Joints III

Hip joint

- Is a ball & socket joint with a marked degrees of interlocking which lead to limited ROM partially compensated for by movement of the lumbar vertebrae but is distinctly more stable.

- These features of the hip joint derive from the basic functions of lower limb support of body weight & locomotion.

- It has 3 degrees of freedom.

ROM

- **Flexion**: it varies according to:

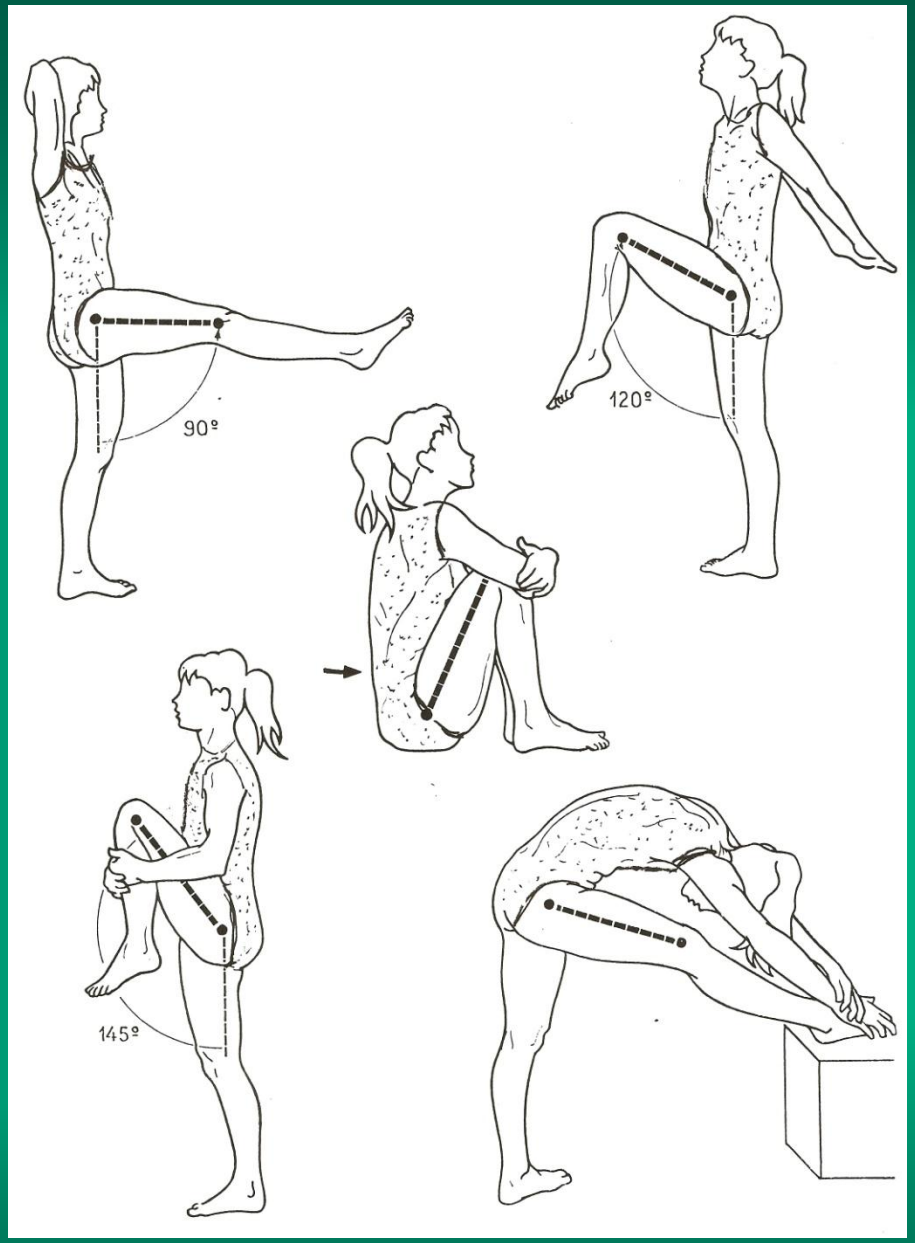
  -Whether the range is passively or actively achieved.

  -Whether the knee is flexed or extended.

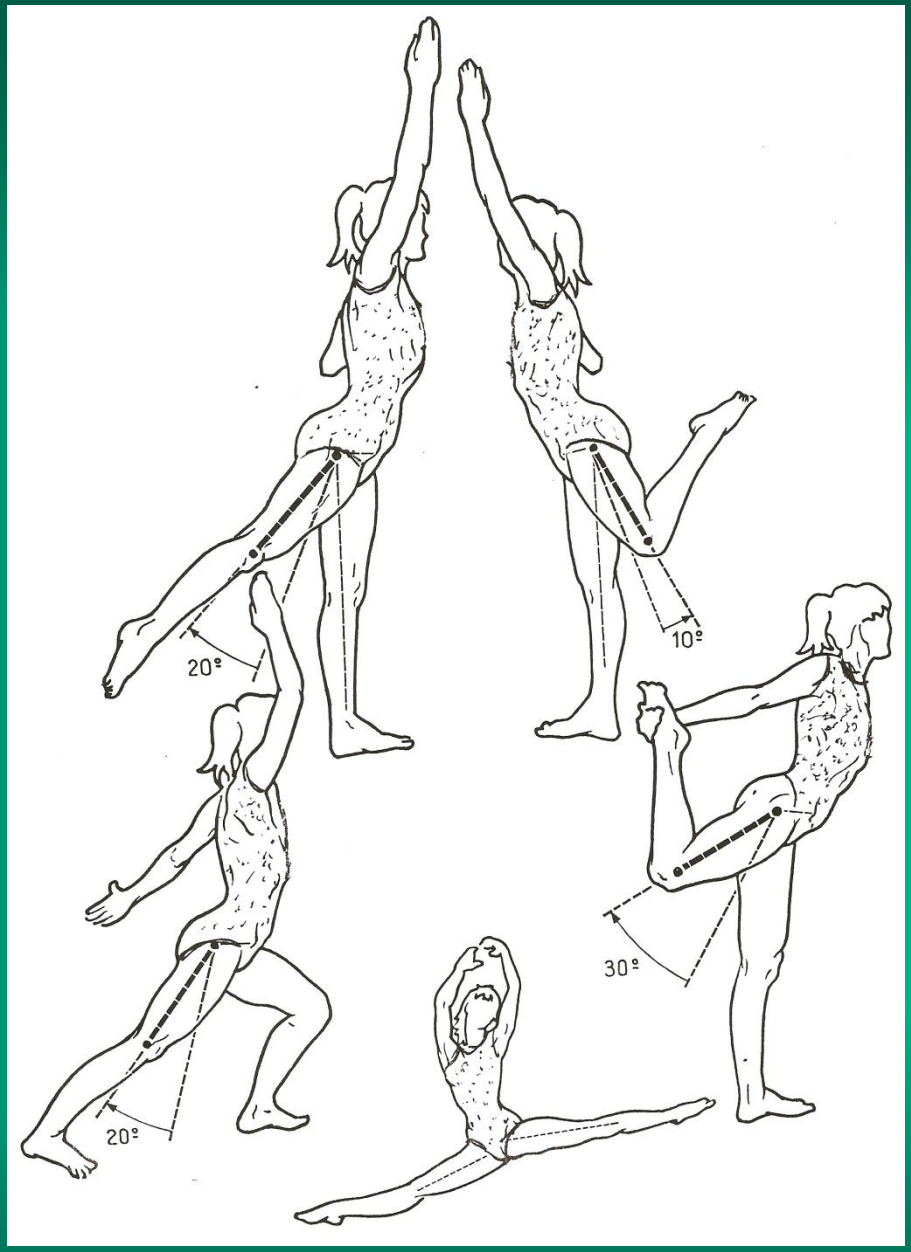
Extension:

-Is limited by iliofemoral ligament, also is affected by whether the knee is flexed or extended, and whether actively or passively performed.

-Range of hip extension is increased by anterior tilting of the pelvis due to exaggeration of lumber lordosis.



Active and passive range of hip flexion with extended and flexed knee.

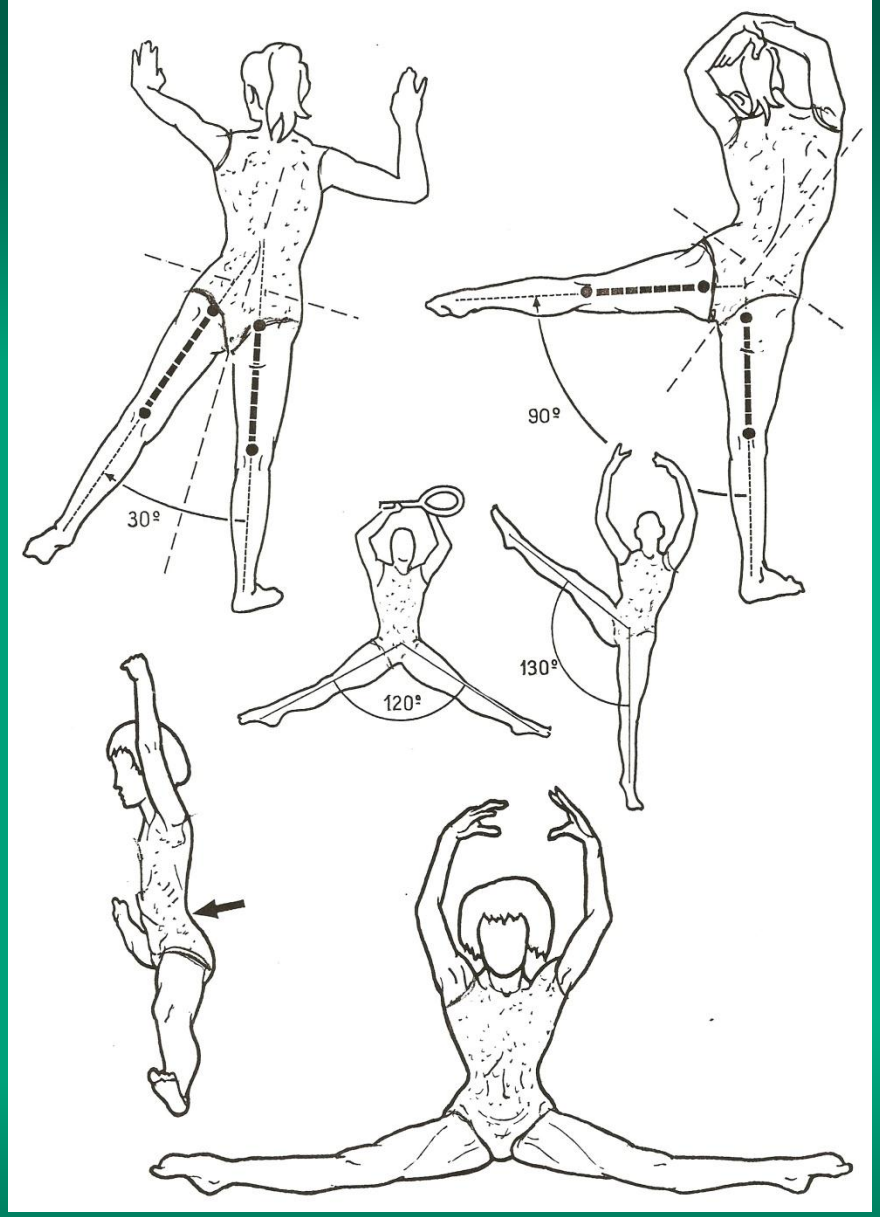


Active and passive range of hip extension with flexed and extended knee.

- **<u>Abduction</u>:**

  -Theoretically abduction can occur at one hip, in practice abduction of one joint is automatically followed by a similar degree of abduction at the other joint. this is obvious after 30 ° abduction.

  -When abduction reach a maximum, the angle between the two L.L. is a right angle, so that each limb has a maximum of 45 °.



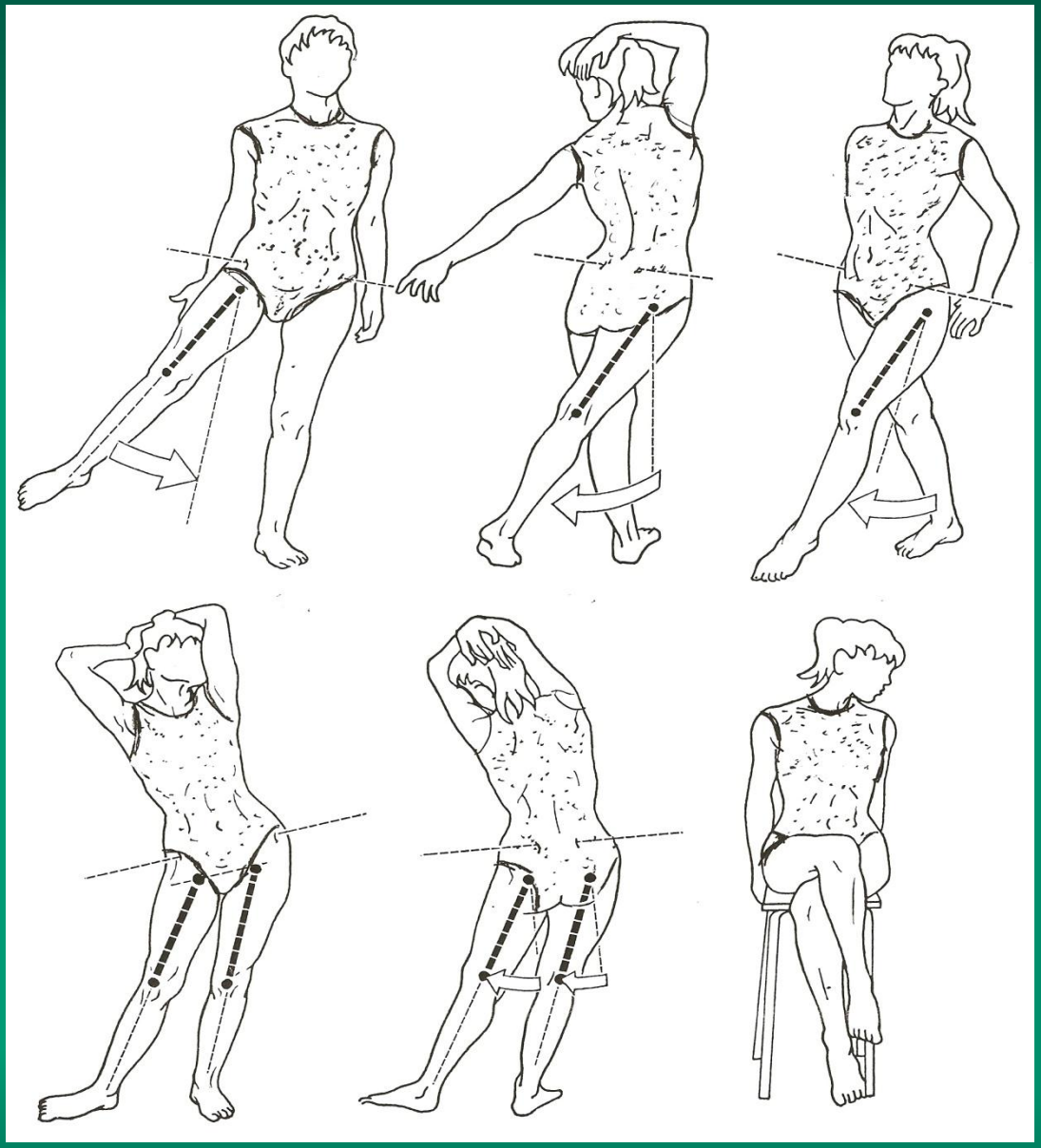
Active and passive range of hip abduction.

- Adduction:

1. There no pure adduction from the anatomical position, but relative adduction occurs as when the limb moves medially from any position.

2. Adduction can be combined with flexion, extension of the same limb, or abduction of the other limb.

3. The maximum adduction is 30°

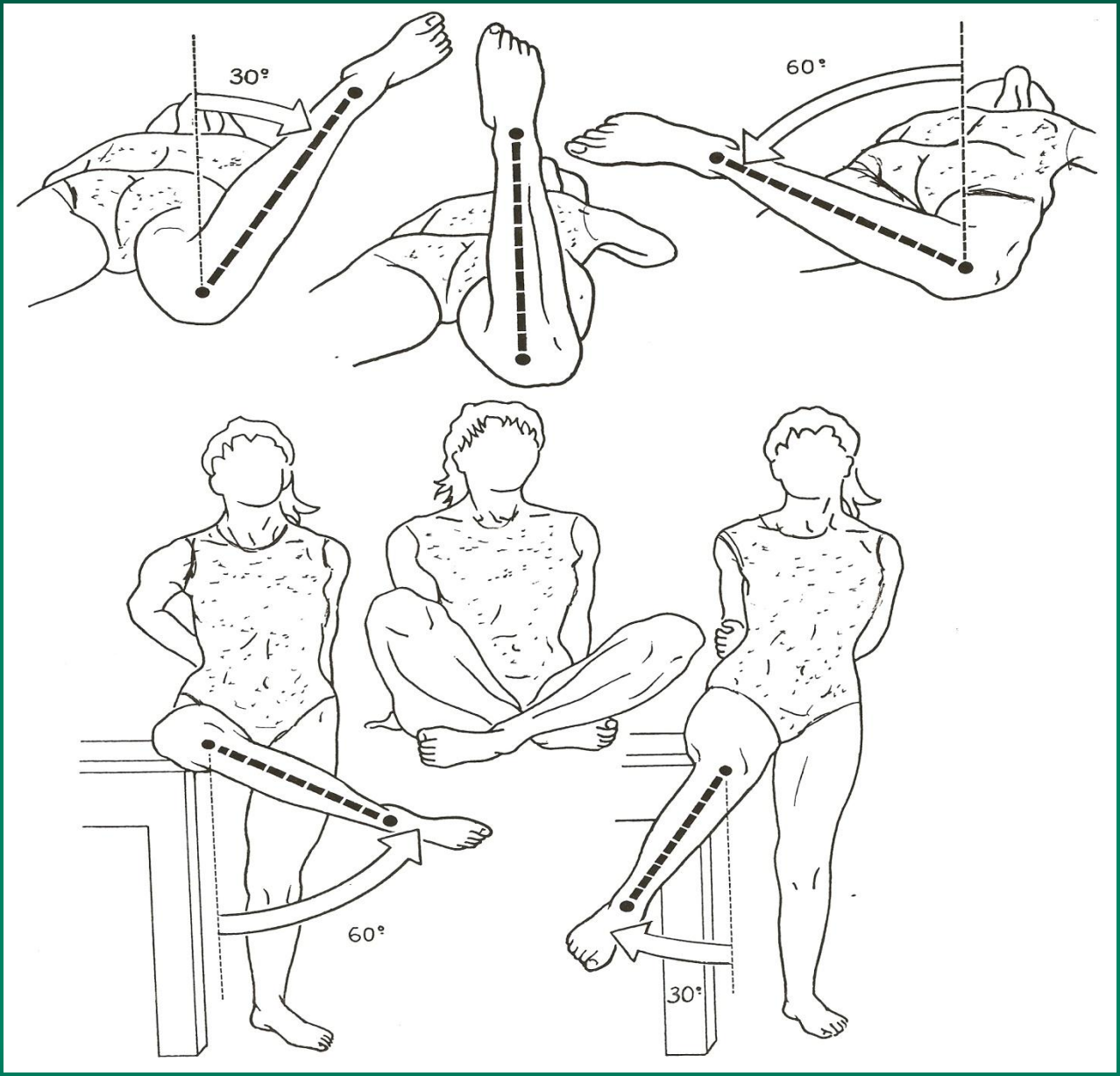


Active and passive range of adduction.

- Rotation:

1. Medial rotation of the hip joint 30-40°
2. Lateral rotation up to 60°

- N.B. when the hip & knee are flexed to 90°, the total range of external rotation increase because hip flexion relaxes the iliofemoral & pubofemoral ligaments. The range of rotation depends on the angle of anteversion of the femoral neck.



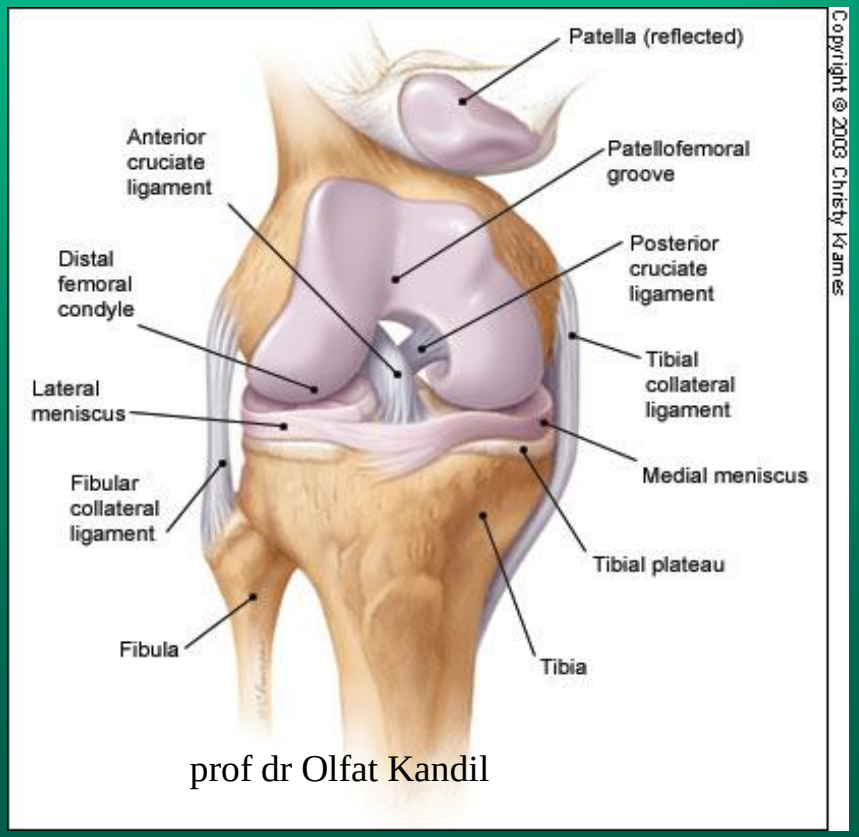
Active and passive range of rotation.

- Circumduction:

- It is a combination of the elementary movements occurring simultaneously around the 3 axes.

Knee joint

- It has mainly one degree of freedom, and an accessory degree of freedom which allow rotation of the long axis of the leg only when the knee is flexed.



- N B
- Physiological valgus of the knee occur because the axis of the femoral shaft doesn’t coincide with that of the leg but forms with the latter an obtuse angle of 170-175 opening outwards.
- Refer to mechanical axis of bone

ROM

- Extension: relative extension
- Flexion: absolute & relative

N.B. range of flexion varies according to:

- position of the hip
- Whether it is active or passive range.
- Active flexion with hip already flexed: 140 °
- Active flexion with hip extended: 120 °
- Passive flexion: 160 °

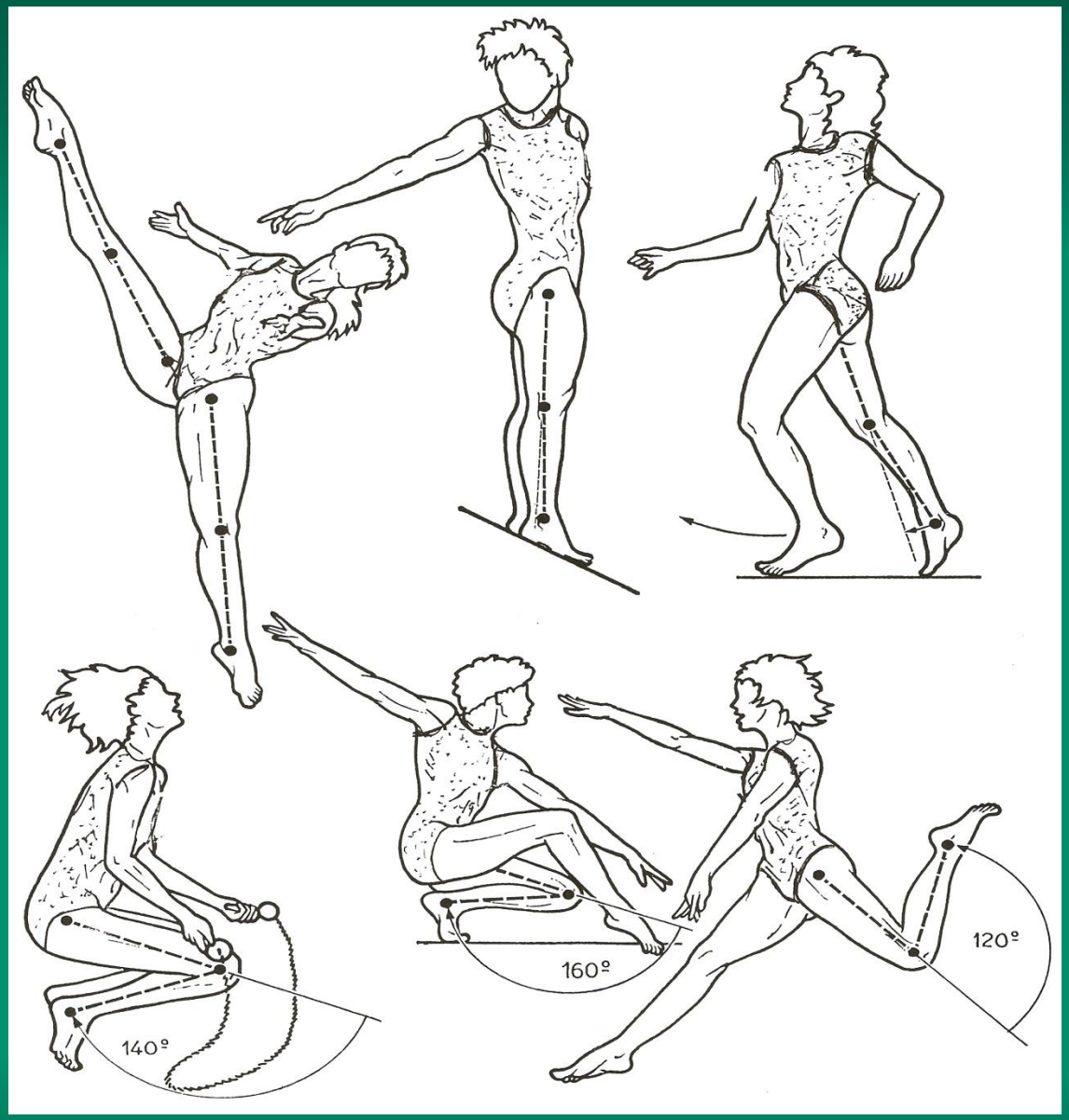
- Axial rotation:

➢ Medial rotation:40 °

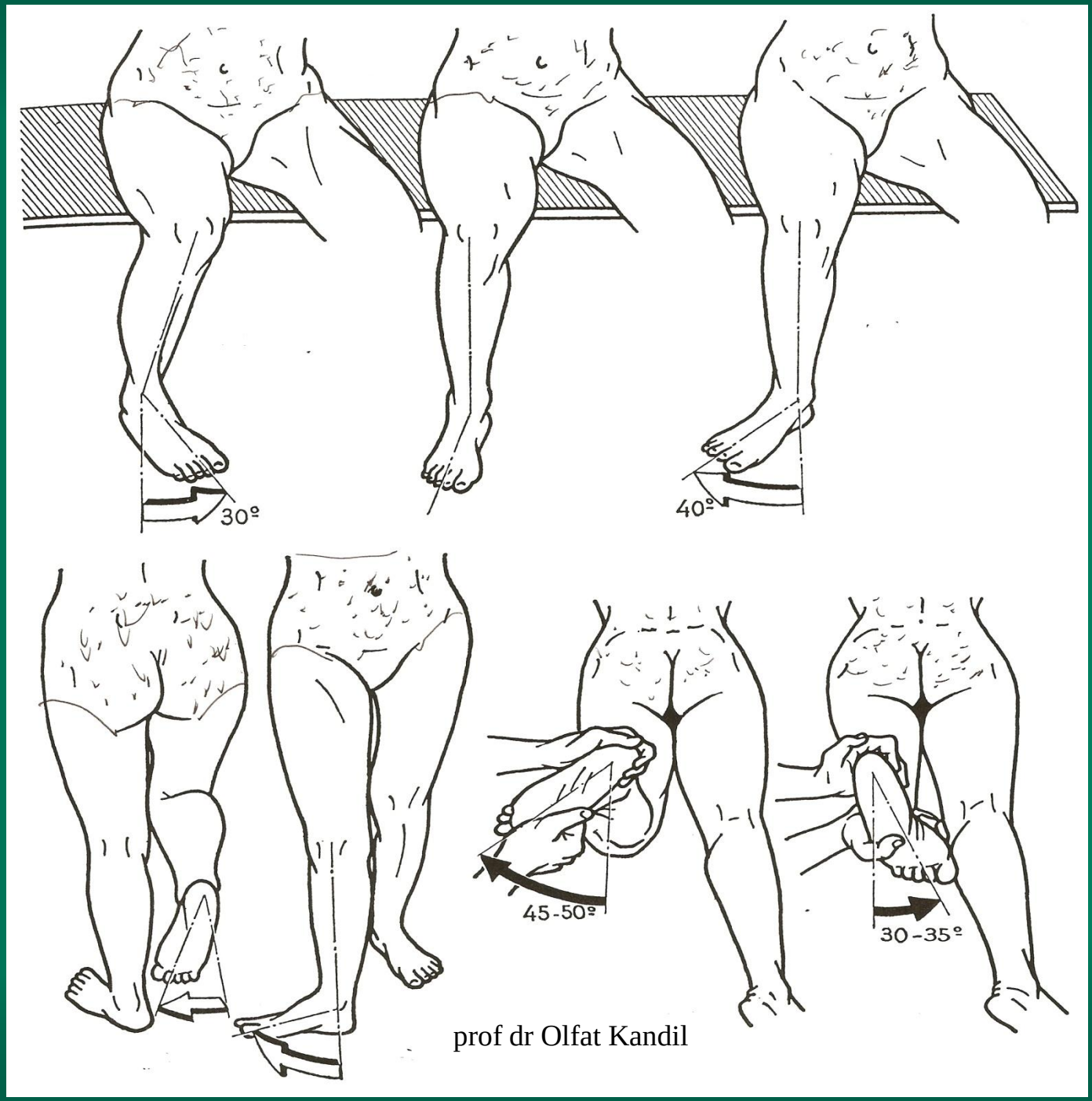
➢ Lateral rotation 30 °

➢ Automatic rotation occur at the end of extension (lateral), &at beginning of flexion (medial).

➢ Locking and unlocking of the knee refer to screw home mechanism



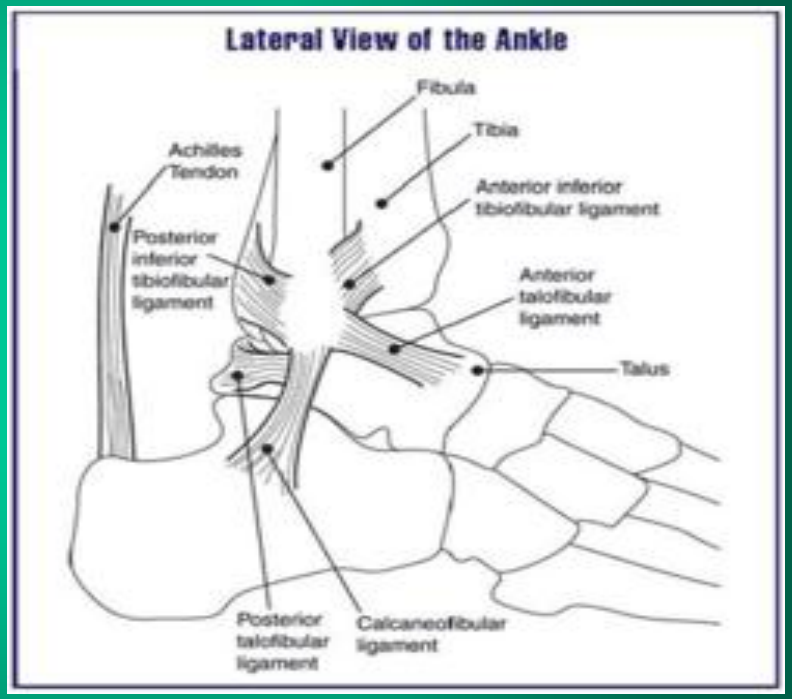
Active and passive range of knee flexion and extension


30º
40º
45-50º
30-35º

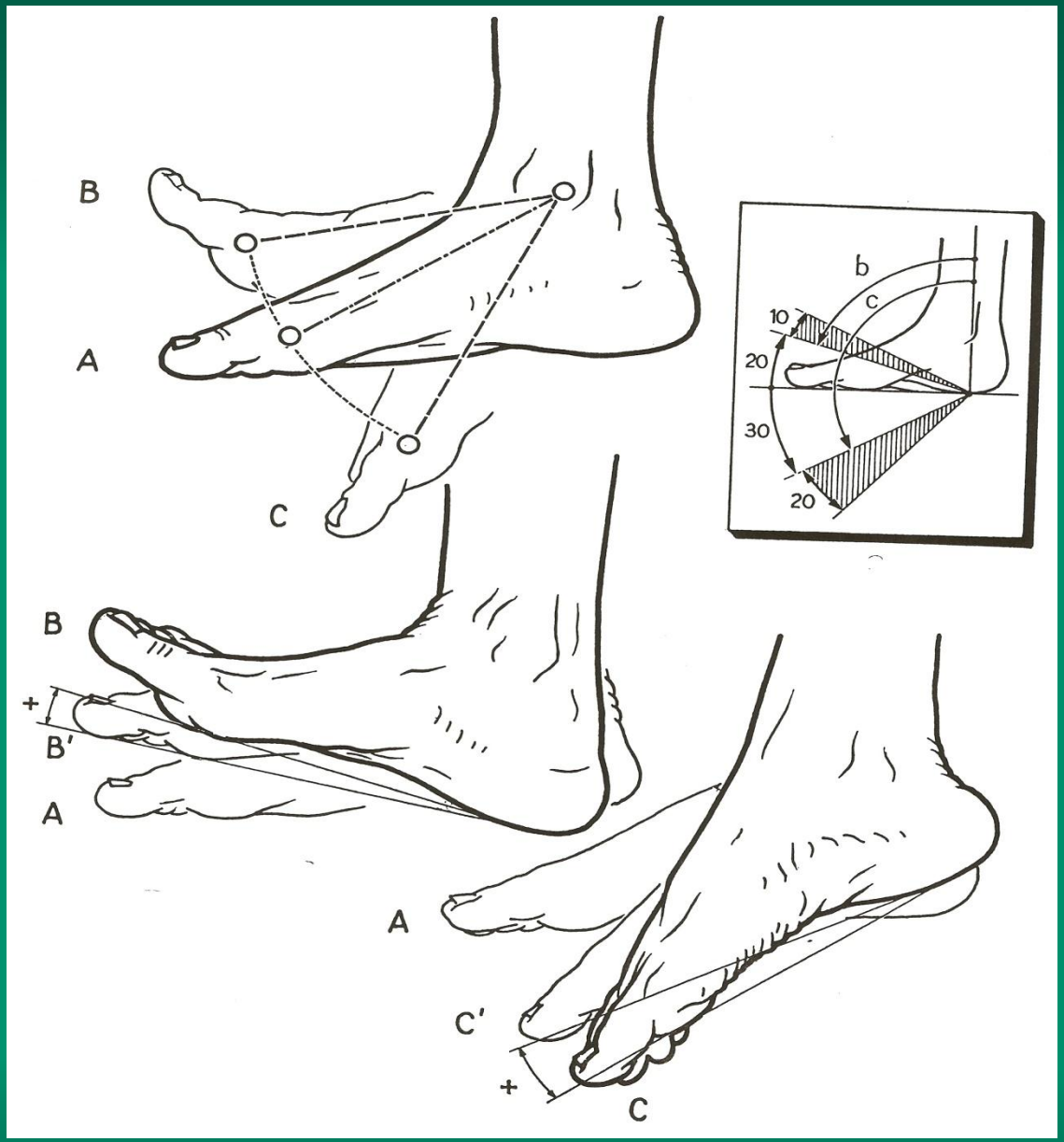
Ankle joint

- Has one degree of freedom, & allow planter flexion, and dorsiflexion.
- Dorsiflexion (flexion): 20-30°
- Planterflexion (extension): 30-50°


Fibula
Tibia
Anterior talofibular ligament (partial tear)
Calcaneofibular ligament (stretched)


Lateral View of the Ankle
Fibula
Tibia
Achilles Tendon
Anterior inferior tibiofibular ligament
Posterior inferior tibiofibular ligament
Anterior talofibular ligament
Talus
Posterior talofibular ligament
Calcaneofibular ligament

Ankle joint

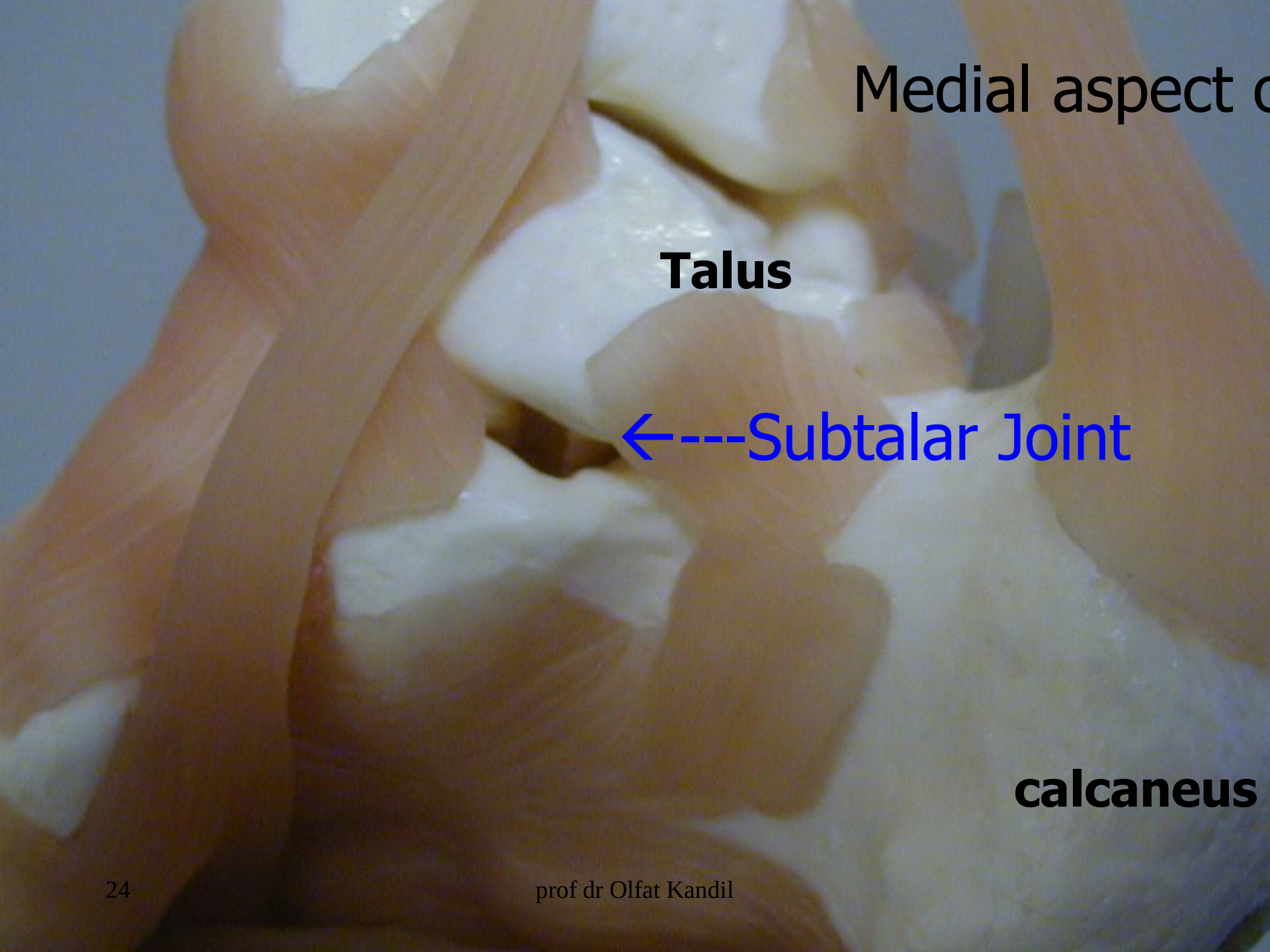


Range of motion of Ankel joint.

Subtalar Joint

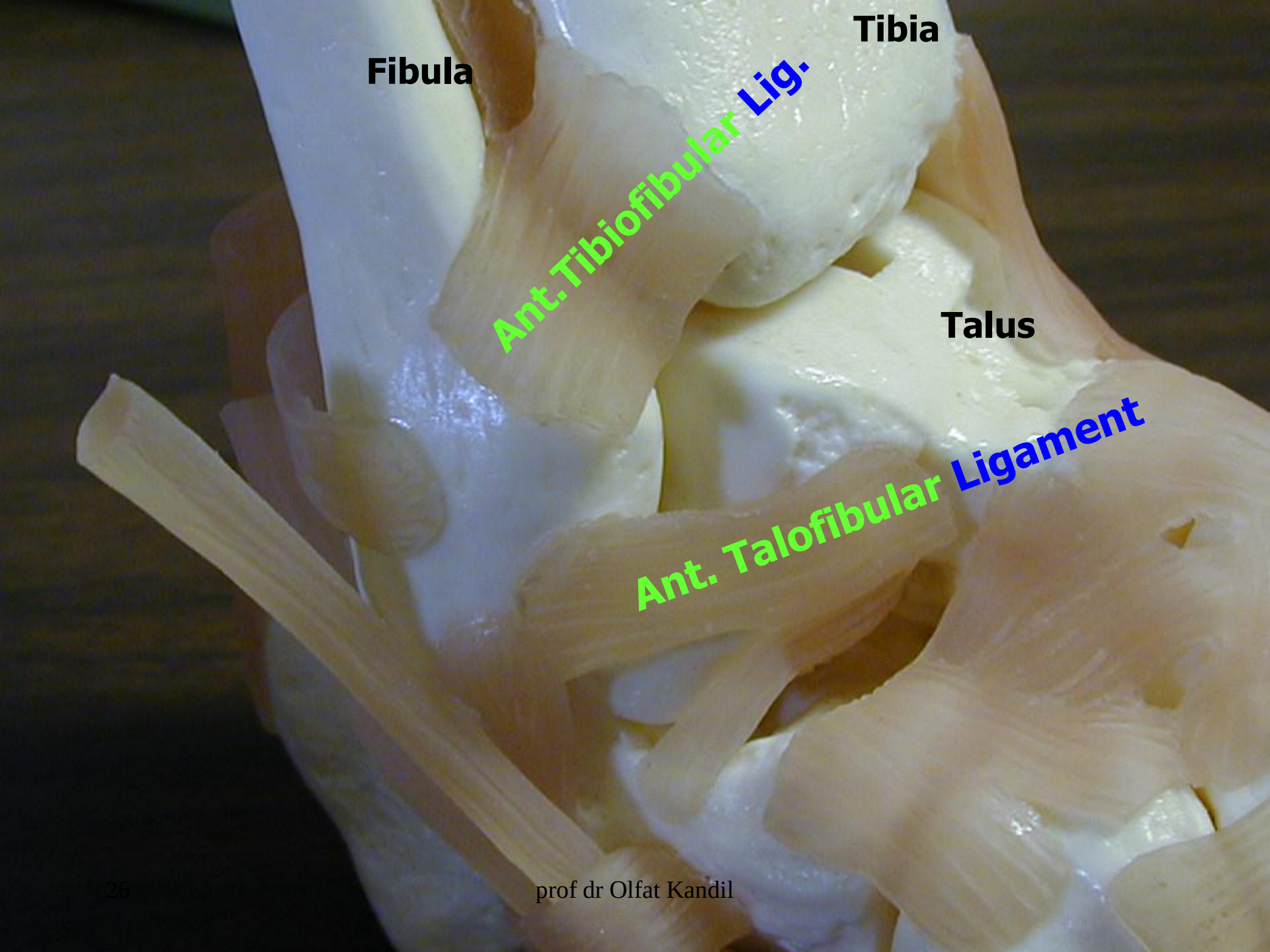
- The articulation between the talus and the calcaneus is referred to as the subtalar joint.
- Motion allowed

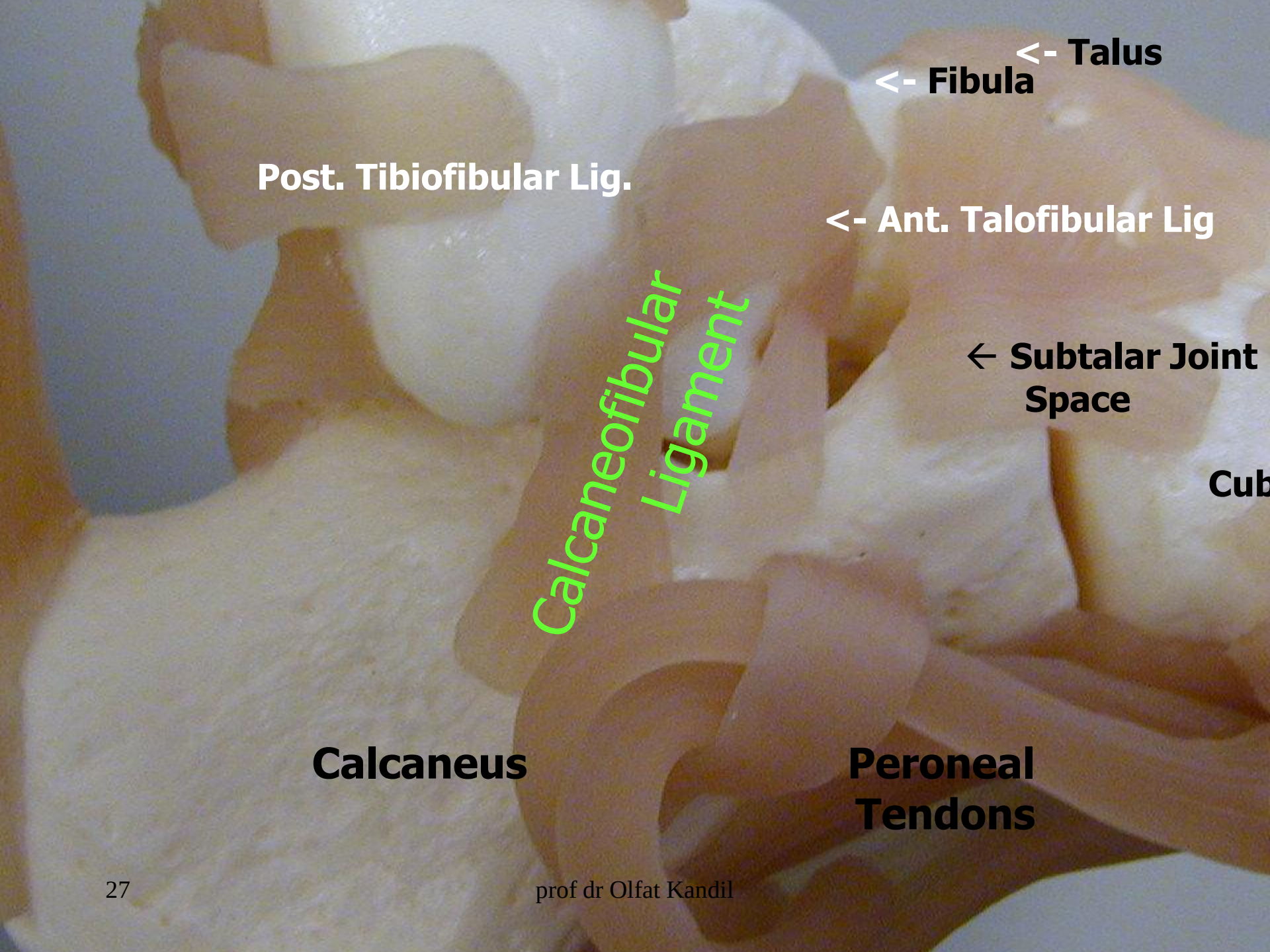
inversion (roll inward)/eversion (roll outward) as well as rear foot pronation (inward tilt of the calcaneus) and supination (outward tilt of the calcaneus) .

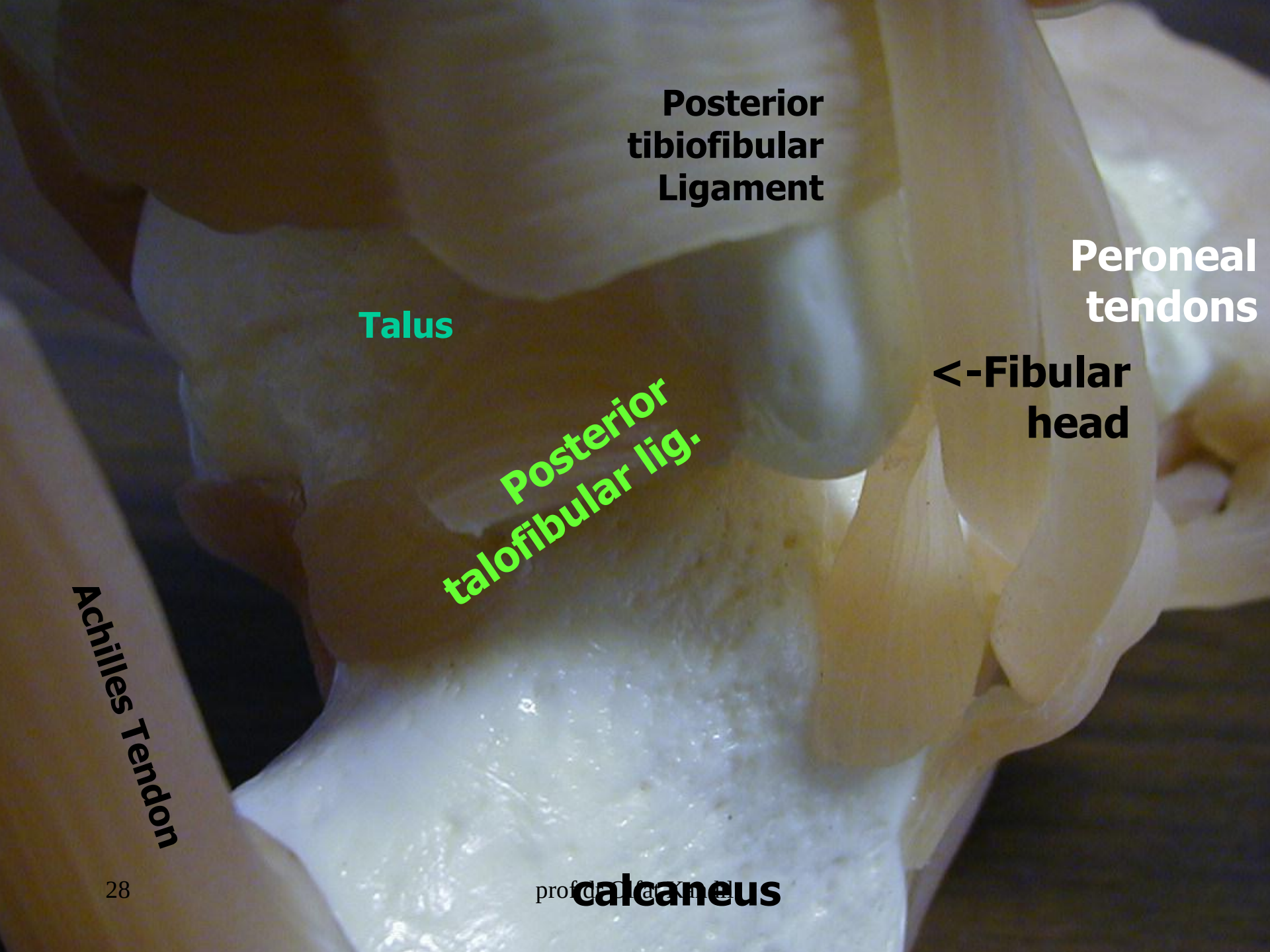

Medial aspect o
Talus
←---Subtalar Joint
calcaneus

Ankle Ligaments

- There are three lateral ligaments predominantly responsible for the support and maintenance of bone apposition (best possible fit). These ligaments prevent inversion of the foot.
- These ligaments are:
  - Anterior talofibular ligament and tibiofibuler
  - Calcaneofibular ligament
  - Posterior talofibular ligament

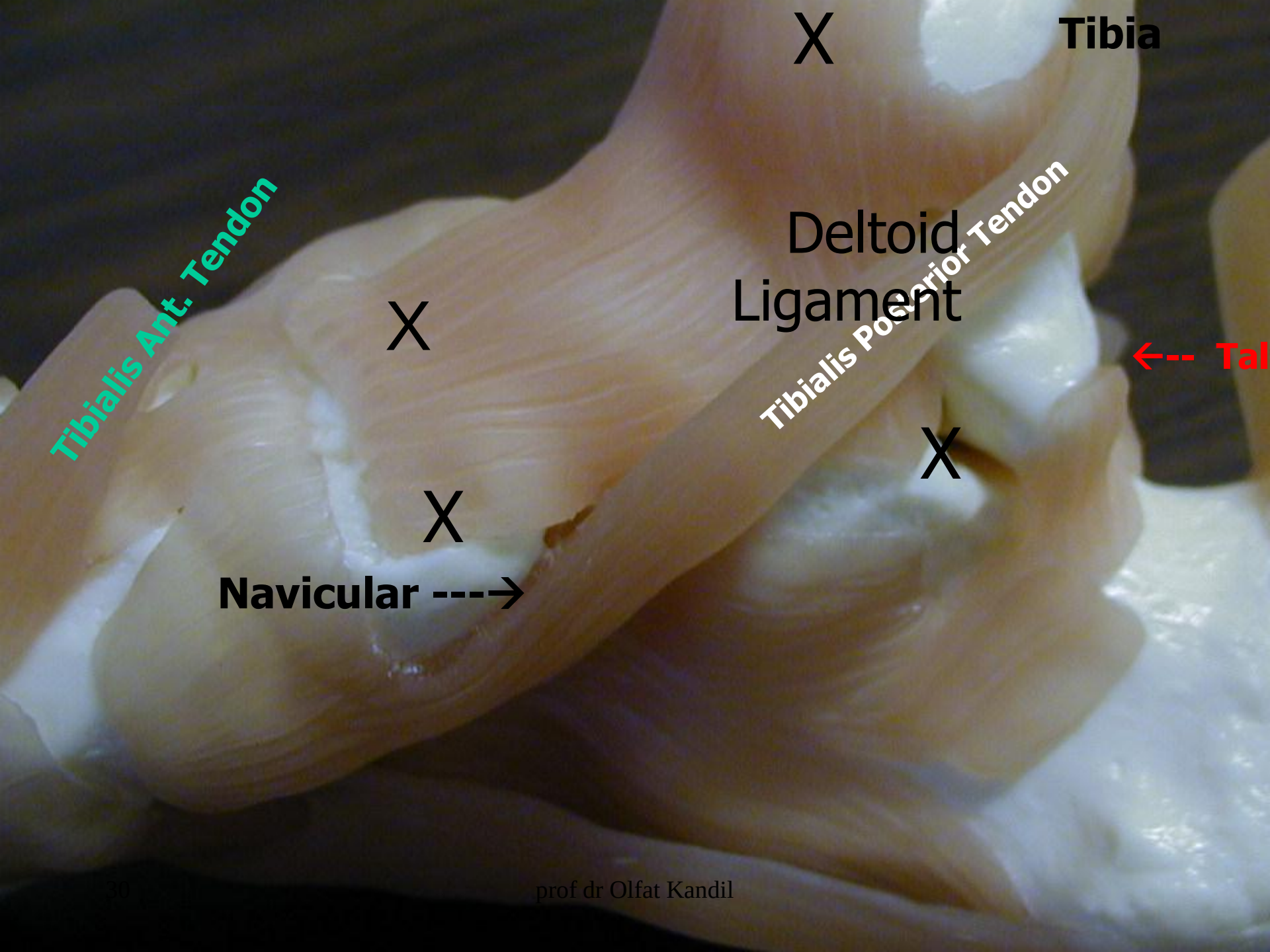

Tibia
Fibula
Ant.Tibiofibular Lig.
Talus
Ant. Talofibular Ligament


<- Talus
<- Fibula
Post. Tibiofibular Lig.
<- Ant. Talofibular Lig
Calcaneofibular Ligament
← Subtalar Joint Space
Cub
Calcaneus
Peroneal Tendons


Posterior
tibiofibular
Ligament
Peroneal
tendons
Talus
<-Fibular
head
Posterior
talofibular lig.
Achilles Tendon
calcaneus

The deltoid ligament

- This is located on the medial aspect of the foot. It is the largest ligament but is actually comprised of several sections all fused together. This ligament prevents (eversion) of the ankle. The deltoid ligament is triangular in shape and has superficial and deep layers. It is the most difficult ligament in the foot to sprain.


X
Tibia
Tibialis Ant. Tendon
Deltoid
Ligament
Tibialis Posterior Tendon
X
←-- Tal
X
X
Navicular ---→