

Back To Chiropractic CE Seminars

Lower Extremity Adjusting ~ 4 Hours

Welcome to Back To Chiropractic Online CE exams:

This course counts toward your California Board of Chiropractic Examiners CE. (also accepted in other states, check our website or with your Chiropractic State Board)

The California Board requires that you complete all of your CE hours BEFORE the end of your Birthday month. We recommend that you send your chiropractic license renewal form and fee in early to avoid any issues.

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- 7. Upon passing the exam you'll be able to immediately download your certificate, and it'll also be emailed to you. If you don't pass, you can repeat the exam at no charge.**

Please retain the certificate for 4 years.

If you get audited and lose your records, I'll have a copy.

I'm always a phone call away... 707.972.0047 or email: marcusstrutzdc@gmail.com

Marcus Strutz, DC

Back To Chiropractic CE Seminars

LOWER EXTREMITY: FOOT, ANKLE, KNEE

Examination, adjusting techniques and supportive therapies.

My gratitude to the following doctors.

- Dr's. George Goodheart, Robert Blaich,
- Dean Raffelock, David Leaf, Joe DiDuro,
- Michael Johnson, Michael Zalben,
- Michael Borkin, Jeff James, Bruce Beddoe,
- Joseph Kelberman, Leonard Faye & Marc Darrow

SPORTS INJURY REHABILITATION



Humans walk bipedally

- **Humans, birds and** (occasionally) **apes** walk bipedally. **Humans, birds, many lizards and** (at their highest speeds) cockroaches run bipedally.
- Our body is able to perform some of the most complex movements imaginable. Most of our movements are reliant on our feet and legs unless you are in a non weight bearing position. One reason why non weight bearing rehabilitation is so effective for some injuries. (bicycle, pool, etc.)
- The feet are probably one of the most overlooked areas in our body. So, today we are going to take a much closer look!
- What I am going to deliver, is a system for understanding, diagnosing and treating foot and gait dysfunction. I've been working on this information in my practice for 32 years. I invite your participation since many of you have skills I may want to learn.

Macro versus Micro Trauma

In most of our offices you get 2 types of cases, macro-trauma (think hit by a bus) or the dreaded repetitive micro-trauma (RMT).

For the typical DC office 90-99% of new patients likely present with RMT instead of macro-trauma, but we shall consider both.

For this course I will assume that visceral & systemic pathology have already been ruled out & that we are dealing with classic acute & chronic soft tissue injuries.

Foot Issues: What if there is no pain?
What if it only hurts when you touch it?



ANATOMY REVIEW: Bones first

- The human foot and ankle has 26 bones, 33 joints, 107 ligaments, 19 muscles and tendons. The 52 bones in your feet make up about 25 % of all the bones in your body.

- Tibia: weight bearing Fibula: Non weight bearing.

- TARSAL BONES:

- Talus, calcaneus, navicular, cuneiforms (3), cuboid

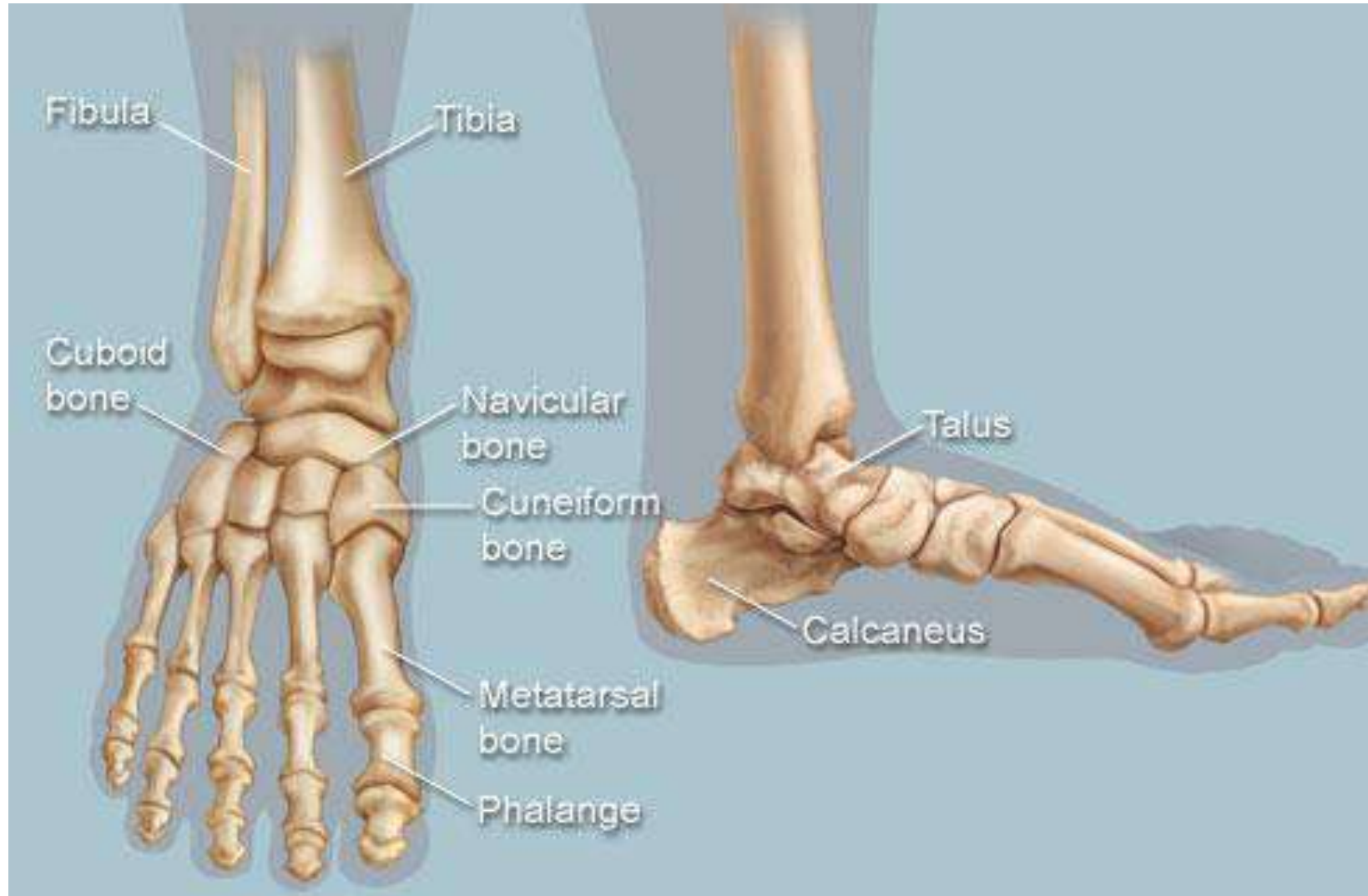
- Metatarsals: (5) Forefoot

- Phalanges: (10) Forefoot

- Hallux Sesamoid bones: 2 under great toe

- Others: There may be accessory bones on the foot.

Boney anatomy of the feet and ankle



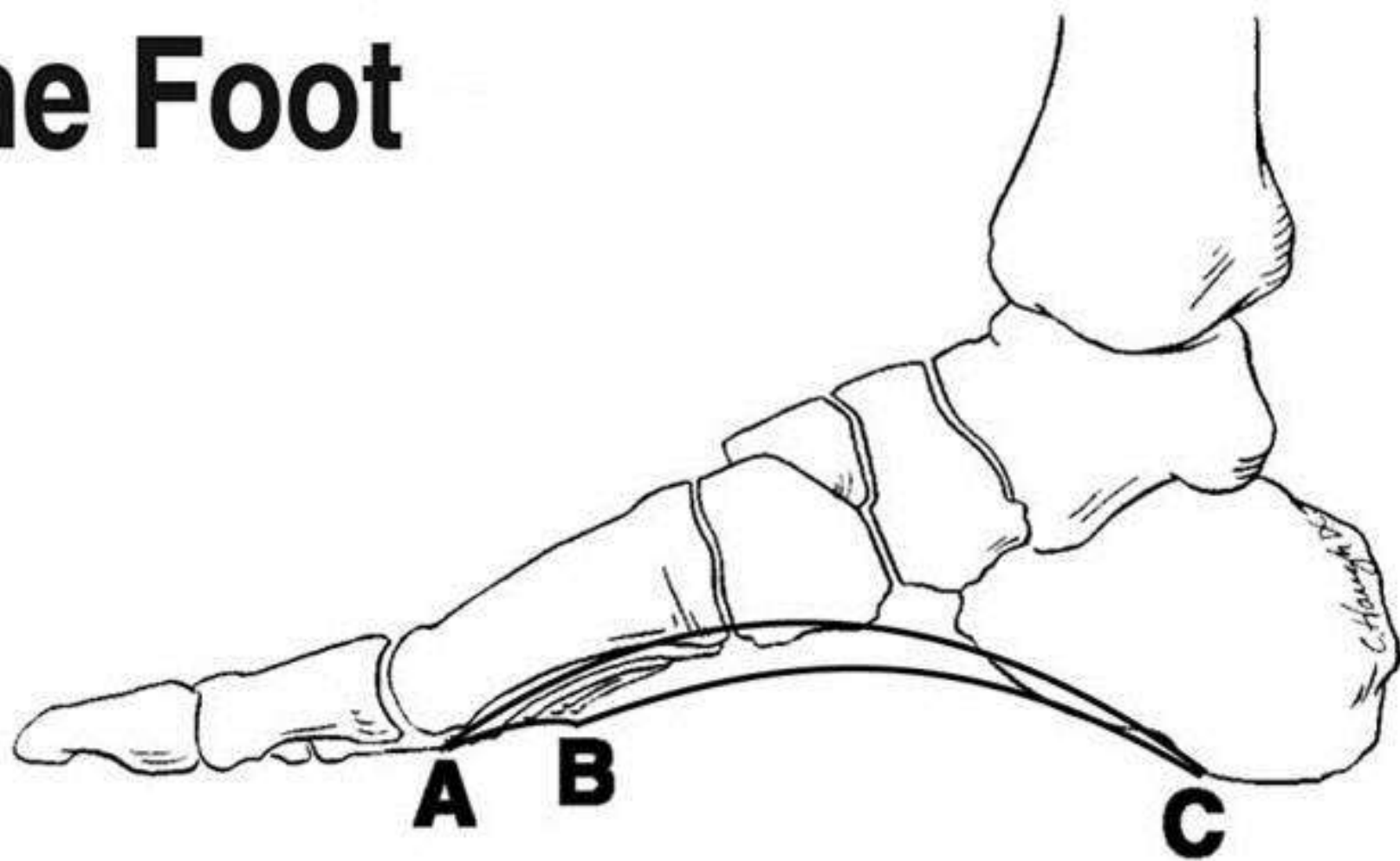
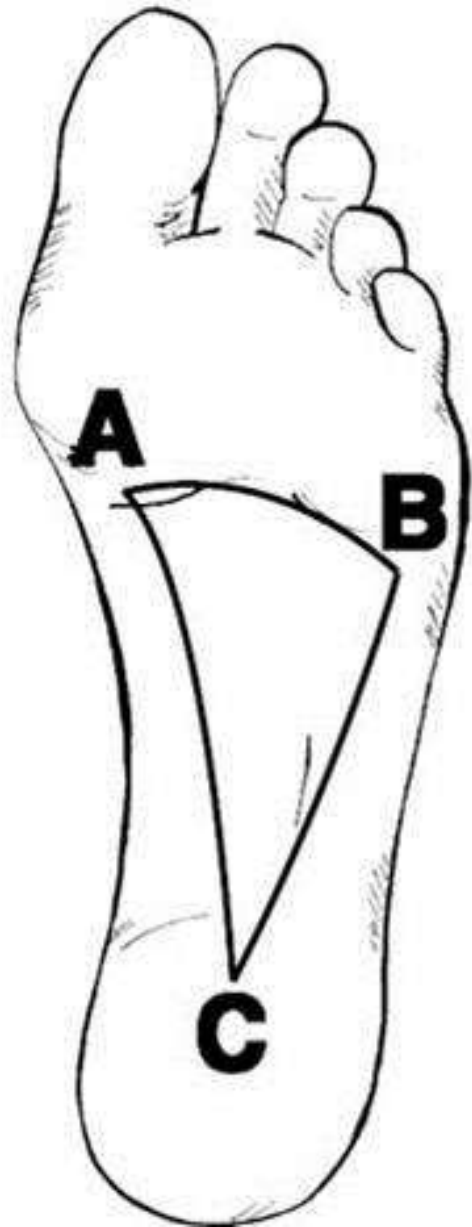
Tarsal Bones of the foot

- Calcaneus: Heel bone, first contact in walking.
- Talus: Makes up ankle joint, & connects to calcaneus
- Cuboid: Lateral
- Navicular: Medial
- Cuneiform: (3) Medial, lateral and intermediate

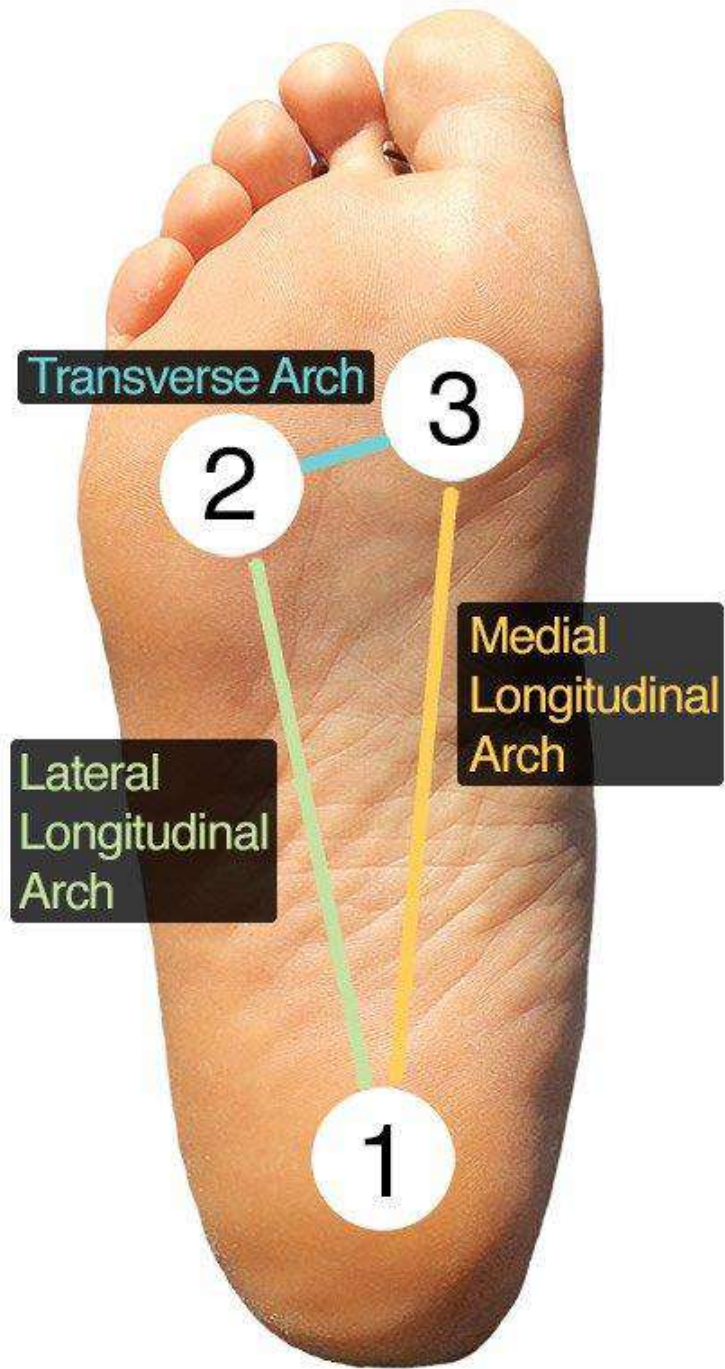
There are 3 arches of the Foot

- Medial and lateral Longitudinal and transverse arch, AKA metatarsal
- What makes up the transverse arch ? 3 Cuneiform bones
- Whether you are treating sport injuries, sprains, or just adjusting feet because it will make your pelvic adjustments last longer. The better you know the anatomy the better you can adjust and help your patients.
- You can use visual cues to adjust, pain related cues, x-ray findings or muscle testing.

Arches of the Foot

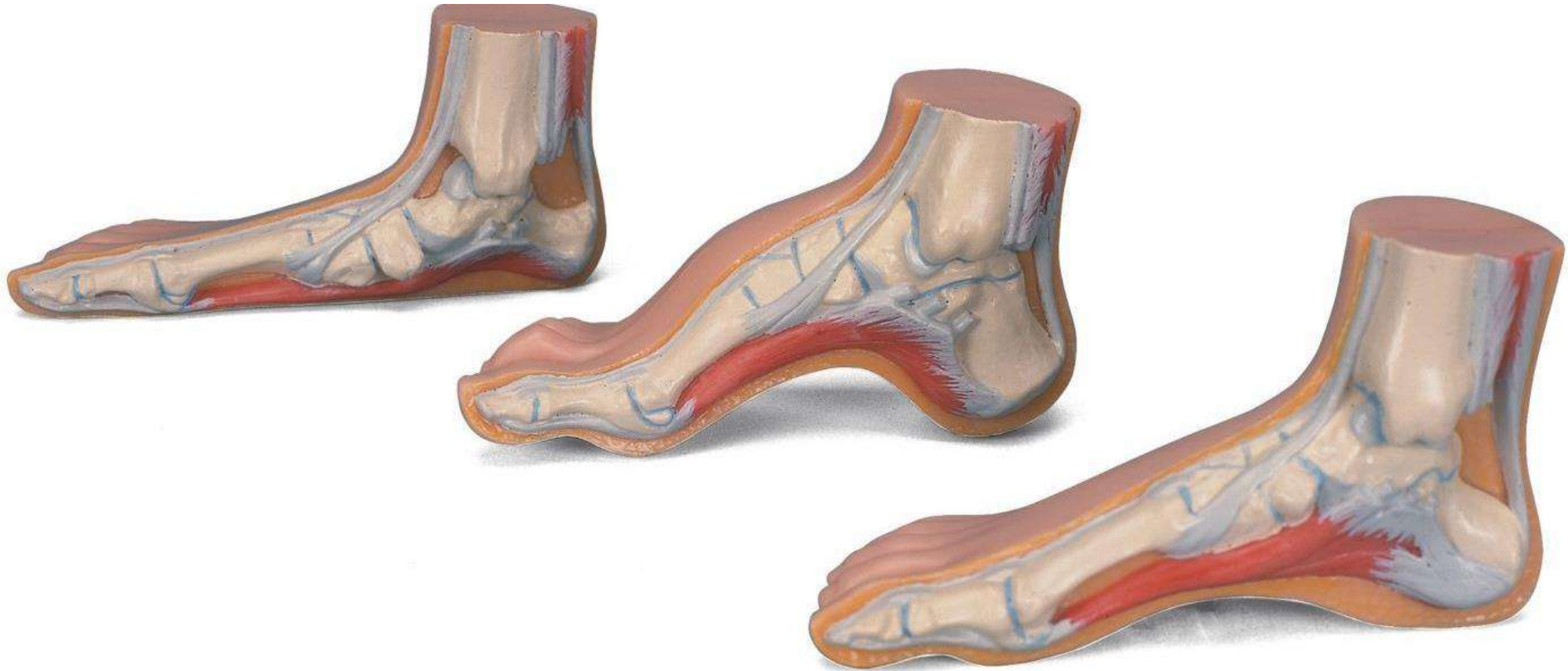


- A-B Anterior Transverse Arch**
- B-C Lateral Longitudinal Arch**
- A-C Medial Longitudinal Arch**

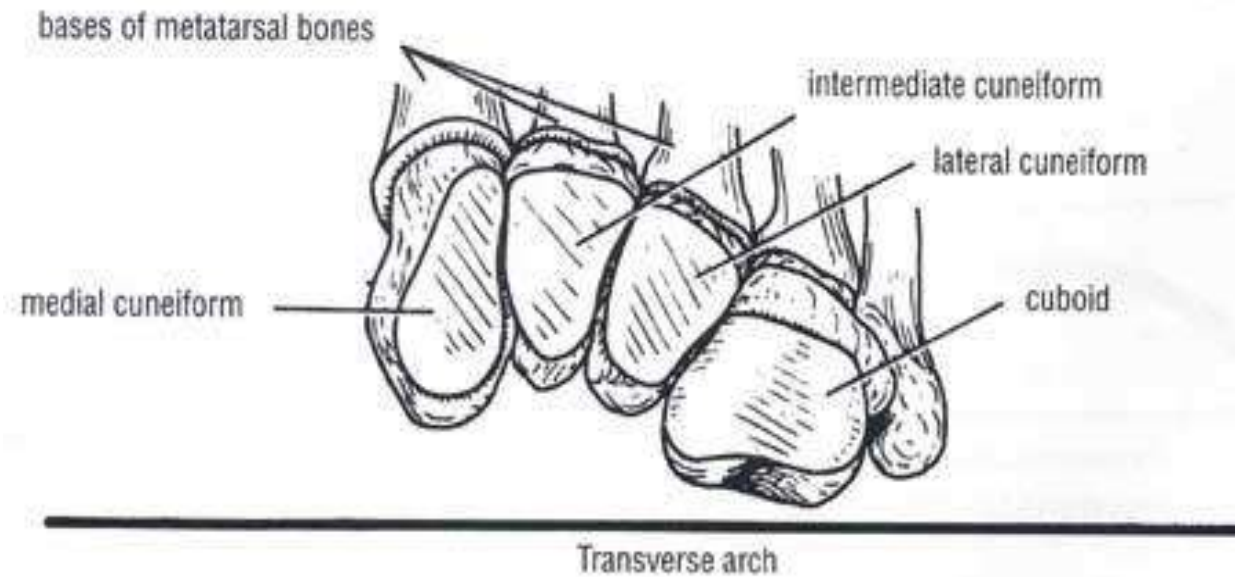


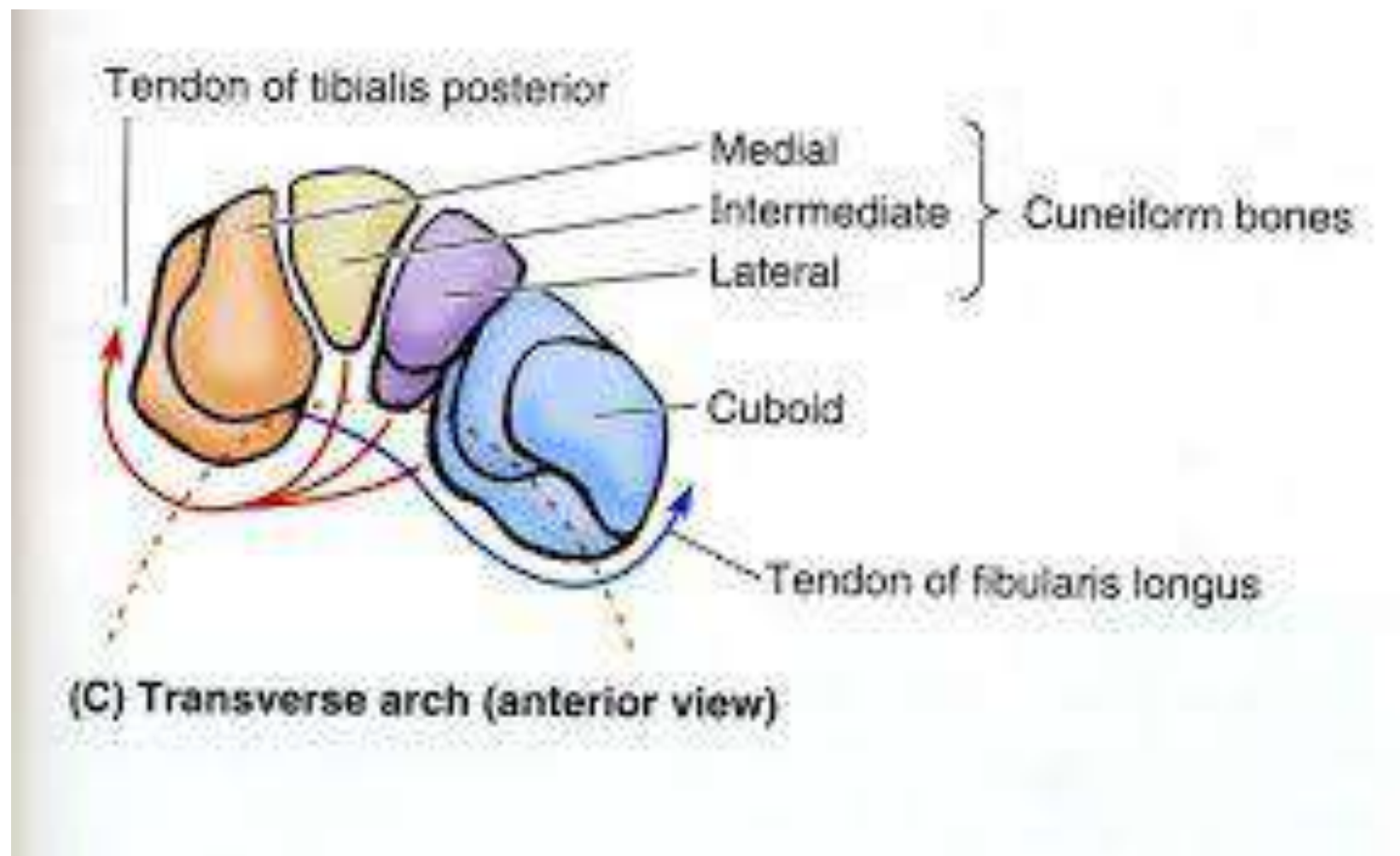
3 Arch Types

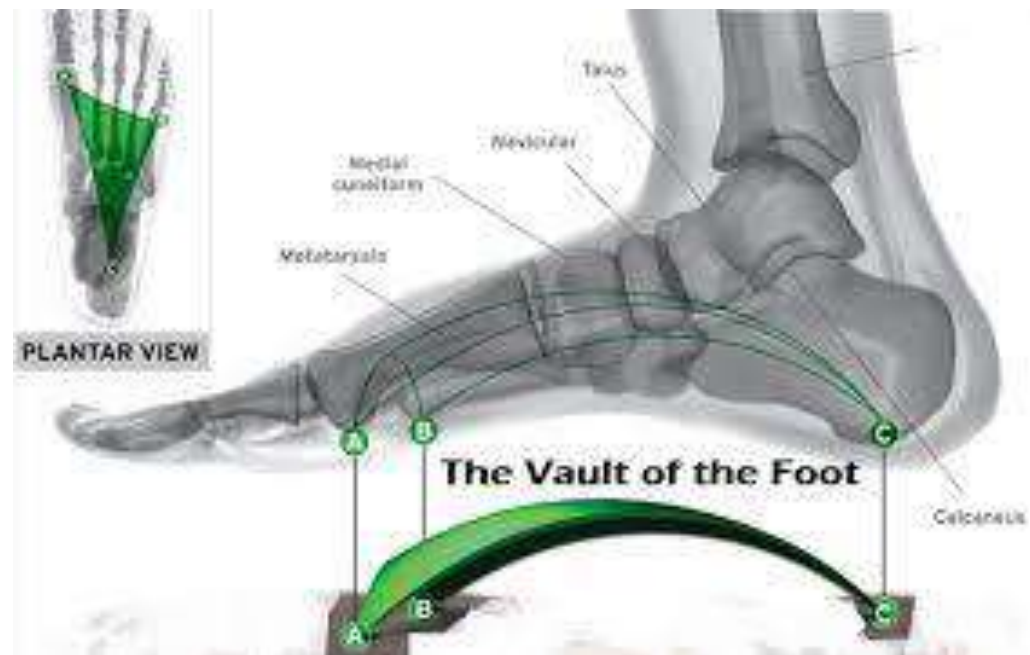
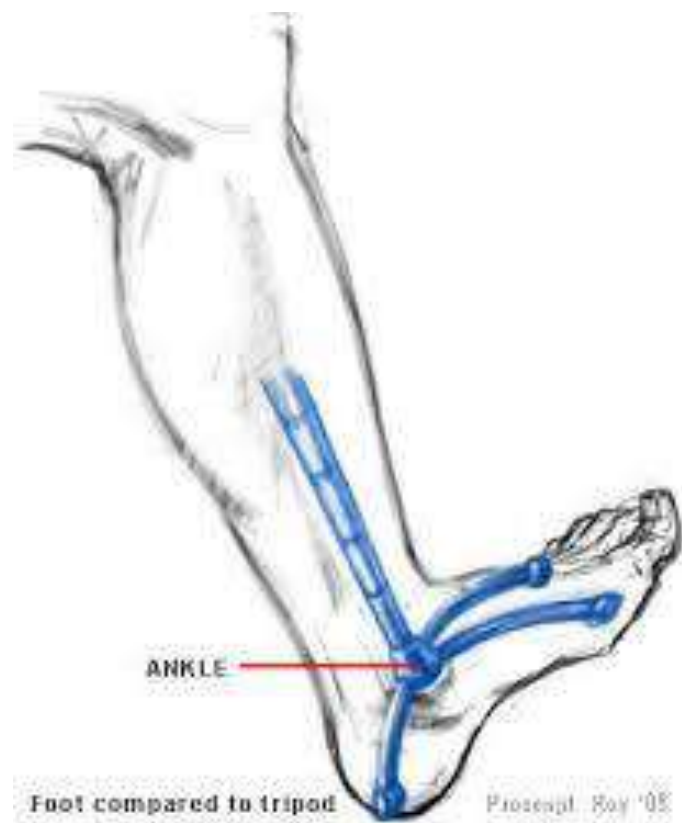
Pes Planus, Cavus and Normal



Transverse Arch not Metatarsal Arch







The talus is the only bone in the foot that has NO muscle attachments



ARCH TYPE → FOOT ALIGNMENT → SHOE TYPE



normal arch



neutral

STABILITY
SHOE



high arch



supinator

CUSHIONED
SHOE



flatfoot

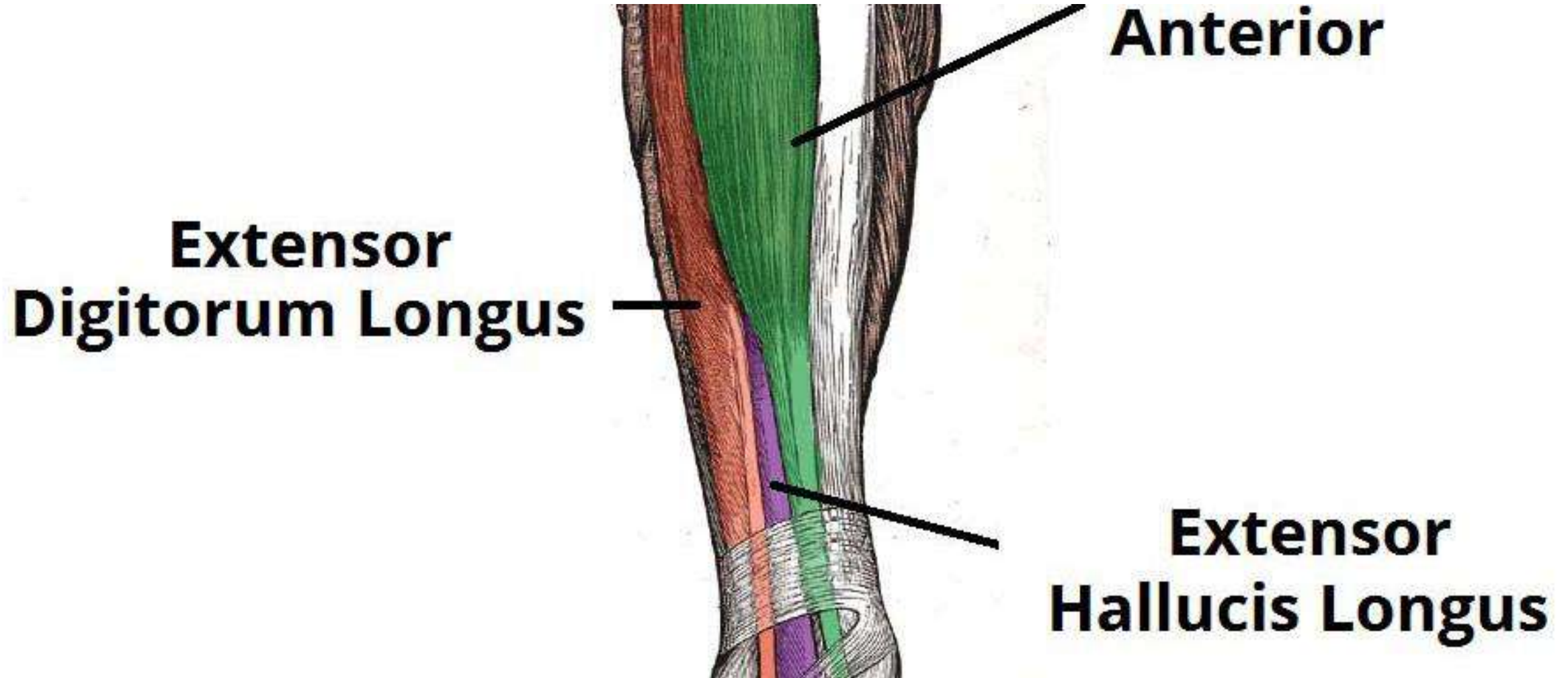


pronator

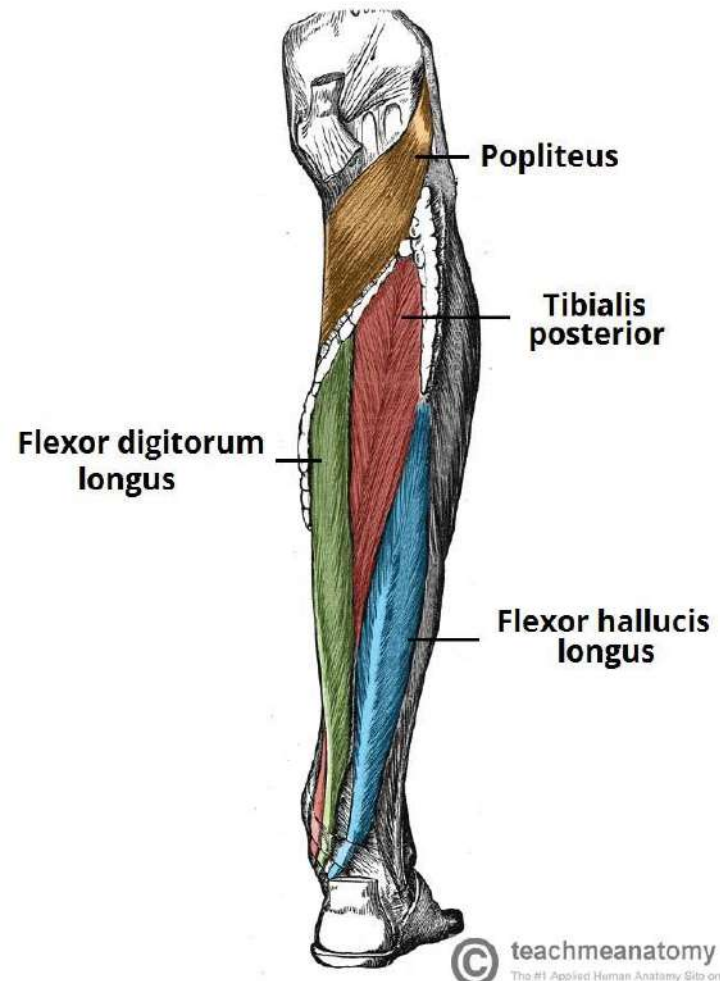
MOTION
CONTROL
SHOE

Fig. 3

Anterior Compartment Muscles



Posterior Compartment Muscles

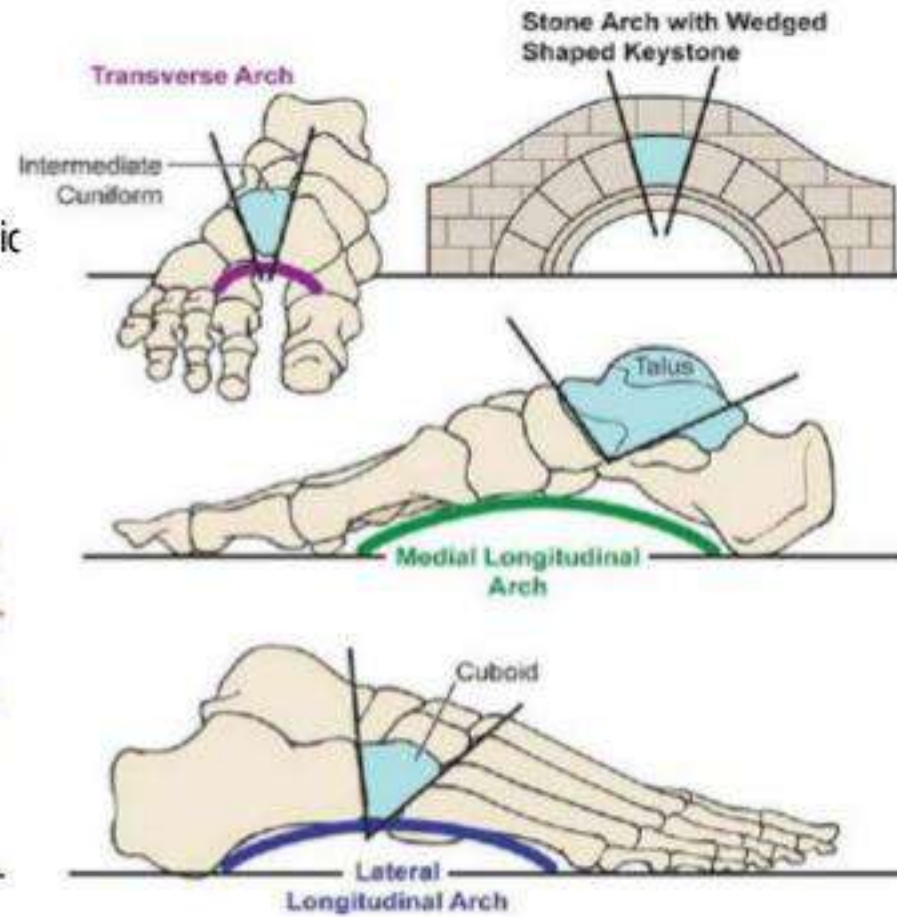
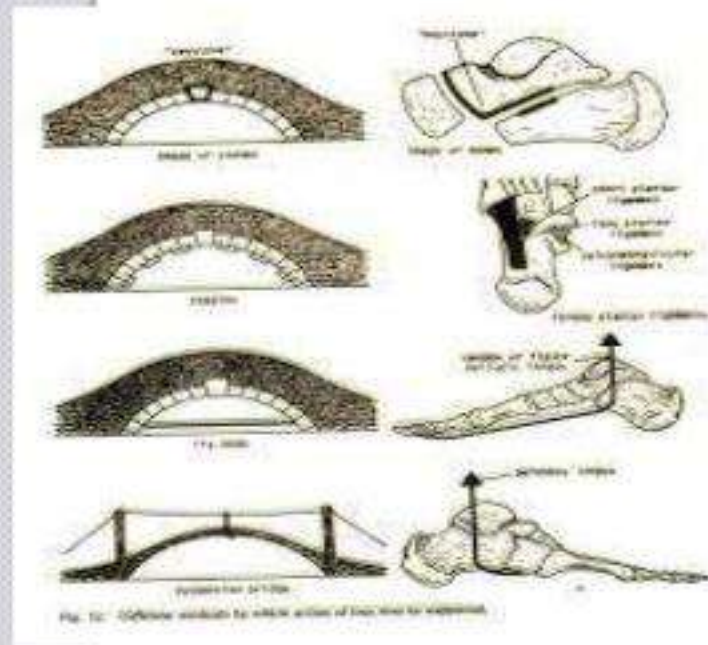


FLAT FEET (pes planus)

- **Are they fallen or genetically flat?**
- **Some people have flat feet due to genetics, while others develop as they age, gain weight, disuse atrophy or during pregnancy. Women during the last trimester of pregnancy develop foot issues or sacroiliac joint issues due to the extra weight they carry and the release of the hormone Relaxin that allows ligament stretch.**
- **There are some simple devices which may prevent the complications of flat feet.**
- **There are racial differences in feet. Africans and African Americans are 35% more likely to have flat feet. They can be completely functional.**

Method of maintaining the arch

- Shape of stones
- Intersegmental ties
- Tie beams
- Slings or suspension bric



ARCHES OF FOOT

1. Longitudnal arches-

- medial longitudinal arch
- lateral longitudinal arch

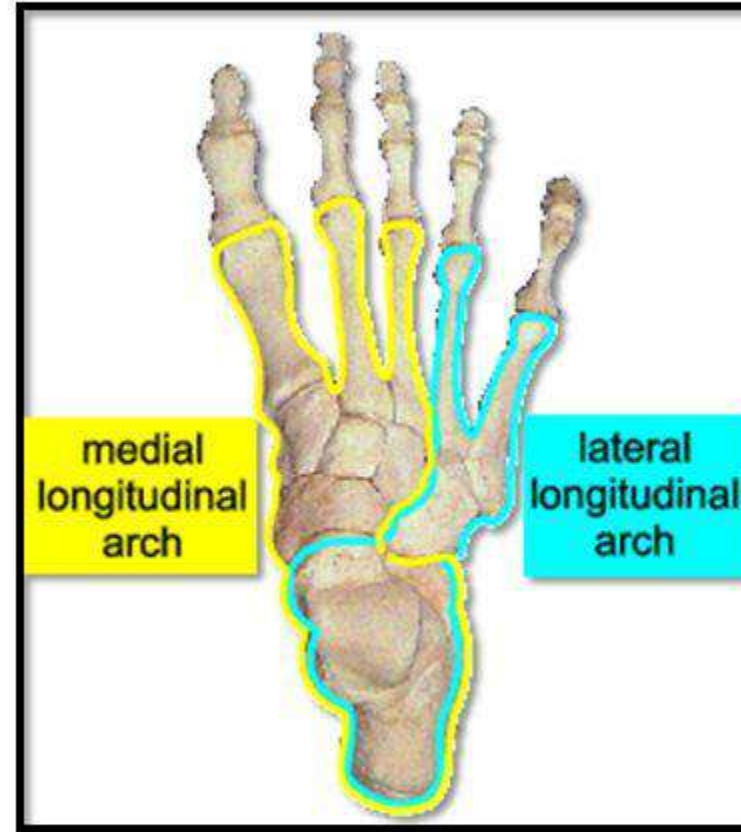
2. Transverse arch

Supports during standing-

- plantar ligaments, plantar aponeurosis bear maximum stress

Supports during locomotion-

- muscles are active
- windlass action of plantar aponeurosis



Arches of Foot

➤ Medial longitudinal arch

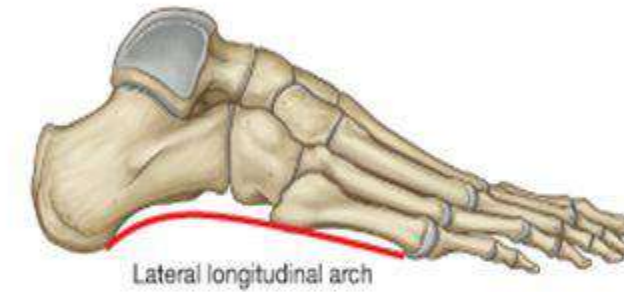
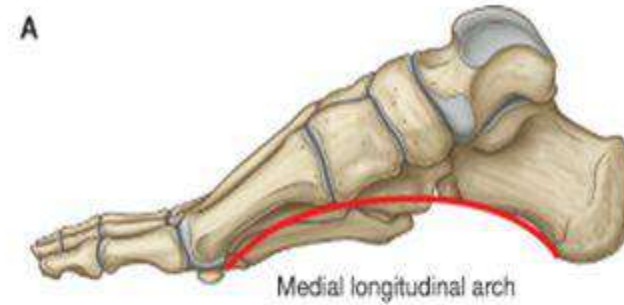
- Is formed of calcaneum, talus, navicular, 3 cuneiform bones, and first medial 3 metatarsal bones.

➤ Lateral longitudinal arch

Is formed of calcaneum, cuboid & lateral 4th & 5th metatarsal bones

➤ Transverse arch

- Lies at the level of **tarso-metatarsal joints**, formed of bases of metatarsal bones, cuboid & 3 cuneiform bones.



How we develop from childhood to Adult

NATURAL HISTORY OF ARCHES

- ❖ Initially, we see significantly bowed legs, noticeable out-toeing, and no evidence of a medial arch.
- ❖ The arches slowly become more obvious and increase in height as our gait improves. The foot grows faster than the rest of the body; it achieves three quarters of its mature length by the time the child is seven years old.
- ❖ By six or seven years of age, most children have also developed their adult medial arch, although some take until age ten or eleven to complete development



Well-Balanced



Mild Pronation



Moderate Pronation



Severe Pronation



high



Supinators

**Cushioning
Shoes**



normal



Mild Pronators

**Stability
Shoes**



flat



Over Pronators

**Motion Control
Shoes**



Talipes
cavus



Talipes
equinus



Talipes
calcaneus



Talipes
valgus



Talipes
equovalgus



Talipes
calcaneovalgus



Talipes
varus



Talipes
equo-varus



Talipes
calcaneo-cavus



Talipes
cavovarus

I want to stimulate you & give you something you can use Monday morning in practice not set your brain on fire



What type of arch is this?



High Heel Arches?

Good looks versus bad mechanics.



What type of arch is this?



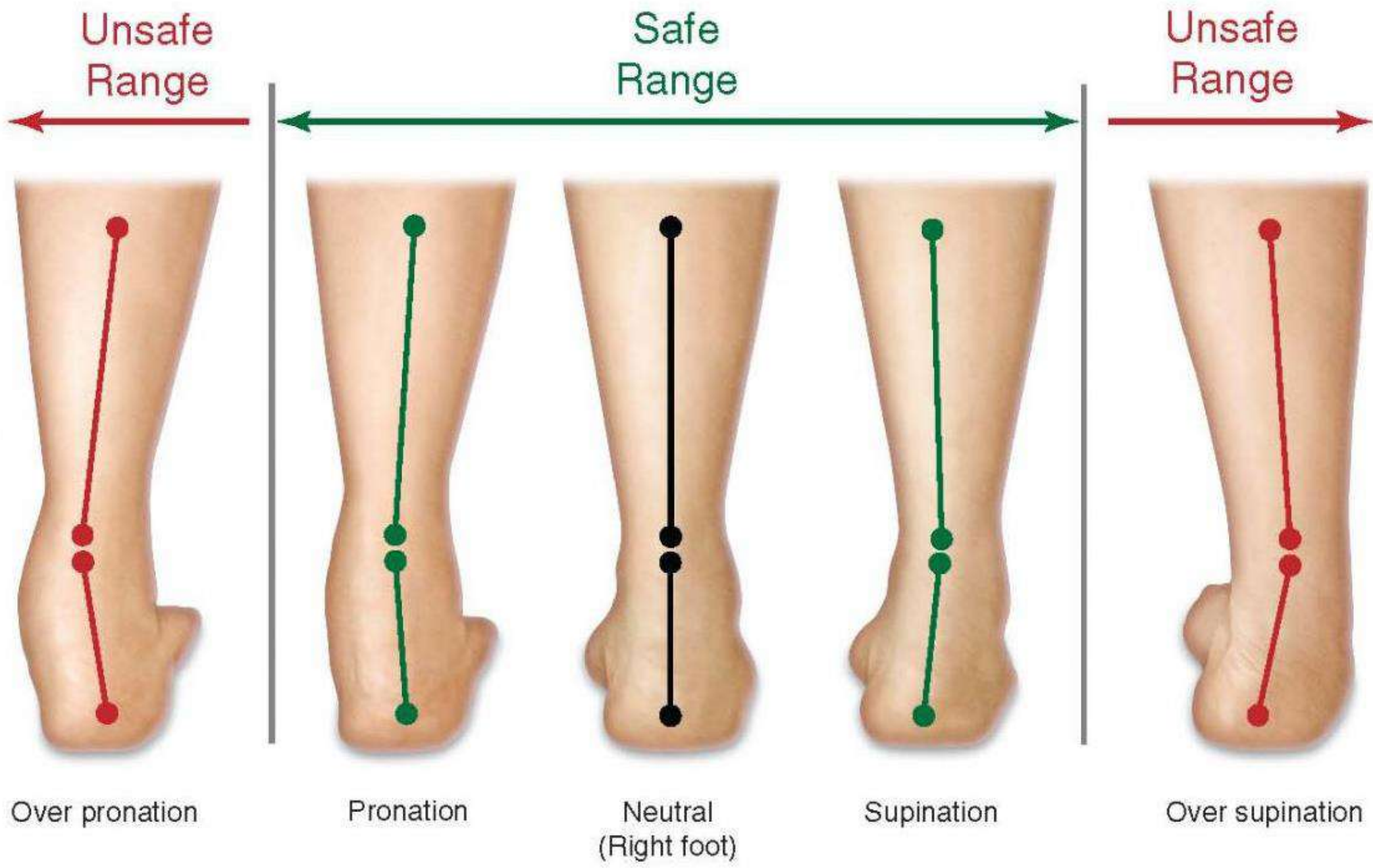
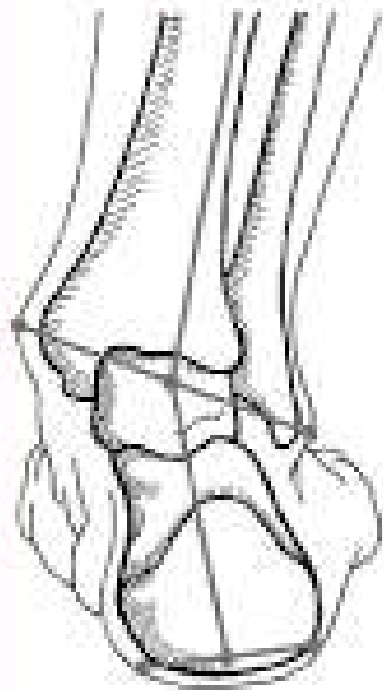
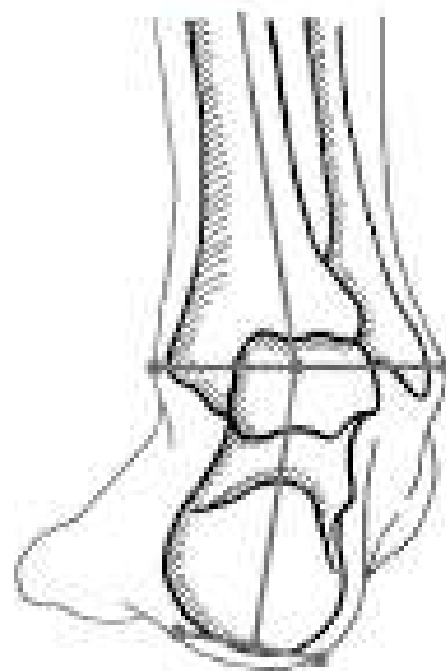


Figure 3: Illustration of pronation and supination of the right foot

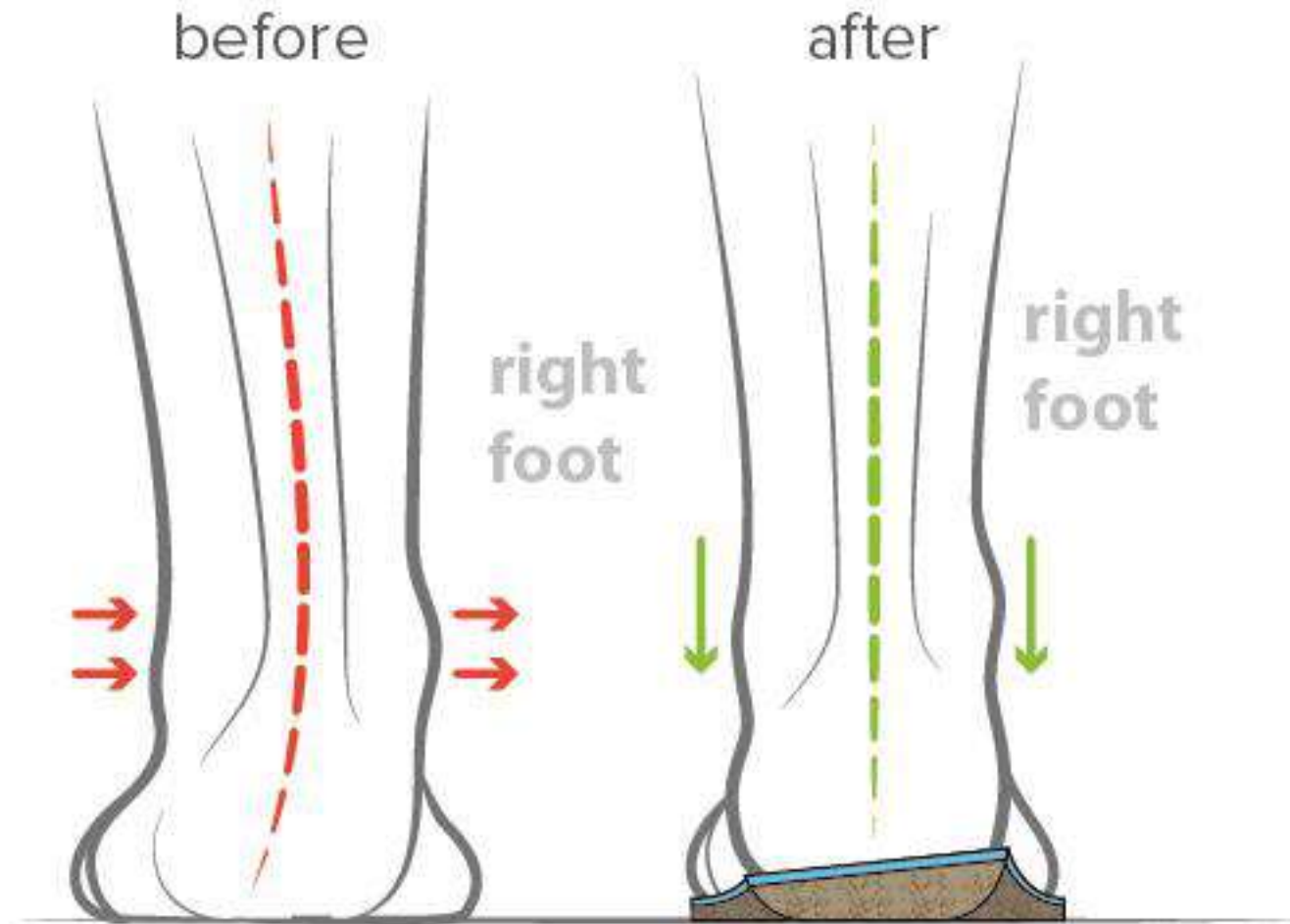


Pronation



Supination

Why orthotics are effective supports.



Muscles:

- **Intrinsic Muscles of the foot:** All begin and end within the foot
- **Extrinsic Muscles of the foot:** Those that are on the calf that attach to the foot.

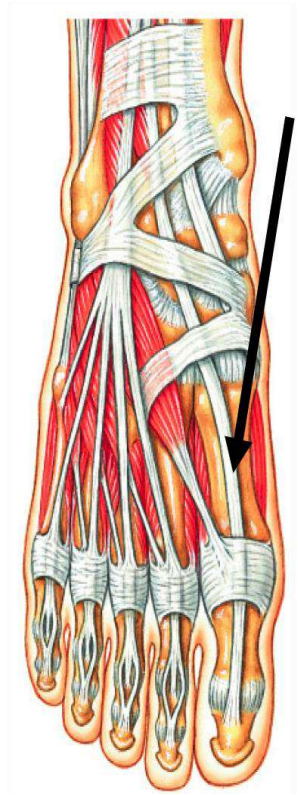
• 5 that really matter

- Tibialis posterior - medial longitudinal arch
- Tibialis Anterior – Raises toe and forefoot while walking & Drop foot indicator L4-L5 nerve root
- Extensor Hallucis Longus – Big toe extensor (strongest toe) L5 nerve root
- Flexor Hallucis Longus - Primary plantar flexor S1 nerve root
- Peroneus longus, brevis and tertius-lateral stabilizers (Fibularis)

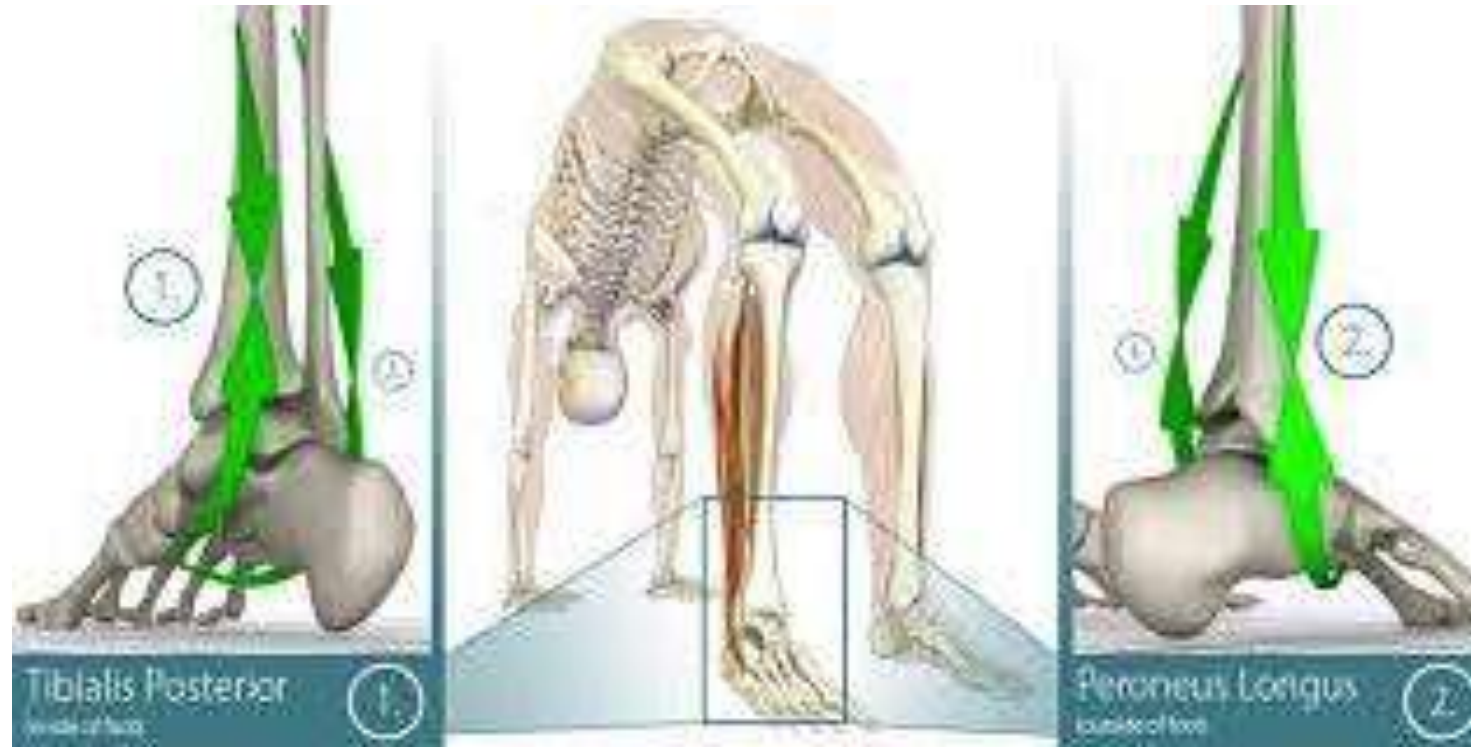
2 more important foot muscles

- Flexor Digitorum Longus – toe flexors
- Extensor digitorum longus - toe extensor group 2-5 frequently involved in ankle sprains

Extensor Hallucis Longus



Foot Stabilizers



If all you have is a hammer everything looks like a nail.

- **Humans can have more than one problem at a time.**
- **People with other foot problems may find that flat feet either contribute to them or make symptoms worse. Examples include: plantar fasciitis, neuroma, metatarsalgia, achilles tendinitis, arthritis, bunions, bunionettes, shin splints and hammertoes.**



OBSERVATION CLUES:

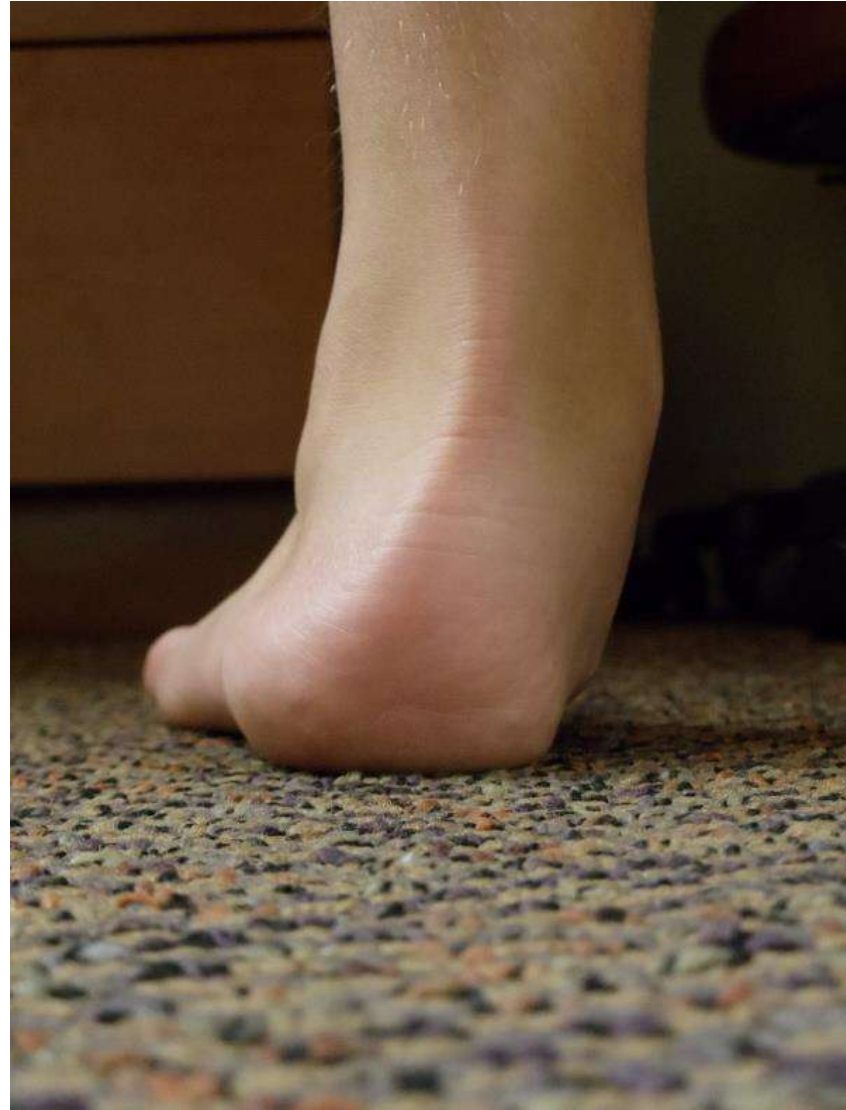
You should be able to get your fingers under the arch while standing. They should also be able to balance on their heels. If they have pain in the medial or plantar aspect of the foot or ankle look for the corresponding misaligned joints and weak muscles.

Pes Planus or Flat Foot





Rear foot - Positive Helbing's Sign



Radiology: Chiropractors are not the only docs that mark x-rays!



Do you see the 3 structural alterations?



X-Ray Versus functional testing

- **Podiatrists** remind me of traditional chiropractors in that they look at x-rays of the feet and determine the course of action based on that data. They take measurements from the films and create orthotics accordingly. Doesn't that sound familiar? How many of you still mark x-rays?
- While this is an acceptable thought process, I can tell you that it does not help you fix a lot of patients. WHY? Because you can have poor mechanics and a very stable and useful foot, OR you can have great x-rays and an unstable foot! Because Muscles and ligaments matter a lot!
-

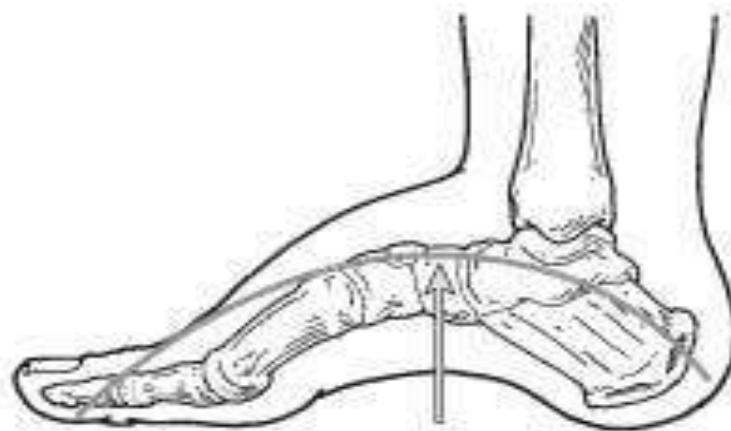
Which came first? The chicken or the egg? How did the foot become misaligned? Was the muscle weakened or tightened and the bone became misaligned? Or was there a single or multiple traumas?

Are there racial differences? You bet. Just like Asians have straighter spines meaning much less spinal curves , African Americans have more spinal curves and lower arches. Compared to Caucasians, African Americans were almost 3 times more likely to have pes planus and were nearly 5 times less likely to have Tailor's bunions (Bunionette) or pes cavus.

Normal Arch versus Cavus Foot (high arch)



Normal Foot



Cavus Foot

Cavus Foot or High Arched Foot

What is Cavus Foot?

Cavus foot is a condition in which the foot has a very high arch. Because of this high arch, an excessive amount of weight is placed on the ball and heel of the foot when walking or standing. Cavus foot can lead to a variety of signs and symptoms, such as pain and instability. It can develop at any age, and can occur in one or both feet.

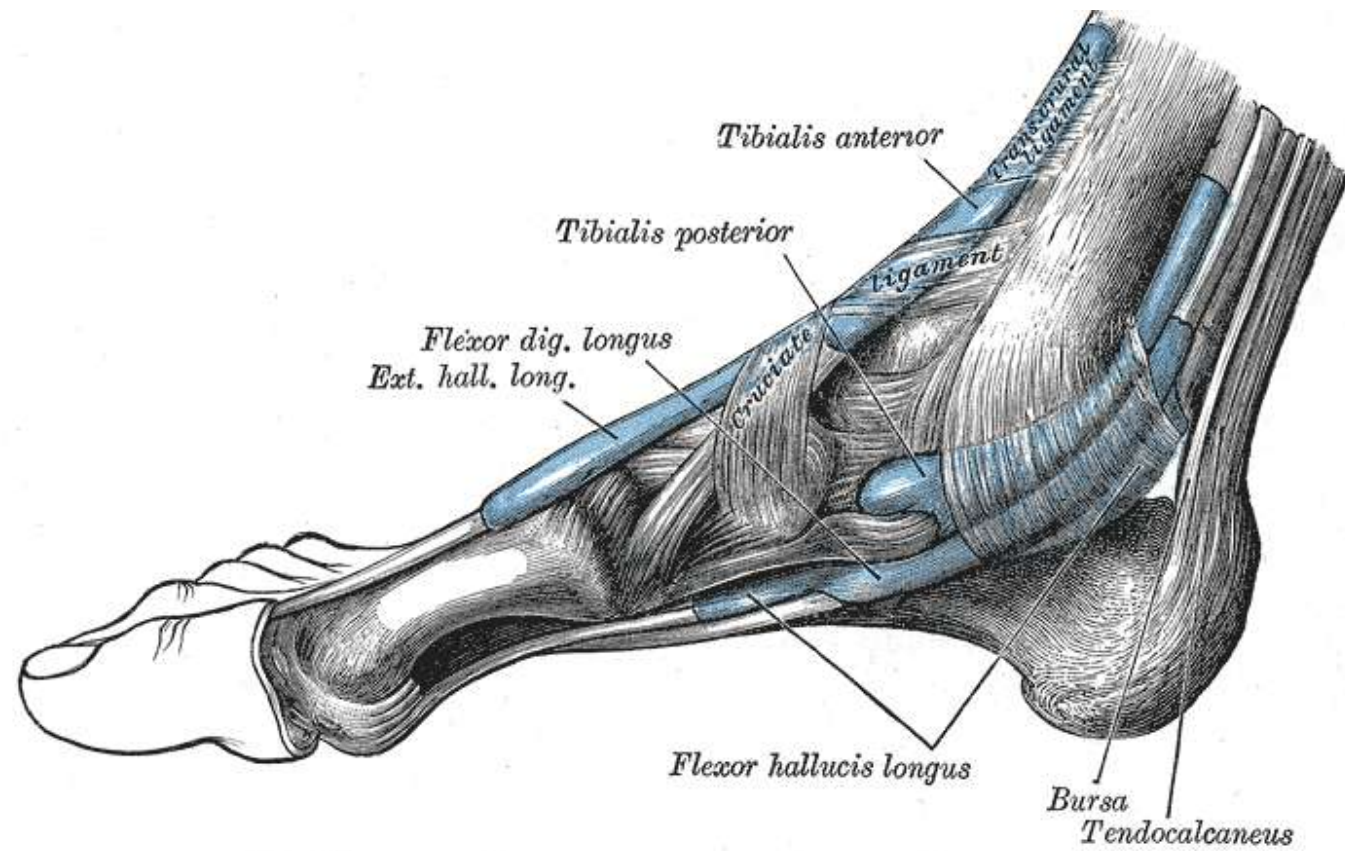
- **Causes**

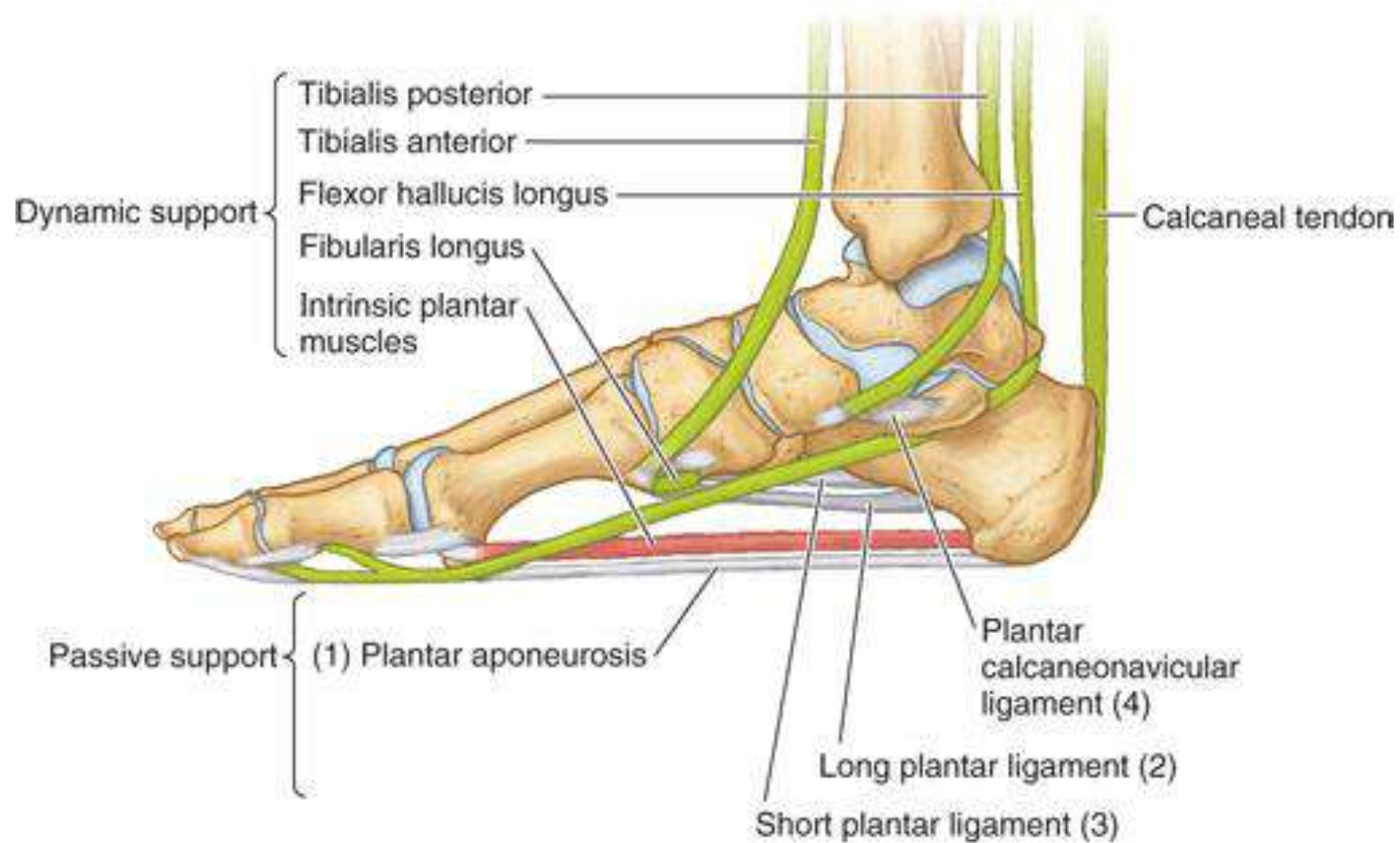
Cavus foot is often caused by a neurologic disorder or other medical condition such as cerebral palsy, Charcot-Marie-Tooth disease, spina bifida, polio, muscular dystrophy stroke or peripheral neuropathy. In other cases of Cavus foot, the high arch may represent an inherited structural abnormality. If the high arch is due to a neurologic disorder or other medical condition, it is likely to progressively worsen. On the other hand, cases of Cavus foot that do not result from neurologic disorders usually do not change in appearance.

CAVUS FOOT continued

- The arch of a cavus foot will appear high even when standing. In addition, one or more of the following symptoms may be present:
 - Hammertoes (bent toes) or claw toes (toes clenched like a fist)
 - Calluses on the ball, side, or heel of the foot
 - Pain when standing or walking
 - An unstable foot which can lead to ankle sprains. Some people with cavus feet may also experience foot drop, a weakness of the muscles in the foot and ankle that results in dragging the foot when taking a step. Foot drop is usually a sign of an underlying neurologic condition.
HELLO! Doctors of Chiropractic this is your domain.

Medial Foot Muscles & Tarsal Tunnel





(E) Medial longitudinal arch (medial view)

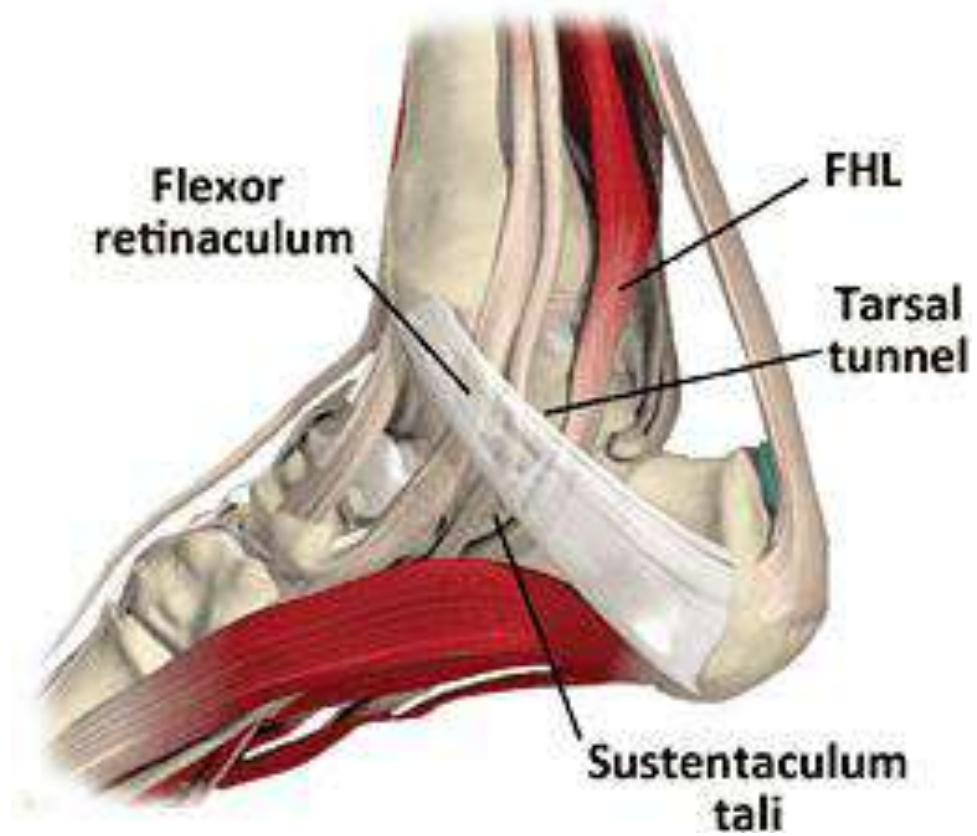
Pain Pattern



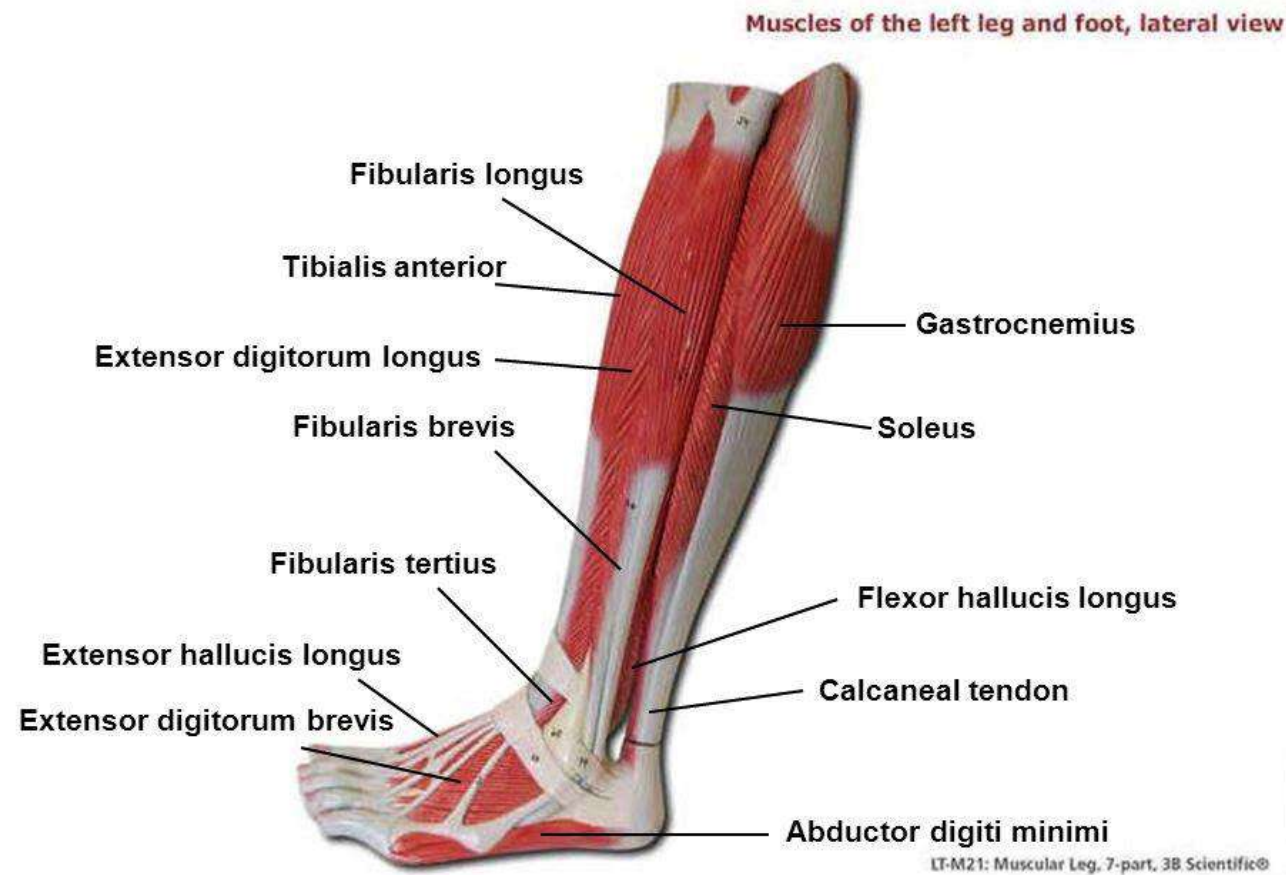
Soleus Pain Pattern



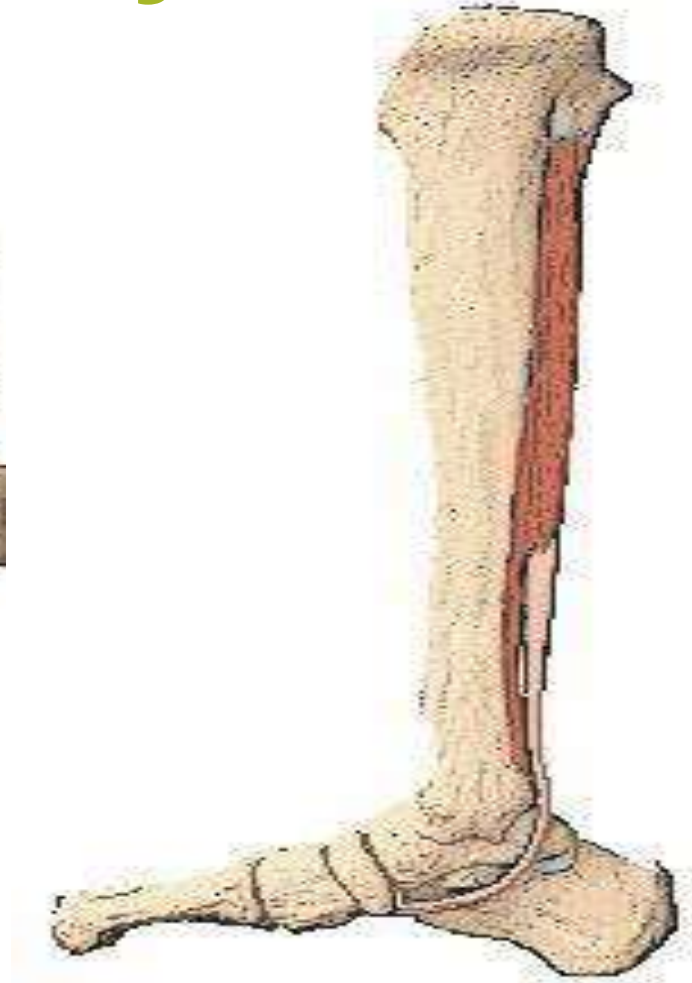
Tarsal Tunnel



Lateral Foot & Ankle Musculature



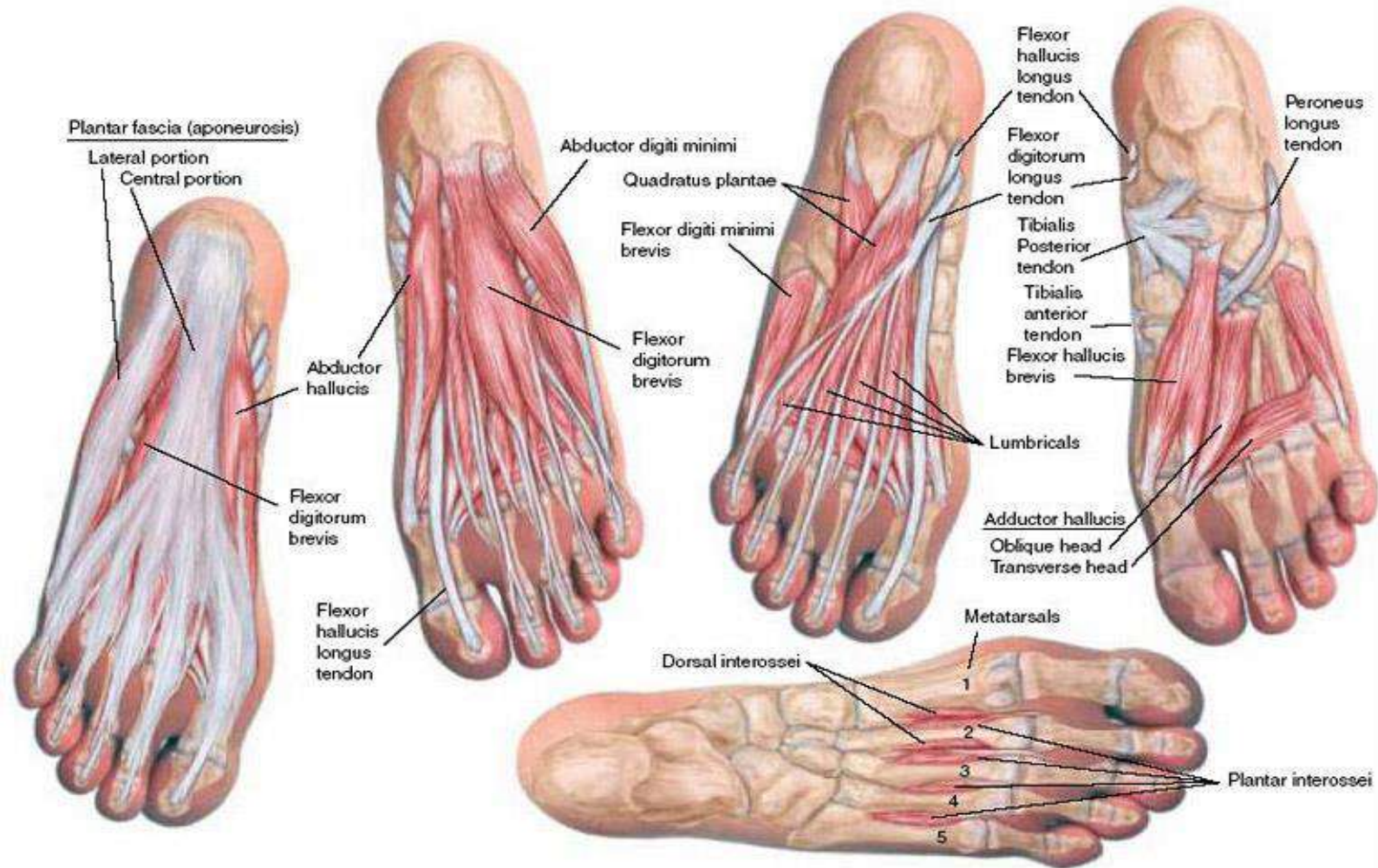
Tibialis Posterior has multiple attachments not just the navicular



The transverse arch of the foot is maintained by the strength and integrity of the tibialis posterior and the peroneus longus. When viewed on the plantar surface of the foot, the tendons of these muscles cross so that contraction of the muscles pulls the medial and lateral aspects of the foot together supporting the transverse arch. When the arches are intact, the body weight should be supported on a tripod.

Cuboid subluxation: Peroneus longus tendon

Navicular Subluxation: Tibialis Posterior tendon



Checking for hypermobility

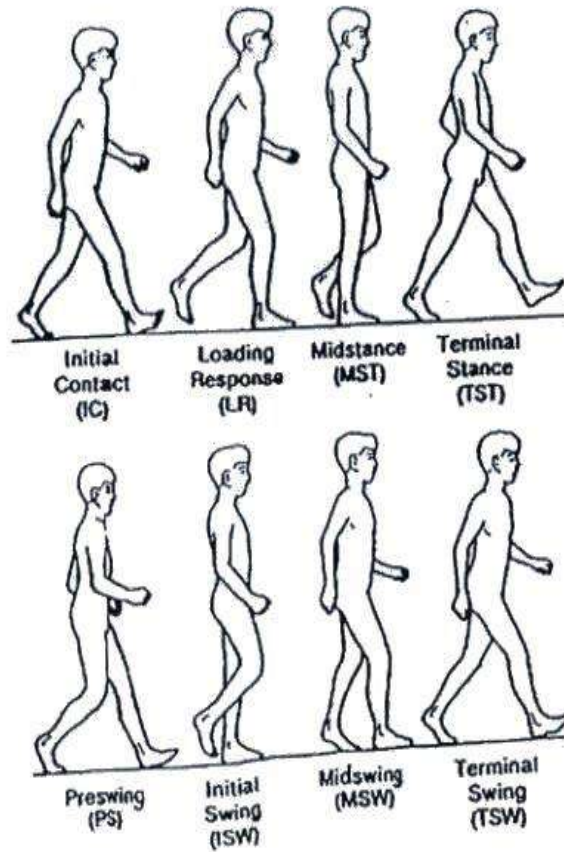
- The Beighton score is used to measure generalized hypermobility, a common finding in most types of Ehlers-Danlos Syndrome. Finger extension is usually 90 degrees and wrist flexion with thumb abduction touches the forearm.



WALKING

- **OXFORD, ENGLAND**—A new report in the *Journal Of The Anthropological Society Of Oxford* reveals that human feet were likely once used as a means of extravehicular locomotion. "Apparently, as recently as 20 years ago, the foot was used in a process called 'walking,' by which the human body actually propelled itself," the report read. "Starting sometime in the late 1970s, these crude early feet gradually evolved into their present function of operating the gas and brake pedals on automobiles." The same team of researchers discovered in 1994 that the human brain was once used for various problem-solving applications before evolving into an absorption/storage unit for lyrics to TV-show theme songs.

GAIT CYCLE from heel strike to heel strike



The Descriptive Stages of the Gait Cycle

Examination of the feet

When you get up from your chair, what muscle should contract first? NO, it's not your gluts! **Flexor hallucis longus**...Treat and strengthen feet and your patients can get up easier from a sitting position with less back stress.

- **Have the patient facing you. The most telling simple test to have the patient perform, is to ask them to go up on their toes and balance as long as they can. And I show them how to do it, with their feet shoulder width apart and NO toe out. After that I ask them to balance on their heels. You get to see all the weakness right away.**
- **Does the patient have a high arch, normal arch or low arch?**

Check the Range of Motion

- Determine whether the foot is hypermobile or hypomobile. Is it rigid or supple? This will help you determine what to do about the issues you find.

Hypomobile require mobilization while hypermobile require stabilization.

- You will usually find that as we age we become less mobile. Are there damaged ligaments? Is there a positive Draw sign.

- **ROM: ankle and foot**

- **Ankle dorsiflexion: 0-20 degrees**
- **Ankle plantar flexion: 0-50 degrees**
- **Ankle foot inversion: 0-35 degrees**
- **Ankle and foot eversion 0-15 degrees**

Buerger's test.

Challenge for vascular problems in the lower extremity. Patient is supine and the straight leg is raised 45 degrees and held there for three minutes. The subject then sits with their legs over the table.

Positive = foot blanches and veins collapse with leg elevated
OR it takes 1 - 2 minutes for reddish cyanosis to cover the
foot and the veins to engorge.



Heel Strike: Muscle Activity from heel strike to flat foot is:
eccentric, **Tibialis anterior decelerates plantar flexion &
pronation**



What's Next?

- **When I first started looking deeper at foot function, I started testing the Extensor Hallucis Longus muscle (Big toe extensor). It's the largest toe of the foot so it's easier to test. If you were going to test only one muscle this is it!**
- **What I initially found was that people who had weakness of the EHL muscle also had weakness of the arch or flat foot. And that if I strengthened the plantar flexors the extensors responded in kind.**
- **What I now understand is that when you strengthen the arch it increases the height of the arch. This in turn shortens and realigns the foot which facilitates the extensors to work. Short foot exercise is essential in balance therapy.**

Treating Medial Foot & Ankle Pain

- **Bunions, flat foot, sprains and tarsal tunnel syndromes.**
- Bunions and flat foot are almost always together. It would be rare to have a normal arch with a bunion all by itself but that could happen from trauma!
- **Find the pain and see what alignment issues take the pain out.**
- Treat that subluxed joint (Navicular, cuneiforms, talus and or calcaneus). In the flat foot look for two different types. Tight and immobile or hypermobile. Hypermobile flat feet do better with hard orthotics to control the motion.
- **Ankle draw sign.** Hold the calcaneus in one hand and the tib-fib in your other and approximate a few times. If it moves all over the place you have a hyper mobile patient. You may want to add kinesiotape, arch pads or full orthotics to your treatment regime. Bunions can be treated using laser, toe spacers, a 1st met head cut out or raise in the orthotic, to keep that joint aligned while healing. Get the inflammation out any way you choose.

How do we strengthen Feet?

- We initially utilized the typical old fashioned techniques for feet, which are really more for keeping range of motion than strengthening. Picking up marbles or a towel on the floor etc.
- Later we used the Elgin ArchXerciser, Pilates foot corrector, and recently added the foot gym. These are far superior to all of the older techniques, except barefoot walking or running on the beach.
- Cord exercises and rocker & slide board for lateral ankle peroneal group.
- Balance exercise (foam mat) for dynamic weight bearing strengthening.
- Wobble and rocker board exercise (rocker is the beginning exercise for strengthening).

Strengthen Plantar Muscles: Elgin ArchXerciser: Sitting



Pilates: Foot Corrector weightbearing









Exercise Rehab









Adjusting feet 101

- What is the most important area of the foot to adjust? Is it medial, lateral, posterior or anterior? If you are undecided and have not figured out how to determine priority adjust everything. Just do it gently.
- **MAKE SURE THE PATIENT CAN TOLERATE THE ADJUSTMENT YOU WANT TO PERFORM! SELECT MANUAL VS INSTRUMENT VS DROP or SOFT TISSUE..**
- I used to love to manipulate all metatarsals manually. Once you sprain a foot and have to fix it for a patient that wanted to go travelling or run a race that day, you will appreciate this fact. Do this by examining ROM in the area you are going to adjust and see if the patient if the movement elicits pain or not.

Foot Adjustments

- **Calcaneal and talus adjustments** are great to do as a pull move : check inversion , eversion ROM and adjust to improve those ROM's. As the foot elongates it tends to allow the calcaneus to drift posteriorly. Remember this for taping techniques. Can enhance the function of the **gastrocnemius and Sartorius** muscles.
- A **dropped navicular** Does not make sense to do a pull move since it would make it worse! Try drops or instrument adjustments since they are easy to adjust superiorly. Or put the patient prone so your thrusts can raise the joint. It should enhance the function of the **tibialis posterior** muscle.
- **Cuboid adjustment**: same as navicular just lateral in location. Strengthens the **peroneal group**.
- **Transverse arch**: Cuneiforms: I prefer drops (use a form to adjust over) or activator for this region as well since they tend to drop inferiorly. Strengthens the **extensor hallucis longus** muscle

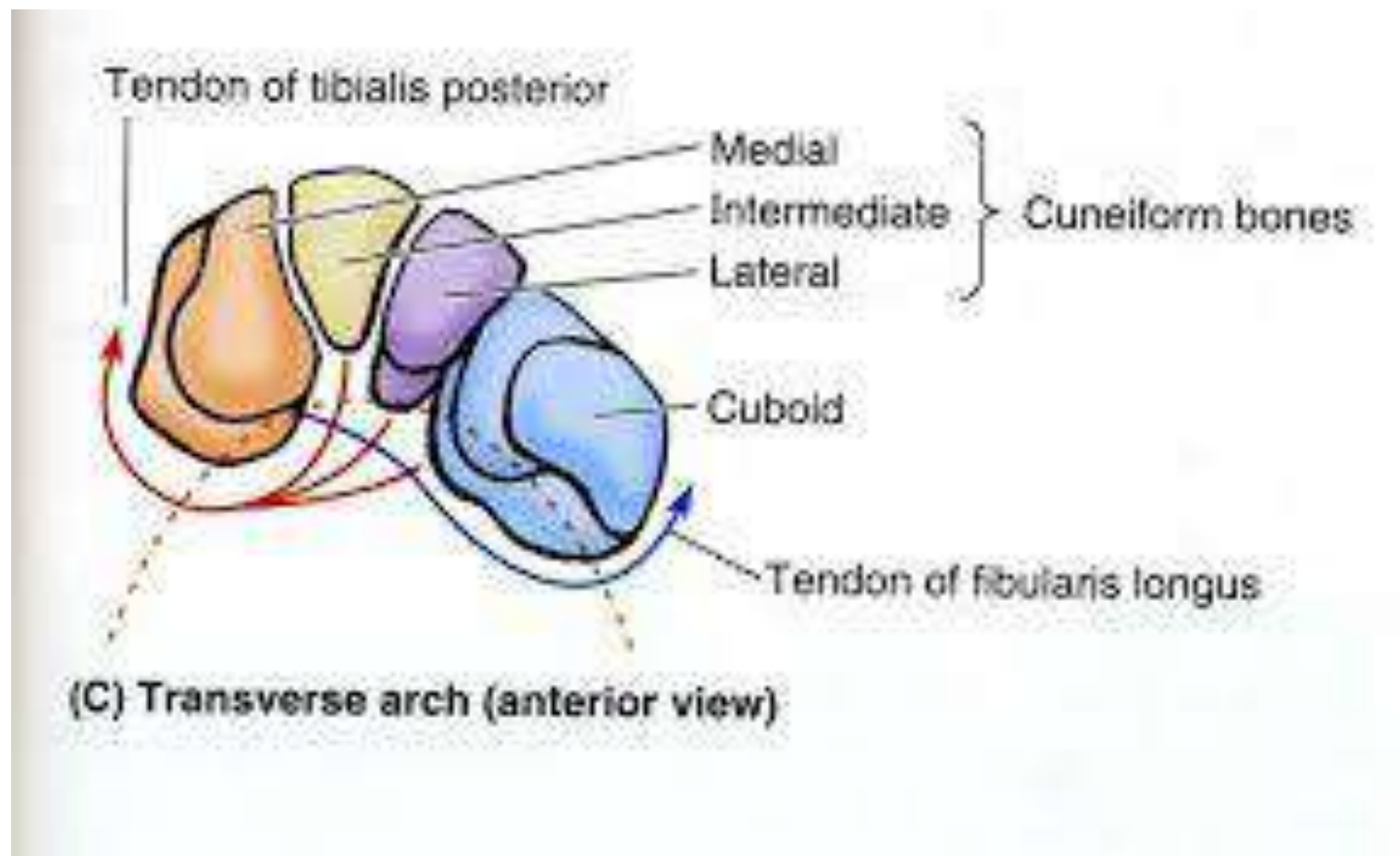
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General treatment Rules

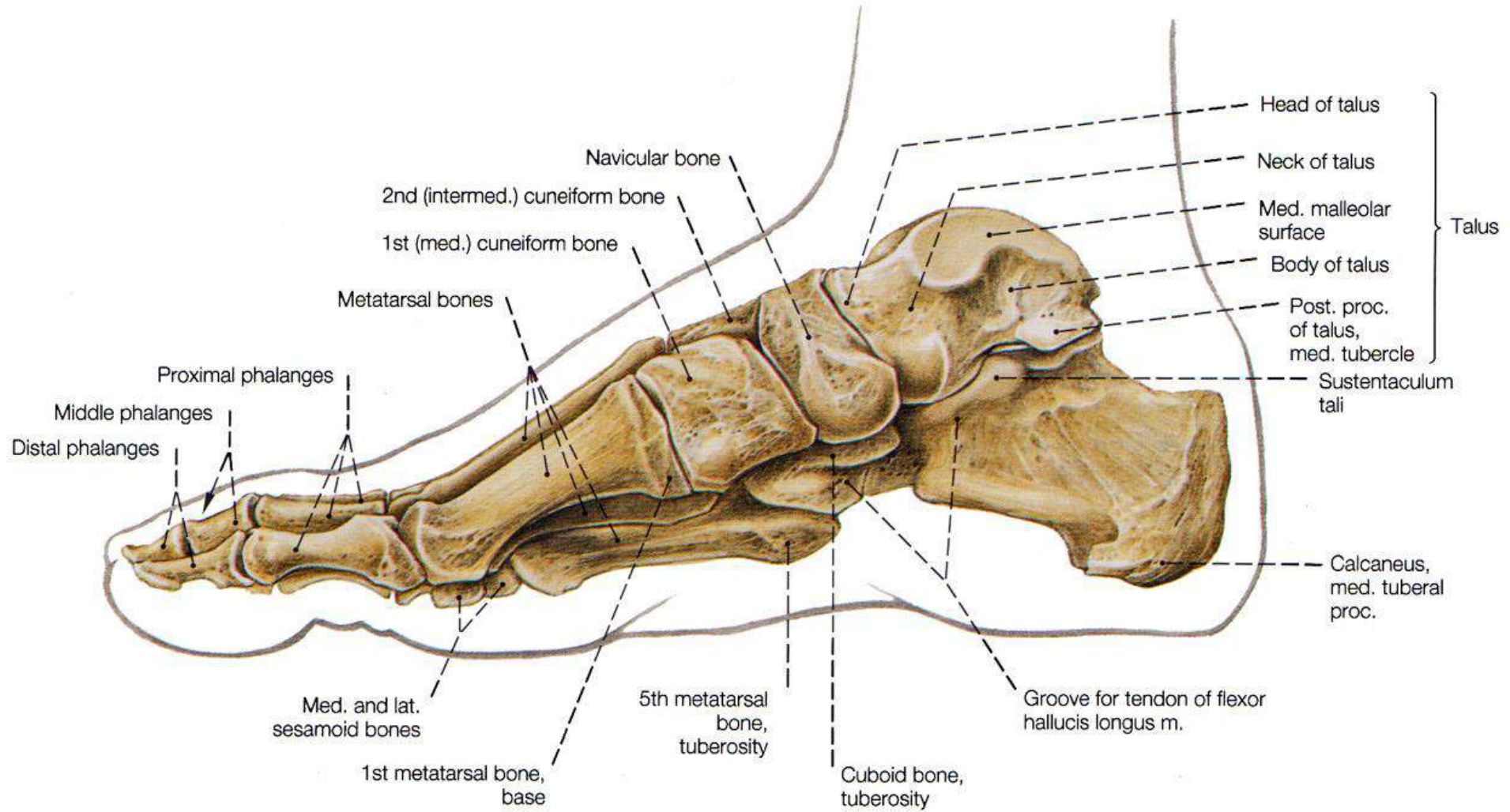
- There are 3 types of feet anatomically.
- Pronators, Neutral and Supinator's
 - "STABLE" or "UNSTABLE"? "HYPOMOBILE" or "HYPERMOBILE"?
- HYPERMOBILITY TEST This really works ! 8 Finger extension or finger pry test.
 - Pronators usually benefit arch supports. Always check prominent tendons.
 - What about Cavus feet? They can also benefit from arch support.
 - Supinator's need lateral support: Strengthening, Heel cups, clips or flanges.
 - Foot considerations:
- Misalignments can occur in any combination. Rear foot pronates while forefoot supinates in compensation, etc. Fix what you find.
- Transverse arch consideration: Sometimes the patient is just breaking down in that arch and need support, probably why foot levelers became so popular and effective.













Velcro strap for patients with real instability at the fibula



GIVE YOUR PATIENTS HAPPY FEET



Fibula Adjusting

- Fibula-tibia junction, unless traumatically misaligned will respond to whatever the foot and associated muscle weakness pattern is occurring. SO, pronators usually sublux the fibula anteriorly And Supinators usually subluxation the fibula posteriorly. The other very common issue with that joint is that it becomes hypermobile, unstable and just needs to be approximated and taped (can do with whatever adjustments you elect).
- Phalanges: Axial pull manipulation works fine here. Just make sure the patient can tolerate the pressure required to hold the phalange. Older patients may not tolerate this adjustment very well.

How to select which muscle therapy to apply?

Tight Muscles: Stretching or fascial flush should take pain away.

• **Stretched Muscles:** Shortening the muscle should take pain away. Strain Counter Strain. Strength training.

• **Torn Muscle:** Compression should reduce the pain. Especially calf tears.

Treating lateral Ankle Pain

- The most common structures injured are deltoid ligament, peroneal muscle or tendon or retinaculum.
 - **Find the painful muscles and associated joints & FIX them.**
- These are Peroneal or Fibularis muscles and Fibula and Cuboid joints.
- Unless there was trauma the fibula usually misaligns according to the foot design or muscle weakness. Supinators and lateral foot weaknesses: fibula subluxes posteriorly.
- Pronators have medial weakness and typically the fibula subluxes anteriorly.
- Then comes trauma. Depending on the direction of the trauma the fibula can sublux one way at the ankle and another way at the superior tibial attachment. Adjust accordingly. If all you have is lateral weakness do not raise that patients arch with an orthotic.







Treating Rearfoot Patients

- Since heel strike is a must for walking rear foot pain is also common.
- Find the area of pain. See what local structures reduce the pain and or what lumbar nerve root is involved. If the pain is anterior to the calcaneus it will usually respond to fixing structures anterior to the calcaneus. If the pain is posterior than look to the talus and calcaneus and see if the achilles tendon, gastrocnemius or soleus are involved.
- If the pain is truly at the bottom of the calcaneus the patient may love gel heel cups which basically act as a cushion while you figure out the real issue.
- **If there is hypermobility in the rearfoot with pain (+draw sign) then you may want to shorten the foot with an appropriate adjustment and use kinesiotape. (bring the calcaneus anteriorly while raising the arch).**
- If there is a jammed talus there is nothing like an old fashioned pull move. Just accommodate the adjustment with a medial or lateral traction before manipulating.

Inflammation of
Achilles Tendon



CHECK YOUR PATIENTS SHOES!

This is frequently an issue. Patients have no idea what a good shoe is! Especially women! Quick Check. The two most important things to look for in a shoe are: **Strong counter** (rear heel structure) and **Torsional stability**. The shoe cannot be twisted easily especially in the forefoot. I recommend a closed rear shoe since that is the impact point when we walk. Open toe for a woman is OK if they have a closed rear. Look at your patient from the rear while they are in their shoes. You will be surprised at what you see. If the shoe is broken down, you will see it with them in it. The old days of wearing a shoe till you see your toes coming through is a very bad idea.







Using muscle testing as functional neurology to better assist you in treating the lumbar spine.

- First determine whether the muscular weakness is from a biomechanical issue in the foot or a nerve supply from the lumbar spine. If nothing you do mechanically to the foot brings the strength back it's usually a nerve from the lumbar spine.
 - Most common causes for weakness of the extensor hallucis longus muscle:

Lumbar nerve: *Innervation, deep peroneal nerve (L4, L5, S1)*, injury to the muscle itself, synergistic muscles tibialis anterior & posterior, metatarsal splaying, dropped navicular or cuneiform, plantar issues, weakness of the flexor hallucis longus.

- Most common causes for weakness of the peroneal group: Deltoid ligament tear, stretch, or instability, cuboid subluxation, fibula subluxation, myofascial issues, high heels, or arch supports that are too high. Why would increased arches be a problem?

CONDITIONS THAT YOU CAN TREAT

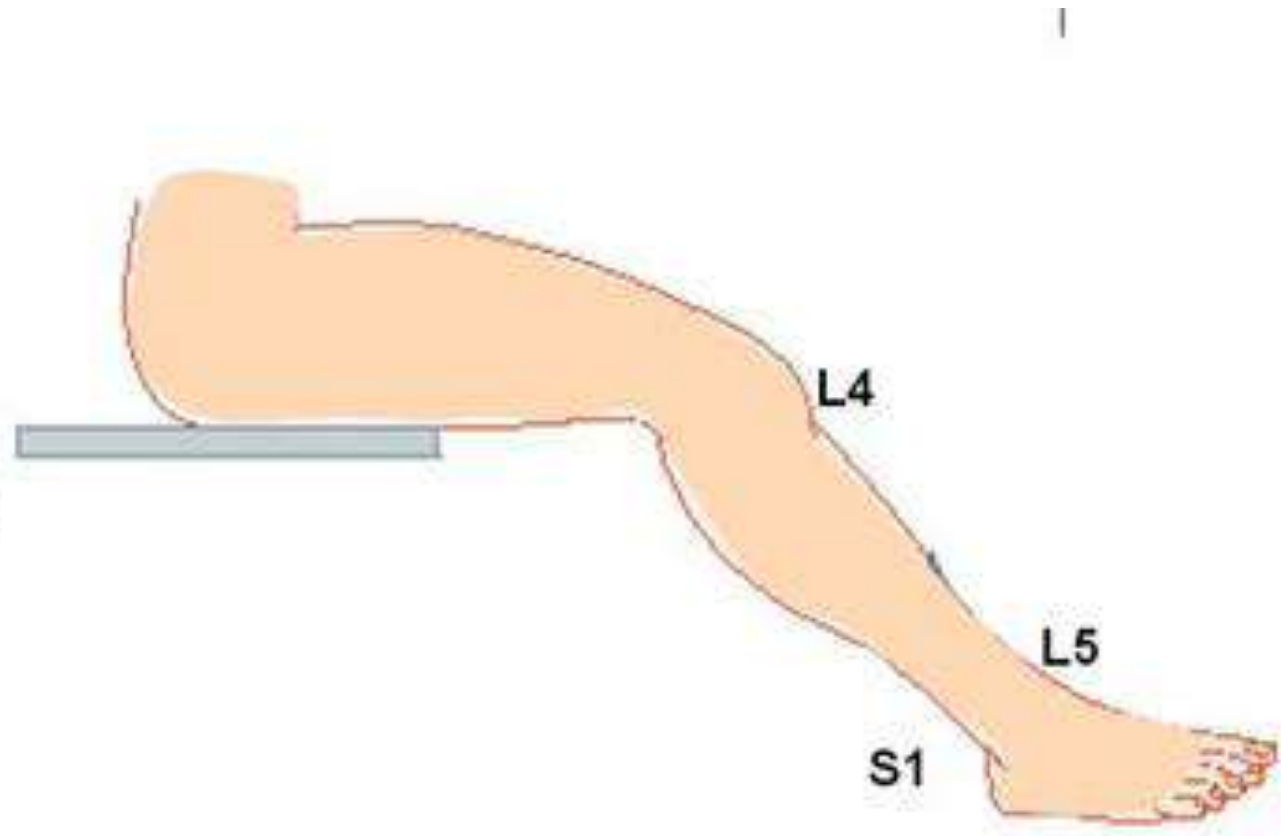
- Plantar Fasciitis
- Heel Spurs:
- Foot and Ankle Sprains and Strains
- Neuromas
- Metatarsalgia
- Tarsal Tunnel Syndrome
- Peripheral Neuropathy
- Bunions: Hallux Valgus (Show typical pictures)
- Bunionette: Tailor's Bunion 5th metatarsal deviation usually from tight shoes and rubbing

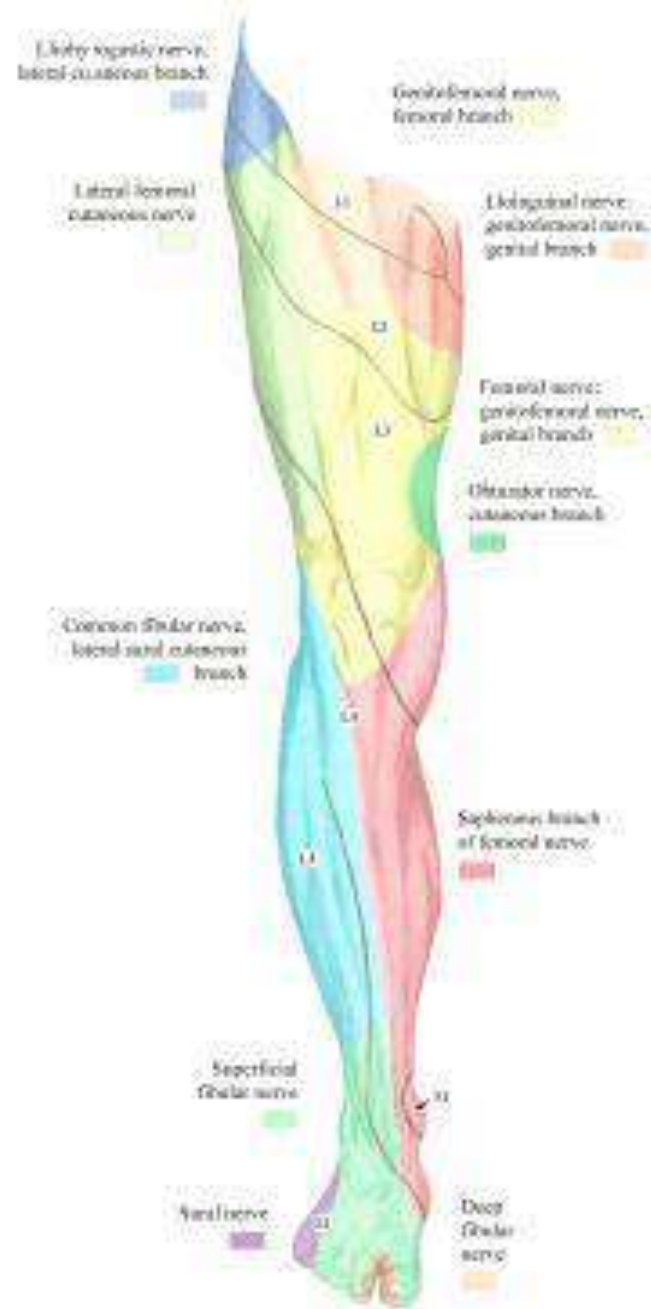
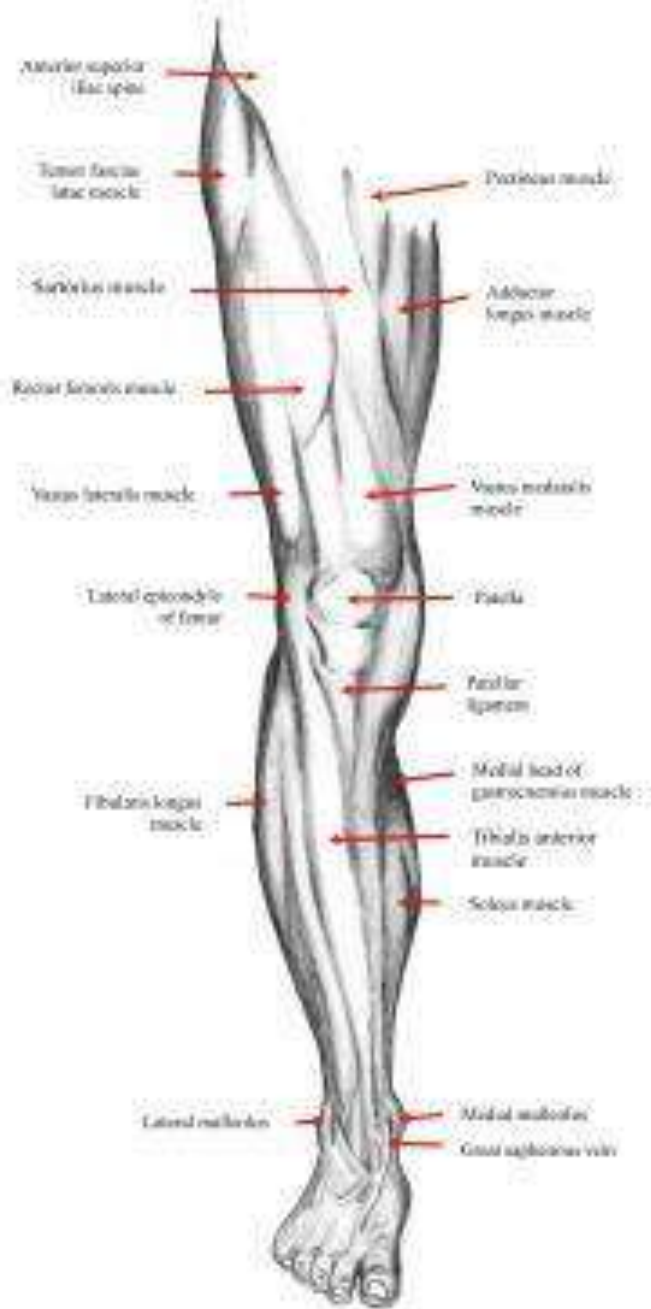
Bunions



Use manual muscle testing to evaluate nerve root and disc involvement

- L4
 - Leg extension at knee
 - Patellar tendon reflex
- L5
 - Dorsiflexion at ankle
- S1
 - Plantar flexion at ankle
 - Achilles tendon





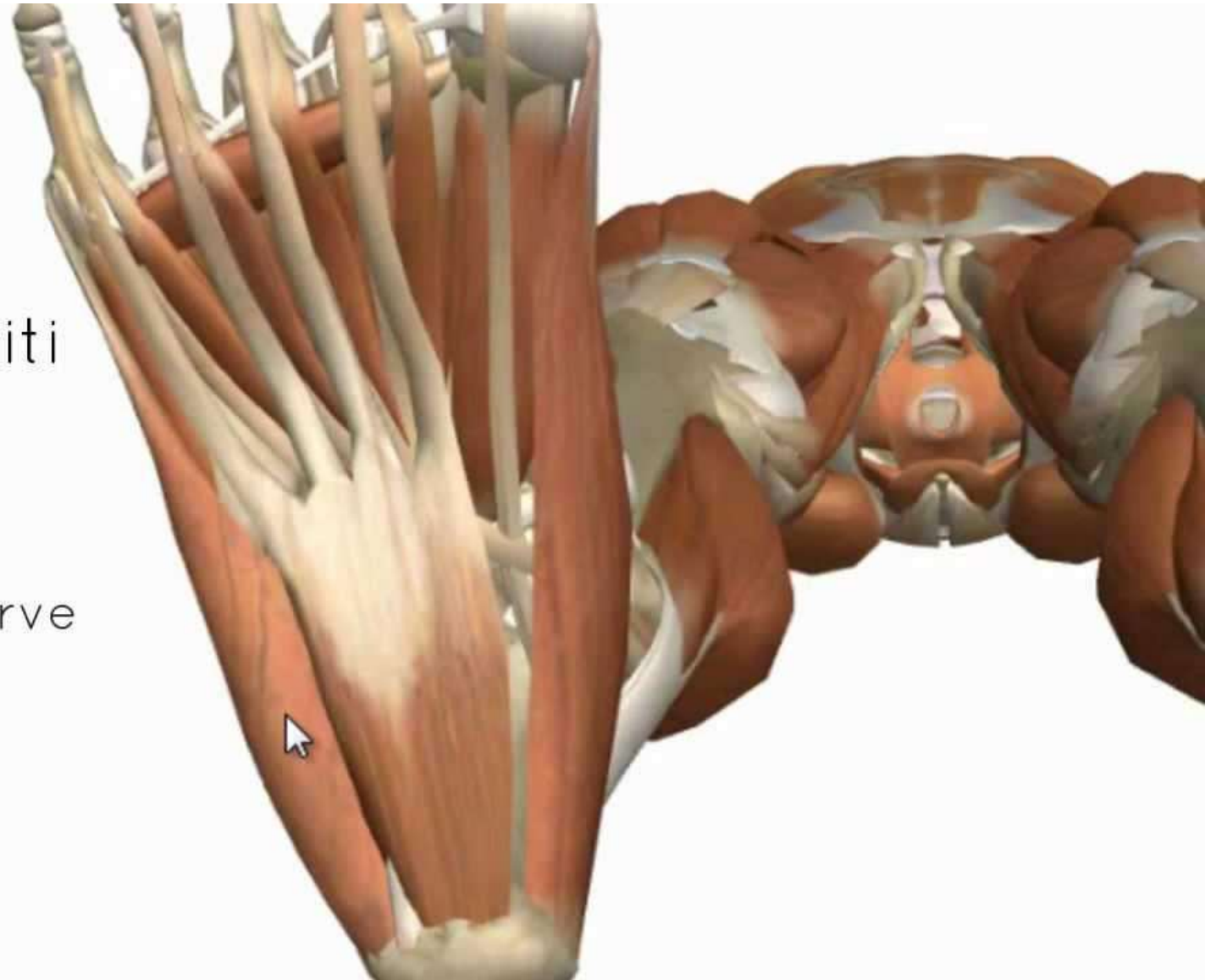
Treating Plantar Fasciitis

- Like Carpal Tunnel, people think that all pain in the foot is plantar fasciitis.
- Locate the pain first. If it is in the plantar fascia find out what you can do to reduce pain. Does stretching or shortening take the pain out. The only other possibility is, if there is a fascial tear then compression of the structure takes the pain out. This applies to ALL muscles.
- You may find that the reason for many plantar fasciitis cases is what I call the last man standing effect. Since some or all of the other supporting structures have failed you now have a tendonitis of the fascia because it could not do all the work without becoming inflamed.
- Check all the joints as they relate to the musculature and adjust them. Work on all musculature that did not strengthen to the adjustments. You can also employ fascial release work, laser and Kinesiotape.

Plantar Fasciitis

abductor digiti
minimi

lateral plantar nerve



Prominent Tendons & Fascial Accommodations



Plantar Fascia



What is a heel spur and why do we develop spurs at this location?



Nutritional Therapies: Injury Recovery

- Anti-Inflammatory dysfunction: OVER TRAINING
- Adrenal exhaustion, injury, lack of sleep, poor diet, stress, mal absorption, lack of exercise, genetics, toxic chemicals-metals or non metals, allergies, etc.. Try using Curcumin, Vit C, adrenal support AM or PM explain, essential fatty acids, ice or use whole body cryo-therapy. Don't recommend you detox an injury patient until you make progress unless you have to.
- Poor muscle healing: Protein deficiency, anemia, vegetarian or vegan, decreased hormone levels, real tears !
- Significant injuries: Bone damage or bruising (edema seen on MRI) requires bone growth which is dependent on many things. Minerals, vitamin D. Use a bone building formula (osteoven)

Adrenal Stress, Exhaustion & Pain

- Checking blood pressure from lying down or sitting to standing is a simple method. Blood pressure should rise when you rise.
- There are 3 stages of adrenal fatigue and you may see different pressure readings in each.
- **ALARM PHASE:** Reaction to Stressors our body produces higher adrenaline, norepinephrine, cortisol, DHEA and insulin.
- **RESISTANCE PHASE** Body produces stress hormones at the expense of sex hormones. Pregnenalone steal.
- **BURNOUT** Both stress hormones and sex hormones are failing along with neurotransmitters. Depression, irritability, fatigue.

Dietary Models and Preferences

- **Paleo-Diet:** Removes grains, dairy, sugar and lower sugar fruit. Benefits are in the fat burning and removal of excess calories areas. Many patients lose weight just by getting them off carbs. Down side is that if you have a kidney deficient patient and you load them with high protein they can become worse (stones, prostate, etc.)
- **Mediterranean Diet:** Very popular since patients can eat carbs.
- **Athletic Performance:** Some of us are different genetically and require higher carb consumption for prolonged exercise.

Can patients get to sleep & stay asleep?

- Can't get to sleep- Usually means they are too stimulated. Find out what is in the cause. Too much caffeine is common, too much sugar, emotional stress, etc.
- Can't stay asleep is different. It may mean they are eating a heavy acid diet, too many oxalates (spinach and nuts), medications, toxicity, allergies, etc.
- The acupunctural liver meridian peaks from 1-3 AM, which is probably the most common wake up reported by patients. So fix the liver imbalance. Whatever that is.

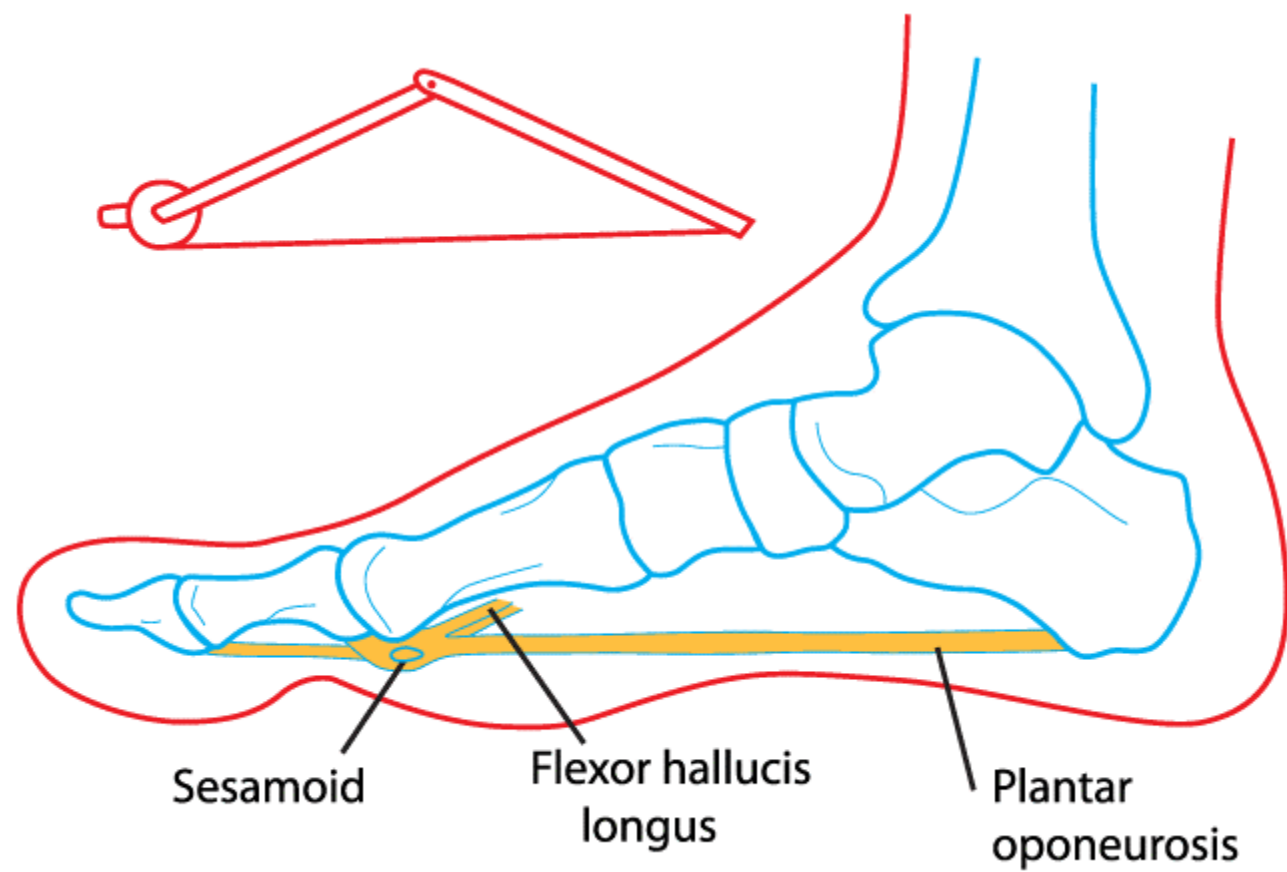
CRYOTHERAPY



Absence of windlass mechanism

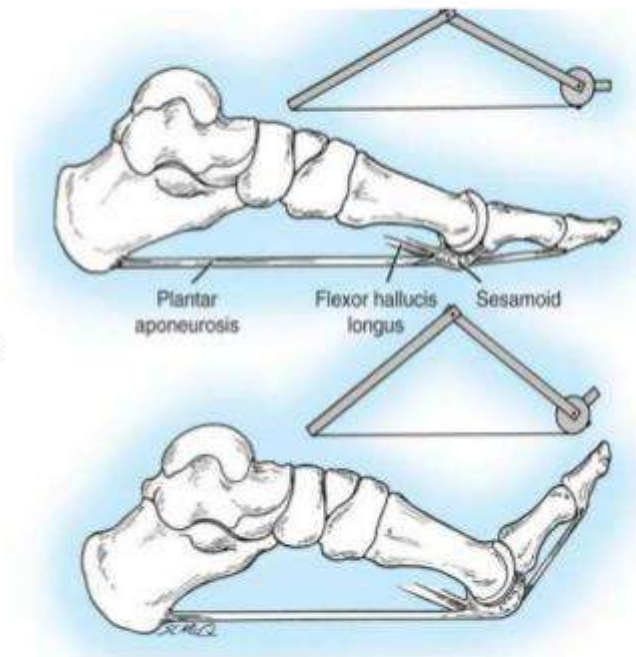
- During propulsive phase of gait cycle dorsiflexion of the 1st mtp will occur.
- That's winds the plantar fasciis around the head of the meta tarsal causing calcaneal inversion, shortening the truss, and lead to subtalar jt supination.
- Absence of this mechanism affects the subtalar jt supination that will lead to plantar fasciis.

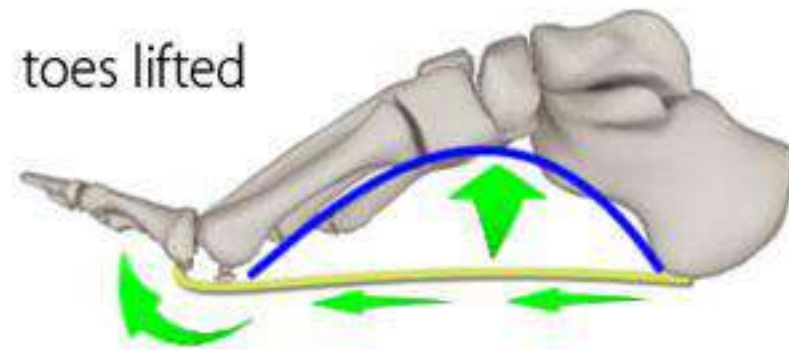
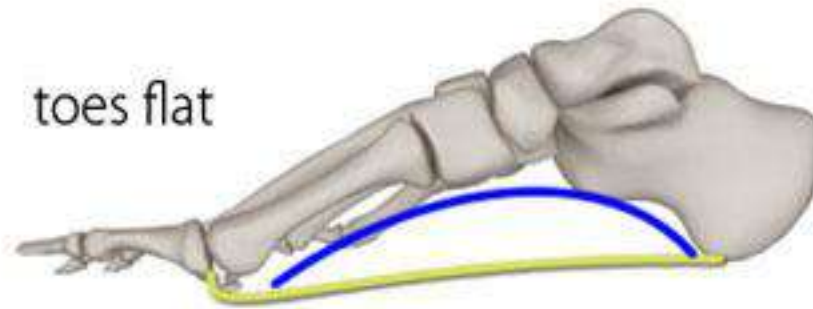




Windlass mechanism of the plantar fascia

- As the toes are dorsiflexed plantar fascia is under constant traction as it is pulled distally around the metatarsal heads (drum of the windlass).
- This tightening elevates the longitudinal arch, inverts the hind foot and externally rotates the leg. This mechanism is passive and depends entirely on bony and ligamentous instability.

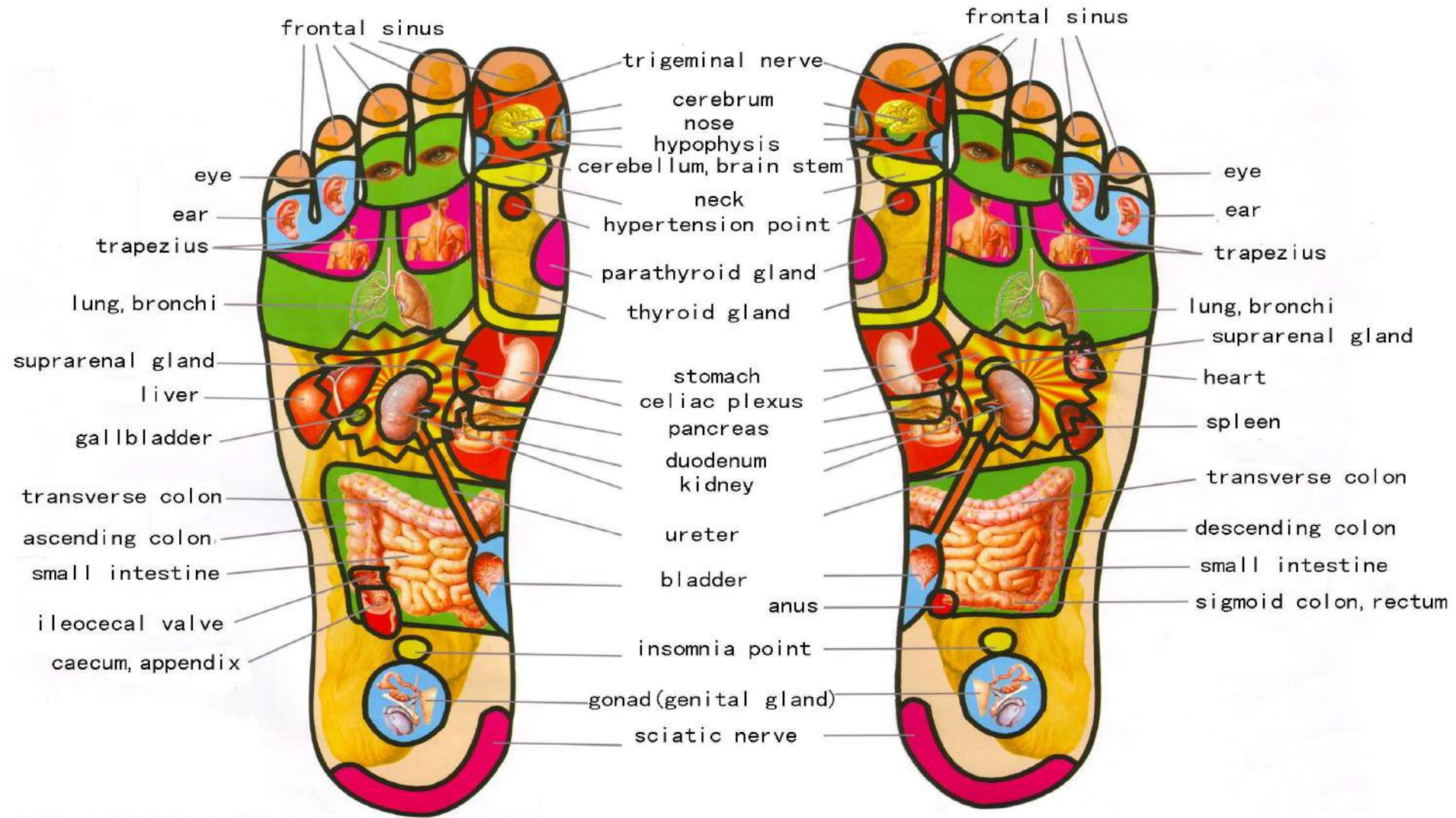




Growth Plate apophysitis



FOOT REFLEXOLOGY



Your feet can reveal many things about you. For the purpose of this lecture we will take a one minute fanciful look at what your feet reveal about your personality and then stick to the mechanical factors.

BASED ON THIS,
WHAT ARE YOUR ROOTS?



Egyptian

1



Roman

2



Greek

3



Germanic

4



Celtic

5

FASCIAL CHAINS

Fascial chains function in a specific pattern and can explain why adjusting a navicular (medial) joint of the foot can have a facilitating effect on the gluteus medius (lateral) muscle.

There is *Synergy* between the extensor hallucis longus and tibialis anterior and posterior muscles (peroneal nerve L4-5-S1) like any other fascial chain in the body.

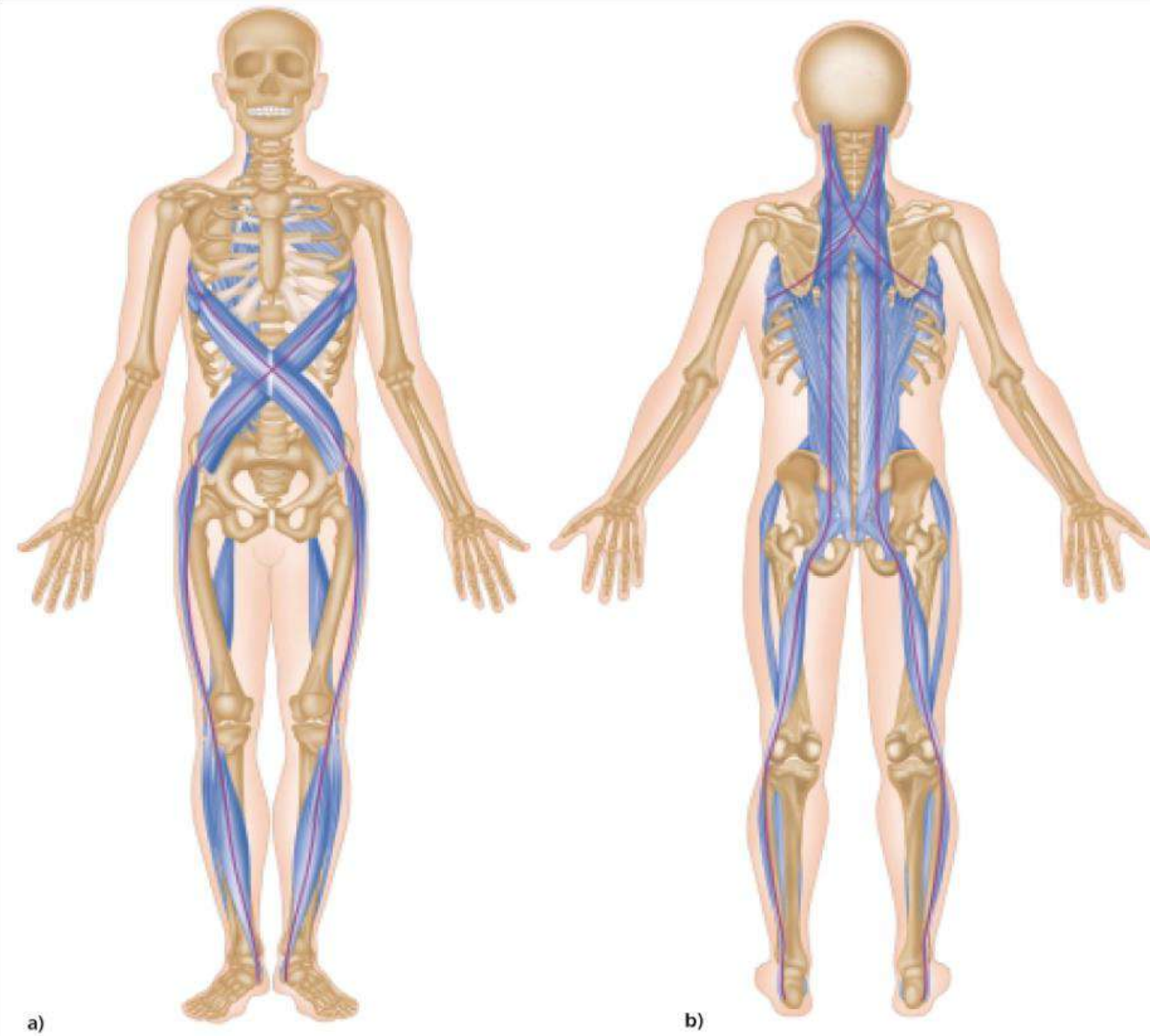


Figure 8.16: The Spiral Line (SL); a) anterior view, b) posterior view.



The Spinal Region of the Muscular System
Illustrated by
Katherine M. Mendenhall

Spiral Line



Padding & Kinesiotaping



KINESIOTAPE

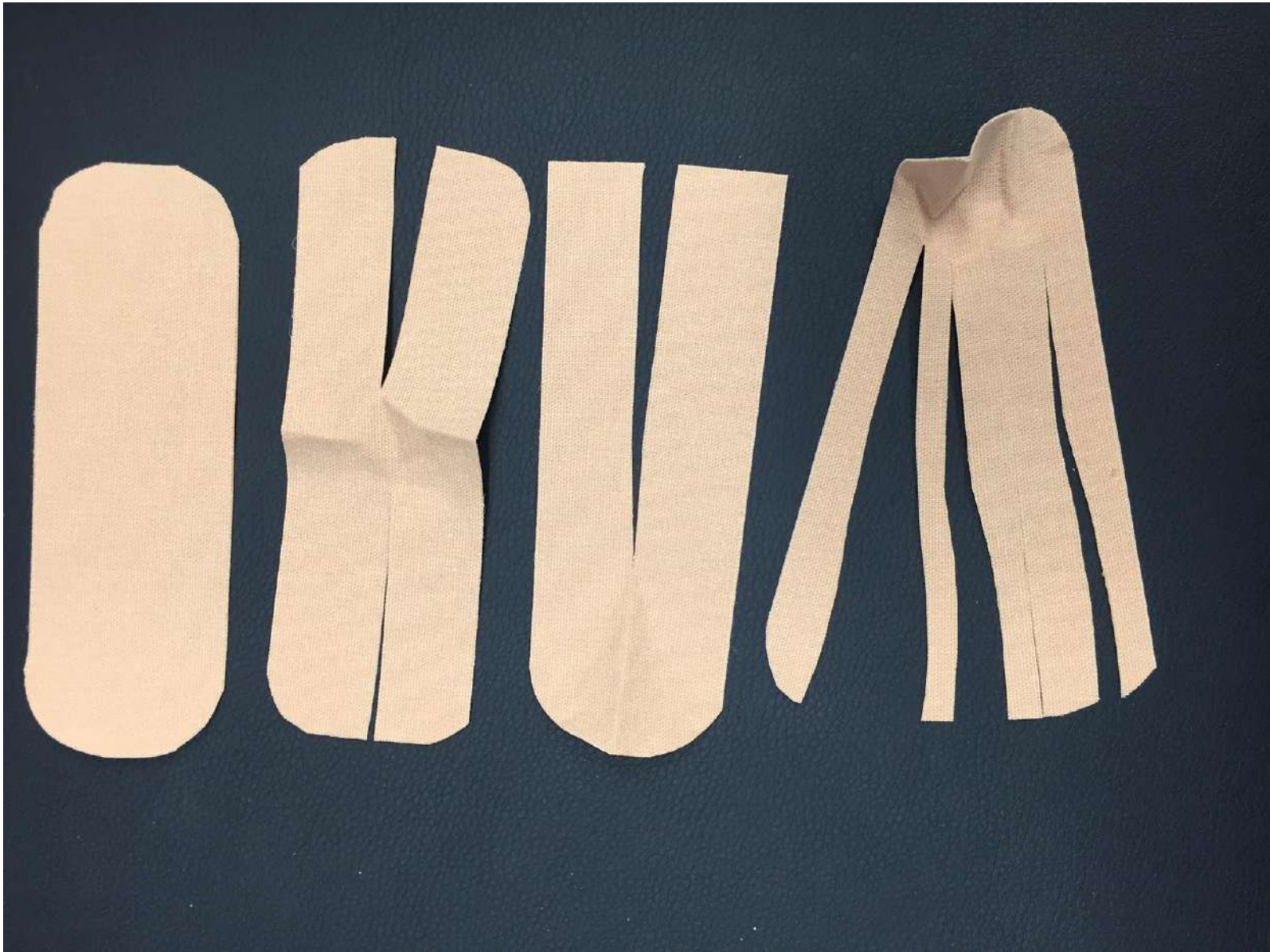
was developed by *Dr. Kenzo Kase* In Japan in 1979.

Kinesiotape has similar stretch capability as your own skin. So, it works with your skin and musculature. It does not work like the old adhesive tape. Adhesive tape has a place but for our offices I prefer Kinesiotape.

If you are on the athletic field, and treating acute injuries where the athlete has to go immediately back onto the field or you need more complete immobilization you should still use adhesive tape.

The following is a current theory of how Kinesiotape works.

The Kinesiotape pulls the upper layers of skin, creating more space between the dermis and the muscle. The space created is believed to relieve pressure on the lymph channels in the area between the muscle and the dermis, creating more space for lymph flow and thus better lymph drainage through an affected area. Most of us do not check for and correct skin reflexes, after all the skin is frequently injured in trauma along with the deeper tissues, so taping is a great alternative.



This space also houses various nerve receptors that send specific information to the brain. When the space between the epidermis and the muscle is compressed, such as during an injury, these nerve receptors are compressed and send information to the brain regarding continuous touch, light touch, cold, pain, pressure, and heat.

This information causes the brain to send out certain signals to the body on how to react to particular stimuli. So, by today's terminology you could call Kinesiotaping a brain based therapy.

Kinesiotape alters the information that these receptors send to the brain and causes a less reactive response in the body, allowing the body to work in a more normal manner and removing some of the roadblocks that normally slow down the healing process.

Kinesiotape can affect deeper tissues in the body. Increased space theoretically allows muscles greater contractility, which in turn pushes more fluid through the muscle, resulting in better muscle performance. The end results are believed to be reduced muscle fatigue, increase in range of motion, and better quality of muscle contraction.

Kinesiotape is used to improve joint alignment by affecting the muscles and fascia, and can reduce poor function of a joint by influencing opposing muscle groups and joint mobility.

Fascia and lymph have an intimate relationship with each other. Fascia is a material that divides and separates the muscles and internal organs and helps to provide support against gravity in some parts of the body. Lymph removes fluids and chemical substances in the muscles. Lymph channels pass through fascia between the bone and the muscle and superficially between the skin and the muscle. Lymph ducts range in size from smaller than a hair to 2 cm lymph nodes. Major lymph channels can be found in the groin, neck, and armpits.

The working model gives rise to the basic theoretical concepts of the Kinesiotaping Method. There are six basic concepts of the Kinesiotaping technique called corrections. They are: mechanical, fascia, space, ligament/tendon, functional, and circulatory/lymphatic. Mechanical corrections are used for improved stability and biomechanics. Fascial corrections create or direct movement of fascia. Space corrections are used for decreasing pressure over a target tissue. Tendon/ligament corrections decrease stress on a ligament or tendon. Functional corrections provide sensory stimulation to either assist or limit a motion. Circulatory/lymphatic corrections help move lymphatic fluid from more congested to less congested areas.





PARTS OF AN ORTHOTIC

- Medial or lateral flange or clips: Pronators or Supinators
- **Fascial Accommodation:** I enlarged this component because it is why many patients hate all orthotics. The patient has a prominent fascial tendon, checked with the patient in full dorsiflexion. The patient will not tolerate typical hard orthotics though they usually tolerate soft materials as they are more forgiving. Picture the tendon hitting the arch on impact.
- Rear foot posting: corrects valgus or varus rearfoot misalignments.
- Metatarsal pad or bar (positioning is crucial). Especially good if the patient has lost their fat pads (common as you age).
- Forefoot extensions: most common 1st metatarsal but 5th as well.
- Morton's extension: A rigid Morton's extension is essentially a continuation of the orthosis beyond the first metatarsophalangeal joint (MPJ), extending to the tip of the toe. In cases of hallux rigidus, this rigid extension can act to limit any remaining first MPJ motion that may be leading to pain.

Orthotics- continued

- Cut-Outs: 1st met head. This would accommodate a fixed 1st met plantarflexion and allow functional movement of a flexible 1st met plantarflexion whilst supporting a varus forefoot.
- Using 1st and 5th met head cut outs also acts as a transverse arch support used where you think it would work better than a bulbous metatarsal pad.
- Heel Cups: Helps control rear foot movement and lateral weakness. Can combine with Rear foot posting.
- Think about using foot orthotics with any chronic lumbar , pelvic or lower extremity case. Especially sciatica! I also use them on ALL of my neuropathy patients.

ORTHOTIC MATERIALS:

- HARD VS SOFT:

- Hard orthotics hold their shape forever which is sometimes better for heavier patients and soft may be more comfortable but have to be refurbished yearly especially if the patient is heavy.
- Here are your concerns. If the foot is hypermobile and you need to control movement hard may be better. But if you have a sensitive patient try putting a soft cover of spenco over it to soften the impact. IF you know the patient probably won't tolerate hard orthotics, especially if they had them before and refused to wear them, use soft. There are many different types of soft materials.
- SOFT: Ranging from diabetic EVA Puff or aliplast and crepe to leather.
- HARD: Range from semi flexible subortholene to semi rigid polypropylene and rigid graphite.
- Find an orthotic lab to work with. Refer to my Lab Slip for ease of ordering. Remember call your lab they are very helpful and would love to have you as a customer.

MOLDING AN ORTHOTIC

- Whether you use foam, plaster or computerized touch pads your goal should be foot stability for the desired foot task. You can use foam molds if you measure the corrections that you really need and relate that to your lab so they can manufacture the orthotic correctly. My personal favorite is still plaster casting in a non weight bearing position. Still many docs prefer foam molds. Fewer errors means happier patients and you get to spend more time doing what a chiropractor should.
- You should be able to trust your lab! When in doubt call them after they look at the molds and discuss the correction you are thinking. Things like age, weight and shoes are crucial.
- Hard to fit shoes or patients. You can actually mold the patients foot in their shoes by using a plastic bag over the plaster before you put them in the shoe.
- Fit the orthotics properly and double check your work.
- You must see the patient and make sure they fit. Every now and then I will have a travelling patient and go without it. And every now and then it's a nightmare!
- You should do a 2 week follow up to make sure they are working the way you had intended.

Knee Treatment

- **Acute versus chronic.**

- MRI's are valuable since X-Ray rarely shows anything but joint degeneration. It helps to know how much damage there is and whether meniscus are torn, articular cartilage, etc. If you don't have an MRI and things are taking longer than expected you are probably looking at **cartilage or boney edema**. You must keep these athletes from aggravating it during the healing process. Good luck.
- If the patient is very swollen you must get the swelling out first or refer to have the knee drained. Discuss this with the patient. They will have a preference. Draining the knee can save you 2 weeks of icing and electrotherapy and anti-inflammatory nutrients . So if time is of the essence consider being more aggressive.
- You usually cannot put a knee brace on a swollen patient so use lymphatic Kinesiotape.
- Determine where the injury is medial, lateral, anterior or posterior. Is it all muscle or ligaments involved, meniscus or articular cartilage. Palpate for pain and relief of pain, perform orthopedics. You may or may not want to manipulate an acute injury.

Biomechanics

- Knee is basically a hinge joint
- More complex as it rotates as well
- During extension-tibia rotates externally to lock knee in what is known as a screw home mechanism

Squat Test: Can you critique the form?





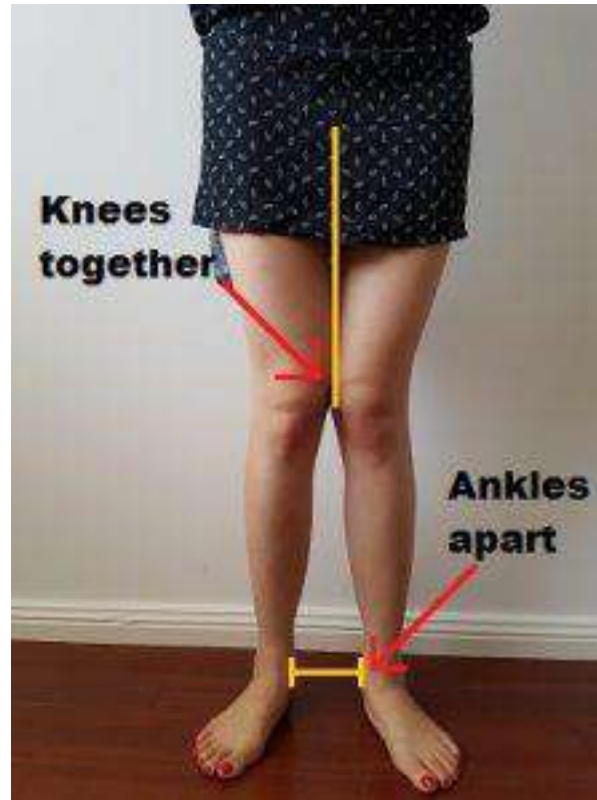
Introduction

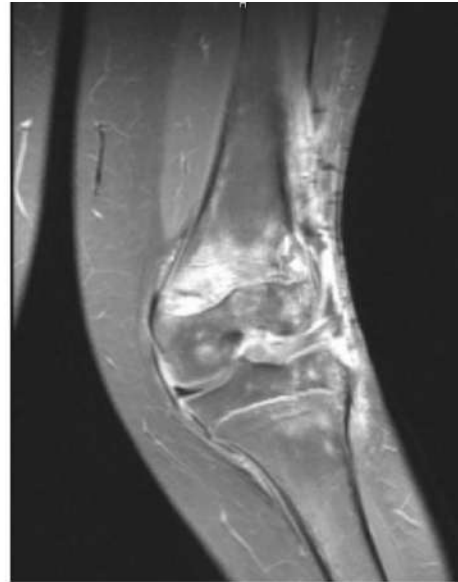
- The knee is a mechanism of **three joints and Four bones** - the femur, tibia, patella and fibula
- Interact in **separate joints** - the tibiofemoral & patellofemoral
- The function of these joints is to allow certain movements, restrict others, and to provide load transfer through the lower limb.

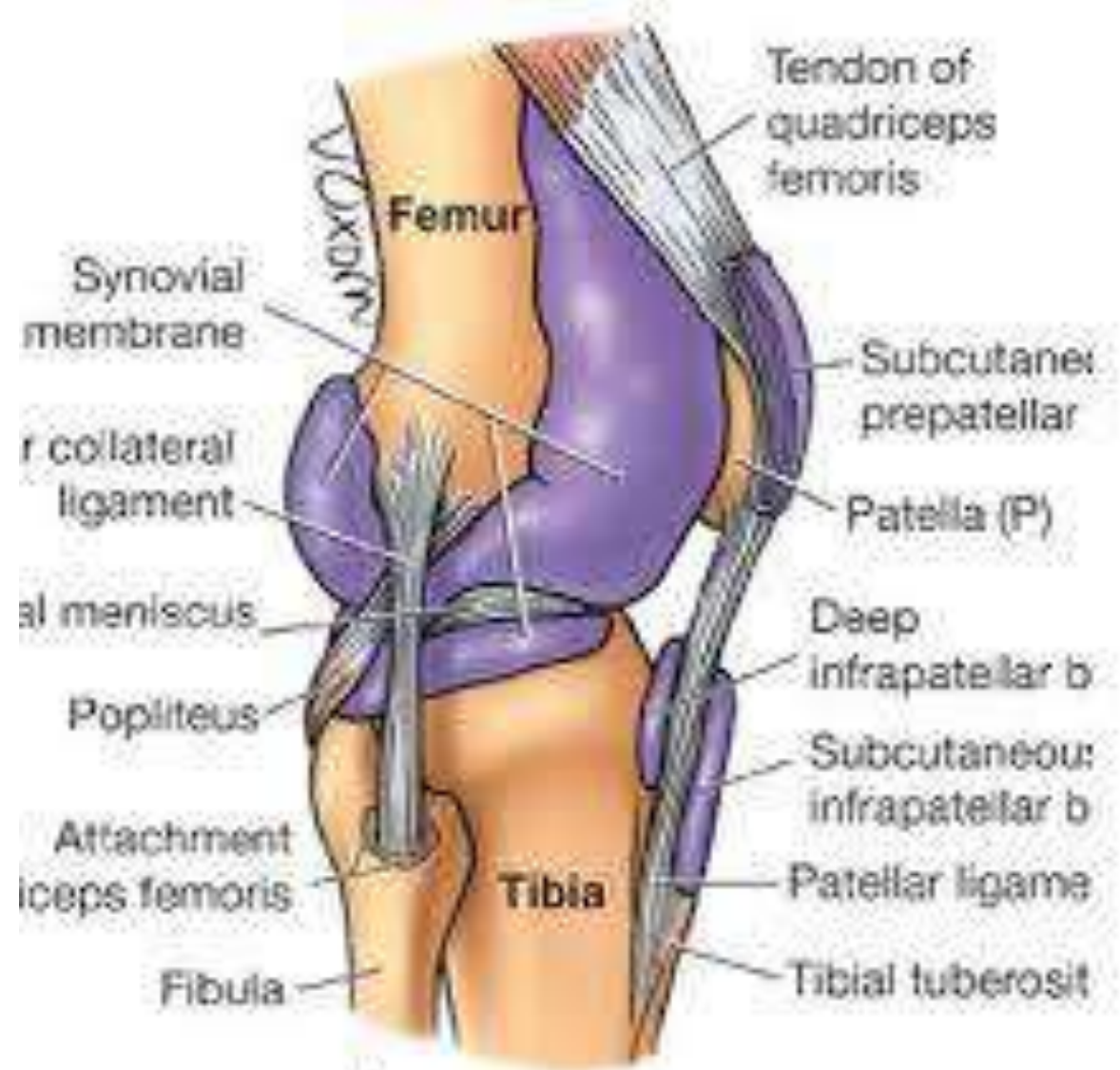
Knee Effusion



Knee Valgus: Very common







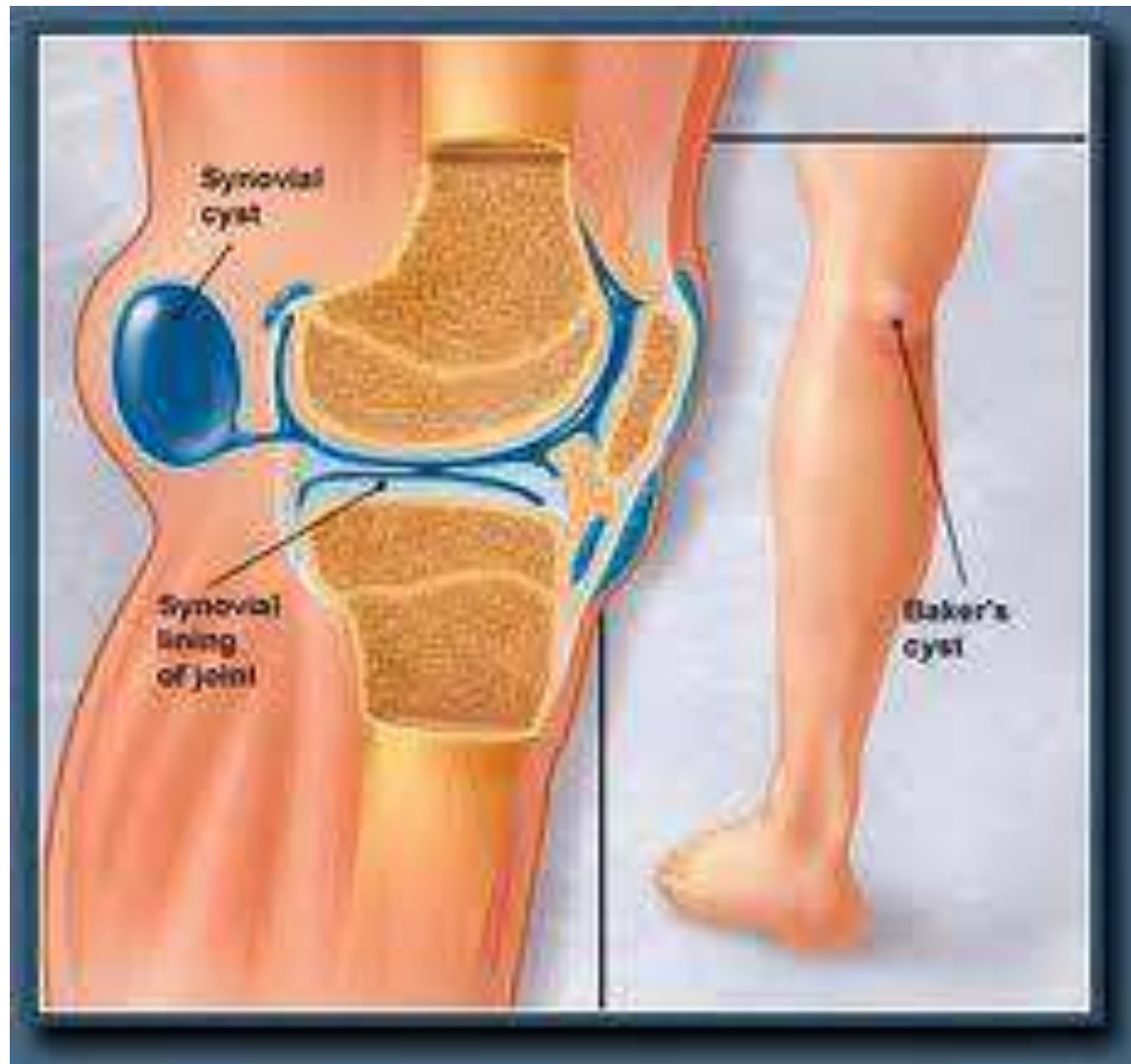
Tendon of quadriceps femoris
 Femur
 Synovial membrane
 Subcutaneous prepatellar
 Patella (P)
 Anterior collateral ligament
 Posterior collateral ligament
 Medial meniscus
 Popliteus
 Deep infrapatellar b
 Subcutaneous infrapatellar b
 Attachment quadriceps femoris
 Tibia
 Patellar ligament
 Tibial tuberosity
 Fibula

A Lateral view

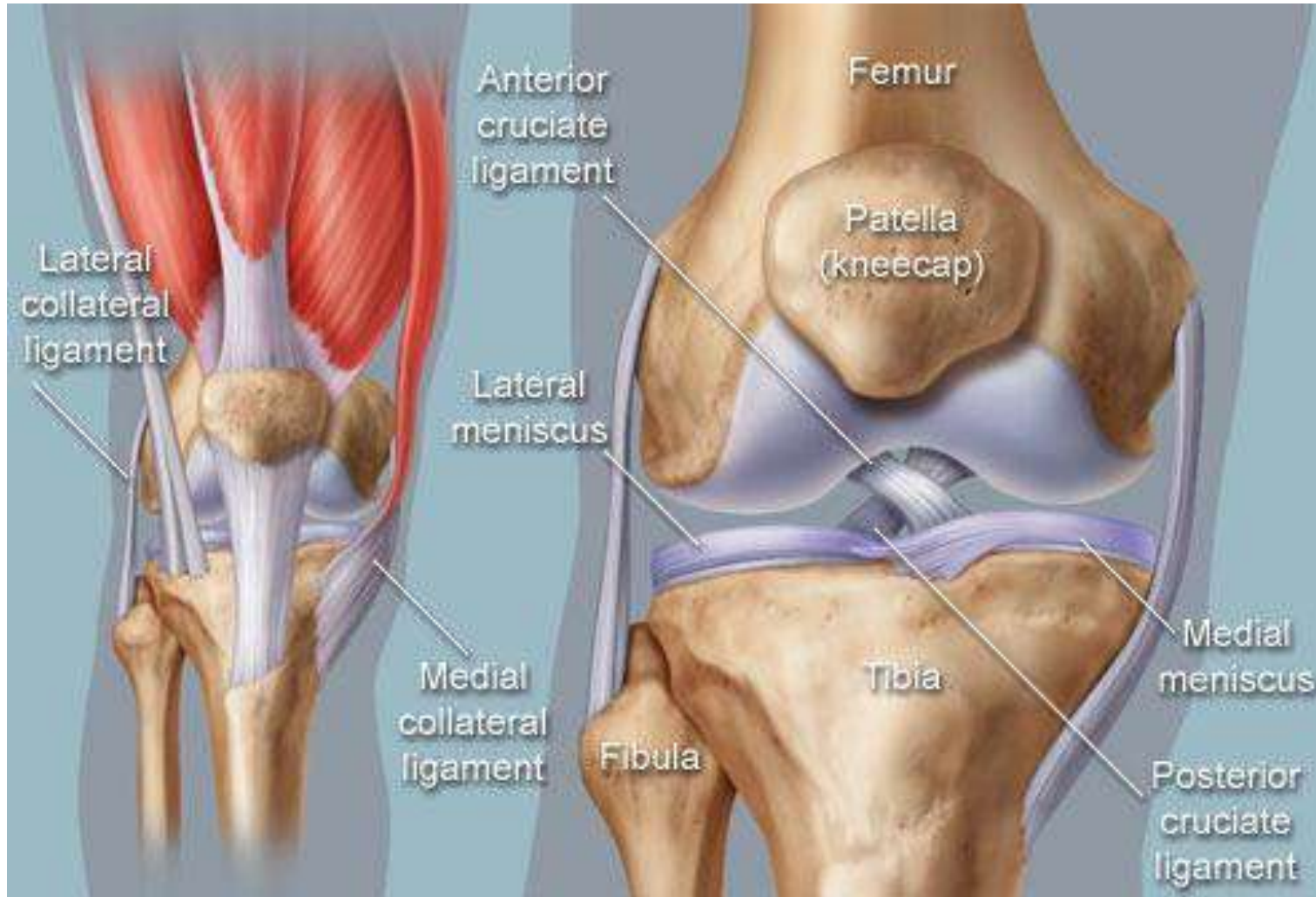
Prepatellar Bursitis



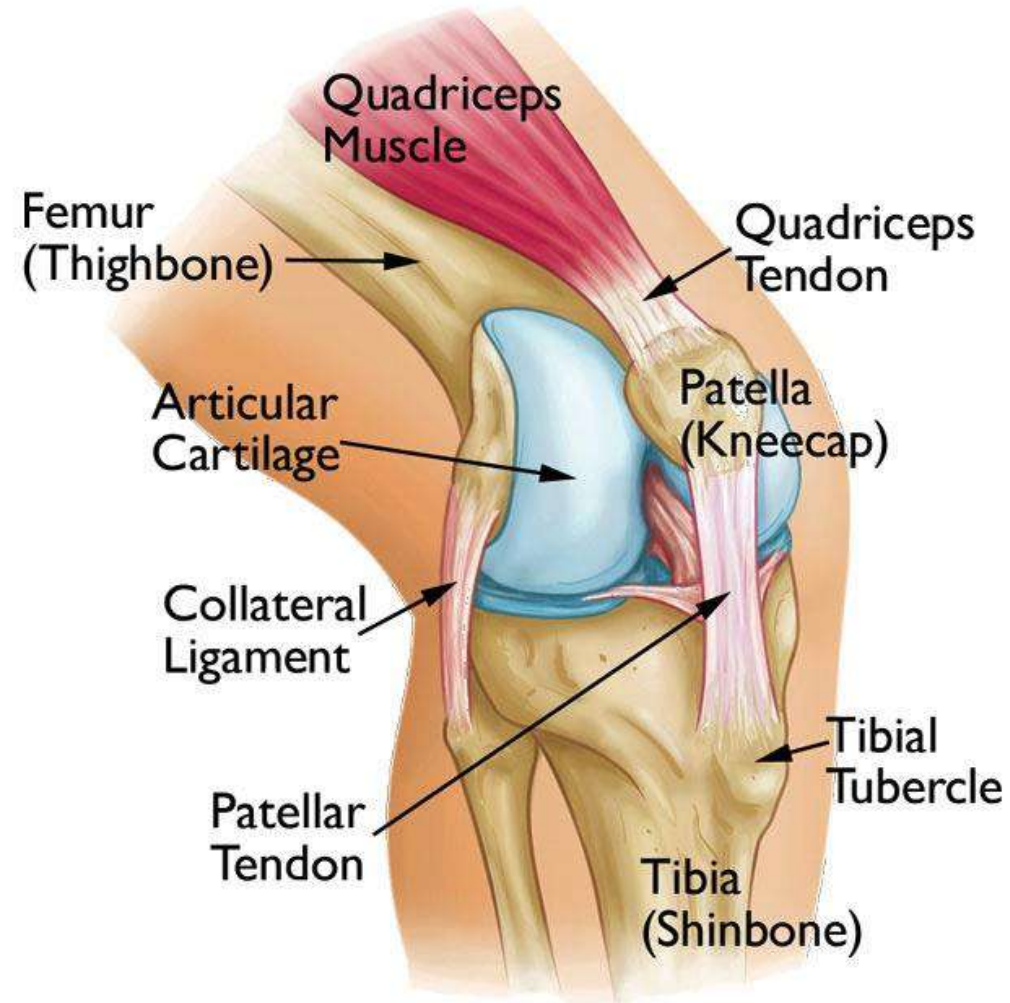
Baker's Cyst



Knee: Anterior View



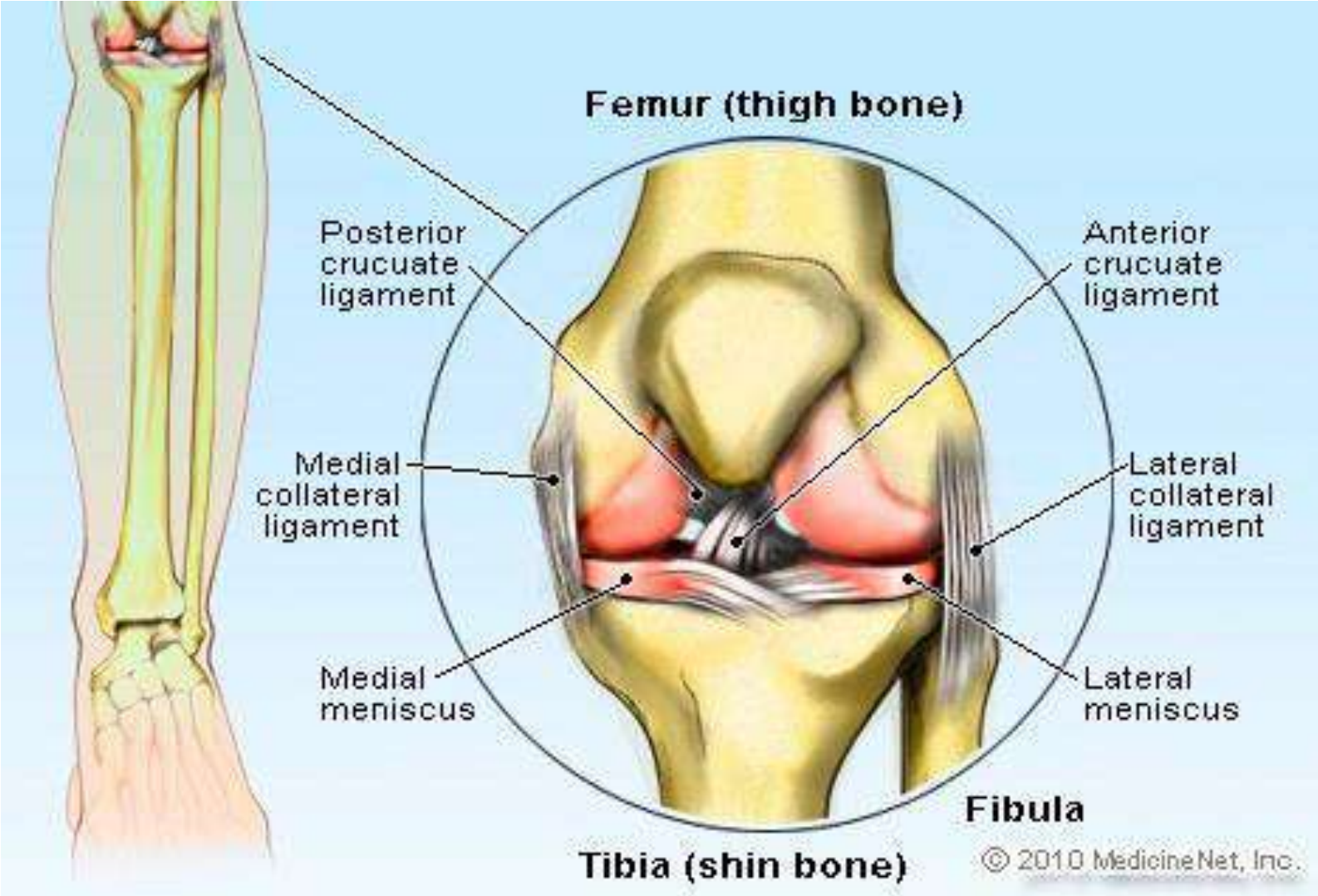
Knee Anatomy



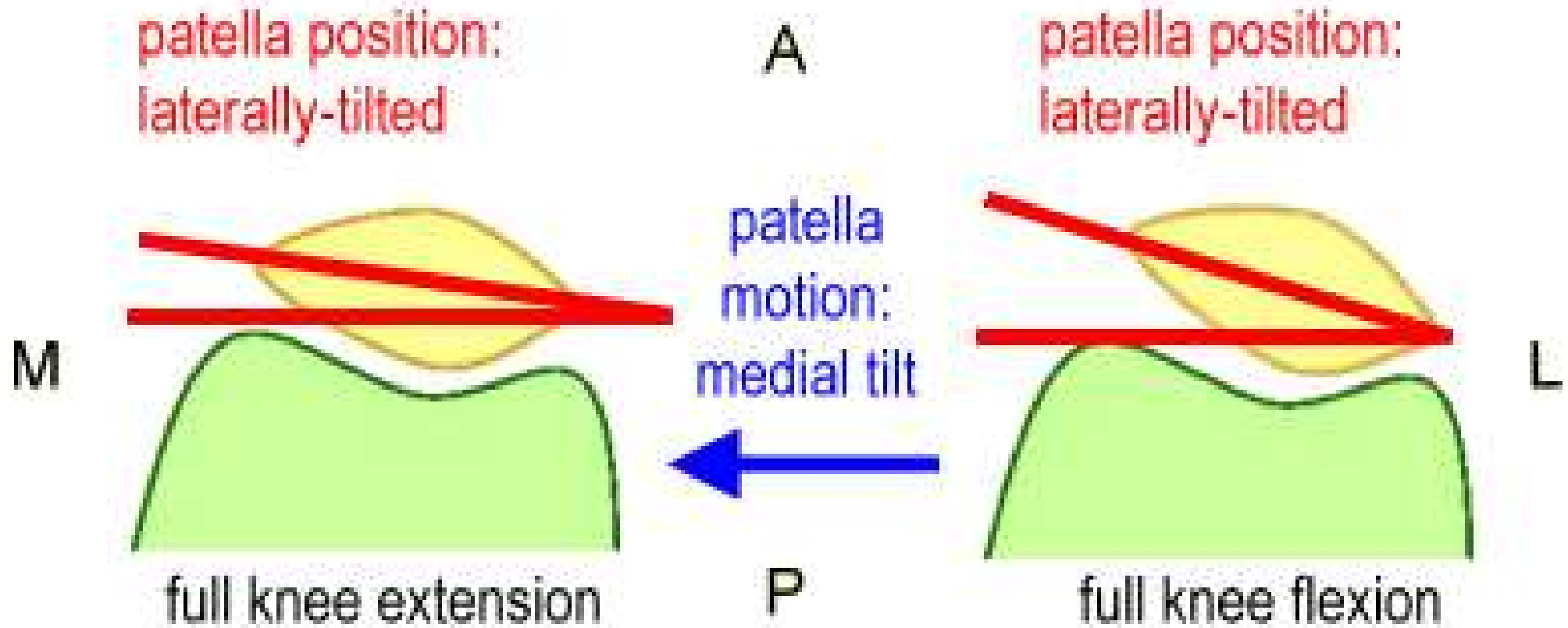
Knee Pain Location



Knee Joint



X-Ray View: Sunrise



Patella Tilt (Axial View)



What adjustments are you going to do first?

Where's the pain and what takes the pain out? Flexion, extension, anterior and posterior draw, then rotate the knee while flexing it to see which is better. Whichever position take the pain out will help guide your adjustments. Palpate directly over all ligaments and if involved, treat accordingly. Laser, ice, tape, bracing, electrotherapy etc..

Patellar tracking issues.

Most commonly involve VMO, adductor, gracilis, sartorius or other medial weakness and can be aggravated by a valgus angle or flat foot. They will also have ITB issues?

Posterior Pain

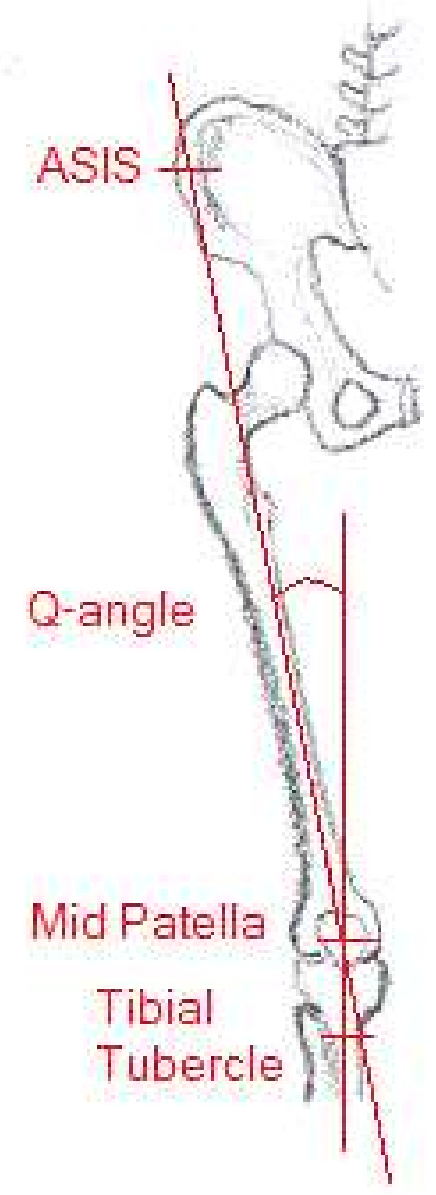
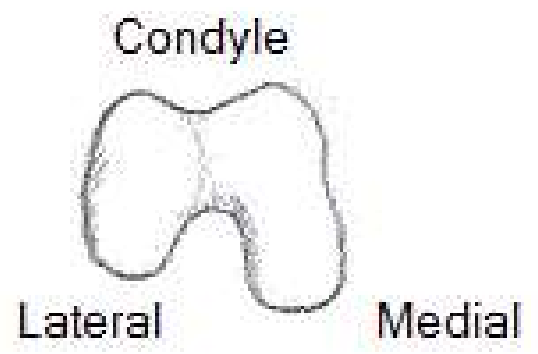
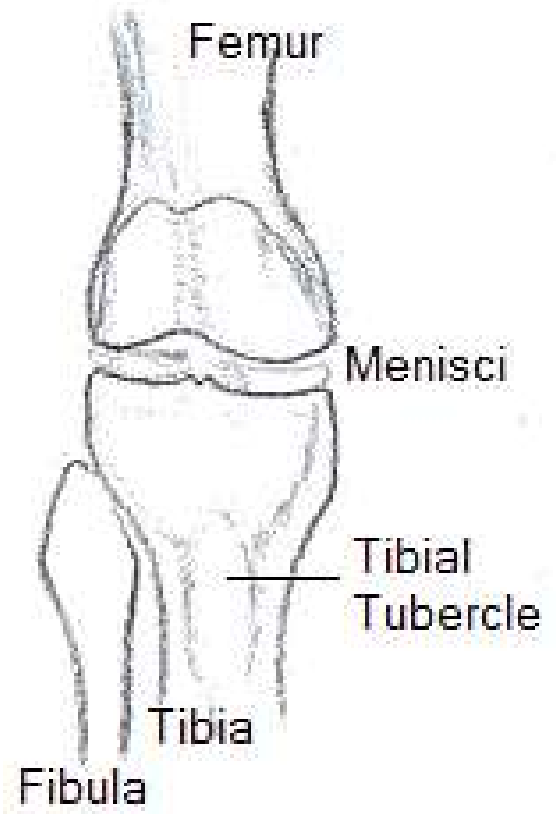
When the knee pain is posterior you may be looking at a bakers cyst or 'myofascial issue that involved hyper extension injury especially popliteus. Consider checking the entire pelvis as a three dimensional misalignment along with the pubic joint. This can often resolve the posterior knee pain fast. Remember to check all posterior leg and calf muscles.

See pictures that demonstrate anterior tibia drop adjustment as well as all others.



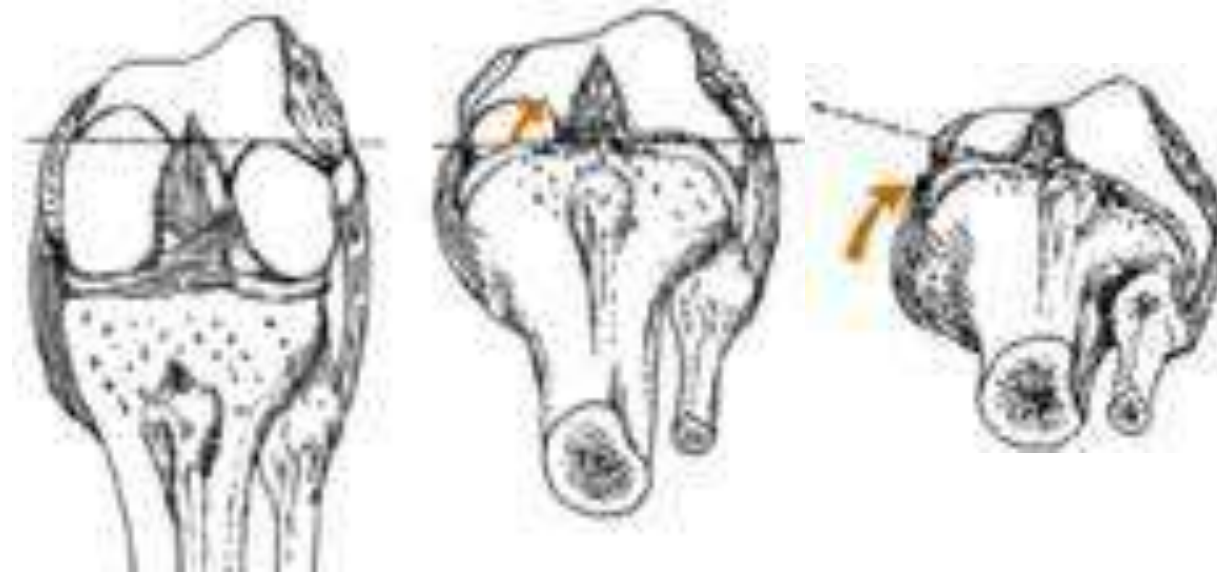
Upper Fibula joint Adjusting

- The fibula has an arthrodial joint between the lateral condyle of the tibia and the head of the fibula. The contiguous surfaces of the bones present flat, oval facets covered with cartilage and connected together by an articular capsule and by anterior and posterior ligaments. I mention this in greater detail because it is often overlooked.
- Determine what direction corrects the joint misalignment and adjust accordingly. I prefer drops or instruments and when necessary use Velcro straps or kinesiotape if chronic or hypermobile.



Screw Home Mechanism of the Knee

Femur rotates internally and medially during last 30 degrees extension and externally and laterally on flexion

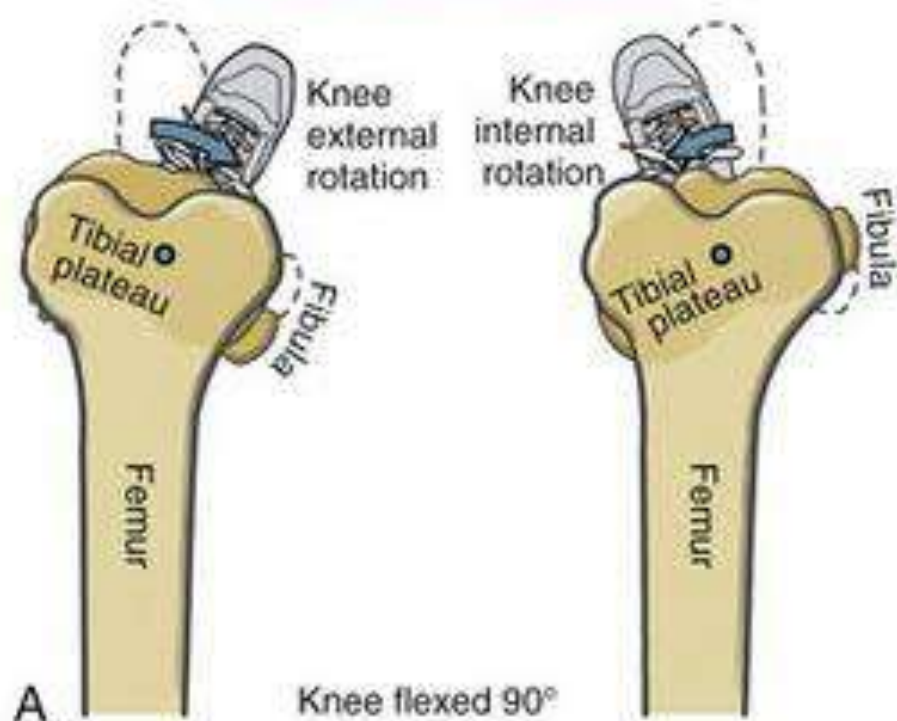


“Locking” the Knee and Popliteus Muscle action to “Unlock” the Knee

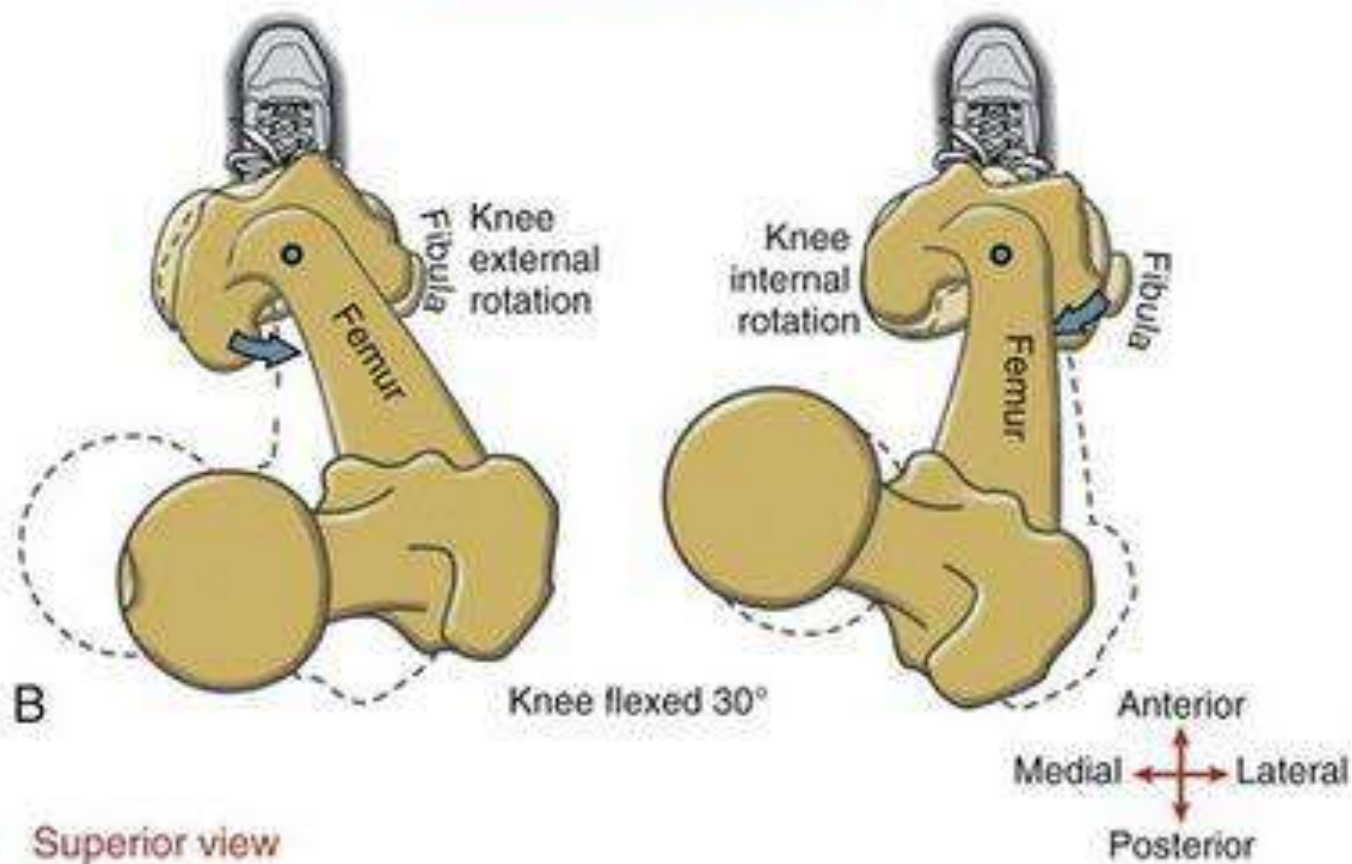
The “screw home mechanism” is the process by which the knee is locked into extension by rotating the tibia externally (if the foot is free—as if kicking a ball) or by internally rotating the femur (if the foot is fixed/planted—as if moving from sitting to standing). Remember, the knee joint is a *modified* hinge joint because it allows for some rotation. In order to unlock the knee from extension to move into a flexed position, the **popliteus muscle** is needed. When the popliteus muscle contracts during knee flexion, it unlocks the knee by internally rotating the tibia (when the foot is free) or externally rotating the femur (when the foot is fixed/planted). The illustrations above help show the screw home mechanism by which the knee joint is locked into extension and also how the popliteus unlocks the knee from an extended position to allow the knee to flex.

Internal and external (axial) rotation in the horizontal plane

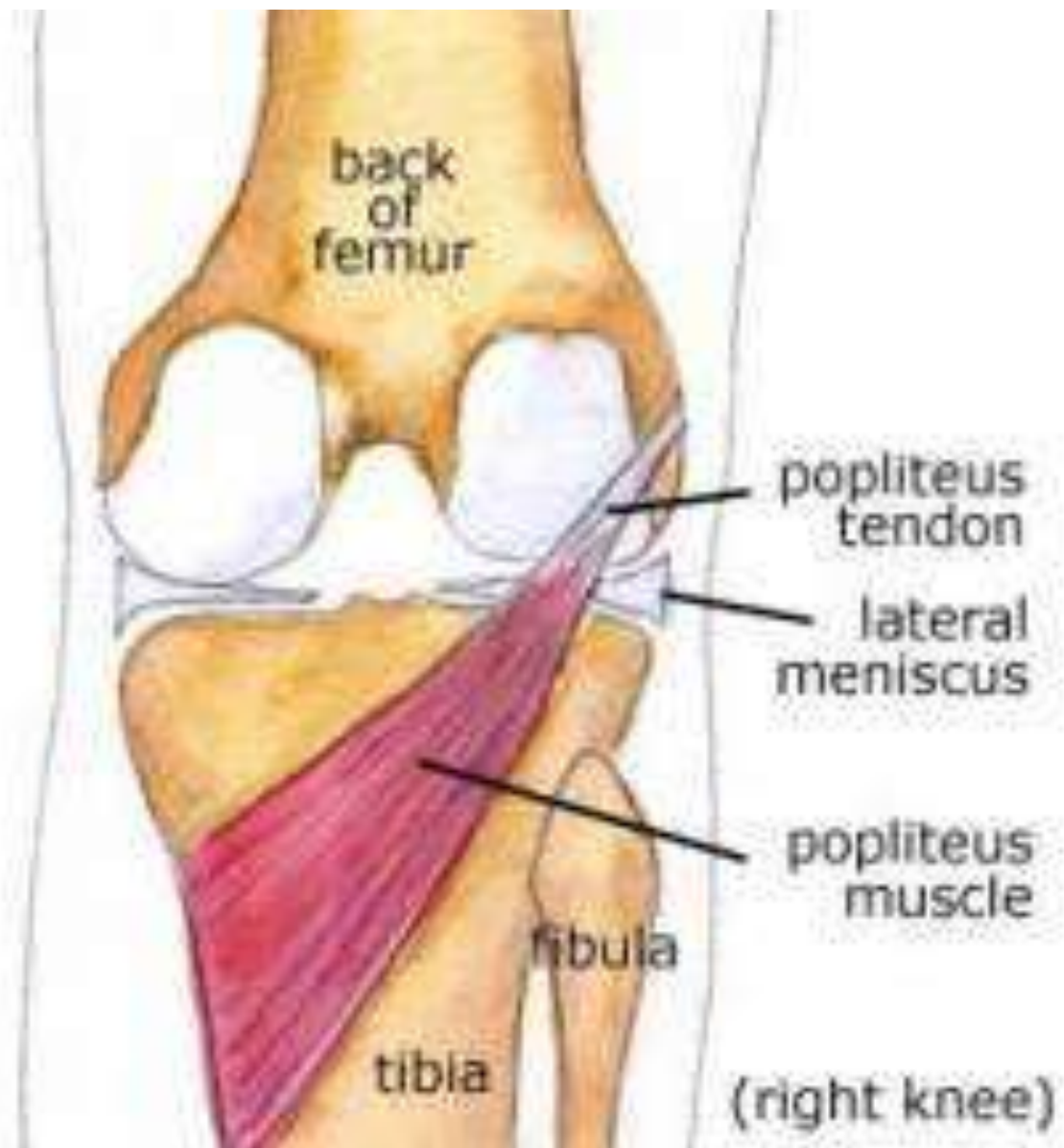
Tibial-on-femoral rotation



Femoral-on-tibial rotation



Superior view



Knee Injuries

- Determine whether the knee injury is anterior and patellar and tendon primary or medial or lateral collateral ligament, cartilage, posterior elements, or combinations of the above.
- Lateral knee injuries will typically involve the fibula. Find the pain location and the direction of fibula alignment that takes the pain out. Adjust accordingly. There are many considerations with the knee adjustments. **Be very gentle with acute knee adjusting.** You can adjust more with a chronic knee but must be careful with an acute one. Activator instruments are usually always safe. Drop adjustment must be done very gently and carefully with degenerative knee joints. Especially when there is rotation involved.
- If the tibia is posterior, then the traditional knee flexion with your arm under the knee joint works fine. Can be a loose PCL. If the tibia is anterior that adjustment will make the patient worse even if you hear an audible release. We will demonstrate a simple drop adjustment for the anterior tibia. They are very common and more so if there is a loose ACL.

Anterior Fibula Drop Adjustment: With the femur stabilized with blocks or other forms the drop block is under the tibia. You can drop straight down driving the tibia posteriorly.





Posterior Tibia Adjustment: These are great and usually have loud audible releases. You open the knee joint with forearm and then lever the tibia anteriorly with the other contact.

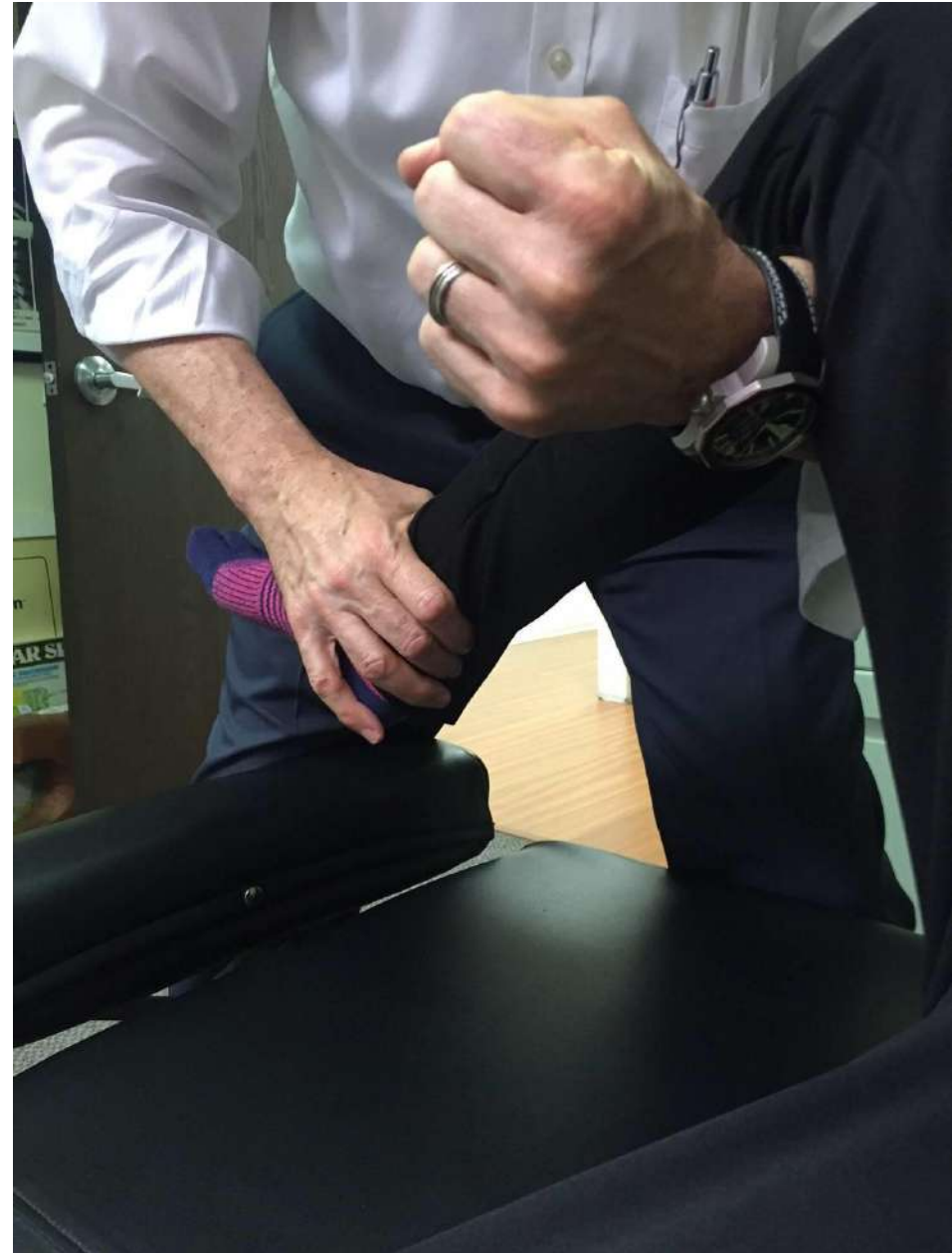
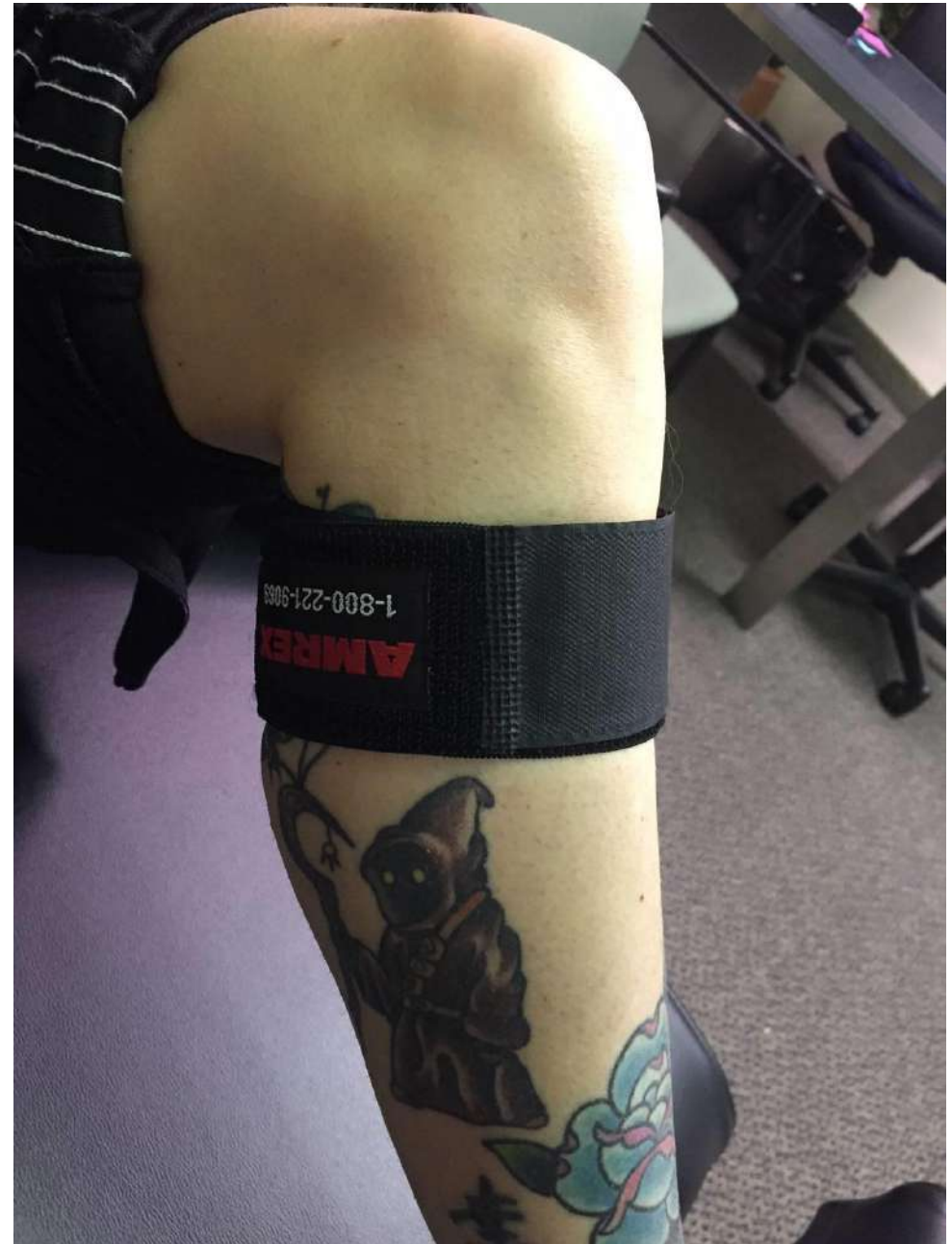


TABLE 1: LIGAMENTS OF THE KNEE

Ligament	Origin	Insertion	Action
ACL	Posteromedial aspect of lateral femoral condyle within intercondylar notch	Anterior aspect of tibial plateau	Restricts anterior translation and anterolateral rotation of tibia on femur
PCL	Anterolateral aspect of medial femoral condyle	Posterior slope of tibial plateau	Restricts posterior translation of tibia on femur and tibial external rotation
MCL	Medial femoral epicondyle of distal femur anserinus	Periosteum of proximal tibia posterior to pes	Restricts valgus stress forces and anteromedial rotation
LCL	Lateral femoral epicondyle of distal femur	Posterior to anterior point of fibular head	Restricts varus stress forces and posterolateral rotation of tibia on femur

When there is an unstable fibula or knee Rotation, you may want to use a Velcro strap Instead of kinesiotape because it is more Reusable and easier for the patient. Remember to Pull into the direction of correction. Clockwise or counterclockwise.



Kinesiotaping the knee

- The knee is taped after you have done all treatments.
- If you are doing any fascial work, know that if you use creams or oils you may not be able to use tape unless fully cleaned afterwards.
- You already know what direction you needed to correct the joint misalignments. Now you have to figure out how to tape in the same direction!
 - Fibula rotation
 - Patellar tracking
 - quad weakness
- Supra or infra patellar tendon pain
 - Collateral ligament Strain
 - Swelling



Full Knee
Spider

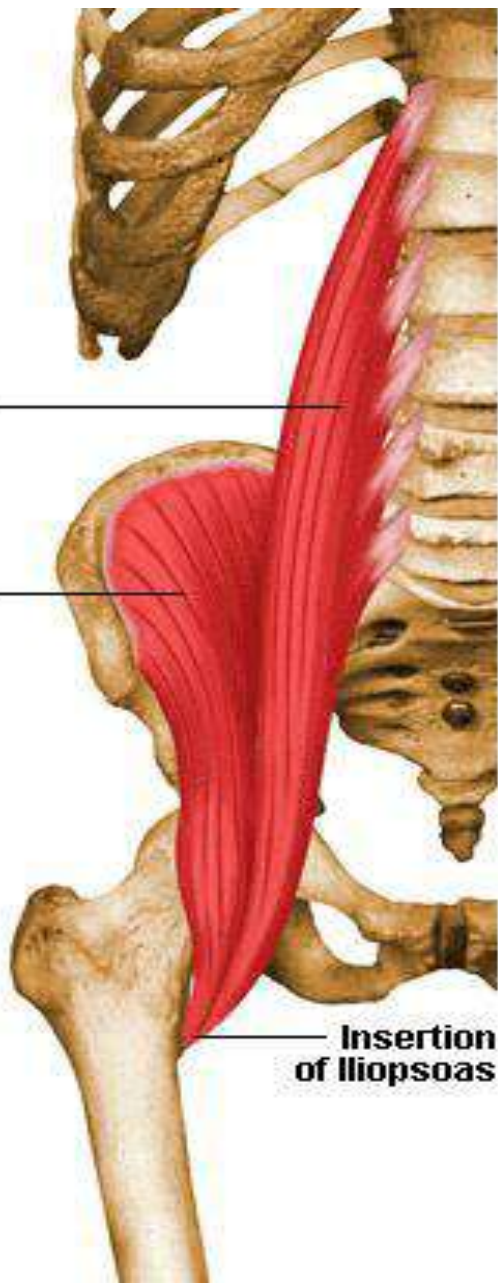
Hip and Lower Back Module

- If you are treating a patient with knee pain as well as hip pain, you may have to think about what type of exercises the knee will tolerate as you go.
- Scars and scar tissue can be VERY important as it interferes with the underlying muscles as if they were part of it. Skin can also be a part of traumatic injury rehabilitation.
- I work in quadrants, starting with the primary injury or weakness. Similar to knee quadrants. Anterior, posterior, lateral, medial if hip and core or lower pelvic regions.
- Hip flexors are extremely important to keep strong. The following are ways that I have found that even an acute pain patient can perform.
- Use the side lying approach when a patient hurts just to lift their leg supine.
- The piriformis muscle can also be strengthened in a seated position.

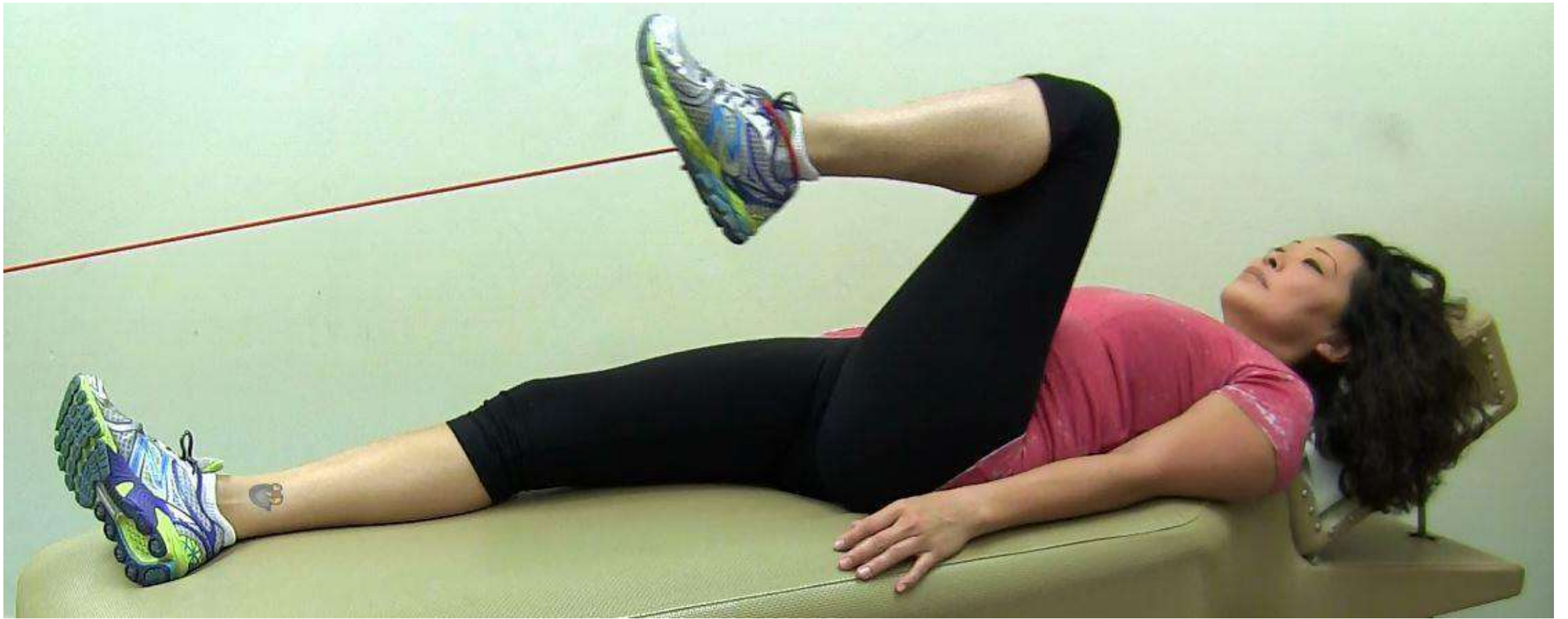
Psoas major

Iliacus

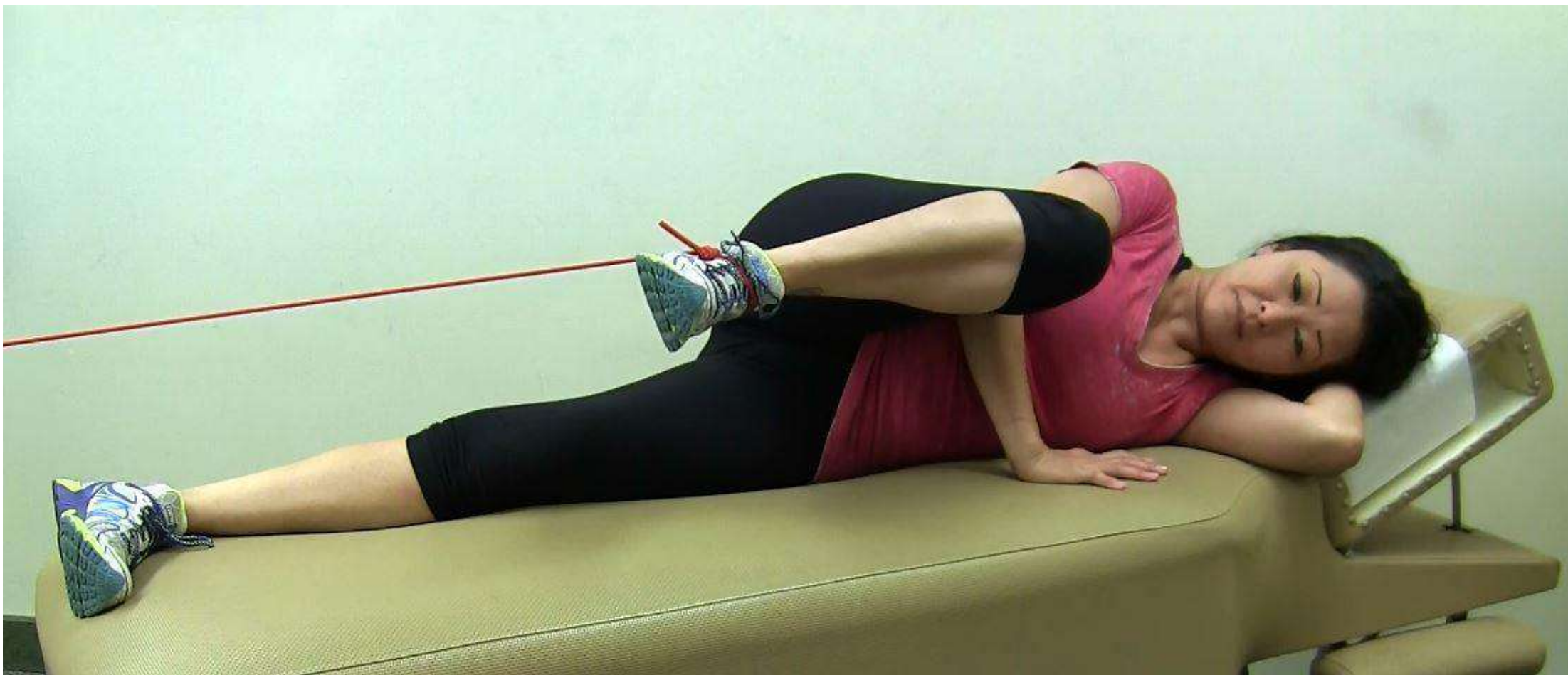
**Insertion
of iliopsoas**



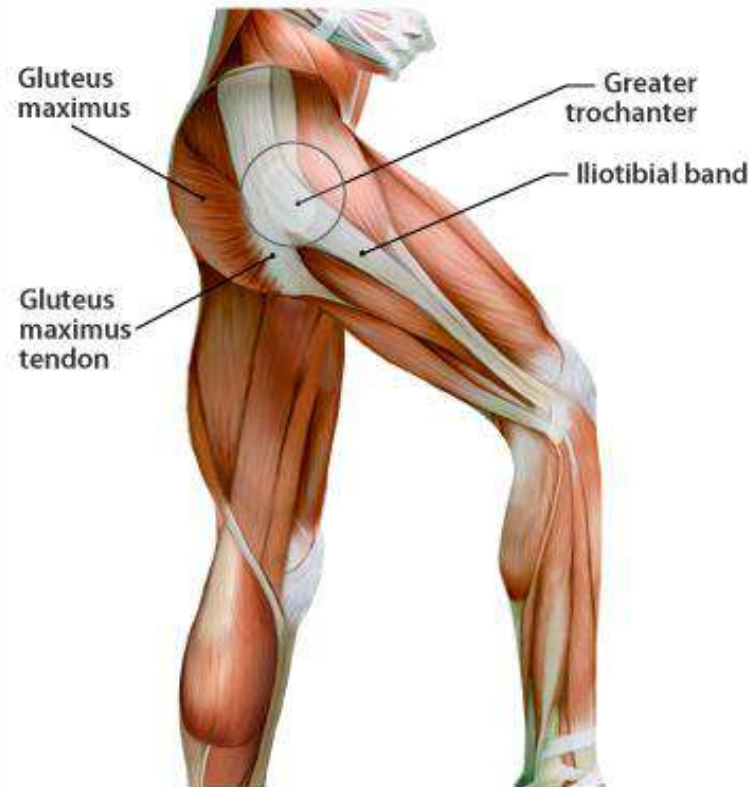
Supine Psoas Rehab



Side Lying Psoas

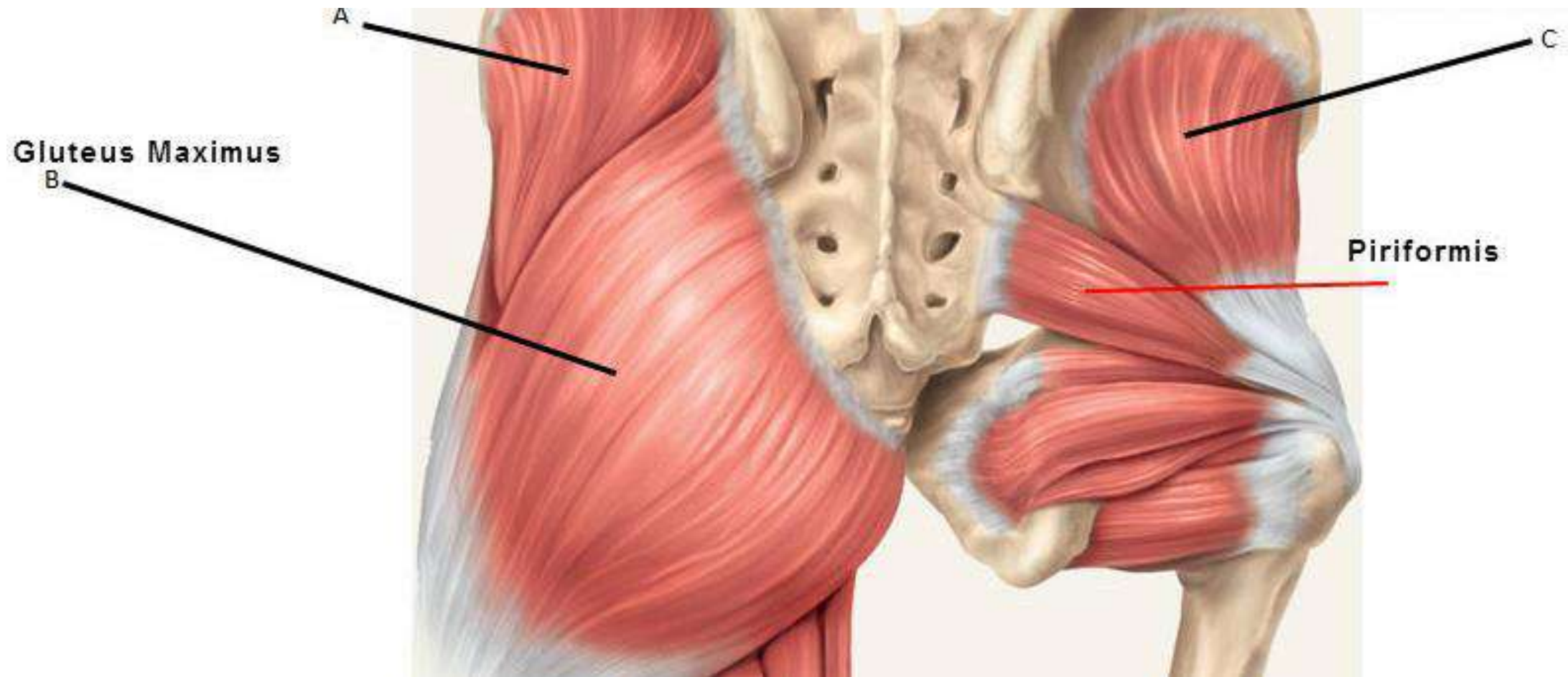


External Snapping Hip Syndrome

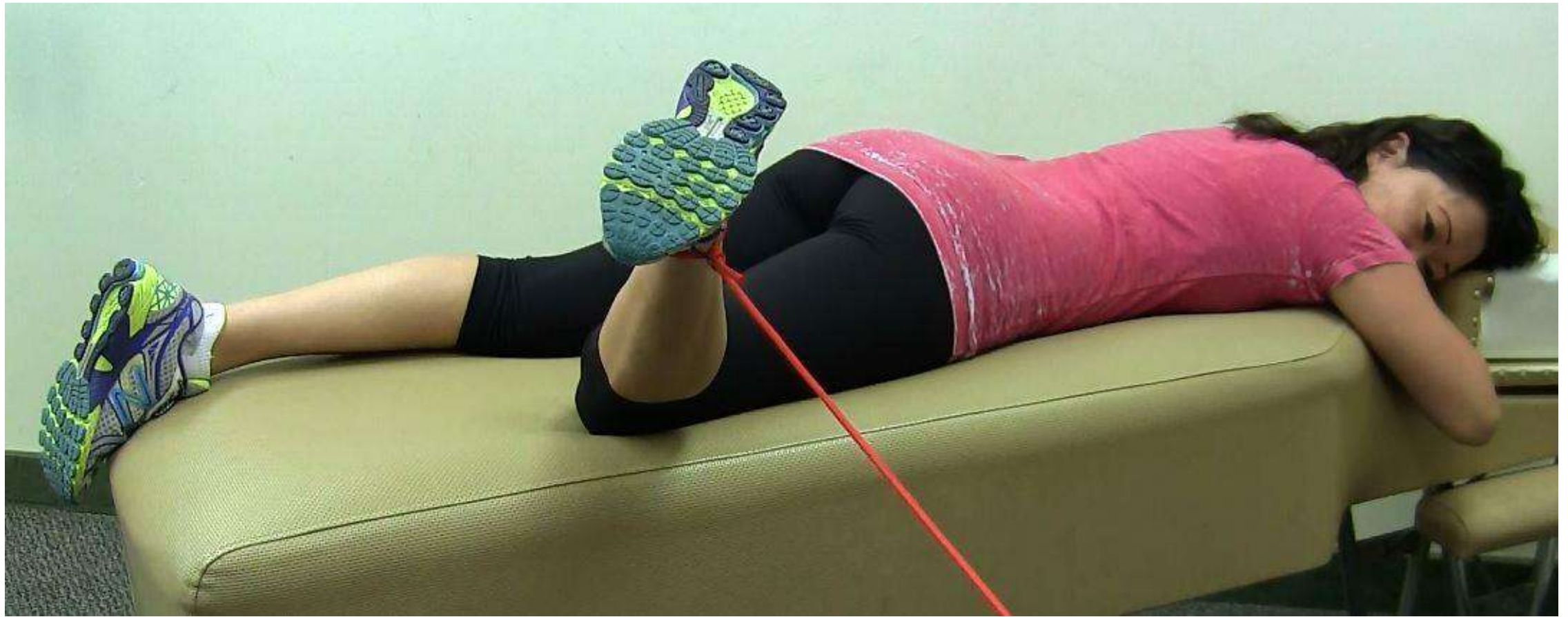


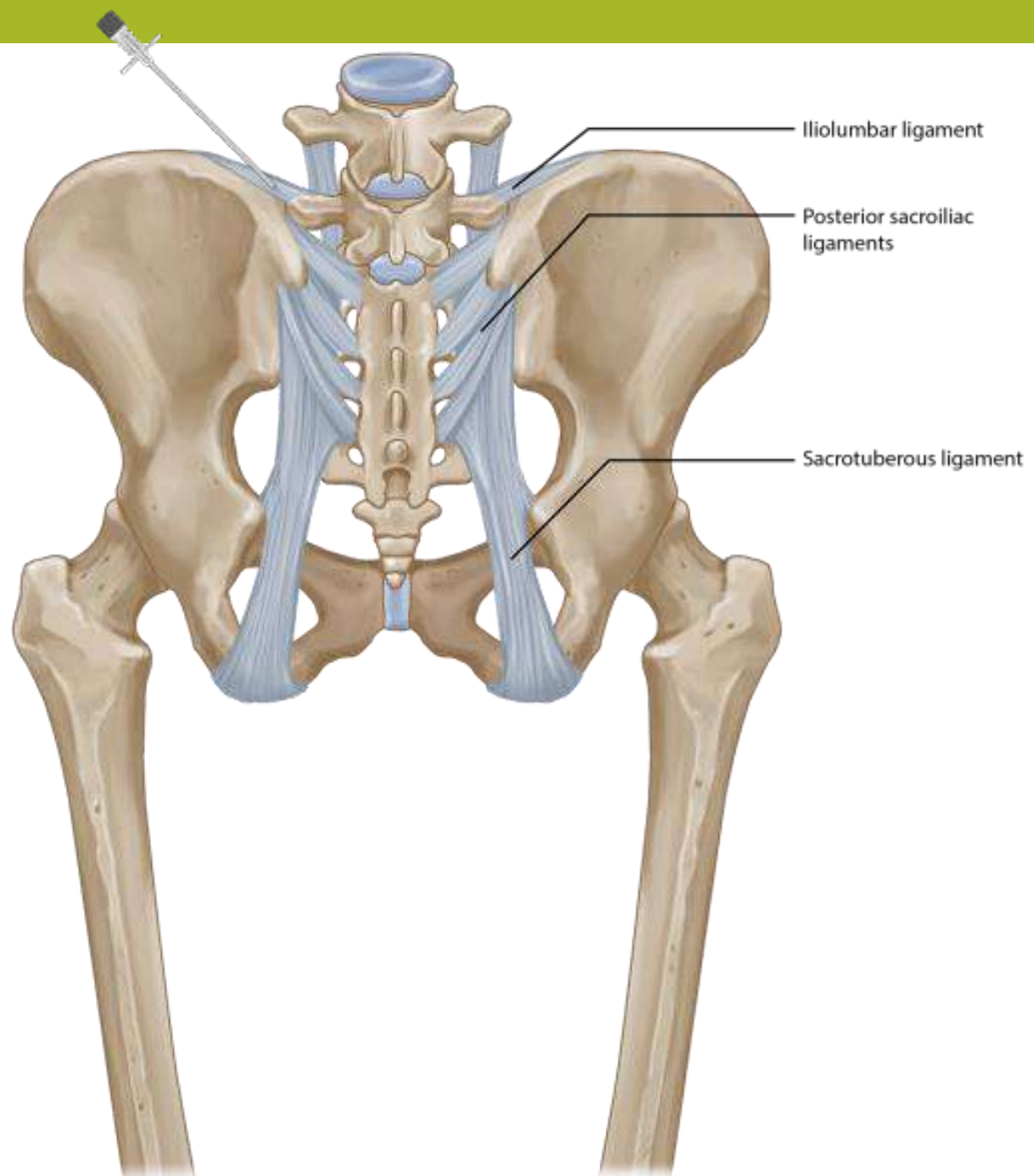
External snapping hip syndrome occurs when the gluteus maximus tendon or iliotibial band catch on the greater trochanter during flexion.

Gluteal Musculature

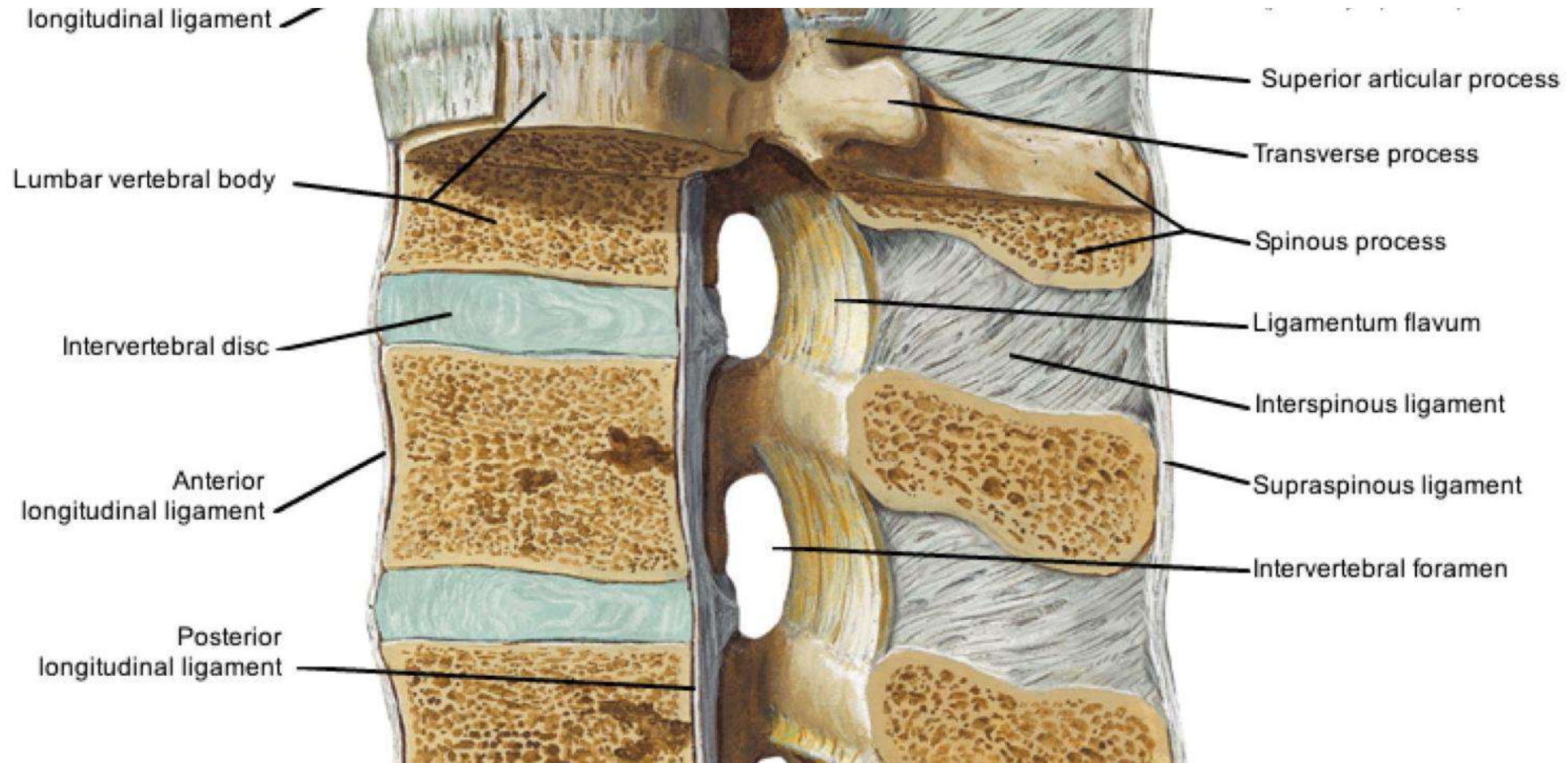


Prone Piriformis





Interspinous Ligaments



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