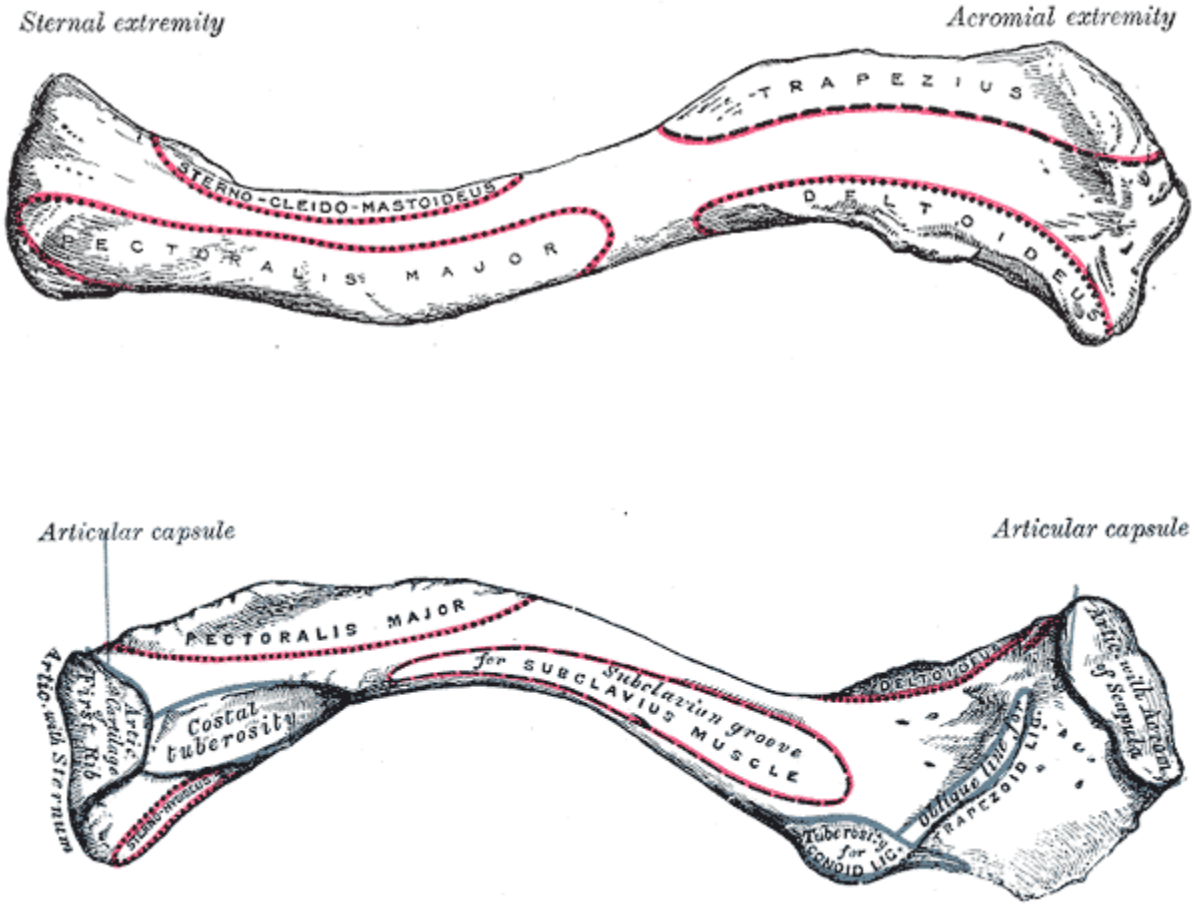
Ligament	Comments
Intra-articular sternocostal	Attaches to the cartilage of the 2d rib and the sternum (manubrium and gladiolus junction). Found consistently ONLY between the 2d costal cartilages and sternum; occasionally 3d rib is attached to the manubrium and gladiolus, also.
Costoxiphoid (Anterior)	Attaches to the anterior and posterior surfaces of the 7th (sometimes 6th) costal cartilage to the surface of the xiphoid process. The dorsal fasciculus is less distinct than the ventral.

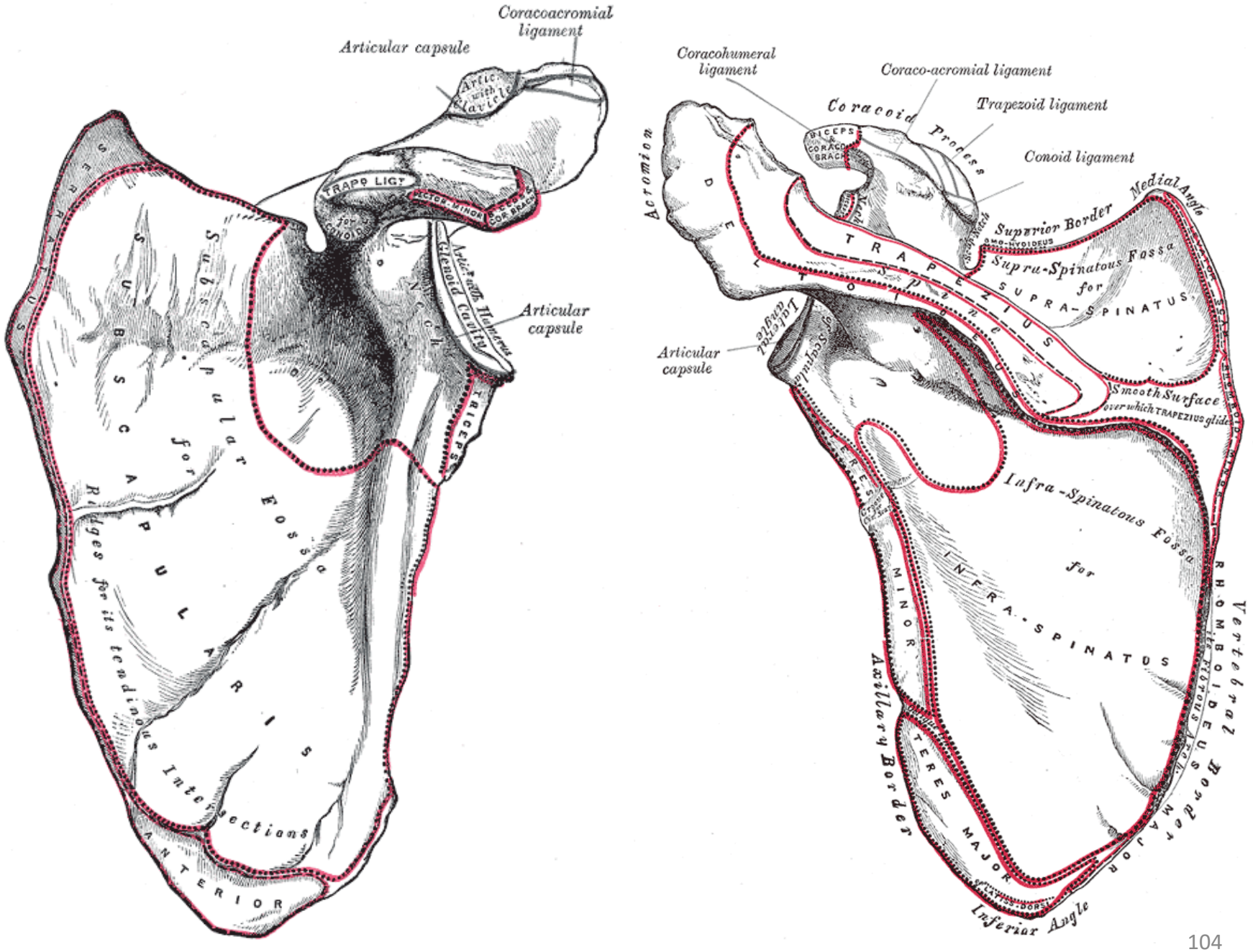


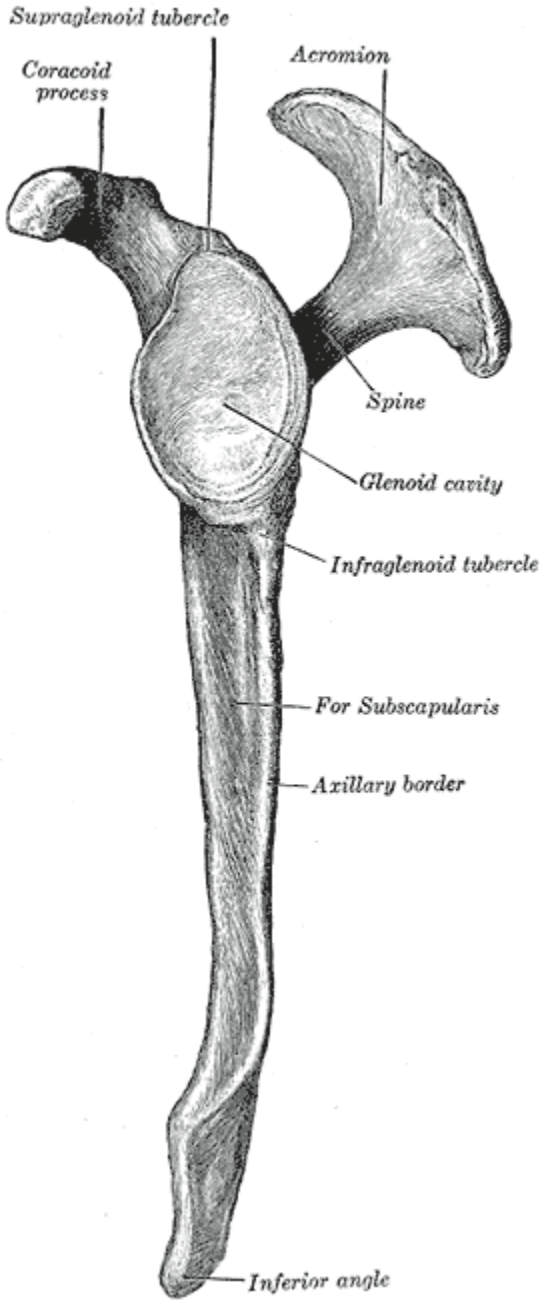


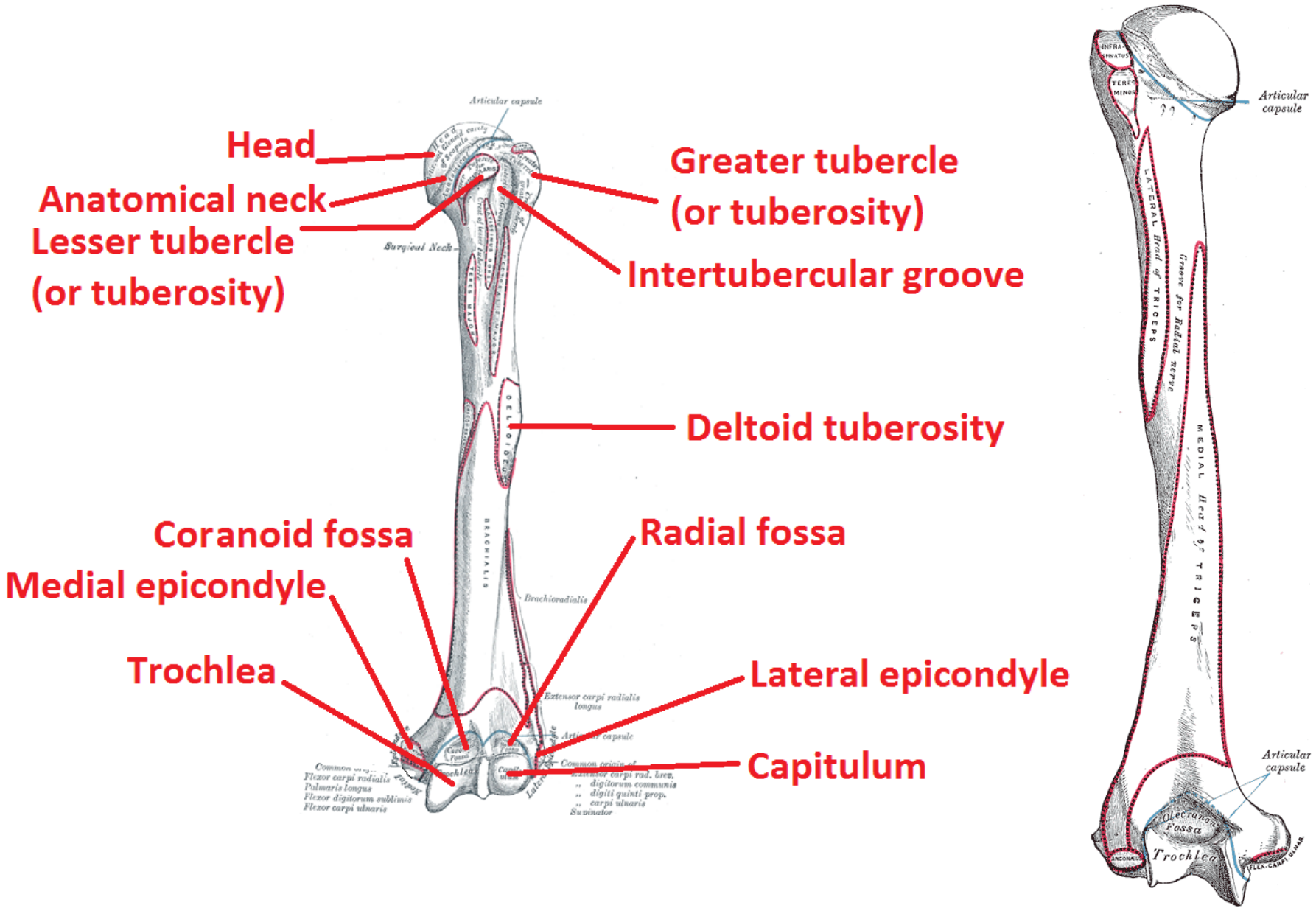
The Shoulder Joint

- The shoulder joint consists of three bones: the clavicle, the scapula and the humerus.
- The shoulder joint consists of three regions:
  - the acromioclavicular,
  - the non-acromioclavicular and
  - the shoulder, proper.
- These regions contain the following ligaments:

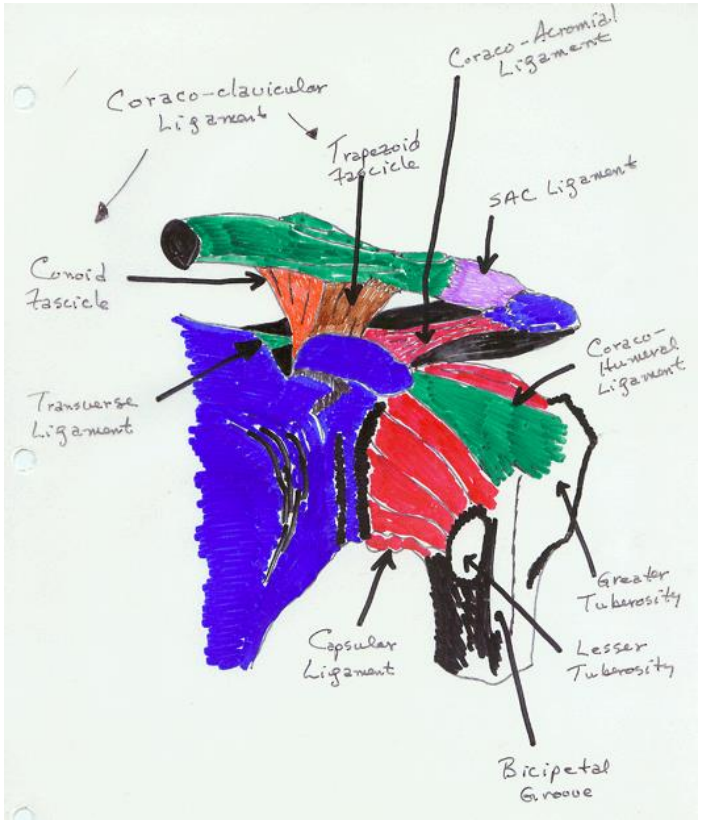

Sternal extremity
Acromial extremity
TRAPEZIUS
STERNO-CLEIDO-MASTOIDEUS
PECTORALIS MAJOR
DELTOIDEUS
Articular capsule
Articular capsule
PECTORALIS MAJOR
for SUBCLAVIUS MUSCLE
Subclavian groove
Costal tuberosity
DELTOIDEUS
Oblique line for TRAPEZOID LIG.
Tuberosity for CONOID LIG.
Articular Cartilage
First Rib
Articulation with Sternum
Articulation with Scapula

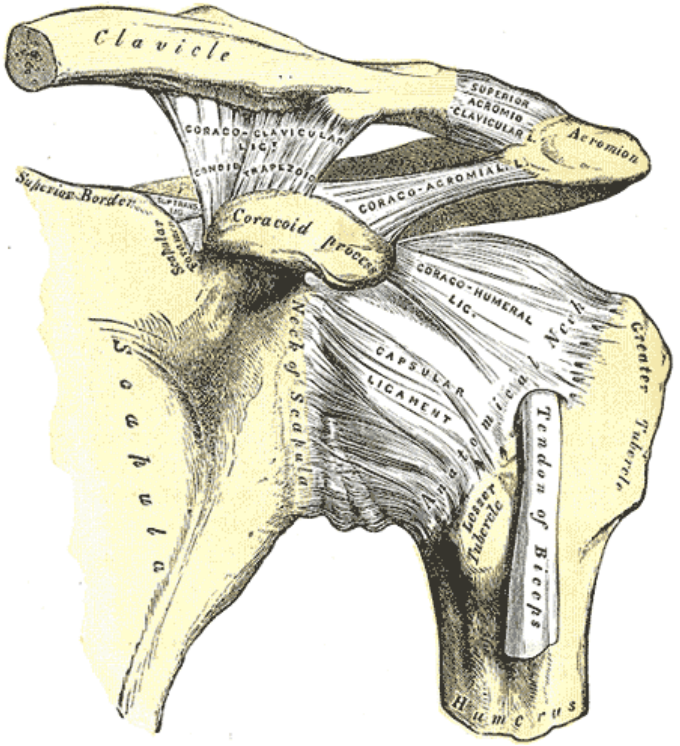

Coracoacromial ligament
Articular capsule
Artic. with Clavicle
TRAPS LIGT
for CONOID
PECT. MINOR
COR. BRAC.
Articular capsule
Glenoid Cavity
Neck
TRICEPS
SUBSCAPULARIS
Subscapular Fossa
Ridges for its tendinous Intersections
ANTERIOR
Coracohumeral ligament
Coraco-acromial ligament
Coracoid Process
Trapezoid ligament
Conoid ligament
Acromion
BICEPS & CORACO BRACH.
DELTOID
TRAPEZIUS
Superior Border
Medial Angle
OMO-HYOIDEUS
Supra-Spinatous Fossa for SUPRA-SPINATUS
Lateral angle of scapula
Articular capsule
Smooth Surface over which TRAPEZIUS glides
TERES MINOR
Infra-Spinatous Fossa for INFRA-SPINATUS
Axillary Border
TERES MAJOR
RHOMBOIDEUS MINOR
Vertebral Border
RHOMBOIDEUS MAJOR
Inferior Angle


Supraglenoid tubercle
Coracoid process
Acromion
Spine
Glenoid cavity
Infraglenoid tubercle
For Subscapularis
Axillary border
Inferior angle

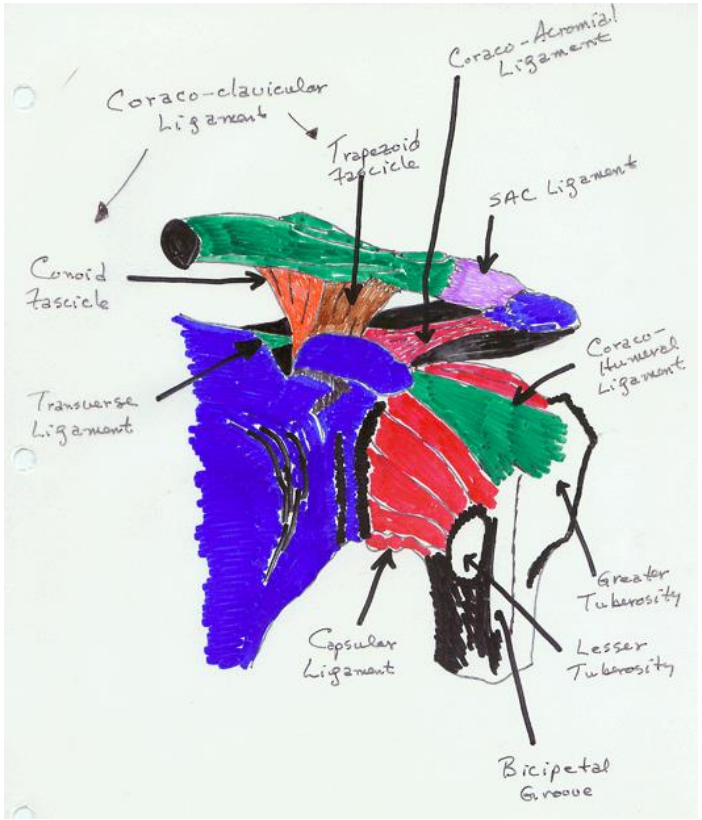

Head
Anatomical neck
Lesser tubercle
(or tuberosity)
Greater tubercle
(or tuberosity)
Intertubercular groove
Deltoid tuberosity
Coranoid fossa
Medial epicondyle
Trochlea
Radial fossa
Lateral epicondyle
Capitulum
Articular capsule
Surgical Neck
Brachioradialis
Extensor carpi radialis longus
Articular capsule
Flexor carpi radialis
Pulmaris longus
Flexor digitorum sublimis
Flexor carpi ulnaris
Supinator
Articular capsule
Olecranon Fossa
Trochlea

NON-acromioclavicular	
Coracoacromial (kore uh koe uh CHROME ee ull)	Attached to the summit of the acromion and to the outer border of the coracoid process.
Transverse	Converts the suprascapular notch into a foramen. It is attached at one end to the base of the coracoid and by the other to the inner extremity of the scapular notch.

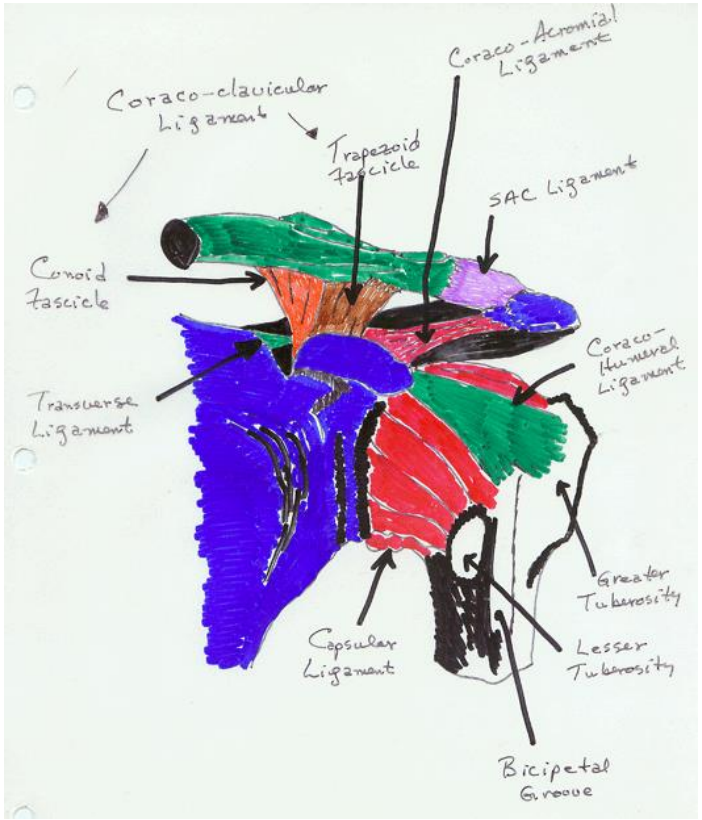




Ligament	Comment
Acromioclavicular region	
Superior acromioclavicular (SAC) uh chrome ee oh kluh VICK you lurr	Covers the superior part of the articulation; extends between the upper/outer end of the clavicle and upper end of the acromion.
Inferior acromioclavicular (IAC) – <u>not in view</u>	Covers the under part of the articulation; continuous with the SAC and forms a complete capsule around the joint.
Coracoclavicular (CC) CORE uh koe kluh VICK you lurr	Connects the clavicle with the coracoid process of the scapula; it consists of the following two fascicles (FASH ih kulls)
Trapezoid TRAPP uh zoyd	Anterior and external portion of the CC; it is placed obliquely between the coracoid and clavicle; its posterior border is joined with the conoid ligament.
Conoid KOE noyd	The posterior and internal fasciculus; it is attached to the base of the coracoid process and to the conoid tubercle of the clavicle.

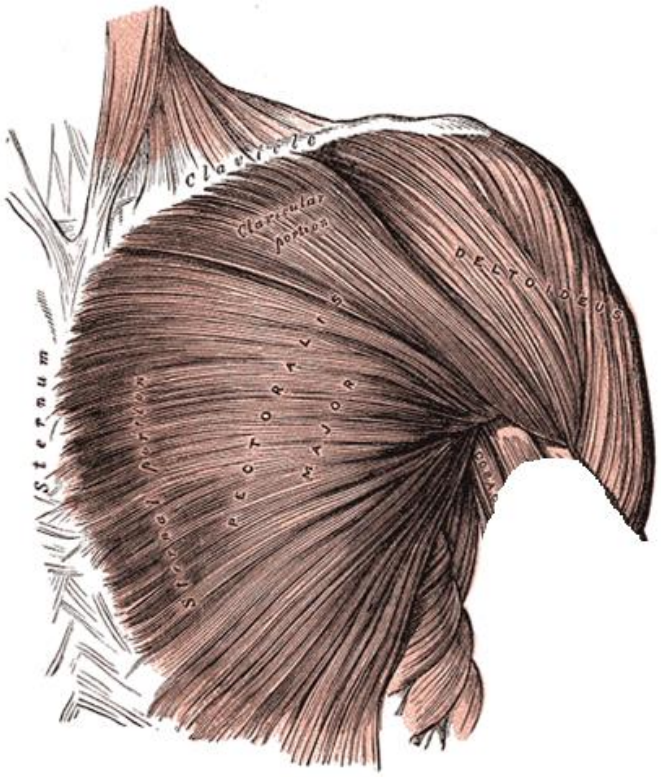


Ligament	Comment
Shoulder, proper	
Capsular	Attached, above, to the circumference of the glenoid fossa and, below, to the anatomical neck of the humerus.
Coracohumeral (CH)	Arises from the outer border of the coracoid and passes obliquely downward and outward to the front of the greater tubercle. This ligament strengthens the upper part of the capsular ligament.
Transverse humeral – <u>not in view</u>	A broad band of fibrous tissue which passes from the lesser to the greater tubercle. This is ALWAYS limited to that portion of the bone, which lies above the epiphyseal line. This fibrous band of tissue converts the intertubercular groove into an osseo-aponeurotic canal (AWSS ee oh ae poe new ROW tick ku NAL; an aponeurosis is a broad flat band of tendinous tissue).
Glenoid – <u>not in view</u>	Is a fibro-cartilaginous rim, attached around the margin of the glenoid fossa. This ligament deepens the cavity for articulation and protects the edges of the bone and is lined by the synovial membrane.

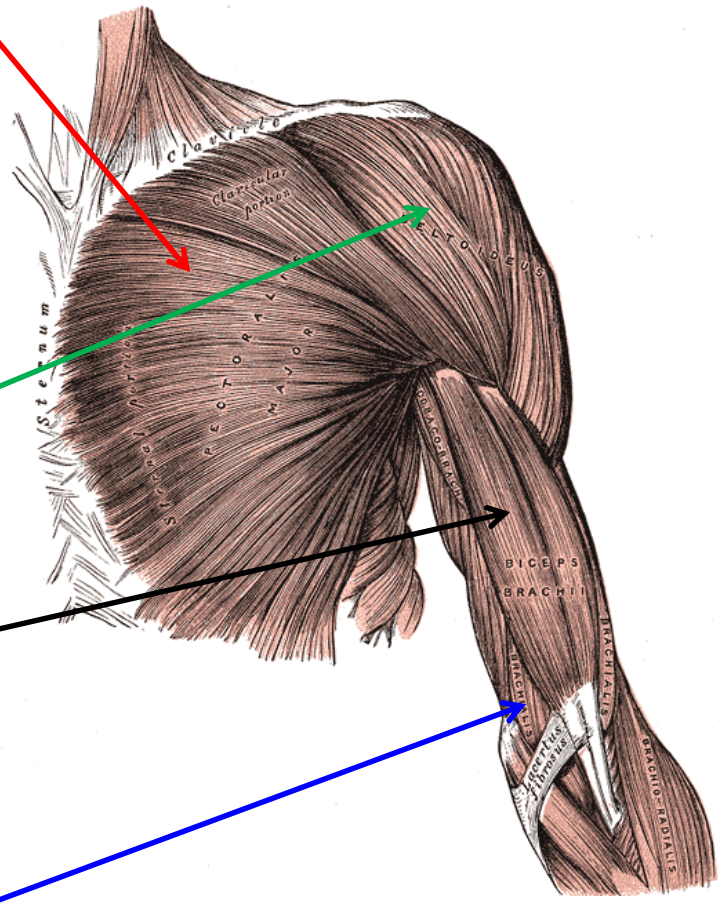


Chest and Shoulder

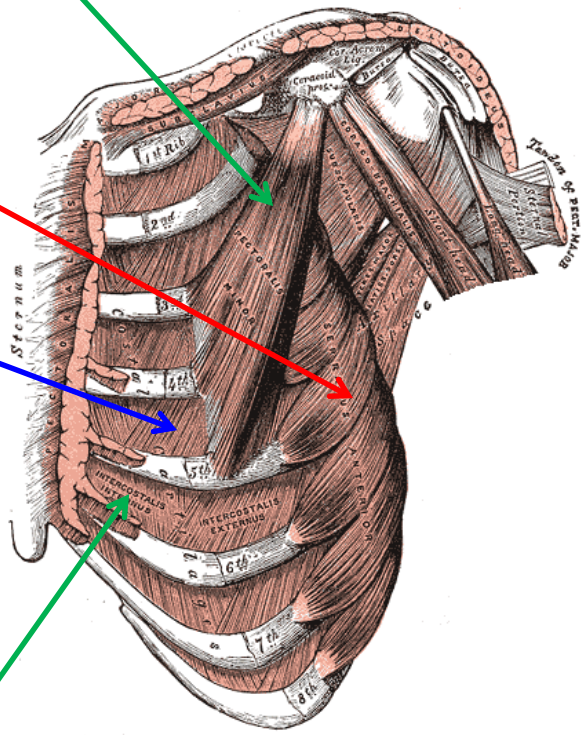
MUSCLE	ORIGIN	INSERTION	ACTION
Pectoralis major	Sternal half of clavicle; anterior half of sternum down to rib 6 or 7; cartilages of all true ribs	Outer bicipital ridge	Adducts arm; brings arm in front of chest; rotates arm inward
Deltoideus	Outer third of anterosupero surface of clavicle	Deltoid tuberosity	Abducts arm; draws the arm forward/ backward

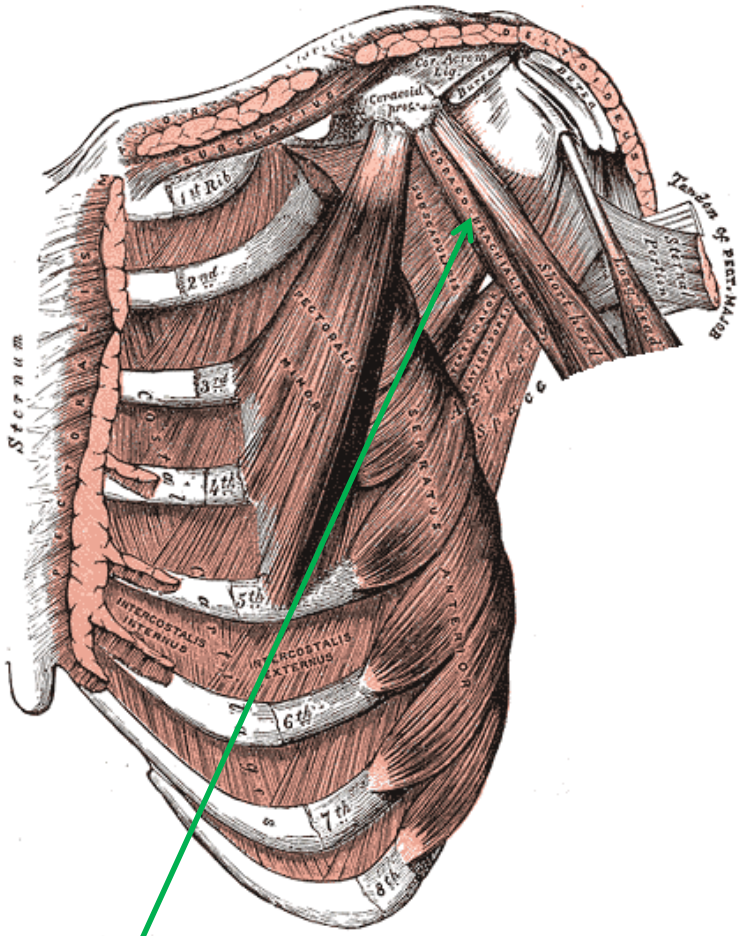


MUSCLE	ORIGIN	INSERTION	ACTION
Pectoralis major	Sternal half of clavicle; anterior half of sternum down to rib 6 or 7; cartilages of all true ribs	Outer bicipital ridge	Adducts arm; brings arm in front of chest; rotates arm inward
Deltoideus	Outer third of anterosupero surface of clavicle	Deltoid tuberosity	Abducts arm; draws the arm forward/ backward
Biceps brachii	Apex of coracoid process; upper glenoid fossa	Radial tuberosity	Flexes forearm; supinator
Brachialis anticus	Lower half of humeral shaft	Anterior ulnar coronoid process	Flexes forearm; protects elbow joint



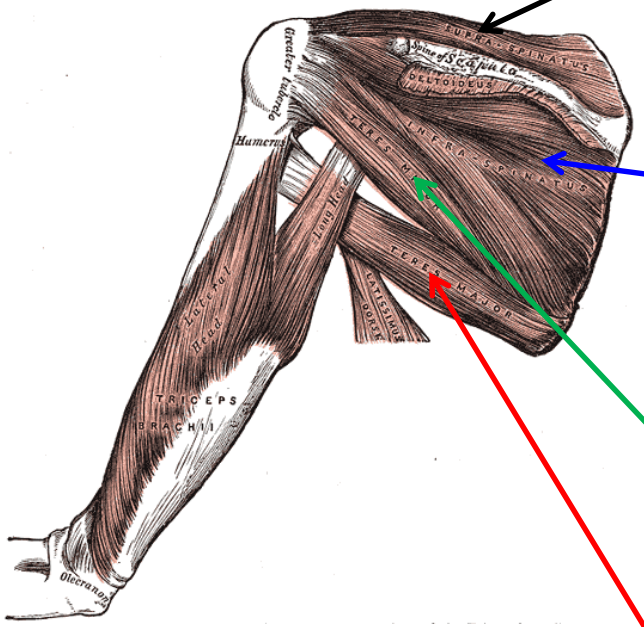
MUSCLE	ORIGIN	INSERTION	ACTION
Pectoralis minor	Superolateral surface of ribs 3-5	Coracoid process of scapula	Beneath major; depresses shoulder; forced inspiration
Serratus magnus	Ribs 1-8	Vertebral border of scapula	Carries scapula forward; raises arm
External intercostals	11 on each side; lower border of each rib	Upper border of rib below	Enlarge thoracic cavity on inspiration; fibers directed obliquely medially
Internal intercostals	11 on each side; inner surface of each rib	Upper border of rib below	Under externals; fibers directed obliquely laterally; decrease thoracic cavity on expiration





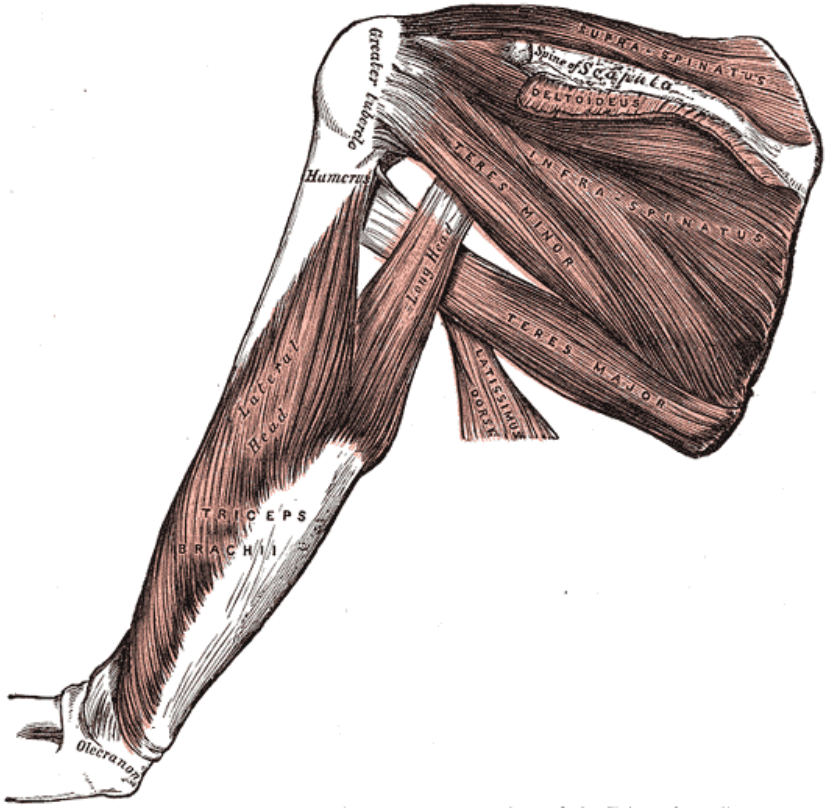
MUSCLE	ORIGIN	INSERTION	ACTION
Coracobrachialis	Apex of coracoid process	Mid-humeral shaft	Draws humerus forward and in; elevates humerus towards scapula

Rotator Cuff Muscles



"SITTS"

MUSCLE	ORIGIN	INSERTION	ACTION
Supraspinatus	Supraspinous fossa	Superior greater tuberosity	Abducts arm; prevents superior dislocation
Infraspinatus	Infraspinous fossa	Mid-greater tuberosity	Rotate humeral head outward; carries arm backwards; prevents posterior dislocation
Teres minor	Axillary border of scapula	Lower greater tuberosity	Same as infraspinatus
Teres major	Inferior angle of scapula	Inner bicipital ridge	"Splits" long head of triceps and latissimus dorsi; draws humerus down and back
Subscapularis	Subscapular fossa	Lesser tubercle	Medial arm rotation

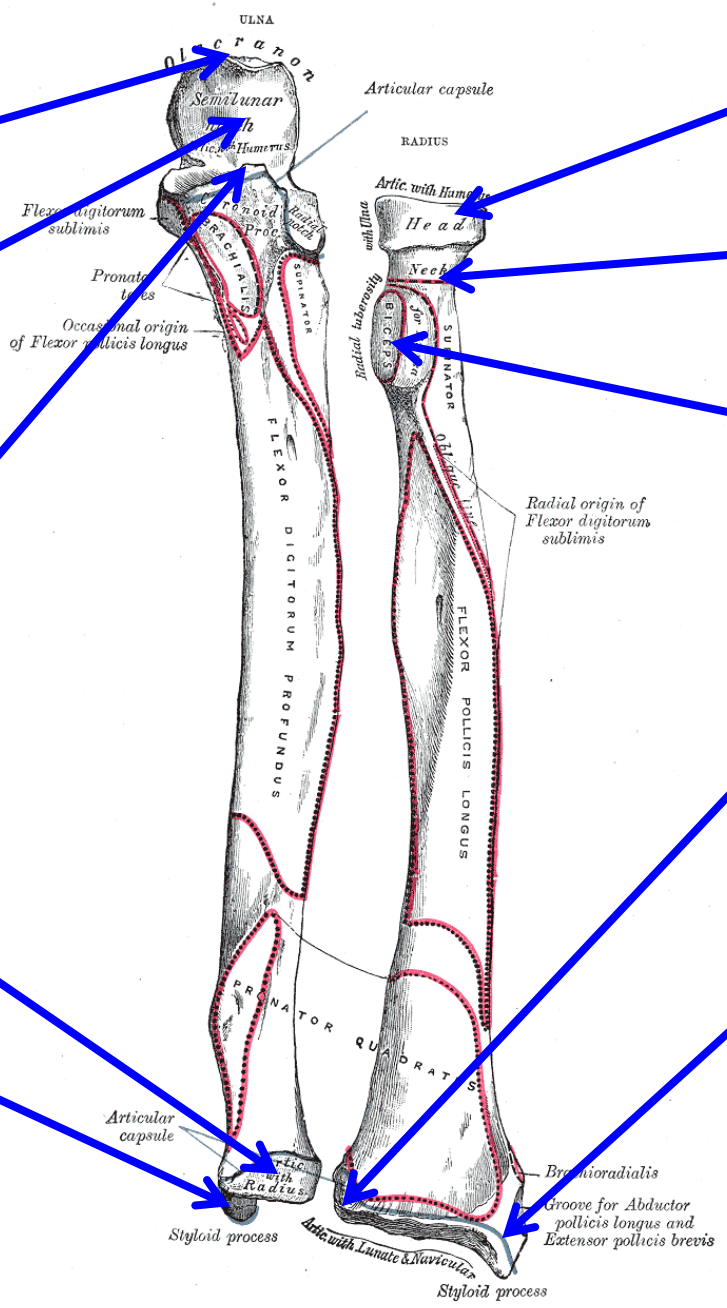


MUSCLE	ORIGIN	INSERTION	ACTION
Triceps brachii	Below the glenoid fossa and humerus	Common tendon of triceps: back part of upper olecranon process	Extends forearm

The Elbow

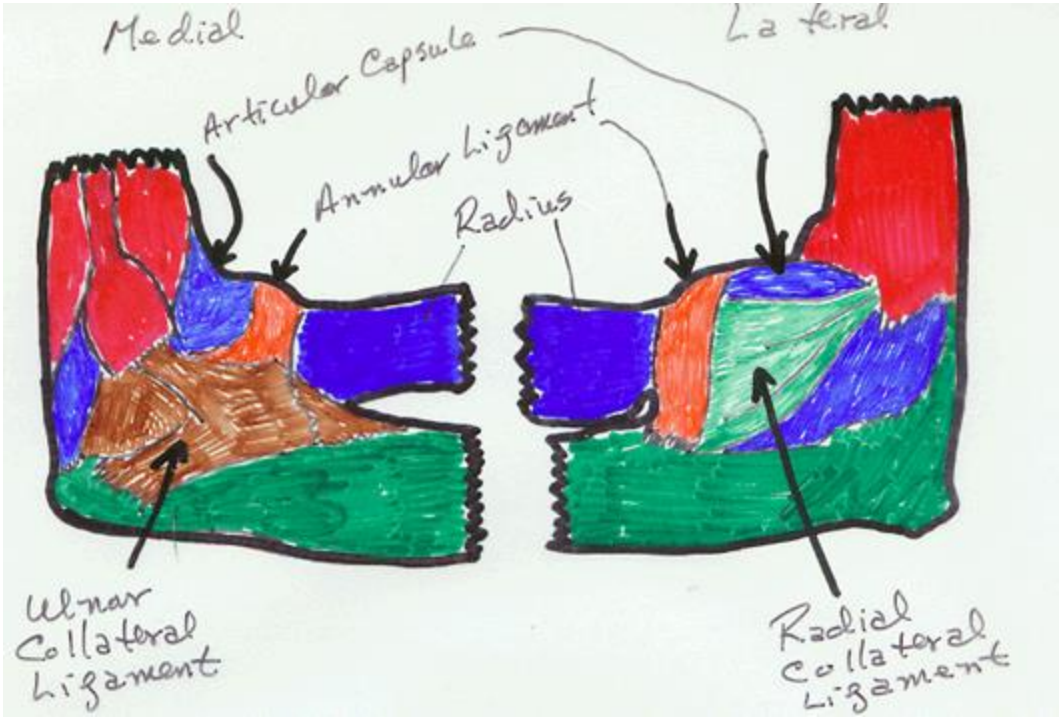
- The elbow consists of three bones:
  - the humerus,
  - the radius and
  - the ulna.
- Four ligaments are of significance, here:

- Olecranon process
- Semilunar notch
- Coranoid process
- Head of ulna
- Styloid process

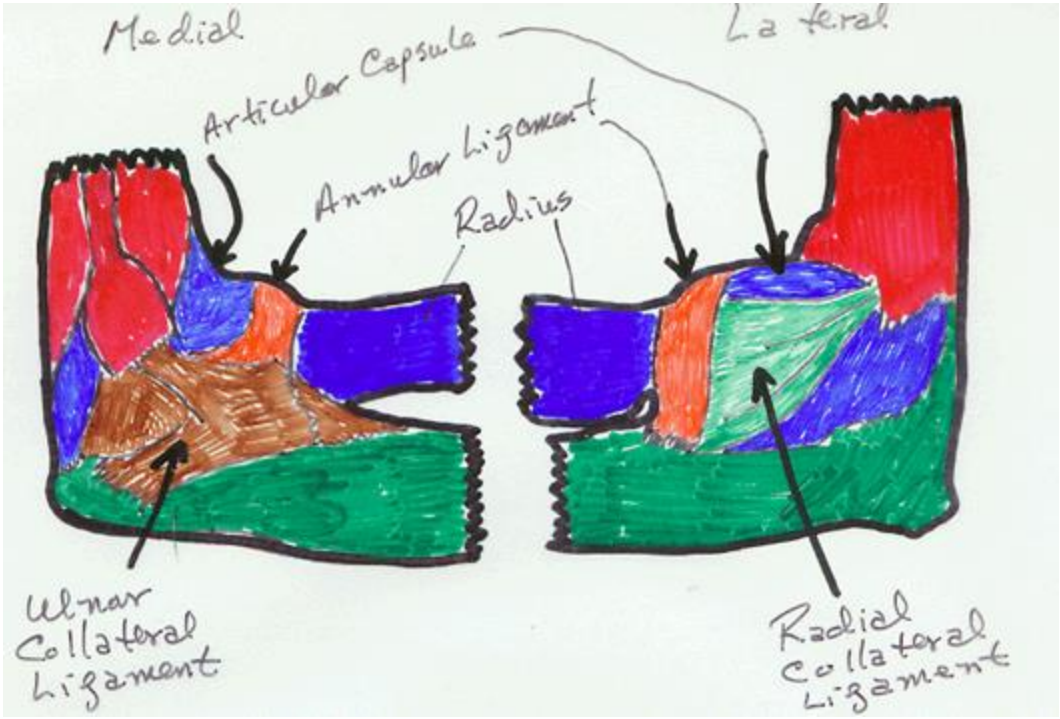


- Radial head
- Neck
- Radial tuberosity
- Ulnar notch
- Styloid process

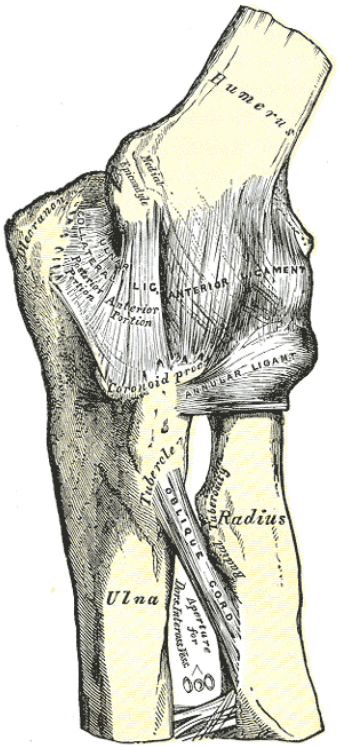
Ligament	Comment
Articular capsule	Anteriorly, this ligament goes between the medial epicondyle and to the humerus (proximal to the coronoid and radial fossa) and to the anterior surface of the coronoid process on the ulna and to the annular ligament; posteriorly, it runs behind the capitulum and close to the medial trochlear margin; to the margins of the olecranon fossa, to the back of the lateral epicondyle away from the trochlea; thence to the proximal and lateral margins of the olecranon to the posterior annular ligament and to the ulna posterior to the radial arch. It is continuous with the radial and ulnar collateral ligaments

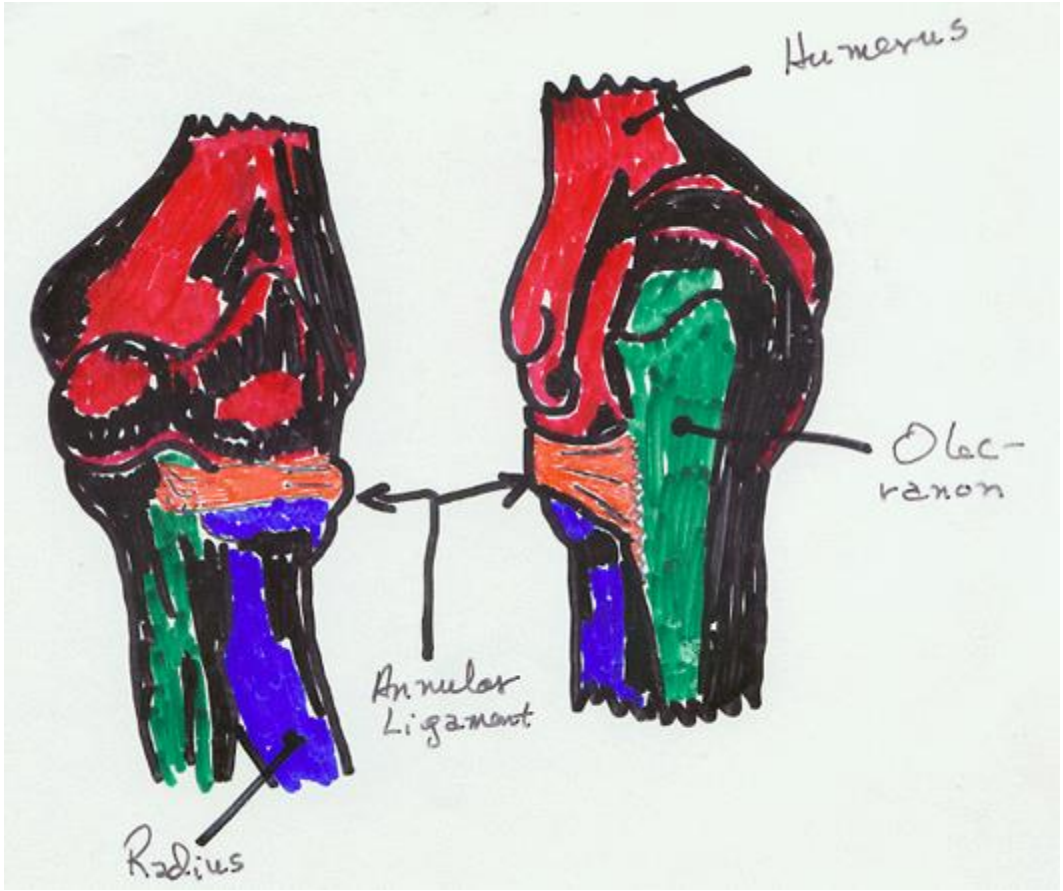


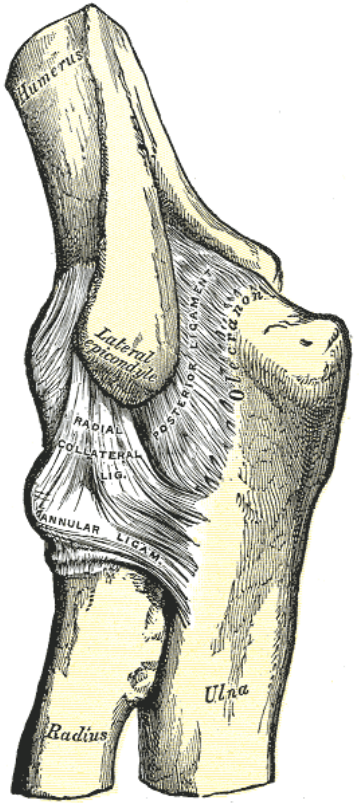
Ligament	Comment
Radial collateral	This ligament runs from a depression distal to the lateral epicondyle to the annular ligament
Ulnar collateral	Anteriorly, it runs from the anterior part of the medial epicondyle of the humerus to the medial margin of the coronoid process. Posteriorly, it runs from the posterodistal portion of the medial epicondyle to the medial margin of the olecranon



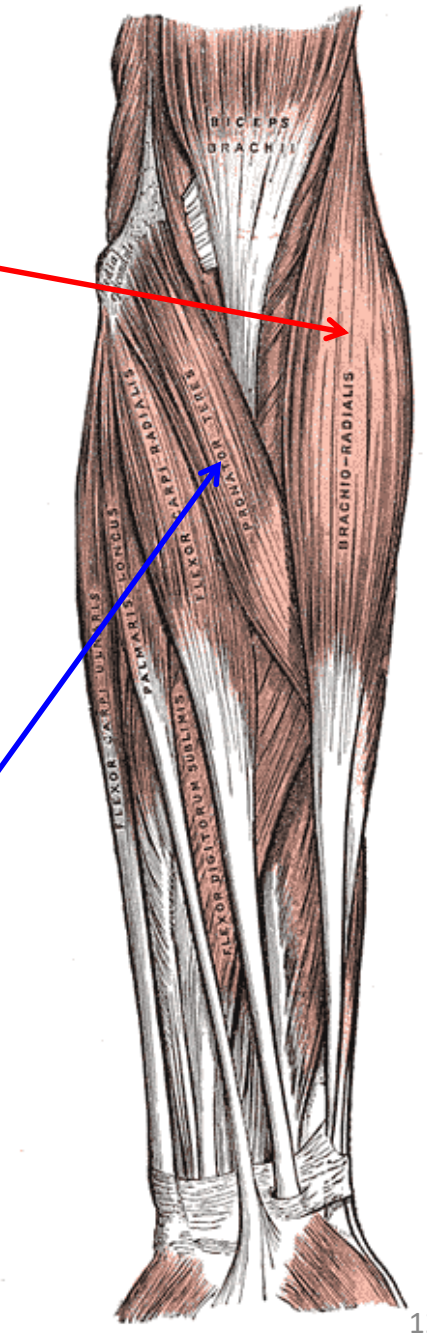
Ligament	Comment
Annular (ANN you lurr)	Proximally, this ligament's border blends with the anterior/posterior ligaments of the elbow. Distally, this ligament is attached to the radial neck. It is a strong band of fibers which encircles the head of the radius and maintains its articulation with the radial notch. It is strengthened by the radial collateral ligament

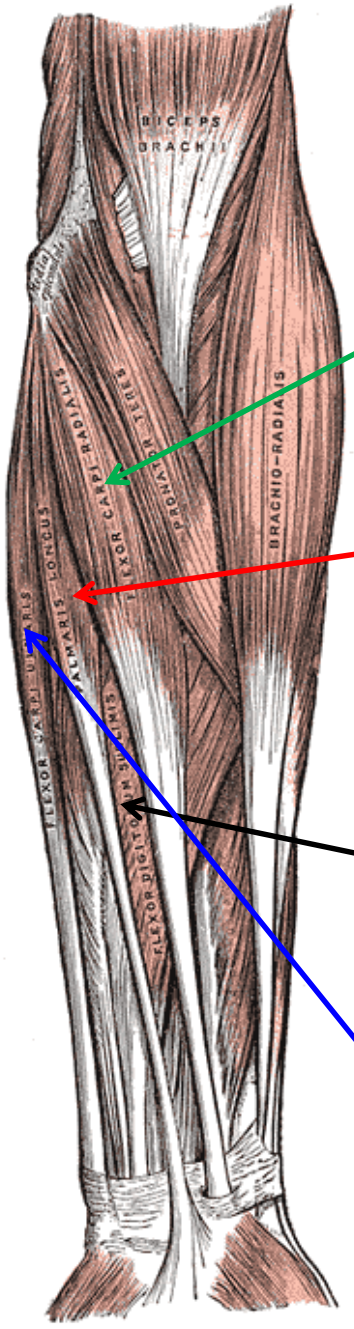




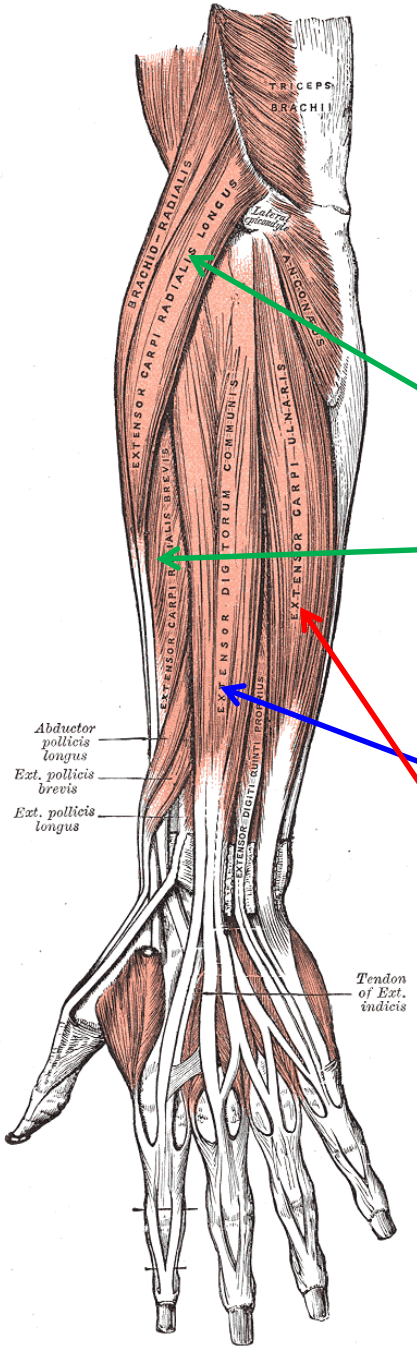


MUSCLE	ORIGIN	INSERTION	ACTION
Supinator longus (brachioradialis)	Lateral supracondylar ridge of humerus	Base of styloid of radius	Most superficial muscle on radial side of forearm; flexes elbow joint and will supinate and pronate hand; moves arm across chest
Pronator radii teres	Superior medial condyle of humerus; medial coronoid process of ulna	Mid-lateral surface of radial shaft	Rotates radius on ulna; pronation

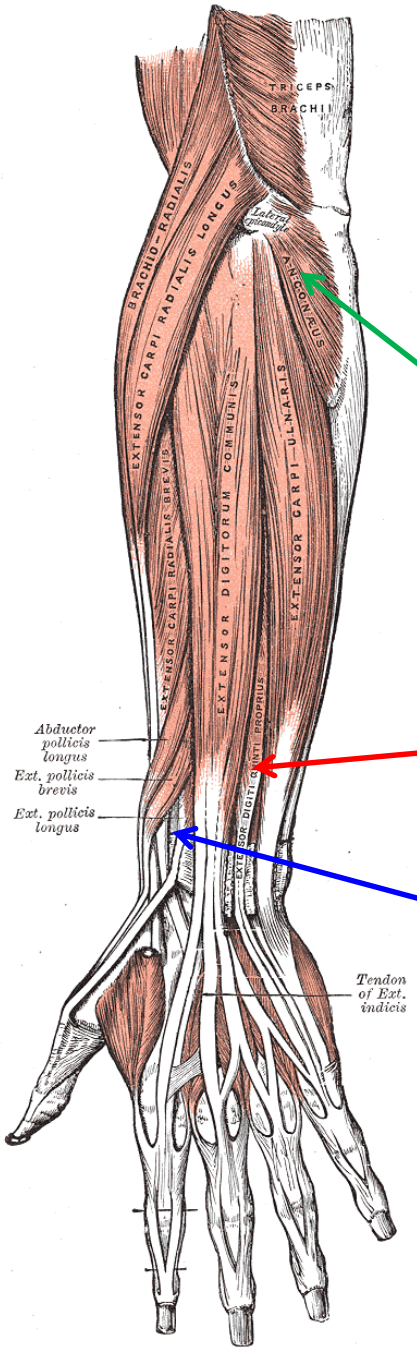




MUSCLE	ORIGIN	INSERTION	ACTION
Flexor carpi radialis	Medial condyle	Base of metacarpal bones on index/society fingers	Medial to previous muscle; flexes wrist; assists in pronation
Palmaris longus	Medial condyle	Palmar fascia to all 5 digits	Medial to previous muscle; flexes wrist/elbow; tenses palmar fascia
Flexor sublimis digitorum	Medial condyle; medial side of coronoid process; oblique line of radius	Digits 2-4	Beneath the preceding two muscles and P.r.t. and F.c.u.; flexes first the middle phalanx, then the proximal phalanx
Flexor carpi ulnaris	Medial condyle; medial olecranon process	Pisiform bone; 5th metacarpal; hamate bone	Lies along ulnar side of forearm; flexes wrist; bends elbow



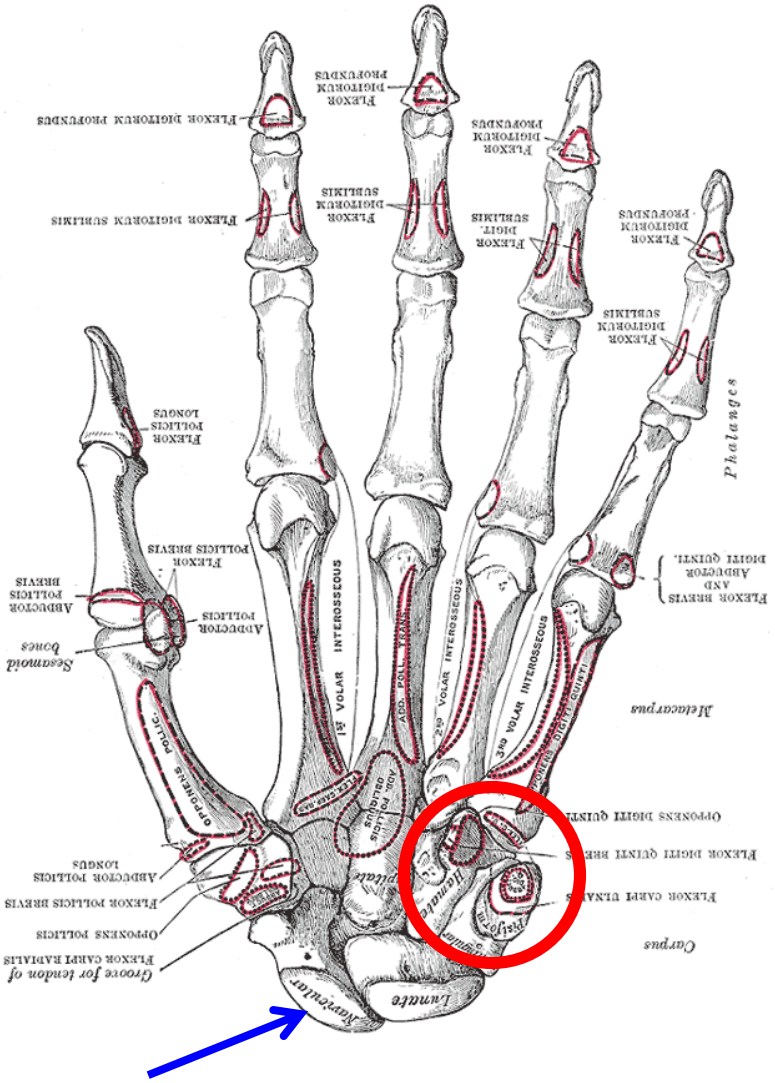
MUSCLE	ORIGIN	INSERTION	ACTION
Extensor carpi radialis	Lateral supracondylar ridge of humerus; lateral condyle of humerus	Base of metacarpals of index and society fingers	Extends wrist; abducts hand; steadies elbow
Extensor communis digitorum	Lateral condyle of humerus	2d and 3d phalanges of fingers	Extends phalanges, then wrist, then elbow
Extensor carpi ulnaris	Lateral condyle of humerus	Base of metacarpal bone of pinky	Extend hand and elbow joint

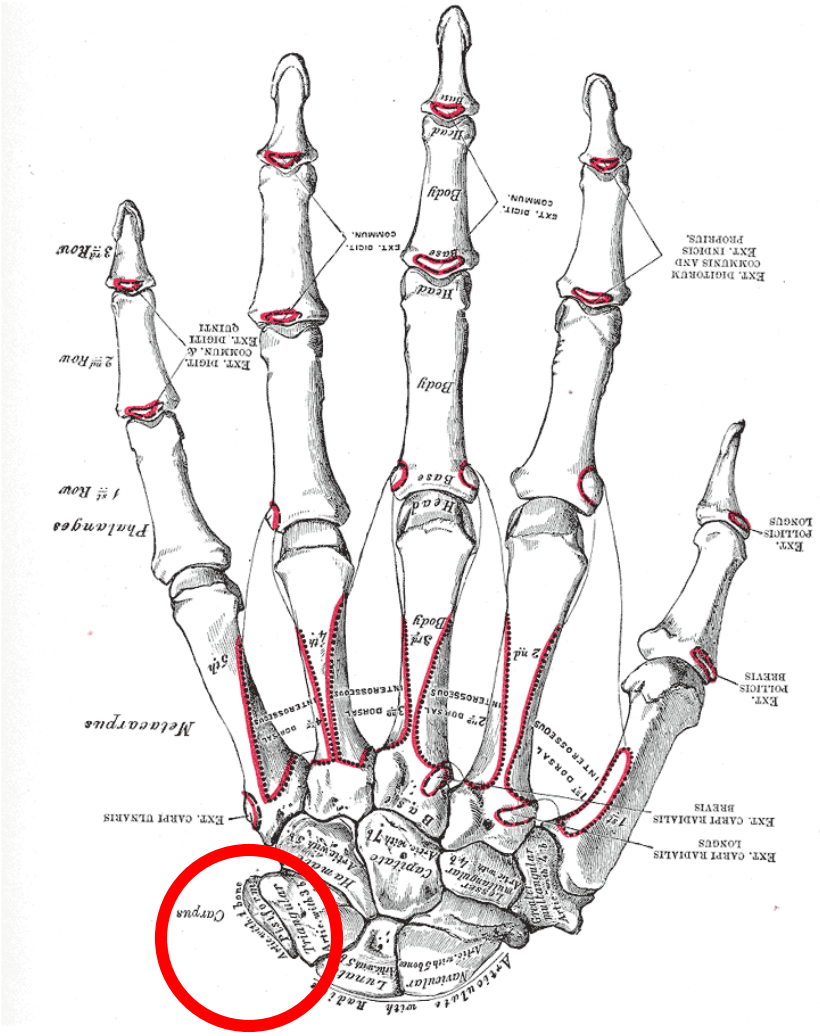


MUSCLE	ORIGIN	INSERTION	ACTION
Anconeus	Lateral condyle of humerus	Side of olecranon process	Extension of triceps; extends elbow
Extensor minimi digiti	Lateral condyle of humerus	2d and 3d phalanges of fingers	Extends little finger and wrist
Extensor longus pollicis	Posterolateral ulnar shaft	Base of distal phalanx of thumb	Extends distal phalanx of thumb, first; extends/abducts wrist, second

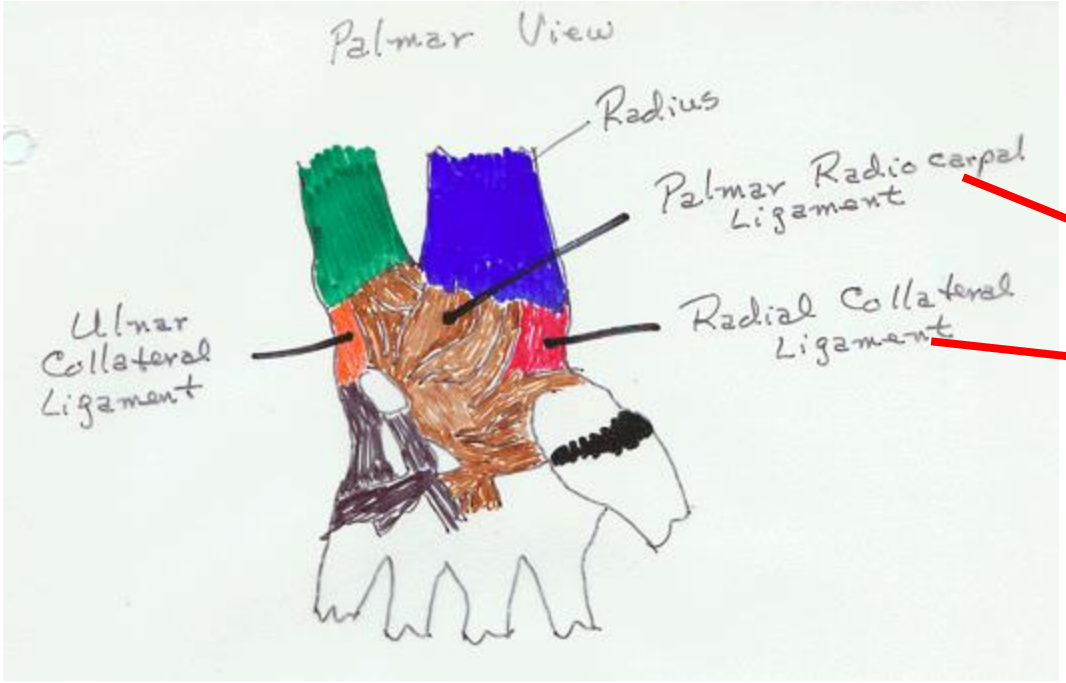
The Wrist and Hand

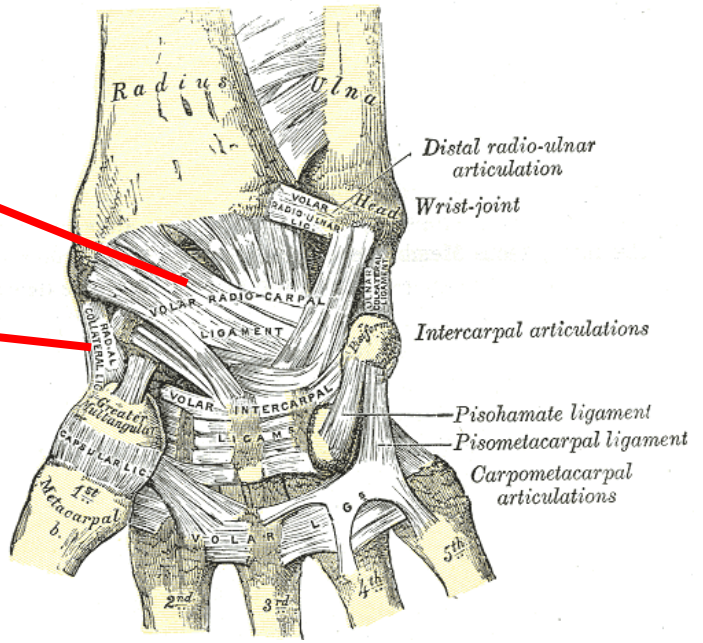
- Consists of the
  - radius,
  - ulna and
  - carpal bones
- Consists of the
  - metacarpals
  - phalanges


Phalanges
Metacarpus
Carpus
Lunate
Navicular
Trapezium
Trapezoid
Capitate
Hamate
Pisiform
Sesamoid bones
1st VOLAR INTEROSSEOUS
2nd VOLAR INTEROSSEOUS
3rd VOLAR INTEROSSEOUS
FLEXOR BREVIS AND ABDUCTOR DIGITI QUINTI
OPPONENS DIGITI QUINTI
FLEXOR DIGITI QUINTI BREVIS
FLEXOR CARPI ULNARIS
FLEXOR POLLICIS LONGUS
FLEXOR POLLICIS BREVIS
ABDUCTOR POLLICIS
OPPONENS POLLICIS
ABDUCTOR POLLICIS LONGUS
Groove for tendon of FLEXOR CARPI RADIALIS
FLEXOR DIGITORUM PROFUNDUS
FLEXOR DIGITORUM SUBLIMIS

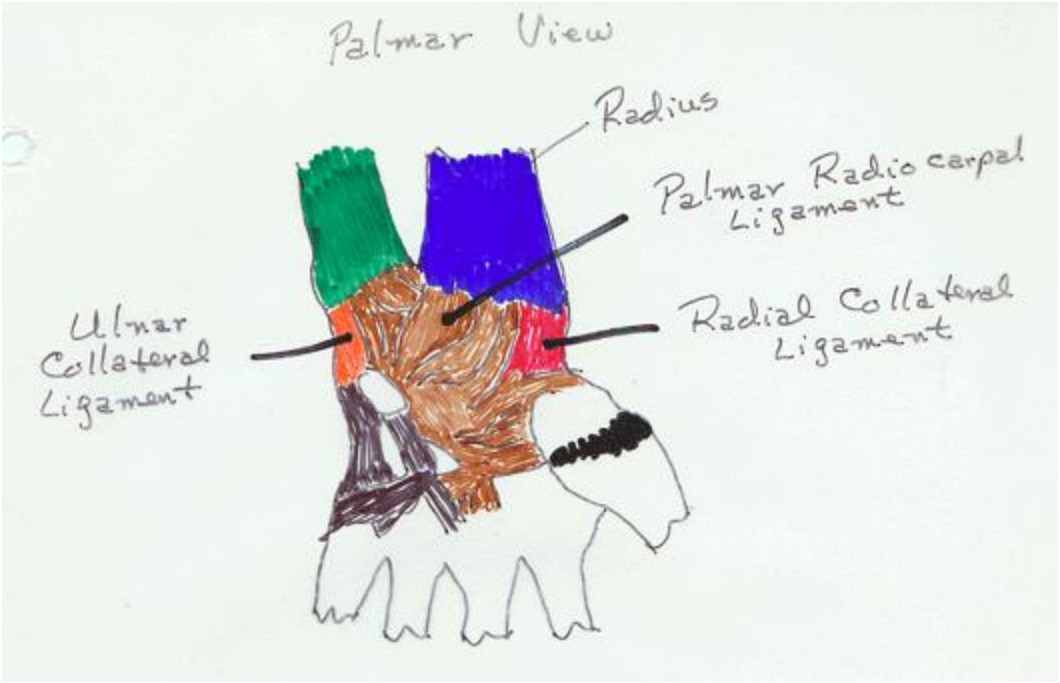

Phalanges
Metacarpus
Carpus
Lunate
Navicular
Trapezium
Trapezoid
Capitate
Hamate
Pisiform
EXT. CARPI ULNARIS
EXT. CARPI RADIALIS LONGUS
EXT. CARPI RADIALIS BREVIS
EXT. POLLICIS BREVIS
EXT. DIGITORUM COMMUNIS AND EXT. INDICIS PROPRIUS
EXT. DIGIT. COMMUN.
EXT. INDICIS
EXT. DIGITI QUINTI
EXT. DIGIT. COMMUN. & COMMUN.

Ligament	Comments
Palmar radiocarpal	attaches to the anterior margin of the distal radius and styloid and distal end of ulna; inserts into the palmar surfaces of the scaphoid, lunate, triangular and some of the capitate. Fibers pass ulna-ward.

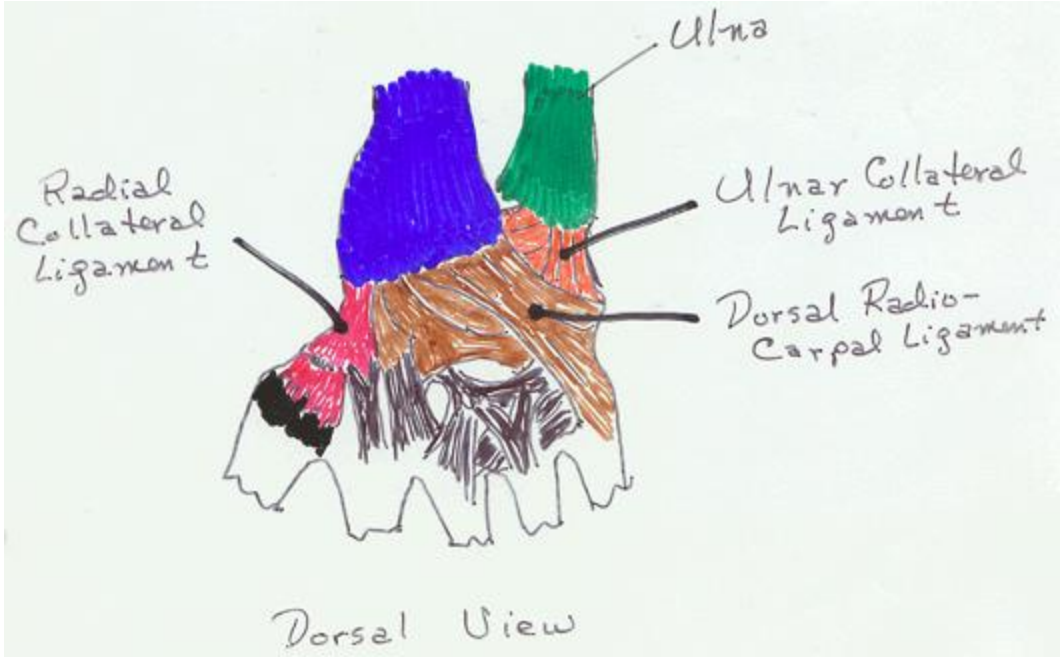


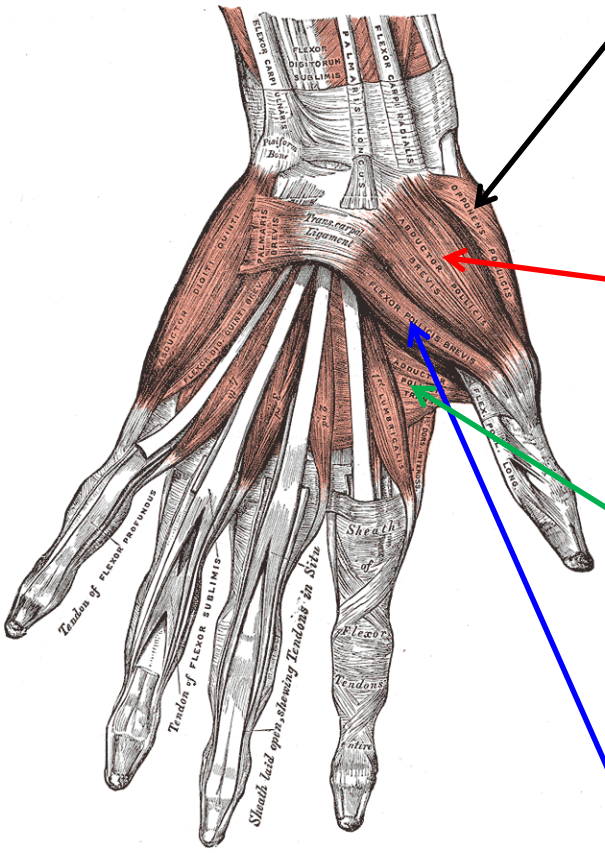


Ligament	Comments
Ulnar collateral	Attaches to the end of the styloid process of ulna across to the medial triangular surface and to the pisiform. Is a rounded cord.
Radial collateral	Attaches to the radial styloid across to the lateral surface of the scaphoid and lateral trapezium.



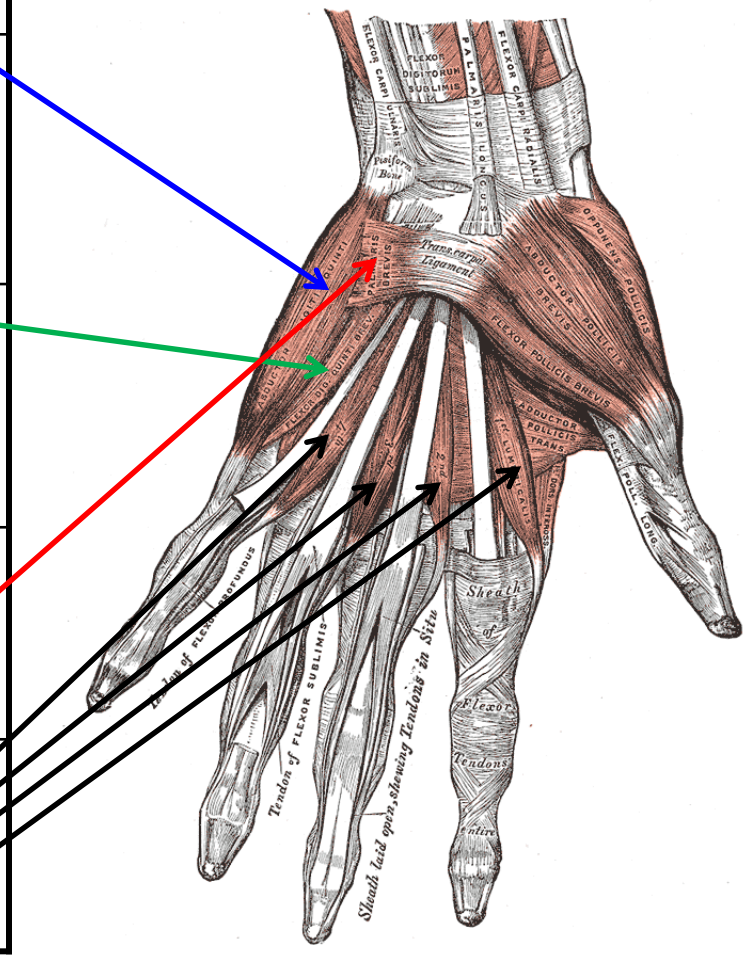
Ligament	Comments
Dorsal radiocarpal	Attaches posterior of distal radius; fixes to the dorsal surfaces of the scaphoid, lunate and triangular. Fibers pass ulna-ward.



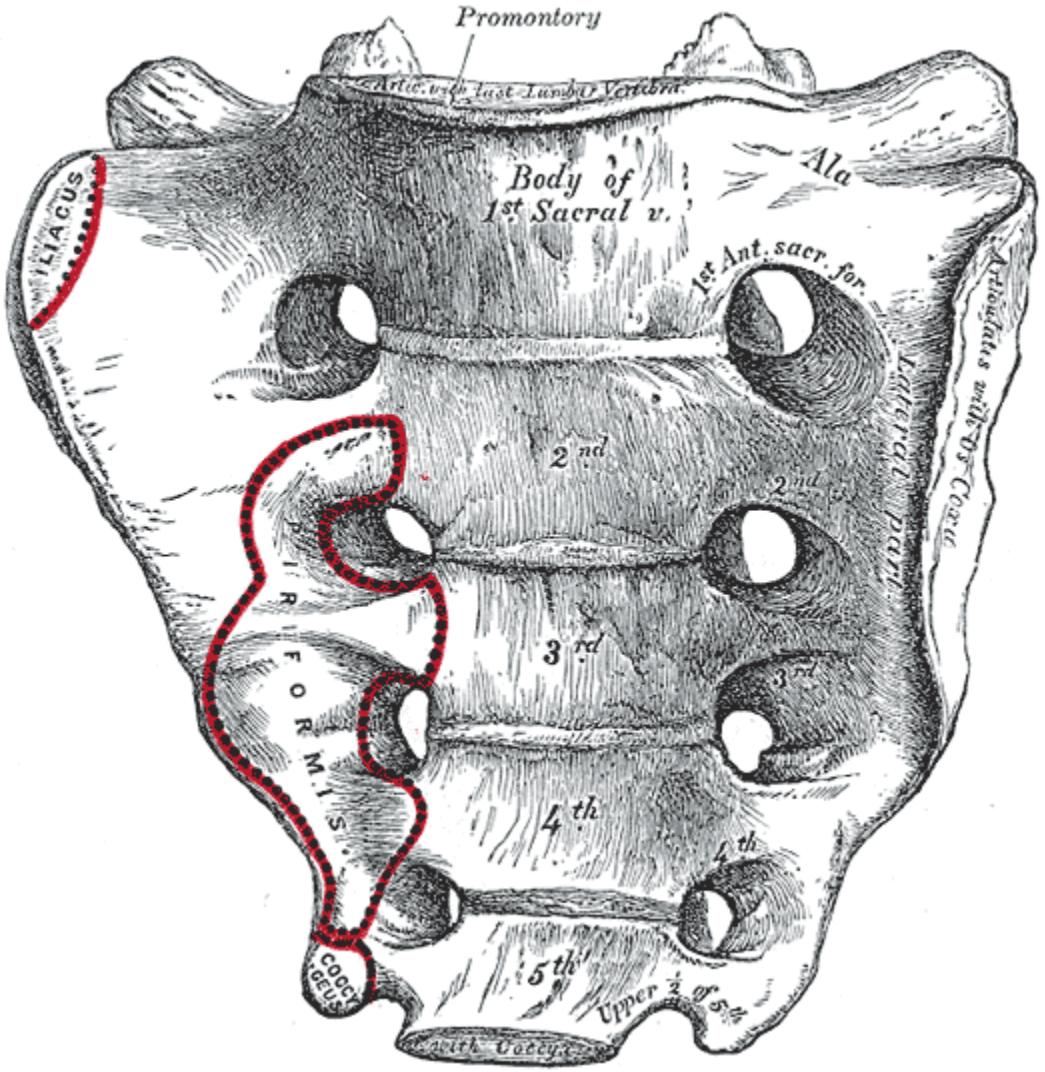


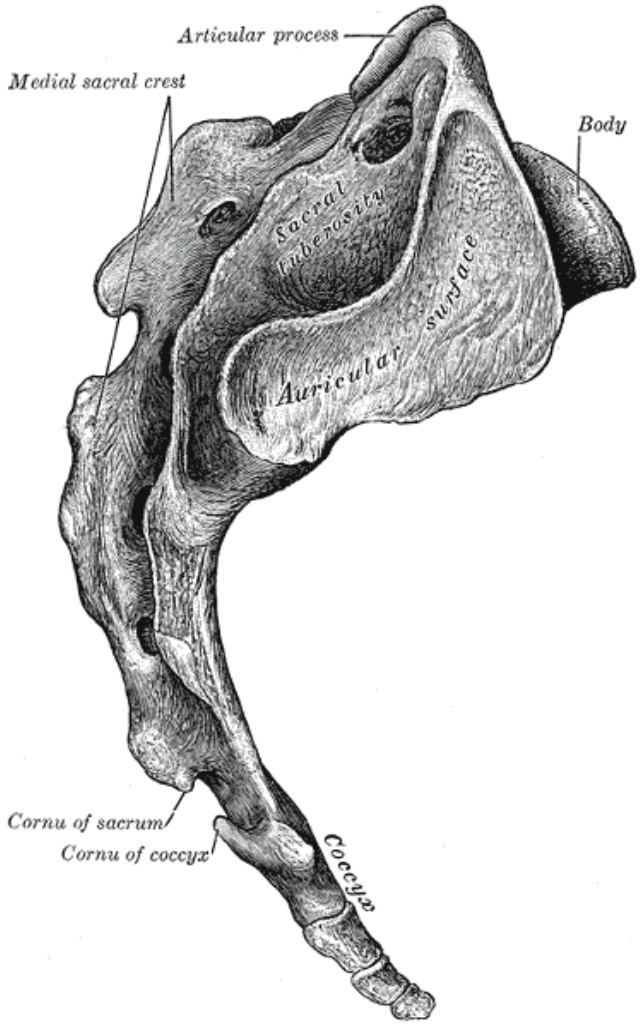
MUSCLE	ORIGIN	INSERTION	ACTION
Opponens pollicis	Trapezium and annular ligament	Whole length of metacarpal bone on radial side	Draws thumb inward over palm
Abductor pollicis	Annular ligament; scaphoid and trapezium	Radial side 1st phalanx of thumb	Moves metacarpal bone outward away from index finger
Adductor transversus pollicis	Lower 2/3 of metacarpal bone of society finger	With inner part of flexor brevis pollicis into ulnar side of base of proximal phalanx of the first digit	Move metacarpal bone of thumb towards index finger
Flexor brevis pollicis	Outer 2/3 of annular ligament	Outer side of the base of 1st phalanx of thumb	Flexes/adducts proximal phalanx of thumb

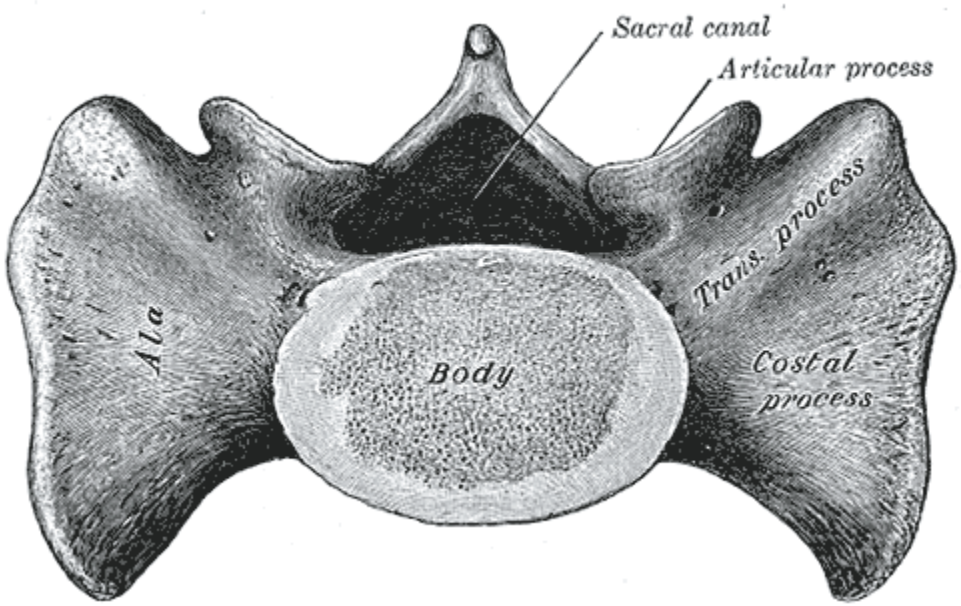
MUSCLE	ORIGIN	INSERTION	ACTION
Abductor minimi digiti	Pisiform bone and tendon of flexor carpi ulnaris	Ulnarside of base of proximal phalanx of 5th digit	(superficial) abducts little finger; flexes proximal phalanx
Flexor brevis minimi digiti	From hook of hamate bone	Inner side of base of proximal phalanx of 5th digit	Ibid
Palmaris brevis	Annular ligament and palmar fascia	Skin of medial border of palm	Corrugates the skin of inner side of palm
Lumbricales	Flexor profundus digitorum tendon	Radial side of corresponding fingers	2d layer; flexes 1st phalanx of digits 2,3,4,5



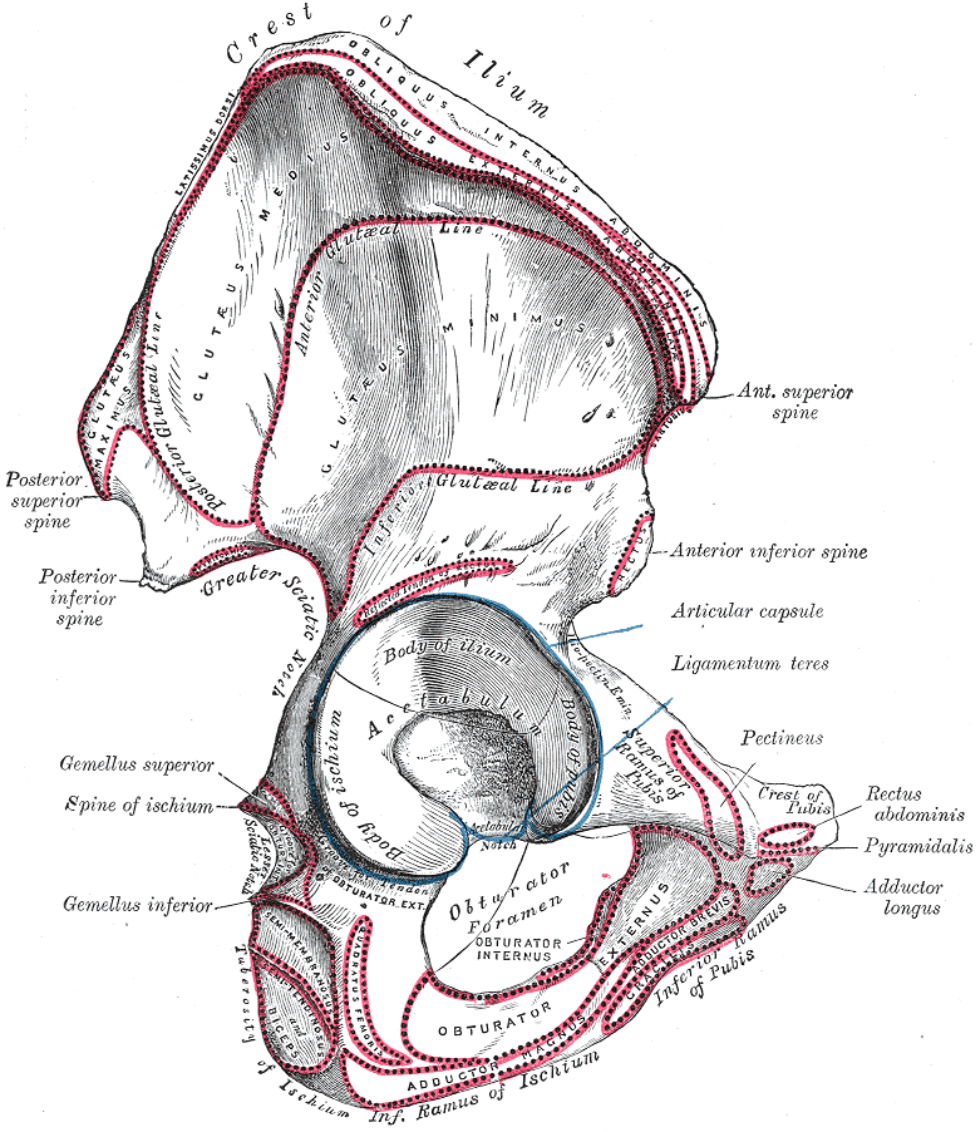
Abdomino-Sacro-Pelvic

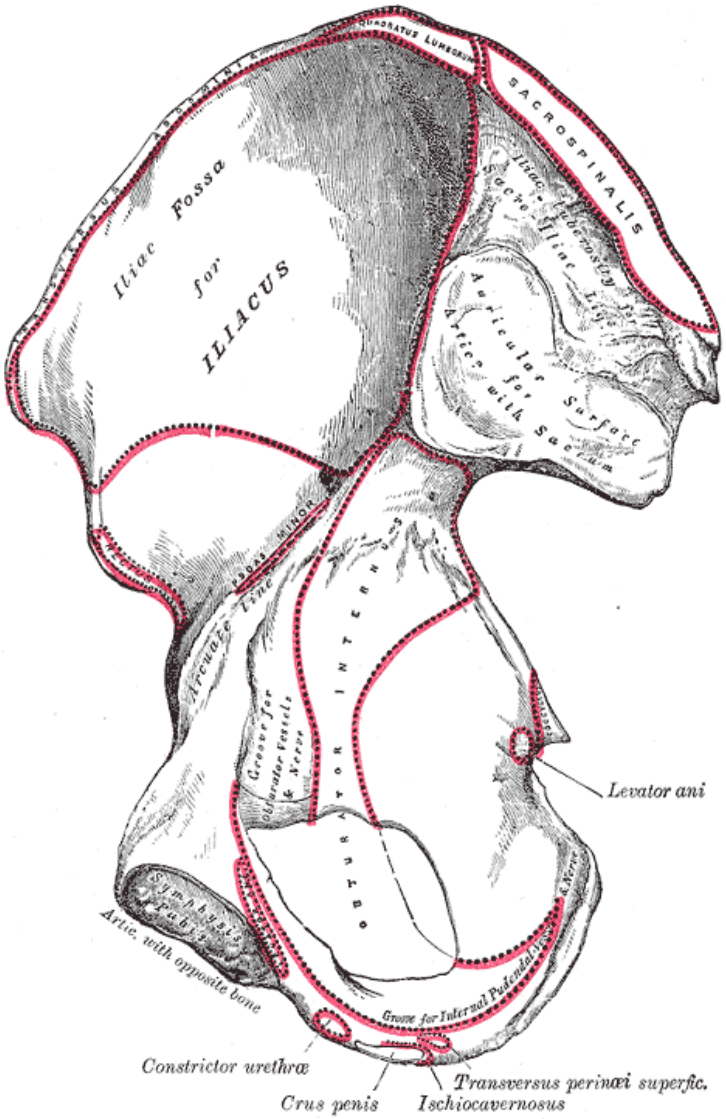




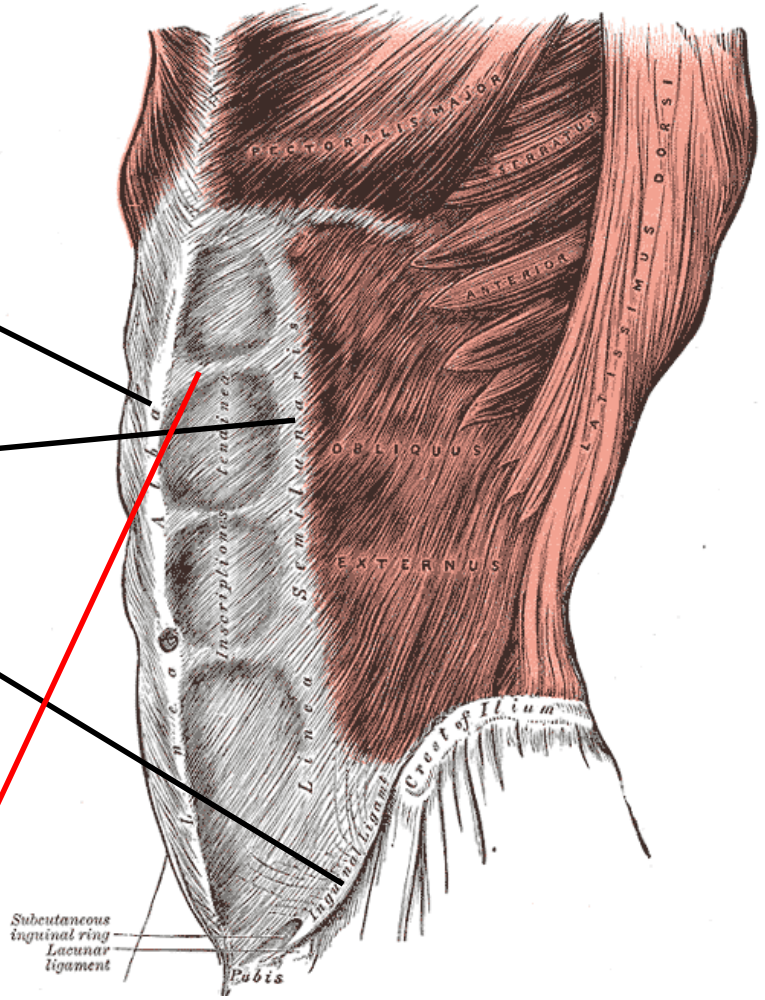

Sacral canal
Articular process
Trans. process
Ala
Body
Costal process

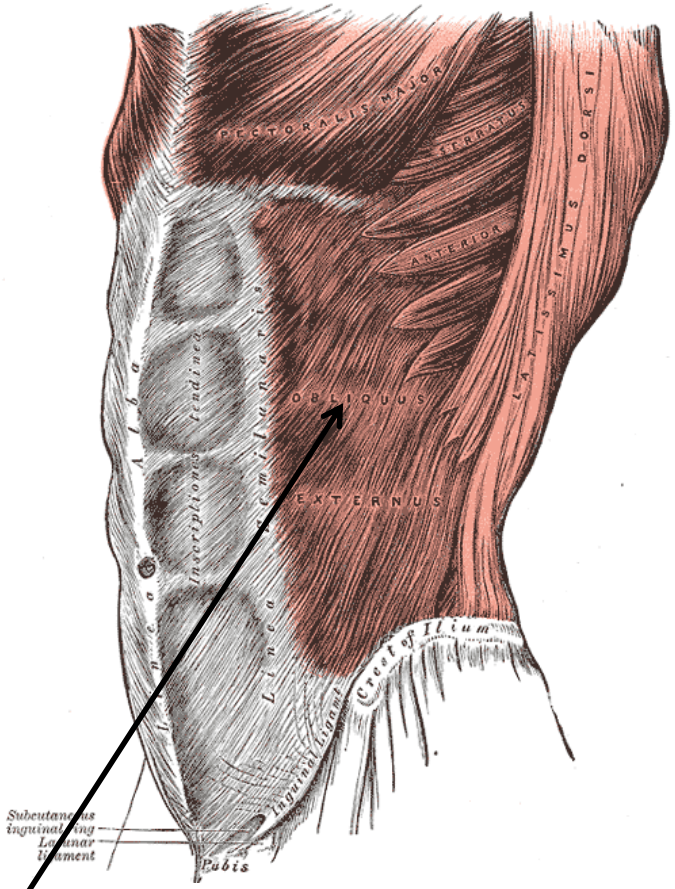
Pelvis and Lower Extremity



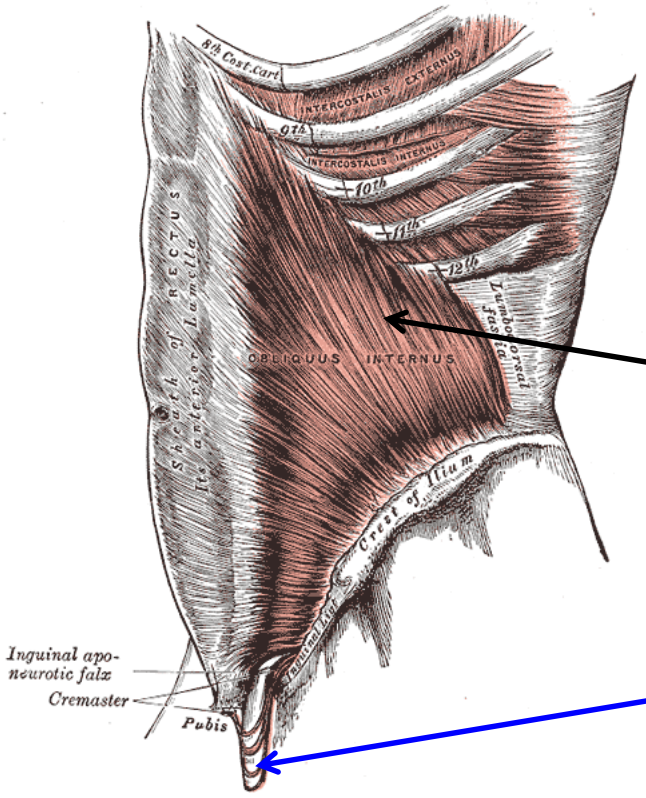


Fascia	Description
Linea alba	Extends from xiphoid process to symphysis pubis; formed by aponeurosis of Obliquii and Transversus muscles
Linea semilunares	Outer border of rectus abdominis; cartilage of 9th rib to pubic spine
Poupart's ligament	ASIS to pubic spine; from aponeurosis of external oblique
Linea transversae	Intersects recti muscles; connect semilunares to alba



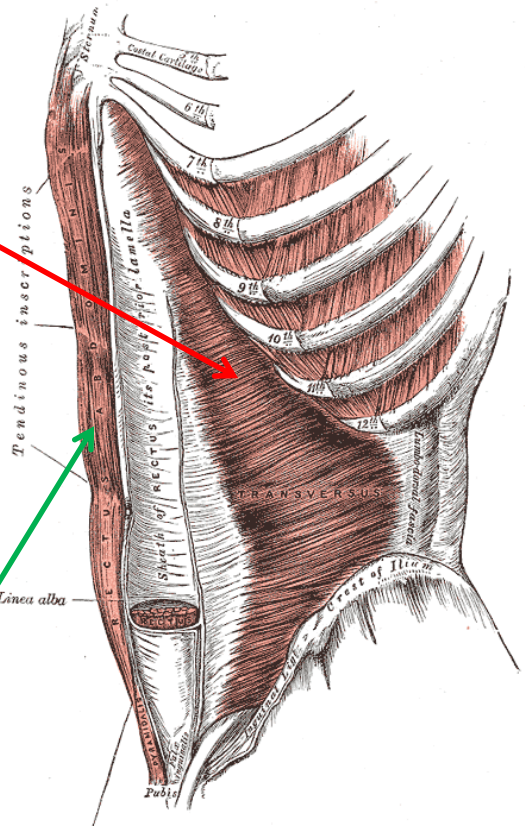


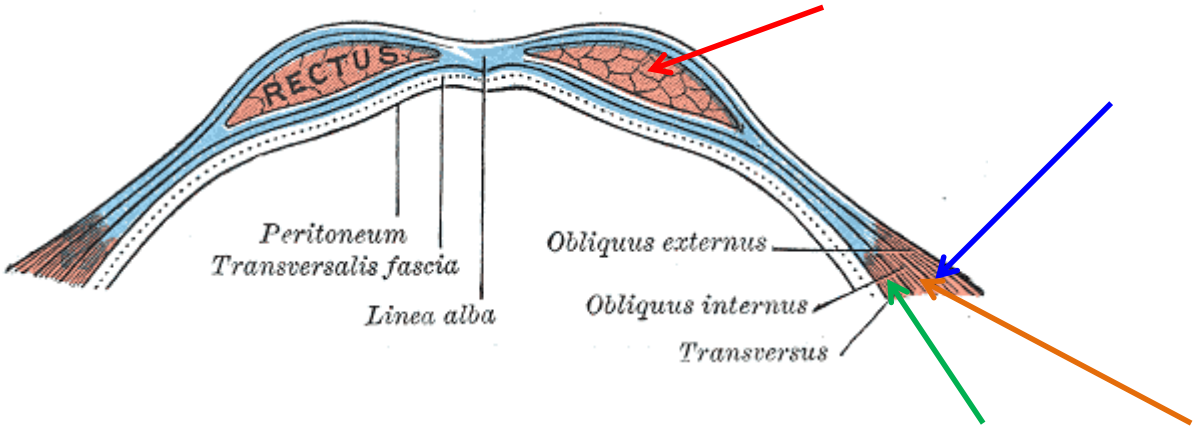
MUSCLE	ORIGIN	INSERTION	ACTION
External oblique	Lower outer surface of ribs 5-12	Iliac crest and ASIS	Compresses abdominal viscera; flexes chest on thighs; outermost layer



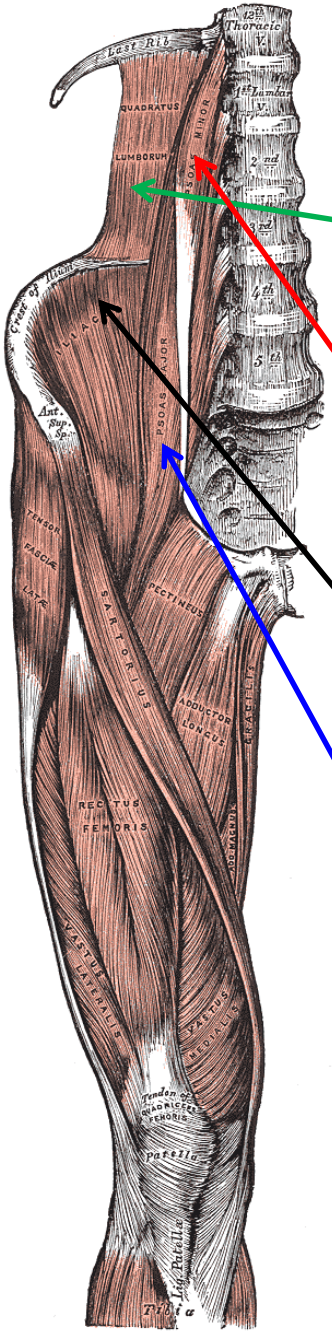
MUSCLE	ORIGIN	INSERTION	ACTION
Internal oblique	Anterior 2/3 of iliac crest and lumbar fascia	Crest of os pubis	Compresses abdominal viscera; flexes chest on thighs; 2d layer muscle
Cremaster	Poupart's ligament and forms loops	Loop ends insert into crest of os pubis	Lower testes when hot; raises testes when cool or excited; in females, only 1-2 loops found in the round ligament

MUSCLE	ORIGIN	INSERTION	ACTION
Transversalis	Poupart's ligament; inner lip of iliac crest; inner surfaces of cartilages of ribs 7-12	Linea alba; crest of os pubis	Compresses abdominal viscera; flexes chest on thighs; innermost (4th – deepest) layer
Rectus abdominis	Crest of os pubis	Cartilage of ribs 5-7	As with other abdominal muscles; third layer



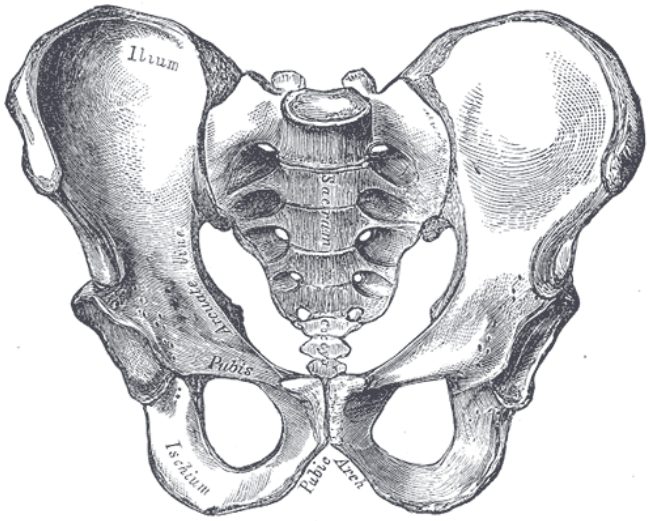


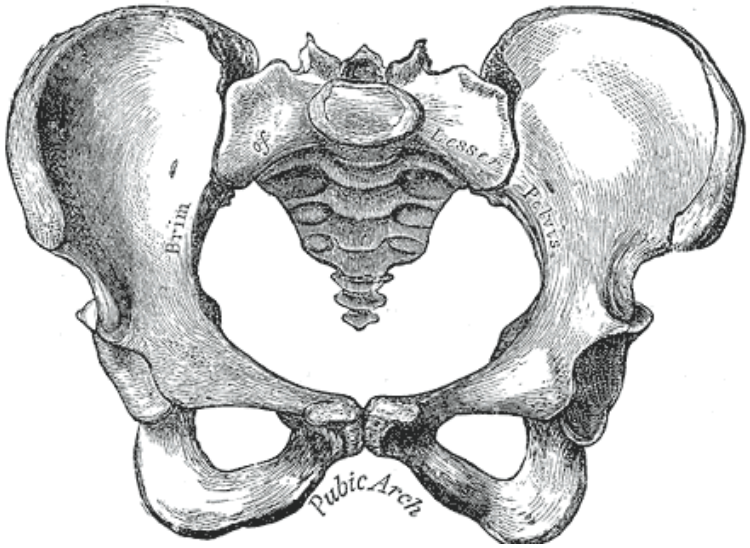
1. First layer = external oblique
2. Second layer = internal oblique
3. Third layer = rectus
4. Fourth layer = transversalis



MUSCLE	ORIGIN	INSERTION	ACTION
Quadratus lumborum	Transverse process of L5 to sacral base; iliac crest just ventral to the SI articulation	Rib 12; transverse processes of L 1-4	Draws rib 12 to pelvis; flexes L spine laterally towards the flexed muscle
Psoas minor	Sides of T12 and L1 bodies	Pectineal line and iliopectineal eminence and iliac fossa	Ventral to major; flexes pelvis and L spine
Iliacus	Superior 2/3 of iliac fossa and inner lip of iliac crest; dorsal sacral base and ASIS and AIIS	Lateral side of psoas major	Flex thigh
Psoas major	Transverse processes of L1-5 and vertebral bodies and disks of T12-L5	Lesser trochanter	Flex thigh; flex L spine; bends L-spine laterally

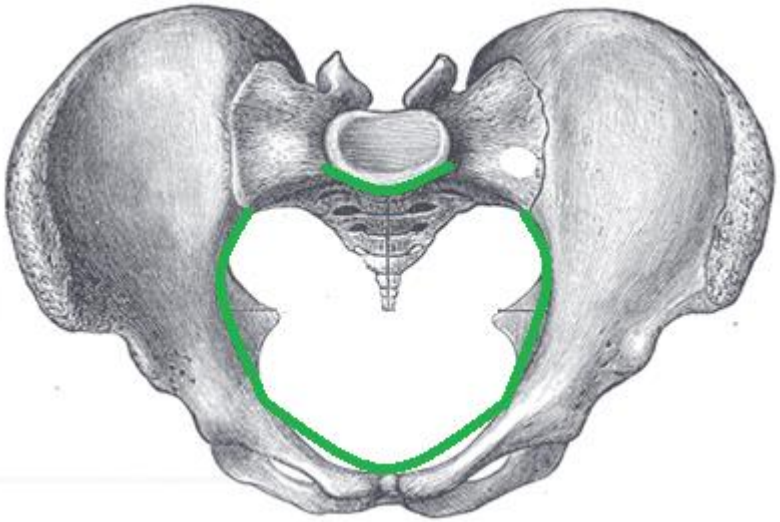
Male vs Female Pelvis





Pelvis -- Sex Differences		
POINT	FEMALE	MALE
General structure	Light/thin	Heavy/thick
Joint surfaces	Small	Large
Muscle attachments	Indistinct	Well marked
Greater pelvis (expanded portion superior to brim of pelvis -- no bony component anteriorly)	Shallow	Deep
Pelvic inlet	Larger/oval	Heart shaped
Pelvic outlet	Large	Small
1st piece of sacrum	≈1/3 width (body vs sacrum)	≈1/2 width
sacrum	Short, wide, flat, curved forward in lower part	Long, narrow, Smooth concavity
Auricular surface (articulates with the sacrum)	To border of S3	Well down S3
Pubic arch	>90°	<90°
Inferior pubic ramus	Everted surface not present	Strong everted surface for attachment of crus of penis (proximal end of corpora cavernosa -- fills with blood during erection)
Symphysis pubis	Less deep	More deep
Ischial spine	Turned inward less	More
Ischial tuberosity	Out	In
Ilium	Less vertical	More vertical
Iliac crest	Less curved	More curved
ASIS	Wider	Closer
Acetabulum	Small	Large
Obturator foramen	Oval	Round
Greater sciatic notch	Wide	Narrow
Iliac fossa	Shallow	Deep

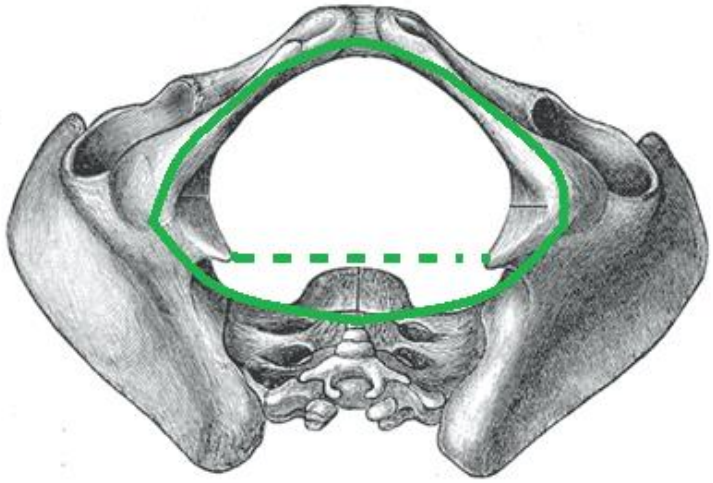
Pelvic Inlet & Outlet



Sacral Promontory
Superior Pubic Ramus
Pubic Symphysis
Arcuate Line

↓

Pelvic Inlet

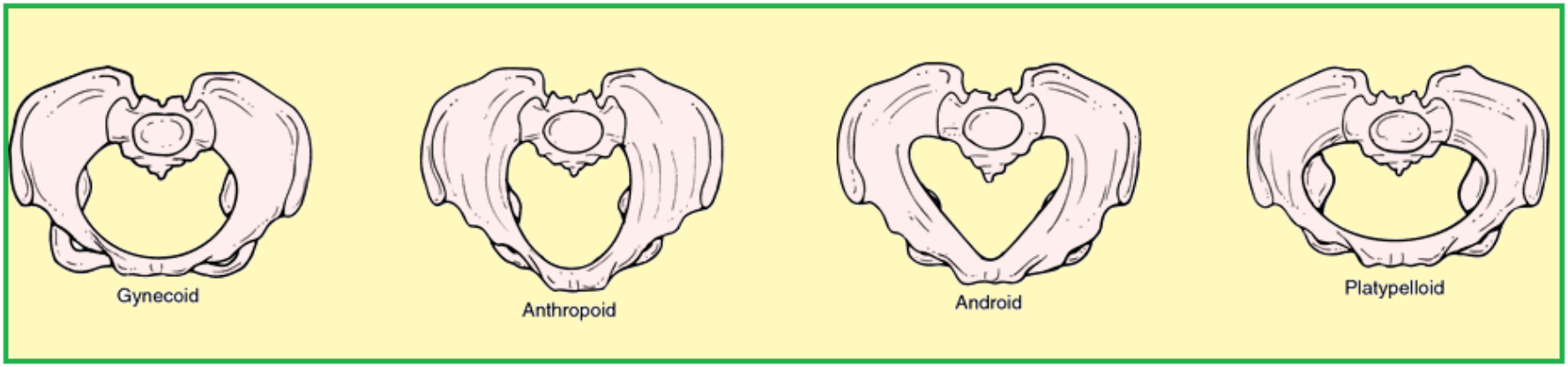


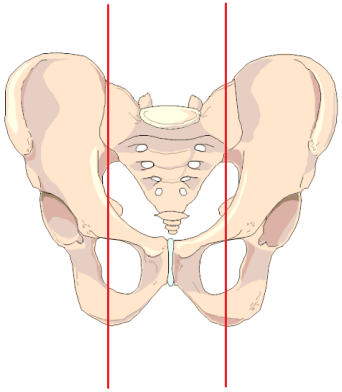
Point of Coccyx
Inferior Pubic Ramus
Pubic Symphysis
Ischial Tuberosities
(Ischial Spines!!!)

↓

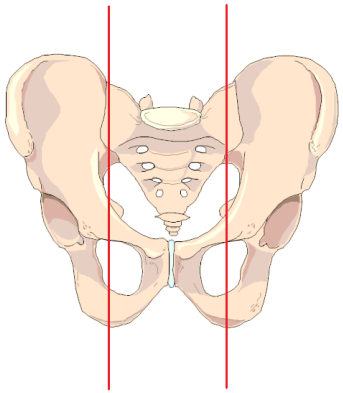
Pelvic Outlet

Generic Pelvis Types in Females

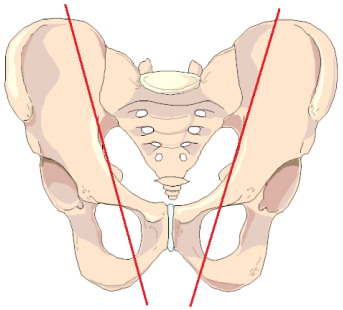




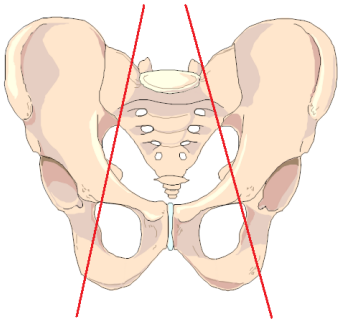
transverse ellipse --> circle



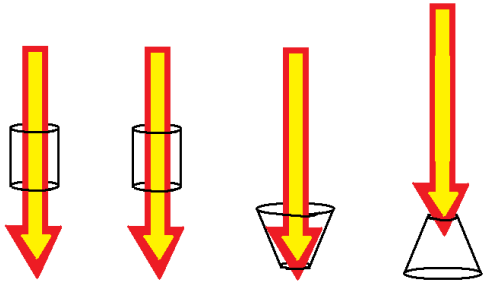
AP ellipse



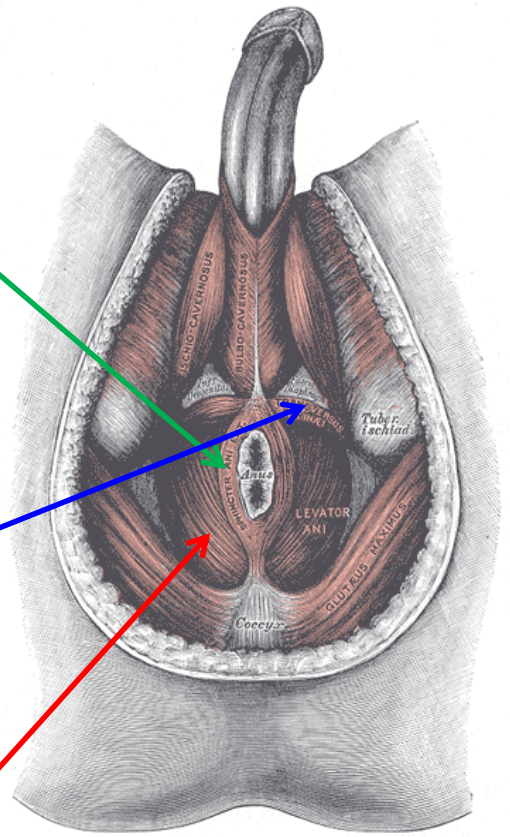
Heart shaped



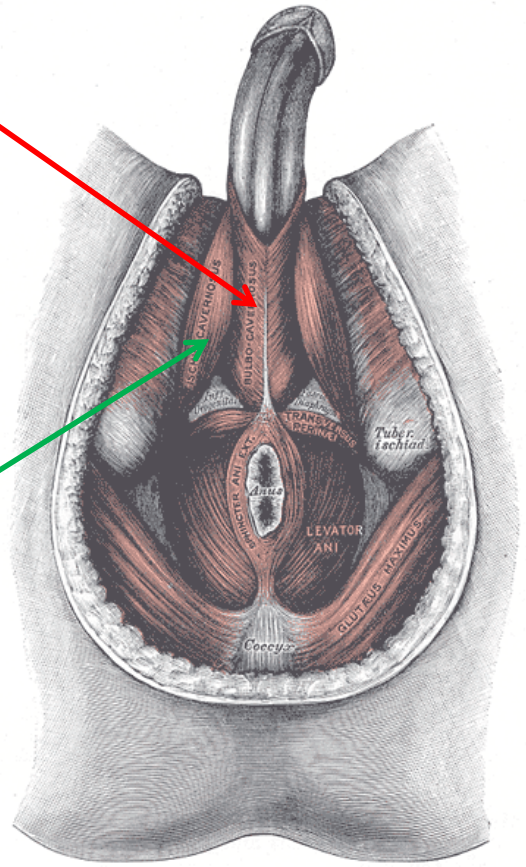
Kidney shaped



MUSCLE	ORIGIN	INSERTION	ACTION
Internal sphincter ani	Surrounds the lower extremity of the rectum for about an inch		Occludes the anal aperature
External sphincter ani	Tip and back of coccyx	Perineal raphe'	Keeps anal orifice closed; may be tightened voluntarily in expiration
Transversus perinaei	Ischial tuberosity	Perineal raphe' (male); central point of perineum; external sphincter ani and sphincter vaginae (female)	On contraction, fixes the raphe' (male); fixes central part of the perineum (female)
Levator ani	Posterior os pubis	Apex of coccyx, rectum, side of prostate	Supports lower end of rectum and vagina; supports bladder during expulsion



MUSCLE	ORIGIN	INSERTION	ACTION
Accelerator urinae (bulbospongiosus)	Perineal raphe'	Corpora cavernosa, corpus spongiosum and os pubis	To empty urethral canal after micturition; erection of penis (compresses corpus spongiosum)
Erector penis (ischiocavernosus)	Ischial tuberosity, crus, ischial ramus	Sides and the under surface of the crus penis	Maintains erection due to compressing the crus, retarding the return of blood
Compressor urethrae	Pubic and ischial rami; about ½ to ¾ of an inch	Prostate gland to surround urethra	Ejects last few drops of fluid like accelerator urinae



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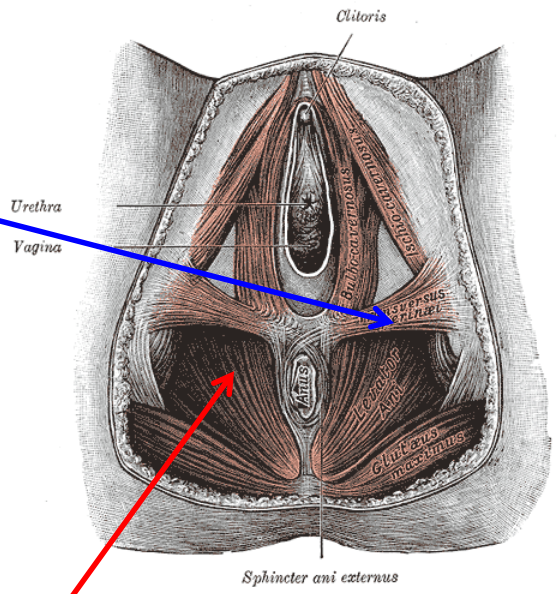
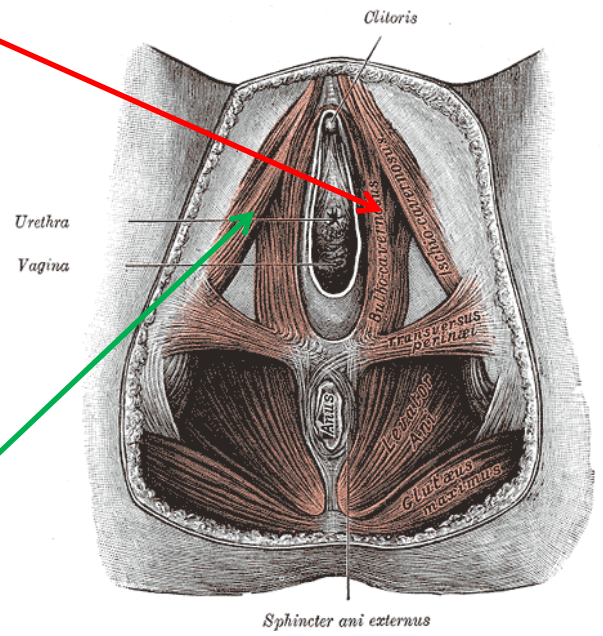
Levator ani	Posterior os pubis	Apex of coccyx, rectum, side of prostate	Supports lower end of rectum and vagina; supports bladder during expulsion



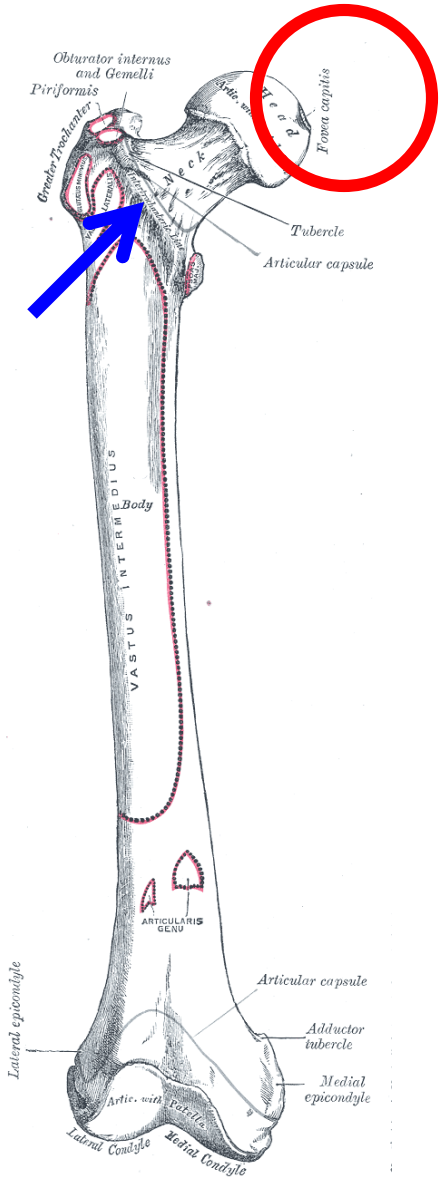
MUSCLE	ORIGIN	INSERTION	ACTION
Sphincter vaginae (bulbospongiosus)	External sphincter ani	Corpora cavernosa of clitoris to compress dorsal vein	Analogous to accelerator urinae in male; decreases size of vaginal orifice; clitoral erection
Erector clitoridis (ischiocavernosus)	Ischial tuberosity, clitoral crus, ischial ramus	Crus clitoris	Maintains erection due to compressing the crus, retarding the return of blood
Compressor urethrae	Pubic rami	In front of urethra and wall of vagina	Ejects last few drops of fluid like accelerator urinae

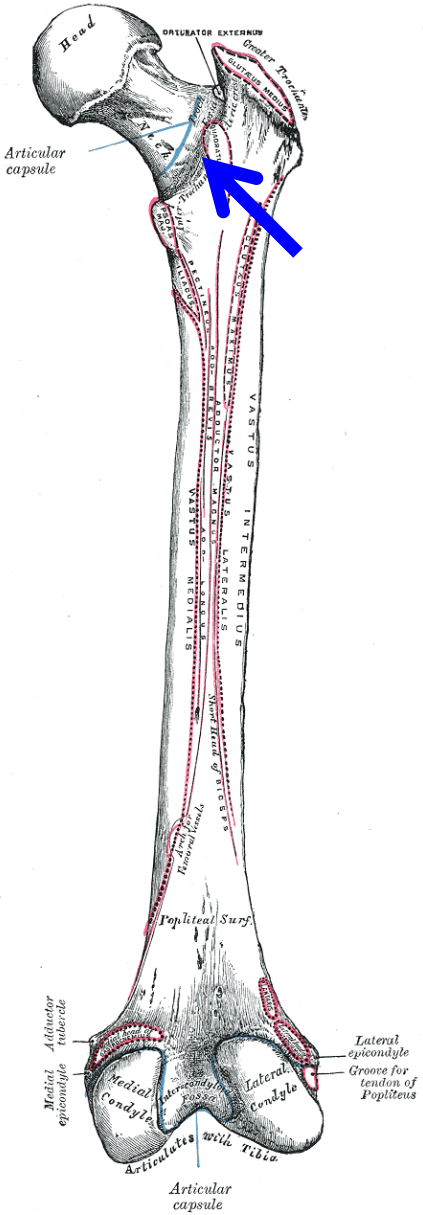


Lower Extremity

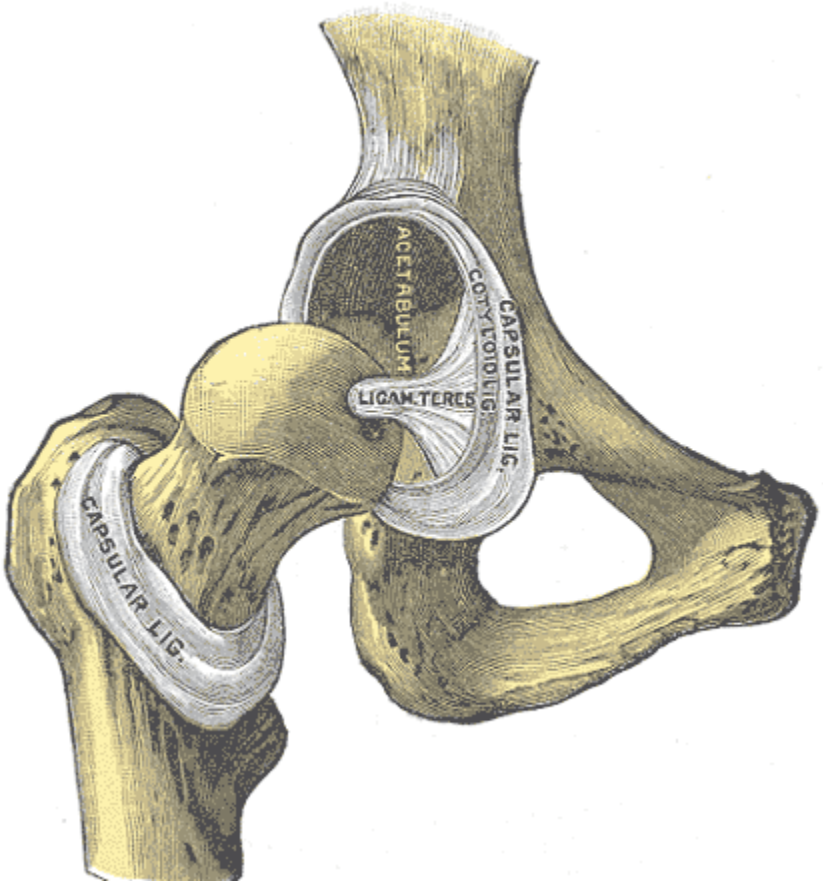
The Hip

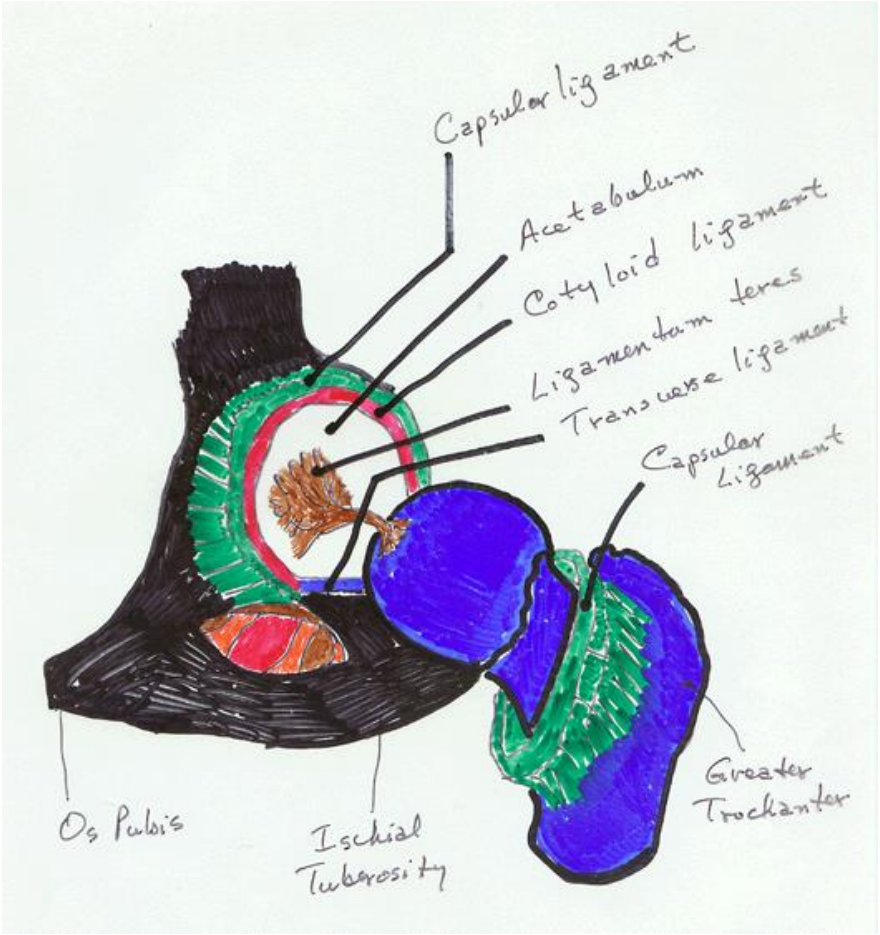
- The hip joint consists of 2-4 bones, depending on how you look at it.
- For two bones,
  - it consists of the femur and an os coxae;
- for 4 bones (during bone development and growth),
  - it consists of the femur and three bones that make up an immature os coxae: the ilium (ILL ee umm; upper flared part), the ischium (ISH ee um; lower part upon which you are sitting right now) and the os pubis (PYEW biss; the bone that makes up the front of the pelvis).


Obturator internus and Gemelli
Piriformis
Greater Trochanter
Head
Fovea capitis
Neck
Tubercle
Articular capsule
VASTUS INTERMEDIUS
Body
ARTICULARIS GENU
Articular capsule
Adductor tubercle
Medial epicondyle
Lateral epicondyle
Lateral Condyle
Medial Condyle

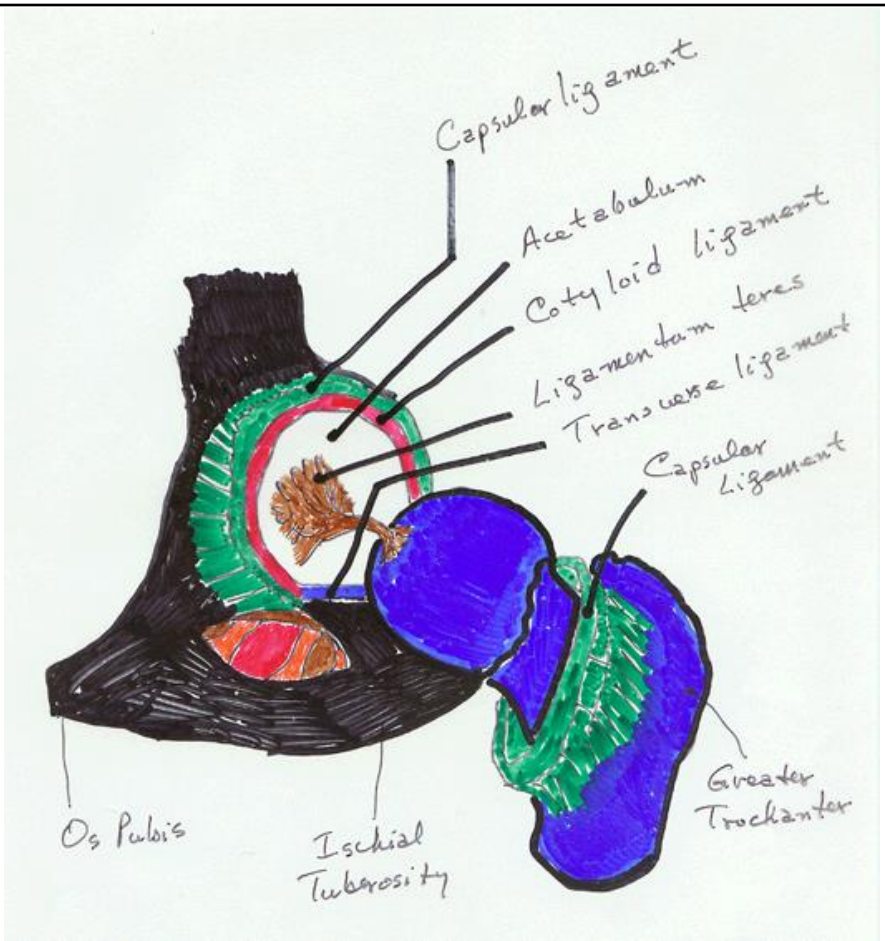

Head
OBTURATOR EXTERNUS
Greater Trochanter
Articular capsule
VASTUS INTERMEDIUS
Popliteal Surf.
Adductor tubercle
Medial epicondyle
Lateral epicondyle
Groove for tendon of Popliteus
Articulates with Tibia
Articular capsule

Ligament	Comment
Capsular	This ligament embraces the margin of the acetabulum, above, and surrounding the neck of the femur, below. The upper circumference is attached to the acetabulum, above and behind, external to the cotyloid ligament. In front, however, this ligament is attached to the outer margin of the cotyloid. It is attached to the transverse ligament and a few fibers are attached to the edge of the obturator foramen. The lower circumference surrounds the neck of the femur, being attached, in front, to the anterior intertrochanteric line; above to the base of the neck, behind to the neck of the bone, roughly half an inch above the posterior intertrochanteric line.

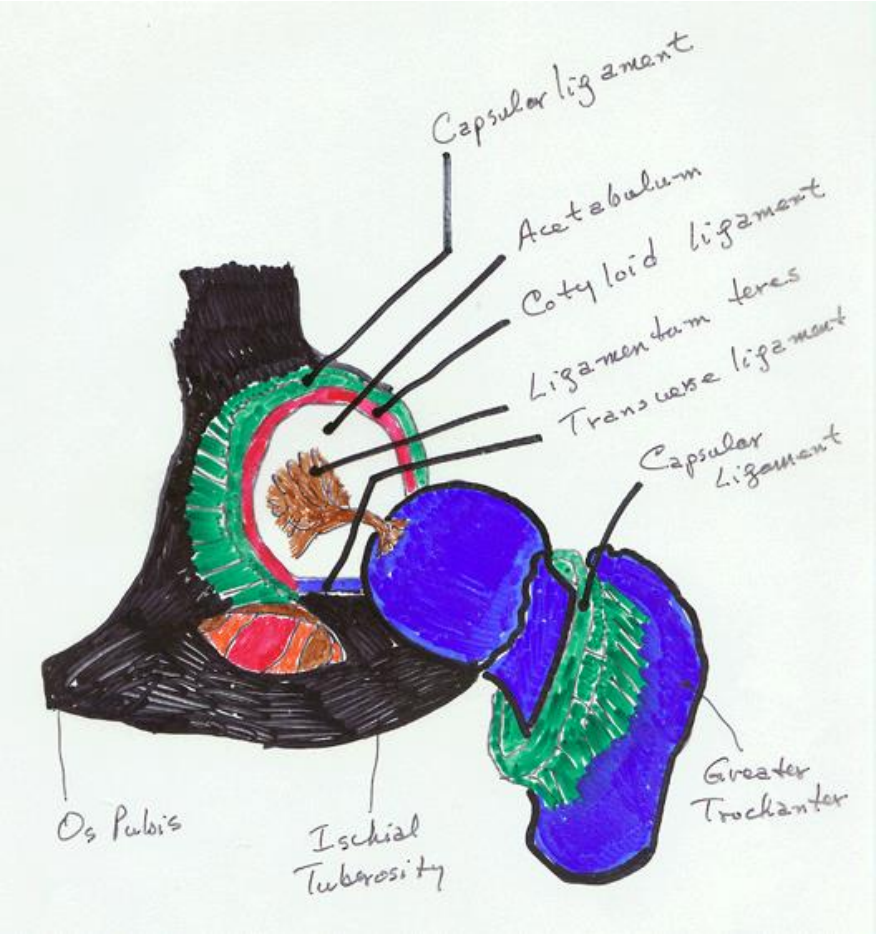




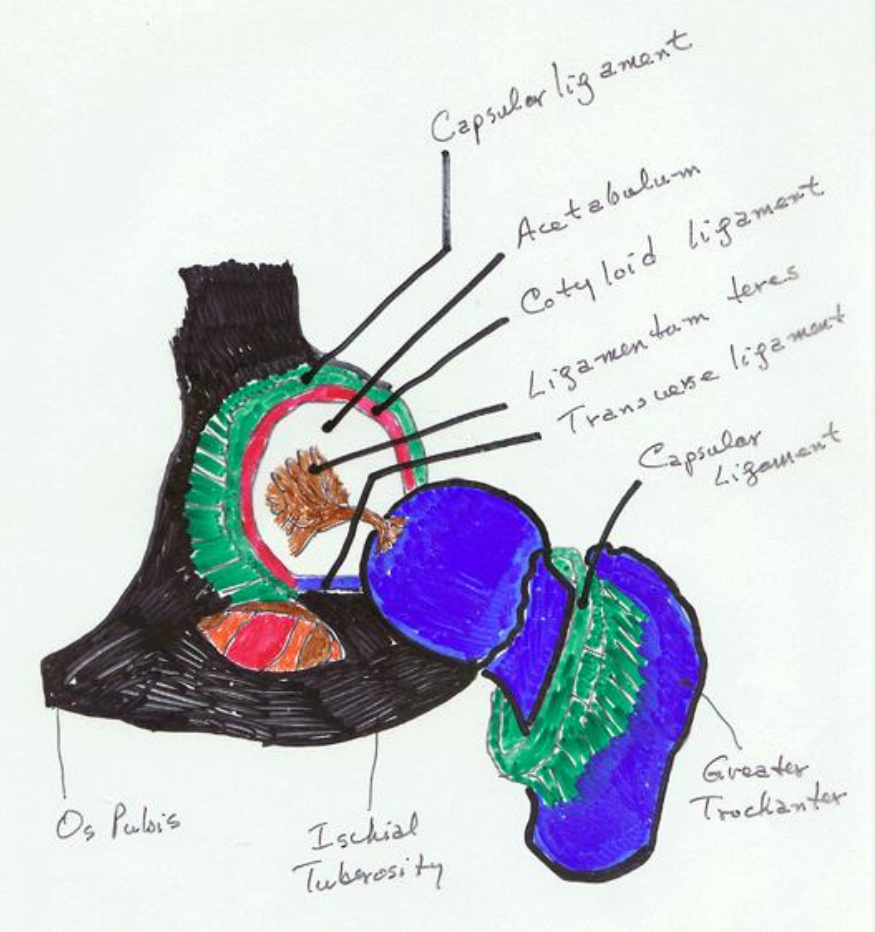
Ligament	Comment
Cotyloid	Attaches to the rim of the acetabulum; protects bone edges and fills in rough edges on the acetabular surface. This ligament bridges over the cotyloid notch as the transverse ligament. It forms a complete circle surrounding the head of the femur closely. It assists in holding the head in its proper position, acting as a sort of valve.



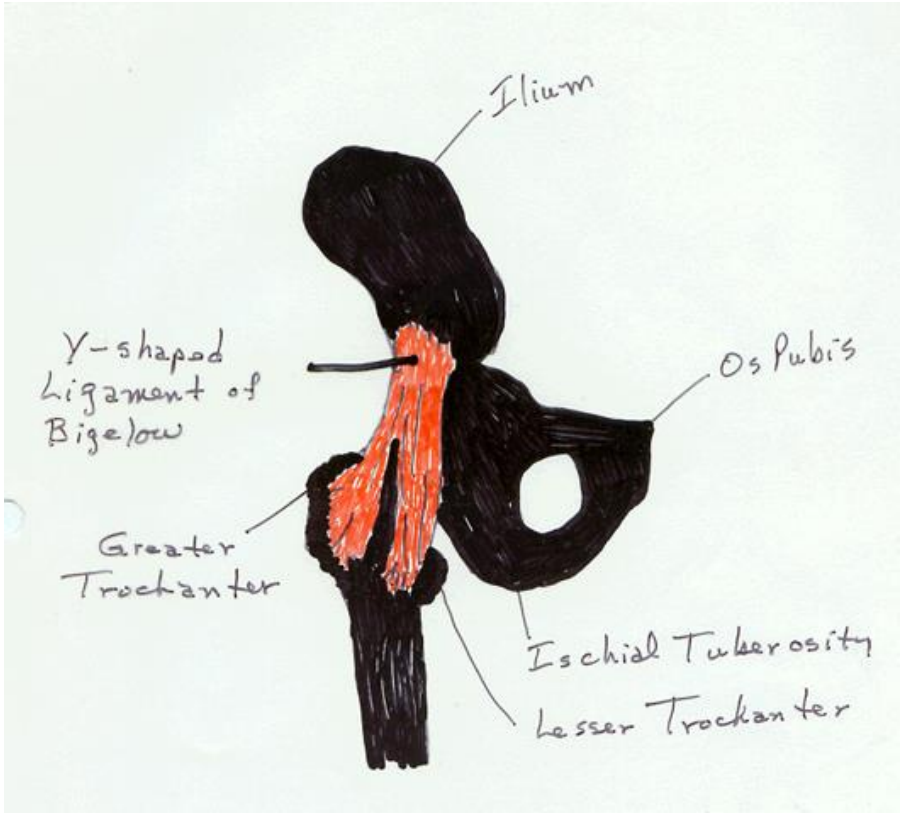
Ligamentum teres	Also called the capitate ligament. It is implanted by its apex into the fovea capitis femoris (a depression in the very tip of the femoral head) and by its broad base into the margins of the cotyloid notch (the notch at the bottom of the acetabulum). This ligament is tensed during adduction and outward rotation and relaxed when the limb is abducted. It has little influence as a ligament.

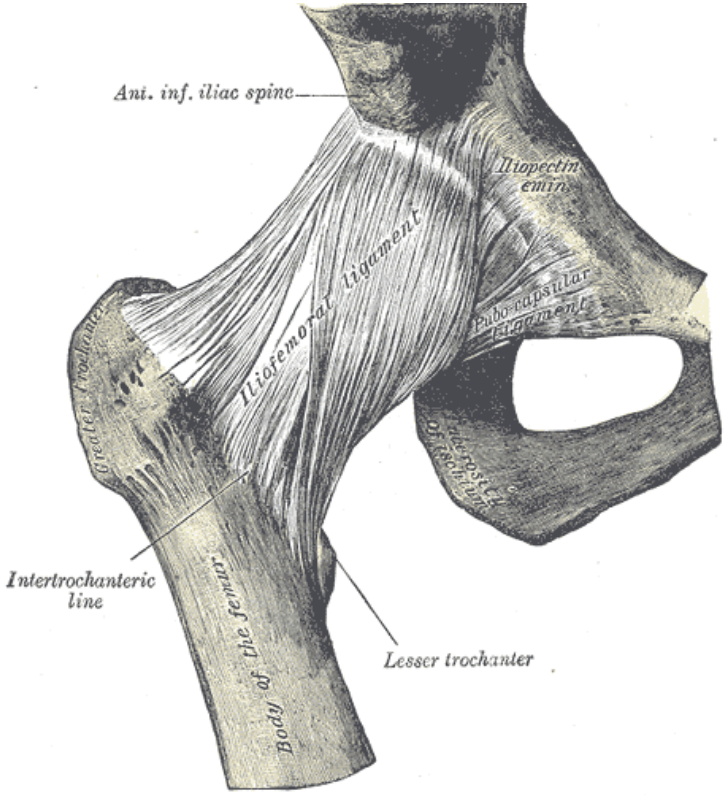


Ligament	Comment
Transverse	A portion of the cotyloid ligament which crosses the cotyloid notch, converting it into a foramen, providing for the passage of nutrient vessels to the joint.

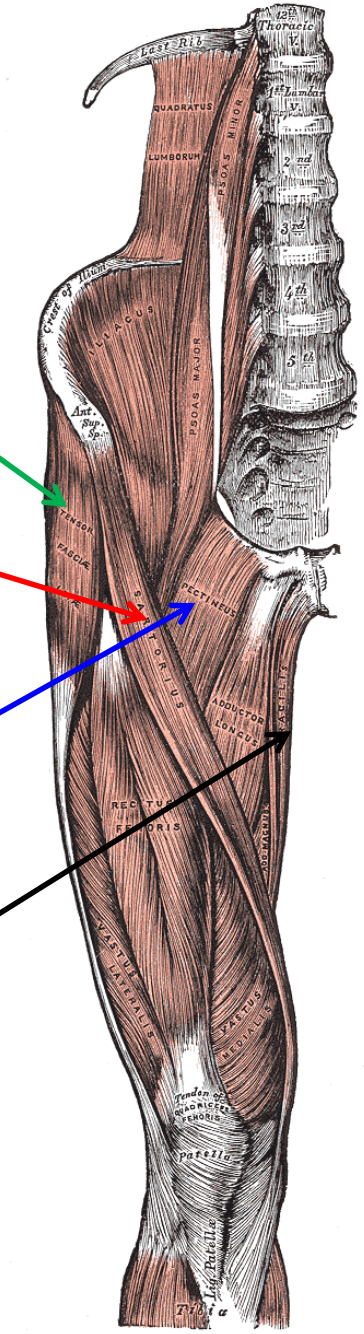


Ligament	Comment
Iliofemoral	Formed from fibers from the capsular ligament. It extends obliquely across the front of the joint. It is attached, above, to the lower part of the AIIS. It diverges downward, forming two bands: one passes downward and inserts onto the lower part of the anterior intertrochanteric line and the other inserts into the upper part of the anterior intertrochanteric line and adjacent part of the femoral neck. This ligament is also sometimes called the Y-shaped ligament of Bigelow; the portion, which attaches to the greater trochanter is sometimes described as a separate ligament: the iliotrochanteric.

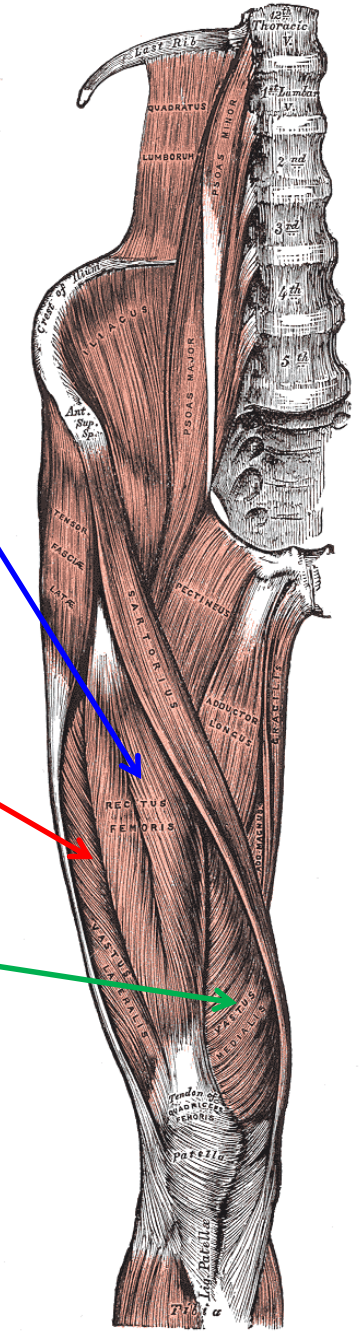




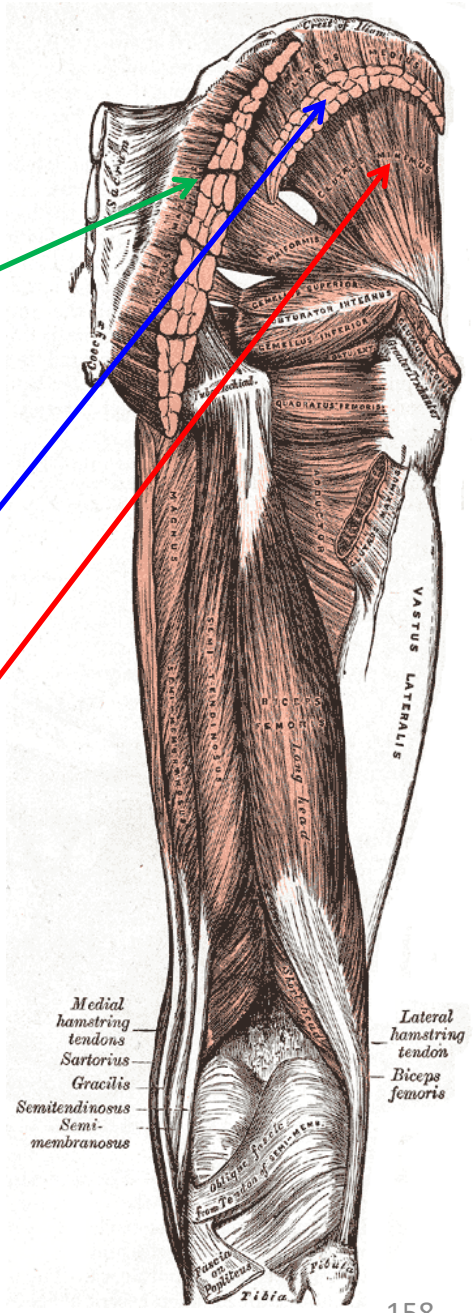
MUSCLE	ORIGIN	INSERTION	ACTION
Tensor fasciae latae	Anterior iliac crest	ITB	Abducts, flexes and medially rotates thigh
Sartorius	ASIS	Medial surface of tibial shaft to crest	Rotates tibia inward; flexes pelvis on thigh; rotates pelvis
Pectineus	Ischial ramus; pubic spine	From lesser trochanter to linea aspera	Behind adductor longus; adducts thigh; flexes thigh on pelvis
Gracilis	Lower margin of pubic symphysis and pubic arch	Superomedial surface of tibial shaft	Flexes leg, rotates leg inward; adducts thigh

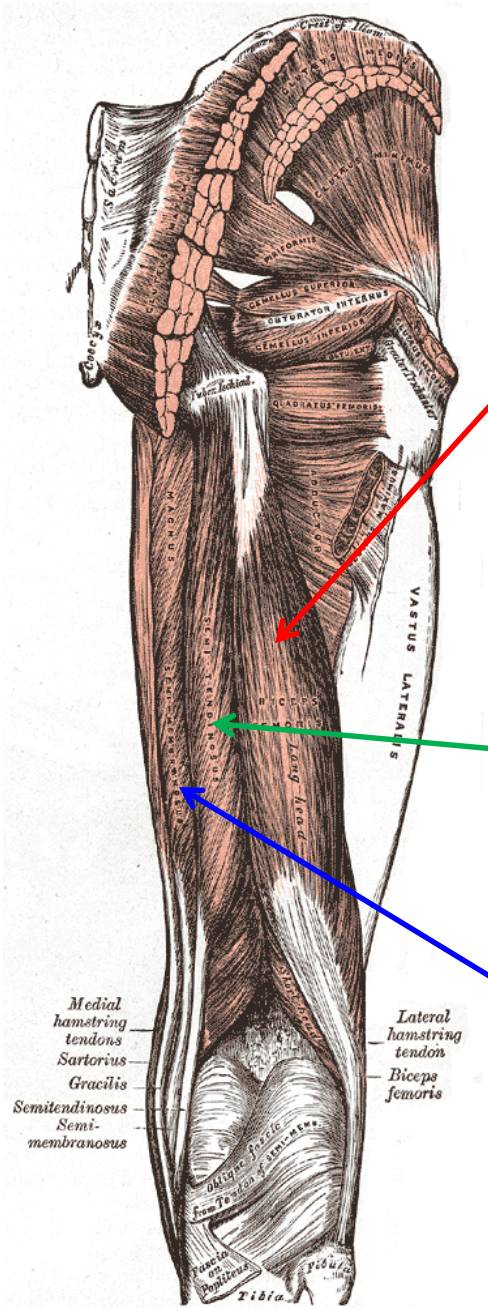


MUSCLE	ORIGIN	INSERTION	ACTION
Rectus femoris	AIIS and brim above acetabulum	Into patella	Supports pelvis and trunk on femur; flexes thigh on pelvis
Vastus (externus) lateralis	Upper ½ of anterior intertrochanteric line; root of greater trochanter; upper ½ of linea aspera	Into patella	Extends leg on thigh
Vastus (internus) medialis	Lower half of anterior intertrochanteric line; linea aspera	Into patella	Draws patella inward as well as upward
Vastus intermedius	Anterolateral femur	Into patella	Extends leg at knee



MUSCLE	ORIGIN	INSERTION	ACTION
Gluteus maximus	Curved line of ilium including crest; sacrum and coccyx	Greater trochanter to linea aspera	Extends femur; brings bent thigh into a line with the body; regain erect position after stooping
Gluteus medius	Ilium; outer lip of crest	Outer surface of greater trochanter	Abduct extended limb; supports body on one limb; rotate thigh inward
Gluteus minimus	Outer surface of ilium; greater sciatic notch	Anterior border of greater trochanter	Immediately beneath the preceding; actions as with other 2 glutei



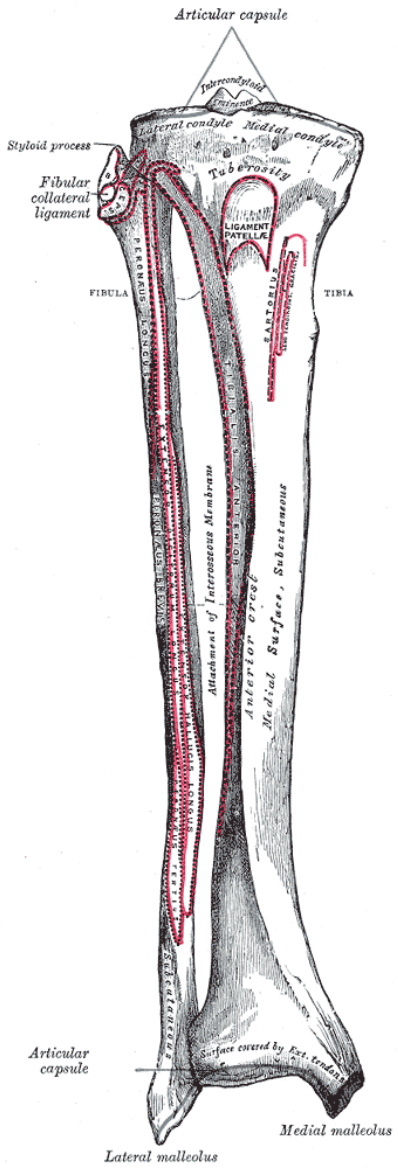


MUSCLE	ORIGIN	INSERTION	ACTION
Biceps femoris	Posterior ischial tuberosity; lateral lip of linea aspera	Outer side of fibular head and lateral surface of tibia	Flexes lower leg on thigh; rotates leg slightly outward
Semitendinosus	Ischial tuberosity common to long head of biceps tendon	Superior medial surface of tibial shaft as far as anterior border	Rotate leg inward; flexes lower leg on thigh; sets on top of semimembranosus
Semimembranosus	Ischial tuberosity common to the long head of the biceps tendon	Supero-medio-posterior aspect of tibia	Rotate leg inward; flexes lower leg on thigh; also medial-most posterior thigh muscle

The Knee

- The knee is the most unstable joint in the body.
- It consists of 4 bones:
  - the femur,
  - the patella (kneecap),
  - the tibia and
  - the fibula.

- The ligaments of significance are tabulated, following tib/fib slide:



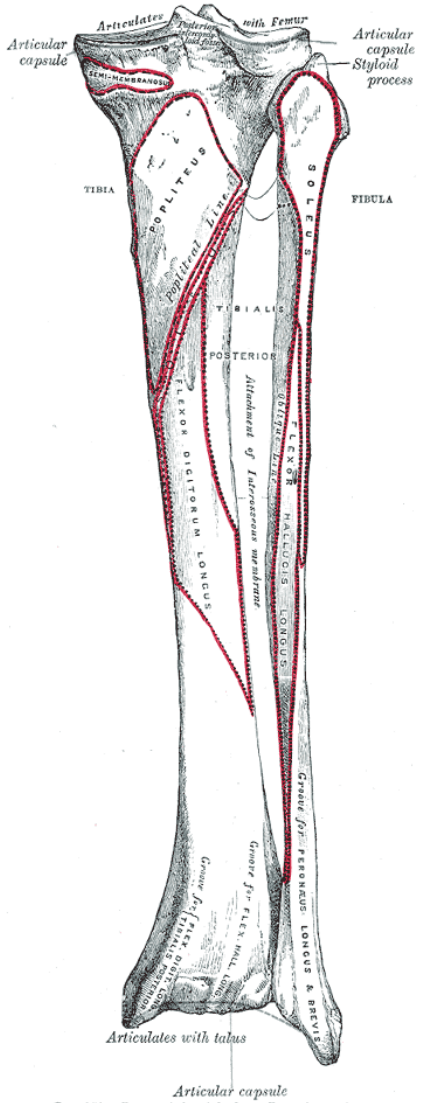
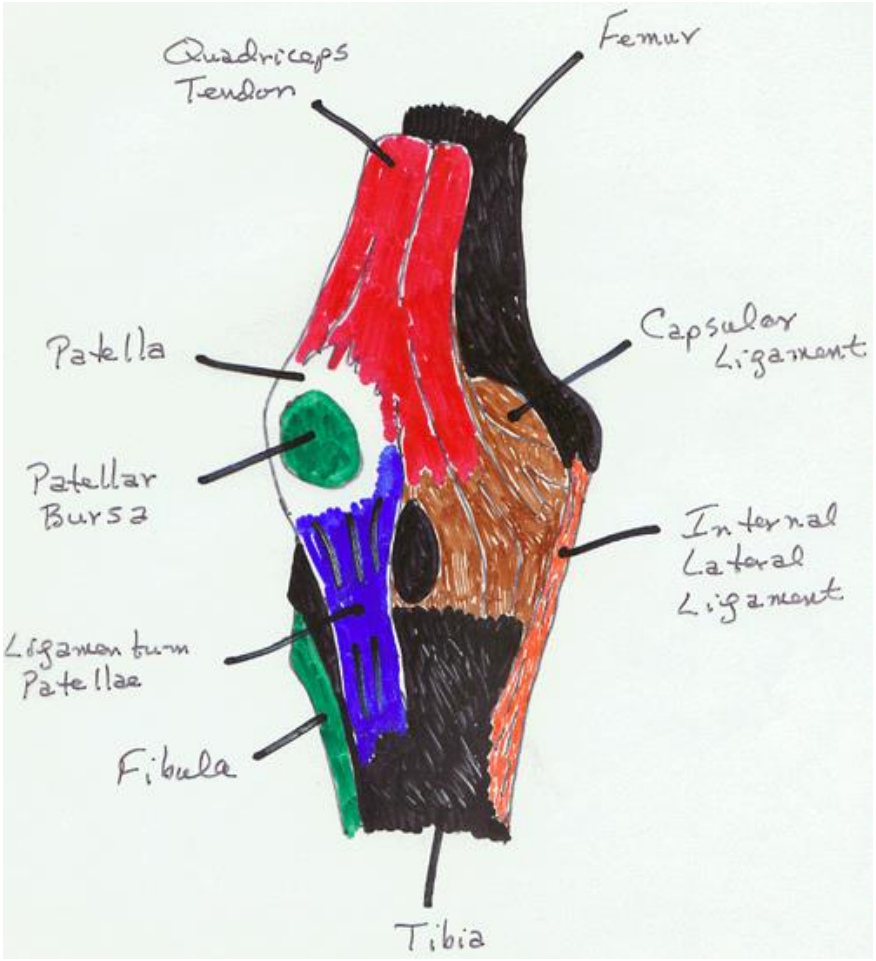
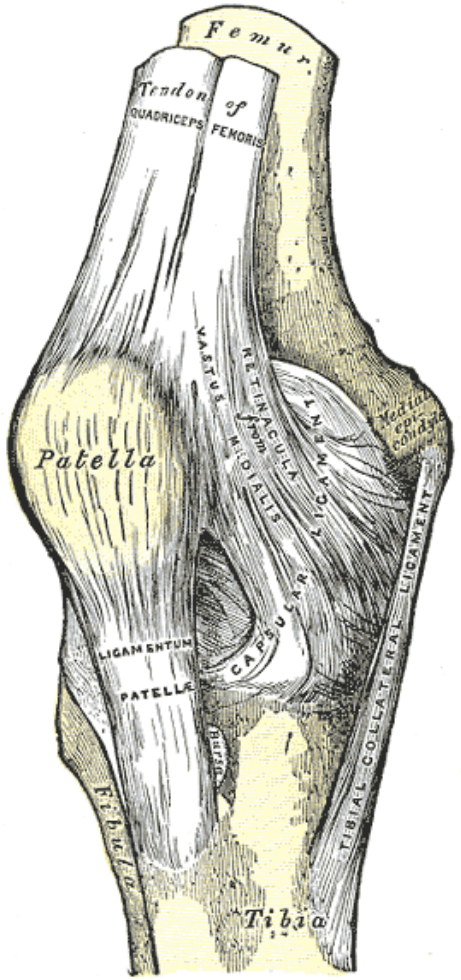


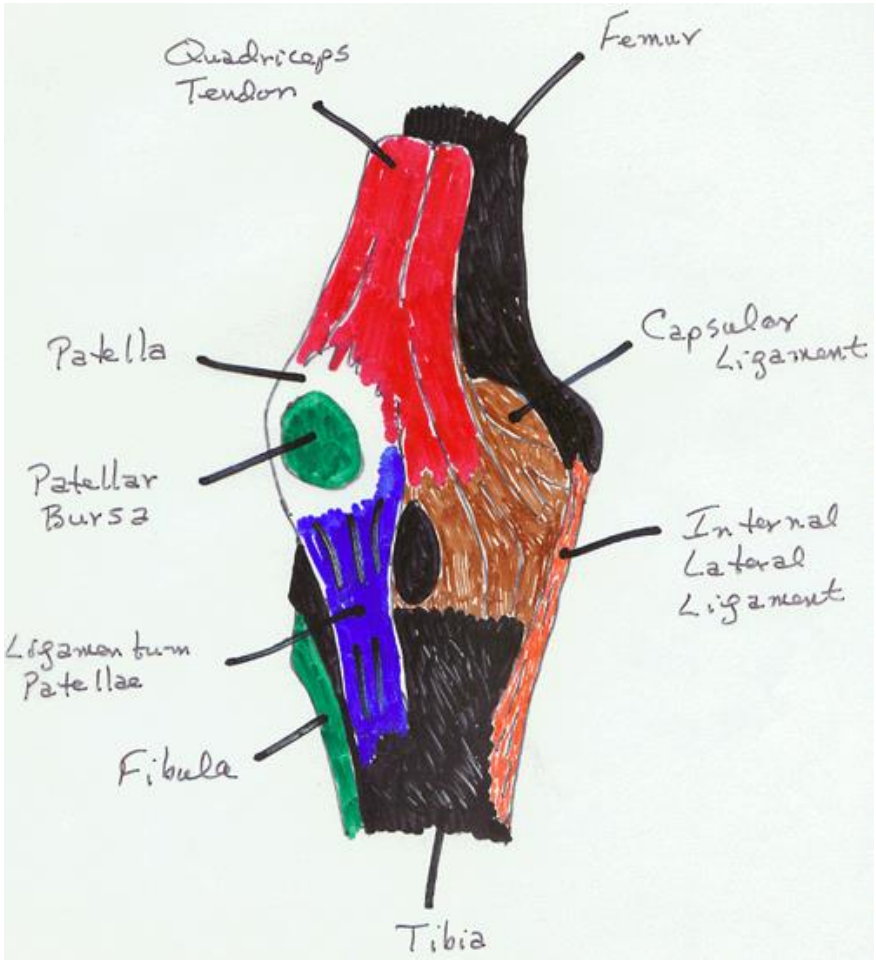
FIG. 259.—Bones of the right leg. Posterior surface.

Ligament	Comment
Ligamentum patellae	The central portion of the common extensor tendon (from the thigh muscles), which is continued from the patella to the tibial tubercle.

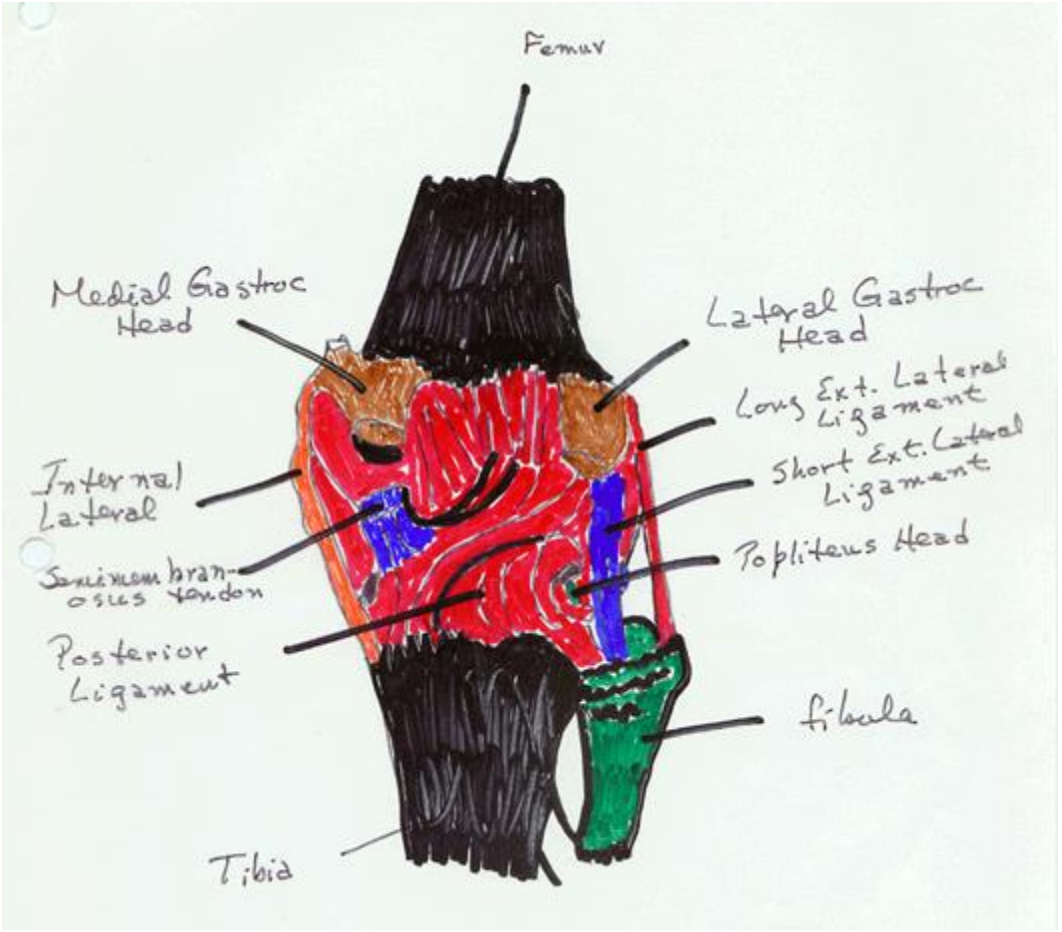


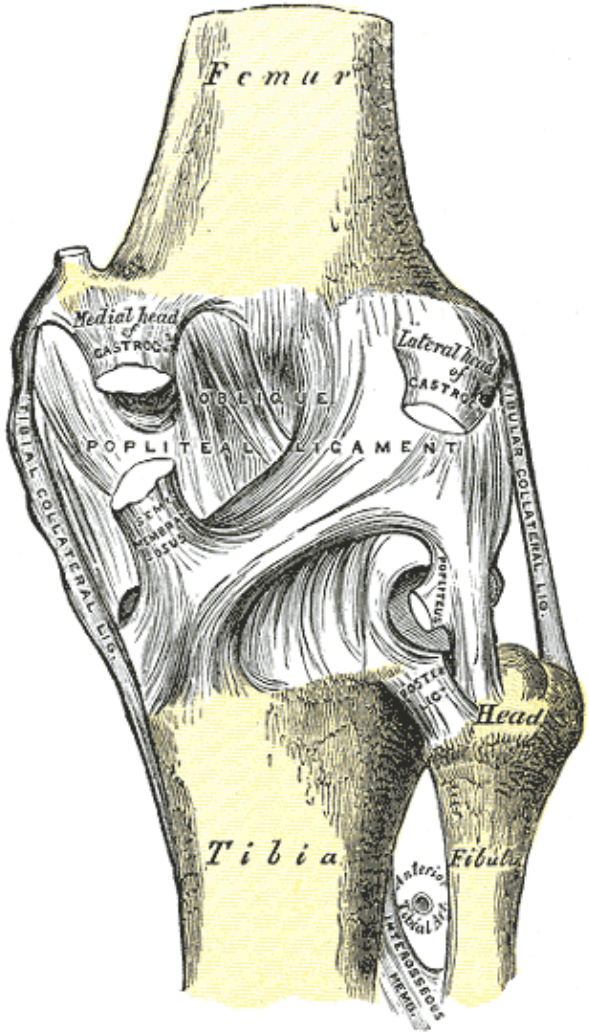


Capsular	Anteriorly, it blends with and forms the lateral portions of the patellar ligament. It fills in the interval between the anterior and lateral ligaments of the joint. Behind, it arises from the condyles and intercondylar notch of the femur, and attaches, below, to the posterior region of the head of the tibia.

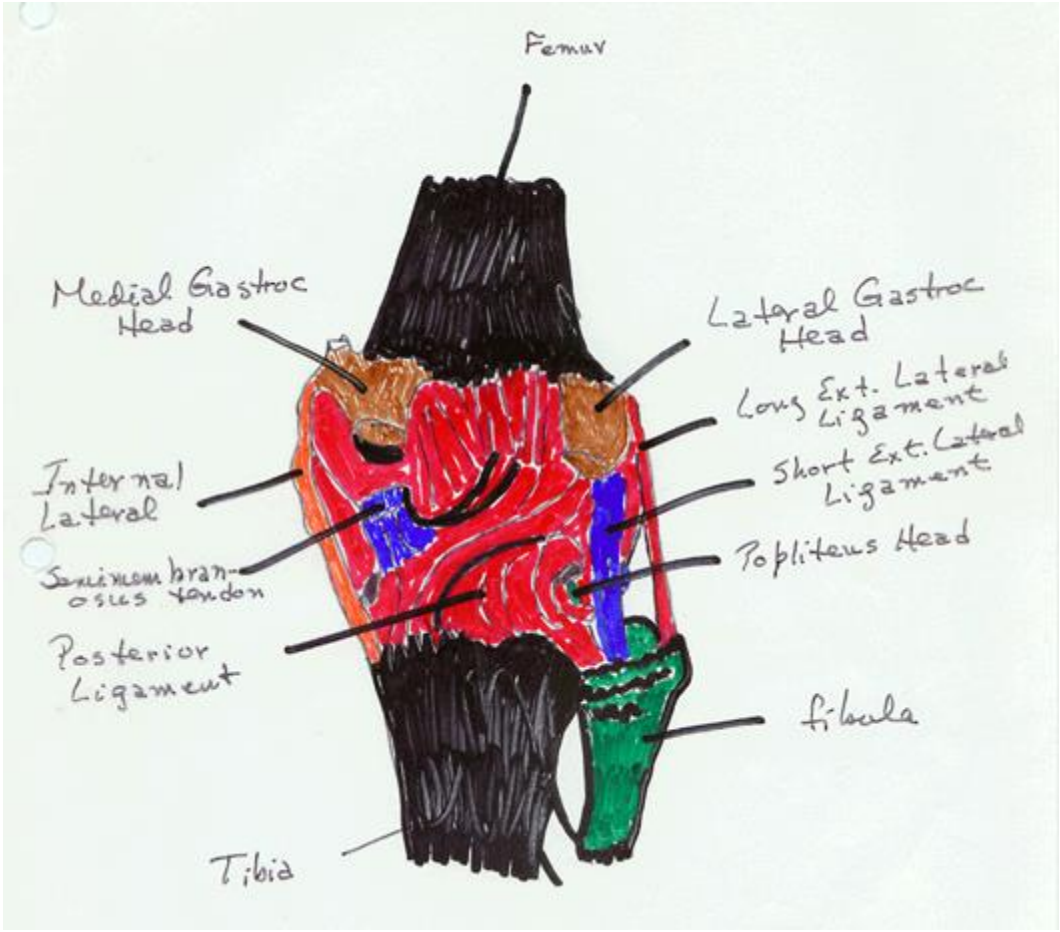


Ligamentum posticum Winslowii	Also called the posterior ligament. It is attached, above, to the upper margin of the intercondyloid notch of the femur. Below, to the posterior margin of the head of the tibia. The posterior ligament forms part of the floor of the popliteal "bed" -- the popliteal artery rests upon it.

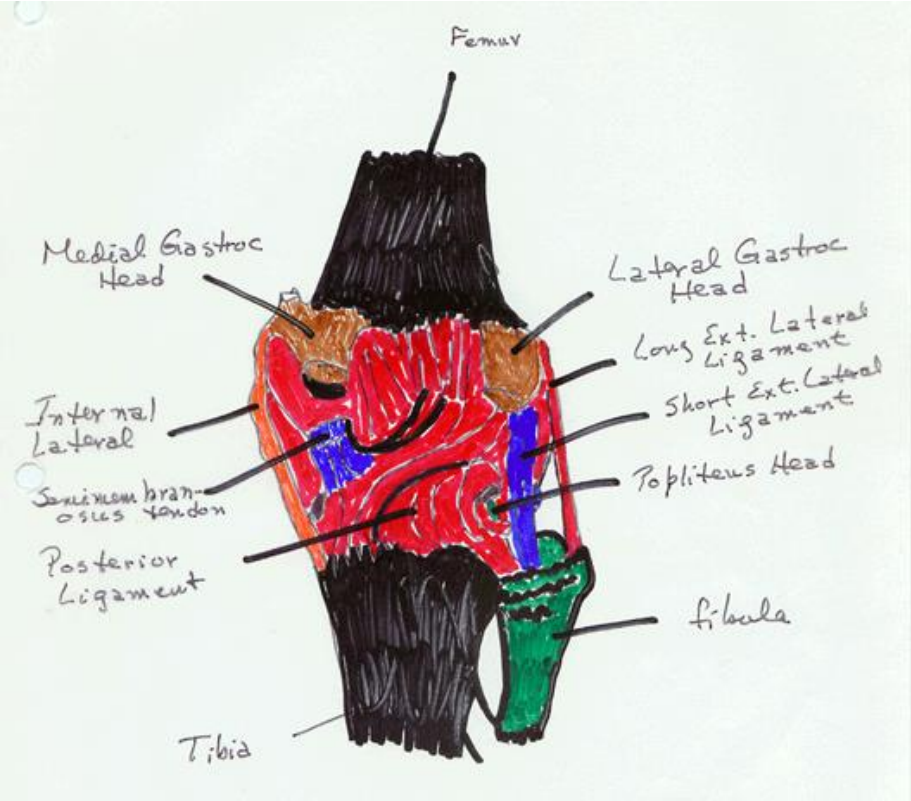




Internal lateral	Also called the tibial collateral ligament. Attached, above, to the inner tuberosity of the femur (superior portion of the medial epicondyle). Attached, below, to the inner tuberosity and inner surface of the shaft of the tibia for about 2 inches. At its inferior portion, tendons of the sartorius, gracilis and semitendinosus muscles cross it.

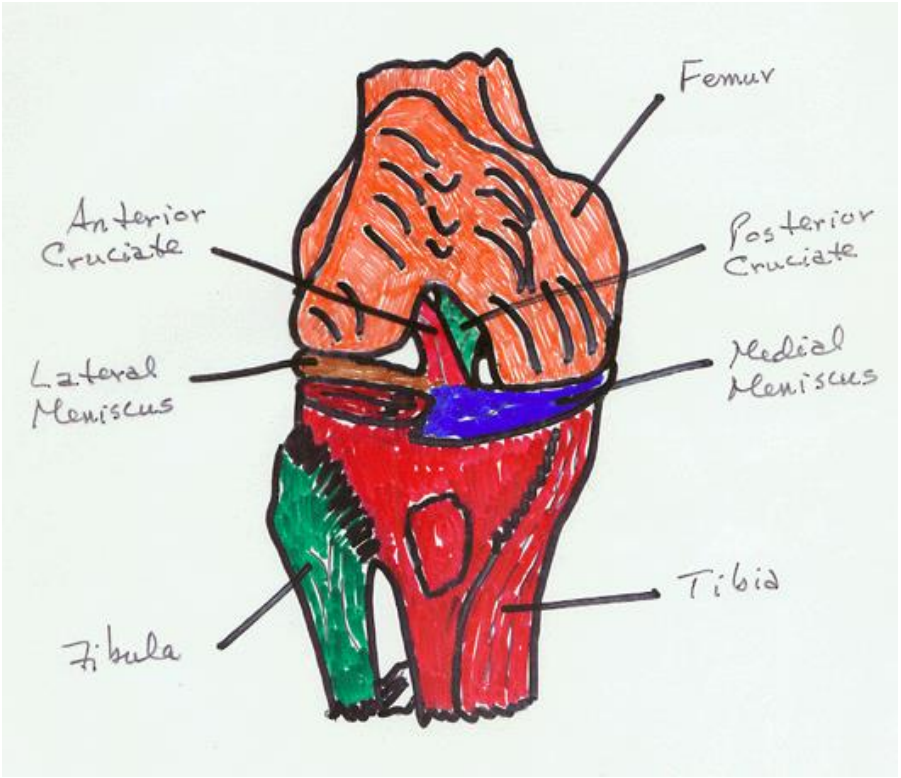


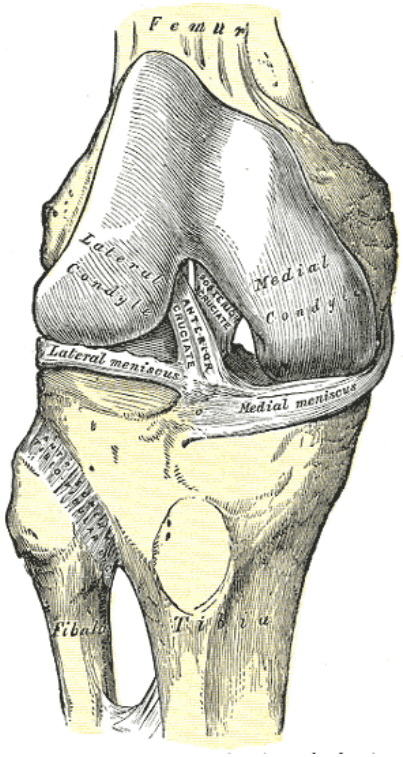
Ligament	Comment
Long external lateral	Also called the fibular collateral ligament. Attached, above, to the posterior region of the lateral epicondyle of the femur. Inferiorly, to the lateral portion of the fibular head. Passing beneath this ligament is the tendon of the popliteus muscle and the inferior external articular vessels and nerve.
Short external lateral	Placed behind and parallel with the long external lateral ligament. Attached, above, to the inferior and posterior portion of the outer tuberosity of the femur. Below, attached to the summit of the styloid process of the fibula. Passing beneath it are the same structures as with the long external lateral ligament.



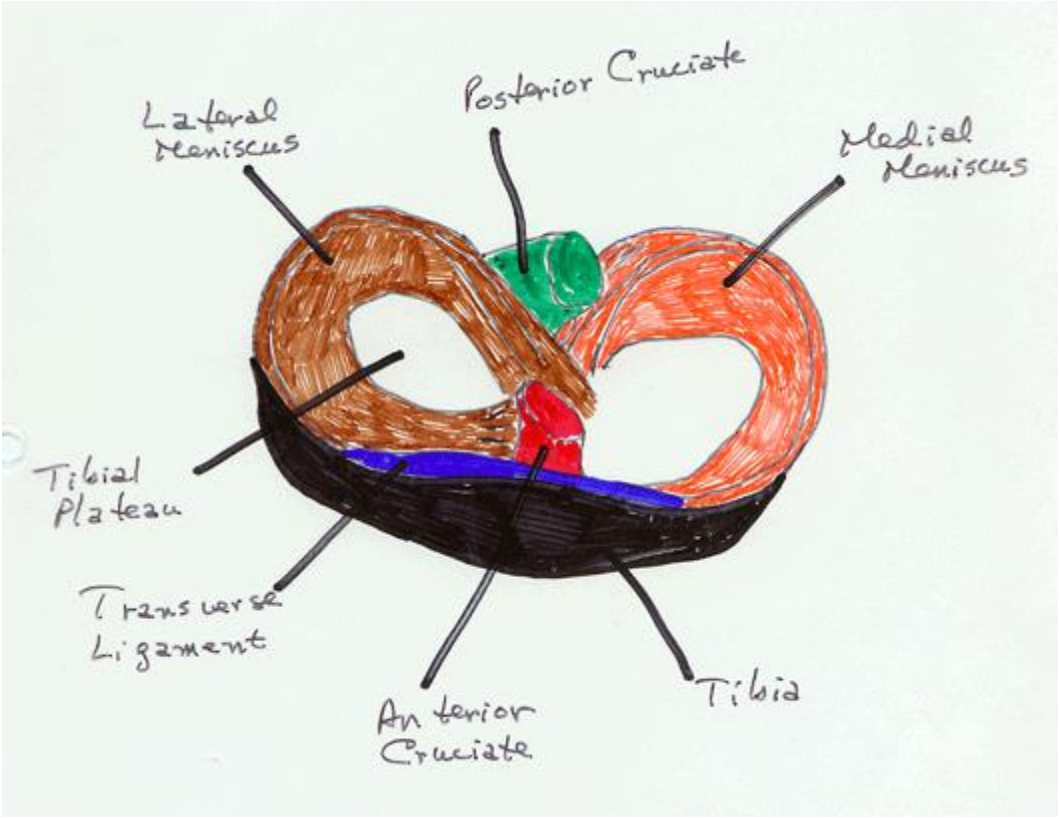
CRUCIATES: (KROO shee utts): there are two

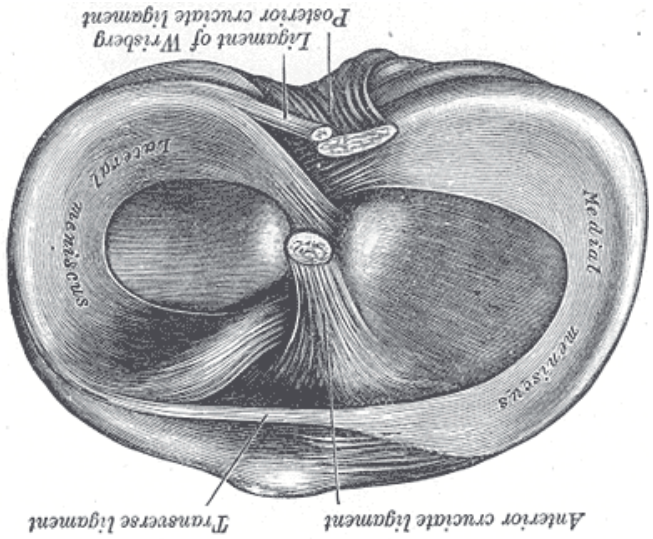
Anterior cruciate	Attached anteriorly to the intercondyloid eminence [of the tibia] in the small depression, and passing, upward, backward and outward is inserted into the medial and posterior portion of the lateral condyle of the femur. Most commonly damaged ligament in football caused by clipping.
Posterior cruciate	Stronger, but shorter and less oblique, than the anterior cruciate. Attached posteriorly to the intercondyloid eminence, to the popliteal notch (postero-medial most aspect of the tibial plateau) and to the posterior extremity of the external semilunar fibrocartilage. This ligament passes upward, forward and inward to be inserted into the lateral and anterior portion of the medial condyle of the femur.





Ligament	Comment
Transverse	A band of fibers that passes transversely from the anterior margin of the lateral semilunar fibrocartilage to the anterior margin of the medial semilunar fibrocartilage

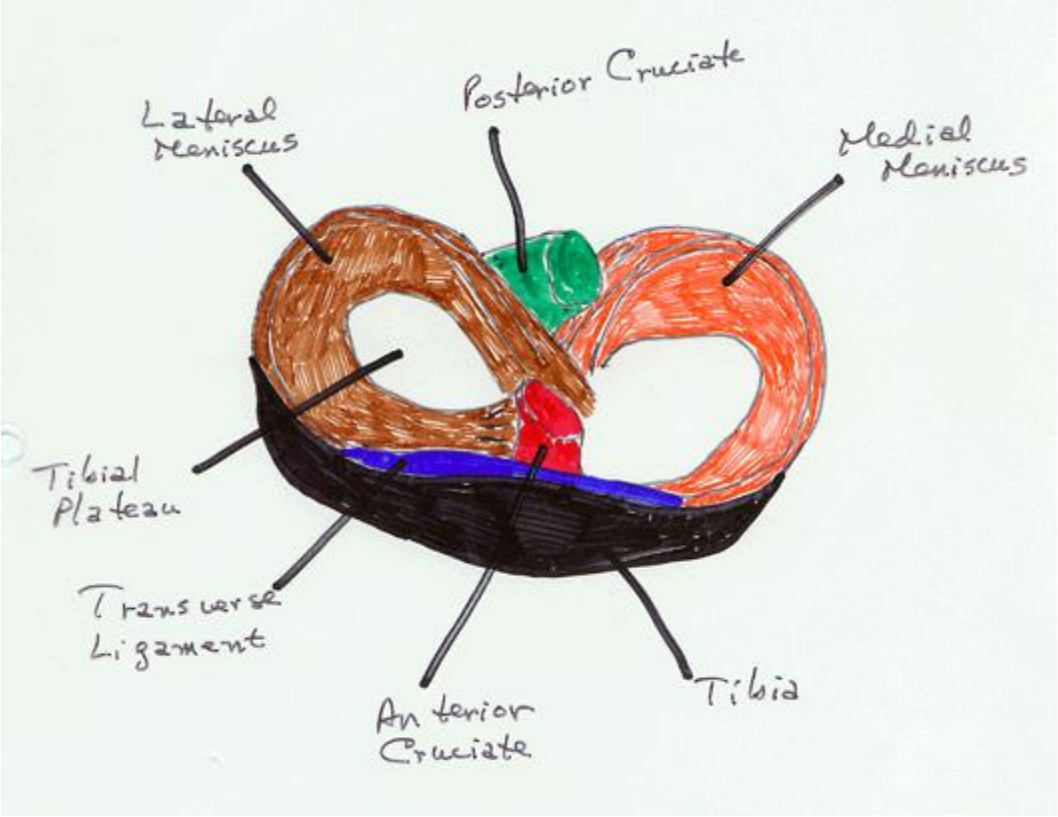




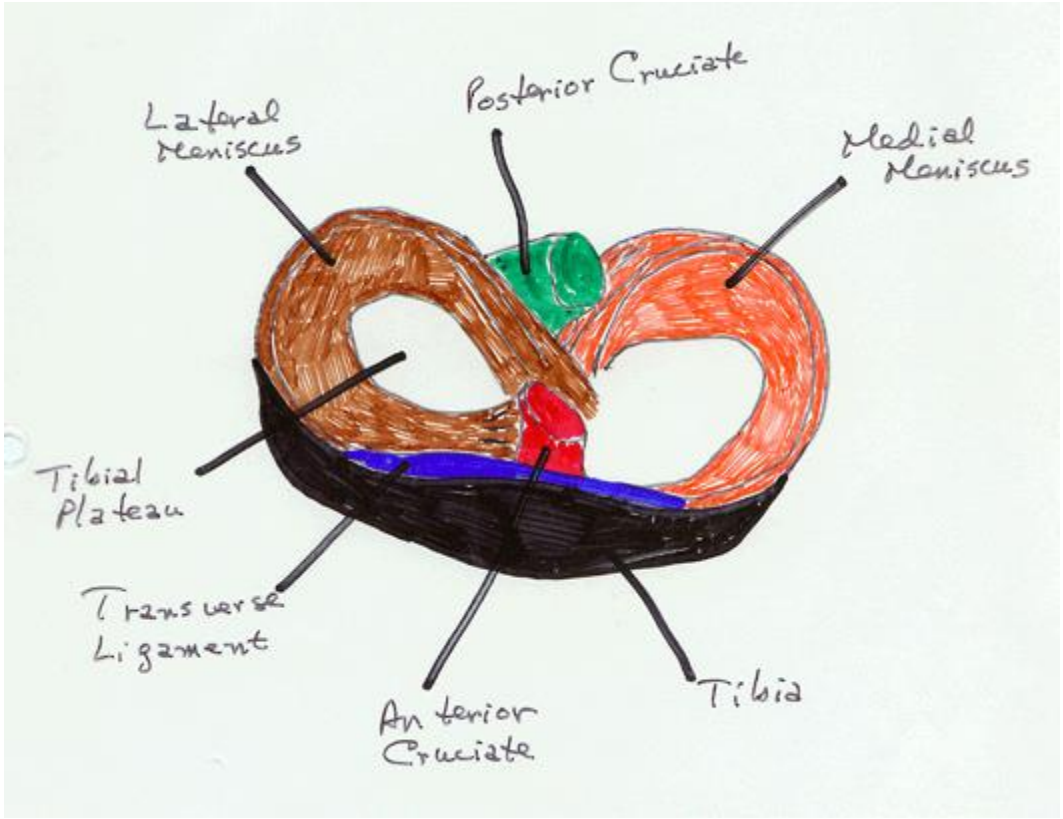
SEMILUNAR FIBROCARTILAGES (SLFC) -- Menisci

- There are two of these, which serve to deepen the surface of the tibial plateau for articulations with condyles of the femur.
- Their superior surfaces articulate with the femoral condyles -- their lower surfaces are flat, and rest on the tibial plateau.
- Each cartilage covers nearly the outer two-thirds of the corresponding articular surface, leaving the inner third uncovered.

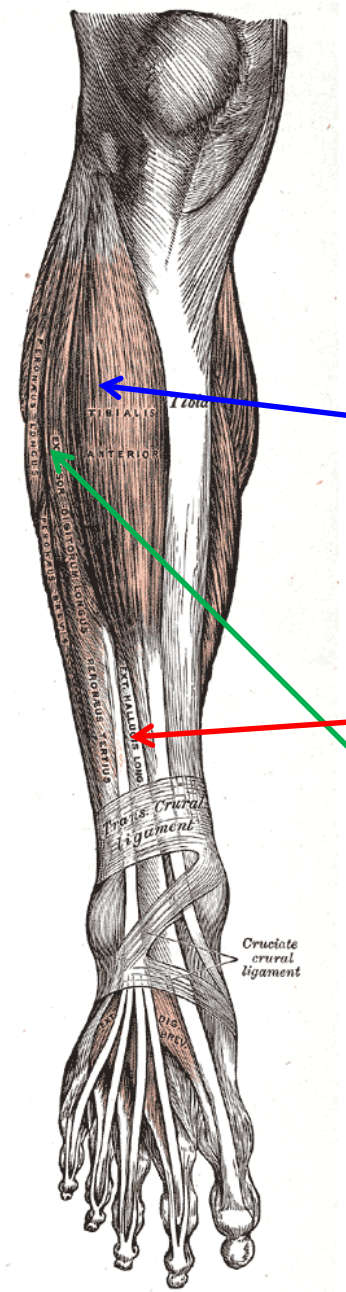
Internal meniscus (muh NISS kuss)	**Also called the medial SLFC. Is nearly semicircular. Anteriorly is attached to a depression on the anterior margin of the tibial plateau, anterior to the anterior cruciate. Posteriorly, it is attached to the depression posterior to the intercondyloid eminence between the attachments of the external semilunar fibrocartilage and the posterior cruciate ligaments.**



External meniscus	Also called the lateral SLFC. Nearly forms an entire circle, covering a larger region than the internal. It is grooved on its lateral side for the popliteus tendon. Anteriorly, it is attached anteriorly to the intercondyloid eminence to the lateral and posterior aspect of the anterior cruciate, with which it blends. Posteriorly, it is attached posterior to the intercondyloid eminence, in front of the posterior extremity of the internal SLFC. The lateral meniscus gives off from its anterior margin a fasciculus, which forms the transverse ligament.

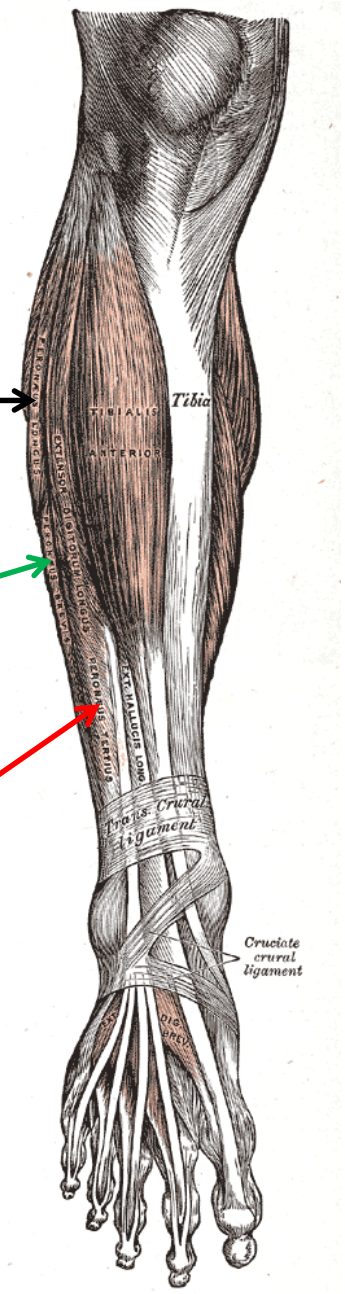


Lower Leg

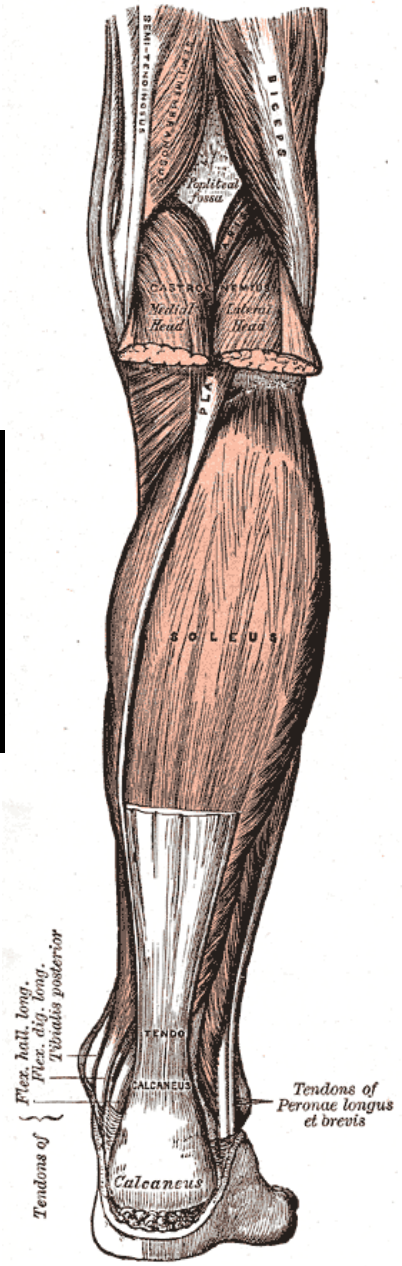


MUSCLE	ORIGIN	INSERTION	ACTION
Tibialis anticus	Lateral surface of tibia	Posteromedial surface of 2d cuneiform bone and base of 1st metatarsal	Flexor of foot and ankle joint; inverts foot
Extensor proprius hallucis	Anterior surface of fibula	Base of distal phalanx of great toe	Extend phalanges of toes; flex foot on leg
Extensor longus digitorum	Lateral surface of tibia; anterior fibular shaft	2d and 3d phalanges of the 4 lesser toes	Extends phalanges of toes; flex foot on leg

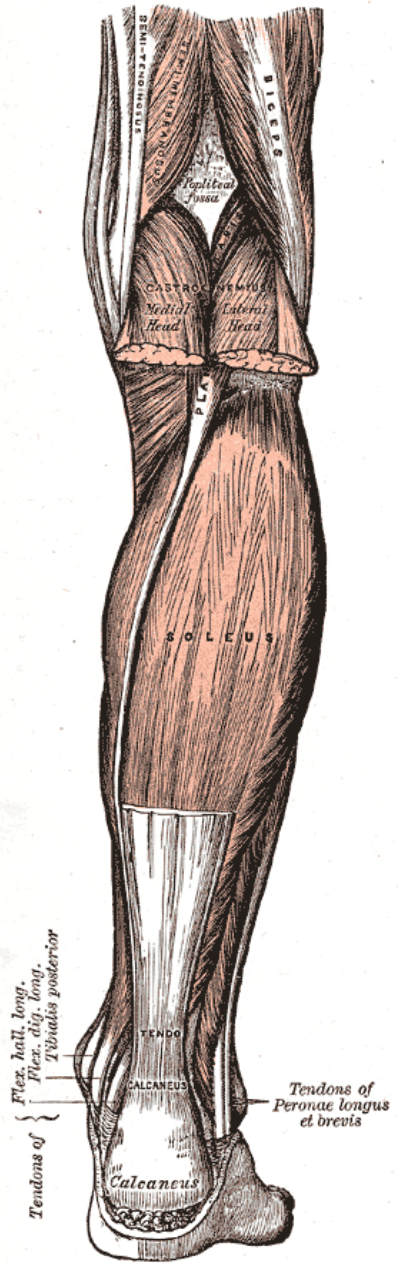
MUSCLE	ORIGIN	INSERTION	ACTION
Peroneus longus	Head and upper 2/3 of lateral fibular shaft	Base of metatarsal bone of great toe and 3d cuneiform	Extends foot on one leg; everts foot
Peroneus brevis	Lower 2/3 lateral surface of fibular shaft	Base of metatarsal bone of little toe	Lies beneath P. longus; extends foot on one leg; everts foot
Peroneus tertius	Anterior lower fibula	Posterior surface of base of 5th metatarsal	A part of E.I. digitorum and P. brevis; everts foot when present

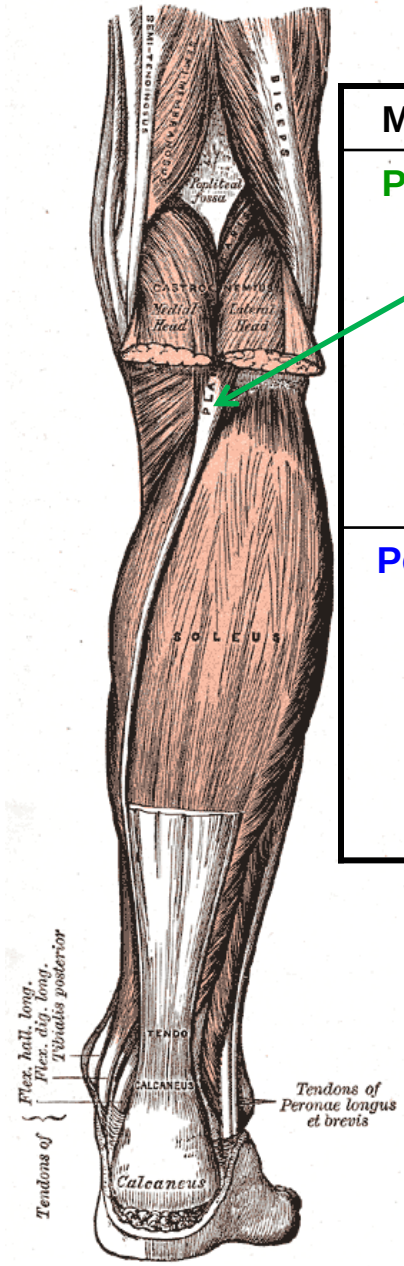


MUSCLE	ORIGIN	INSERTION	ACTION
Gastrocnemius	Both femoral condyles	Posterior os calcis as Achilles' tendon	Most superficial; extends foot at ankle; used in walking, standing, dancing, leaping

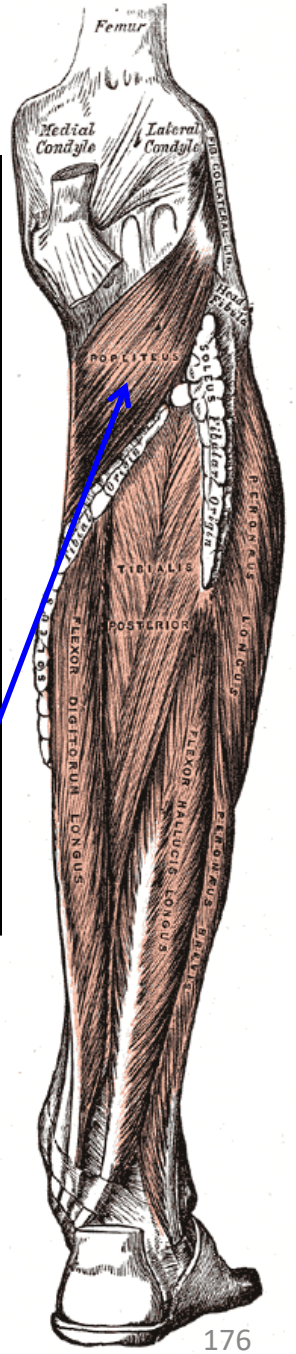


MUSCLE	ORIGIN	INSERTION	ACTION
Soleus	Posterior head of fibular shaft and oblique line of tibia (a posterior line from lateral to medial)	Posterior os calcis as Achille's tendon	Second layer muscle; extends foot at ankle; used in walking, standing, dancing, leaping; steadies leg on foot; prevents body from falling forward

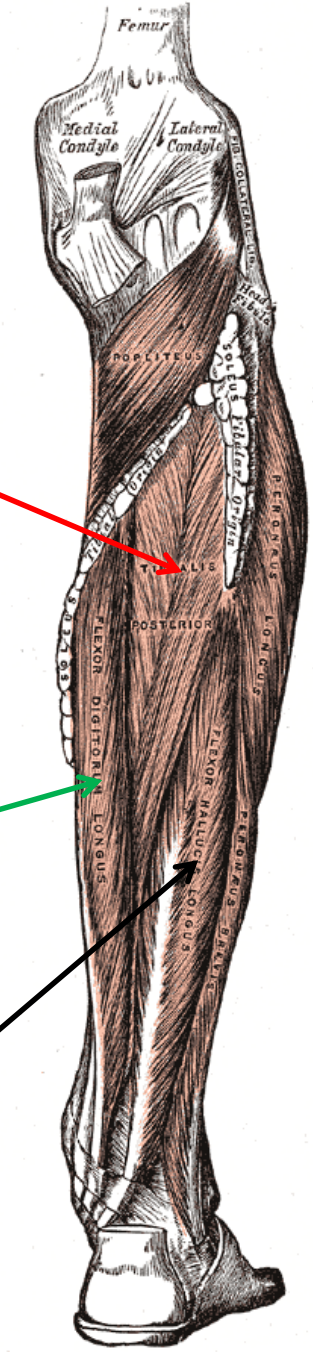




MUSCLE	ORIGIN	INSERTION	ACTION
Plantaris	Inferior linea aspera and posterior ligament of knee joint	Posterior os calcis	Extremely small; accessory to gastroc extending foot if ankle is free or bending the knee if the foot is fixed
Popliteus	Lateral side of lateral femoral condyle and posterior ligament of knee	Above oblique line in triangle shape	Flexes leg on thigh; rotates tibia inward as when knee is bent

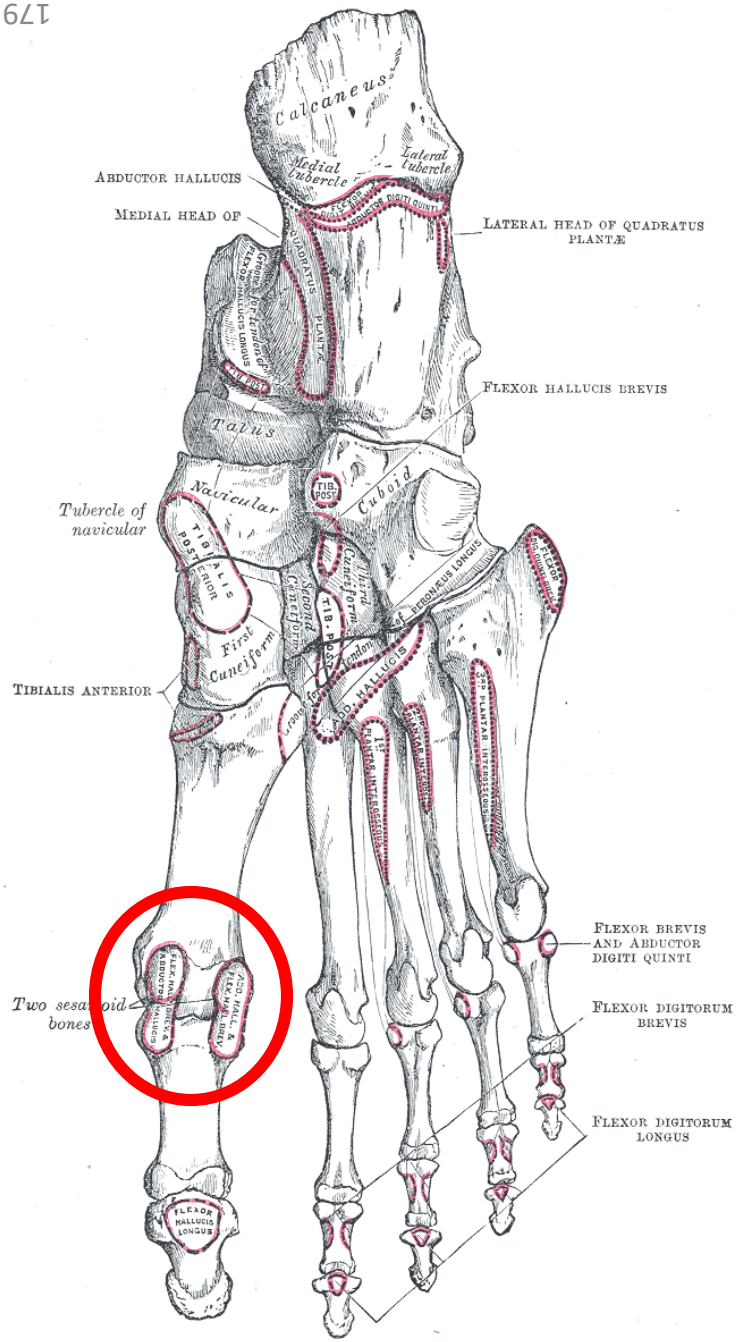


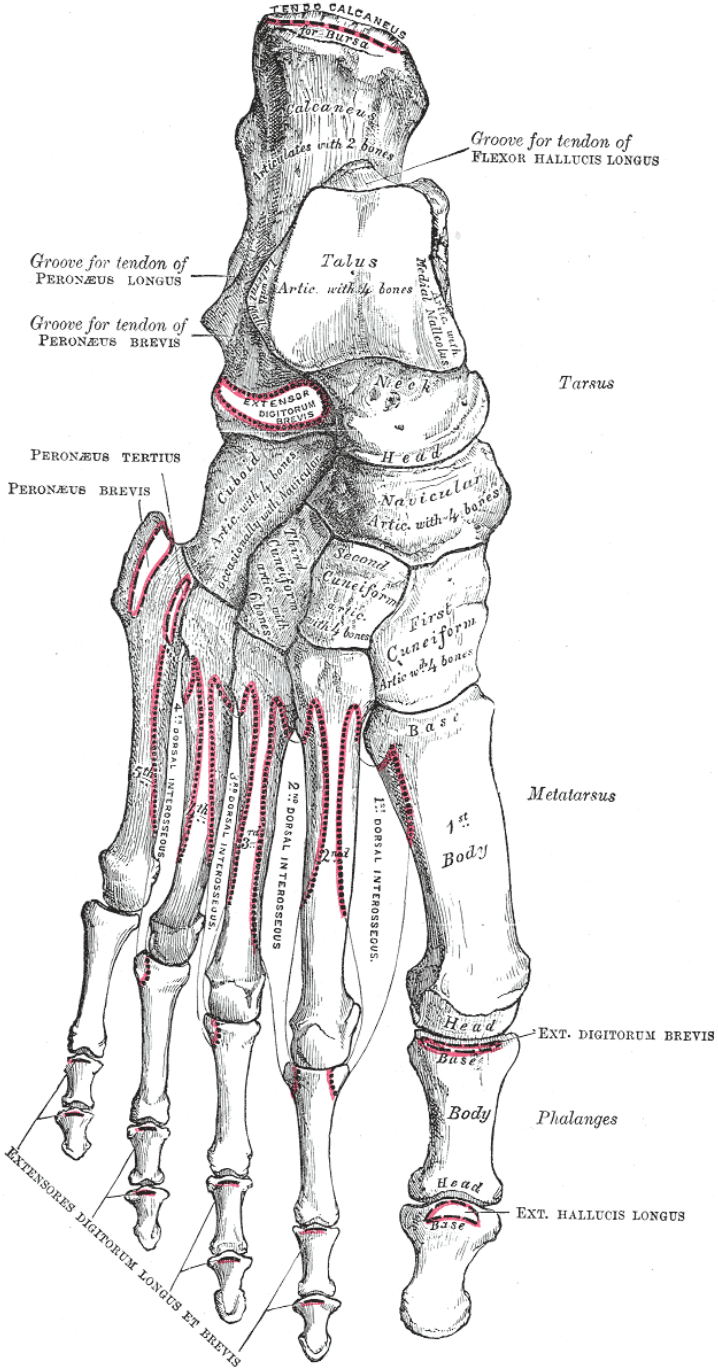
MUSCLE	ORIGIN	INSERTION	ACTION
Tibialis posticus	Posterolateral tibial surface between oblique line and 2/3 down shaft; upper 2/3 of fibula	Navicular and 2d cuneiform bones	Lies between the two preceding muscles; extends foot at ankle; with anticus, inverts foot; with peronei, everts foot; maintains foot arch
Flexor longus digitorum	Below oblique line to 3” short of the distal extremity	Divides into 4 tendons into bases of last phalanges of 4 lesser toes	Tibial side of leg; flexes phalanges; extends foot on leg; plantarflexion
Flexor longus hallucis	Lower 2/3 of fibula	Base of last phalanx of great toe	Fibular side of leg; flexes phalanges; extends foot on leg; plantarflexion



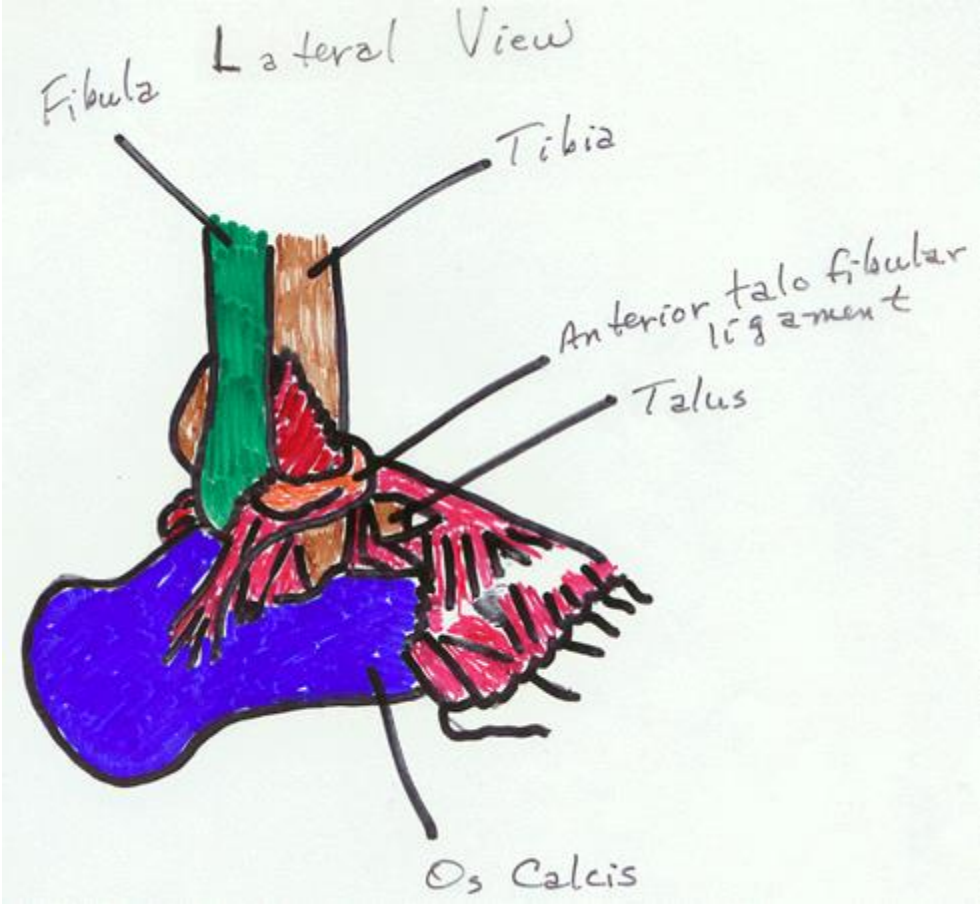
The Ankle and Foot

- Consists of the
  - tibia,
  - fibula and
  - tarsal bones
- Consists of the
  - metatarsals
  - phalanges

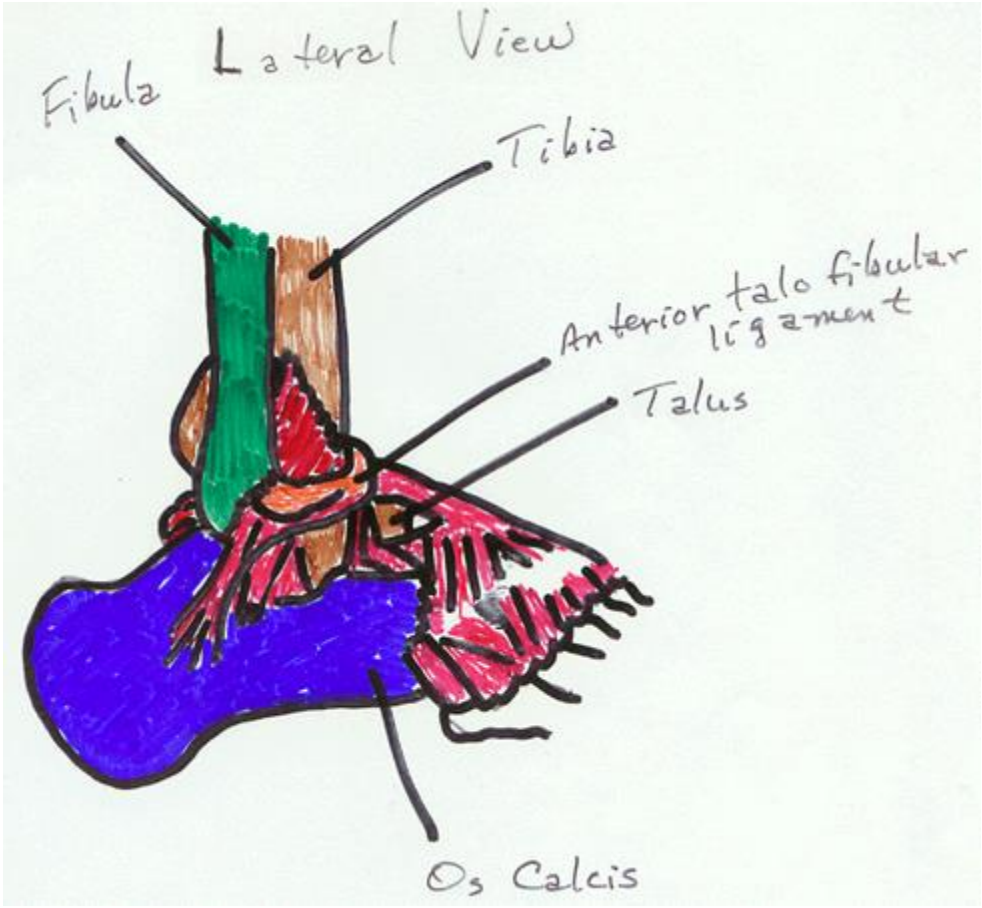

Calcaneus
Medial tubercle
Lateral tubercle
ABDUCTOR HALLUCIS
MEDIAL HEAD OF
LATERAL HEAD OF QUADRATUS PLANTÆ
FLEXOR HALLUCIS BREVIS
Talus
Navicular
Tubercle of navicular
Cuboid
TIBIALIS ANTERIOR
First Cuneiform
Second Cuneiform
Third Cuneiform
TIB. POST.
PERONÆUS LONGUS
ADD. HALLUCIS
Two sesamoid bones
FLEXOR BREVIS AND ABDUCTOR DIGITI QUINTI
FLEXOR DIGITORUM BREVIS
FLEXOR DIGITORUM LONGUS


TENDO CALCANEUS
Bursa
Calcaneus
Articulates with 2 bones
Groove for tendon of FLEXOR HALLUCIS LONGUS
Groove for tendon of PERONÆUS LONGUS
Groove for tendon of PERONÆUS BREVIS
Talus
Artic. with 4 bones
Tarsus
Neck
Head
PERONÆUS TERTIUS
PERONÆUS BREVIS
Cuboid
Navicular
Artic. with 4 bones
Third Cuneiform
Second Cuneiform
First Cuneiform
Base
Metatarsus
1st Body
4th DORSAL INTEROSSEUS
3rd DORSAL INTEROSSEUS
2nd DORSAL INTEROSSEUS
1st DORSAL INTEROSSEUS.
Head
Base
EXT. DIGITORUM BREVIS
Body
Phalanges
Head
Base
EXT. HALLUCIS LONGUS
EXTENSORES DIGITORUM LONGUS ET BREVIS

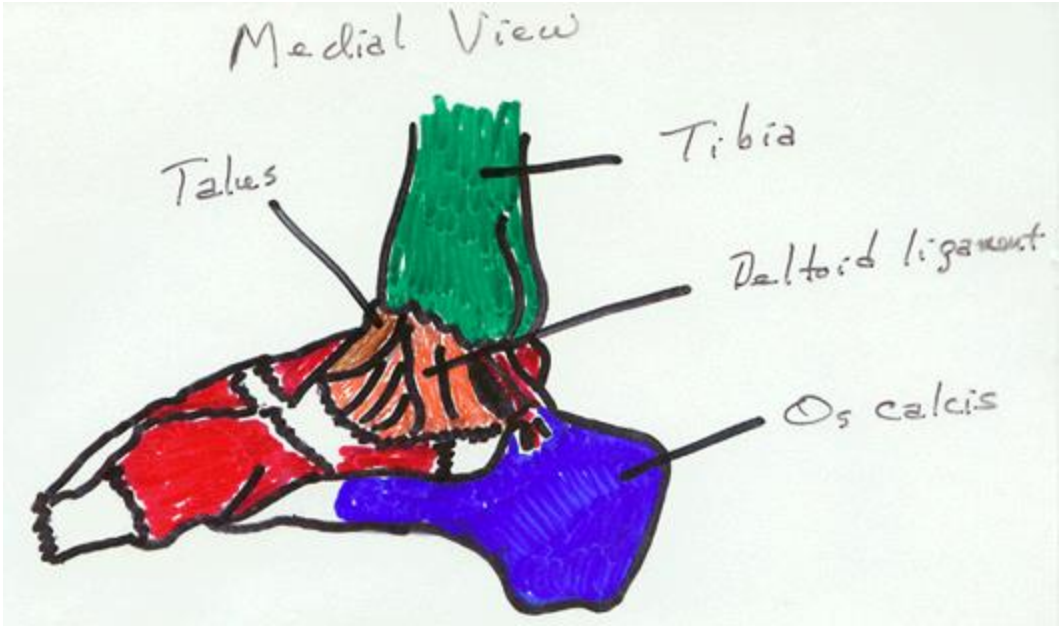
Ligament	Comments
Articular capsule – not in this view	Attaches to the anterior margin of the distal tibia and the posterior margin of the articular surface of the tibia to the talus around the articular surface distally and the talus posterior to the superior articular facet.



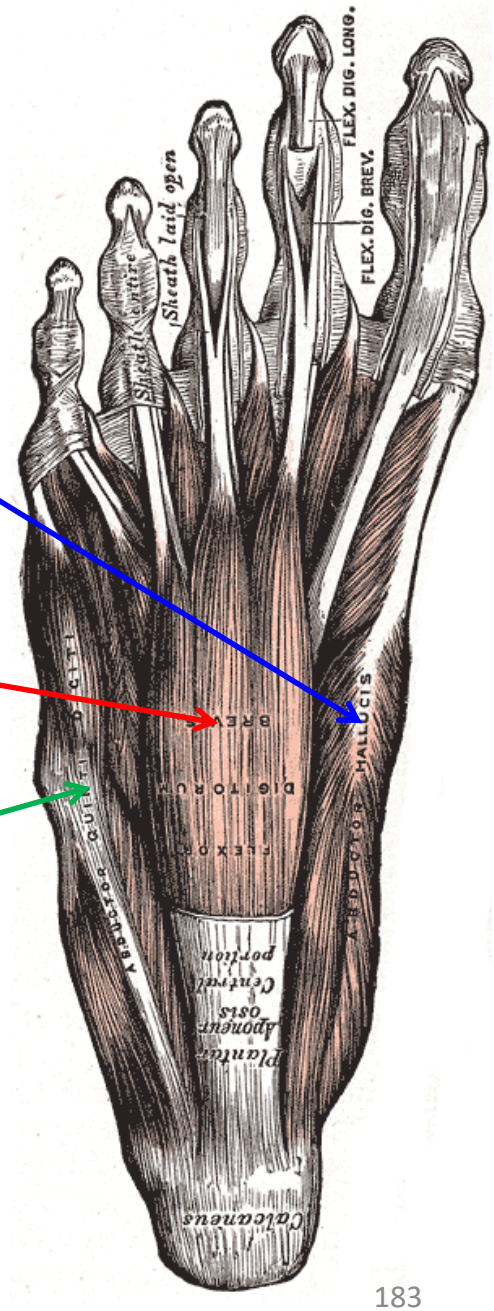
Ligament	Comments
External lateral – consists of 3 fascicles	Anterior talofibular (shortest), posterior talofibular (strongest and deepest) and calcaneofibular (longest). Attaches from anterior margin of lateral malleolus to talus; from posteromedial part of lateral malleolus to posterior surface of talar tubercle; from apex of lateral malleolus to lateral calcaneal tubercle.



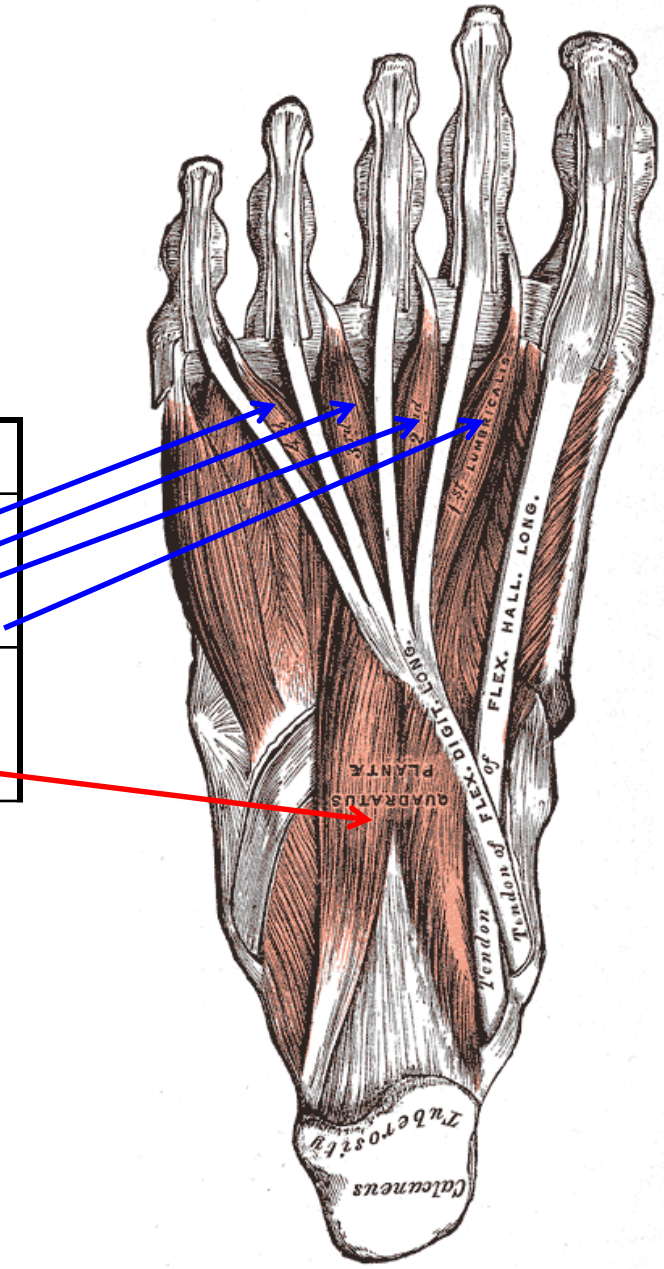
Ligament	Comments
Superficial Deltoid	Splits into 3 fascicles (tibionavicular, calcaneotibial and posterior talotibial). Attaches from the navicular tuberosity to the medial margin of the plantar calcaneonavicular ligament; from the anterior medial malleolus to the calcaneus; from the posterior medial malleolus to the inner side of the talus. This ligament is a triangular band; is attached to the apex and to the anterior and posterior borders of the medial malleolus.
Deep Deltoid (anterior talotibial)	Attaches to the tip of the medial malleolus and medial surface of the talus.



MUSCLE	ORIGIN	INSERTION	ACTION
Abductor hallucis	Under surface of os calcis	Inner side of phalanx 1, base of digit 1	Like abductor pollicis with thumb
Flexor brevis digitorum	Under surface of os calcis and center of plantar fascia	Digits 2-5; phalanges 1 and 2	Like tendons in palm of hand
Abductor minimi digiti	Outer and under portion of calcaneus	Outer portion of phalanx 1 of digit 5	Like abductor minimi digiti with “pinky”



MUSCLE	ORIGIN	INSERTION	ACTION
Lumbricales	Flexor longus digitorum tendon	1st phalanx of digits 2-5; medial aspect	Same as lumbricales in hand
Flexor accessorius	Inner and outer edges of calcaneus	Tendon of flexor longus digitorum	"Fixes" and assists Flex. long. digit.



MUSCLE	ORIGIN	INSERTION	ACTION
Flexor brevis minimi digiti	Base of metatarsal 5	Base of phalanx 1 in digit 5 on lateral aspect	Same as Flex. brevis minimi digiti in hand