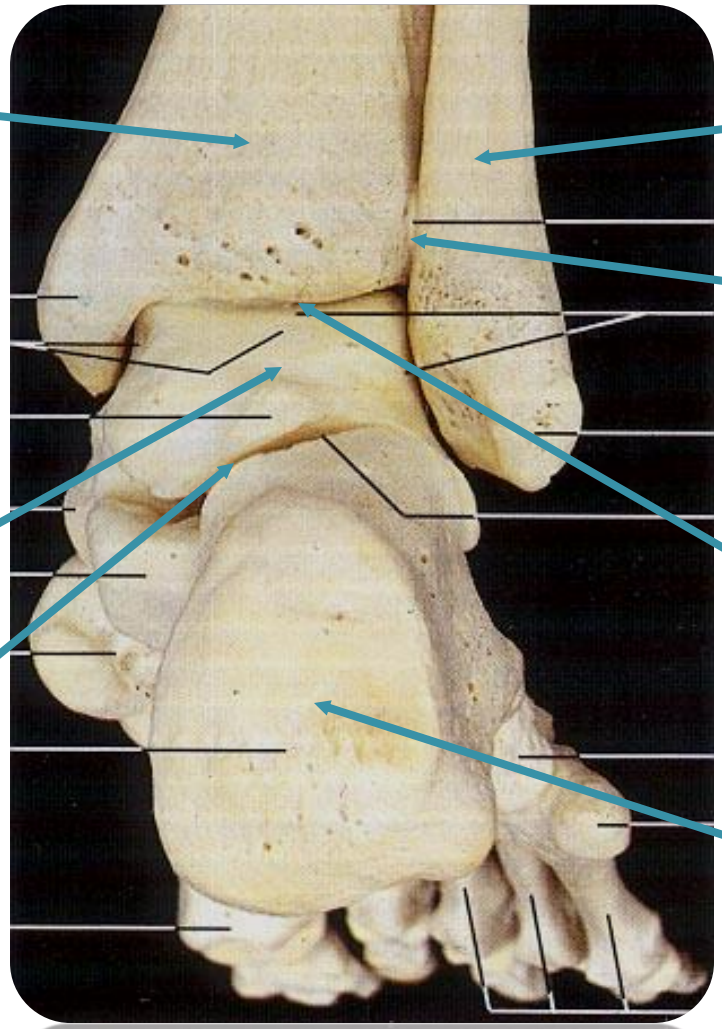
بسم الله الرحمن الرحيم

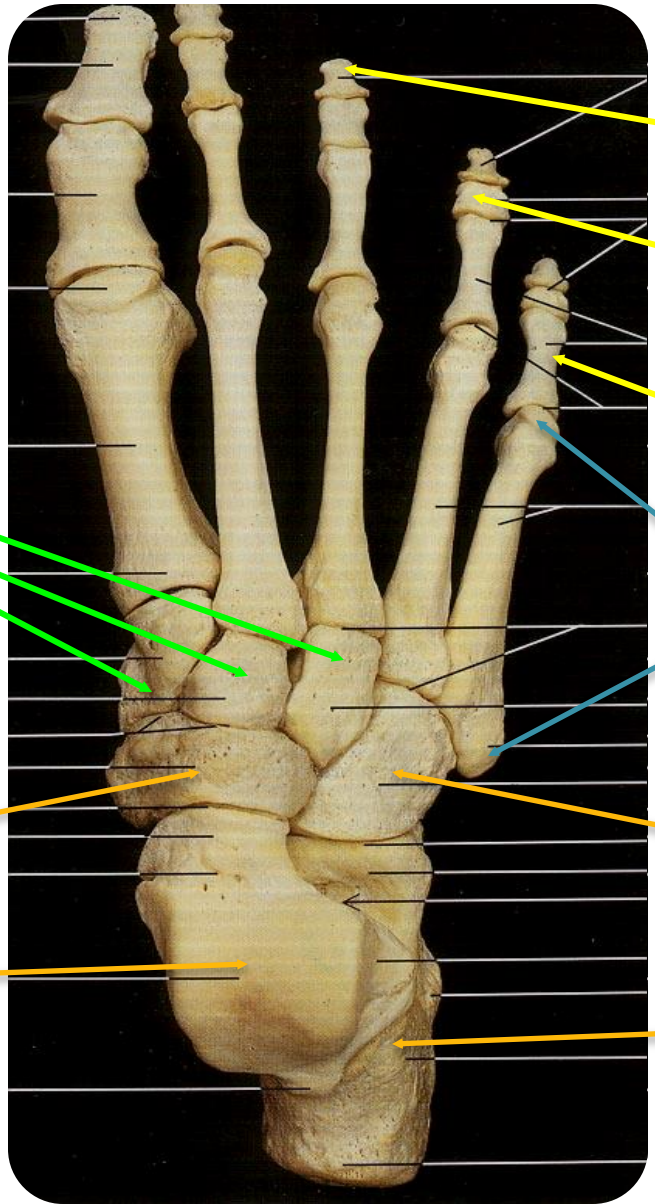
Laboratory

RHS 221
Manual Muscle Testing
Theory – 1 hour
practical – 2 hours
Dr. Ali Aldali, MS, PT
Department of Physical Therapy
King Saud University

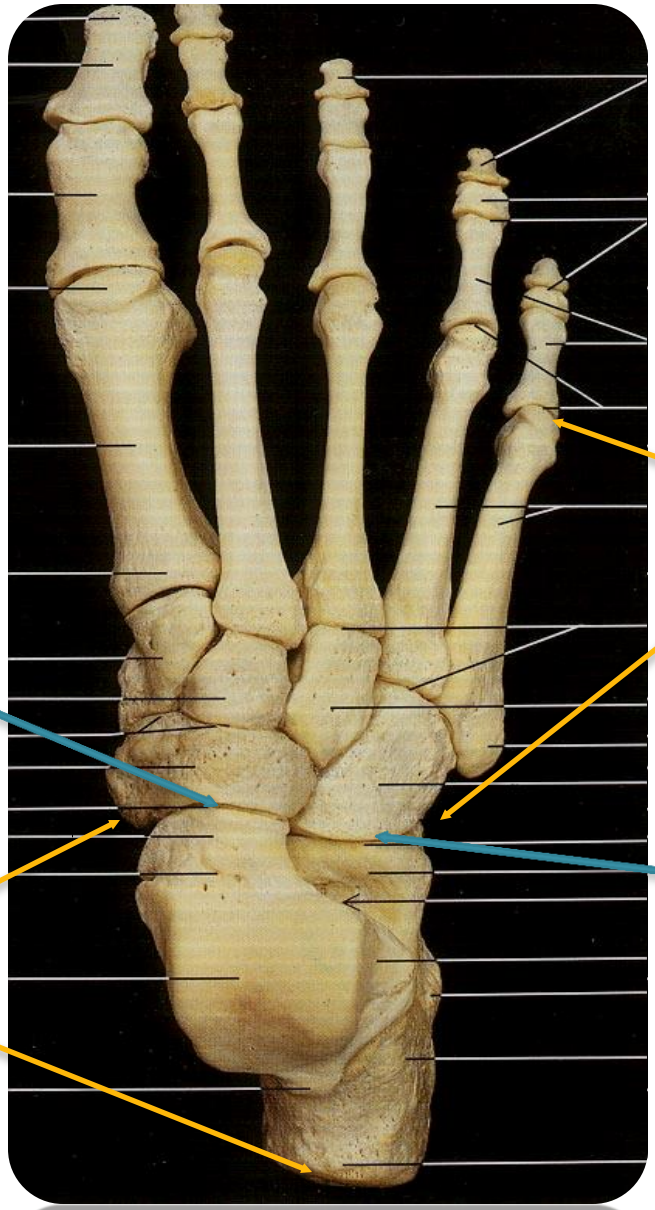
Talocrural and Subtalar Joint Osteology



Dorsal View of Foot Bones

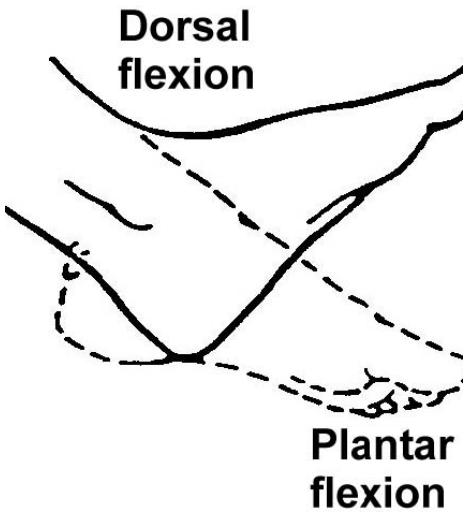


Rearfoot and Forefoot



Hindfoot (Rearfoot)
Talocrural (Ankle) joint

- ROM:
  - Planterflexion: 0-40° (end-feel: Firm or hard)
  - Dorsiflexion: 0-20° (end-feel: Firm)
- Close Packed position: maximum dorsiflexion
- Resting position: 10° planterflexion midway between extremes of ROM
- Capsular pattern: planterflexion more limited than dorsiflexion



Hindfoot (Rearfoot)
Subtalar (Talocalcanean) joint

- Meeting of the talus and calcaneus.
- Inversion/Eversion
  - Supination:
    - Adduction and inversion
  - Pronation:
    - Abduction and eversion
- Supporting Ligaments:
  - Lateral and medial talocalcanean

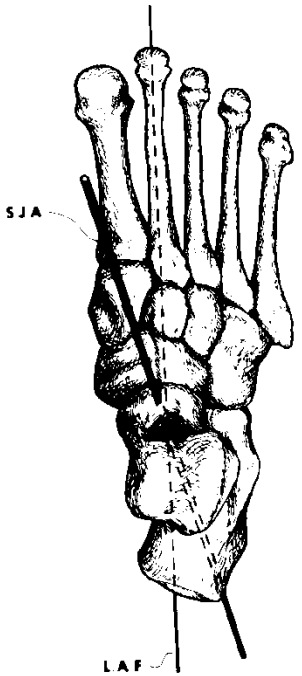
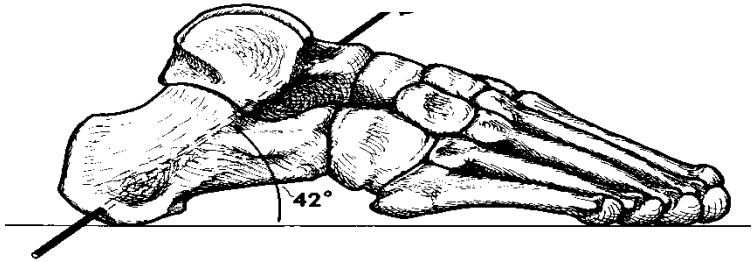
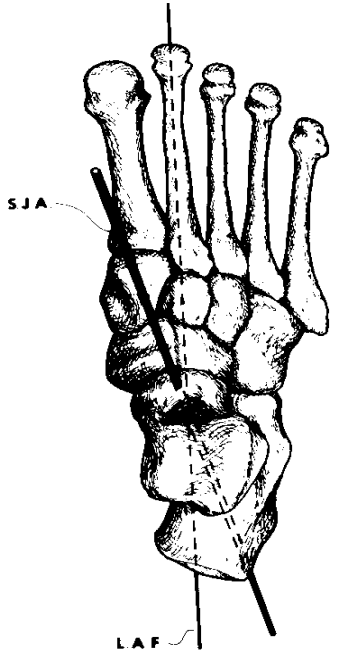


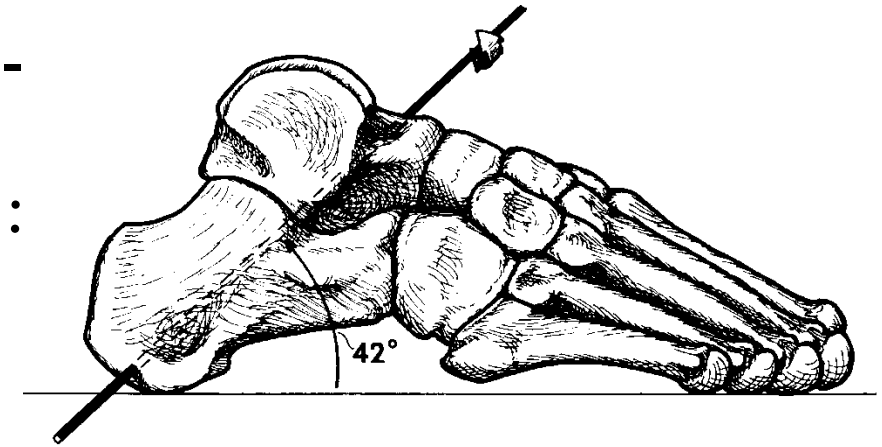
Fig. 1-40



Hindfoot (Rearfoot)
Subtalar (Talocalcanean) joint

- Closed packed position: supination.
- Resting position: Midway between extremes of ROM
- Capsular pattern: inversion is limited more
- ROM:
  - 5°-15° inversion (end-feel: firm)
  - 5° eversion (end-feel : hard)





Midfoot

Midtarsal joints

- Talocalcaneonavicular joint (talonavicular joint)
- Cuneonavicular joint
- Cuboideonavicular joint
- Intercuneiform joints
- Cuneocuboid joint
- Calcaneocuboid joint

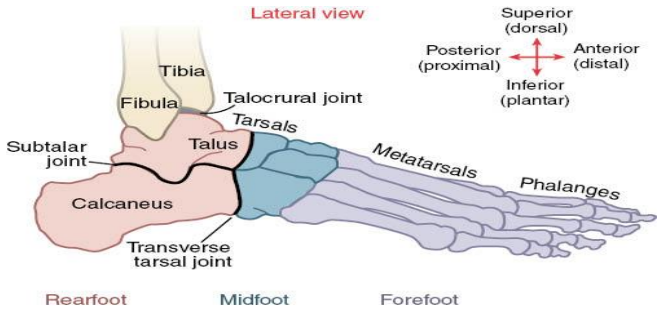
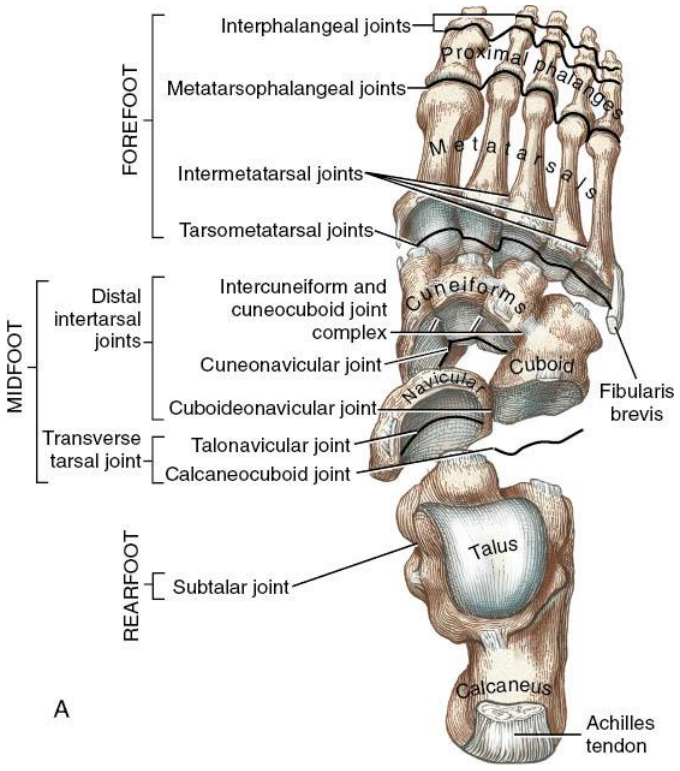


FIGURE 14-1. Overall organization of the bones, major joints, and regions of the foot and ankle.

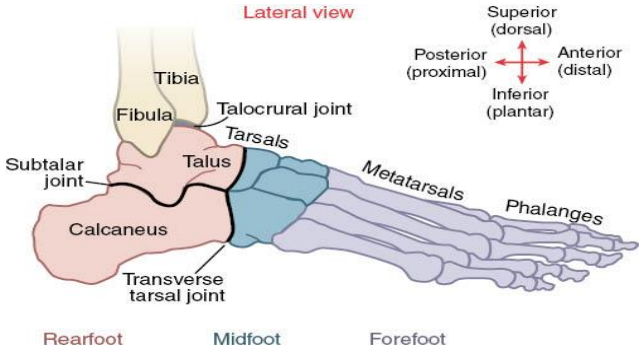
(From Neumann: Kinesiology of the Musculoskeletal System, 2nd edition.)



Midfoot

Midtarsal joints

- Resting position: Midway between extremes of ROM
- Close packed position: Supination
- Capsular pattern: Dorsiflexion, planterflexion, adduction, medial rotation
- Transverse tarsal joint ROM:
  - 30 to 37° inversion (end-feel: firm)
  - 15 to 21° eversion (end-feel: firm)



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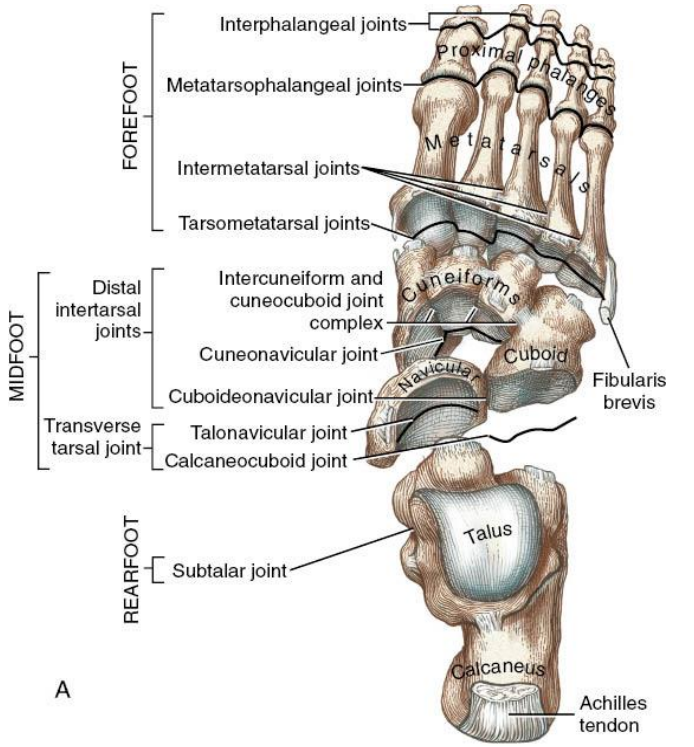
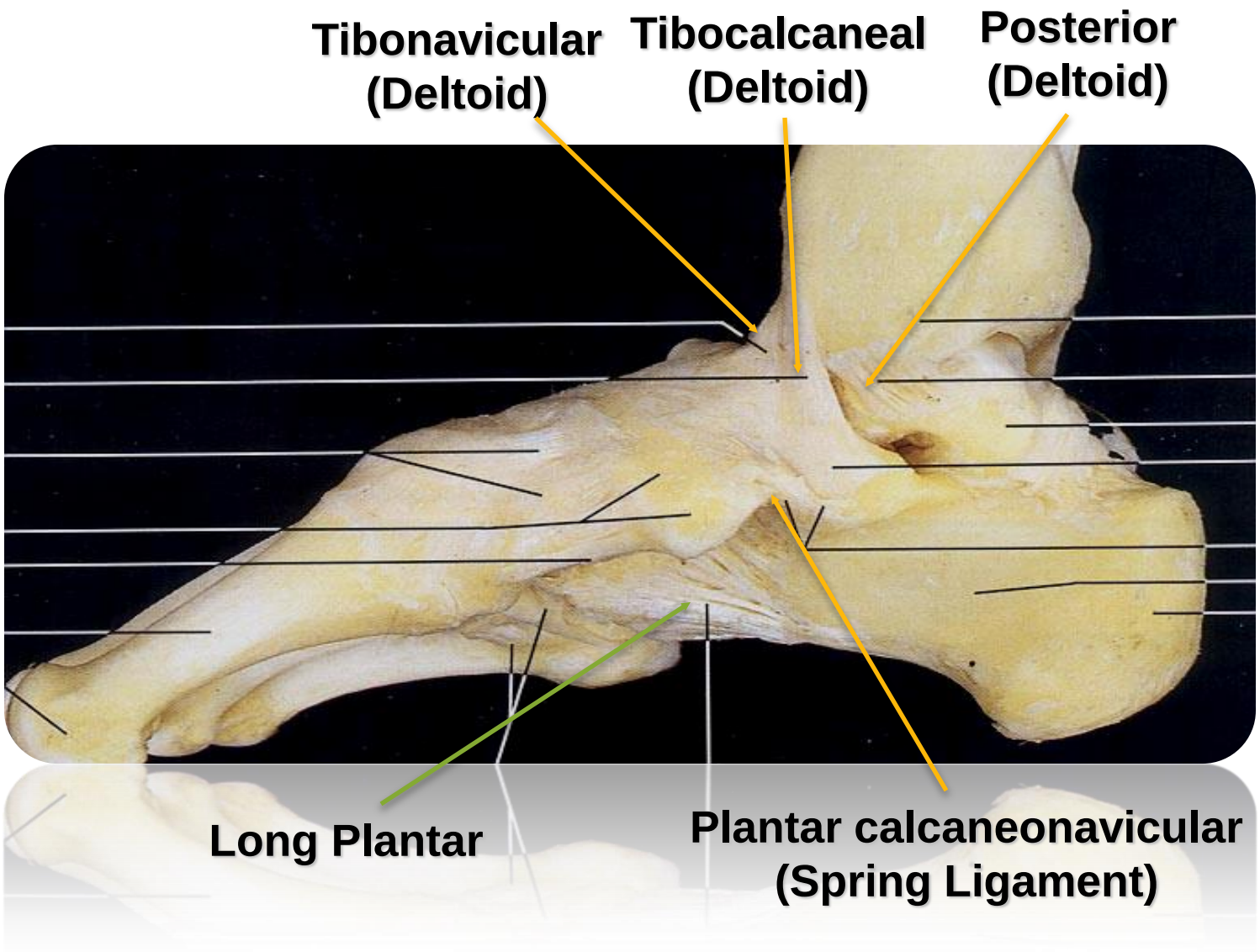
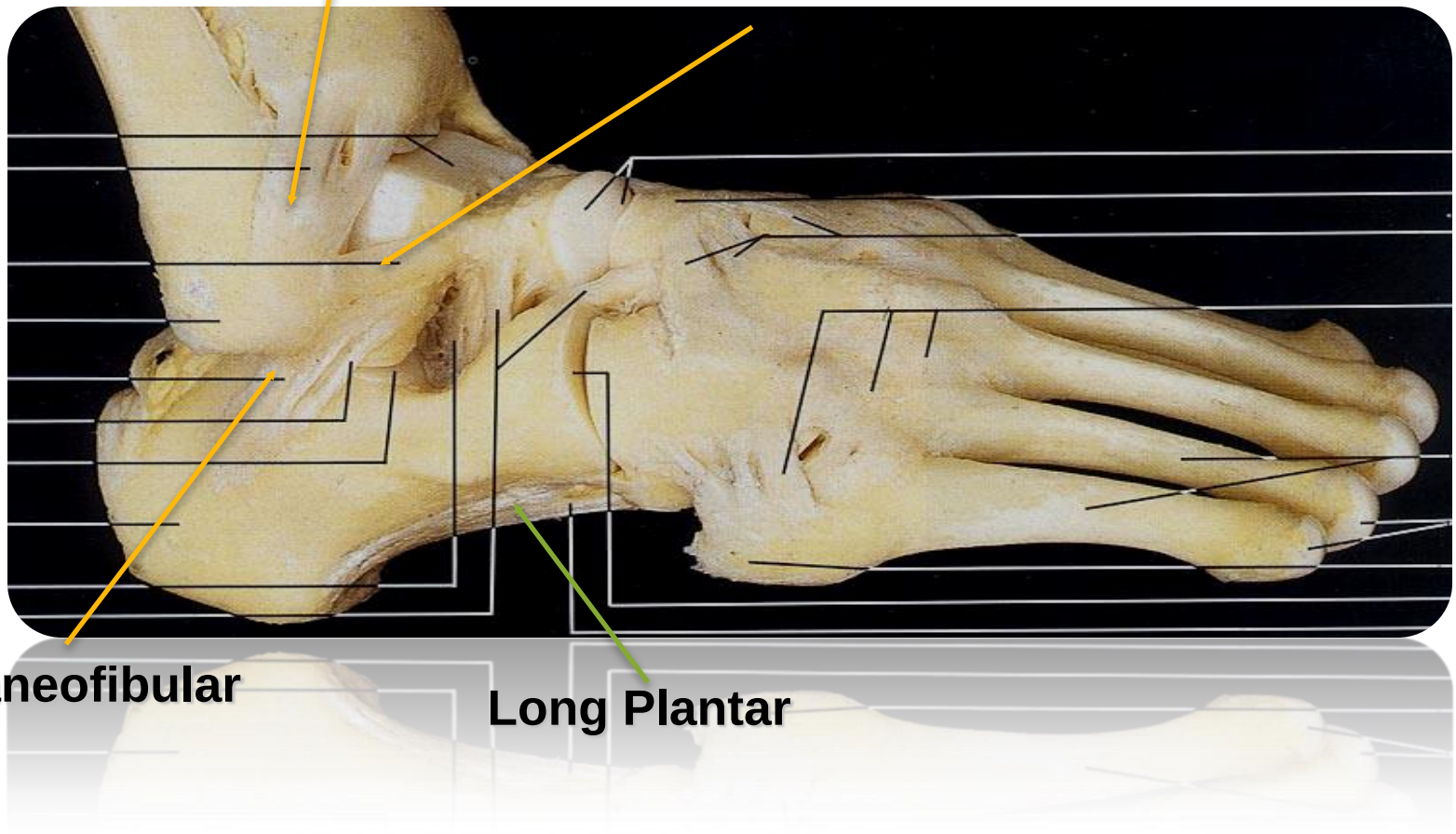


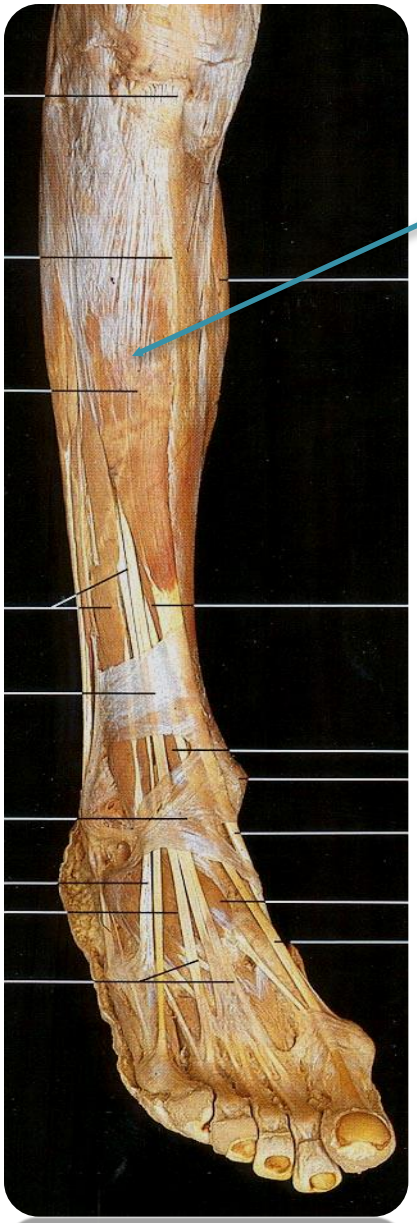
Medial Ligaments



Lateral Ligaments



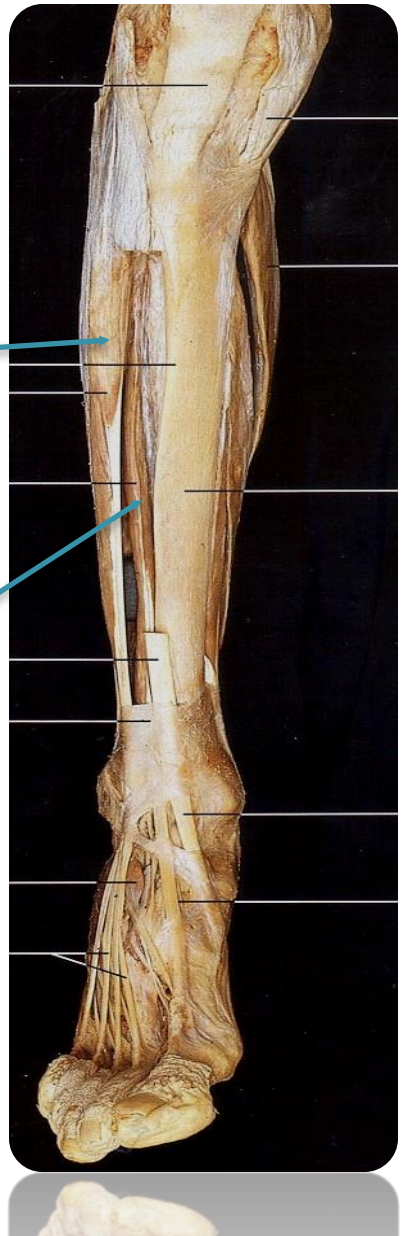
Anterior Compartment Muscles



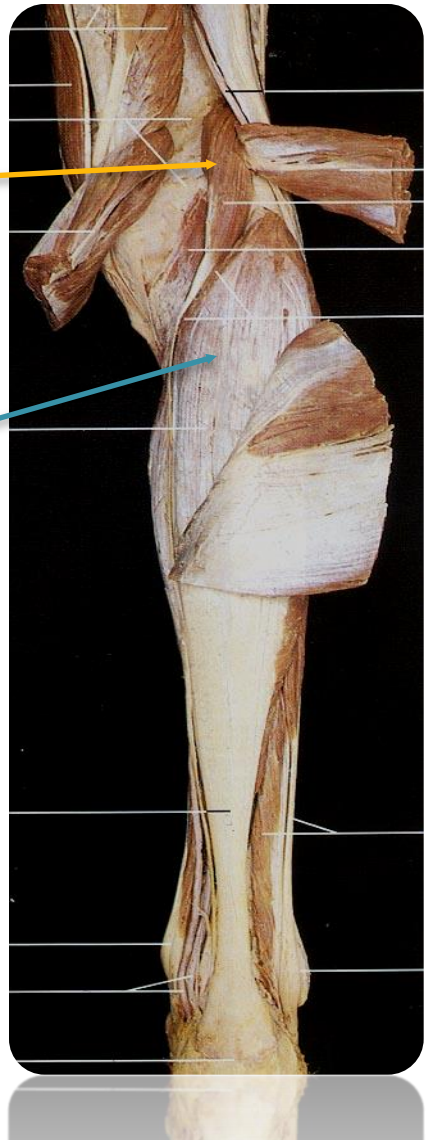
Tibialis Anterior

Extensor Digitorum

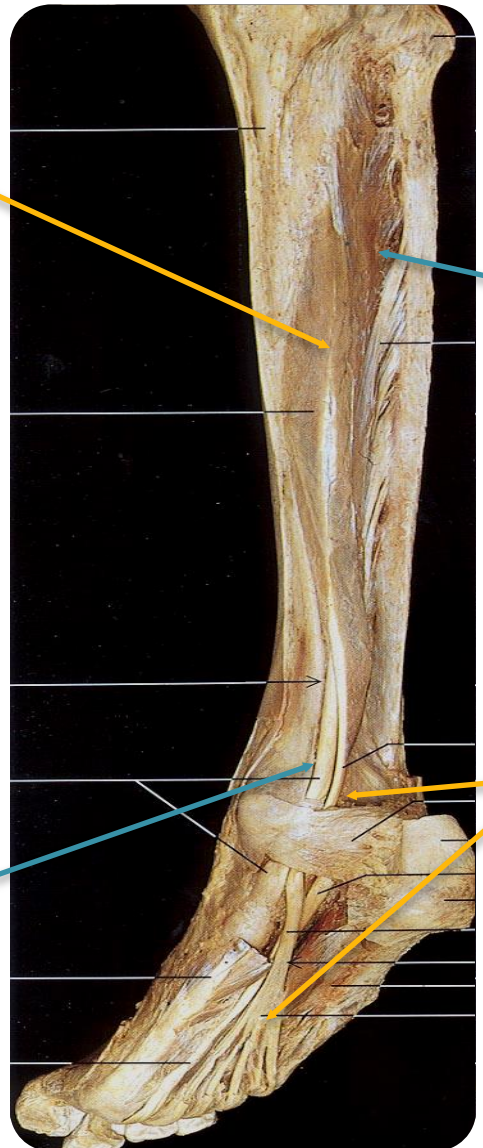
Extensor Hallicus Longus

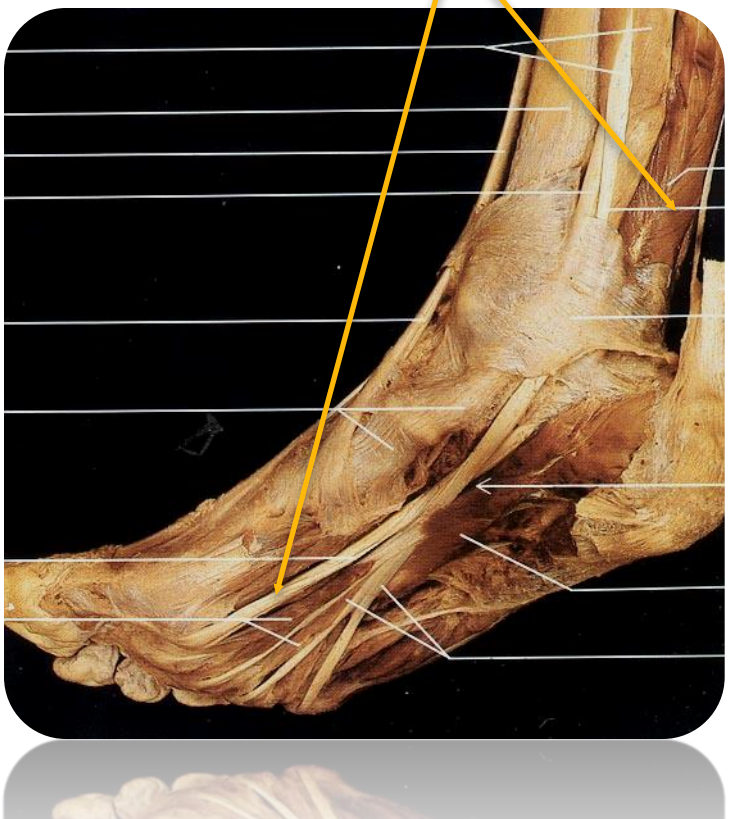


Superficial Posterior Compartment Muscles

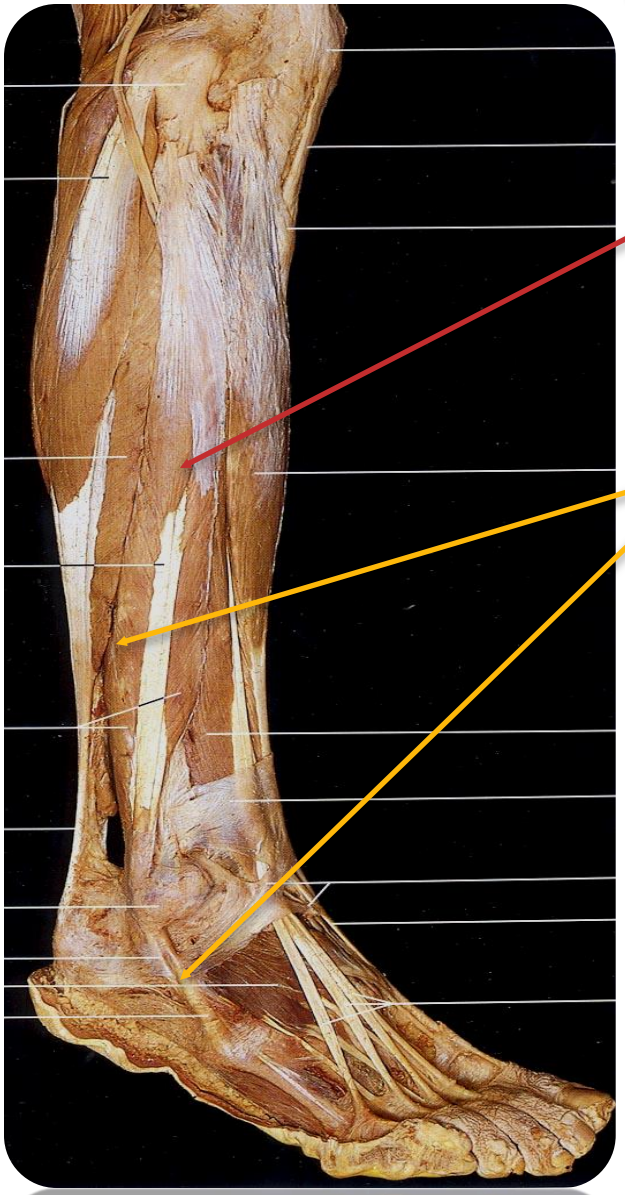


Deep Posterior Compartment Muscles





Lateral Compartment Muscles



Peroneus L

Peroneus B

First MTP Motion

Normal gait:

- Requires 75^0 of 1st MTP extension - occurs as result of:
  - heel lift
  - STJ supination
  - 1st MT shorter than 2nd
  - normal sesamoid function

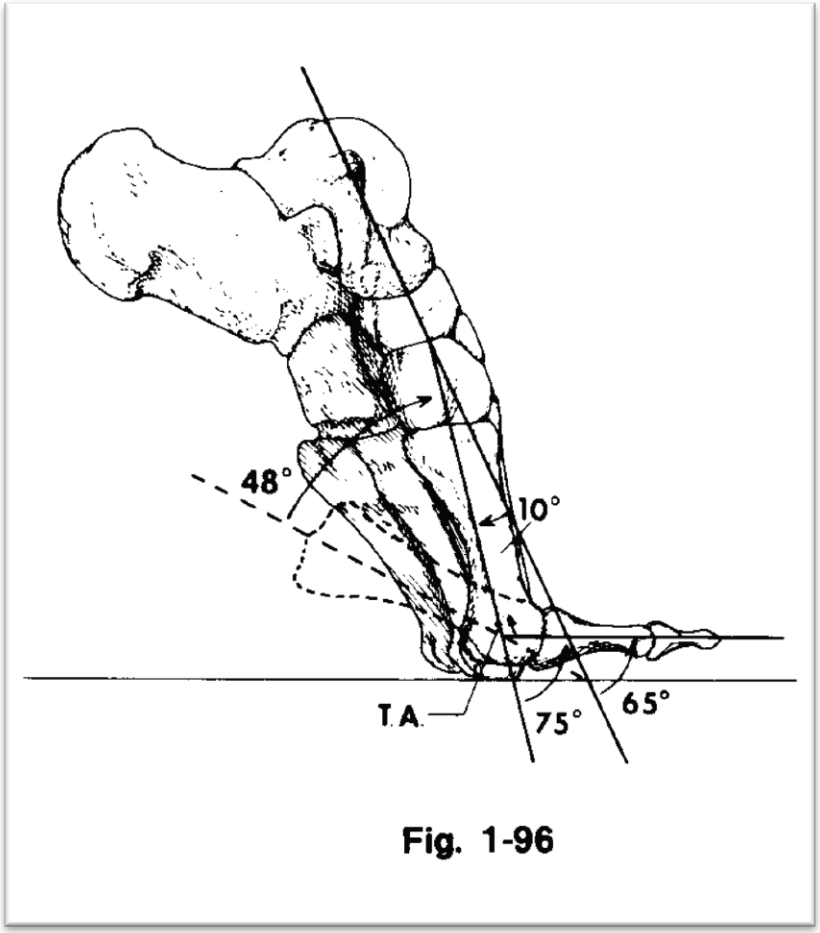


Fig. 1-96

Testing the Muscles of the Lower Extremity

1. Foot Dorsiflexion and Inversion.
2. Foot Inversion,
3. Foot Eversion with Plantar Flexion

Foot Dorsiflexion and Inversion

1. Prime mover/agonist: Tibialis Anterior

	origin	insertion
Tibialis anterior	tibia (lat. Condyle)	1st cuneiform (on medial surf.)
		1st metatarsal (base).

2. Synergist/ Accessory muscles:

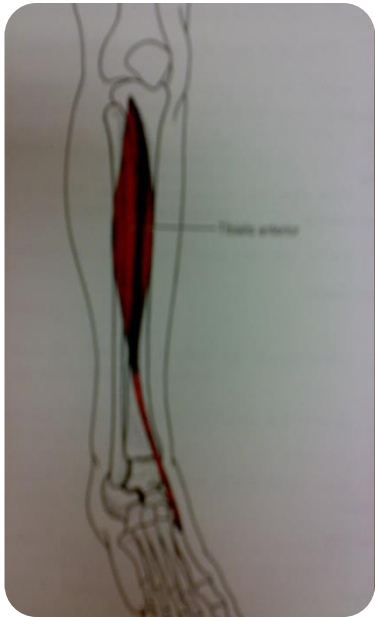
   peroneus tertius, extensor digitorum and hallucis longus.

3. Nerve supply:

   Deep peroneal n. (L4-S1)

4. Range of motion:

   0 to 20^0



Foot Dorsiflexion and Inversion.

5. Fixation:

   a. By weight of leg.

6. Effect of weakness/contracture/shortening:

   effect of weakness: decrease the ability to dorsiflex the ankle joint result in (**Droop of Foot**).

   effect of contracture: in ability to plantarflex the ankle.

7. Factor limited range of motion:

   a. Tension of latero-tarsal ligament.
   b. Tension of peroneus longus and peroneus brevis muscles.
   c. Contact of tarsal bone medially

8. Substitution:

   By the extensor digitorum and hallucis longus muscles results in toes extension

Foot Dorsiflexion and Inversion.

9. Procedures:

a- patient position (pt):

b- Therapist Position:

inner hand:

Outer hand: Direction of Resistance :

Instruction to patient:

c- grading system:

Normal(5), Good(4), Fair(3), Poor(2), Trace(1), Zero(0)

make sure patient tolerates maximal resistance pluse hold 3 sec.

e. Palpation site:

Foot Inversion

1. Prime mover/agonist: Tibialis posterior

	origin	insertion
Tibialis posterior	Tibia post. (lat. Condyle)	Navicular bon (tuberosity)
	Fibula (proximal posterior medial)	1st cuneiform

2. Synergist/ Accessory muscles:

peroneus tertius (with Dorsiflexion), Tibialis ant., and flexor digitorum and hallucis longus.

3. Nerve supply:

Tibial (medial popliteal n.)- (L4-L5)

4. Range of motion:

0 to 35^0

Foot Inversion

5. Fixation:

   a. By weight of leg.

6. Effect of weakness/contracture/shortening:

effect of weakness: may dropping in medial arch of the foot. (flat foot).

effect of contracture: in ability to plantarflex & evert the ankle.

7. Factor limited range of motion:

   a. Tension of latero-tarsal ligaments.

   b. Tension of peroneal muscles group.

   c. Contact of lateral bones medially.

8. Substitution:

By the flexors digitorum and hallucis longus muscles results in toes flexion

Foot Inversion

9. Procedures:

a- patient position (pt):

b- Therapist Position:

inner hand:

Outer hand: Direction of Resistance :

Instruction to patient:

c- grading system:

Normal(5), Good(4), Fair(3), Poor(2), Trace(1), Zero(0)

make sure patient tolerates maximal resistance pluse hold 3 sec.

e. Palpation site:

Foot Eversion with Plantar Flexion

1. Prime mover/agonist:

	origin	insertion
Peroneus longus	Fibula (head & lat. Aspect)	1st Metatarsal (base & lat aspect)
Peroneus brevis	Fibula (distal & lat. Aspect)	5th Metatarsal (tuberosity base, lat. Aspect)

2. Synergist/ Accessory muscles:
   Gastrocnemius.
3. Nerve supply:
   Superficial peroneal n. (L5-S1)
4. Range of motion:
   0 to 25^0

Foot Eversion with Plantar Flexion

5. Fixation:

   a. By weight of leg.

6. Effect of weakness/contracture/shortening:

   effect of weakness: may results in:

   - Decrease the strength of eversion of the foot & planter flexion of the ankle jt.
   - Decrease lateral stability of the foot.

   effect of contracture: results in an everted or valgus position of the foot.

7. Factor limited range of motion:

   a. Tension of medial tarsal ligaments.

   b. Tension of tibialis anterior and tibialis posterior muscles.

   c. Contact of tarsal bones laterally

8. Substitution:

   No substitution.

Foot Eversion with Plantar Flexion

9. Procedures:

a- patient position (pt):

b- Therapist Position:

inner hand:

Outer hand: Direction of Resistance :

Instruction to patient:

c- grading system:

Normal(5), Good(4), Fair(3), Poor(2), Trace(1), Zero(0)

make sure patient tolerates maximal resistance plus hold 3 sec.

e. Palpation site:

Thank You