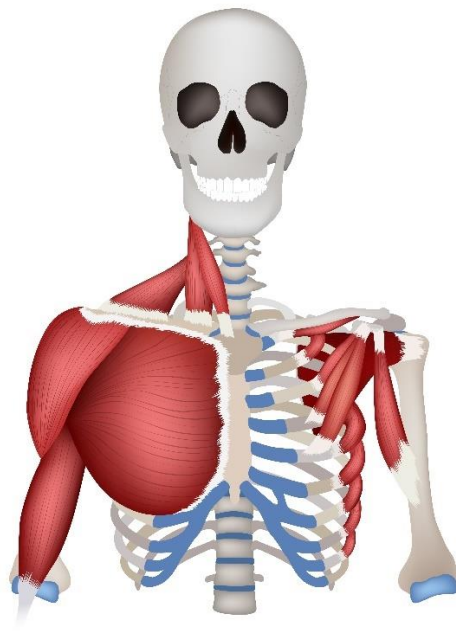


Functional Anatomy101

C.E.U Course



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Functional Anatomy 101 CEU Course by Tracy L. Markley

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Functional Anatomy 101

Introduction

Welcome to the “Functional Anatomy 101” continued education course. It is wonderful that you have chosen to reach out and take this course to increase your knowledge of the muscles and movements of the human body. Taking this course will help bring the best care you can to all you current and future clients.

J.A. Mastropaolo writes in his book Kinesiology for the Public Schools

Muscles create the movements that maintain life. The breathing muscles power the air into and out of the lungs where oxygen goes into the blood. The heart muscles pumps powerfully the blood's oxygen to every cell in the body. To stay alive, the body needs oxygen more than anything else. That is why everyone needs to know how to maintain powerful breathing muscles and a powerful heart.

The only way to maintain a powerful heart and breathing muscles is to exercise the body's skeletal muscles.....

Many professions require the knowledge of skeletal muscles, where muscles attach, and the movements the muscles perform. This includes but is not limited to, physical therapist, personal trainers, yoga instructors, Pilates instructors, chiropractors, nurses, massage therapist, dance instructors, athletic trainers, coaches, and many more.

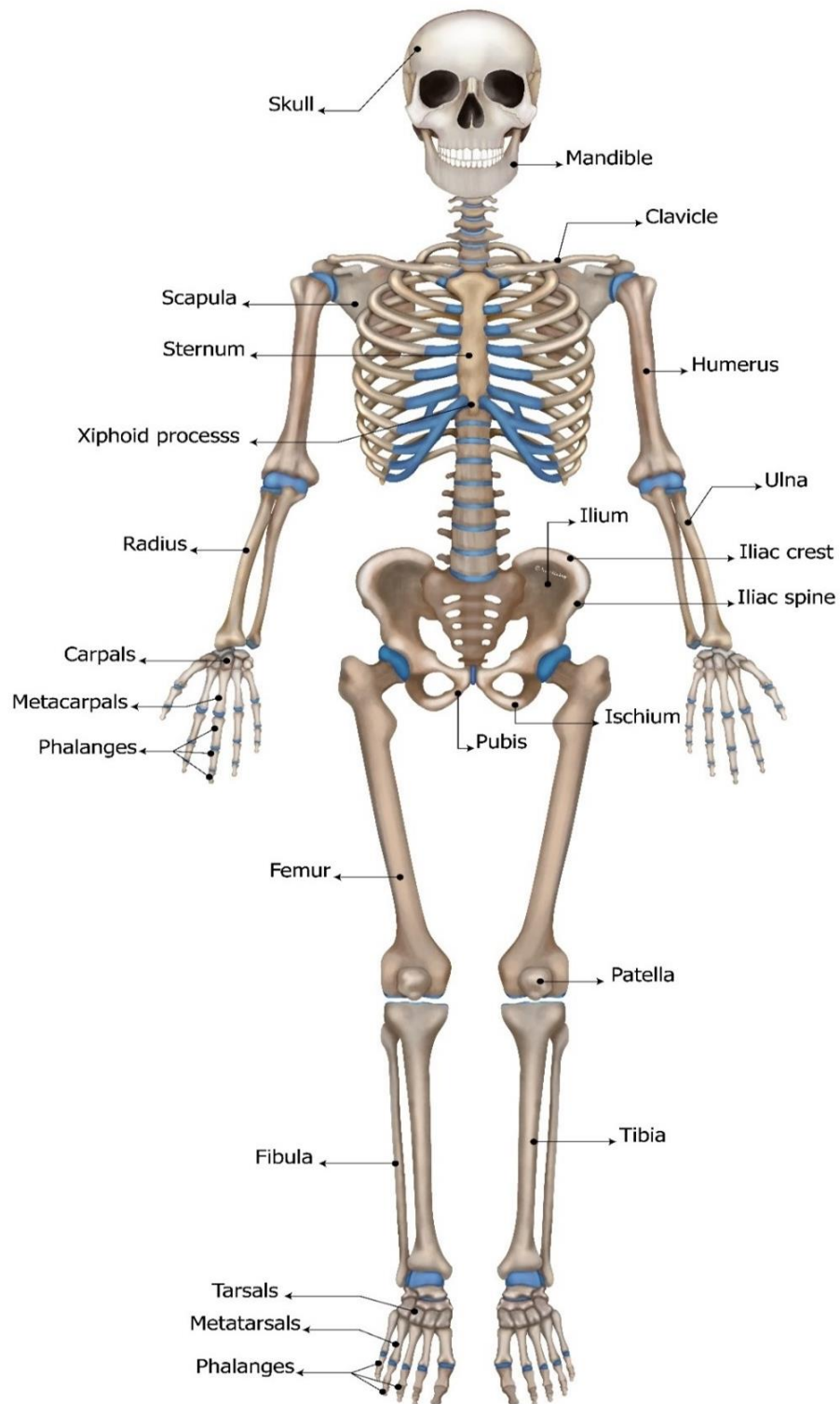
There are over 650 skeletal muscles in the human body. In some illustrations the number of skeletal muscles shown can near 800. Skeletal muscles move body parts by contracting and relaxing. Muscles pull bones to make movements. Since muscles do not push bones into a movement, muscles work in pairs of flexors and extensor muscles to complete a movement. Studies show that over 70 percent of the body's muscles are activated while walking.

This course was created with the intention to bring a greater knowledge of muscles then the basic anatomy that comes with most certification programs.

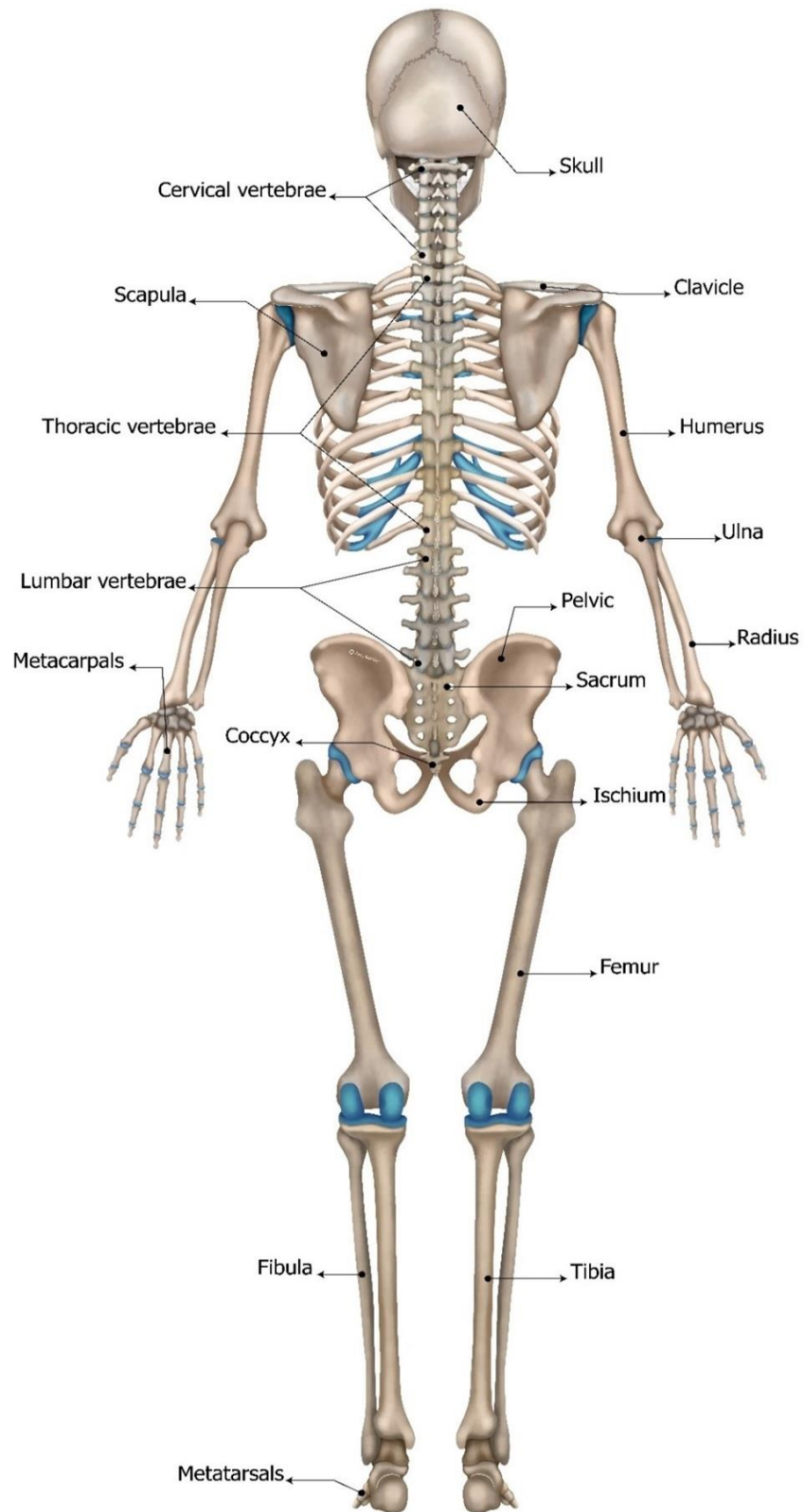
Please refer to the PowerPoint and video portions of this course for more information. They are also important parts of this course.

There are 206 Bones in the body

Anterior View



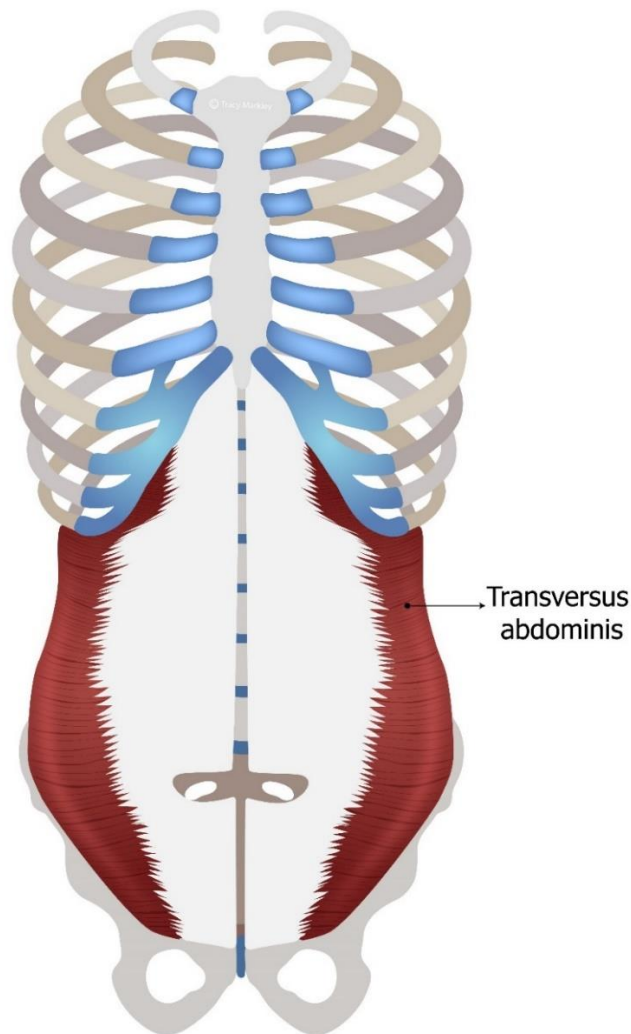
Posterior View



Muscles Of the Body

Abdominal Muscles

Transverse (Transversus) Abdominals



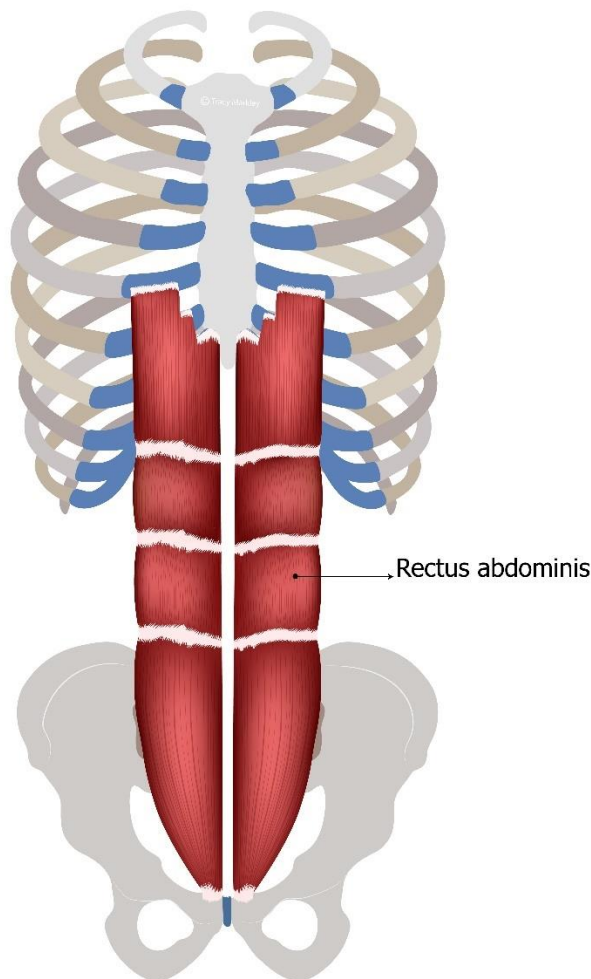
Transverse Abdominis attaches at the anterior iliac crest, lateral half of inguinal ligament, thoracolumbar fascia, and cartilages of ribs 6-12, Abdominal aponeurosis to Linea alba, xiphoid process, and pubic symphysis.

It is the deepest of the abdominal muscles. A critical function of this muscle is to stabilize the lower back and pelvis before movement. It is the deepest abdominal muscle, wrapping around the body to act like a corset. When engaged, it also pulls the belly in and provides support to the **thoracolumbar fascia**, and it is the stabilizer of the shoulder girdle, the head, neck, pelvis, and lower extremities. It adducts the ribs and compresses the abdomen causing exhalation. It is the main antagonist muscle of the diaphragm.

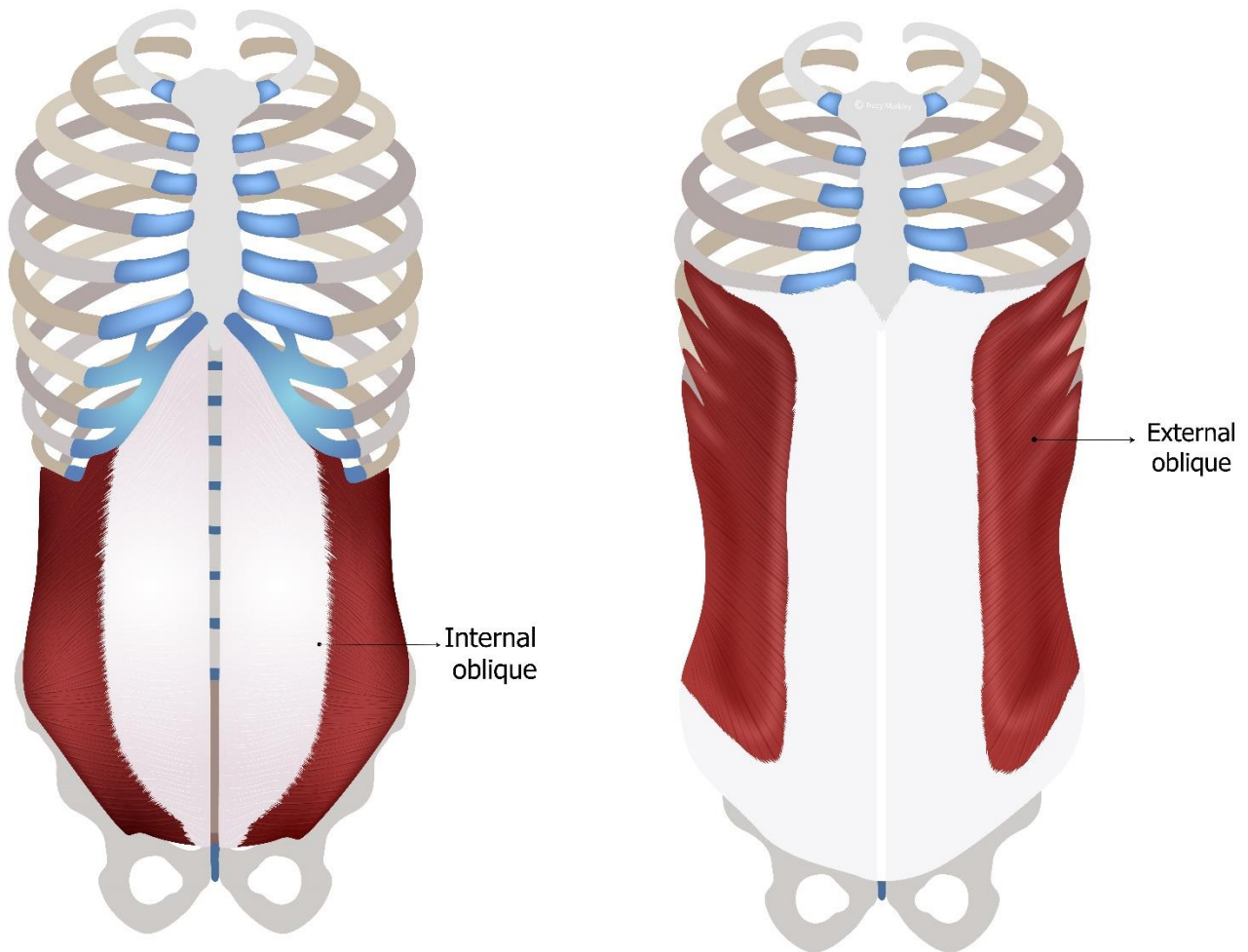
If a client has rounded shoulders and poor posture, it cannot be corrected if the transverse muscle maintains a weakness. The transverse muscle must be strengthened, along with the other stabilizing muscles, to hold the body strongly upright so that it can achieve a posture in which the shoulders are stacked over the hips. If the head is upright and balanced over the shoulders, we have better balance. Clients need to build stability in the pelvis and hips, so that the lower limbs and joints can have strength, function in alignment, and perform properly for safe movements.

Rectus Abdominis

Rectus Abdominis - Attaches from the lower ribs to the pubis. It adducts the ribs causing exhalation and flexes the spine. Also referred to as flexing the trunk.



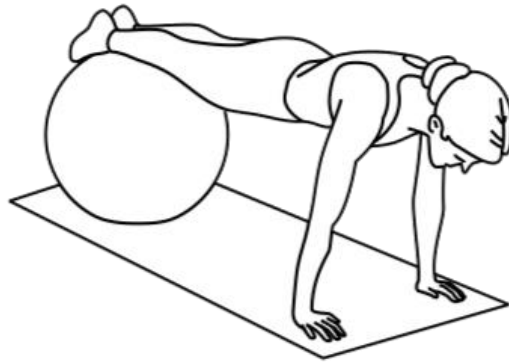
Oblique Abdominals



External Oblique - Attaches from ribs 5 through 12 to the crest of the ilium. It adducts the ribs causing exhalation and lateral rotation of the spine/trunk.

Internal Oblique - Attaches from ribs 10 through 12 and to the crest of the ilium. It adducts the ribs causing exhalation and lateral rotation of the spine/trunk. It acts as an antagonist muscle to the diaphragm.

The obliques act as the antagonist muscles to the diaphragm, even though the transverse abdominis is the main antagonist muscles to the diaphragm.



This person with the Swiss ball is activating all her abdominal muscles and many spinal muscles. I would call this activating the core muscles. As well as she is working on balance, spatial awareness, and proprioception, strengthening her upper body, flexing her wrists, and extending her forearms.



The woman on the ball flexing her spine as she works the abdominal muscles. Also working on her balance. She has flexed knees, flexed elbows, and both her scapula are elevated.



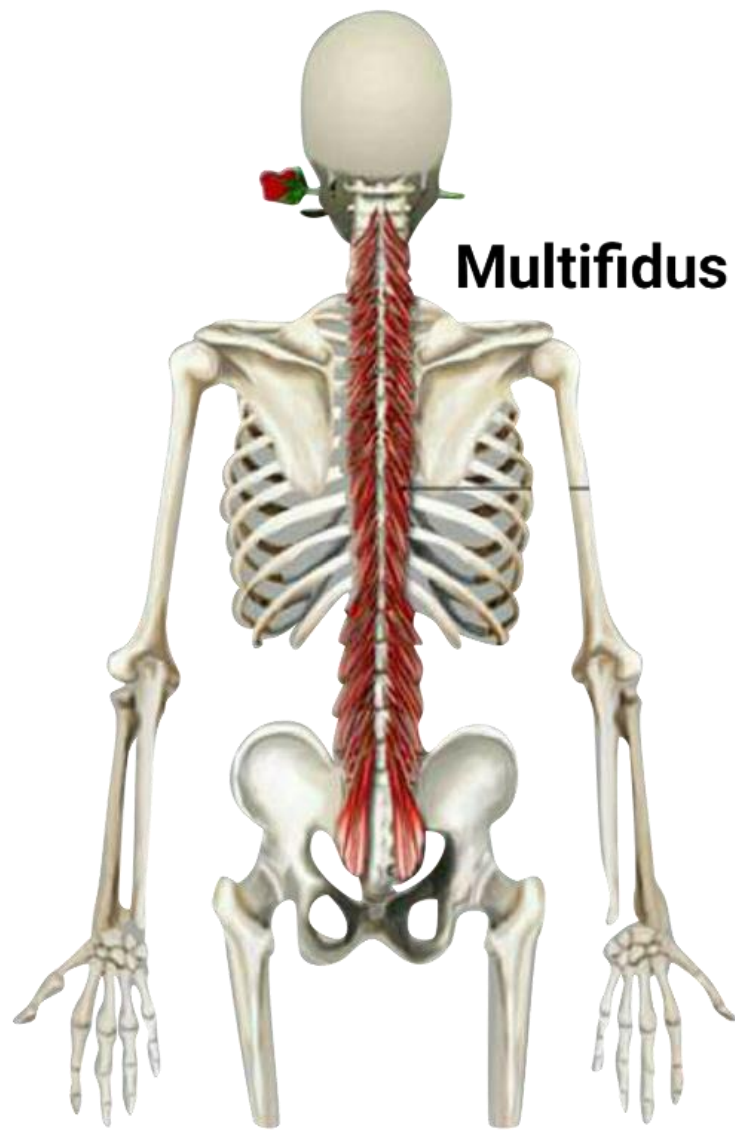
The pitcher is flexing, abducting, adducting, rotating his spine.

Spine and Back Muscles

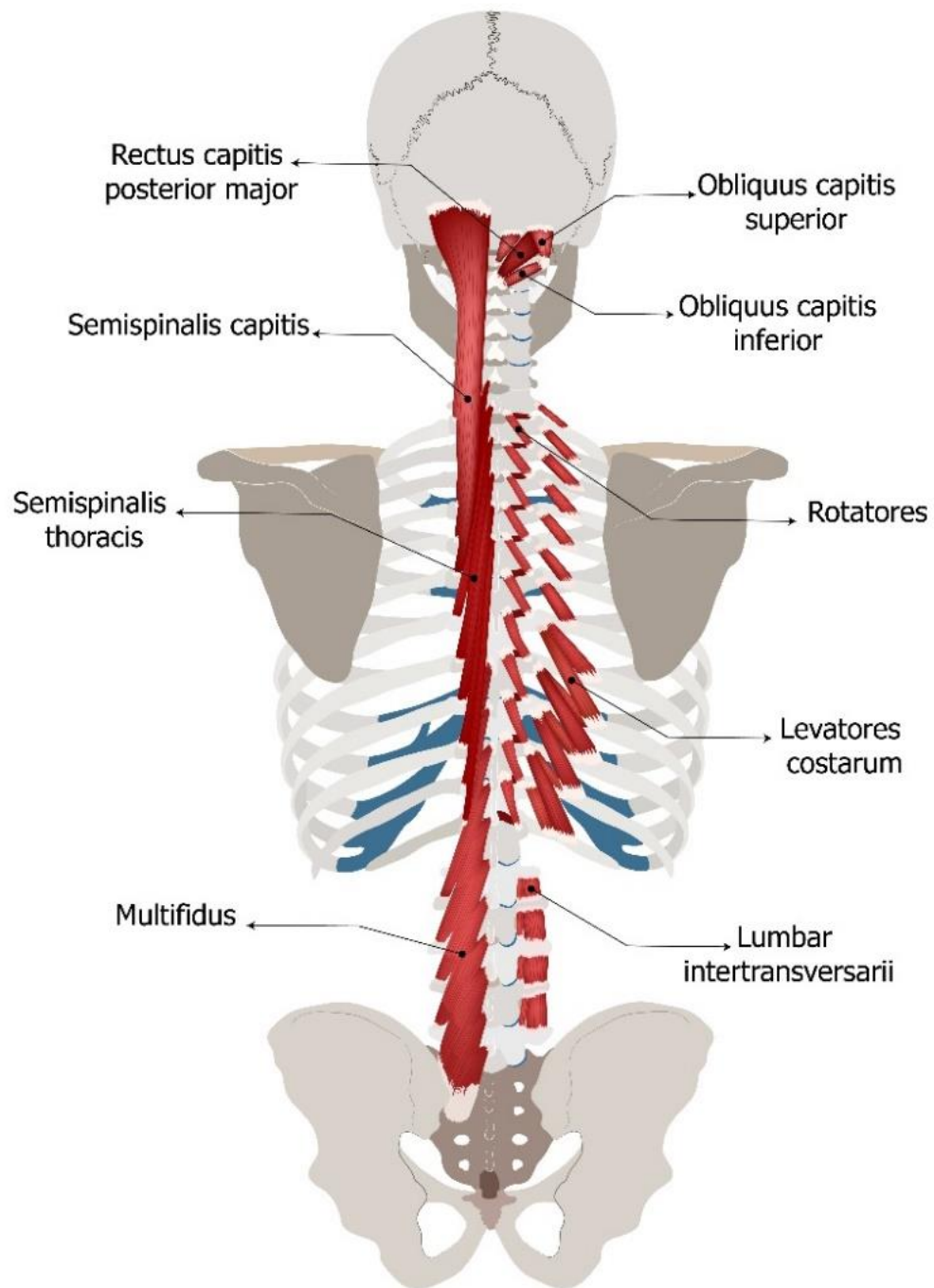
Although this manual includes many illustrations of the spine, not all muscles of the spine are shown in the illustrations. Also, not all the muscles in illustrations are defined with their attachments and their actions.

I wanted to share how important it is to strengthen the core and spine from the inside out. The body communicates for movement and moves beginning deep in the spine. There are so many powerful muscles in the spine of all sizes. This is important when training clients to regain and/or strengthen cognitive skills such balance, spatial awareness, and proprioception.

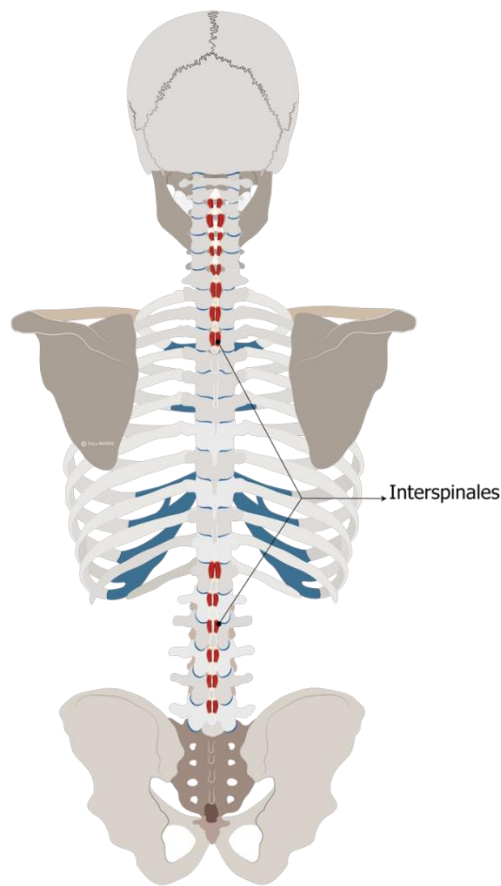
Multifidus



The **multifidus** - Attaches to the head of a vertebrae to the vertebrae below. It is a small but powerful muscle. It is the main stabilizing muscle of the spine. This muscle takes pressure off the vertebral discs, so that the body weight can be distributed properly throughout the spine. If this is weak, you will also have weakness in the low back. The **multifidus** begins to activate before the body moves to protect the spine. It is part of the stabilizing system in the body. To gain better balance, this muscle must be stronger. Proper posture leads to better balance.



The small muscles near the vertebrae need to be activated harmoniously. These muscles are also often known as the postural muscles.



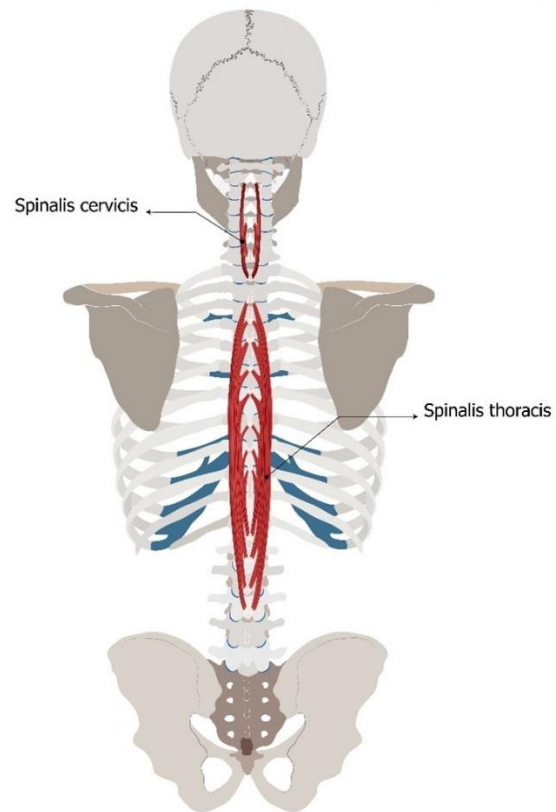
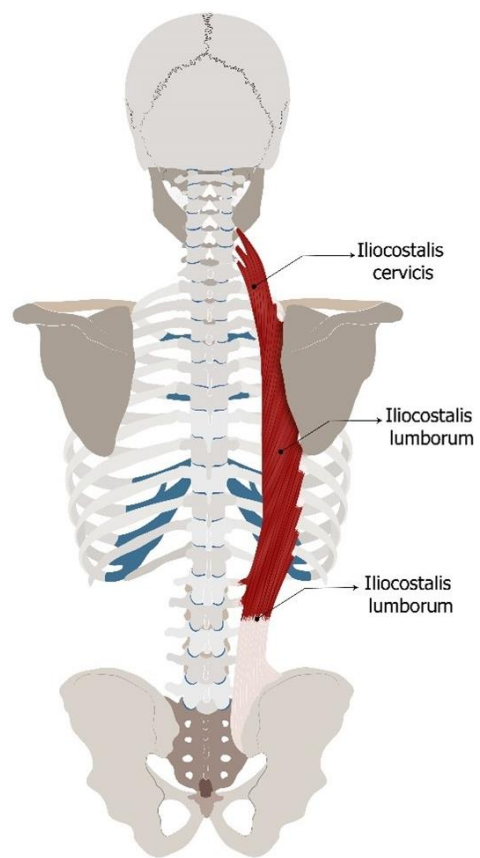
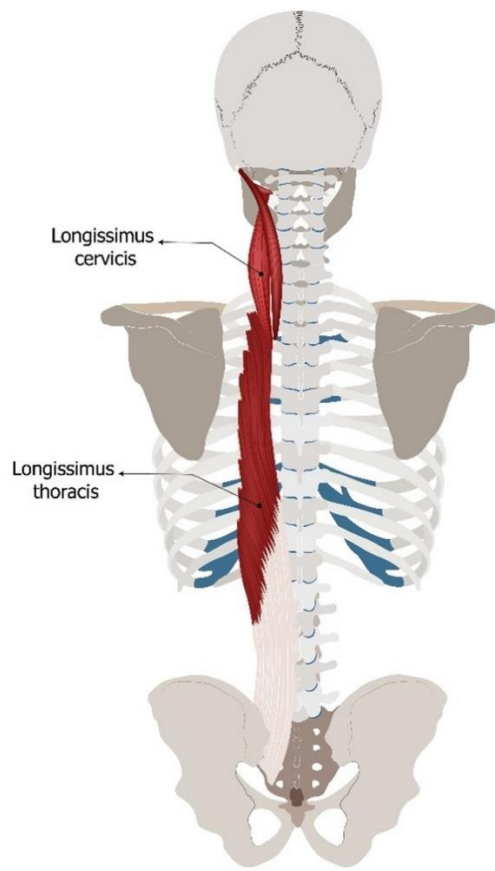
Interspinales attach from a vertebra to a lower vertebra. They perform segmental extension. This muscle brings a lot of proprioception for the back, balance and stability of spine, and body in movement. Segmental extension of the spine means arching the back. They extend, abduct, adduct, and rotate the spine.

Intertransversarii attach between the transverse processes of the adjacent lumbar vertebrae. Mainly in lumbar region of spine and up to vertebrae T10. They make small segmental motion and lateral flexion of the spine. They are small muscles that are on both sides of the spine.

The **Interspinales** and **Intertransversarii** muscles move and stabilize the spine. They also play a large role in body's spatial awareness and proprioception.

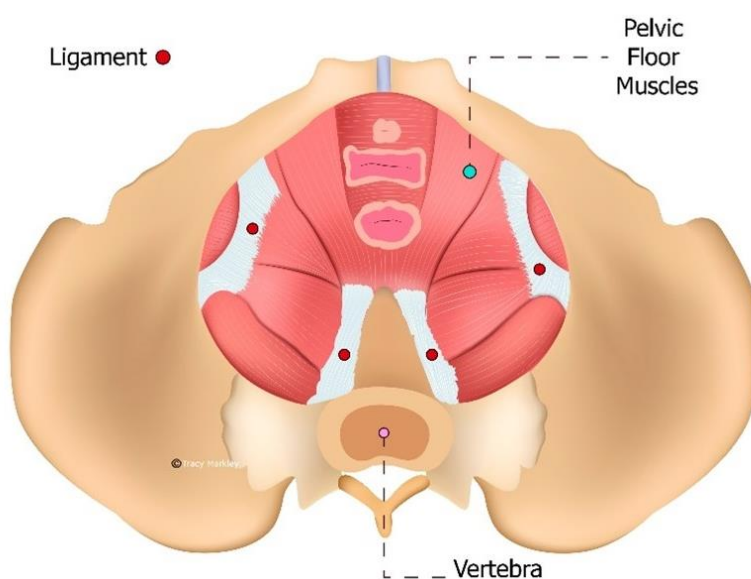
Splenius Capitis attach from the cervical vertebra to a cervical vertebra below. They extend, abduct, adduct, and rotate the spine.

Lumbar Intertransversarii, Levatores Costarum, and the Rotators are deep, posterior muscles attach from a vertebra to a lower vertebra. They extend, abduct, adduct, and rotate the spine.



Pelvic Floor Muscle

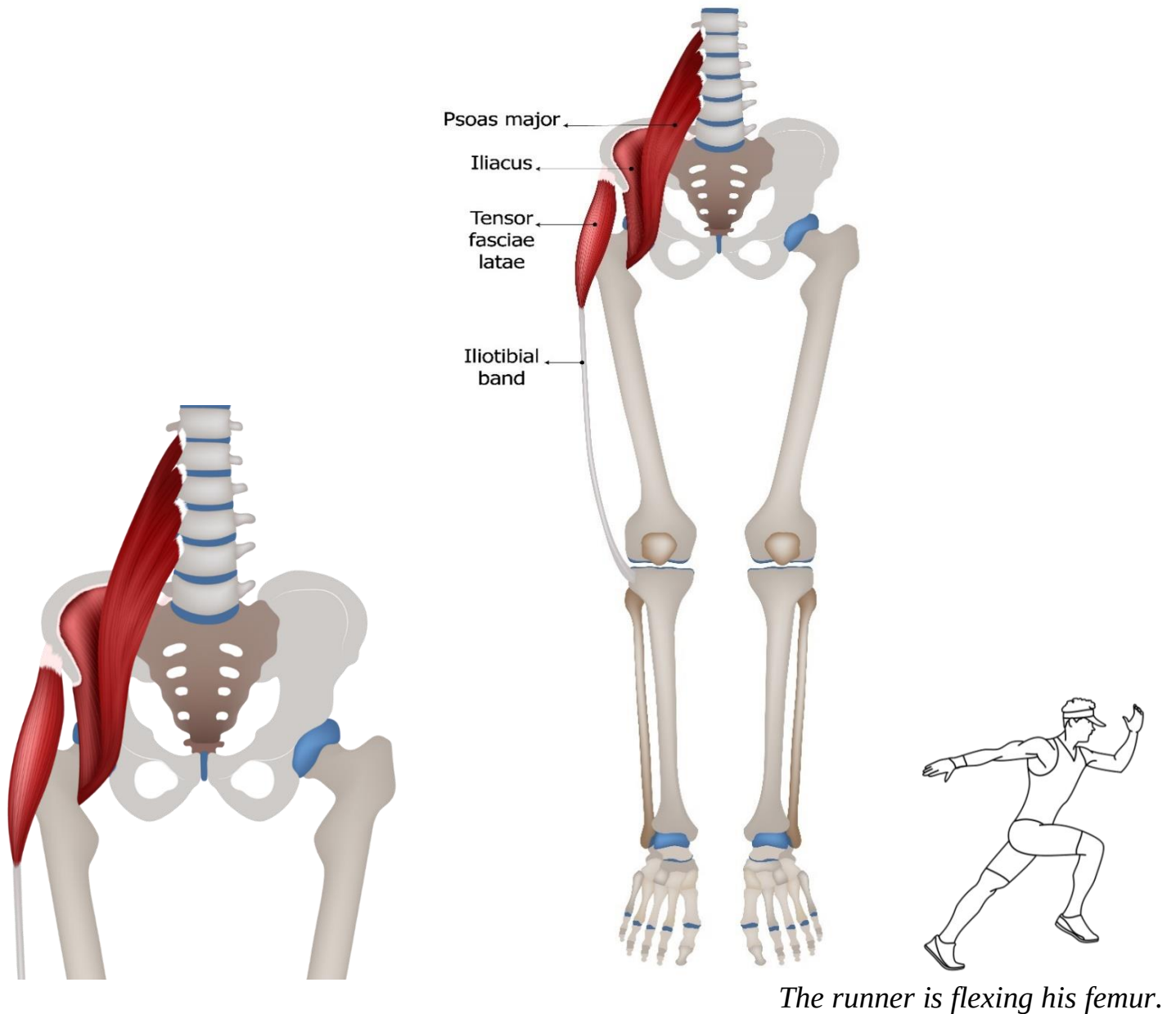
The **pelvic floor** muscles work as stabilizers of the abdominal and pelvic organs. The pelvic floor muscles and the gluteus muscles are made to work and move in opposite directions. One must be able to engage the pelvic floor without engaging the gluteus muscles to obtain optimal core strength. These two muscles must be separated in the brain and nervous system for overall whole-body functioning. This plays a role in preventing back issues. The **transverse** muscle must be strong for the pelvic floor to become strong and function properly since they are on the same neuromuscular loop with the **diaphragm** and **multifidus**.



The **pelvic floor** works close to the diaphragm as well. If you sit or stand in good alignment and focus on engaging the pelvic floor, you can feel that the diaphragm pulls slightly towards the pelvic floor as the pelvic floor lifts slightly towards the diaphragm. There is a difference between doing a Kegel and engaging the pelvic floor. It is also important to be able to engage the pelvic floor without engaging the glute muscles for the inner unit and stabilizing system in the body to work efficiently.

Diaphragm is a muscle on the internal aspect of the thorax. It is one of the muscles of respiration. Illustration shown later in the manual.

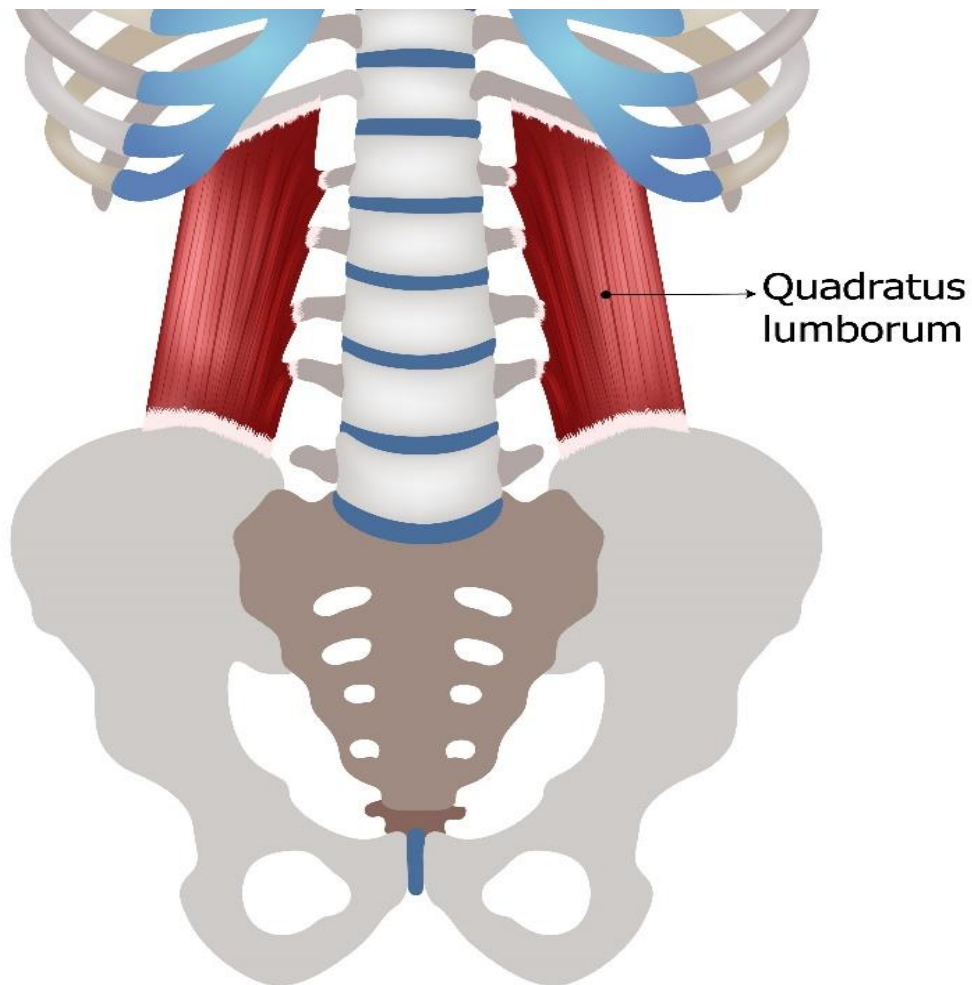
Psoas



Psoas attaches at the lumbar vertebrae, ilium, and to the femur. It flexes the hip, helps flex the femur, and rotates the femur externally. There is one on the left side and one on the right side. The psoas is a powerful muscle and extremely important muscle. It lies deep beneath the transverse abdominal muscle. It is a deep spine muscle and the only muscle in the upper body and spine that directly attaches to the legs. It begins at the spine and crosses over the hips to the top and front of the femur bone.

When someone is referring to the **iliopsoas** they are referring to the iliacus and the psoas combined together as one.

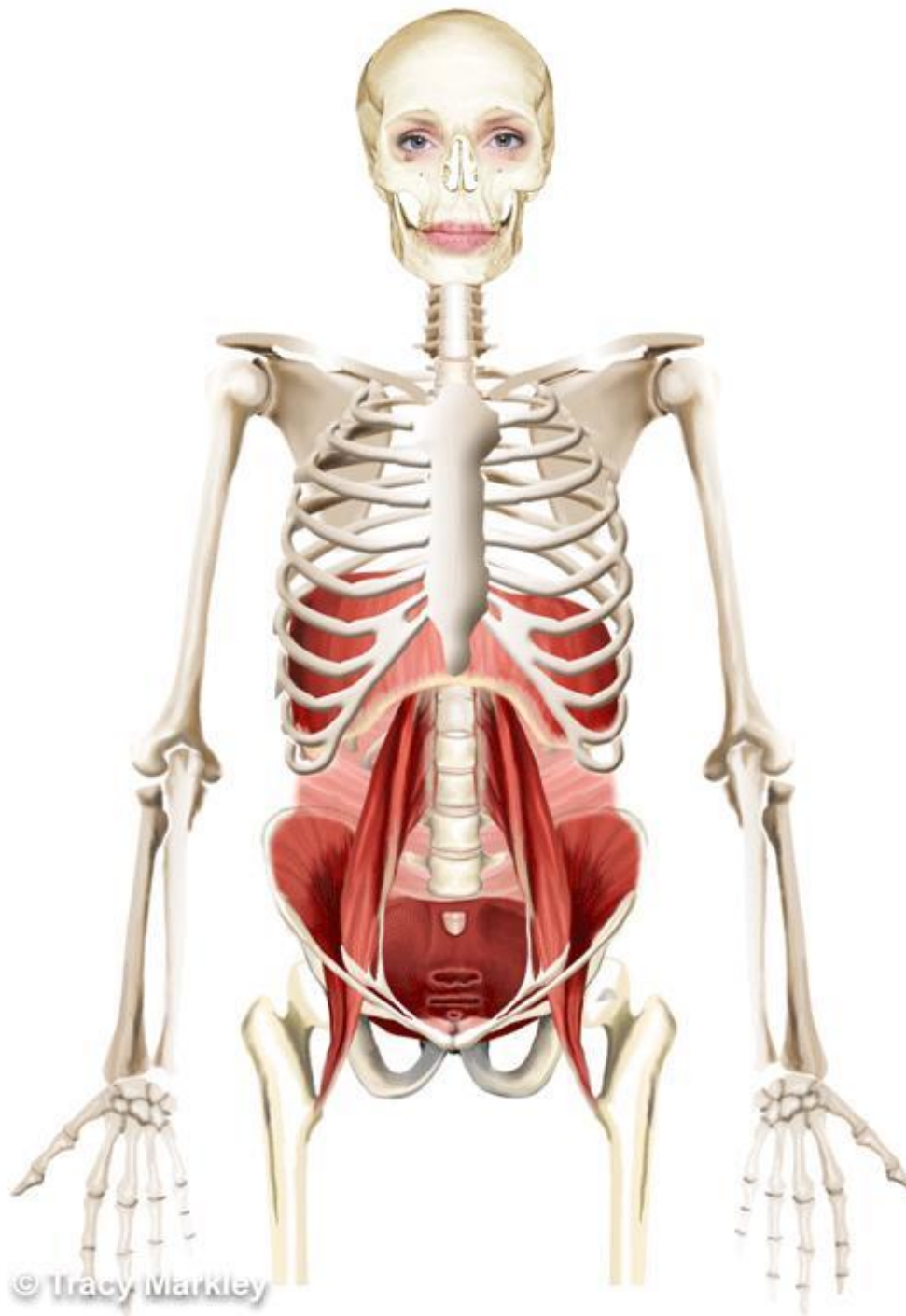
Quadratus Lumborum



The quadratus lumborum attaches from the lumbar vertebrae and rib 12 to the crest of the ilium. It stabilizes the pelvis (hip girdle), as in walking, and it laterally flexes the spine.



The Yoga girl is laterally flexing her spine to her left.



In the above illustration you can see the pelvic floor, iliopsoas diaphragm and obliques muscles.

Fascia and Movement

Fascia is a continuous structure that surrounds and intermingles tissues and structures throughout the body. It varies in density and thickness. Nerves and blood vessels also run through fascia. When the brain is sending messages for movement, it includes the fascia.

Fascia is also interconnected with the structures it surrounds. The health and mobility of fascia plays a huge role for the body to have healthy movement, and to avoid pain and injury. There are ongoing studies on fascia and its mandatory importance for the body to move.

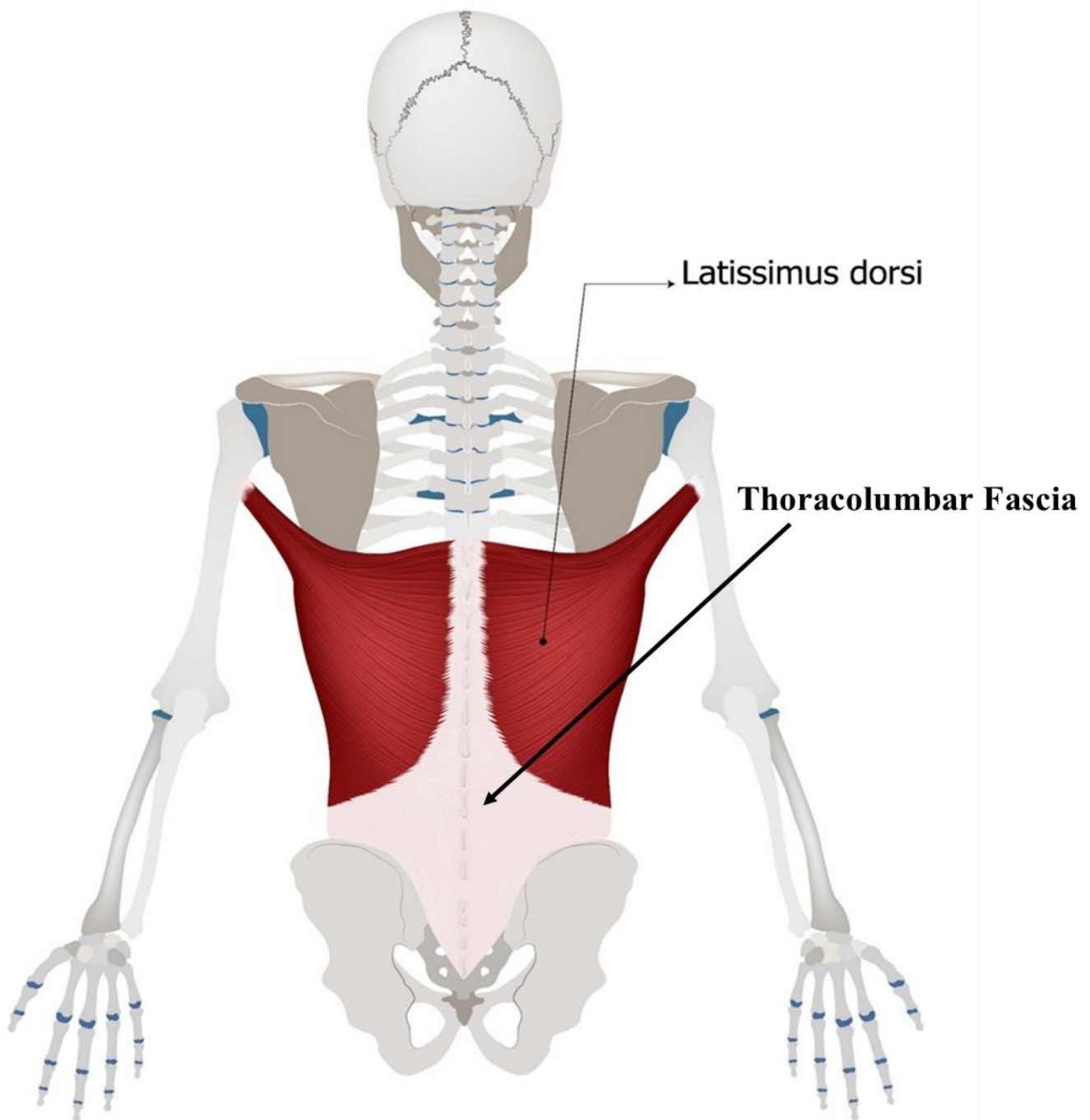
“Fascia contains mechanoreceptors and proprioceptors. In other words, every time we use a muscle, we stretch fascia that is connected to spindle cells, Ruffini and Paccini corpuscles and Golgi organs. The normal stretching of fascia thus communicates the force of the muscle contraction and the status of the muscle regarding its tone, movement, rate of change in muscle length and position of the associated body part to the central nervous system.” **From Dr. Warren Hammer, the chiropractic profession's leading expert in soft tissues and fascia (The Fascial System is a Sensory Organ).**

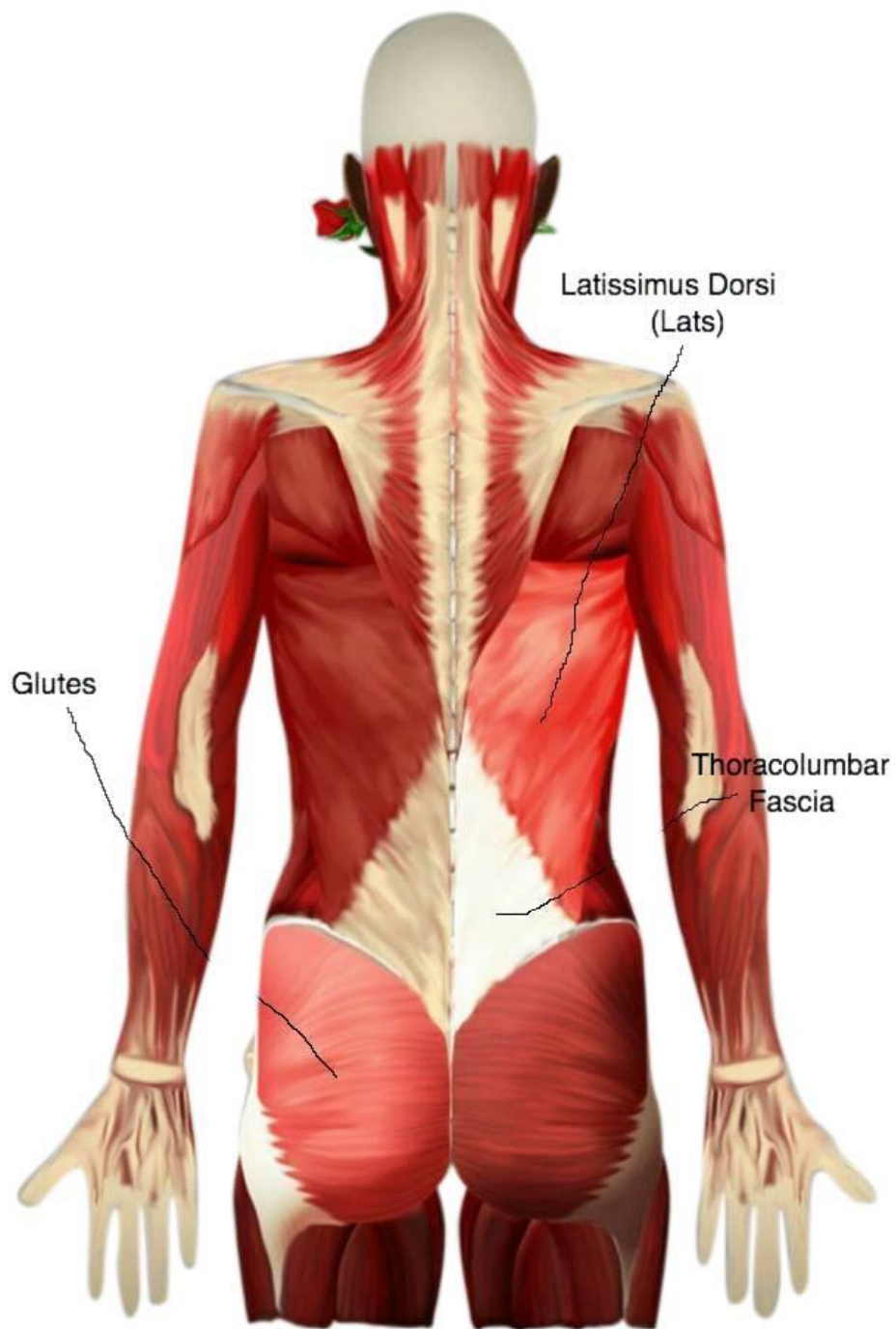
Dr. Hammer went on to say in another article (Why We Need to Fix the Mechanoreceptors) that, *"One of the most relevant discoveries in the world of anatomy over these many years is that muscle spindles, the chief proprioceptive cells affecting our muscles, are not in the muscle, but in the fascia surrounding the muscle and its muscle bundles. A mechanoreceptor is stimulated when it is deformed, but when it is restricted in fascia that is unable to glide... it is unable to stretch, which is critical for the function of the spindle cell."*

The **thoracolumbar fascia** is an important fascia to understand. The **thoracolumbar fascia** supports the back muscles and helps them achieve the ability to move the body. It is made up of strong fibers and helps channel forces of movement as the back muscles contract and relax. The nerves to these muscles also cross through this fascia. This fascia goes deep to the spine and is made of three layers. It is essential for contralateral motions like walking. It works with the **latissimus dorsi** (lats) to coil the core of the body. It is necessary for walking, running and mobility. It helps bridge the muscles of the back to the muscles of the abdominal wall. This fascia also helps integrate the movements of the upper body with the lower body

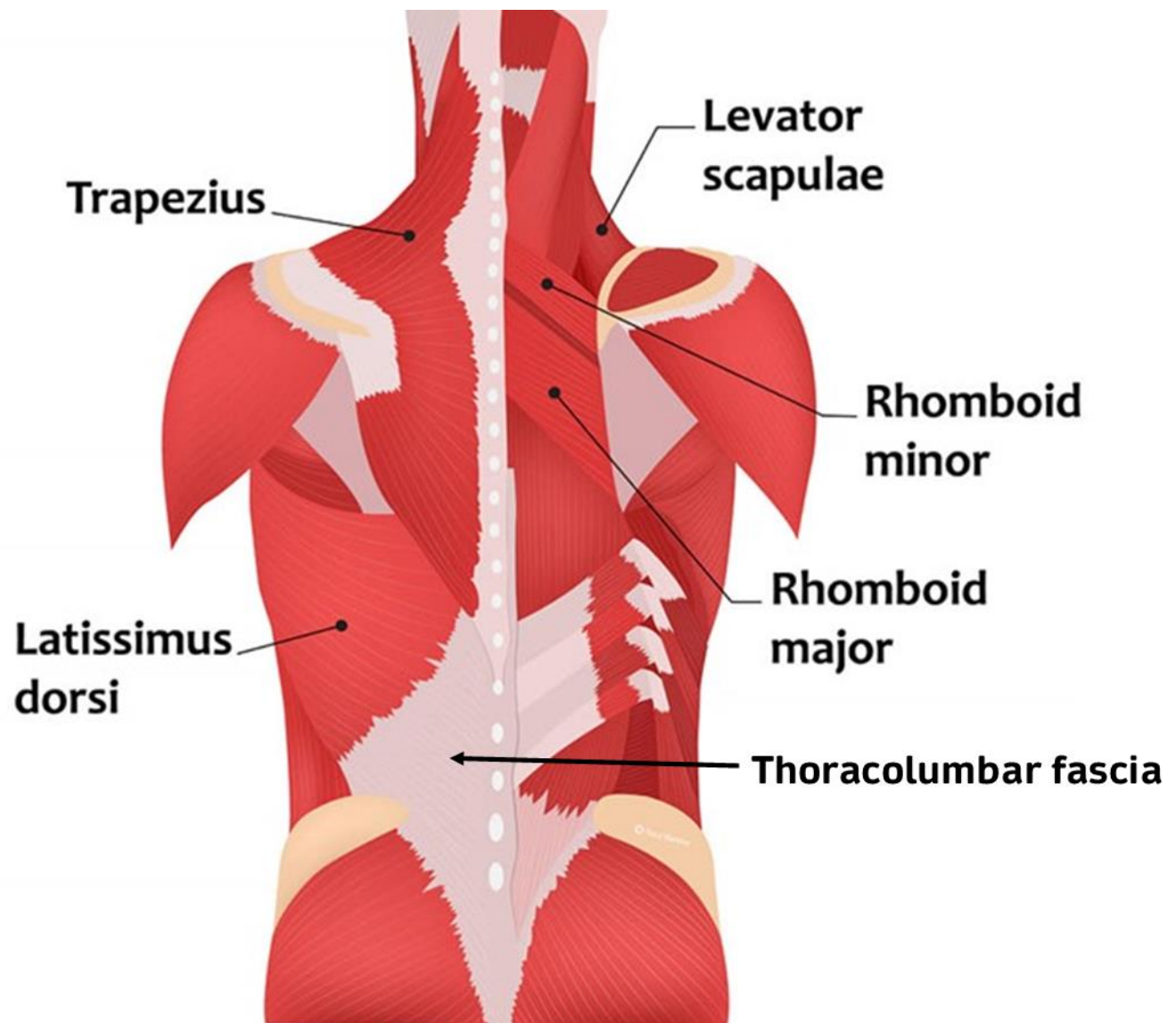
When the **thoracolumbar fascia** is supported, it allows all the muscles that connect to it to **function better**. These muscles include **the gluteus maximus, latissimus dorsi, trapezius, erector spine, quadratus lumborum, psoas, transverse, and internal obliques.**

Thoracolumbar Fascia





This illustration is a good example showing how the glutes and lats merge into the thoracolumbar fascia. The opposite glute works with the opposite side lat.

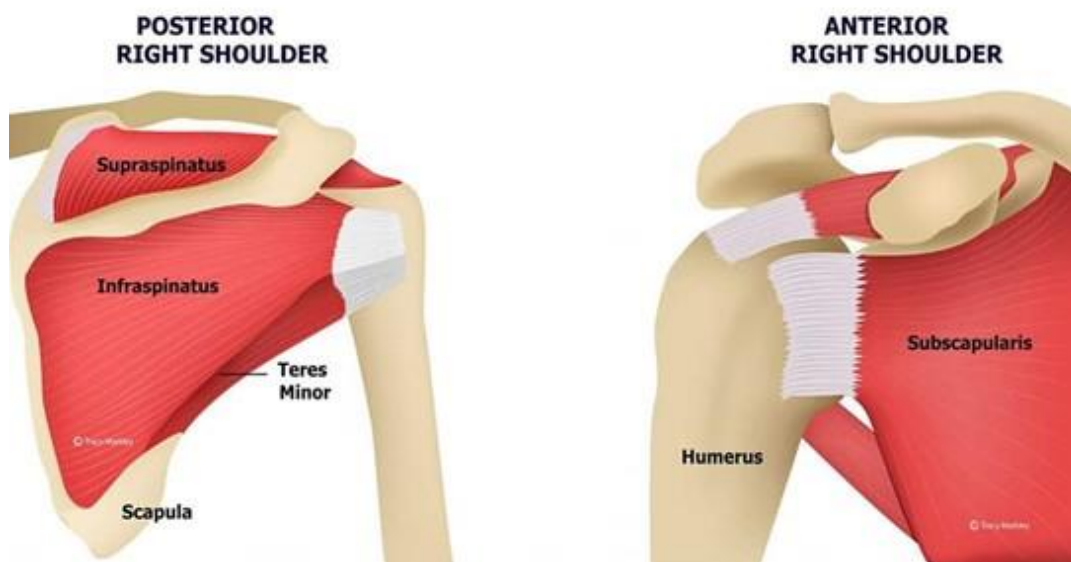


Notice in the above illustration that the glutes, latissimus dorsi, and trapezius connect into the thoracolumbar fascia.

Upper body Shoulders, Chest, And Arms

Rotator Cuff Muscles

Proper posture is necessary for the rotator cuff muscles to hold the shoulder girdle in the proper position so the ball and socket joint can move through the many ranges of motions it performs without causing injury or limitations of any movements.



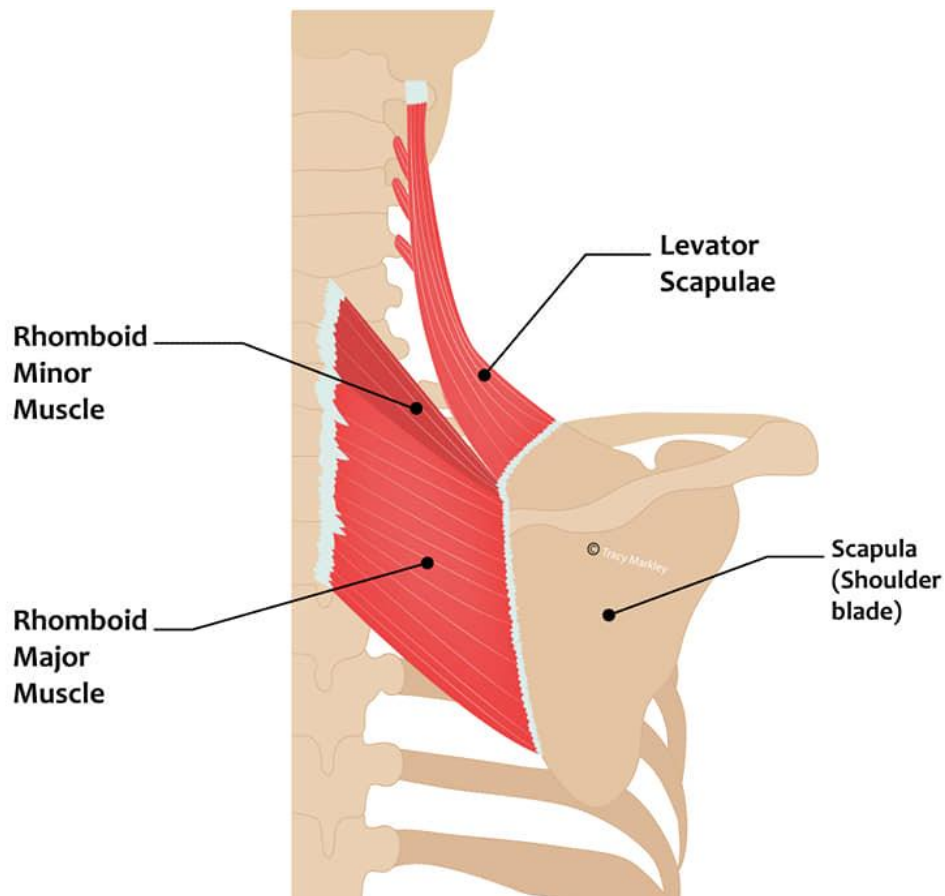
There are four muscles that make up what is known as the "rotator cuff." These four muscles work together as a team to hold the shoulder girdle properly in place so that the shoulder joint can move freely and safely. These four muscles are the **Supraspinatus**, **Infraspinatus**, **Teres Minor**, and **Subscapularis**. They work as a team, but also have their movements that they perform on their own. Poor posture and using the shoulder joint in everyday activities, including exercising in poor form in all the different modalities, will cause an injury. It is common to hear clients say they have a "rotator cuff injury" and not know which muscle or ligament it is. Many just assume it is a cuff and don't understand that there are four muscles creating the so-called "cuff."

Supraspinatus attaches at the scapula and the humerus. It abducts the humerus.

Infraspinatus attaches at the scapula and the humerus. It extends and rotates the humerus outward.

Teres Minor attaches at the scapula and the humerus. It extends and rotates the humerus outward.

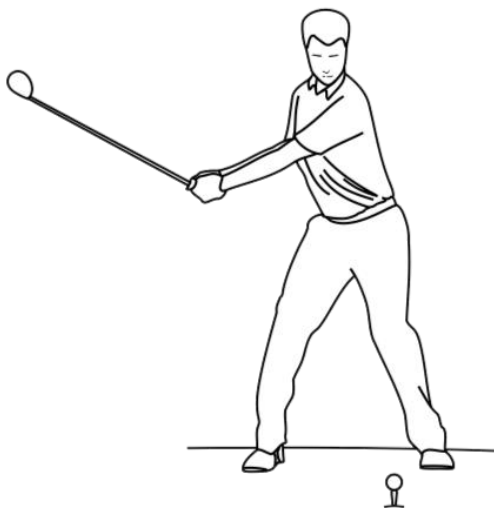
Subscapularis attaches at the scapula and the humerus. It adducts and rotates the humerus inward.



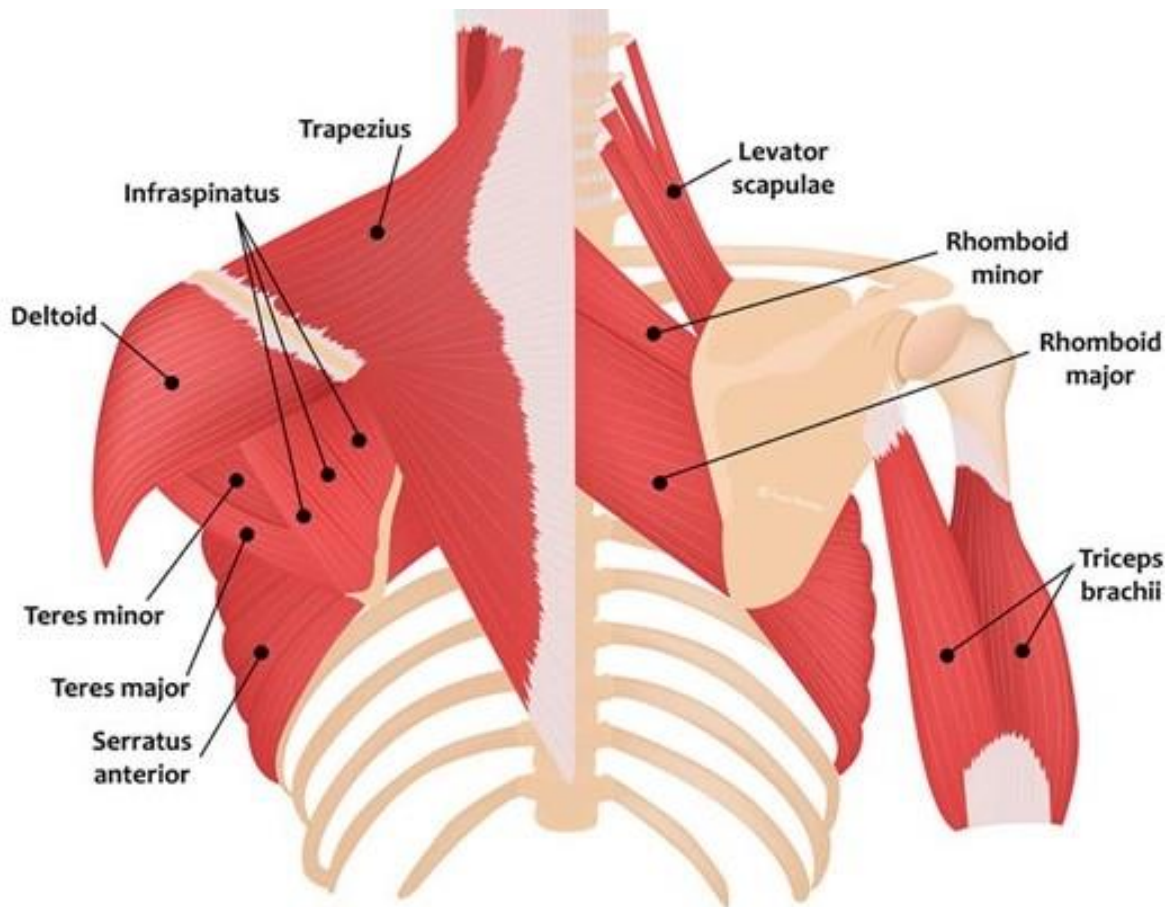
Rhomboid Major attaches at the scapula and the spine at the cervical vertebra (neck). It rotates inward and adducts the scapula.

Rhomboid Minor attaches at the scapula and the spine. It rotates inward and adducts the scapula.

Levator Scapulae attaches at the scapula and the top 4 cervical vertebrae spine. It rotates inward and adducts the scapula. It abducts and adducts the spine. Levator means elevator.

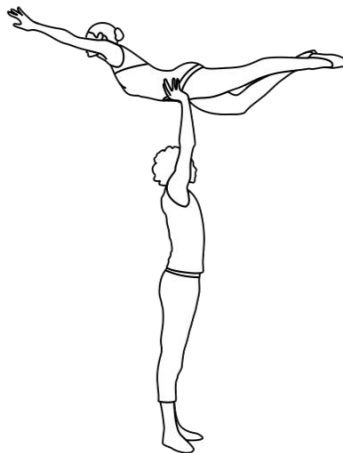


The golfer will abduct his left humerus to hit the ball.



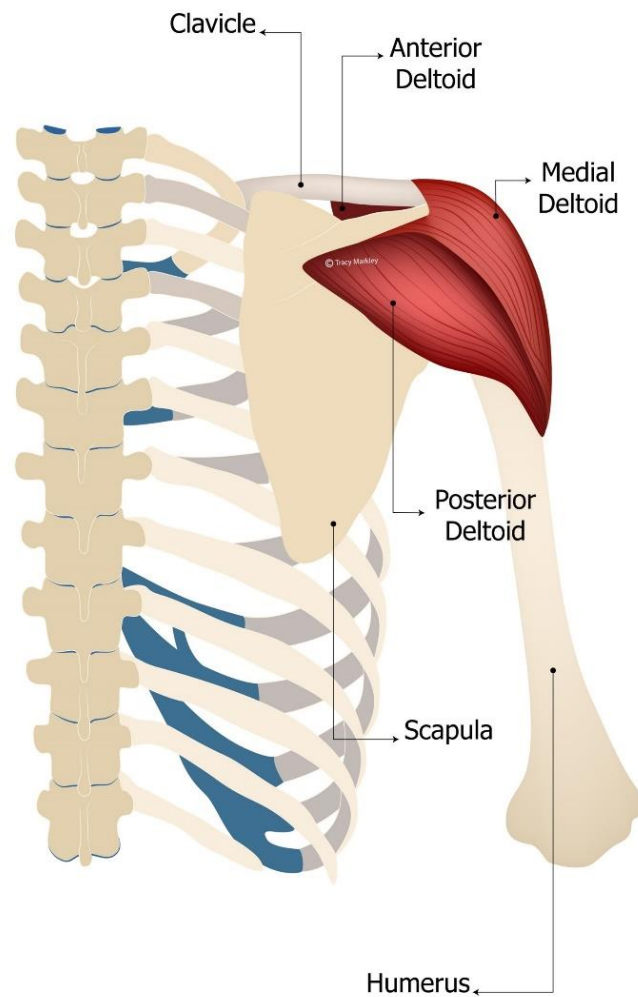
Teres Major attaches at the scapula and the humerus. It extends, adducts, and rotates the humerus inward. The humerus is the upper arm bone.

The **Teres Minor** is one of the four rotator cuff muscles. It attaches at the scapula and to the humerus. It extends and rotates the humerus outward. The scapula is the shoulder blade.



The lower dancer is abducting his scapula. The dancer above is rotating inward her scapula.

Deltoids

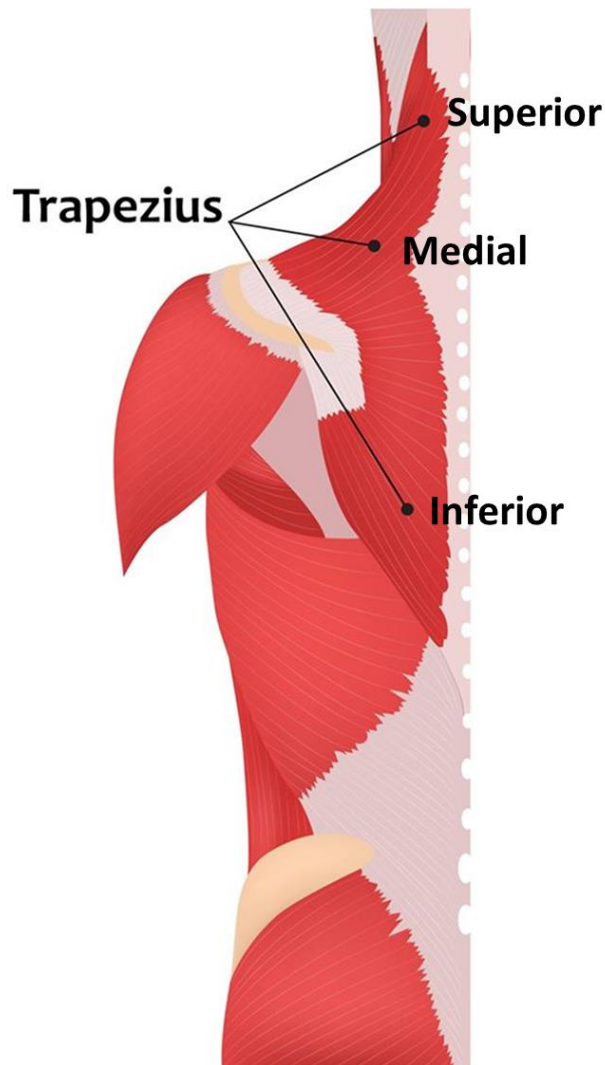


Anterior Deltoid attaches to the clavicle and the humerus. It flexes, abducts, and rotates the humerus inward.

Medial Deltoid attaches at the scapula and the humerus. It abducts the humerus.

Posterior Deltoid attaches at the scapula and the humerus. It extends, abducts, and rotates the humerus outward.

Trapezius



Trapezius adducts the scapula, tilts the head and chin, draws back acromion and rotates the scapula.

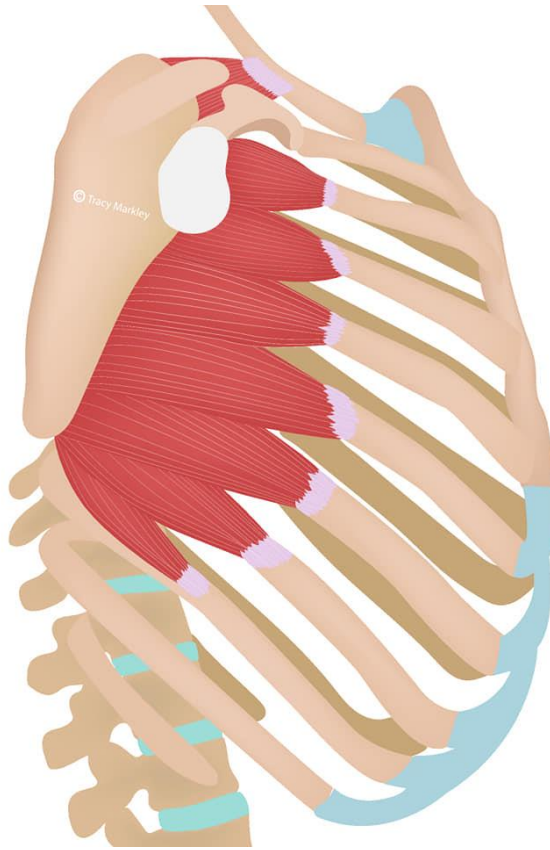
The **Trapezius** muscles are in three sections—the **superior, medial, and inferior**. Superior means above. Medial means middle. Inferior means lower.

The **Superior Trapezius** attaches to the scapula, the skull, and the vertebrae. It abducts the scapula.

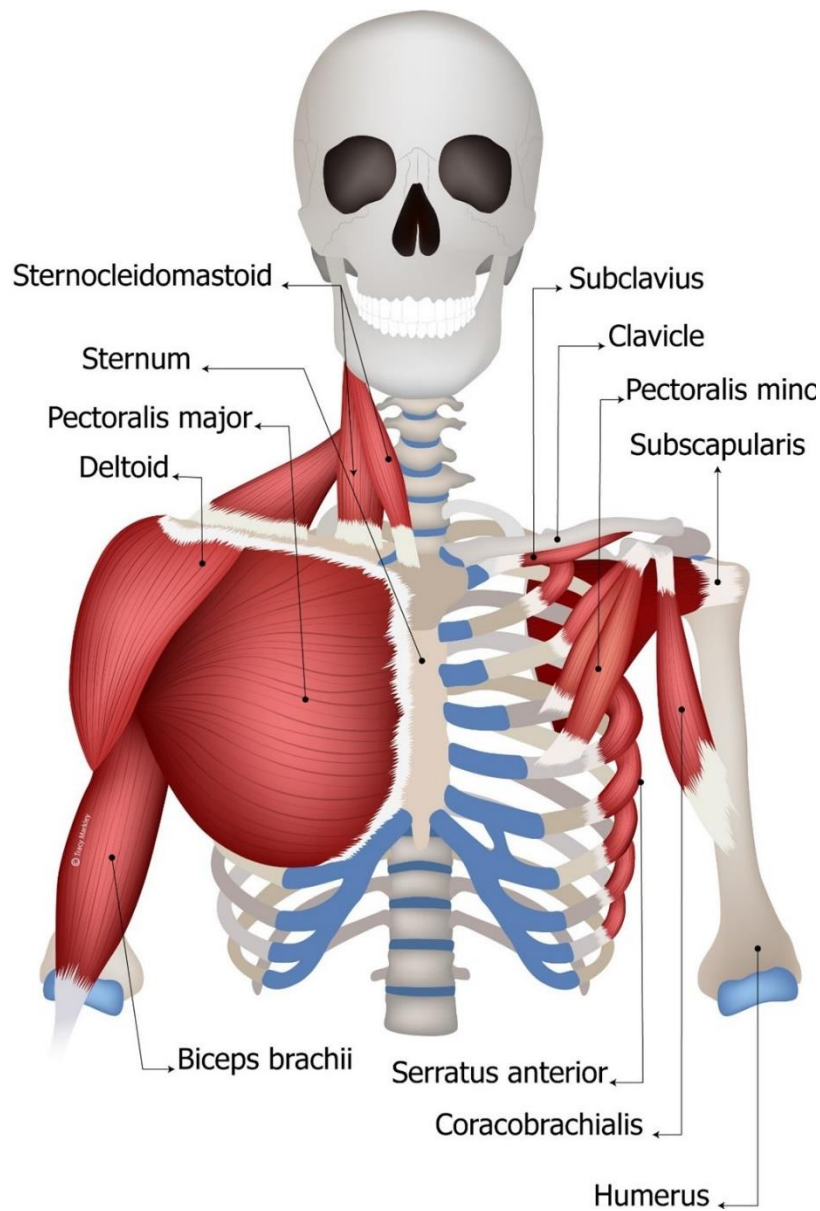
The **Medial trapezius** attaches horizontally from the scapula to the vertebrae. It abducts and inwardly rotates the scapula.

The **Inferior trapezius** attaches to the scapula and the vertebrae below. It abducts and inwardly rotates the scapula.

Serratus Anterior



Serratus Anterior attaches at the scapula and to ribs 1 through 9, and it rotates the scapula outward.



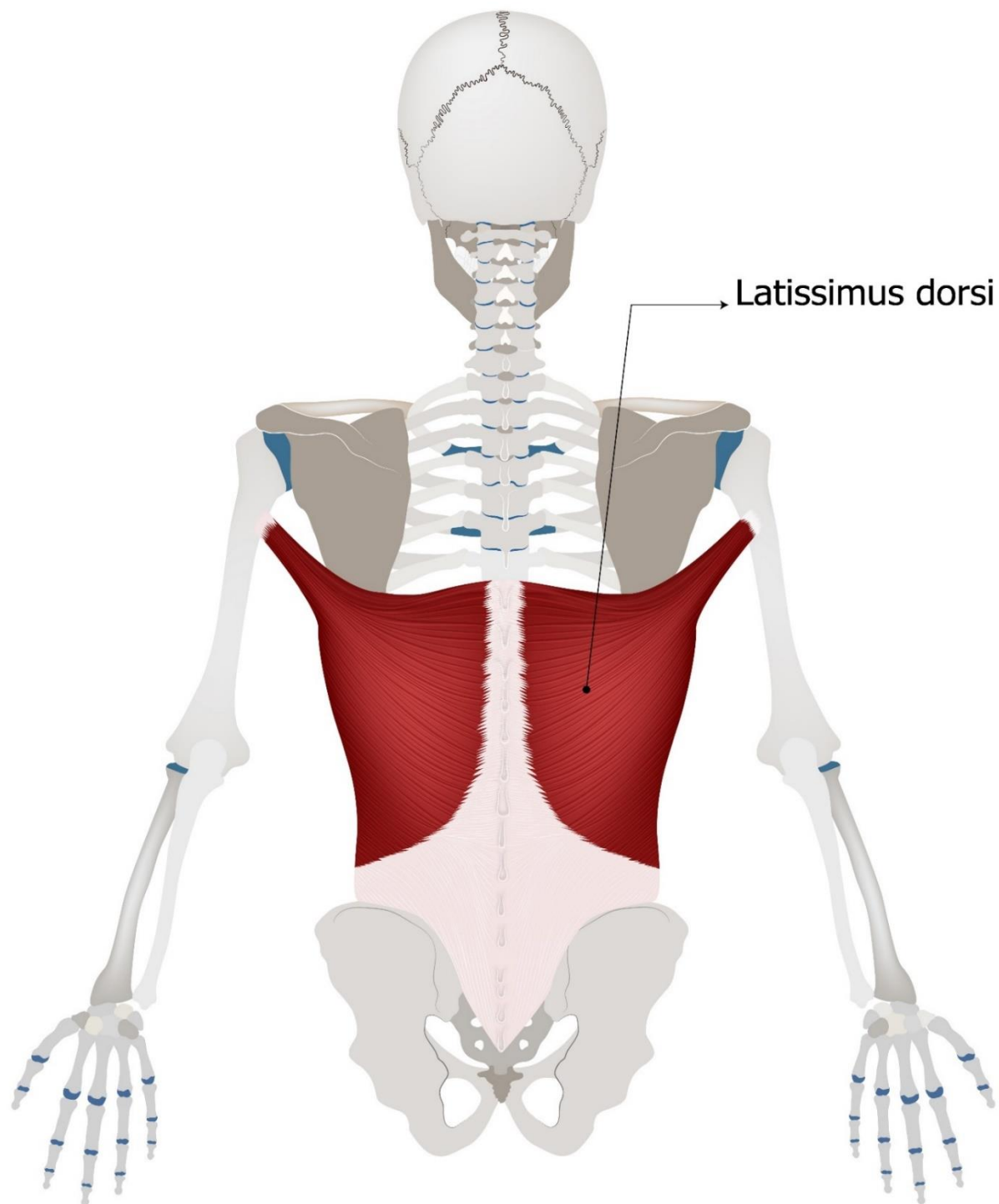
Sternocleidomastoid attaches from the mastoid process of the skull to the sternum and to the clavicle. It flexes, abducts, adducts, and rotates the spine.

Subclavius attaches to the clavicle and to rib 1. It adducts the clavicle.

Pectoralis major attaches from the fascial sheath, sternum, clavicle, and humerus. It flexes, adducts, and rotates the humerus inward.

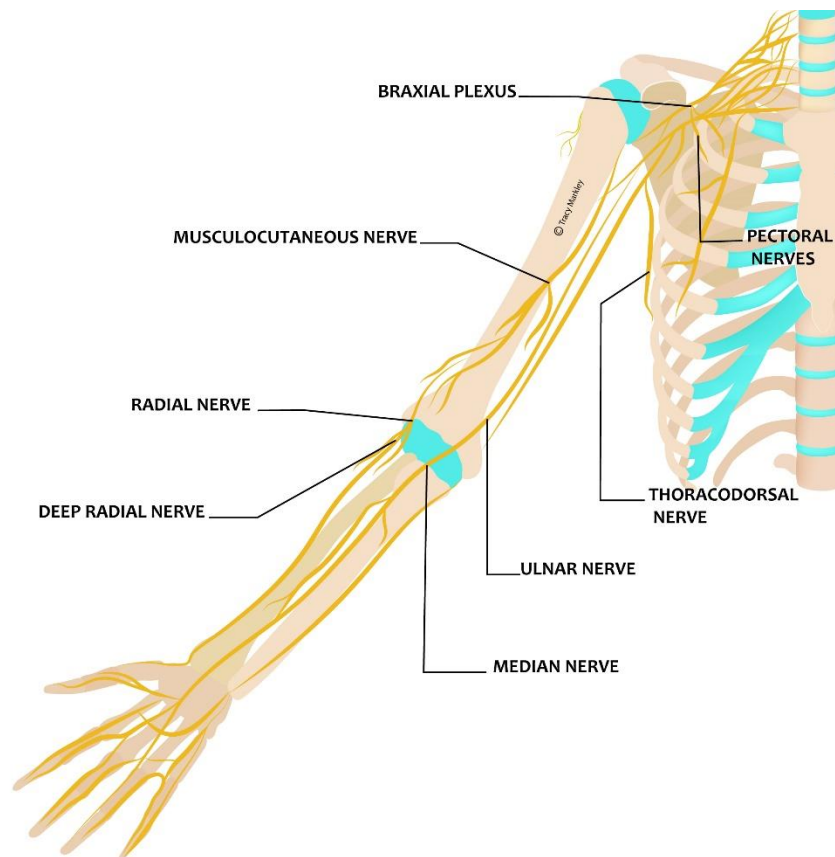
Pectoralis Minor attaches to the scapula and to ribs 3, 4, and 5 below. It adducts and rotates the scapula outward

Coracobrachialis This muscle is a joint muscle. It attaches at the humerus and the front of the shoulder joint on the scapula. It flexes the humerus.



The latissimus dorsi helps bring the arm back down, helps pull the body up, like when we are climbing a tree and performing pullups.

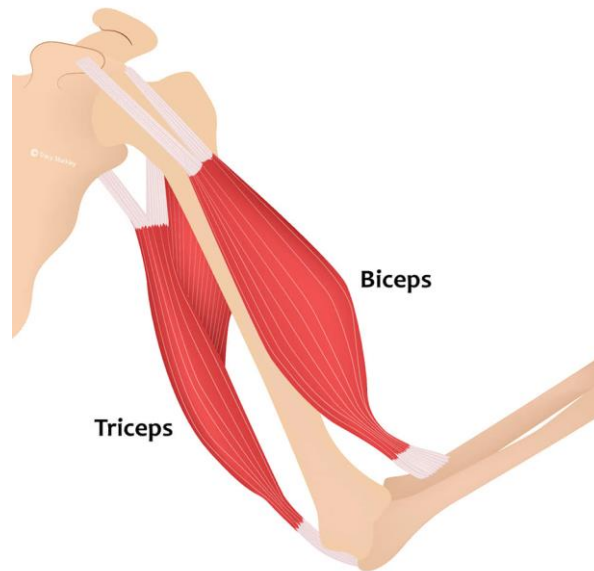
Brachial Plexus Nerve



The **brachial plexus** is the network of nerves that send signals from the spinal cord to the shoulder, arm, and hand. There are 5 terminal branches of the brachial plexus nerve. They are the *Musculocutaneous*, *median*, *ulna*, *radial*, and *axillary* (not shown here) nerve.

This illustration is shared to show the nerves that communicate to arm and hand movement and that it begins in the neck and high upper back area. This is another reason proper posture is essential.

Biceps and Triceps



Biceps flex the forearm.

Flexing the forearm is merely bending the elbow.

Biceps: “Bi” means two. The Biceps muscle has two heads

Biceps brachii long head attaches at the scapula and radius.

It flexes the forearm. (Bends the elbow)

Biceps brachii short head attaches at the humerus, scapula, and radius.

It flexes the humerus. (Bends the elbow)

The forearm bones are the **radius** (larger bone) and the **ulna**.

Triceps extends the forearm.

Extending the forearm is merely unbending the elbow and straightening the arm.

Triceps: “Tri” means three. The **Triceps** muscle has three heads.

Medial head of the triceps brachii attaches from the humerus to the ulna.

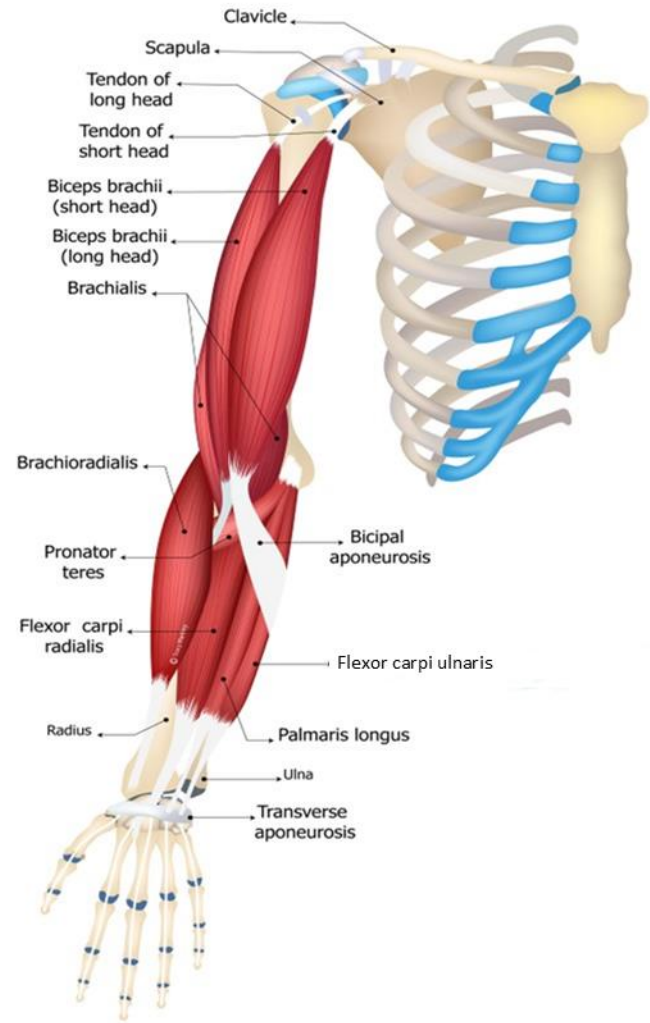
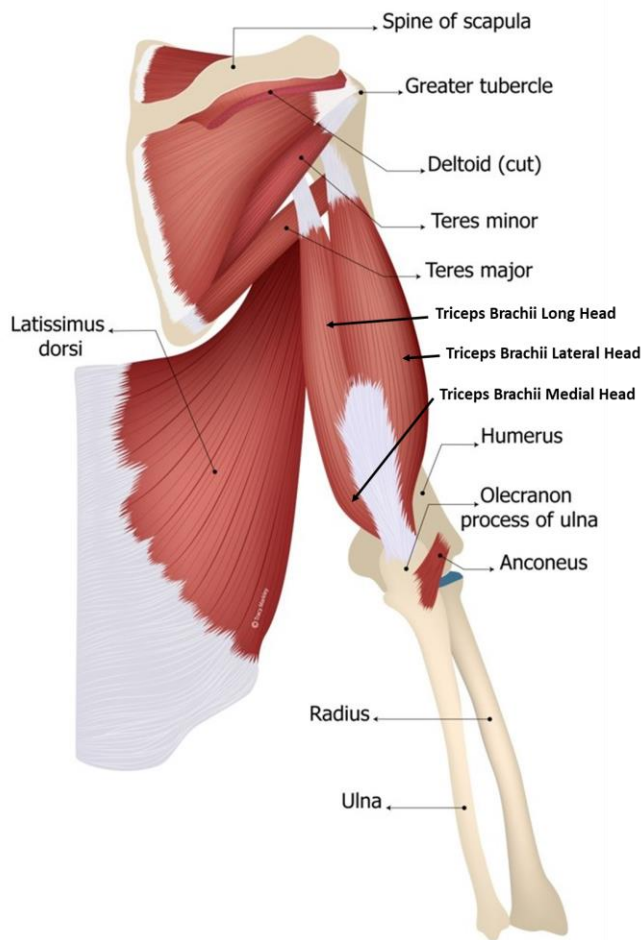
It extends the forearm.

Lateral head of the triceps brachii attaches from the humerus to the ulna.

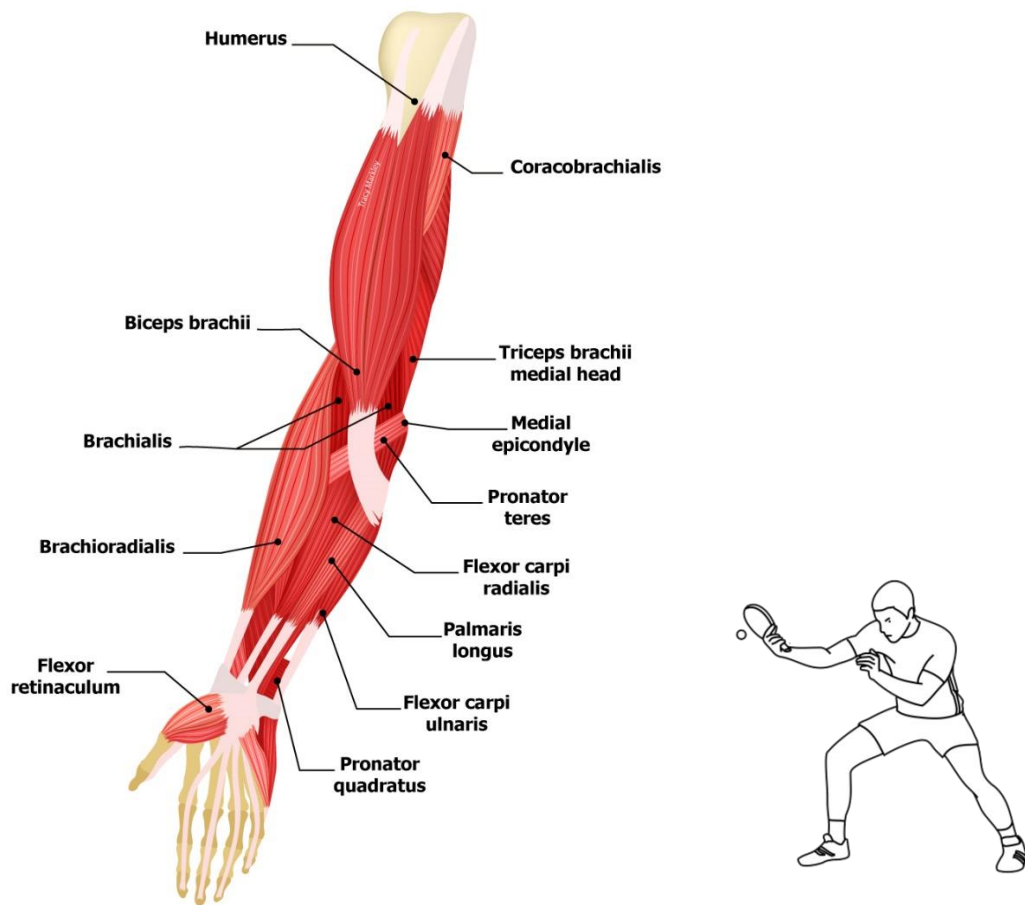
It extends the forearm.

Long head of the triceps brachii attaches from the scapula to the ulna.

It extends the forearm (Straightens the elbow/arm).



The above illustrations show many muscles. They also show the two heads of the bicep and the three heads of the triceps.



The table tennis player is extending and abducting the hand as he makes a backhand slam.

Brachioradialis attaches to the humerus and the radius. It flexes the forearm.

Brachialis attaches to the humerus and the ulna. It flexes the forearm.

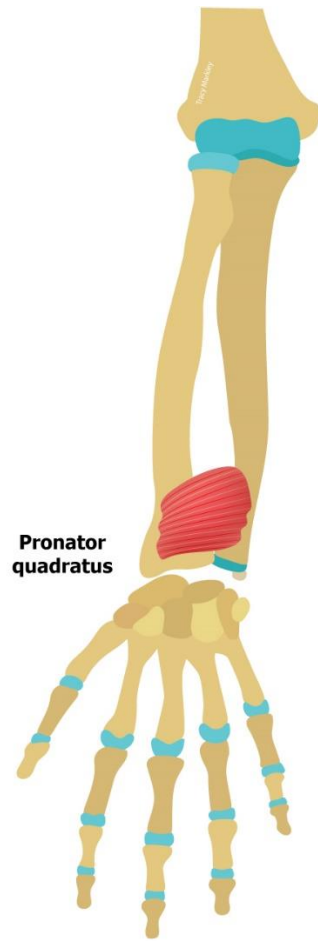
Pronator teres attaches to the radius and the ulna. It rotates the forearm inward (pronates). When the radius is parallel to the ulna in position this muscle can pull the radius to cross over the ulna.

Flexor Carpi radialis attaches to the humerus and the base of metacarpal 2. It flexes and abducts the hand.

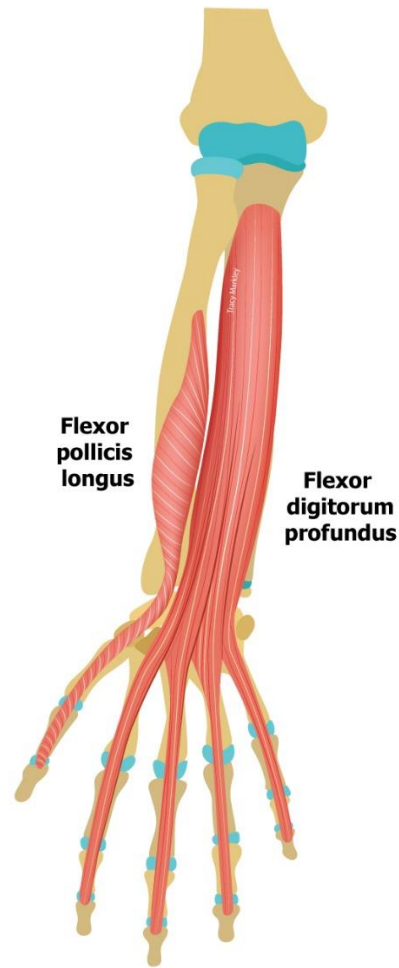
Palmaris longus attaches to the humerus and the palmar aponeurosis (connective tissue). It flexes the hand.

Flexor carpi ulnaris attaches to the humerus and the base of metacarpal 5. It extends and adducts the hand.

Pronator quadratus attaches to the radius and the ulna. It rotates the forearm inward (pronates). When the radius is parallel to the ulna in position this muscle can pull the radius to cross over the ulna.



Pronator quadratus



Flexor pollicis longus

Flexor digitorum profundus

Pronator quadratus attaches to the radius and ulna. It helps the radius to cross over the ulna. It also rotates the forearm inward.

Did you know the word “quadratus” means square?

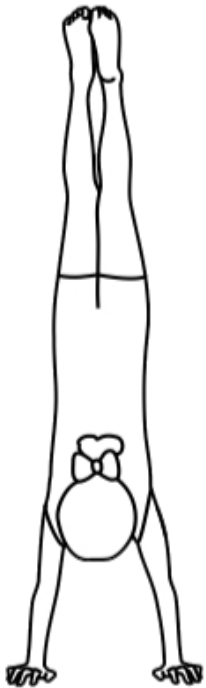
Flexor pollicis longus attaches to the radius and the thumb. It flexes the thumb.

Flexor digitorum profundus attaches at the ulna to the four fingers (not the thumb). It flexes the fingers (not the thumb).

Did you know the word “profundus” means deep?



As the bowler is putting a spin on the ball he is inward rotating the forearm.

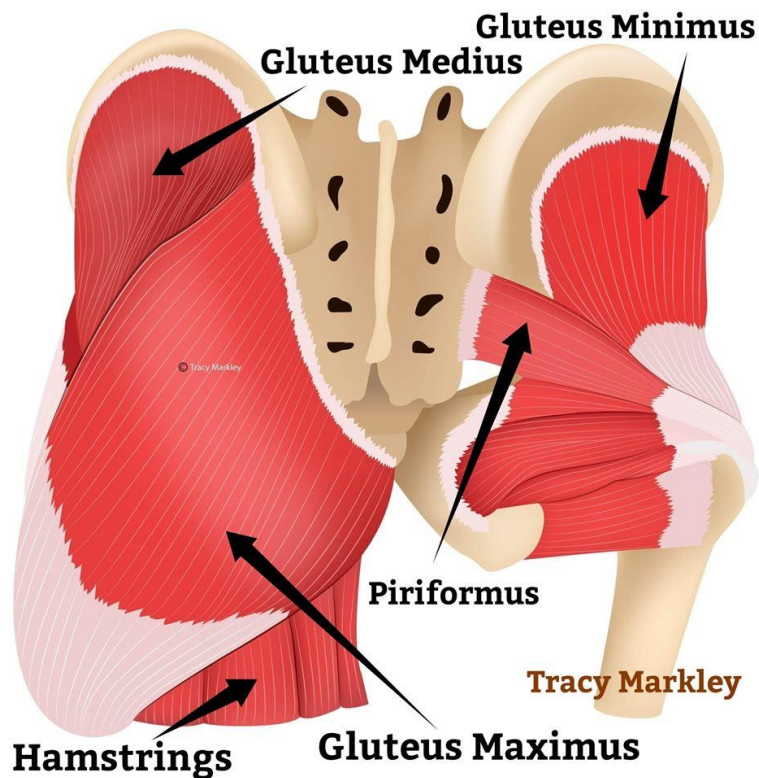


This girl is extending her forearms to perform her handstand.



To block the ball from going into the net, the basketball player without the ball is extending the four lesser fingers to try to block it. His feet are also extending as he jumps high to make the block.

The Hips And Legs



Gluteus Maximus attaches at the ilium and sacrum and to the femur. It extends and rotates the femur outward.

Gluteus Medius attaches at the ilium and to the femur. It abducts and rotates the femur inward.

Gluteus Minimus attaches at the ilium and to the femur. It abducts and rotates the femur inward.

Piriformis attaches at the ischium and the sacrum and to the femur. It rotates the femur outward. (See next illustration)

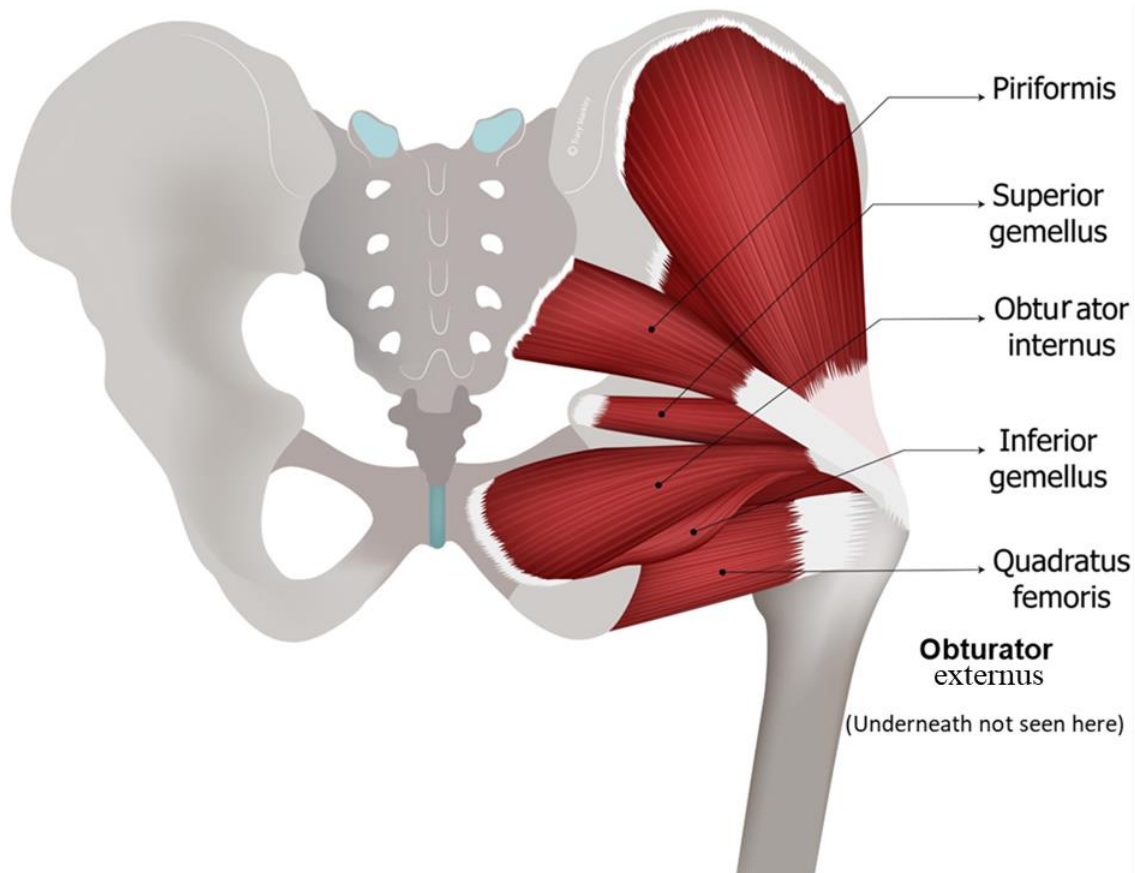
In the gluteus illustration, you will see the large glute muscle and the smaller muscles that are underneath. The large glute muscle extends the femur, which is the backswing of the leg while walking. It also rotates the femur outward. The smaller group of muscles work together to rotate the femur outward. The femur is the large upper leg bone.

We have a **gluteus maximus**, **medius**, and **minimus**. The **gluteus maximus** extends the femur and rotates it outward while the **gluteus medius** and **minimus** abducts and rotates the femur inward.

The glute muscles are immensely powerful. In walking, they complete the backward movement of the step. When someone has “saggy butt,” meaning, weak, non-toned, or non-strengthened glutes, this shows that the glute muscles are not performing their primary function in walking.

If the spine and back muscles are weak and there is poor posture, the hips and pelvic will not be strong and stable enough to allow these muscles and other muscles like the **piriformis** and the other hip rotator muscles that you see in this illustration to work properly. This leaves the spine and back muscles to try to assist in these muscles’ jobs, leaving the body trying to function and move out of balance, causing pain, weakness, and injury in the back as well as hips, knees, and ankles. Therefore, posture is essential.

6 outward rotators



Piriformis attaches at the ischium and the sacrum and to the femur. It rotates the femur outward.

Superior gemellus attaches at the ischium and the sacrum and to the femur. It rotates the femur outward.

Obturator internus attaches at the ischium and the sacrum and to the femur. It rotates the femur outward.

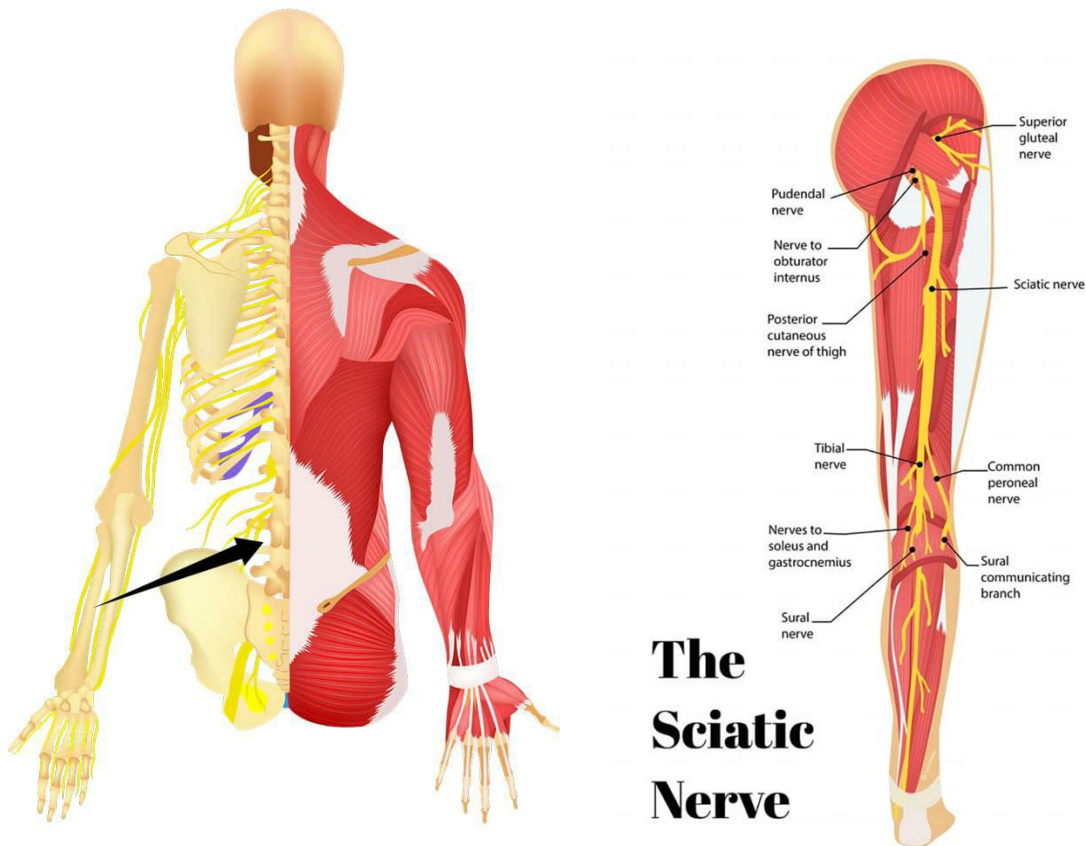
Obturator externus attaches at the ischium and the sacrum and to the femur. It rotates the femur outward.

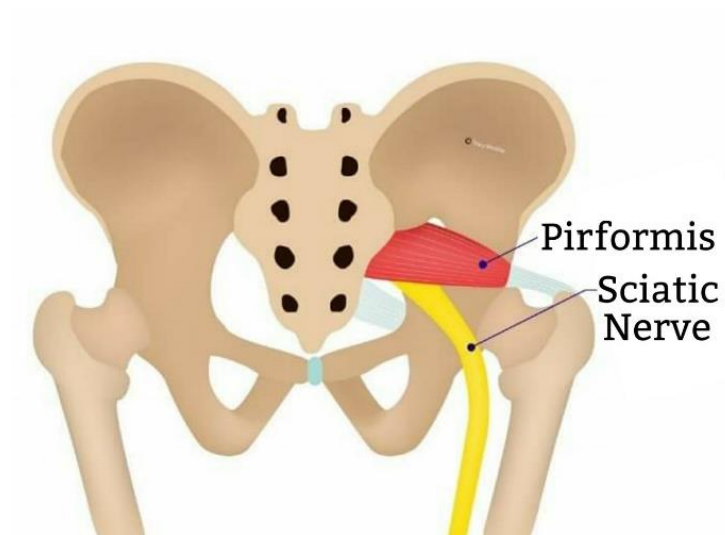
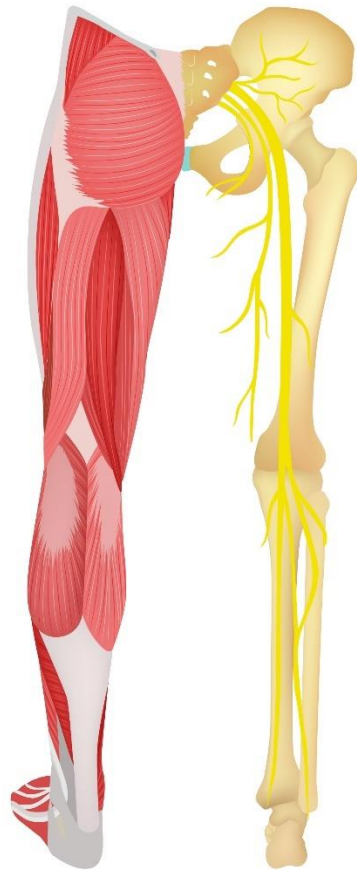
Inferior gemellus attaches at the ischium and the sacrum and to the femur. It rotates the femur outward.

Quadratus femoris attaches at the ischium and the sacrum and to the femur. It rotates the femur outward.

The Sciatic Nerve

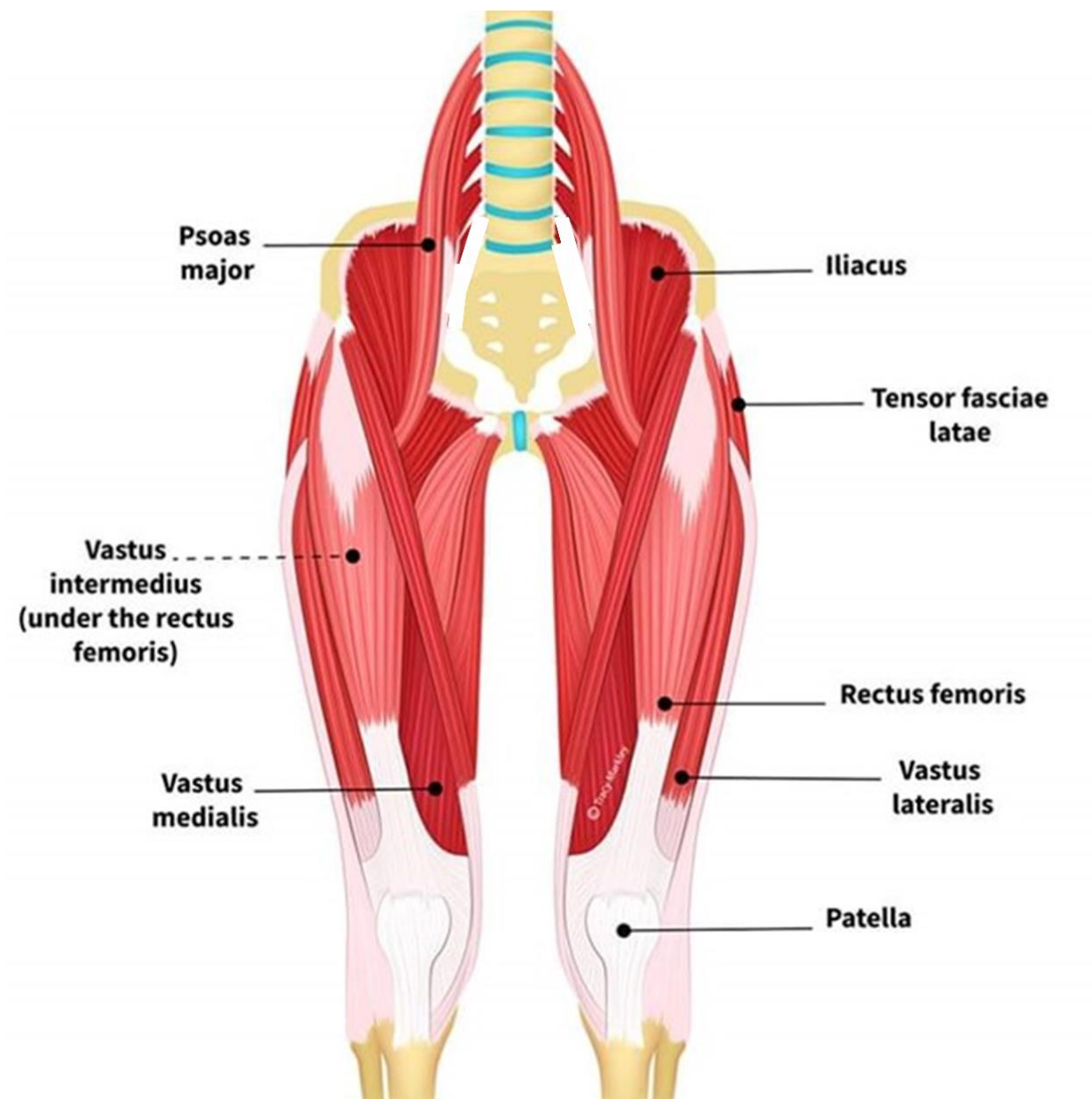
As trainers and therapist when we hear “sciatic nerve” we instantly think pain. Although the sciatic nerve is the largest single nerve in the body, it is made up of five nerves. It is found on the right and left side of the lower spine by the fourth and fifth lumbar nerves and the first three nerves in the sacral spine. At the largest part of the nerve, it is as big as a male thumb. The five nerves group together on the front of the piriformis muscles and become one large nerve, known as the sciatic nerve. This nerve supplies sensation and strength to the leg and the reflexes of the leg. It connects the spinal cord with the outside of the thigh, the hamstring muscles and the muscles of the lower leg and feet. It provides motor and sensory functions to regions of the leg and foot. When the sciatic nerve is impaired, it can lead to muscle weakness and/or numbness and tingling in the leg, ankle, foot, and toes. The sciatic nerve and its nerve branches enable movement and feeling in the thigh, knee, calf, ankle, foot, and toes.





This illustration is showing how close the piriformis muscles and the sciatica nerve are to one another.

The Quadriceps



There are four quadriceps muscles. They are the **vastus intermedius**, **rectus femoris**, **vastus medialis**, and the **vastus lateralis**.

They are muscles of the front of the thigh. *The quadriceps help raise and push forward the thigh and leg while walking.*

Rectus femoris attaches at the ilium and to the tibia through its attachment at the patella. It extends the foreleg.

Vastus intermedius attaches to the femur and the tibia through its attachment at the patella. It extends the foreleg.

Vastus medialis attaches to the femur and the tibia through its attachment at the patella. It extends the foreleg.

Vastus lateralis attaches to the femur and the tibia through its attachment at the patella. It extends the foreleg.

Sartorius attaches at the ilium and crosses over the medial side of the thigh behind the knee, then attach at the tibia. It flexes the foreleg. It is also in the group of hip flexor muscles. This is the longest muscle on the body.

Tensor Fasciae Latae attaches to the ilium, patella, and tibia. It flexes and abducts the femur.

Tibia: is one of the two lower leg bones. The other is the **Fibula**. The **Tibia** is the larger of these two bones

Fibula: is one of the two lower leg bones. The other is the **Tibia**. The **Fibula** is the thinner of these two bones.

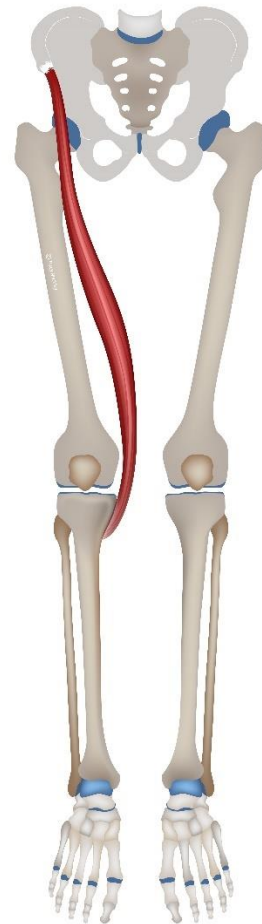
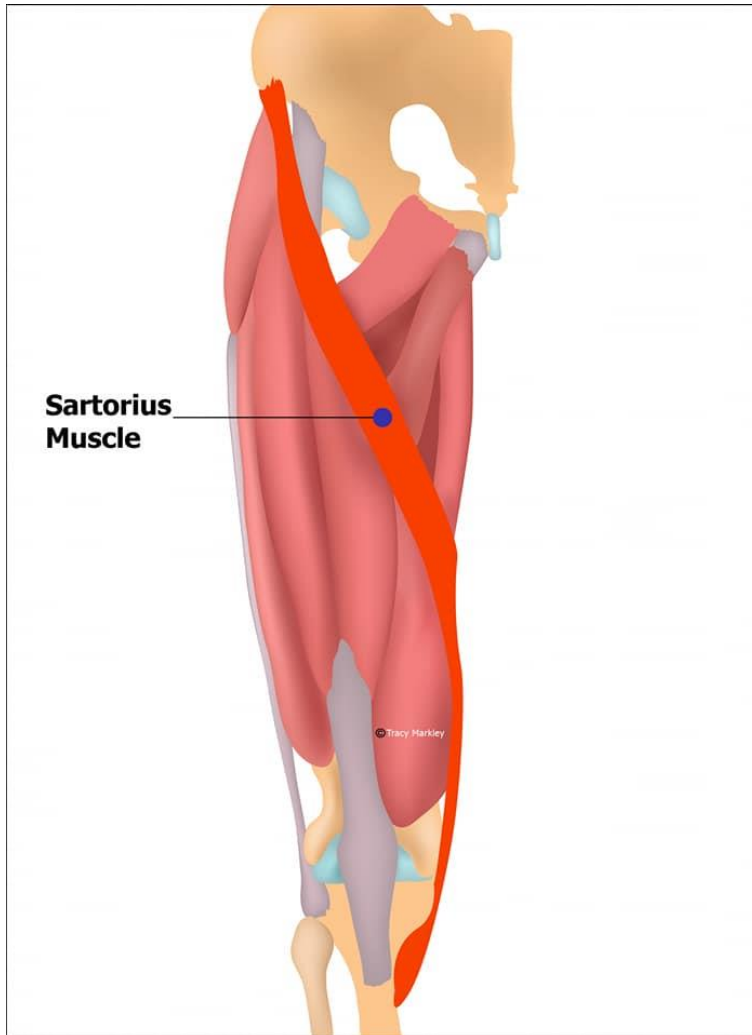
Ilium: is the largest part of the hip bone and the upper part of the hip bone.

Ischium: is the posterior/inferior area of the hip bone. It supports the body while sitting.

Quadriceps: means four heads.

Patella is the kneecap bone.

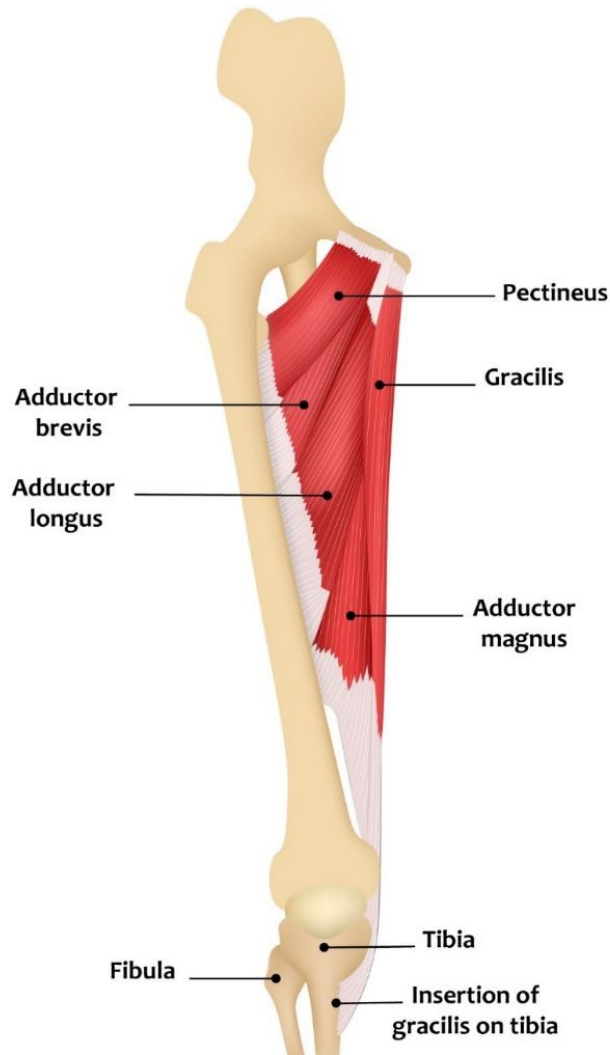
Sartorius



The **Sartorius** is the longest muscle in the body.

It attaches to the front of the ilium, crosses over the medial side of the thigh, and from the knee to the front of the tibia. Although it is an anterior muscle, it inserts into the tibia from behind the knee, and it flexes the foreleg. It also flexes, abducts, and laterally rotates the thigh at the hip. The **sartorius** helps to lift the leg in taking steps while walking.

Adductors of the Femur/thigh



Pectineus attaches to the pubis and to the femur. It flexes the femur.

Gracilis Attaches to the pubic bone and goes behind the knee and then attaches to the front of the tibia. It adducts the hip, flexes the knee, and flexes the foreleg.

Adductor Magnus attaches to the pubis, ischium, and the back of the femur.

Adductor Brevis attaches to the pubis and femur. It adducts the femur.

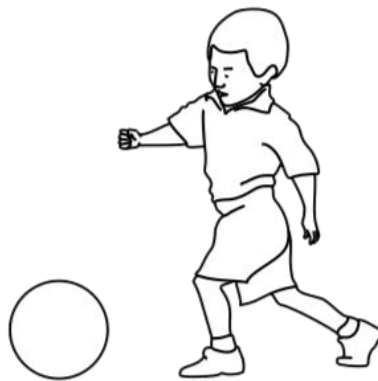
Adductor Longus attaches to the pubis and the femur. It adducts the femur.

Adductor Minimus (NOT shown in illustration) It attaches to the pubis and the femur and adducts the femur.

All adductor muscles in the thighs pull the femur toward the middle of the body when walking. This helps stabilize and maintain balance.

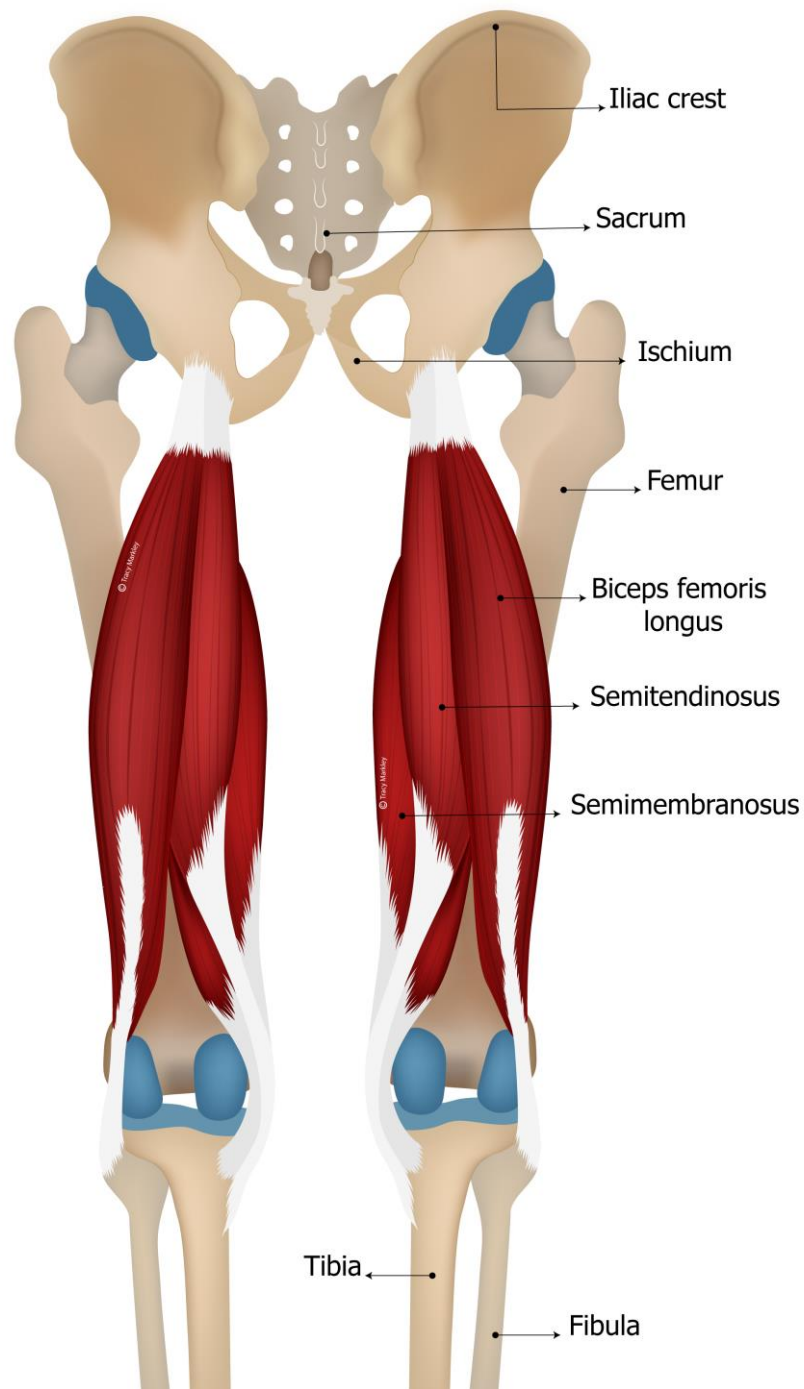


The adductors of the femur are also a group of muscles that are activated when a squat is performed. These adductor muscles help hold the femur and knees stable. This also helps the ankles stay supported.



The thigh adductors are also activated while this young boy plays soccer. His left leg is being held stable, so the knee stays stable in place and the thigh stays solid and supportive as he prepares and kicks the ball with his right foot.

Hamstring muscles



The hamstrings are on the back of the legs. They move the leg backward in walking steps. When the glutes are weak, the back and/or the hamstrings will try to do the glutes' job. This causes and maintains imbalances and injury.

Biceps Femoris: This muscle has a *long head* and a *short head*.

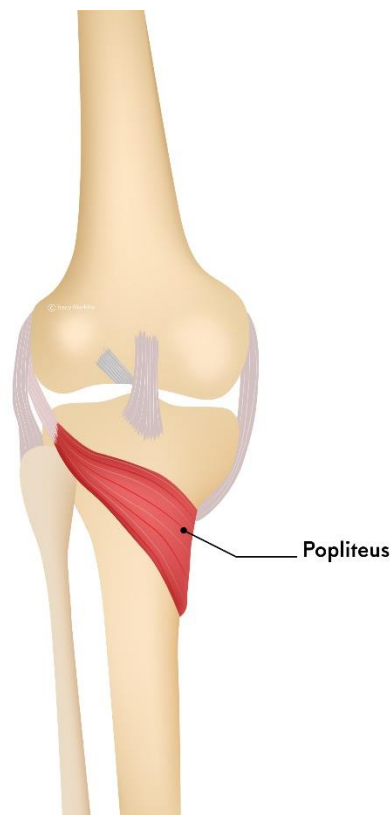
Short head: attaches to the back of the femur and the fibula. It flexes the foreleg (lower part of the leg) and rotates the foreleg outward.

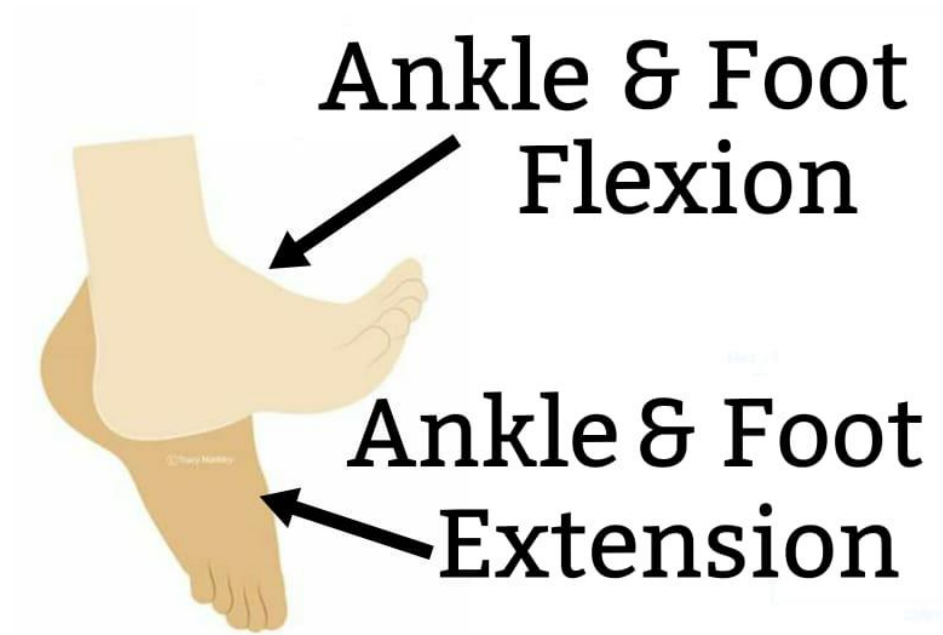
Long head: attaches to the ischium and the fibula. It flexes the foreleg (lower part of the leg) and rotates the foreleg outward.

Semimembranosus attaches to the ischium and the tibia. It flexes the foreleg (lower part of the leg) and rotates the foreleg inward.

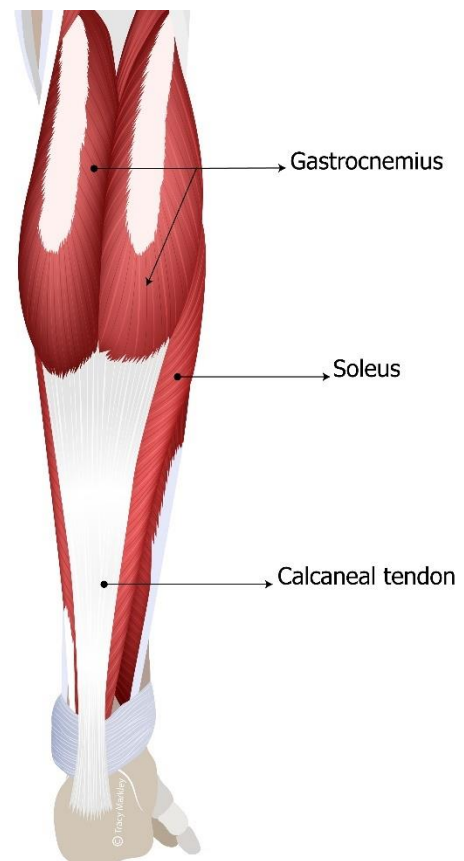
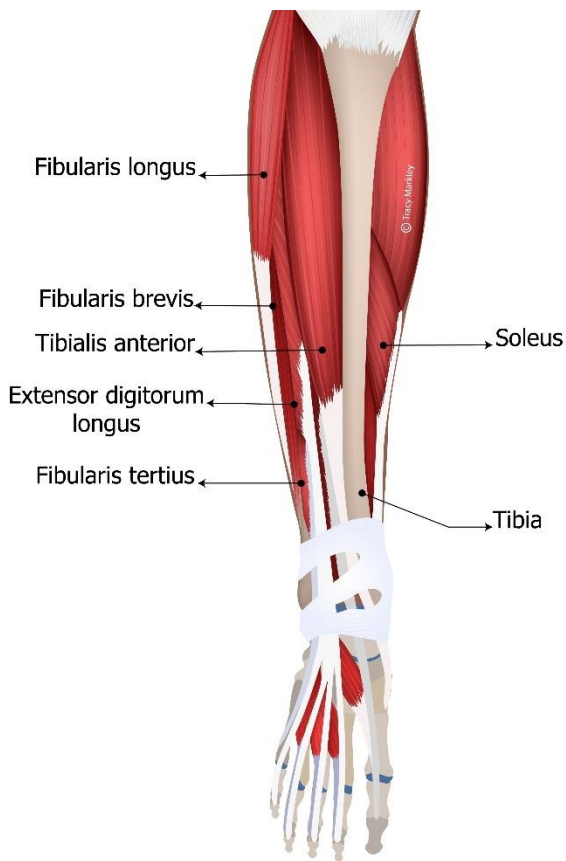
Semitendinosus attaches at the ischium and the tibia. It flexes the foreleg (lower part of the leg) and rotates the foreleg inward.

Popliteus: This is a small muscle. It attaches to the femur and the tibia. It flexes the foreleg (lower part of the leg) and internal rotation of the knee joint. This muscle unlocks the knee joint, bringing it from a straight position by helping to bend the leg at the knee joint, which is important for walking.





No old shoes or loose sloppy shoe tongues and laces. The feet and ankles need to be in a stable position. Unstable and unsupported shoes will affect feet, ankles, knees, hips, back and posture.



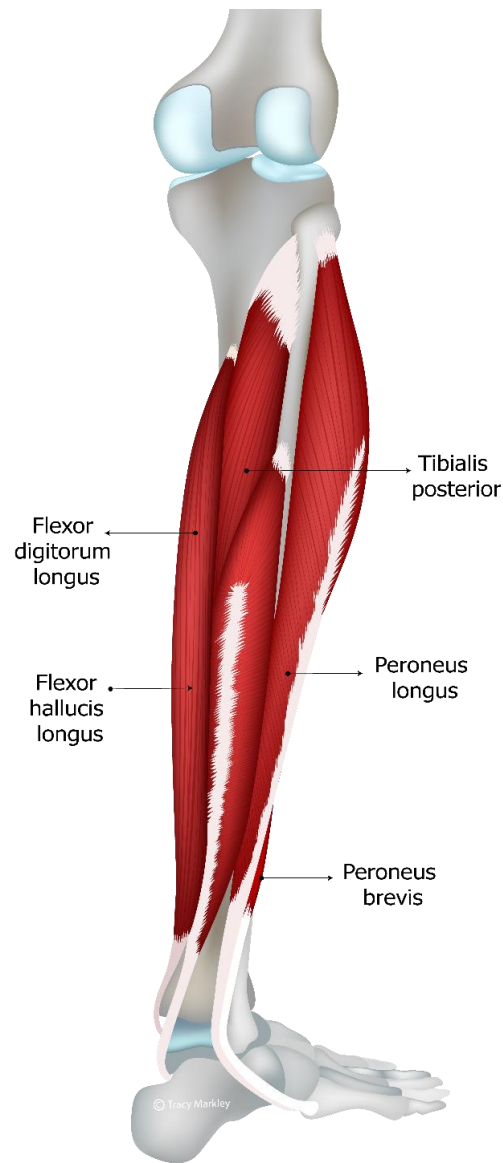
Soleus attaches to the back of the tibia and the back of the calcaneus. It extends the ankle and foot.

Gastrocnemius attaches to the back of the femur and the back of the calcaneus. It extends the ankle and foot.

Calcaneus: The heel bone.

Malleolus: A bony part on the side of the ankle

Plantaris attaches to the back of the femur and the back of the calcaneus. It extends the ankle and foot. This muscle is not shown in the illustrations.



Fibularis Longus attaches to the fibula, 1st cuneiform and 1st metatarsal. It performs plantar flexion and eversion of the foot.

Fibularis Brevis attaches to the fibula, median cuneiform, and 1st metatarsal. It performs plantar flexion and eversion of the foot at the ankle joint. It performs eversion of the foot.

Fibularis Tertius attaches to the fibula and the 5th metatarsal. It performs dorsiflexion and eversion.

Flexor Hallucis Longus attaches to the back of the fibula and goes behind the ankle and under the foot to the end of the big toe. This toe is known as the toe number one. It extends the ankle and foot.

Flexor Digitorum Longus attaches to the back of the tibia and goes behind the ankle and under the foot to the end of four of the five toes. It does not attach to the big toe. It extends the ankle and foot.

Tibialis Posterior attaches to the back of the tibia and goes behind the **malleolus** and under the foot to the three middle metatarsals. It extends and adducts the foot.

Peroneus Longus attaches to the **fibula** and goes behind the malleolus and under the foot to the base of the big toe. It extends and abducts the foot.

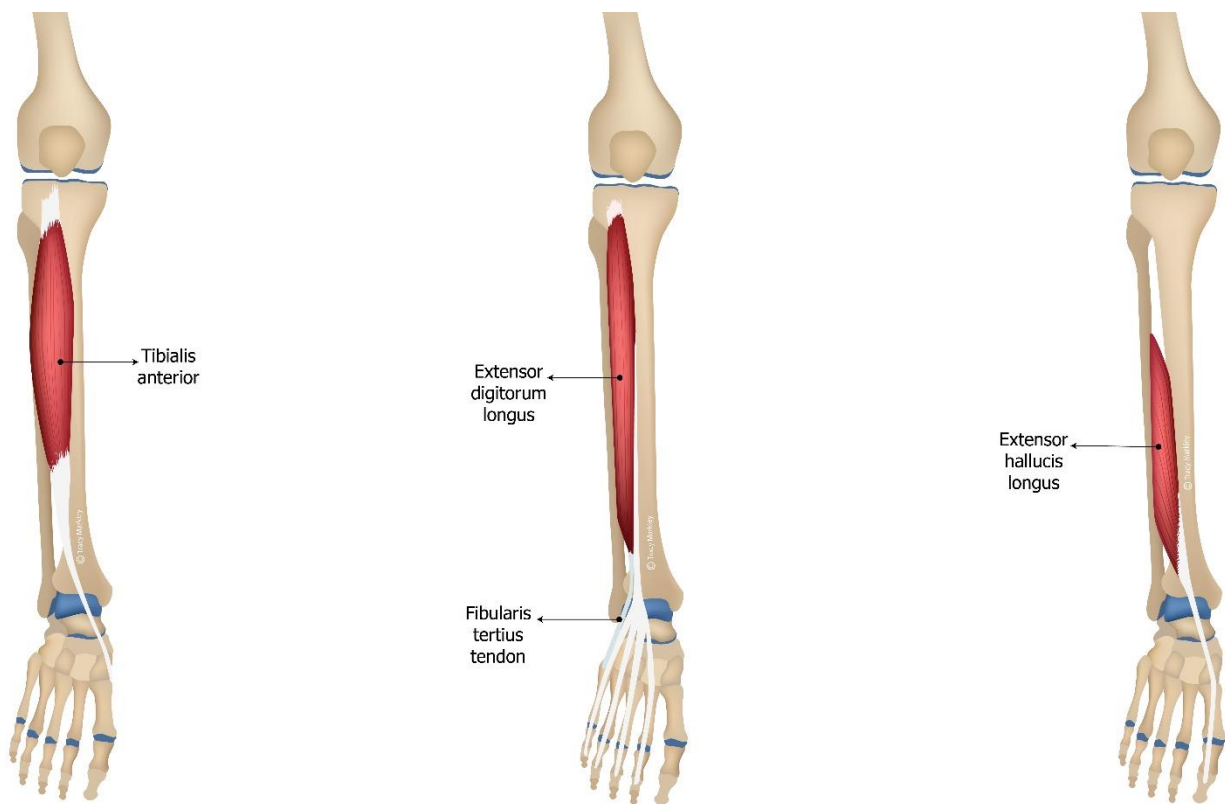
Peroneus Brevis attaches to the fibula and goes behind the malleolus to the base of the pinky toe. It extends and abducts the foot.

Extension of the ankle and foot is when we stand on our tiptoes. It is also the position when we are sitting down and pointing the toes away from the body.

Flexion of the ankle and foot is when we are standing flat on our feet. It is also positing when extending the legs straight out in front of you while sitting down, pulling the toes toward the body.



As the basketball player dribbles the ball down the court he is extending and adducting his foot.



At the front of the lower leg, there are the tibialis muscles. These raise the foot as one takes a walking stride. This keeps the foot up so that it does not scrape the ground in steps. Walking and practicing walking help keep these muscles strengthened for walking. Not all lower leg muscles are shown in illustrations.

Tibialis Anterior attaches to the front of the tibia and the base of the long bone behind the big toe. This would be the metatarsal number one; it flexes and adducts the ankle and foot.

Extensor Hallucis Longus attaches to front of the fibula and the end of the big toe. It flexes the ankle and foot.

Extensor digitorum Longus attaches to the front of the fibula and the ends of the number two to five toes. It **does not** attach to the big toe. It flexes the ankle and foot.

Peroneus Tertius: attaches to the fibula and goes in front of the ankle to the base of the long bone above the little toe. It flexes and abducts the ankle and foot. (Not shown in illustration)

Helpful Definitions

Abduct When the movement is moving away from the midline of the body.

Adduct When the movement is moving toward the midline of the body.

Agonist A muscle or muscle group that is described as being primarily responsible for a specific joint movement when contracting.

Anatomy the branch of science concerned with the bodily structure of humans, animals, and other living organisms, especially as revealed by dissection and the separation of parts.

Antagonist A muscle or muscle group that counteracts or opposes the contraction of another muscle or muscle group.

Anterior Towards the front of the body.

Awareness Knowledge or perception of a situation or fact.

Bones Hard whitish tissue making up the skeleton in humans and other vertebrates.

Concentric contraction A contraction in which there is shortening of a muscle

Depression Inferior movement of the shoulder girdle, as in returning to the normal position from a shoulder shrug.

Distal Farthest from the midline of the body or point of reference.

Eccentric contraction A contraction in which there is lengthening of a muscle.

Extension A movement where two joints move farther apart.

Flexion A movement where two joints come together.

Inferior Towards the Bottom of the body (below the other)

Isometric contraction A type of contraction with little or no shortening of the muscles resulting in no appreciable change in the joint angle.

Isotonic contraction occurring which there is either shortening or lengthening in the muscle under tension. Also known as dynamic contraction. May be classified as being either concentric or eccentric.

Joint A structure in the human or animal body at which two parts of the skeletal bones are joined together.

Kinesiology The science of movement, which includes anatomical (structure) and biomechanical (mechanical) aspects of movement.

Knowledge Information, facts and skills acquired by a person through experience or education, the theoretical or practical understanding of a subject. Having awareness.

Lateral Side

Medial Middle

Posterior Towards the back of the body.

Retraction Backward movement of the shoulder girdle towards the spine, adduction of the scapula.

Superior Towards the top of the body (above the other)

Theory A supposition or a system of ideas intended to explain something.

Theory A supposition or a system of ideas intended to explain something.

About the Author

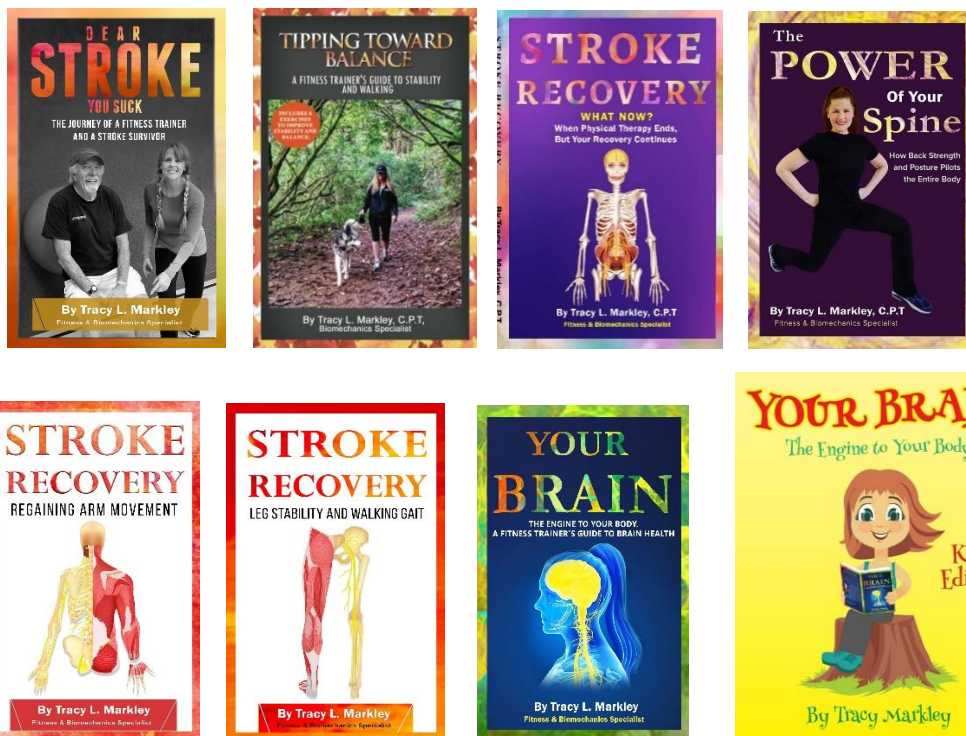


Tracy L. Markley has been working and studying in the fitness industry for over 20 years. She is the owner of Tracy's Personal Training, Pilates, and Yoga Studio in Long Beach California. She is the 2021 IDEA Personal Trainer of the Year Award recipient, and she was also one of the three finalists for 2020 IDEA Personal Trainer of the Year Award. She is a Certified Health Fitness Specialist, Personal Trainer, Dance & Group Exercise Leader, Fitness & Nutrition, Biomechanics Specialist, BOSU® Master Trainer, AFAA Group Fitness, FiTOUR Pro-Trainer, Reiki Master-Teacher, as well as a Pilates and 200 RYI, Yoga Instructor. She is the author of ten books. Her books and videos have helped stroke survivors and caregivers worldwide. Tracy is the author of nine books.

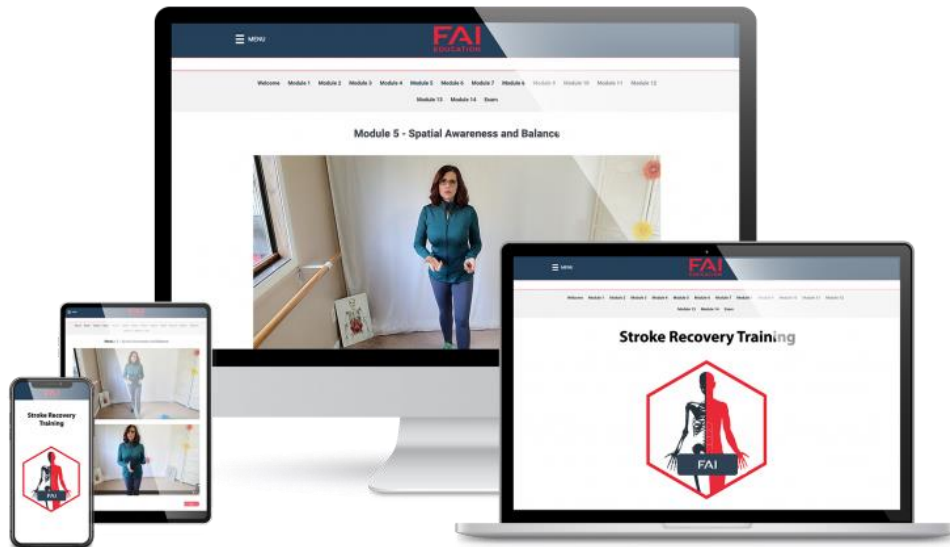
In 2020 Tracy was awarded the second place Medical Fitness Professional of the Year Award with the Medift Foundation. She received a Literary Book Award for her Children's book in 2020 as well. She has been in several magazine articles and has written fitness articles for the local newspaper in the town she lives in. She is the host of the radio show, *The Health and Fitness Show with Tracy* on KXCR FM radio on the Oregon Coast. It can also be heard at her podcast channel. Tracy is available for speaking events, book signings and training. She can be contacted at her websites www.tracymarkley.com and www.strokerecoverybooks.com

www.instagram.com/motivate_healthyfit YouTube Channel: Tracy L. Markley Fitness

Tracy's books and CEC courses.



Books can be purchased at her websites or at Amazon at www.amazon.com/author/tracymarkley



Stroke Recovery Training Course

Did you know that we have 7 million stroke survivors in the United States? Unfortunately, those stroke survivors can sometimes be met with extremely limited physical therapy options. In turn, they along with many stroke survivor caregivers are seeking out fitness professionals for help. With over 20 years in the fitness industry, Tracy Markley, CPT, has developed the Stroke Recovery Training course to bring knowledge, experience, and exercises to help fitness professionals guide a stroke survivor to a better recovery.

As a fitness provider, what will you learn? You will learn about stroke statistics, brain damage, and neuroplasticity. Additionally, you will be equipped with how to communicate and train a survivor who has spasticity, limited arm movements, foot drop, walking gait, hyperextended knees, balance challenges, aphasia, memory issues, and more. Included in the course is a large section with muscle illustrations and biomechanics of the body's movements to help you put together programs for a stroke survivor.

<https://fai.securechkout.com/stroke-recovery-course>