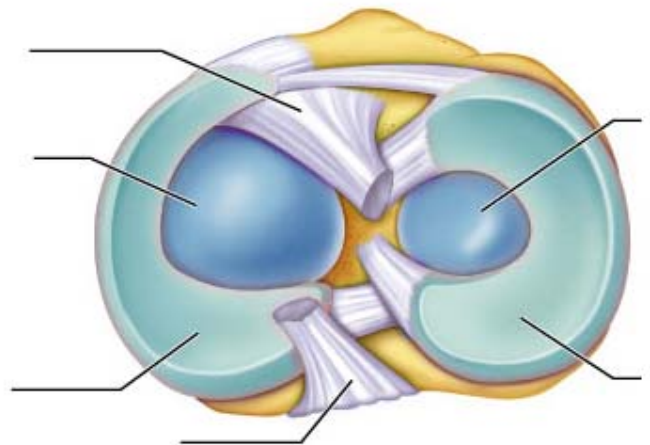
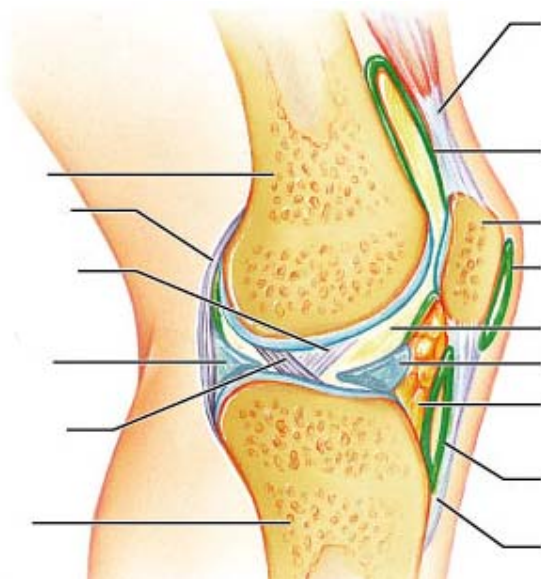
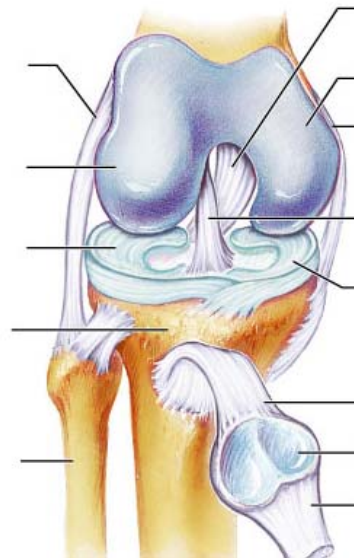
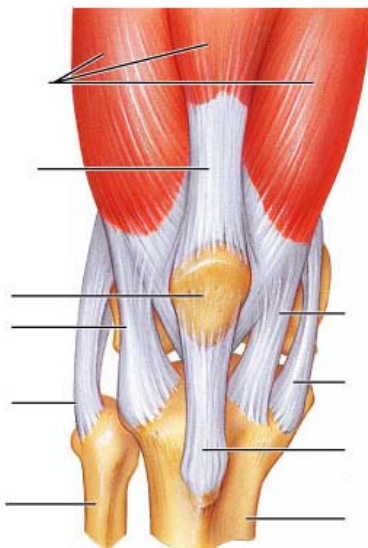


Articulations and Muscles

KNEE JOINT

The condyles of the knee joint contain stabilizing pads of fibrocartilage referred to as the **medial meniscus** and **lateral meniscus**. Attaching from the intercondylar eminence of the tibia to the intercondylar fossa are the **anterior cruciate ligament** and **posterior cruciate ligament**. The outer aspects of the knee are protected and held together by the **medial (tibial) collateral ligament** and **lateral (fibular) collateral ligament**. The quadriceps muscles attach to the upper part of the patella by the quadriceps tendon that continues as the **patellar ligament** from the kneecap to the tibial tuberosity.



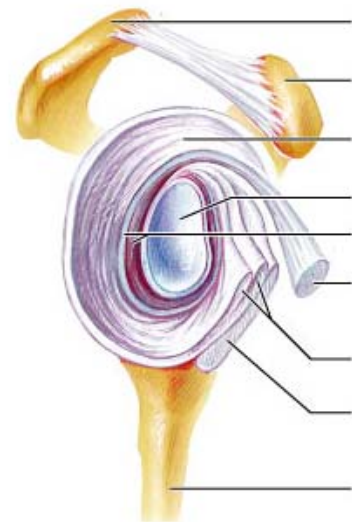
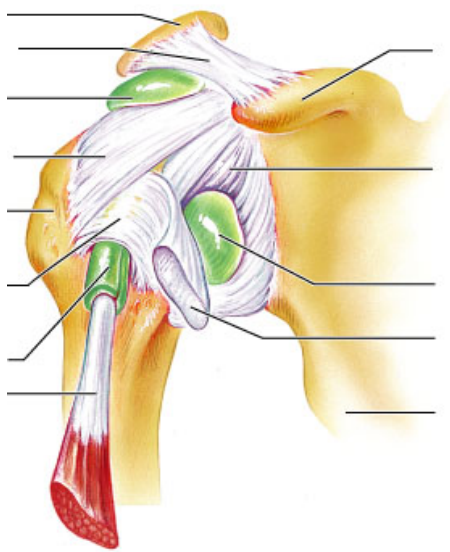
SHOULDER JOINT (GLENOHUMERAL) STRUCTURE & MUSCLES

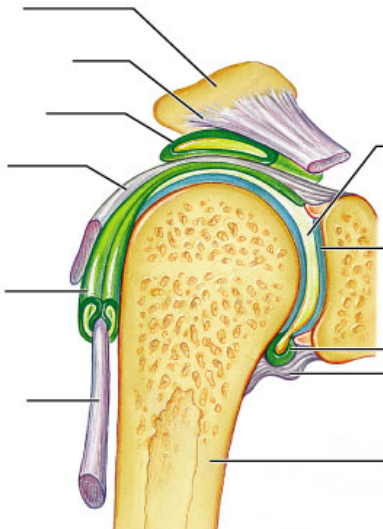
The **glenoid fossa** is shallow concavity and contains the **glenoid labrum** which deepens it and aids in stability. With 120 degrees of unassisted flexion, the glenohumeral joint is the most mobile joint in the body. The rotator cuff muscles (teres minor, supraspinatus, infraspinatus, and subscapularis) of the shoulder produce a high tensile force, and help to pull the head of the humerus into the glenoid fossa.

The glenohumeral joint has a loose joint capsule (more so inferiorly) and is at risk of dislocation inferiorly, it attaches to the anatomical neck of the humerus and the anatomical neck of the scapula. The tendon of the **long head of the biceps brachii** muscle travels inside the capsule to attach to the supraglenoid tubercle of the scapula. Because the tendon is inside the capsule, it requires a synovial **tendon sheath** to minimize friction.

A number of bursae in the capsule aid mobility. Namely, they are the subdeltoid bursa (between the joint capsule and deltoid muscle), subcoracoid bursa (between joint capsule and coracoid process of scapula), coracobrachial bursa (between subscapularis muscle and tendon of coracobrachialis muscle), **subacromial bursa** (between joint capsule and acromion of scapula) and the **subscapular bursa** (between joint capsule and tendon of subscapularis muscle, also known as subtendinous bursa of subscapularis muscle). The bursa are formed by the **synovial membrane** of the joint capsule. An inferior pouching of the joint capsule between teres minor and subscapularis is known as the axillary recess.

It is important to note that the shoulder joint is a muscle dependent joint as it lacks strong ligaments. The main ligaments of the glenohumeral joint are the **glenohumeral ligaments** (superior, middle and inferior bands), the **coracohumeral ligament** and the **transverse humeral ligament**.





MUSCULOSKELETAL SYSTEM

The muscles along with the underlying skeletal structures form leverage systems at joints. For each of the joints on the list, indicate if it is a 1st, 2nd or 3rd class lever.

_____ elbow

_____ ankle

_____ atlas-occipital joint

_____ temporomandibular joint

_____ knee

MUSCLE FASCICLE ARRANGEMENT

Give a muscle example of the following fascicle arrangements

unipennate _____

parallel strap _____

bipennate _____

parallel fusiform _____

multipennate _____

convergent _____

circular _____

MUSCLES

Study the arm, leg, male muscle figures, and torso models for the following muscles (bolded), we may also be examining the cadavers for some of these muscles.

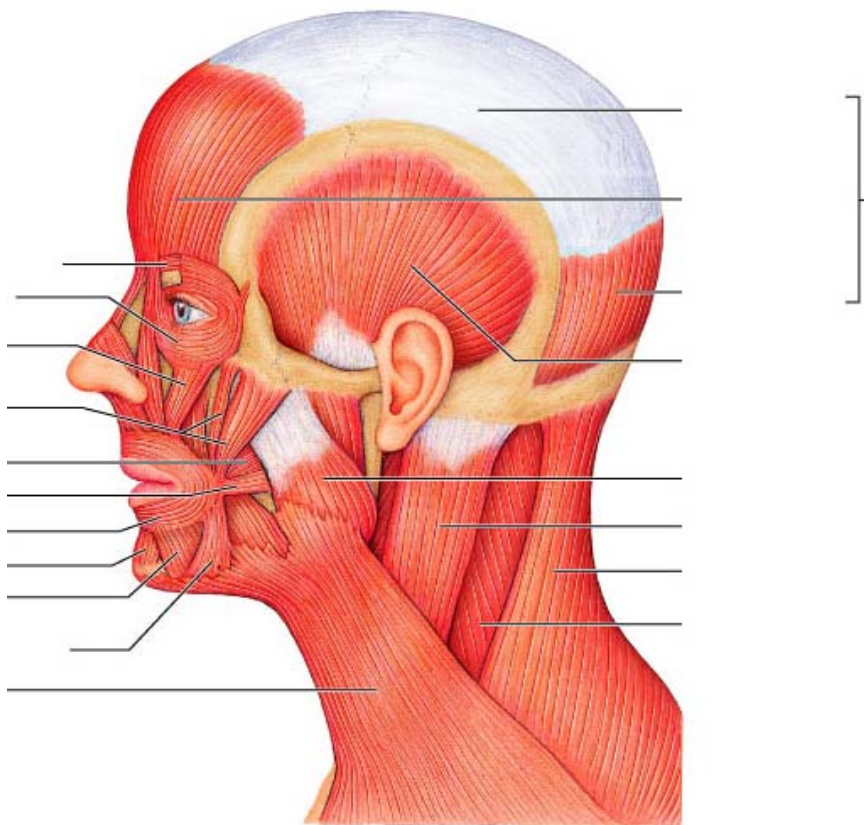
MUSCLES OF FACIAL EXPRESSION

The **platysma** is a superficial muscle that covers the anterior neck from the base of the neck to the mandible. Beneath the platysma is the deep **buccinator** muscle. The **orbicularis oris** surrounds lips and constricts the mouth. The **zygomaticus major** and **zygomaticus minor** attach the mouth to the zygomatic arch and retract and elevate the corner of the mouth. The **levator labii superioris** elevates the upper lip and originates on the lower margin of the orbit. The **mentalis** on the chin protrudes the lower lip. The **orbicularis oculi** circles the eye and closes the eyelids. The **frontalis** (frontal belly of occipitofrontalis) located on the frontal bone raises the eyebrows.



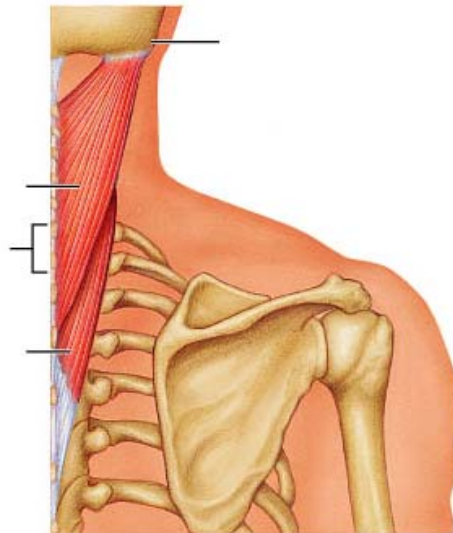
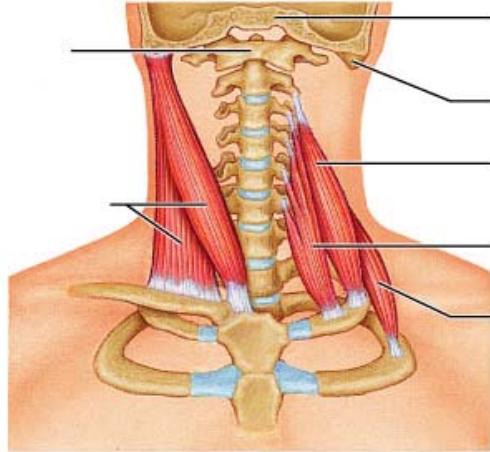
MUSCLES THAT MOVE THE MANDIBLE

The **masseter** is the powerful muscle for chewing and attaches from the lower zygomatic arch to the mandible. The **temporalis** assists the masseter and travels under the zygomatic arch from the skull to the coronoid process of the mandible.



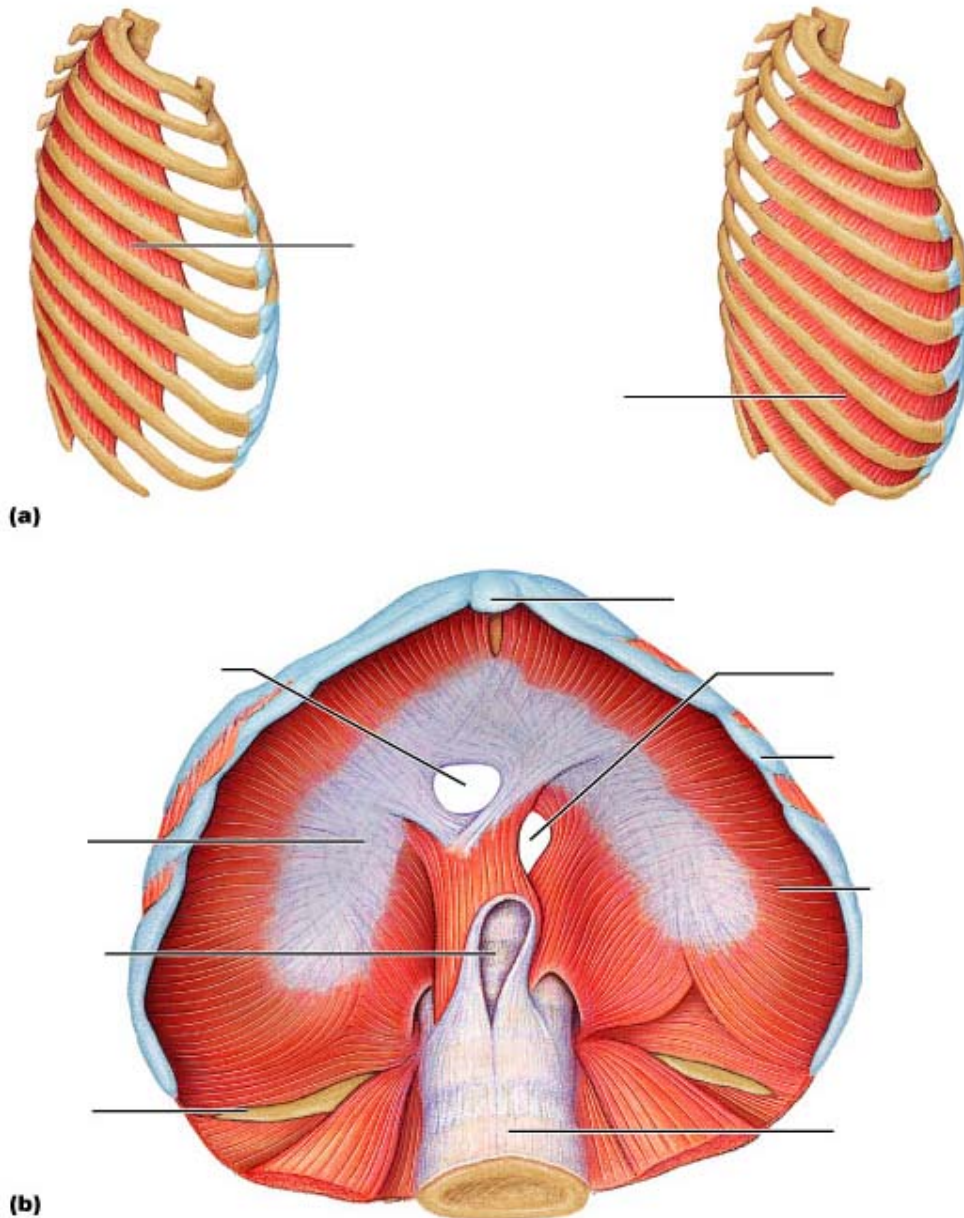
MUSCLES THAT MOVE THE HEAD AND NECK

The **sternocleidomastoid** is an extensive muscle that attaches to the sternum and clavicle and inserts on the mastoid process of the temporal bone. The **splenius capitis** is a posterior muscle that rotates and tilts the neck sideways or extends the neck when both sides contract. The **anterior scalene**, **middle scalene**, and **posterior scalene** muscles are deep lateral neck muscles that flex and bend the neck and elevate the ribs and aid with breathing.



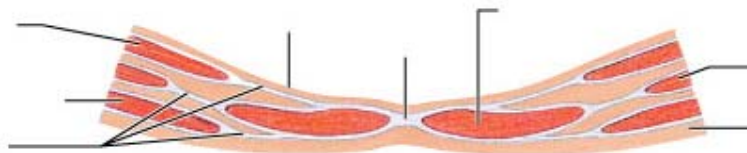
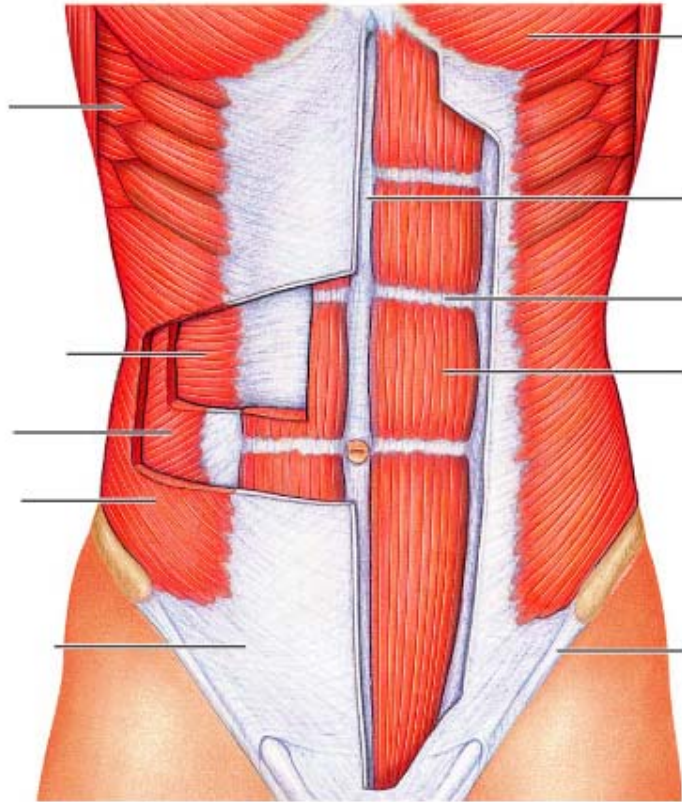
MUSCLES USED FOR BREATHING

The **diaphragm** is a broad muscular sheet that separates the abdominopelvic cavity from the thoracic cavity and is used for inspiration. The **external intercostals** lie between the ribs with the **internal intercostals** running beneath them in a different direction. The **serratus posterior**, a lower back muscle opposes the diaphragm with its action.



ABDOMINAL WALL MUSCLES

The muscles of the abdominal wall help compress the abdomen and flex the vertebral column. Their fibers run in cross patterns with the **external oblique** being the most superficial muscle. Beneath it is the **internal oblique** and the **transversus abdominis** being the innermost muscle. The muscles from both sides attach medially onto the linea alba. The most medial muscle is the **rectus abdominis** that runs vertically from the pubic bone to the thoracic cage.



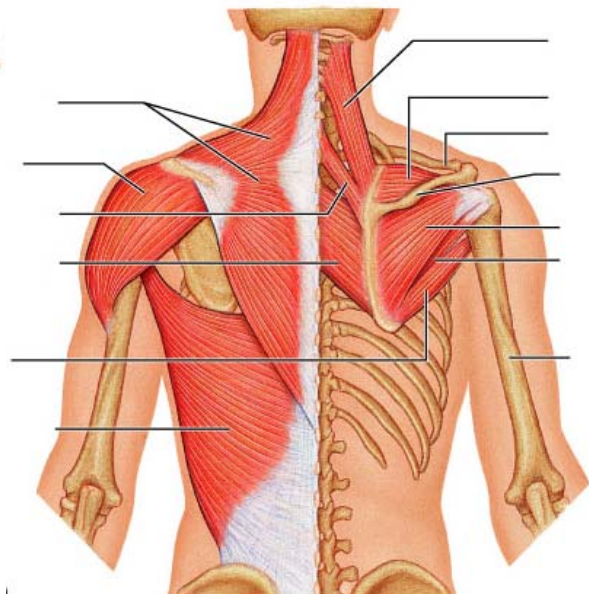
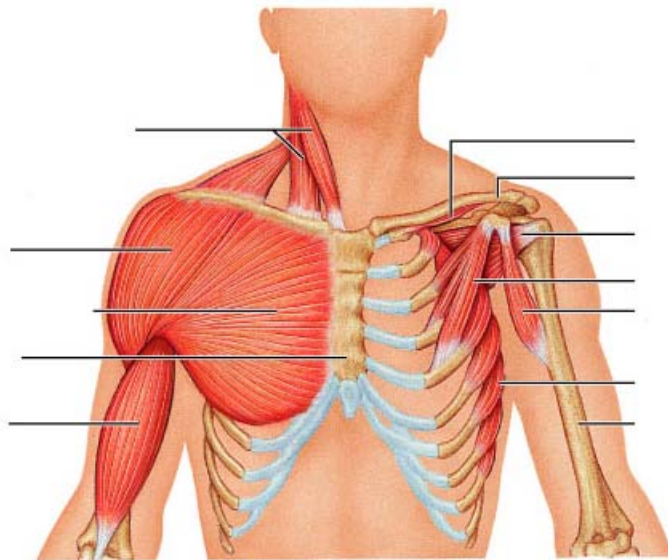
MUSCLES THAT MOVE THE SHOULDER GIRDLE

The anterior muscles that move the shoulder girdle are the lateral **serratus anterior** muscle and a deep **pectoralis minor** muscle. The **trapezius** is a large superficial posterior shoulder and back muscle with the **rhomboid major**, **rhomboid minor**, and **levator scapulae** located beneath the trapezius. The rhomboideus major attaches to the lower medial border of the scapula with rhomboideus minor and levator scapulae attaching higher up on the scapula.

MUSCLES THAT MOVE THE SHOULDER JOINT (ARM)

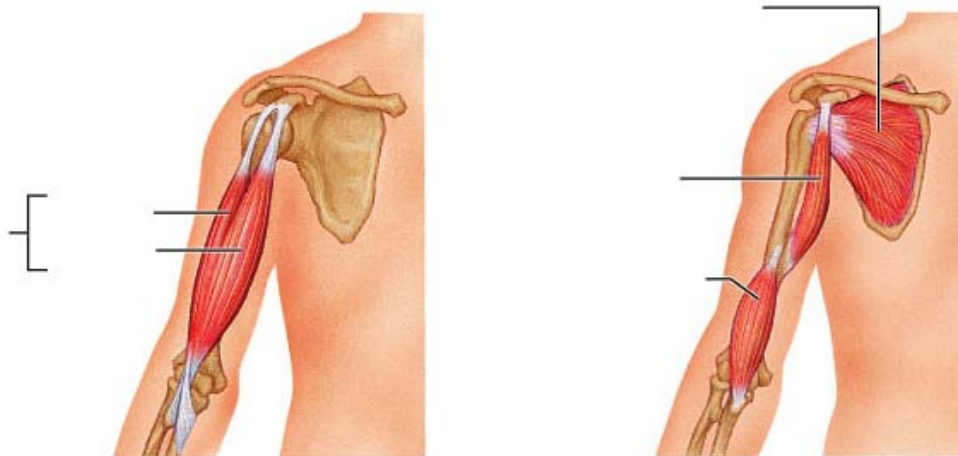
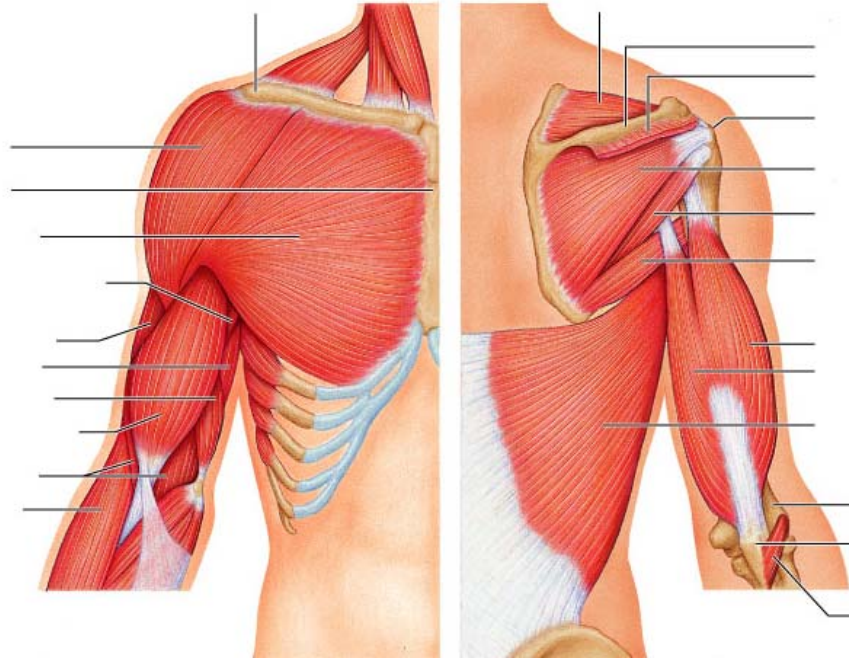
The large triangular muscle that covers the lateral surface of the shoulder is the **deltoid** muscle. The posterior **latissimus dorsi** and anterior **pectoralis major** are large, broad, superficial muscles. The small **coracobrachialis** extends from the coracoid process to the medial shaft of the humerus. The **teres major** is attached to the lower scapula to humerus.

Four muscles attach from the scapular fossae to the greater or lesser tubercles and help rotate the shoulder joint. These four **rotator cuff muscles** include the **supraspinatus**, **infraspinatus**, **teres minor** and **subscapularis**. The long head of the triceps brachii and the biceps brachii also move the shoulder but are discussed in the next section.



MUSCLES THAT MOVE THE ELBOW JOINT

The posterior muscles of the arm include the **triceps brachii lateral head**, the **triceps brachii long head**, and the **triceps brachii medial head**. All three extend the elbow. The anterior muscles include the **biceps brachii long head** and the **biceps brachii short head**. The short head is the more medial of the two. A lateral **brachialis** and the distal **brachioradialis** complete the four flexors of the elbow.

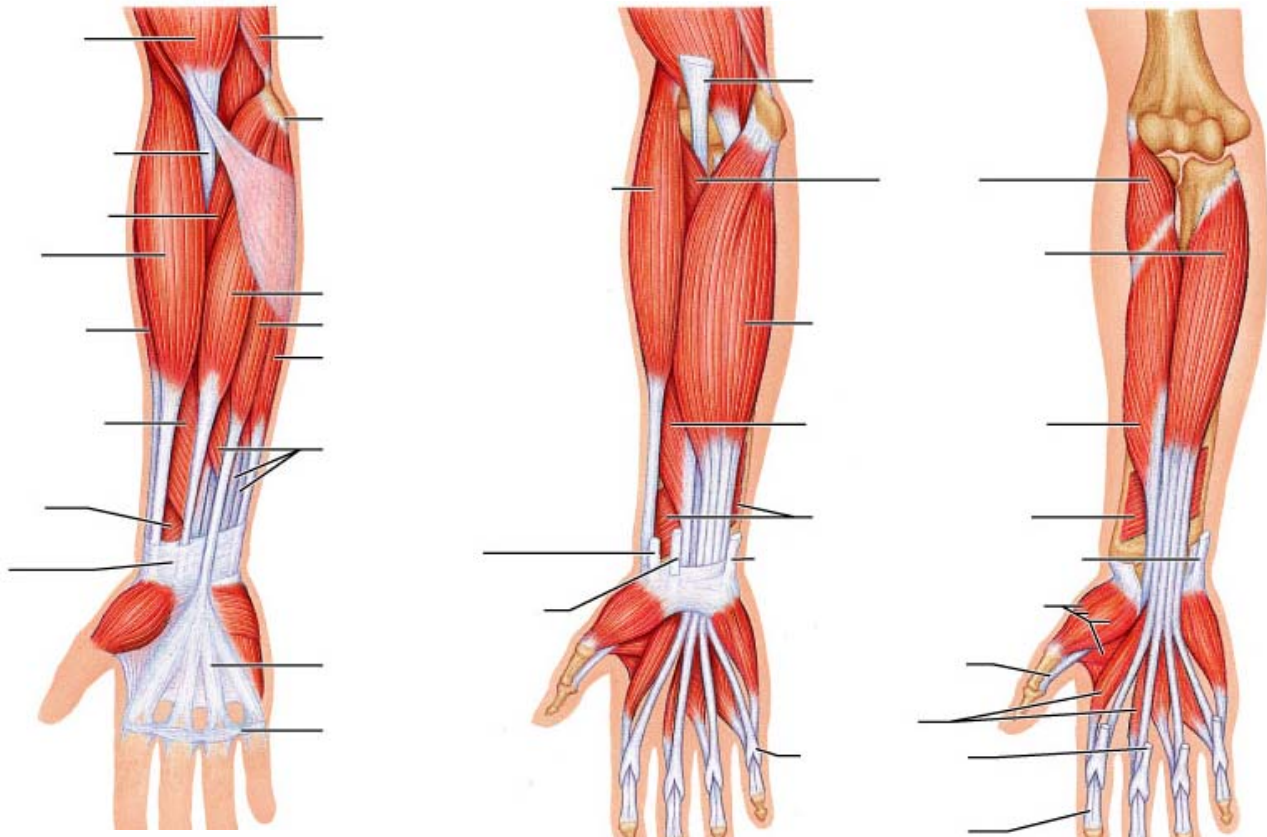


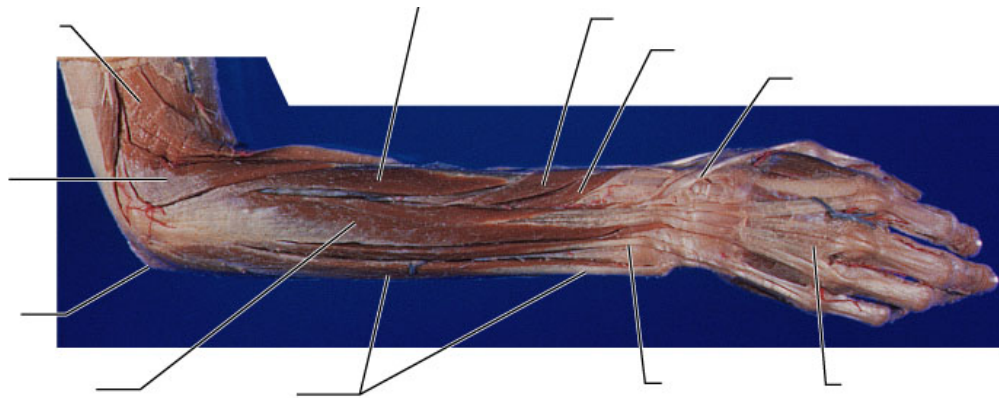
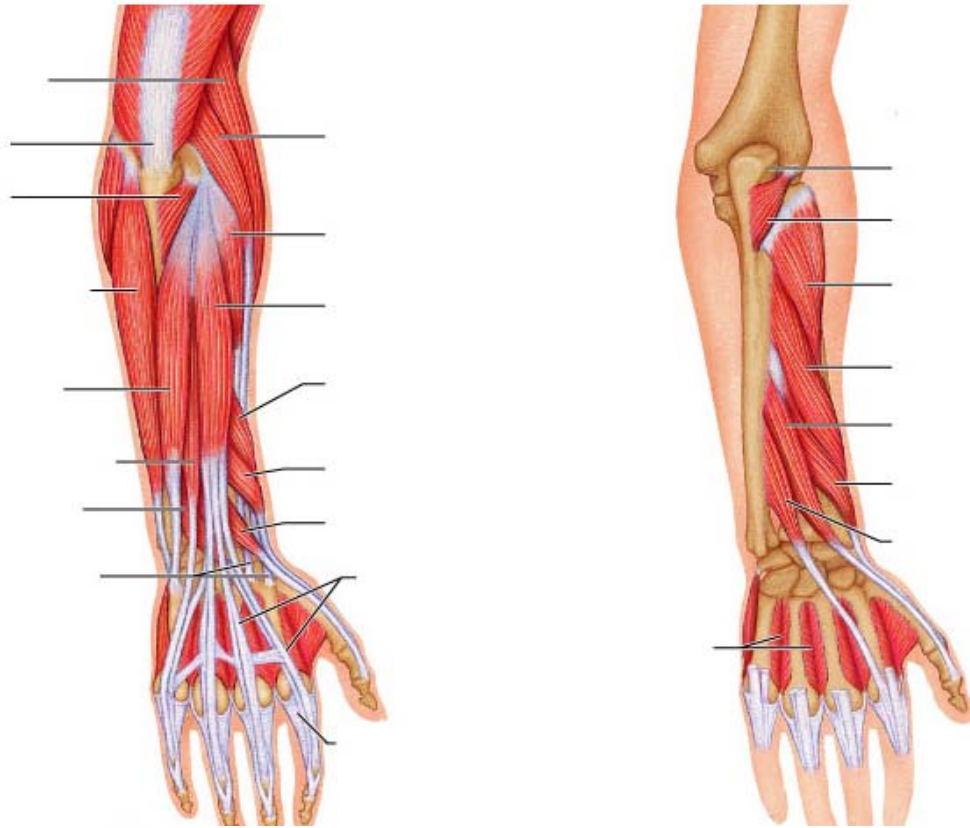
MUSCLES THAT MOVE RADIUS RELATIVE TO THE ULNA

The **pronator teres** and the pronator quadratus muscles help pronate (cross) the radius over the ulna while the **supinator** reverses this action. The supinator is deep to the brachioradialis on the proximal portion of the radius while the pronator teres crosses over the insertion of the supinator.

MUSCLES THAT MOVE THE WRIST AND FINGERS

The names for the following muscles describe their insertion points and their actions. The superficial posterior forearm muscles from lateral to medial are the **extensor carpi radialis longus**, **extensor carpi radialis brevis**, **extensor digitorum**, and **extensor carpi ulnaris**. The superficial anterior muscles from lateral to medial are the **flexor carpi radialis**, **palmaris longus**, and **flexor carpi ulnaris**. The three muscles that move the thumb or pollex are the **abductor pollicis longus** being the most lateral muscle, the **extensor pollicis brevis** and the **extensor pollicis longus**. This latter muscle is deep to the extensor muscles and can't be seen on the model except for its tendon.

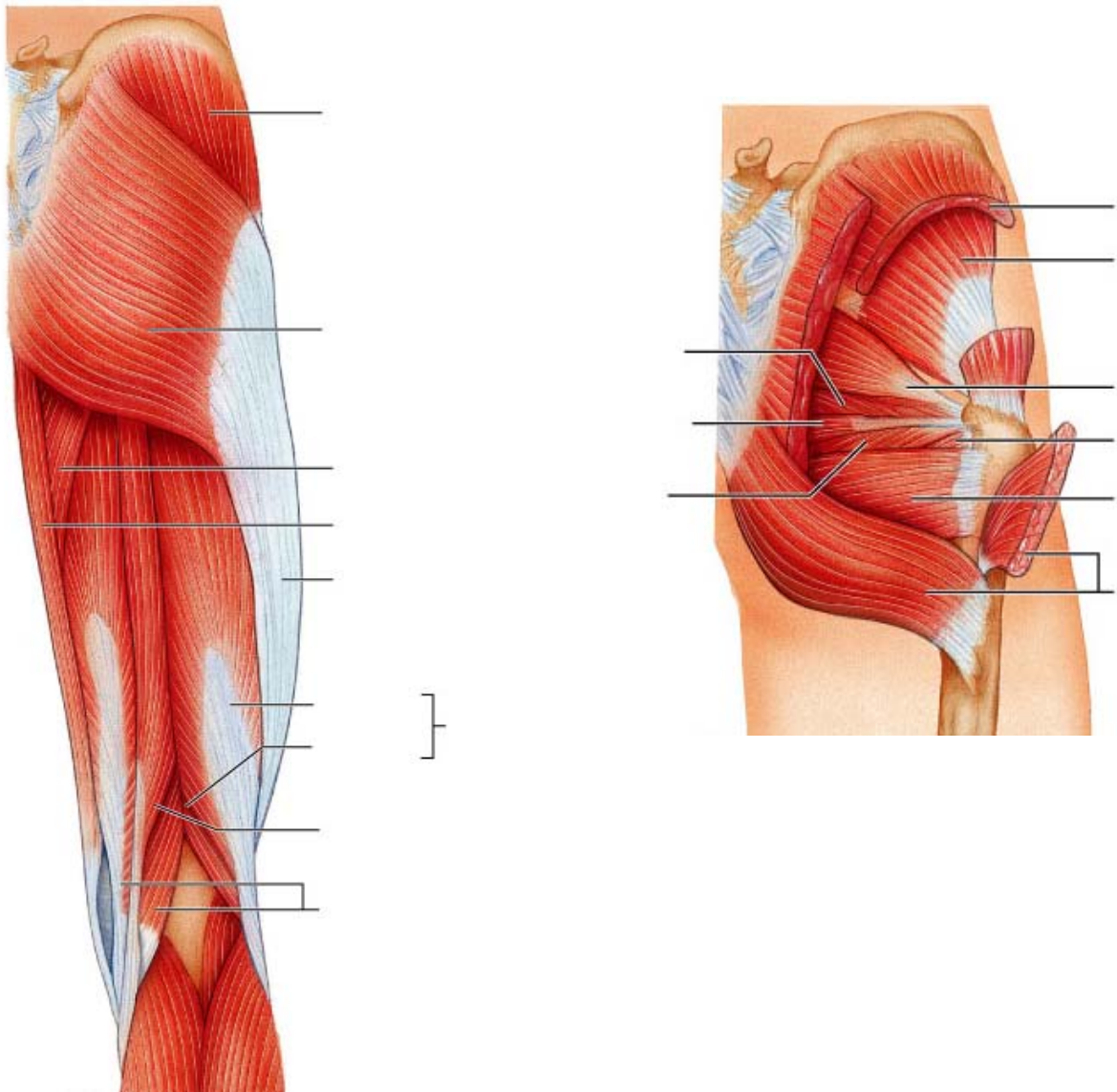




PELVIC MUSCLES THAT MOVE THE HIP JOINT

The largest and most superior hip muscle is the **gluteus maximus**. Anterior and deep to the gluteus maximus are the **gluteus medius** and underlying **gluteus minimus**. Both of which produce abduction and medial rotation of the hip joint. A lateral muscle is the **tensor fasciae latae** that attaches from the iliac crest to the fascia lata or iliotibial tract that is a band of aponeurosis that extends from the ilium to the tibia.

There are six small lateral rotators of the hip joint and include the **piriformis**, superior gemellus, obturator internus, inferior gemellus, **quadratus femoris**, and obturator externus.

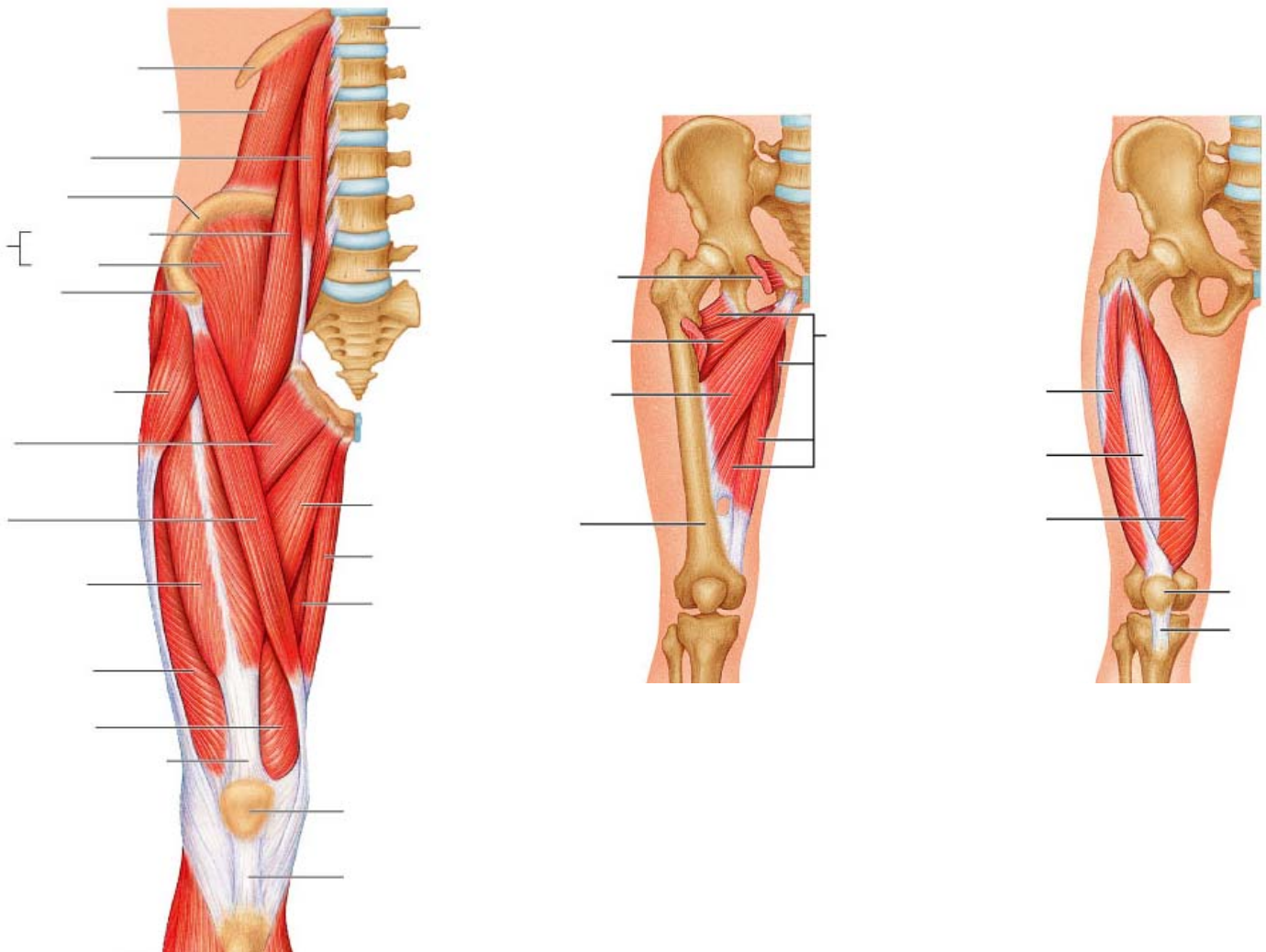


There are five adductor muscles of the hip joint that originate on the rami of the pubis. They include the **adductor longus**, **adductor magnus**, adductor brevis, **pectineus**, and **gracilis**. The gracilis will be further discussed in the next section.

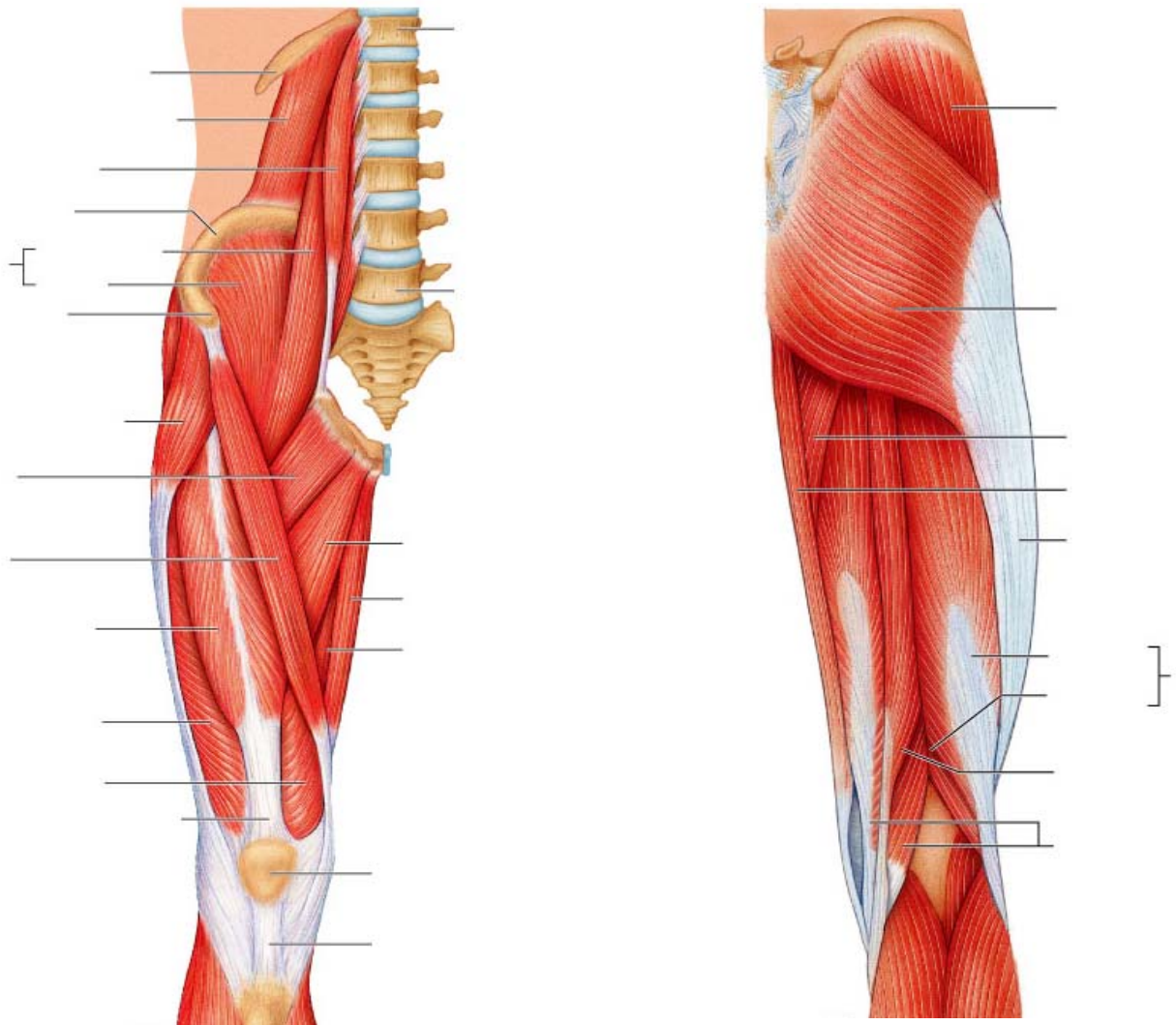
The **psoas major** and **iliacus** make up the medial surface of the pelvis and attach to the lower vertebrae and iliac fossa respectively. They are collectively referred to as the iliopsoas muscle.

MUSCLES THAT MOVE THE HIP JOINT AND/OR KNEE JOINT

The muscles that extend the knee are on the anterior thigh and are collectively referred to the **quadriceps femoris** muscles. They include the **vastus lateralis**, **vastus intermedius**, **vastus medialis**, and **rectus femoris**. The rectus femoris also flexes the hip joint. All four of these muscles insert on the tibial tuberosity by way of the patella ligament and quadriceps tendon.



The flexors of the knee joint include the **sartorius, gracilis, popliteus, and the hamstring muscles**. The hamstring muscles include the **biceps femoris short head, biceps femoris long head, semimembranosus, and semitendinosus**. The latter three muscles originate on the ischial tuberosity and extend the hip joint as well as flex the knee joint. The biceps femoris muscles have lateral insertion points while the semimembranosus and semitendinosus insert medially on the tibia. The semimembranosus is a large deep muscle with the semitendinosus located superficially on top of the semimembranosus. The popliteus muscle is a small muscle that wraps around the posterior aspect of the tibia within the popliteal fossa. The popliteus unlocks the knee by medially rotating it at the start of flexion of the knee joint. The sartorius is the longest muscle in the body and wraps medially around the anterior thigh from the anterior superior iliac spine to the medial surface of the tibia. The sartorius also moves the hip joint.



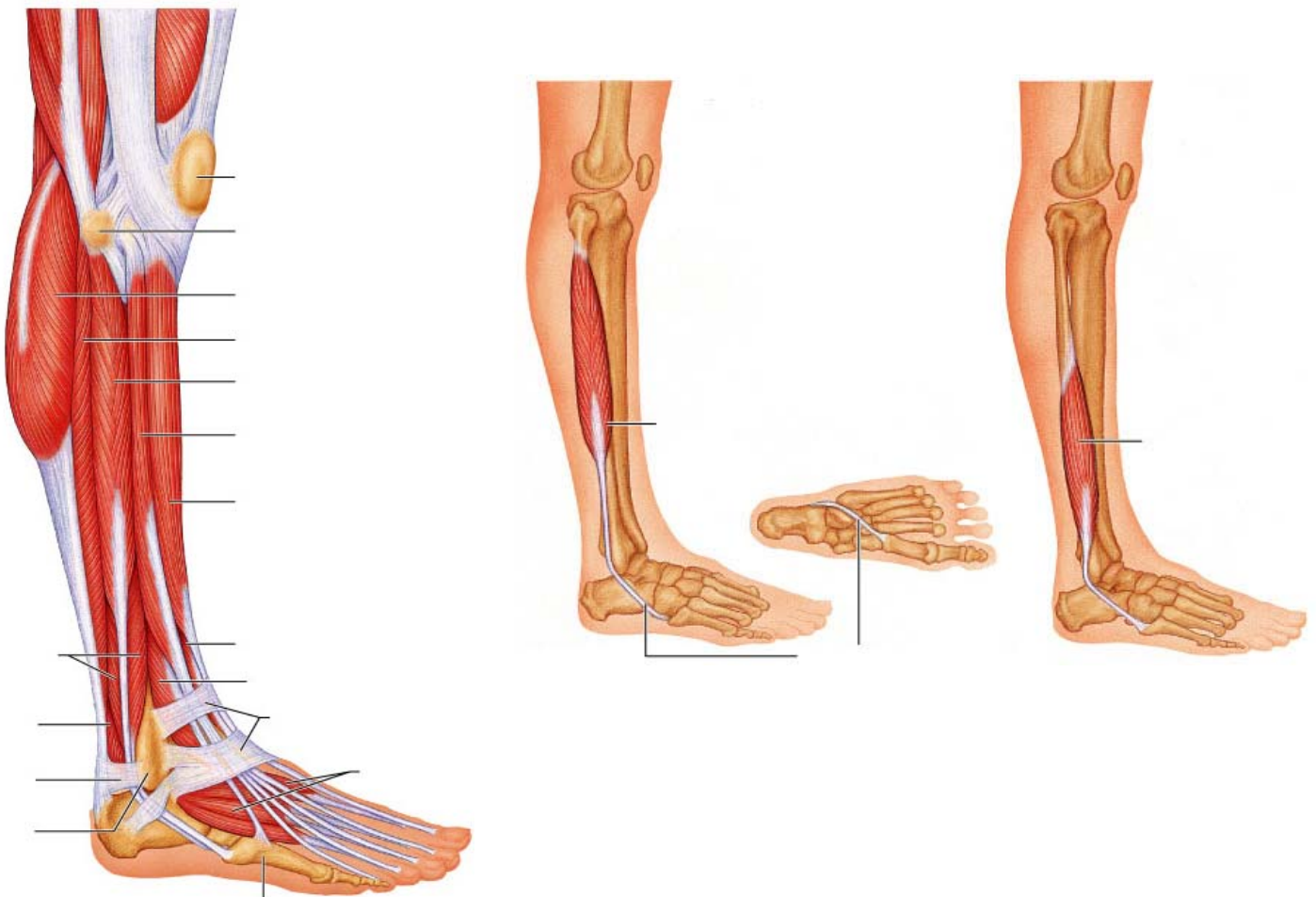
MUSCLES THAT MOVE THE ANKLE, FOOT, AND/OR TOES

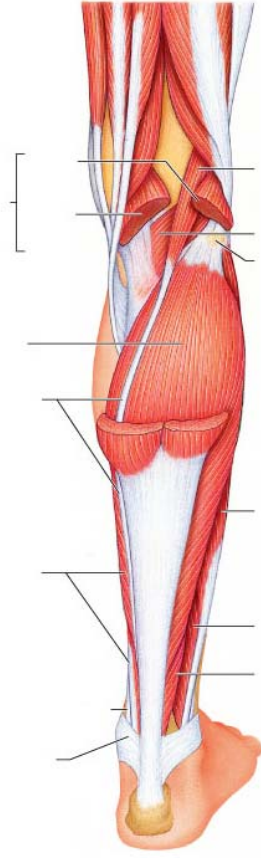
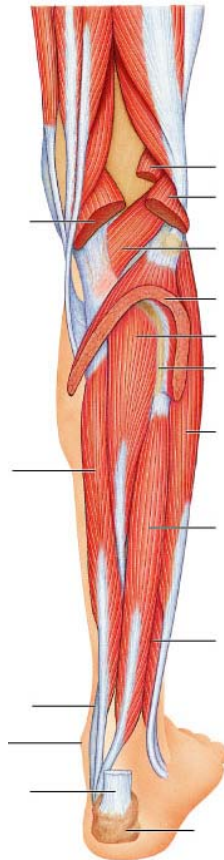
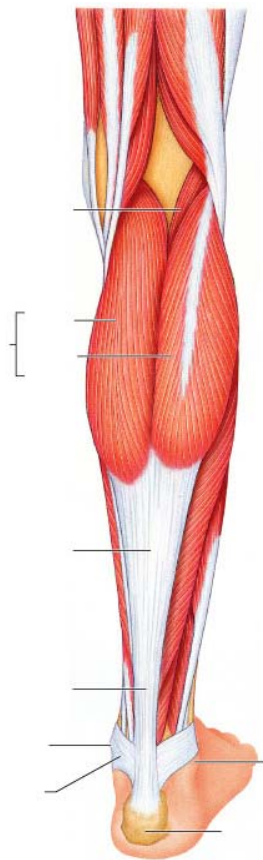
The calf muscles are strong plantar flexors and include the proximal **gastrocnemius** and the deeper and more distal **soleus**. Both attach to the tendon of calcaneus or Achilles tendon. The gastrocnemius also acts on the knee joint. The three peroneus muscles aid the above muscles with plantar flexing and by everting the foot. The three lateral fibularis (peroneus) muscles are the **fibularis (peroneus) longus**, the shorter and underlying **fibularis (peroneus) brevis**, and the small and deep fibularis (peroneus) tertius. The **tibialis posterior** is a deep muscle posterior to the tibia.

The major dorsiflexor of the ankle and foot is the **tibialis anterior** and it lies lateral to the anterior tibial crest or shin.

The **extensor digitorum longus** extends the toes while the **extensor hallucis longus** extends the hallux or big toe. These two muscles are located within the anterior compartment lateral and posterior to the tibialis anterior.

The **flexor digitorum longus** and **flexor hallucis longus** flex the toes and big toe respectively and are located near the tibialis posterior.





(e)



(f)



MUSCLE ORIGINS, INSERTIONS, & ACTIONS

You will be responsible for the following list of muscles; a chart similar to this one will be on your examination which will have a blank in any of the four locations.

MUSCLE NAME	ORIGIN	INSERTION	ACTION
Coracobrachialis	coracoid process	medial shaft of humerus	adducts and flexes shoulder joint
Deltoid	clavicle & acromion and spine of scapula	deltoid tuberosity	abducts and flexes shoulder joint
Supraspinatus	supraspinous fossa	greater tubercle of humerus	abducts shoulder joint
Infraspinatus	infraspinous fossa	greater tubercle of humerus	lateral rotation of shoulder joint
Teres minor	lateral border of scapula	greater tubercle of humerus	lateral rotation of shoulder joint
Subscapularis	subscapular fossa	lesser tubercle of humerus	medial rotation of shoulder joint
Teres major	inferior angle of scapula	medial lip of intertubercular groove	extends and Adducts shoulder joint
Latissimus dorsi	spinous processes of lower thoracic vertebrae and lower ribs	intertubercular groove	extends, adducts and medially rotates shoulder joint
Pectoralis major	sternum, costal cartilage of ribs 2-6 & clavicle	greater tubercle	extends, adducts and medially rotates shoulder joint
Biceps brachii long head	supraglenoid tubercle	radial tuberosity	flexes and supinates elbow joint
Biceps brachii short head	coracoid process	radial tuberosity	flexes and supinates elbow joint
Brachioradialis	lateral epicondyle of humerus	styloid process of radius	flexes elbow joint
Triceps brachii long head	infraglenoid tubercle	olecranon process	extends elbow joint
Triceps brachii lateral head	lateral margin of humerus	olecranon process	extends elbow joint
Triceps brachii medial head	posterior surface of humerus	olecranon process	extends elbow joint
Rectus abdominus	pubis	costal cartilage of ribs 5-7 & xiphoid process	flexes trunk/lumbar vertebrae at abdomen
Gluteus maximus	iliac crest, sacrum and lumbodorsal fascia	below greater trochanter and iliotibial tract	extends and laterally rotates hip joint
Gluteus medius	lateral iliac crest	greater trochanter	abducts and stabilizes hip joint

Gluteus minimus	lateral surface of ilium	greater trochanter	medially rotates and abducts hip joint
Tensor fasciae latae	iliac crest and anterior superior iliac spine	iliotibial tract	flexes, abducts and medially rotates hip joint
Adductor longus	inferior ramus of pubis	middle half of linea aspera	adducts, flexes and medially rotates hip joint
Adductor magnus	inferior ramus of pubis	linea aspera	adducts, flexes and medially rotates hip joint
Gracilis	inferior ramus of pubis	medial surface of tibia	medially rotates & adducts hip joint and flexes knee joint
Biceps femoris long head	ischial tuberosity	head of fibula	extends hip joint and flexes knee joint
Biceps femoris short head	linea aspera	head of fibula	flexes knee joint
Semimembranosus	ischial tuberosity	medial condyle of tibia	extends hip joint and flexes & medially rotates knee joint
Semitendinosus	ischial tuberosity	medial surface of tibia	extends hip joint and flexes & medially rotates knee joint
Sartorius	anterior superior iliac spine	medial surface near tibial tuberosity	flexes & laterally rotates hip joint and flexes knee joint
Rectus femoris	anterior inferior iliac spine	tibial tuberosity via patellar ligament	flexes hip joint and extends knee joint
Vastus lateralis	below greater trochanter	tibial tuberosity via patellar ligament	extends knee joint
Vastus intermedius	anteriolateral surface of femur	tibial tuberosity via patellar ligament	extends knee joint
Vastus medialis	linea aspera	tibial tuberosity via patellar ligament	extends knee joint
Tibialis anterior	inferior to lateral condyle of tibia & upper 2/3 of the lateral anterior crest	medial cuneiform and first metatarsal of foot	dorsiflexion
Gastrocnemius	femoral condyles	calcaneus via calcaneal tendon	flexes knee joint and plantar flexes foot
Soleus	head and shaft of fibula and shaft of tibia	calcaneus via calcaneal tendon	plantar flexes foot

Muscle List

Platysma	Brachioradialis
Buccinator	Pronator teres
Orbicularis oris	Supinator
Zygomaticus major	Extensor carpi radialis longus
Zygomaticus minor	Extensor carpi radialis brevis
Levator labii superioris	Extensor digitorum
Mentalis	Extensor carpi ulnaris
Orbicularis oculi	Flexor carpi radialis
Frontalis	Palmaris longus
Masseter	Flexor carpi ulnaris
Temporalis	Abductor pollicis longus
Sternocleidomastoid	Extensor pollicis brevis
Splenius capitis	Extensor pollicis longus (tendon only)
Anterior scalene	Gluteus maximus
Middle scalene	Gluteus medius
Posterior scalene	Gluteus minimus
Diaphragm	Tensor fasciae latae
External intercostals	Piriformis
Internal intercostals	Quadratus femoris
Serratus posterior	Adductor longus
External oblique	Adductor magnus
Internal oblique	Pectineus
Rectus abdominus	Gracilis
Transversus abdominus	Psoas major } Iliopsoas muscle
Serratus anterior	Iliacus }
Pectoralis major	Vastus lateralis } Quadriceps femoris
Pectoralis minor	Vastus medius }
Trapezius	Rectus femoris }
Rhomboid major	Vastus intermedius }
Rhomboid minor	Sartorius
Levator scapulae	Popliteus
Deltoid	Biceps femoris short head } Hamstrings
Latissimus dorsi	Biceps femoris long head }
Coracobrachialis	Semimembranosus }
Teres major	Semitendinosus }
Teres minor	Gastrocnemius
Supraspinatus } Rotator cuff muscles	Soleus
Infraspinatus }	Fibularis (peroneus) longus
Subscapularis }	Fibularis (peroneus) brevis
Triceps brachii lateral head	Tibialis posterior
Triceps brachii long head	Tibialis anterior
Triceps brachii medial head	Extensor digitorum longus
Biceps brachii long head	Extensor hallucis longus
Biceps brachii short head	Flexor digitorum longus
Brachialis	Flexor hallucis longus

Joint Structures

medial & lateral meniscus

anterior & posterior cruciate ligaments

medial (tibial) collateral ligament

lateral (fibular) collateral ligament

patellar ligament

tendon of quadriceps femoris

glenoid fossa

glenoid labrum

tendon sheath of biceps brachii long head

subacromial bursa

subscapular bursa

synovial membrane

glenohumeral ligaments (superior, middle & inferior)

coracohumeral ligament

transverse humeral ligament