

AN OSTEOPATHIC APPROACH TO FOOT PAIN

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No conflicts of interest

But we have a lot to cover in a very short period of time, so I may skip over things you consider important. But,....

OUTLINE

- What I am not covering
- CASE PRESENTATION
- FOOT ANATOMY AND PHYSIOLOGY
- COMMON FOOT PROBLEMS
- GAIT CYCLE
- KINETIC CHAIN
- OSTEOPATHIC INTEGRATION

What I am not discussing (too much)

- **Orthotics** – we don't make them and PT and Podiatry does more – so let them address it
- **Arch Supports** – if they NEED them. But, strengthening the foot should still be part of this – also a PT issue
- **Best running shoes:**
 - no one really knows. The shoe makers “scientific” shoes are more about the science behind the material...not so much about good mechanics
 - Running stores: they get trained by shoe industry; evaluating walking gait is not the same as the running gait.

Foot anatomy: the breakdown –
ankle/hindfoot/midfoot/forefoot

Common Foot Problems

- Anatomical abnormality or Traumatic with instability → Orthopedic issue
- Trauma without much instability → ankle sprains, Ortho and PT
- “OVERUSE” INJURIES....look for the biomechanical reason for “overuse”
 - Plantar fascia pain
 - TIBIALIS POSTERIOR DYSFUNCTION!!!
 - Achilles Tendon pain
 - FOOT PAIN – “it just hurts”
- I do believe “itis” is WAY OVER emphasized. It can exist but usually it is rapid onset in nature but sometimes there still is a biomechanical origin...
- SEVERE DISEASE!!! – KIDS ARE NOT YOUNG ADULTS

CASE PRESENTATION

- 26 YO marathoner presents with 2 days of right ankle pain, after a 10 mile run
- Limp into clinic exam room due to pain
- Tenderness, weakness and swelling along the right posterior tibialis muscle – **Acute Tibialis Posterior Tendonitis**
- OMT to up-slipped right hip and to lumbar, sacrum, foot
- Walks out with near normal gait “but it still hurts...”
- Pain-free running 2 days later

Muybridge Images: photographer who developed rapid-film that allowed “gait” evaluation

Gait: term used to describe the “neural strategy”
used for motion and maintaining balance. (per discussion
with OU-HCOM Comparative Anatomist James O'Reily, PhD)

What is the fundamental flaw in these two pictures?

Kinetic Chain

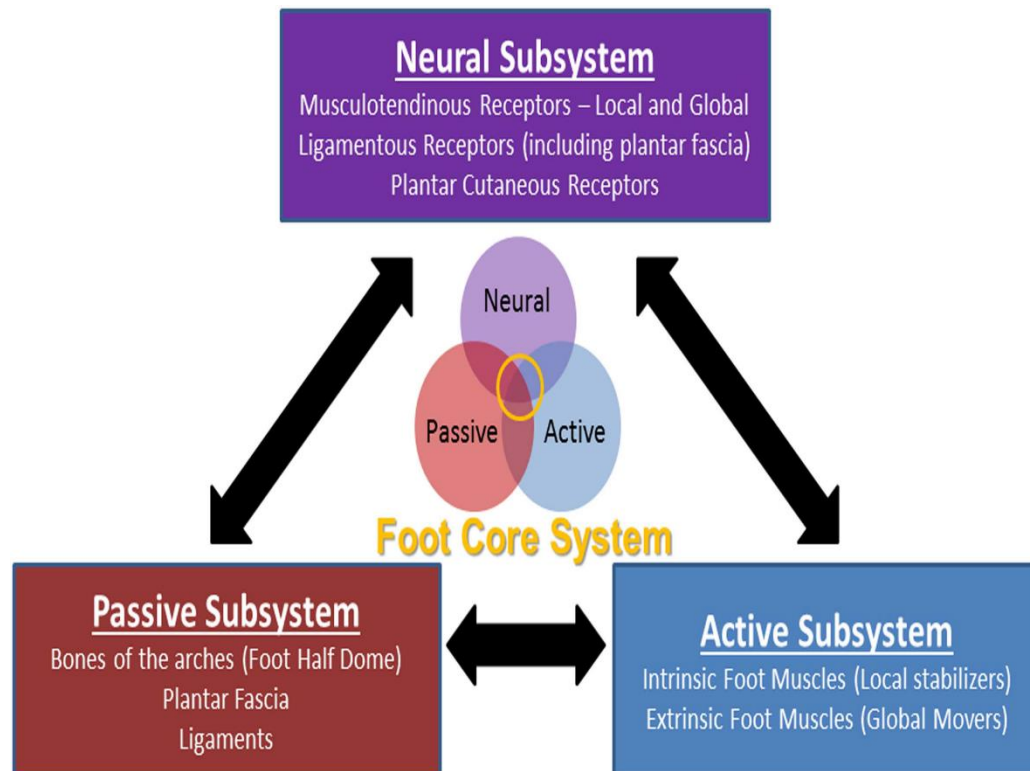
- **Kinetic Chain Model:** A synergistic, neurally-directed recruitment of muscles groups in a proximal-to-distal pattern to create maximally effective movement;
 - **Requires proximal stability for distal mobility**
- *Proximal and distal contributions to lower extremity injuries: a review of the literature.* Chuter V Gait and Posture 36(2012) 7-15.
- *Core Stability and its relationship to lower extremity function and injury.* Willson, J J Am Acad Ortho Surg 2005;13;316-325.

Kinetic Chain

3....Is a magic number.....

The Foot Core System: a “new” paradigm for understanding foot muscle function (3!!)

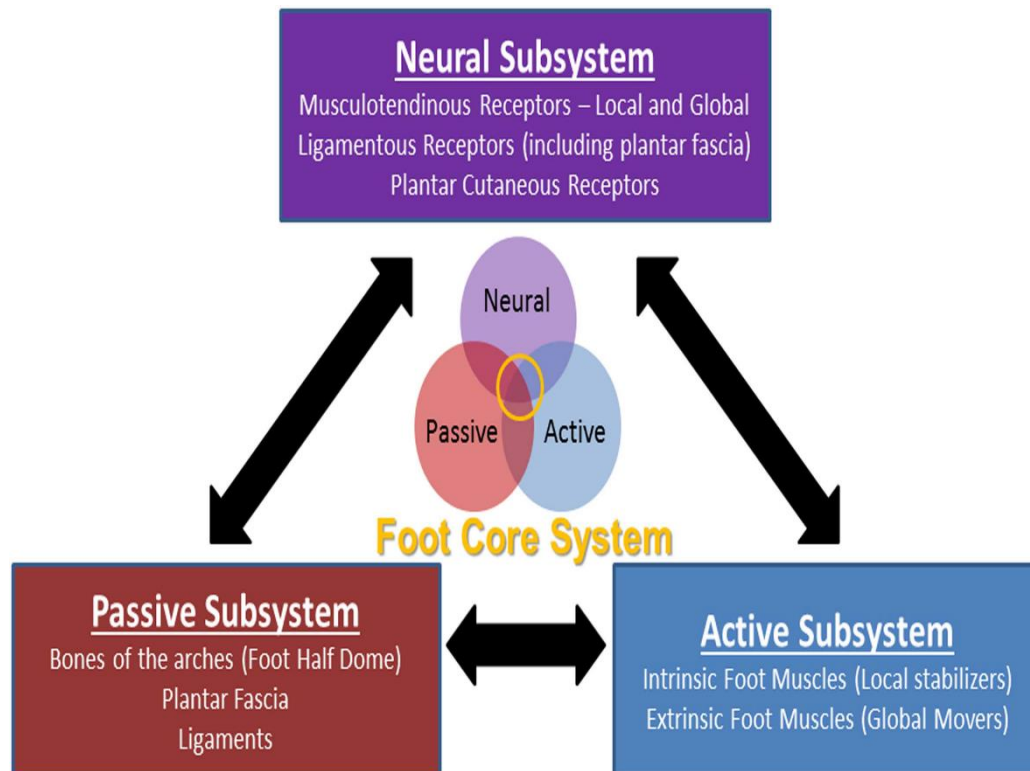
McKeon P, Hertel J, Bramble D et al, Br J Sports Med 2015;49:290



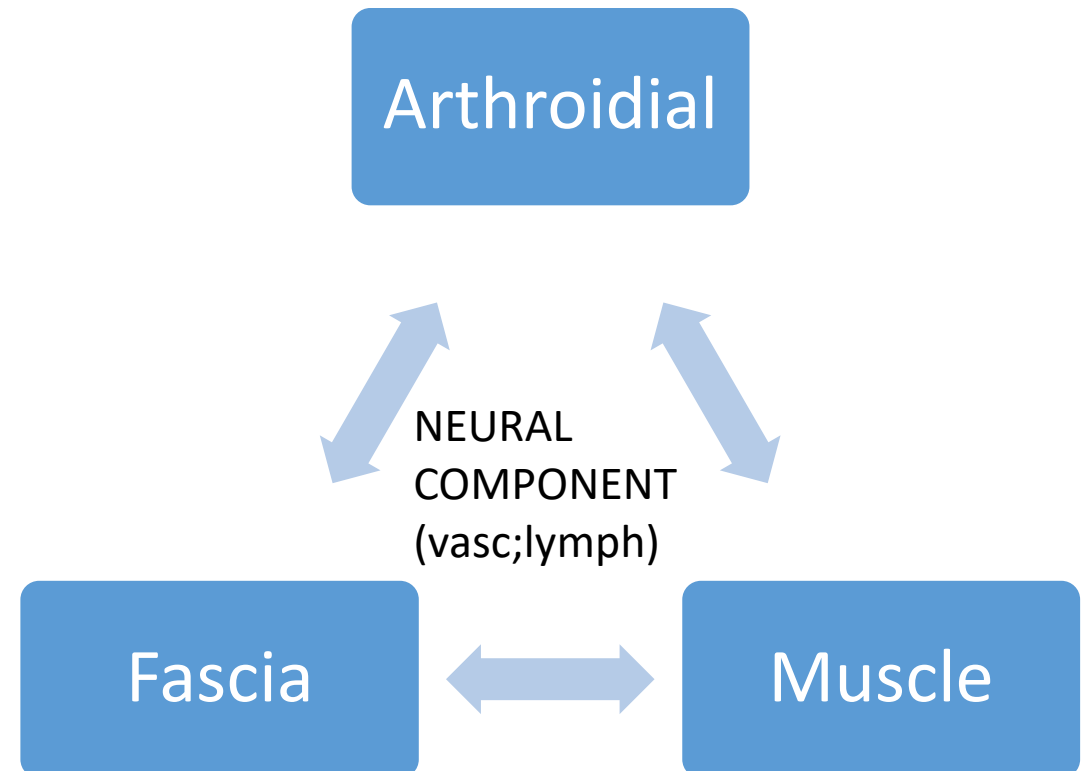
- Directly Based upon Panjabi and his publication of the spine stabilization model
- Panjabi MM. The stabilizing system of the spine. Part I. Function, dysfunction, adaptation, and enhancement. J Spinal Disord 1992;5:383–9; discussion 97.
- This publication is often cited in rehabilitation articles about “The Core”.

The Foot Core System: a “new” paradigm for understanding foot muscle function (3!!)

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Osteopathic Paradigm: what is a “somatic dysfunction”?



Foot Anatomy

3 Parts of Foot:

- 1) **Hind Foot:** calcaneus and talus
- 2) **Mid-Foot:** tarsals
- 3) **Fore-Foot:** meta-tarsals and phalanges

Muscles:

- 1) *Calf and Anterior Tibialis*: impact **Hindfoot** (dorsi and plantar flexion)
- 2) *Tibialis Posterior*: impacts **midfoot medially** (inversion)
- 3) *Peroneous (fibularis)*: impacts **midfoot medially (longus)** and **laterally (brevis)** (eversion)

3 Arches of the Foot:

Medial Arch: Talus, navicular/cuneiforms, 1-3 digits

Lateral Arch: Calcaneus, cuboid, 4-5 digits

Transverse Arch: Navicular, cuneiforms, cuboid

3 parts of feet: hind, mid, fore foot

3 functional muscle regions:

posterior/anterior;

medial/lateral;

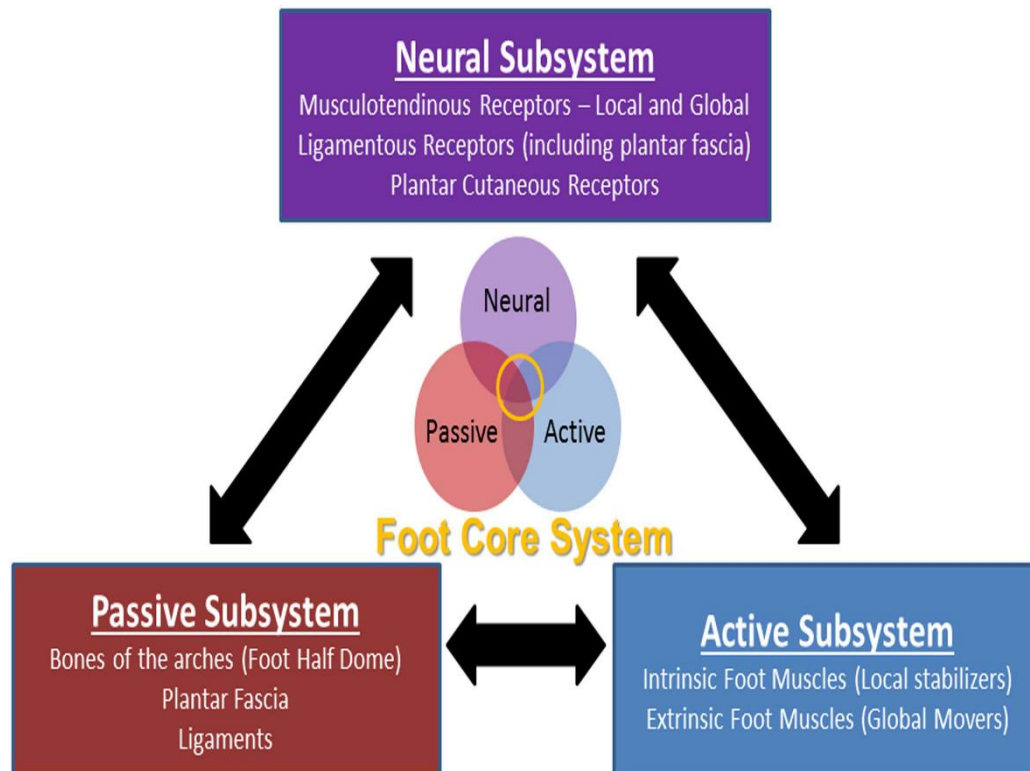
Plantar Aponeurosis/intrinsic foot muscles

3 Arches: overlapping muscles and bones

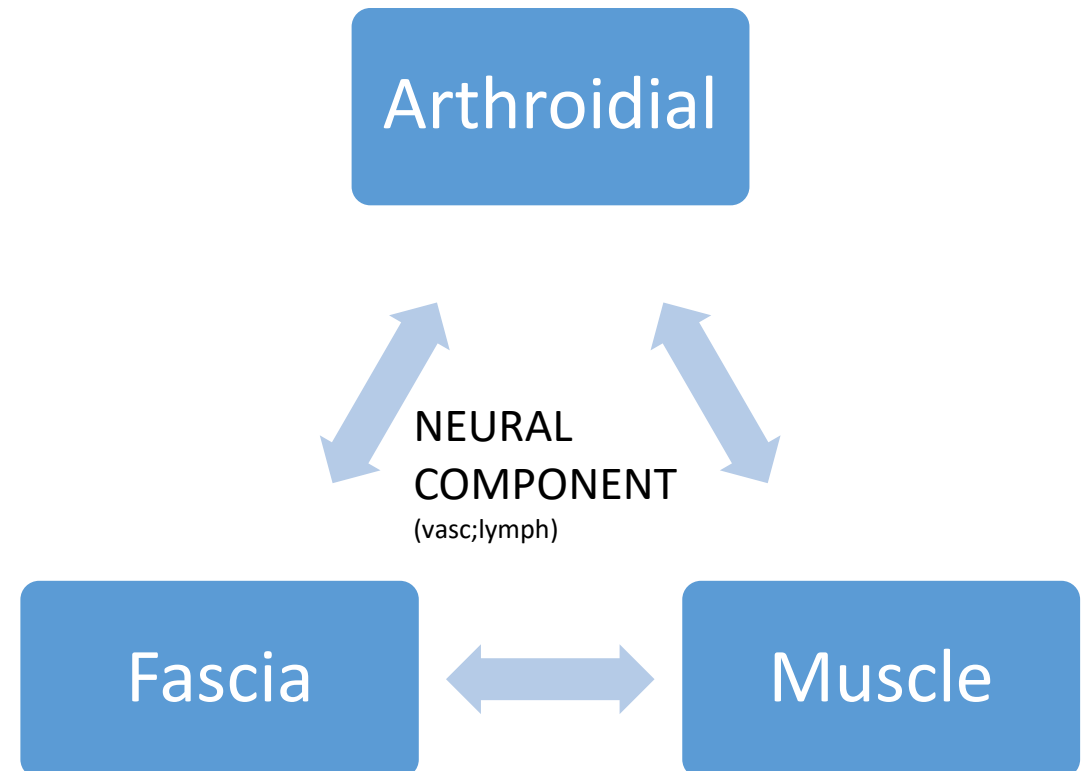
Passive and Active Support System

The Foot Core System: a “new” paradigm for understanding foot muscle function

McKeon P, Hertel J, Bramble D et al, Br J Sports Med 2015;49:290



Osteopathic Paradigm: what is a “somatic dysfunction”?



Case Presentation

- 16 yo male competitive Taekwondo with 1.5 years of right foot pain
- No pain during lifting or football
- Pain only during roundhouse kicks
- 2 rounds of physical therapy focused on right foot strengthen did not help
- Resting from Taekwondo did not help

Roundhouse Kick – notice foot on ground!!

Kinetic Chain – deriving issues beyond the area of complaint.

Case #2 – 16 yo with right foot pain

- His left hip had significant deficits in internal and external rotation
- I did a little OMT but...sent him home with aggressive hip stretching
- 3 weeks later – full contact participation without pain
- There was no assessment of his KINETIC CHAIN by physical therapy – 2 rounds!

My Father – masters
discus thrower who had
a torn TIBIALIS
POSTERIOR muscle.

“I have had a lot of sports injuries and have had to go to physical therapy, probably the past 10 years, about a year and half worth of time. I don’t ever remember a physical therapist actually putting hands on me. I remember them giving me exercises but that’s it.”



The goal of OMT is to improve mobility of joints/muscles/fascia to allow the nervous system to recruit correctly : synergistically from proximal to distal

To Do:

- 1) Assess the critical areas along the kinetic chain of the LE
- 2) Get some movement in as many areas as you can
- 3) Leave it alone

• Don't:

- 1) think you have to get maximal motion in EVERY joint at one visit
- 2) worry too much about the precise “soft tissue” problems. Rehab of plantar fascial pain and Achilles tendonitis and similar.

(I have seen plenty of patients with “precise” diagnoses and orthotics who are not better)

Osteopathic Approach – treat the whole person!!

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Foot and Ankle manipulation in the Elderly

Effect of manipulation of the feet and ankles on postural control in elderly adults Vaillant, J et al. *Brain Research Bulletin* 75(2008) 18-22.

- 17 elderly adults (74 yo) stood barefoot, feet together/eyes open and sway as little as possible, on a force plate – “CONTROL”
- Then told to close eyes for a 10-second evaluation of balance
- Tested before and after foot manipulation
- Massage Therapists were to “target the somatosensory system of the feet and ankle, using manual massage of the feet and mobilization of both the feet and ankle.”
- RESULT: Eye-closed balance was improved AFTER the manipulation compared to BEFORE the manipulation

Osteopathic Approach

- **Treat proximal before distal:** lumbo-sacral-pelvic-hip
 - Iliopsoas and Piriformis tender point treatment; SI joint mobility
- **Knee:** Internal vs external rotation
- **Fibular Head:** anterior vs posterior glide
- **Ankle/Foot complex:**
 - Tenderpoints:
 - Gastrocnemius/soleus and Anterior Tibialis: IMPACT → Hind foot and both archs
 - Posterior Tibialis: IMPACT → mid foot, medial arch, transverse arch
 - Peroneous muscles: IMPACT → mid foot, lateral arch, transverse arch
 - Plantar aponeurosis/small muscles: IMPACT → plantar aspect
 - Mobilization of Hind foot/mid foot/forefoot

Knee

Anatomy	Position	Motion	Treatment
Tibia	Anteromedial (ext) Posterolateral (int)	Rotation/Torsion	Connective Tissue Release
Fibula	Anterior Posterior	Glide	Muscle Energy HVLA

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Osteopathic Approach

- Joint mobilization of the ankle/foot
 - *Dorsiflexion vs plantar flexion*: ME or joint mobilization
 - *Hindfoot*: grasp heel and anterior talus
 - *Medial Arch*: tender navicular/cuneiform: counterstrain, large arch mobility
 - *Lateral arch*: cuboid mobility, large arch mobility

Afferent messages (cutaneous and muscular) contribute to balance control. *The Plantar Sole is a “dynamometric map” for human balance control*, Kavoundoudias, A, et. Neuroreport: 9(14): 3247-3252.

Talus

- Locate the medial and lateral malleoli
- Now, move medially and anteriorly to the midline of the foot.
- Palpate the rounded prominence. This is the head of the talus
- Input rotary motion between the talus and calcaneus and compare motion bilaterally

Navicular & Cuboid

- Navicular is located just inferior and distal to the medial portion of the head of the talus.
- Invert and evert the foot to assure contact with the navicular, in inversion the navicular tubercle will become more prominent
- Cuboid is located just proximal to the 5th metatarsal and articulates with the calcaneus.
- Locate the tuberosity of the 5th metatarsal and move your contact proximally until a drop off is felt
- Note the articulation between the cuboid and navicular

Cunieforms & Metatarsals

- Begin palpation just proximal to the metatarsal phalangeal joint.
- Explore all 5 metatarsal bones
- The 5th metatarsal bone has a lateral prominence named the tuberosity of the 5th metatarsal
- Locate the 1st metatarsal and move proximally to palpate a small joint between the medial cunieform and the 1st metatarsal
- Move onto the cunieform and examine the bony structures more laterally (middle and lateral cunieforms)

Ankle/Foot

Anatomy	Position	Motion	Treatment
Talus	Anterior Posterior	Plantarflexion Dorsiflexion	Muscle Energy
Sub Talar (Talar-Calcaneal)	Inversion Eversion	Glide	Connective Tissue Release
Cuboid	Plantar and Lateral	Plantar and Lateral Glide	HVLA Articular
Navicular	Plantar and Medial	Plantar and Medial Glide	HVLA Articular
Cuneiforms	Plantar	Plantar Glide	HVLA Articular
Metatarsal	AB/ADduction Rotation Plantar/Dorsiflexion	Glide	Articular Connective Tissue Indirect

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Question?