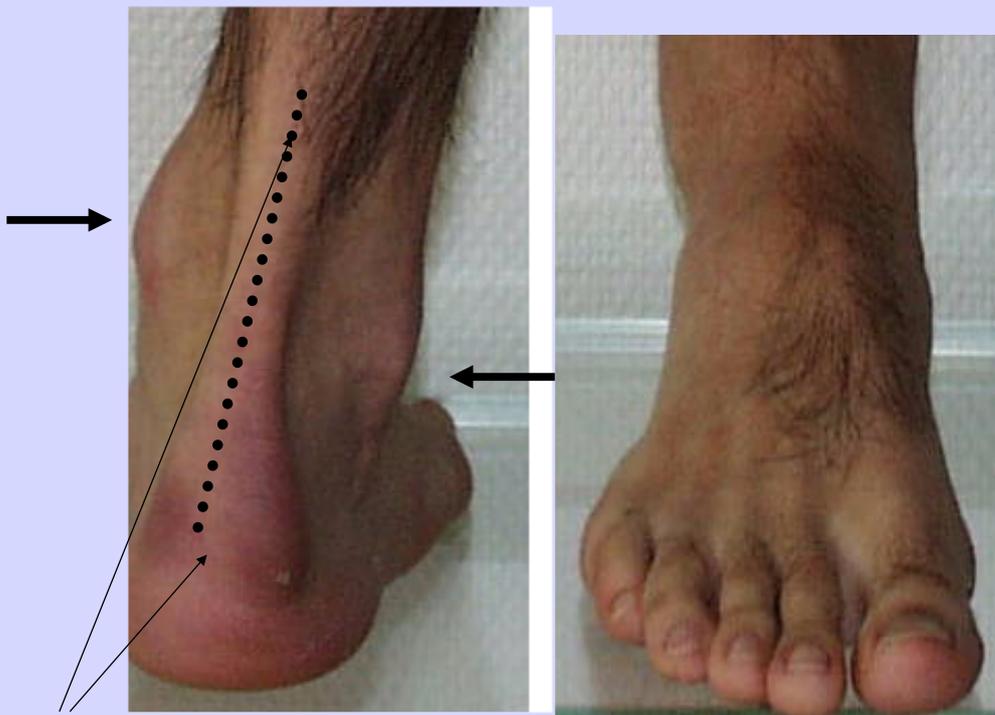


# The foot

- bones
- ligaments
- joints
- muscles
- mouvements
- pathologies



## Ankle and foot



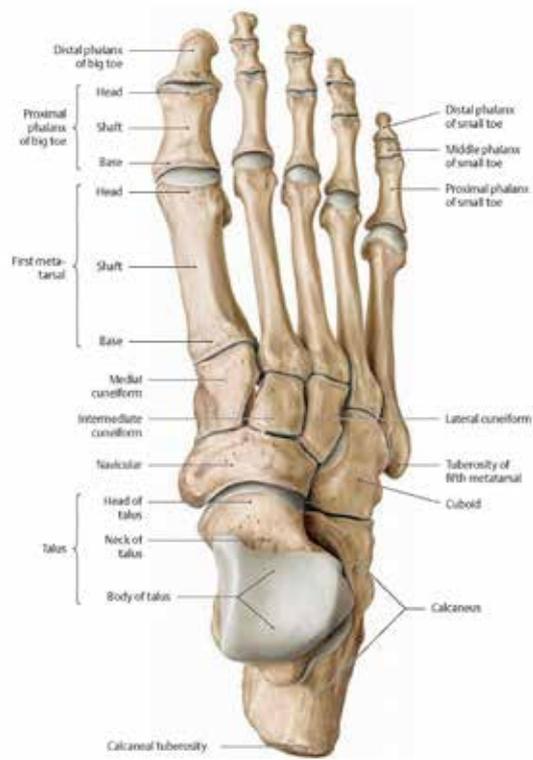
tendon d 'Achille



voûte

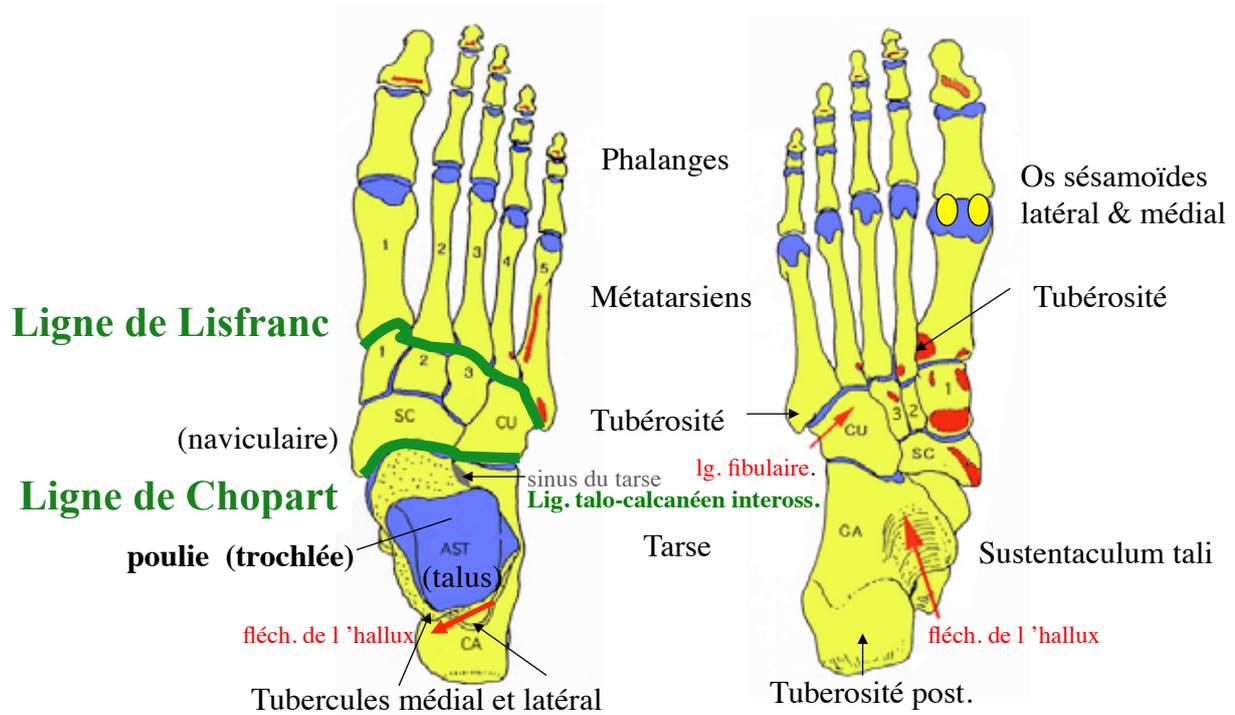


**E The bones of the right foot**  
Plantar view.

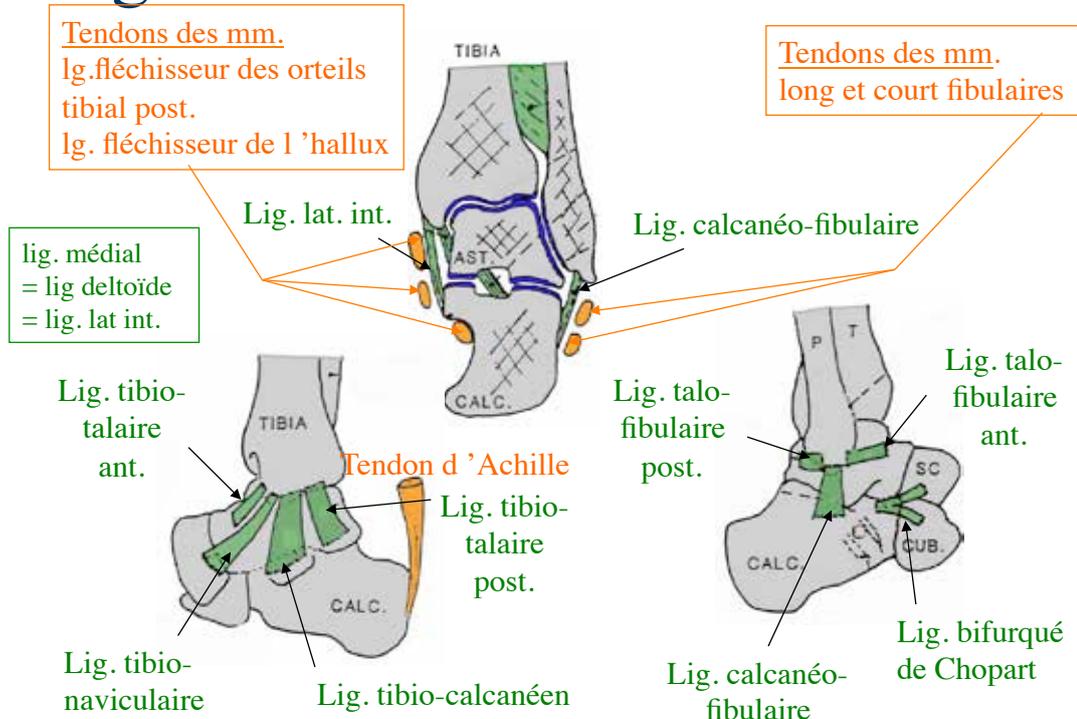


**A The bones of the right foot**  
Dorsal view.

# Bones of the foot



# Ligaments of the ankle



2/2

## Ankle (art. talo-crurale)

Lig. talo-fibulaire post.  
(péronéo-astragalien)

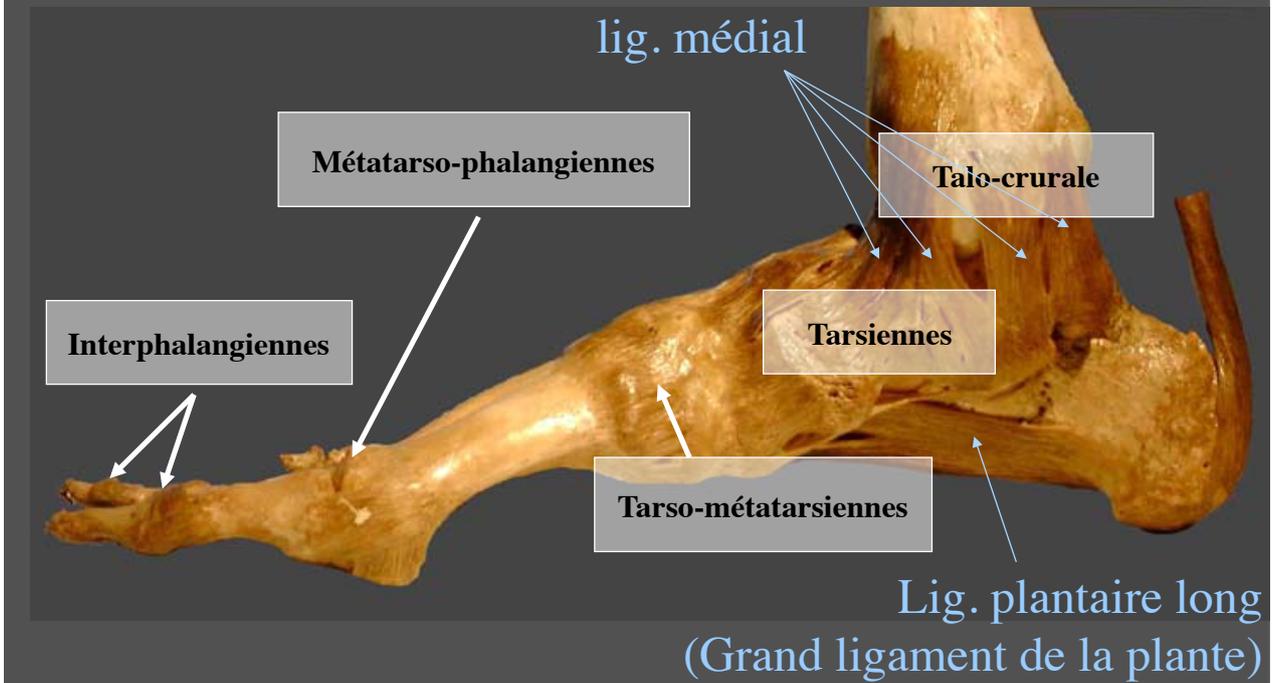


Lig. bifurqué  
de Chopart

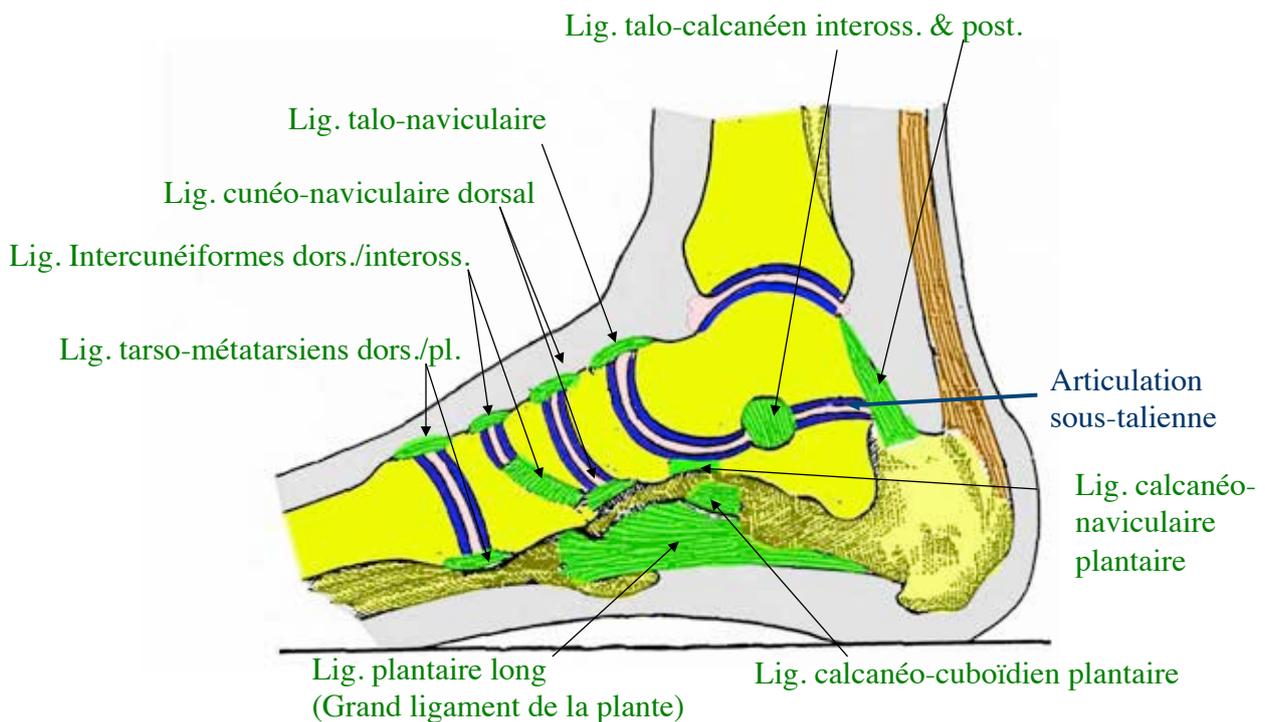
Lig. calcanéofibulaire  
(péronéo-calcaneen)



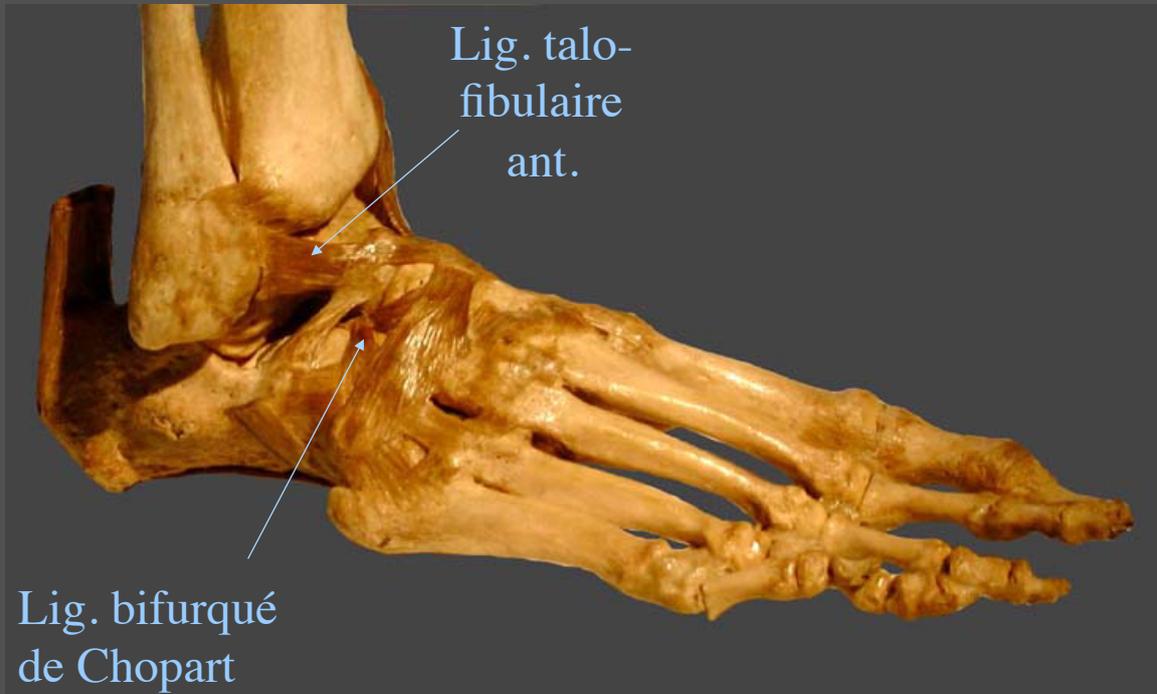
# Ligaments et articulations



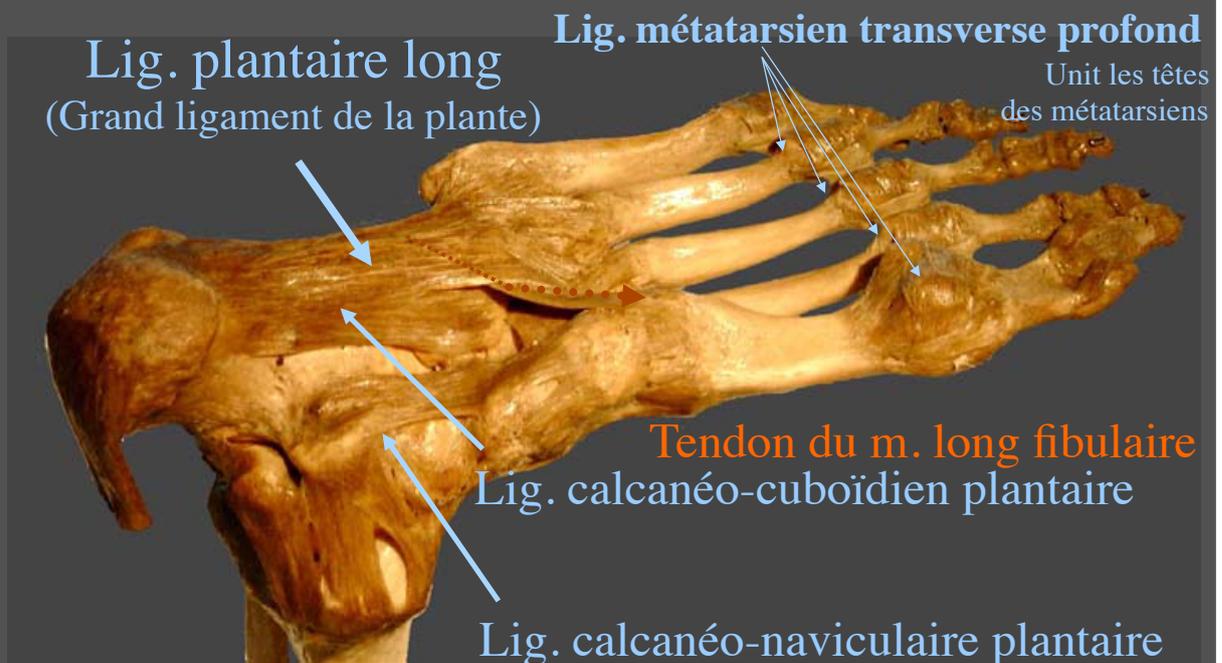
## Les ligaments du tarse

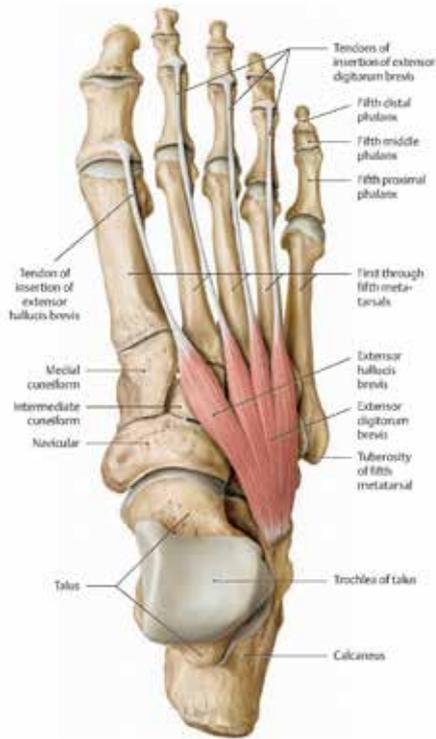


## tarsal ligaments



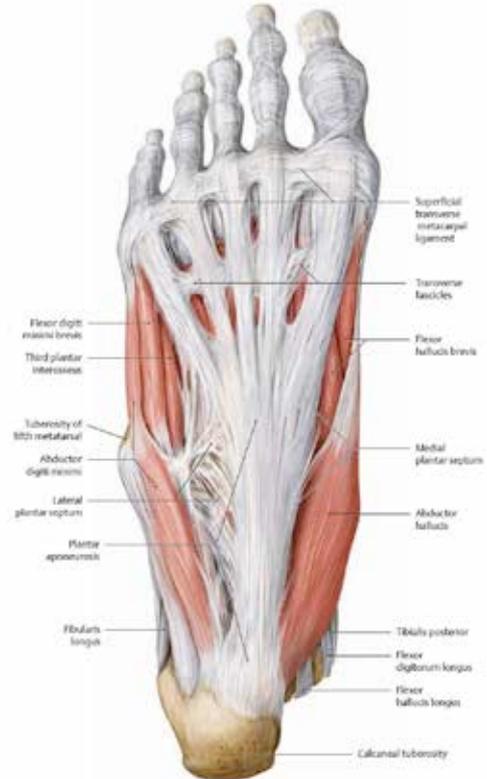
## plantar ligaments





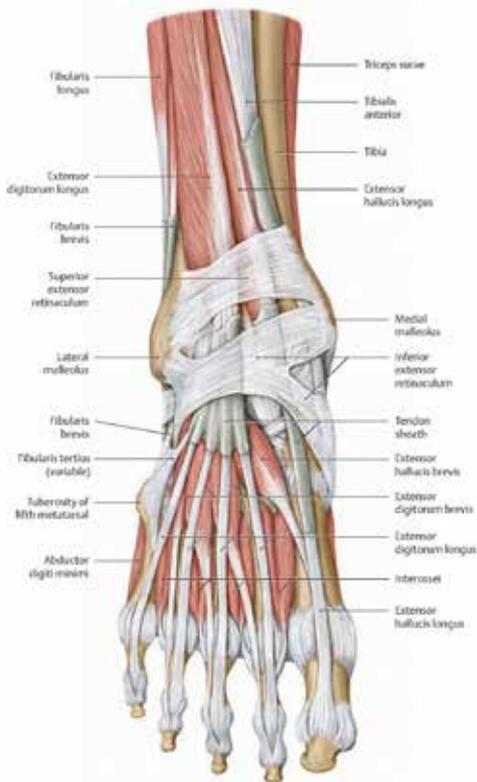
**C The dorsal muscles of the foot (extensor digitorum brevis and extensor hallucis brevis)**  
Right foot, dorsal view.

Illustrator: Karl Wesker pp. 428-429  
Schoenke et al. *THIEME Atlas of Anatomy • General Anatomy and Musculoskeletal System*  
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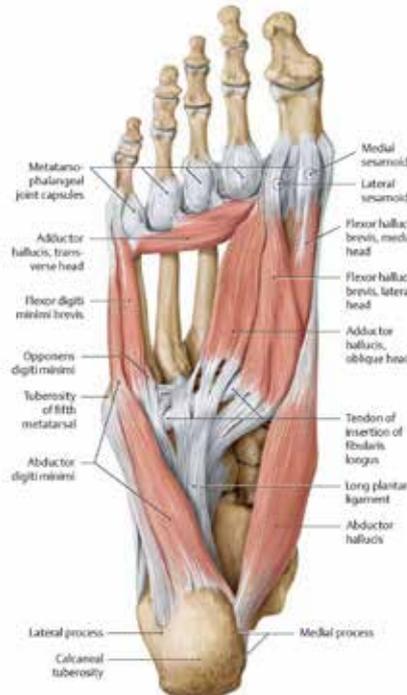
**A The plantar aponeurosis of the right foot from the plantar view**

Illustrator: Karl Wesker pp. 456-457  
Schoenke et al. *THIEME Atlas of Anatomy • General Anatomy and Musculoskeletal System*  
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**A The tendon sheaths and retinacula of the right foot from the anterior view**

Illustrator: Karl Wesker pp. 454-455  
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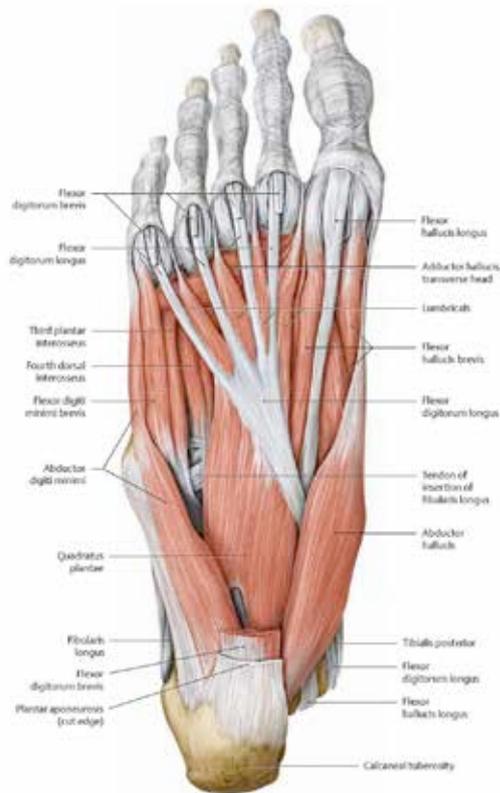


**D The plantar muscles of the medial and lateral compartments (abductor hallucis, adductor hallucis, flexor hallucis brevis, abductor digiti minimi, flexor digiti minimi, and opponens digiti minimi)**  
Right foot, plantar view.

\* The adductor hallucis is considered part of the central compartment.

Illustrator: Karl Wesker pp. 428-429  
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**A The intrinsic muscles of the right foot from the plantar view**

Illustrator: Karl Wesker

pp. 450-459

Schuenke et al. *THieme Atlas of Anatomy • General Anatomy and Musculoskeletal System*  
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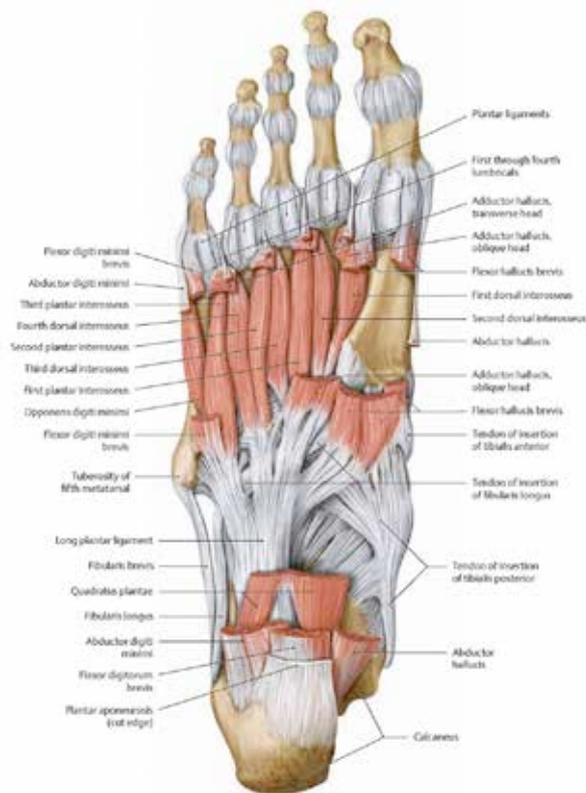
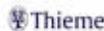


**B The intrinsic muscles of the right foot from the plantar view**

Illustrator: Karl Wesker

pp. 454-457

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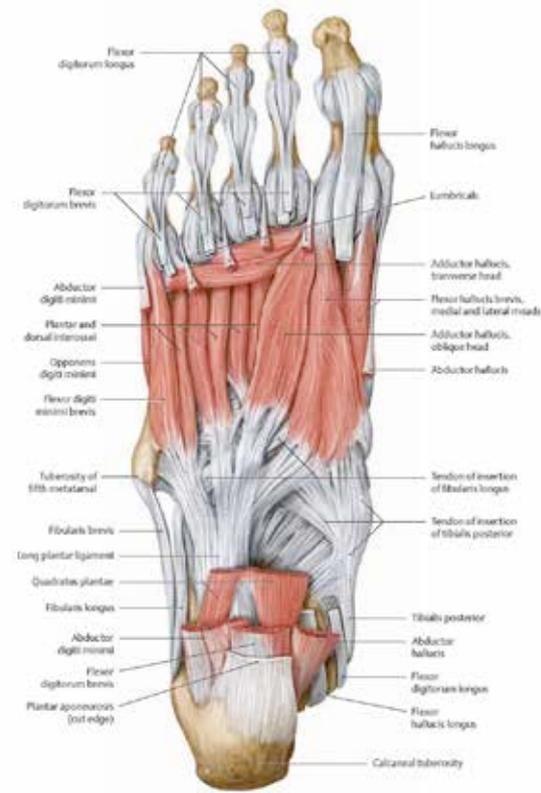
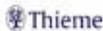


**A The intrinsic muscles of the right foot from the plantar view**

Illustrator: Karl Wesker

pp. 460-461

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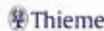


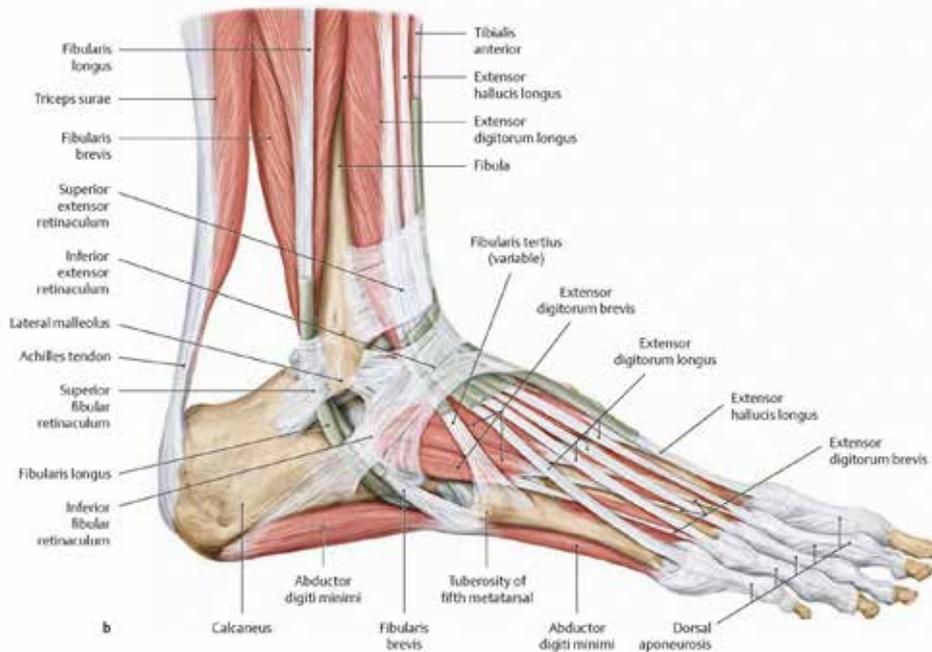
**B The intrinsic muscles of the right foot from the plantar view**

Illustrator: Karl Wesker

pp. 455-459

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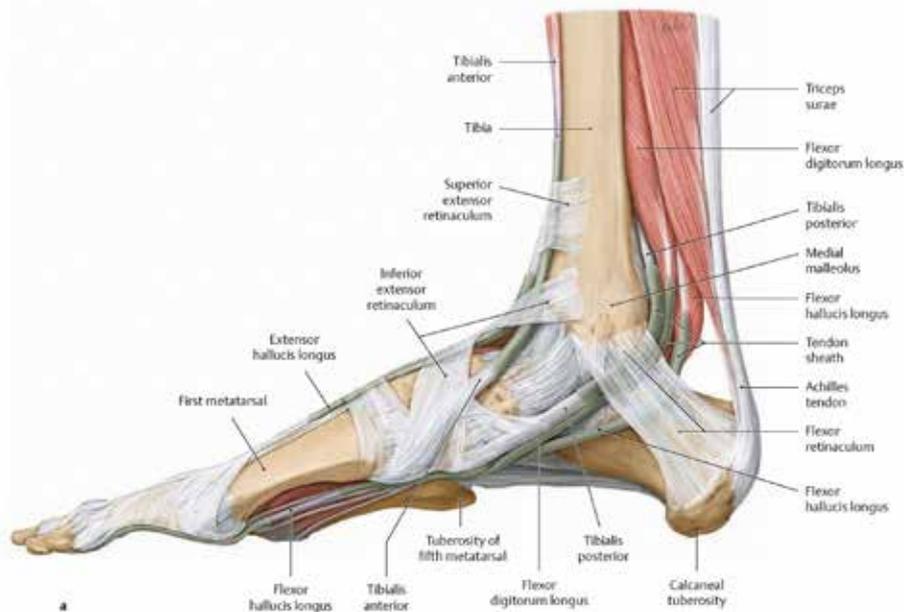
**B The tendon sheaths and retinacula of the right foot**

b Lateral view.

Illustrator: Karl Wesker

pp. 454-455

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**B The tendon sheaths and retinacula of the right foot**

a Medial view.

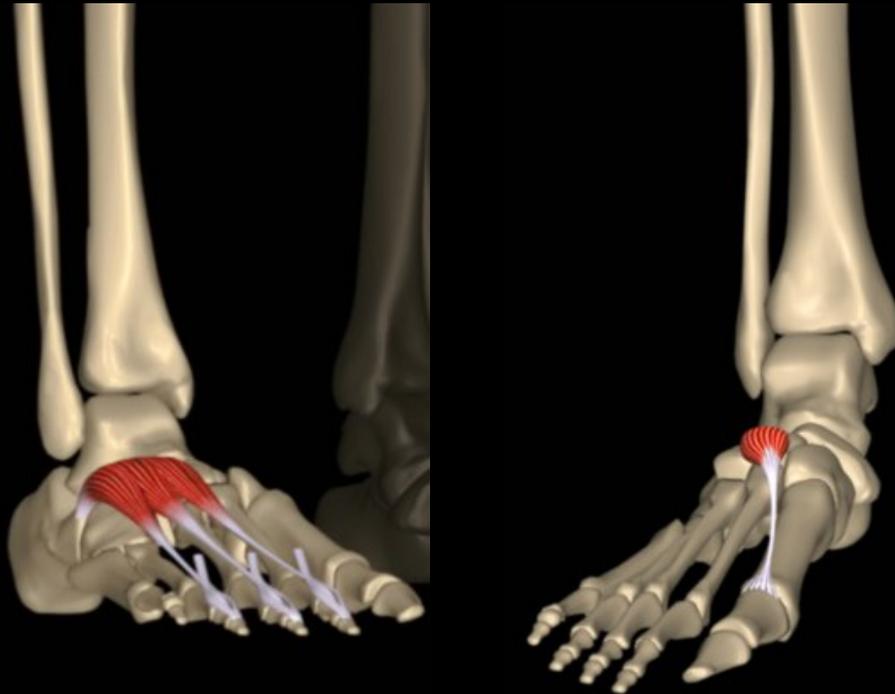
Illustrator: Karl Wesker

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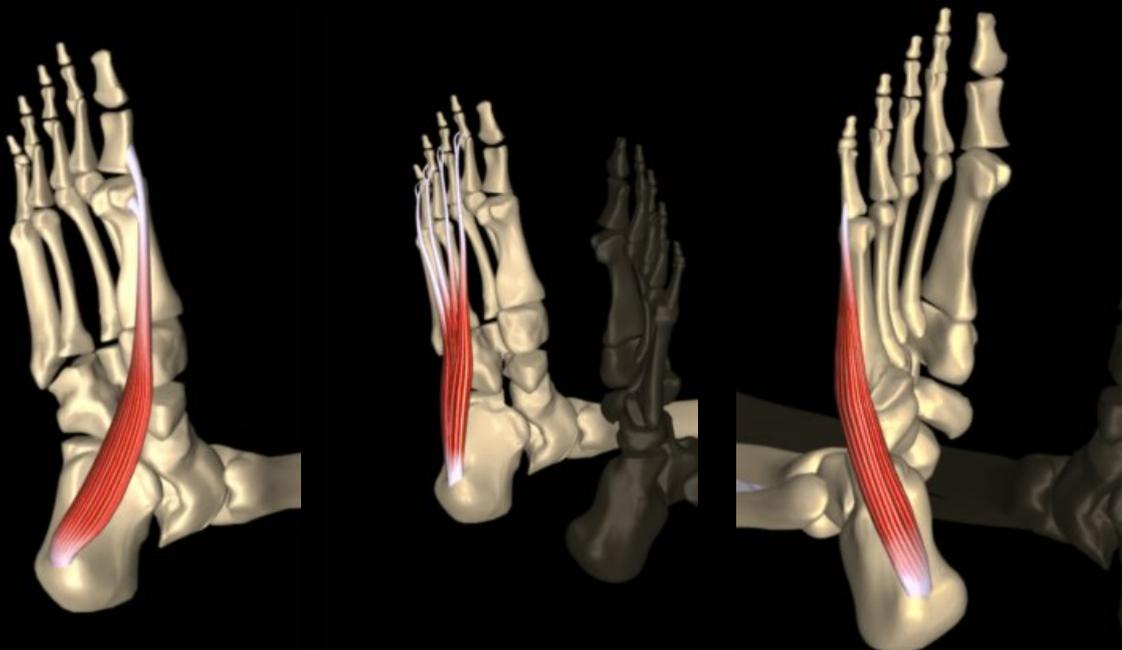
## dorsal muscles of foot



m. court extenseur des orteils et de l'hallux, ( m. pédieux)

## Short plantaris muscles

m. court fléchisseur des orteils



m. abducteur de l'hallux

m. abducteur du petit orteil

## Short plantar muscles



**chair carré plantaire**



**mm. lombricaux**

## Short plantaris muscles

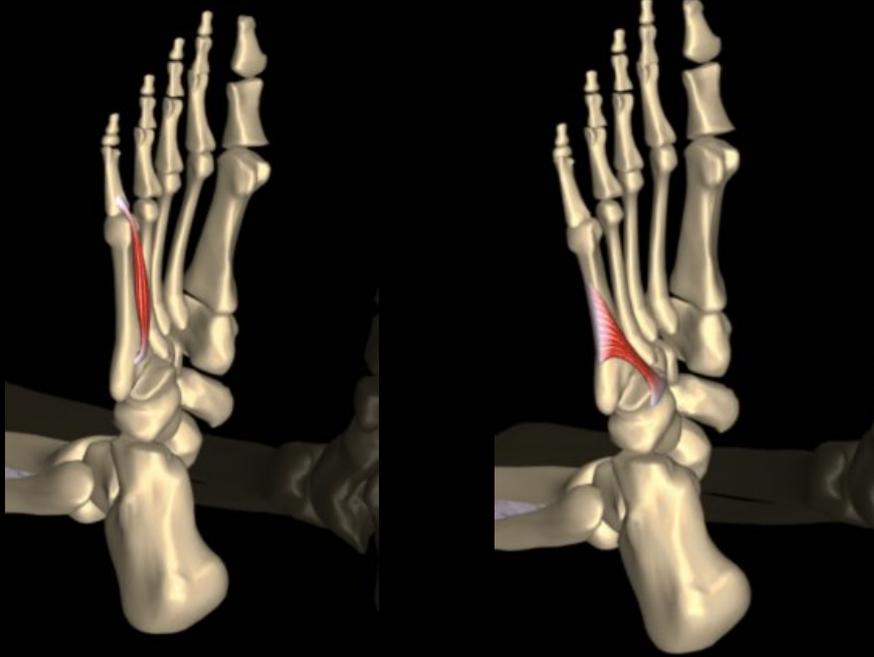


**m. court fléchisseur de l'hallux**



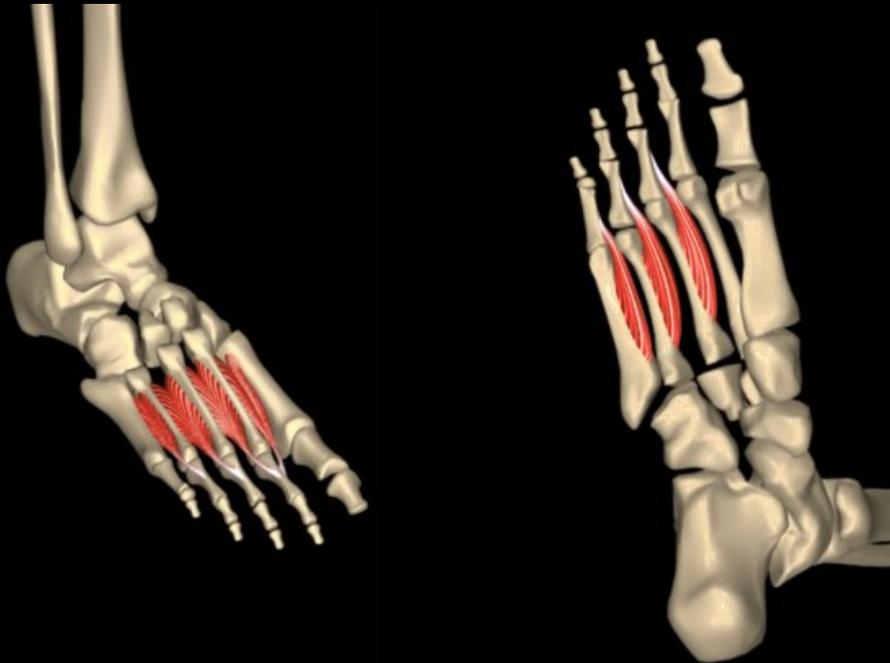
**m. adducteur de l'hallux**

## Short plantaris muscles

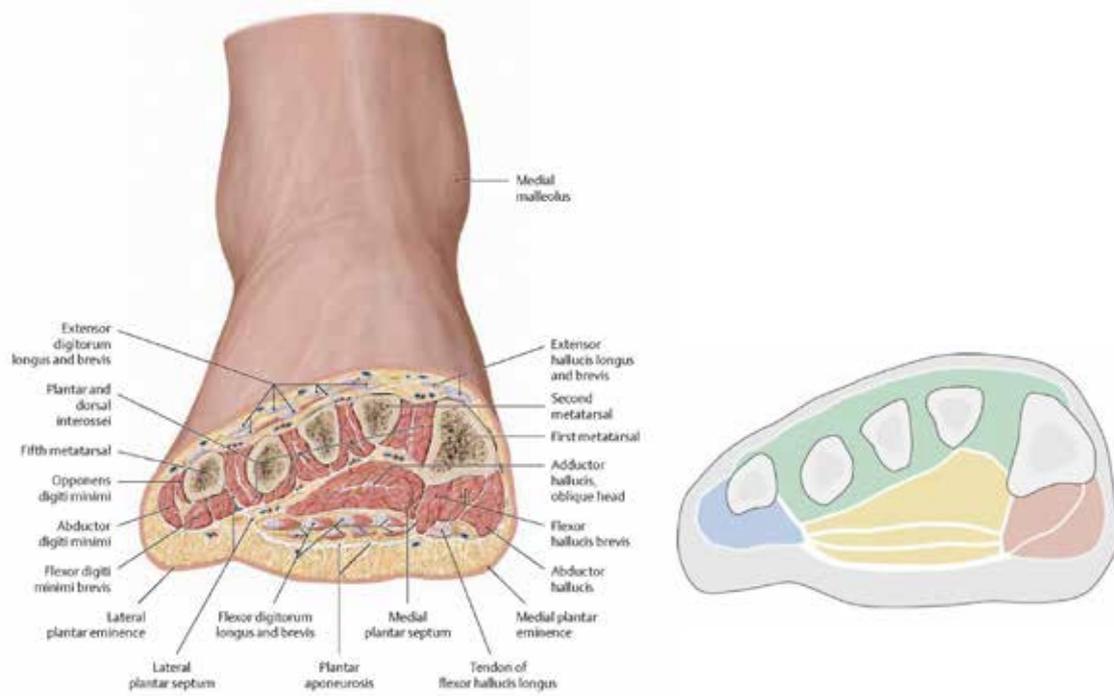


mm. court fléchisseur et opposant du petit orteil

## Interossei muscles



mm. interosseux dorsaux et interosseux plantaires



**D Cross-section through the right foot at the level of the metatarsals**  
View of the distal cut surface.

Illustrator: Karl Wesker

pp. 462-463

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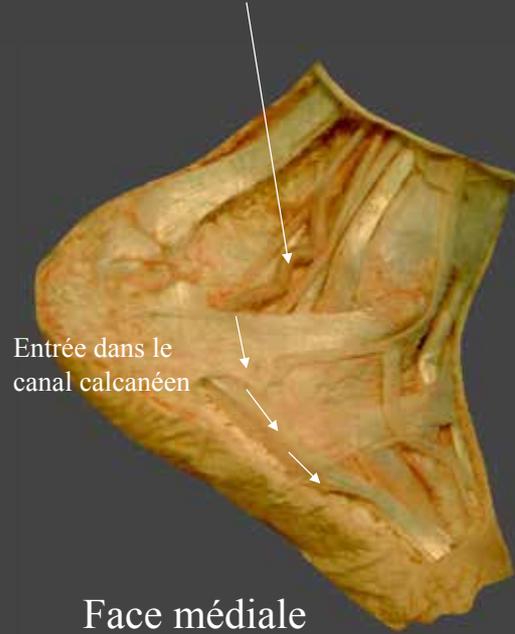
# Topography of foot



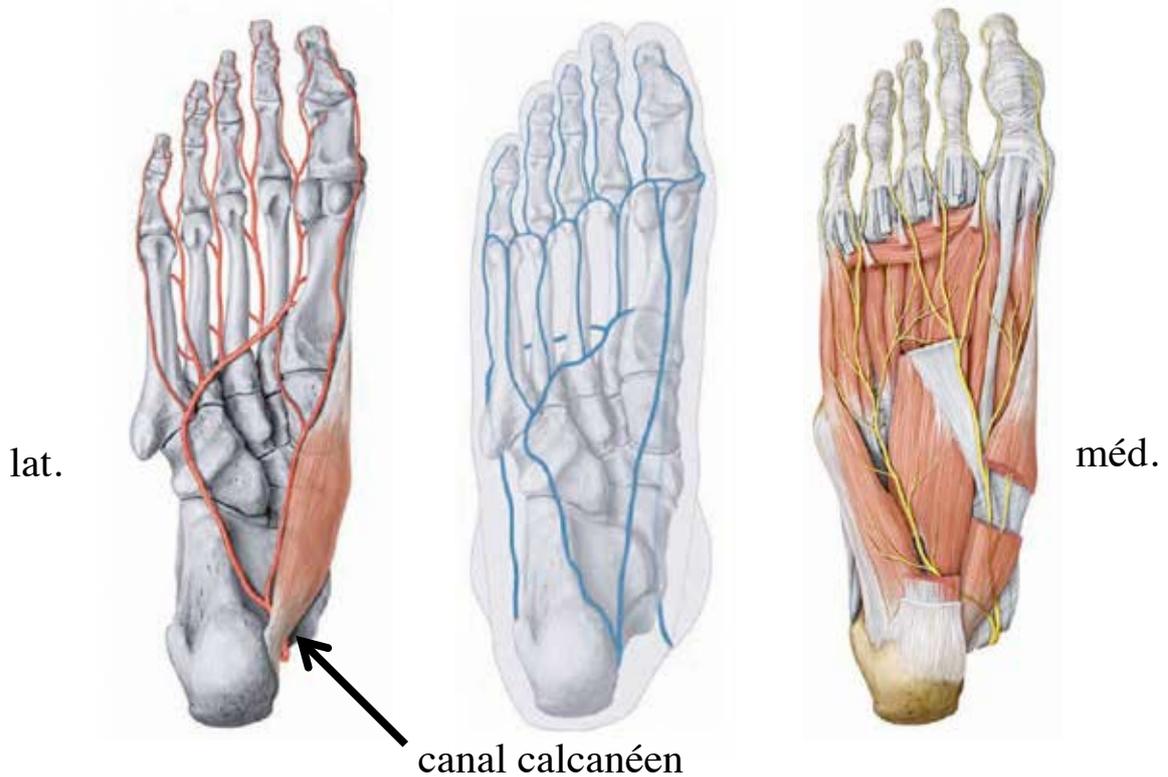
# Aspects externes

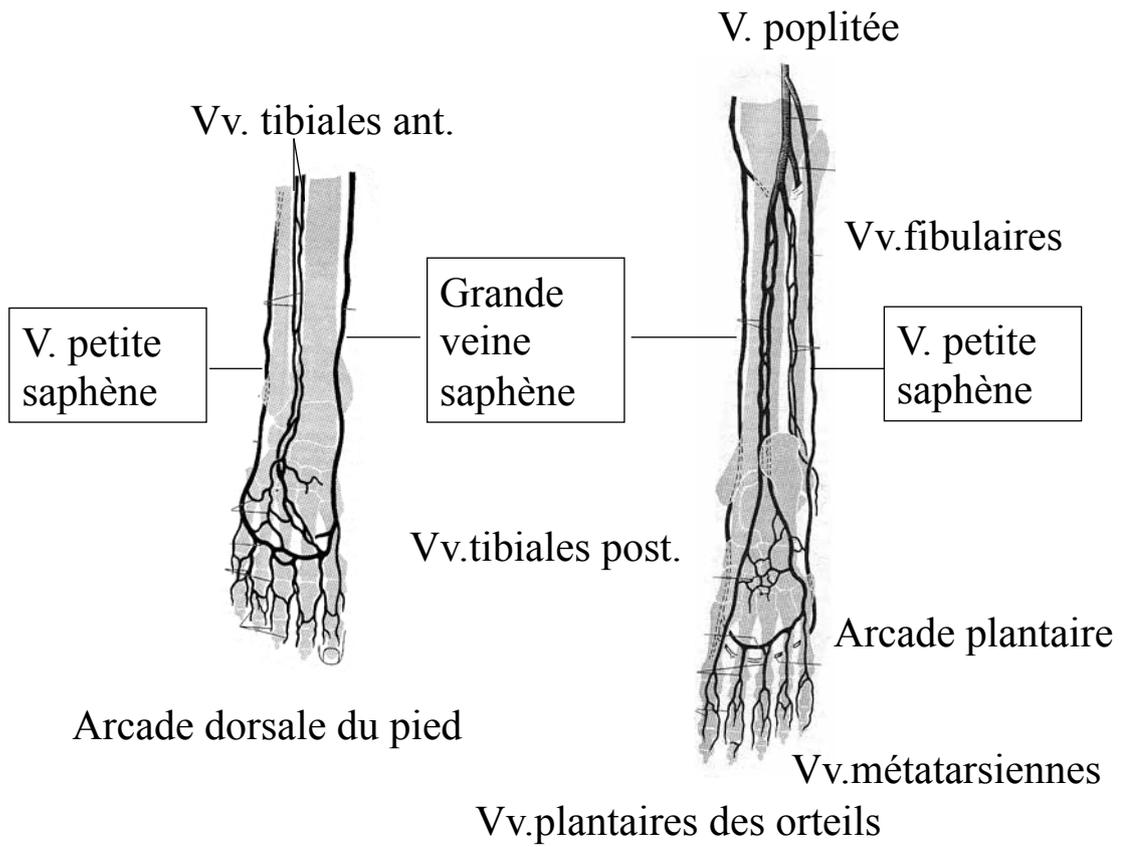
Petite veine saphène avec arcade dorsale

Artère tibiale postérieure

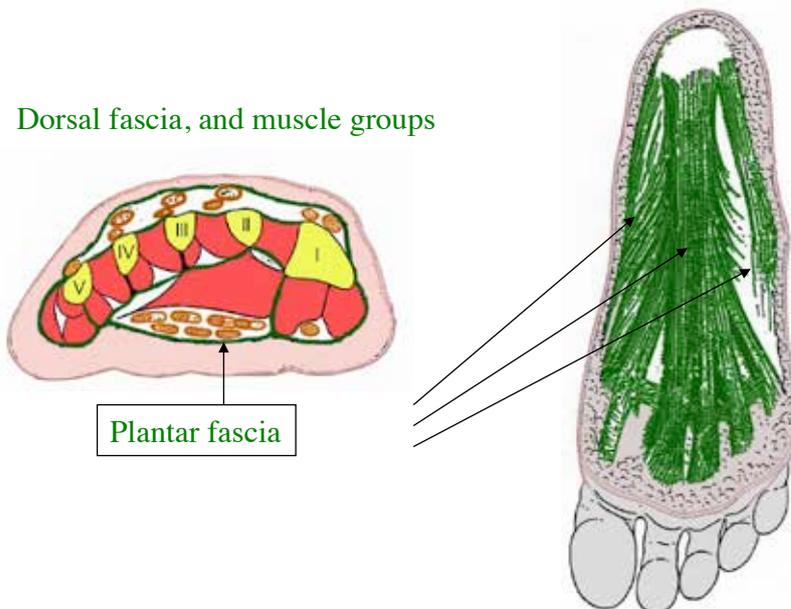


## Artères, veines et nerfs plantaires





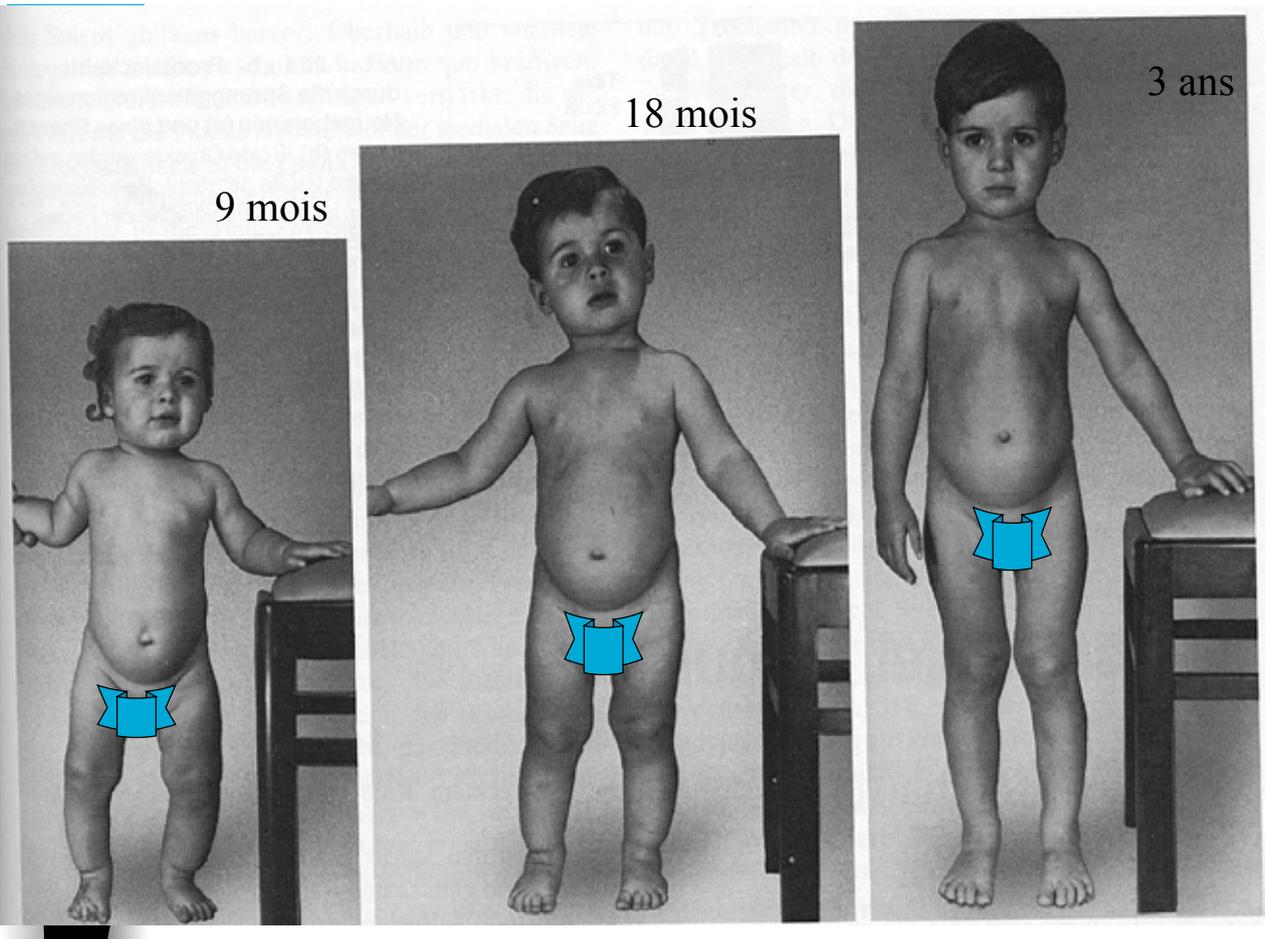
## Fasciae of the foot



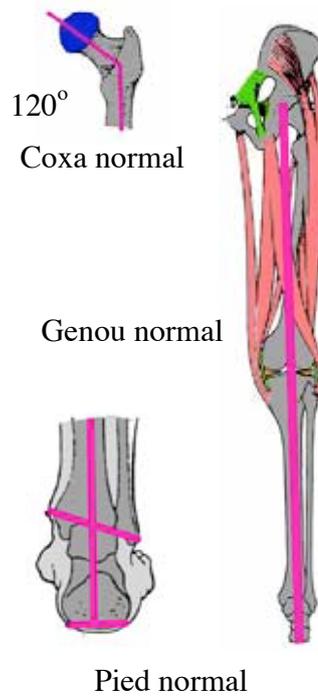
Superficial transversal metatarsal ligaments

Longitudinal & transversal fibers

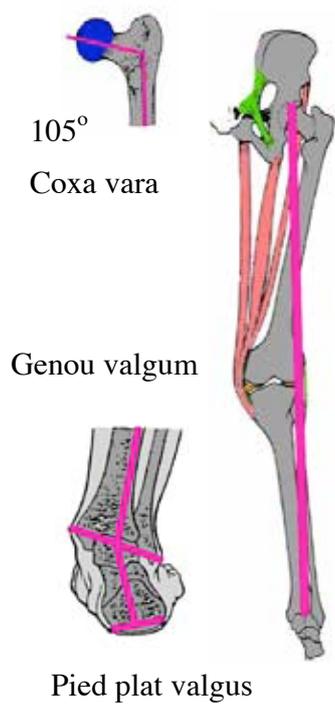
Plantaris fascia



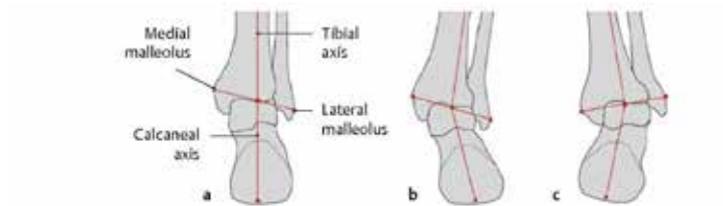
# Mechanical and anatomical axis



# Mechanical and anatomical axis

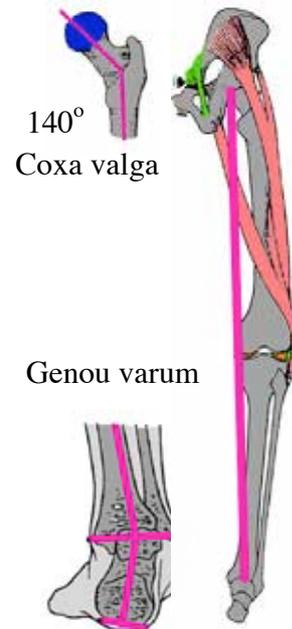


# Mechanical and anatomical axis



- C Axis of the hindfoot**  
Distal right leg and hindfoot, posterior view.
- a Normal axial alignment in the hindfoot.
  - b Pes valgus: The foot is in an everted position.
  - c Pes varus: The foot is in an inverted position.

Illustrator: Karl Wesker pp. 410-411  
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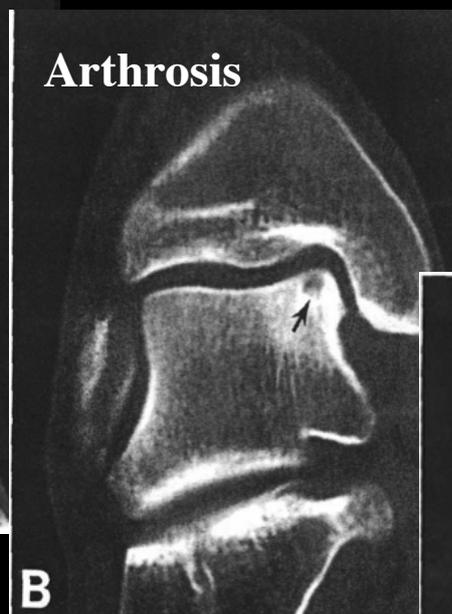


Pied bot varus

# Radiographie et Tomographie



X rays



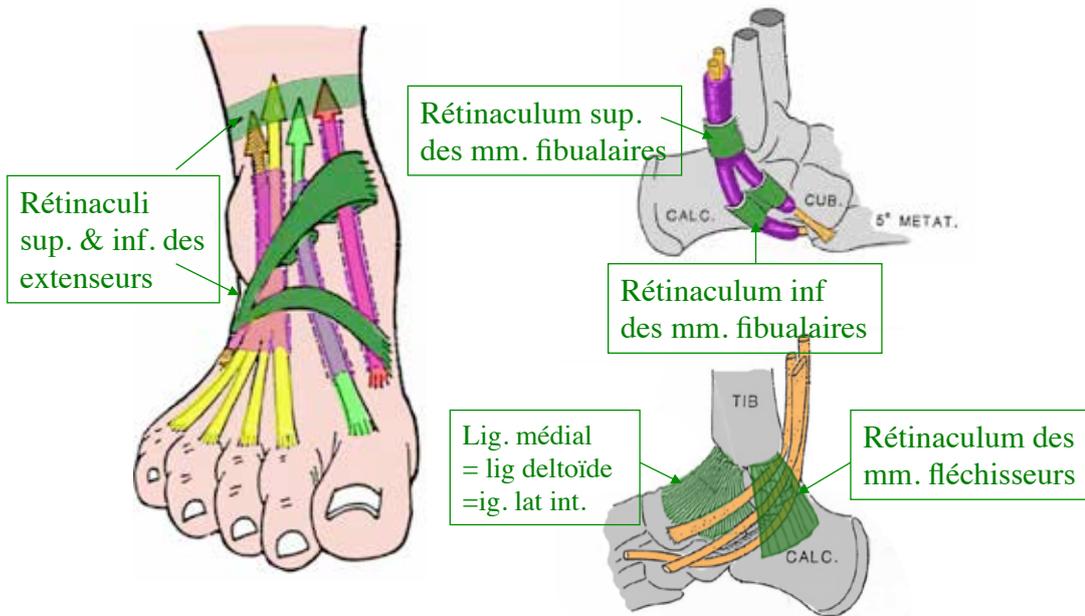
CT



MRI

**Arthrosis**

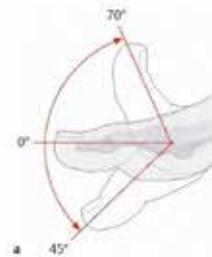
# Retinaculi



## Ligament - Rétinaculum - Fixation



**E Range of motion of the subtalar joint**  
Right foot, anterior view.  
a Everted by 10 degree.  
b Neutral (zero-degree) position.  
c Inverted by 20 degree.



**F Range of motion of the joints of the big toe**  
Lateral view.  
a Flexion/extension of the first metatarsophalangeal joint.



**D Normal range of motion of the talocrural joint**  
Lateral view.  
b Right foot off the ground (swing leg).



**D Footprints (podograms) of right feet (after Rauber and Kopsch)**

- a Normal plantar arches (pes rectus).
- b Increased height of the longitudinal arch (pes cavus).
- c Loss of the transverse arch (splayfoot = pes transversoplanus).
- d Loss of the longitudinal arch (flat foot = pes planus).

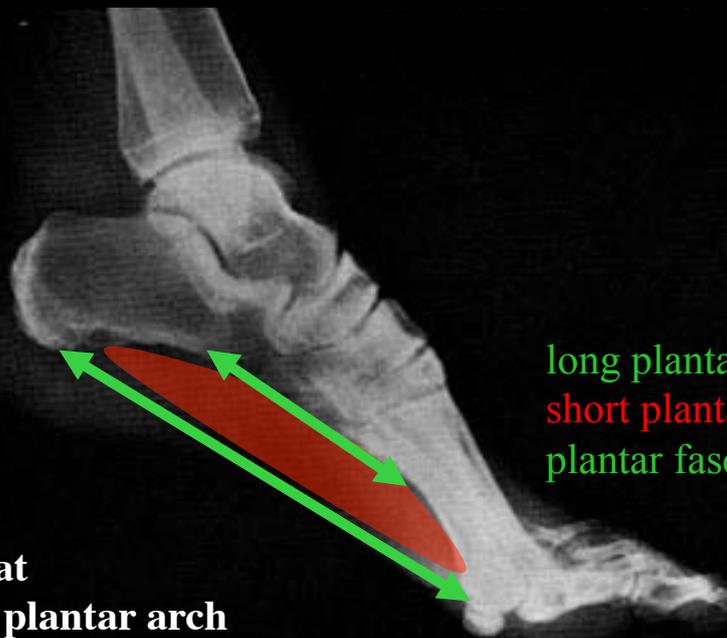
Illustrator: Karl Wesker

pp. 414-415

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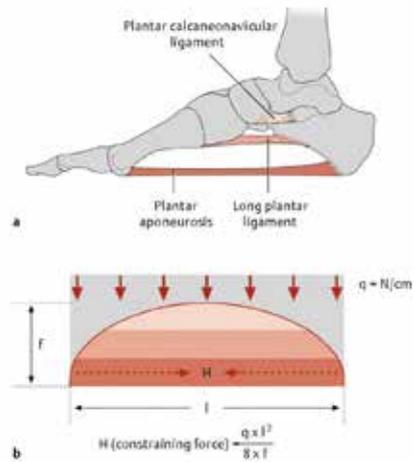


## Radiography of foot



long plantar lig.  
 short plantar mm.  
 plantar fascia

**Elements that stabilize the plantar arch**



**C Support of the longitudinal arch**

- a Ligamentous support of the longitudinal arch (right foot, medial view).
- b Calculating the constraining force (H) needed to maintain the arch (after Rauber and Kopsch).

Illustrator: Karl Wesker

pp. 414-415

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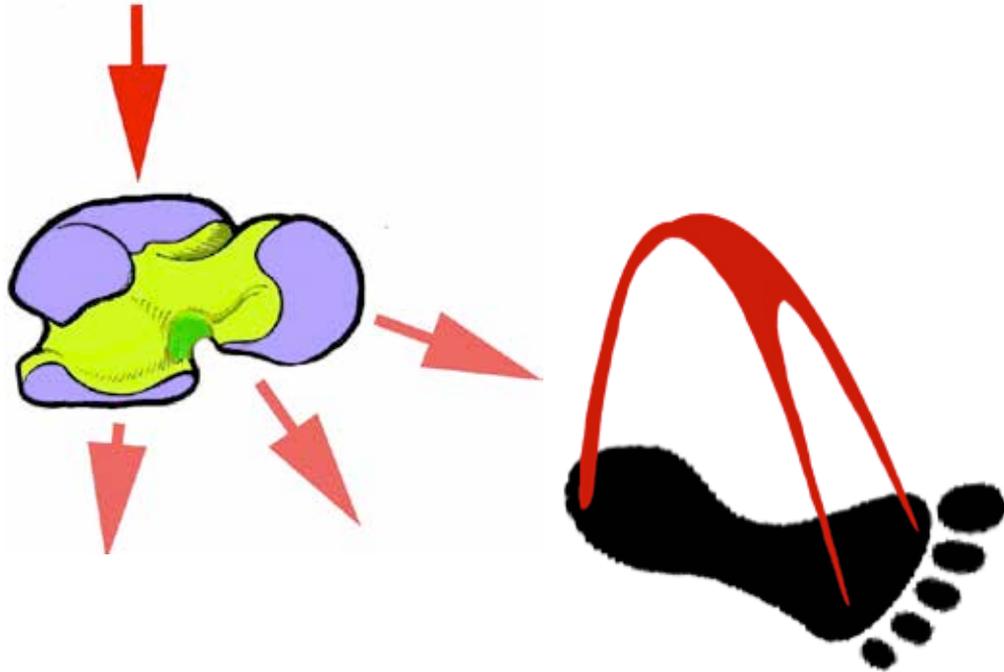
# Plantar Arch



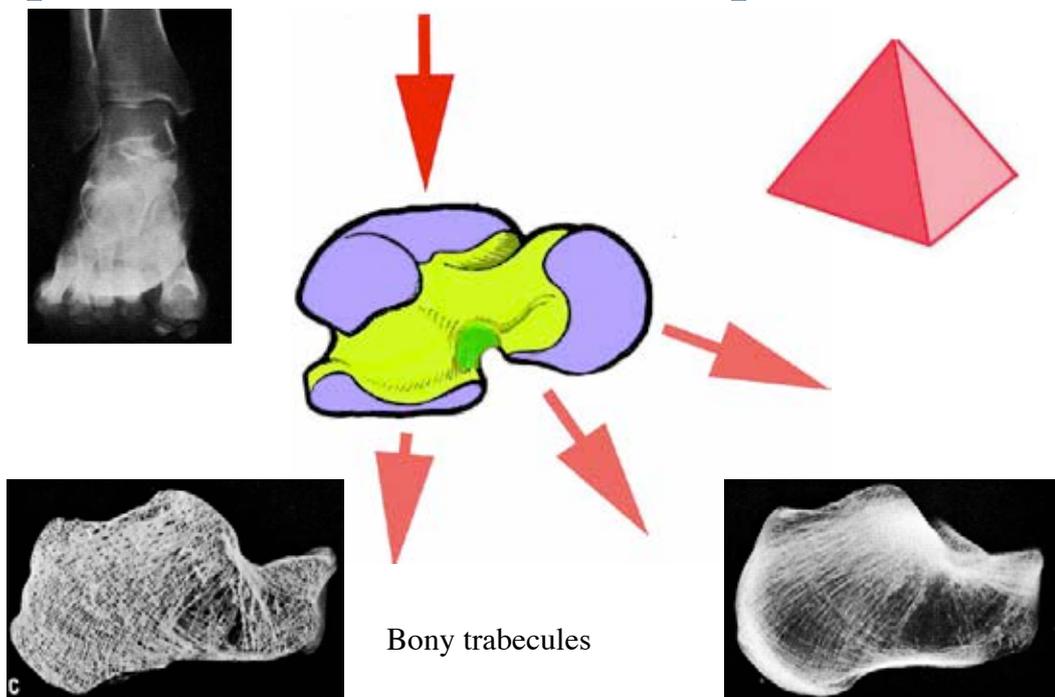
## Podogrammes

- A normal
- B arch increased
- C arch decrease
- D foot valgus

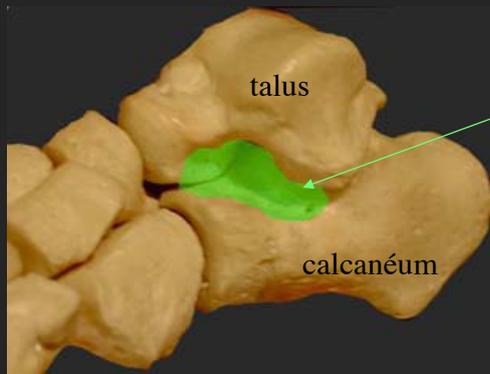
# Plantar arch



Talus bone is the head of the plantar arch, in form of a tripod



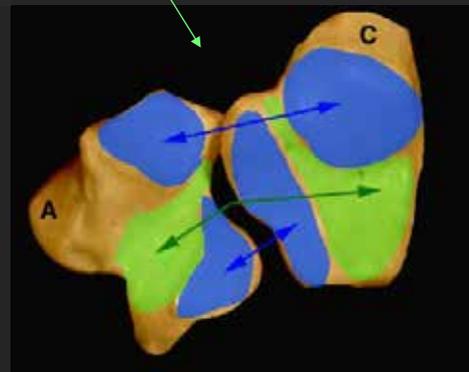
# Tarsal sinus



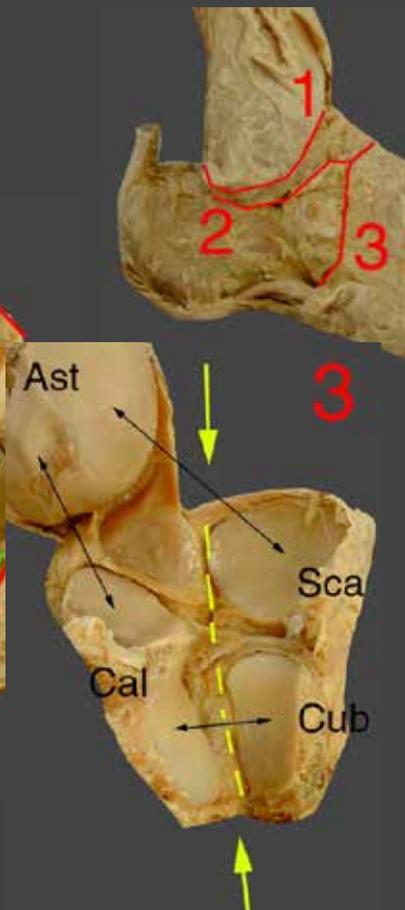
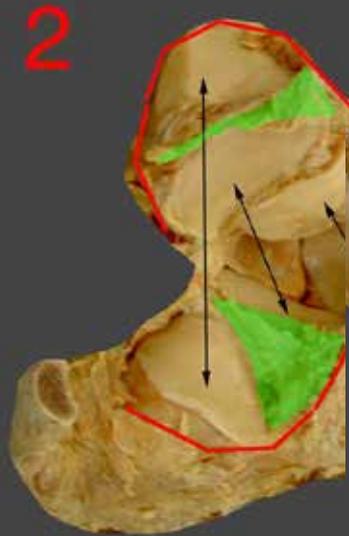
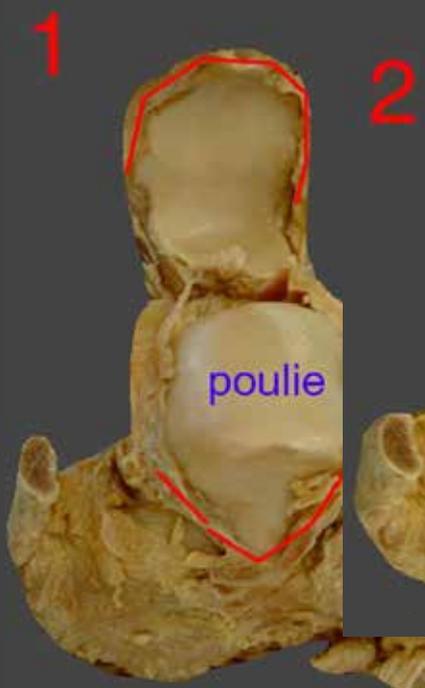
Lig. talo-calcanéen interosseux

Sillon calcanéen  
Sillon talien

Facettes articulaires  
ant. et post. de l'articulation sous-talienne



# different joints



L  
i  
g  
n  
e  
d  
e  
C  
h  
o  
p  
a  
r  
t



b

**C Transfer of compressive stresses in the weight-bearing foot**  
Schematic sagittal section at the level of the first ray, medial view.

b Pattern of the cancellous (spongiose) bony trabeculae resulting from compressive stress.

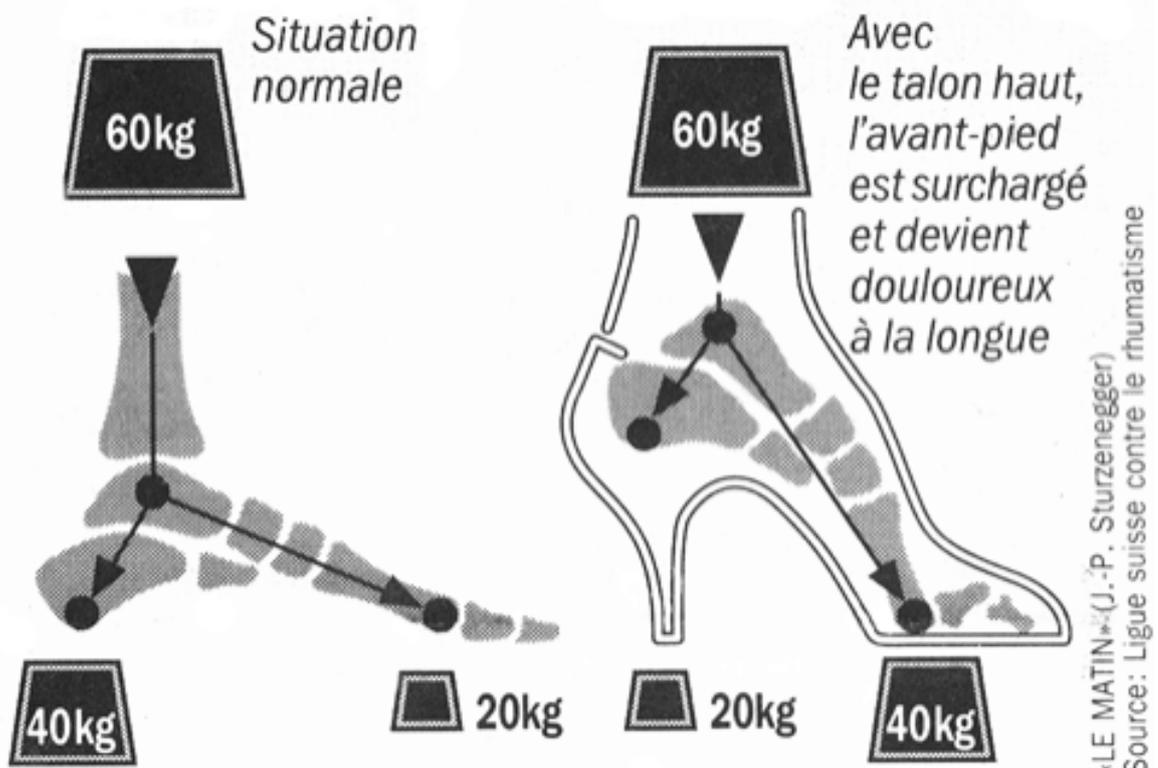
Illustrator: Karl Wesker

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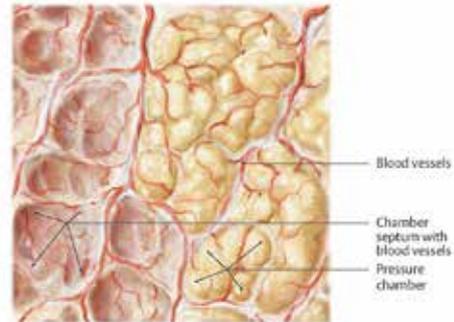
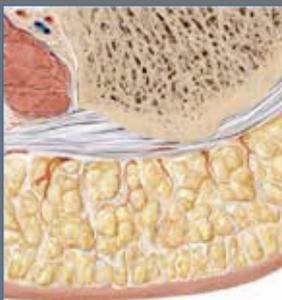
## Repartition of weight



 <p><b>Eva Herzigova</b> Absatzhöhe: 14 cm Glam-Faktor: 1 Gesund-Faktor: 5 Umkipppgefahr aufgrund extremer Absatzhöhe.</p>	 <p><b>Natasha Yarovenko</b> Absatzhöhe: 12 cm Glam-Faktor: 1 Gesund-Faktor: 4-5 Zu hoch: Rücken- und Knieprobleme drohen.</p>	 <p><b>Lilly Becker</b> Absatzhöhe: 13 cm Glam-Faktor: 1 Gesund-Faktor: 4-5 Fester Halt (Ferse), aber Blasen- und Kippgefahr!</p>
 <p><b>Jodie Foster</b> Absatzhöhe: 2 cm Glam-Faktor: 5 Gesund-Faktor: 1-2 Sicherer Tritt, aber Blasenengefahr (Riemchen).</p>	 <p><b>Adriana Karembeu</b> Absatzhöhe: 0 cm Glam-Faktor: 0 Gesund-Faktor: 1 Freiheit für die Füße – gesünder geht's nicht!</p>	 <p><b>Kirsten Dunst</b> Absatzhöhe: 11 cm Glam-Faktor: 2 Gesund-Faktor: 4 Ferse hat Halt, aber Blasenengefahr (Riemchen).</p>

Lets bet on the wellbeing or these feet

## Sagittal

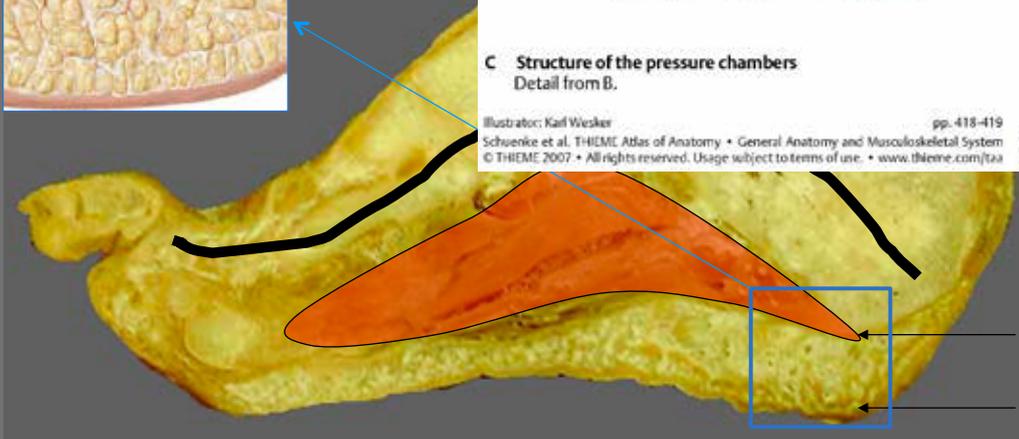


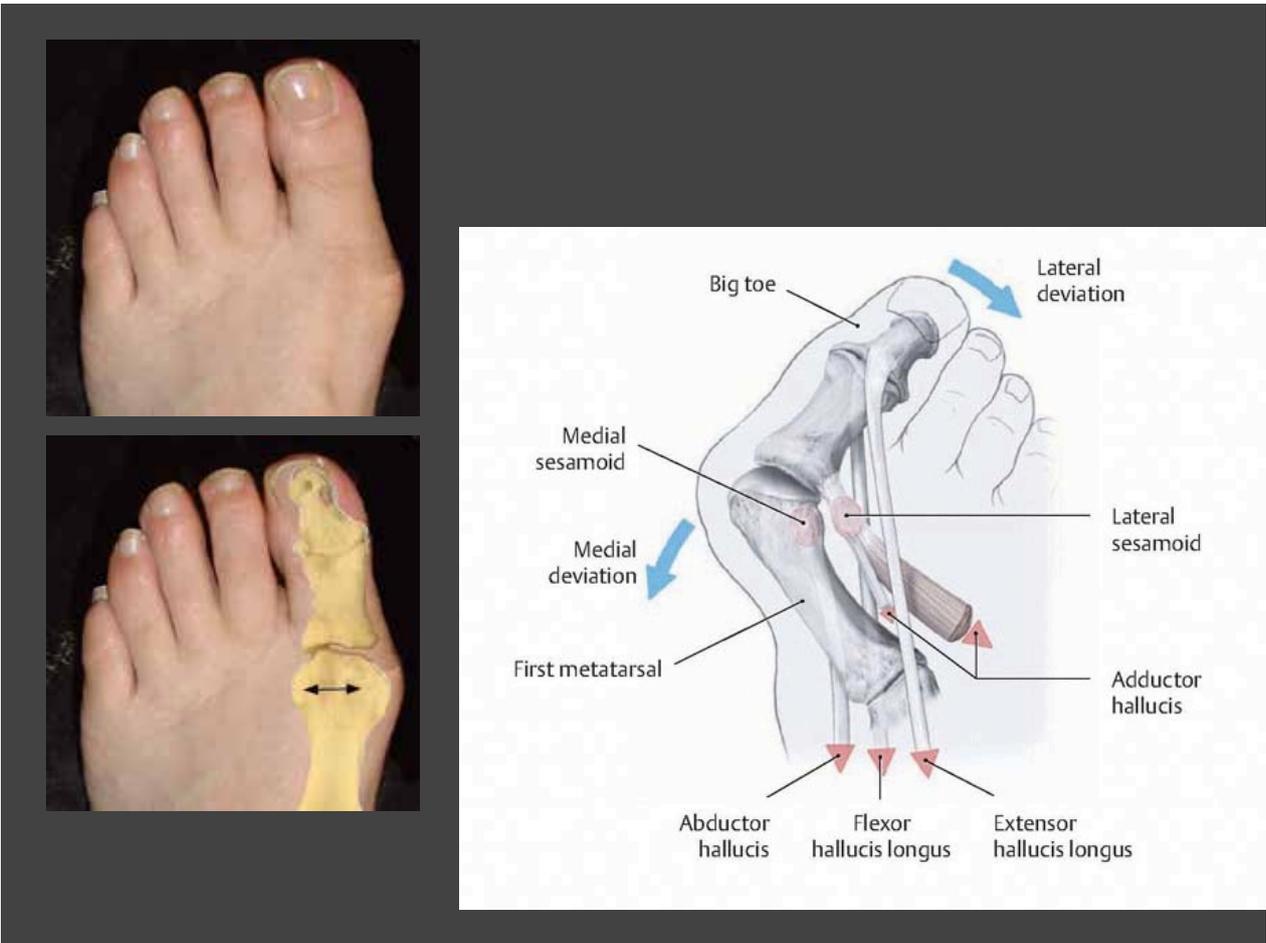
**C Structure of the pressure chambers**  
Detail from B.

Illustrator: Karl Wesker

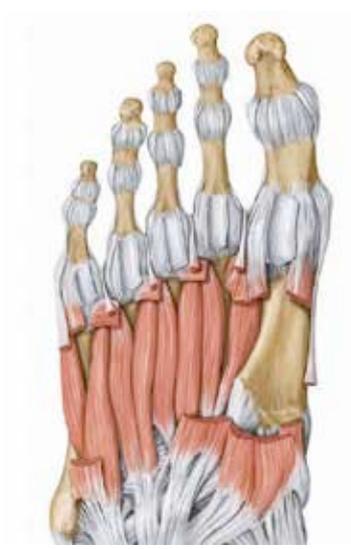
pp. 418-419

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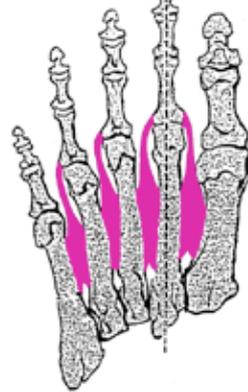




# Les Muscles du Pied

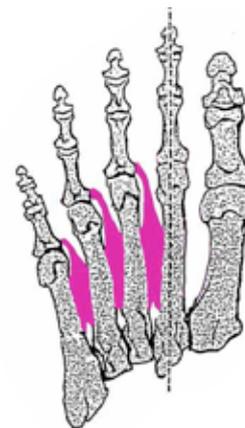


ABDUCTION



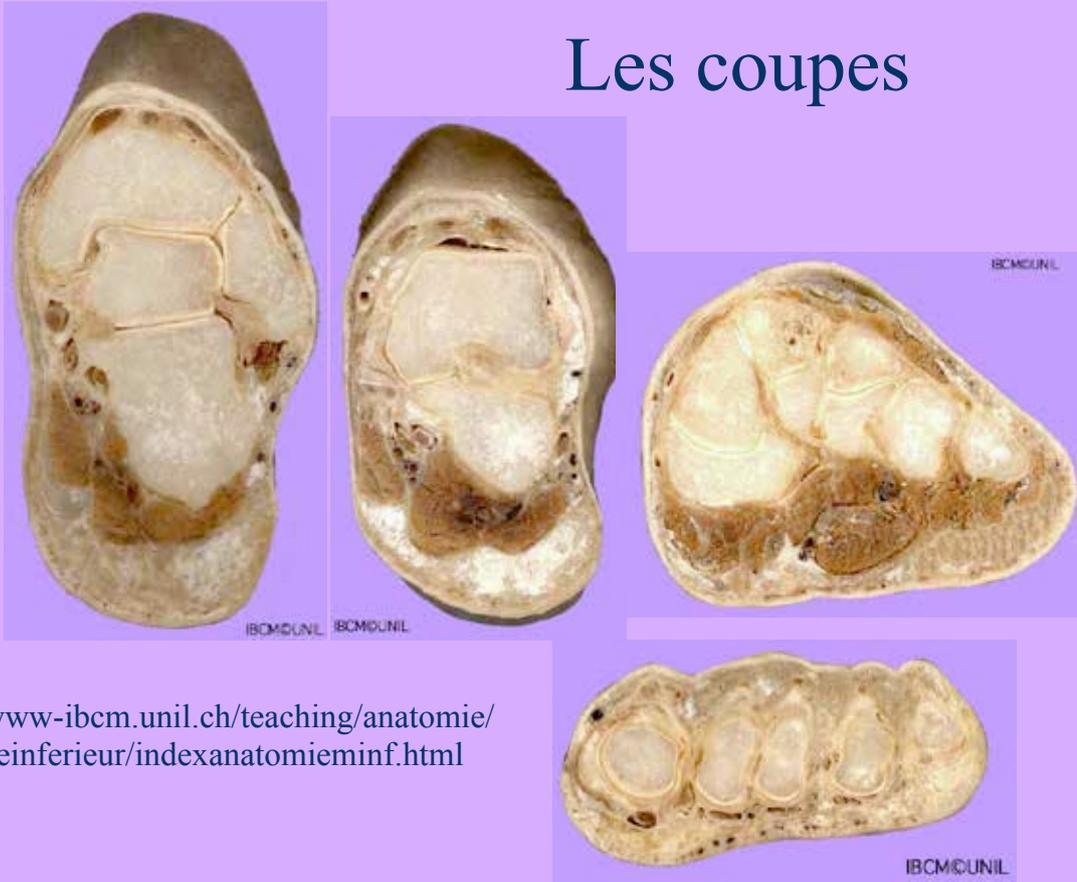
mm. interosseux dorsaux

ADDUCTION



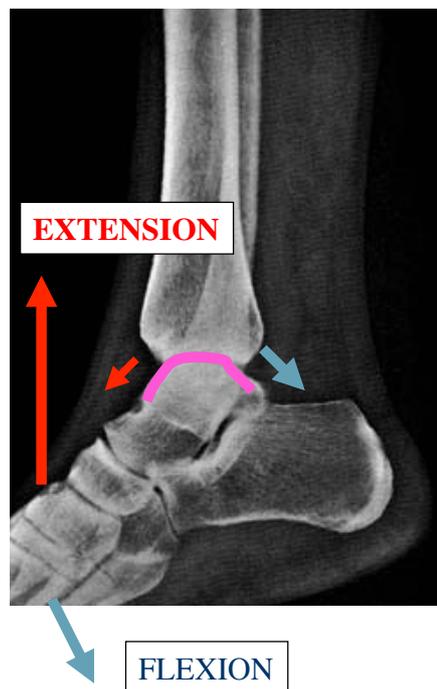
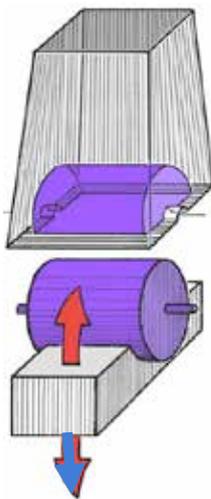
mm.interosseux plantaires

# Les coupes



<http://www-ibcm.unil.ch/teaching/anatomie/membreinferieur/indexanatomieminf.html>

# Ankle joint



Ankle joint:

**Flexion/Extension**

Tarsal joints:

**Eversion/Inversion**



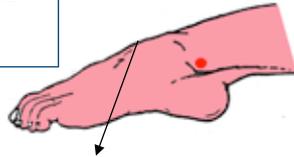
Les mouvements  
des articulations  
tarsiennes



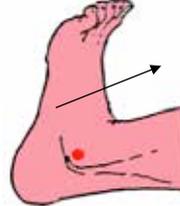
# Mouvements: ankle and foot

m.tibial post.  
mm.fléchisseurs  
m.triceps sural  
m.lg.fibulaire

FLEXION

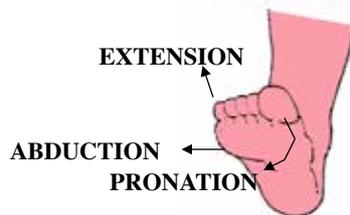


EXTENSION  
(FLEXION DORSALE)



m.tibial ant.  
mm.extenseurs.

EVERSION



mm.fibulaires.

INVERSION



mm.tibiaux

BR©IBCM

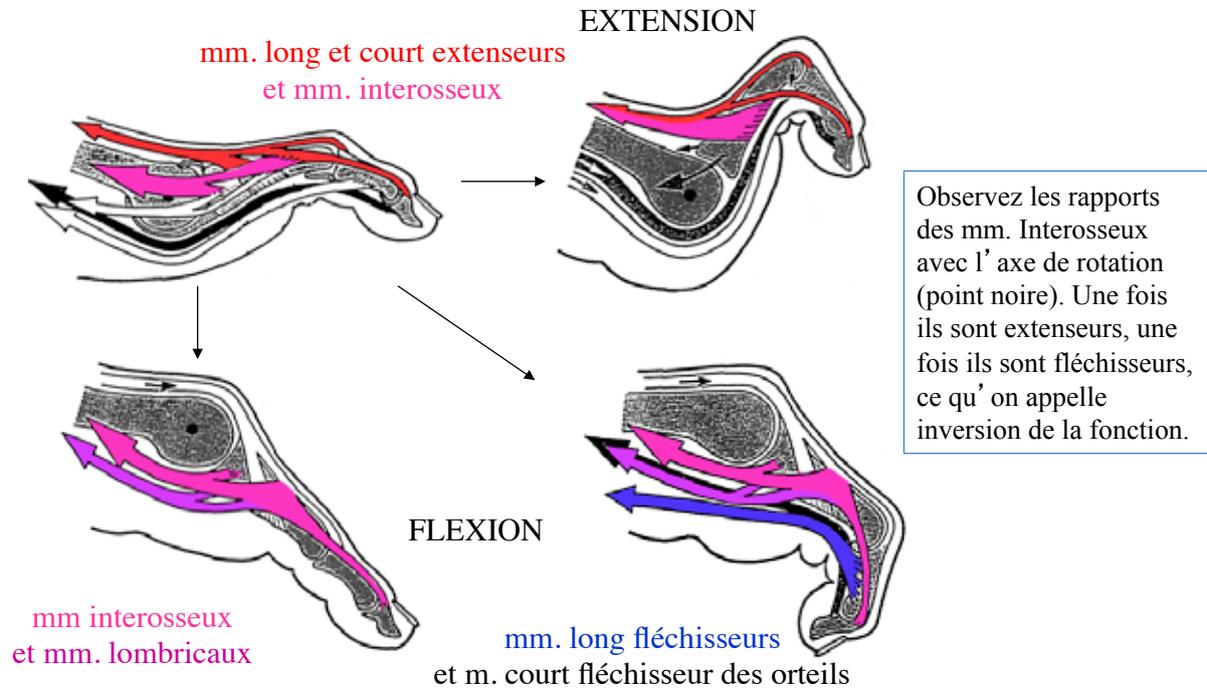


La position  
des pieds

C'est l'  
inversion  
parfaite



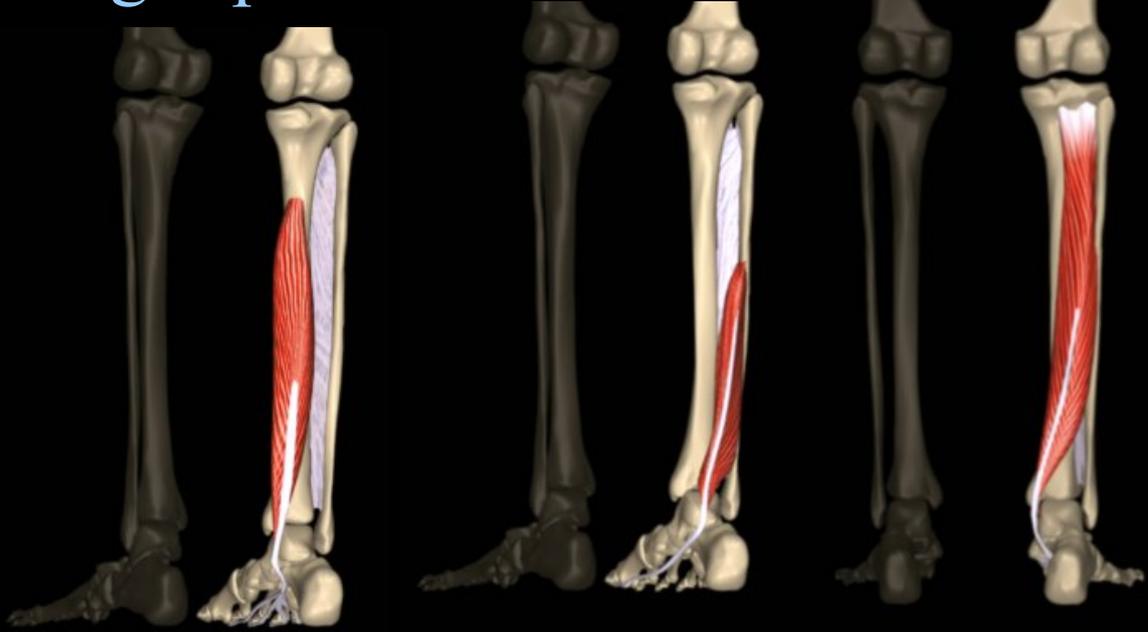
# Mouvements des orteils



BR©IBCM



# Loges postérieures



m. fléchisseur des orteils

m. fléchisseur de l'hallux

m. tibial postérieur

## MUSCLES DE LA JAMBE

### LOGE DES EXTENSEUR

m. tibial antérieur  
m. long extenseur des orteils  
m. long extenseur de l'hallux  
m. 3<sup>ème</sup> fibulaire

n. fibulaire profond  
n. fibulaire profond  
n. fibulaire profond  
**n. fibulaire profond**

### LOGE DES PERONIERS LATÉRAUX

m. long fibulaire  
m. court fibulaire

n. fibulaire superficiel  
n. fibulaire superficiel

### LOGE POSTÉRIEUR, plan superficiel

m. triceps sural (jumeaux et soléaire)  
m. plantaire (grêle)

n. sciatique poplitée interne (n. tibial)  
n. sciatique poplitée interne (n. tibial)

### LOGE POSTÉRIEUR, plan profond

m. tibial postérieur  
m. long fléchisseur de l'hallux  
m. long fléchisseur des orteils  
m. poplitée

n. tibial  
n. tibial  
n. tibial  
n. tibial

## MUSCLES COURTS DU PIED

m. court fléchisseur plantaire  
m. court extenseur des orteils  
m. court extenseur de l'hallux  
m. abducteur de l'hallux  
m. court fléchisseur de l'hallux  
m. adducteur de l'hallux (oblique & transverse)

**n. plantaire médial**  
**n. fibulaire profond (tibial antérieur)**  
**n. fibulaire profond (tibial antérieur)**  
n. plantaire médial  
n. plantaire médial  
**n. plantaire latéral (br. profonde)**

m. opposant du petit orteil  
m. court fléchisseur du petit orteil  
m. abducteur du petit orteil  
m. carré plantaire  
m. interosseux plantaires  
m. interosseux dorsaux  
m. lombricaux (1-3)  
..(4e)

n. plantaire latéral  
n. plantaire latéral  
n. plantaire latéral  
n. plantaire latéral  
**n. plantaire latéral (br. profonde)**  
**n. plantaire latéral (br. profonde)**  
**n. plantaire médial**  
**n. plantaire latéral (br. profonde)**

# Maîtrise ORTHOPÉDIQUE

<http://www.maitrise-orthop.com>

## RENCONTRE



Jacques Vallotton

*Jacques Vallotton exerce à Lausanne à la clinique Bois Cerf.  
Il s'intéresse particulièrement au genou des sportifs. Ses études sur la cinématique de la marche  
l'ont conduit à découvrir l'importance de la pathologie du long fléchisseur du gros orteil.  
Il nous expose avec clarté et conviction toutes les implications fonctionnelles et  
thérapeutiques de cette pathologie.*



**E Location of pain associated with splayfoot and flat foot (after Loeweneck)**

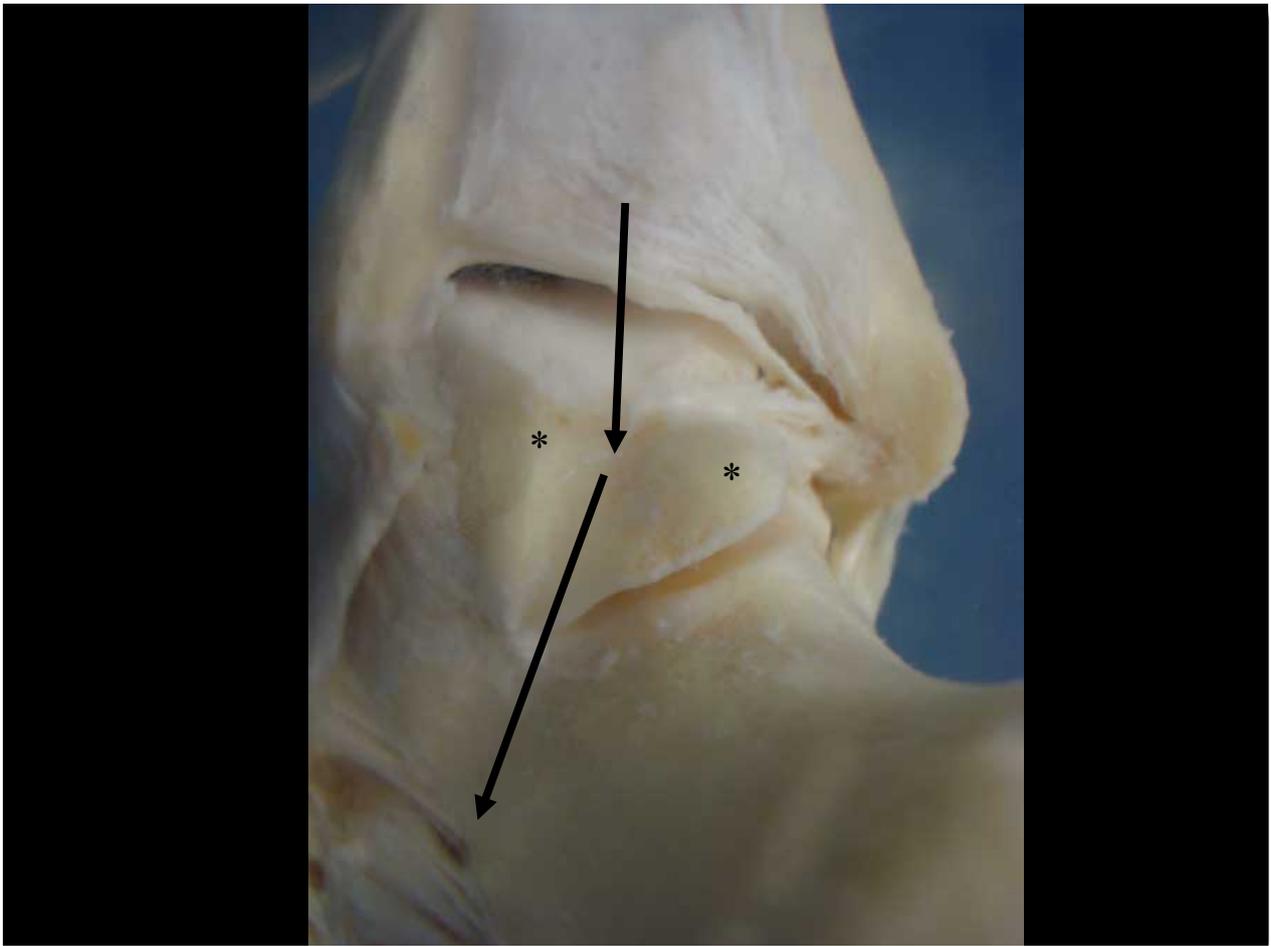
**b Right flat foot viewed from the medial aspect.**

Illustrator: Karl Wesker

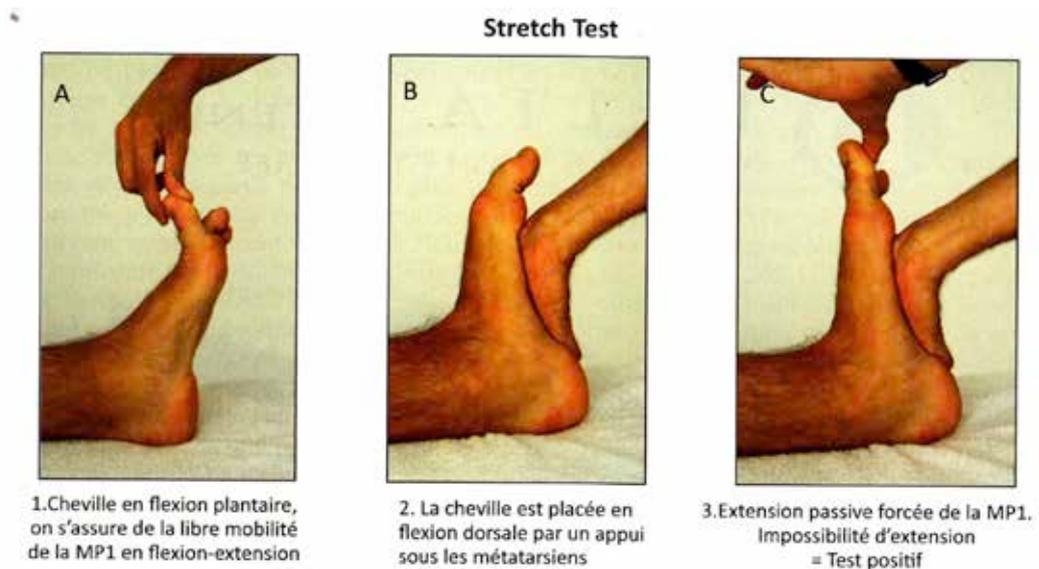
pp. 414-415

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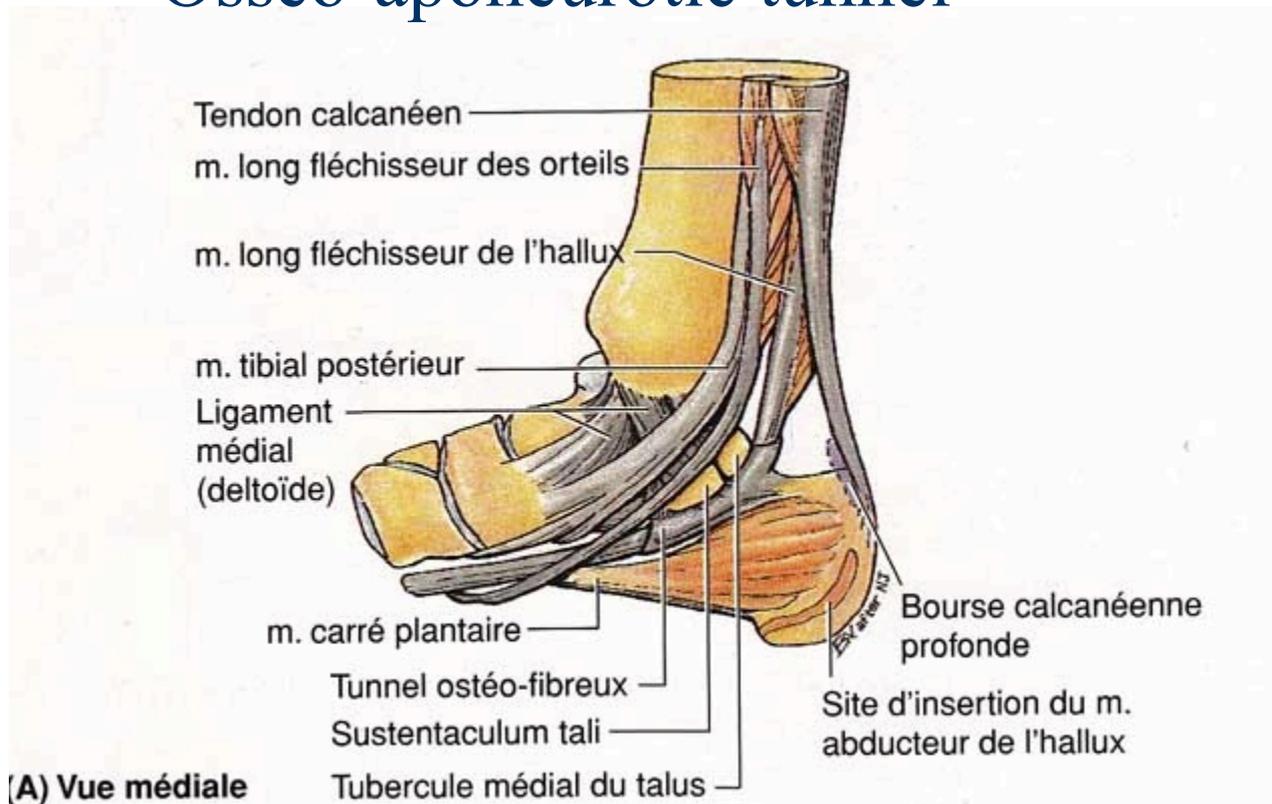
 Thieme



## Stretch test of hallux



# Osseo-aponeurotic tunnel



Where does it block the mouvement?

La poulie rétro-talienne du FHL

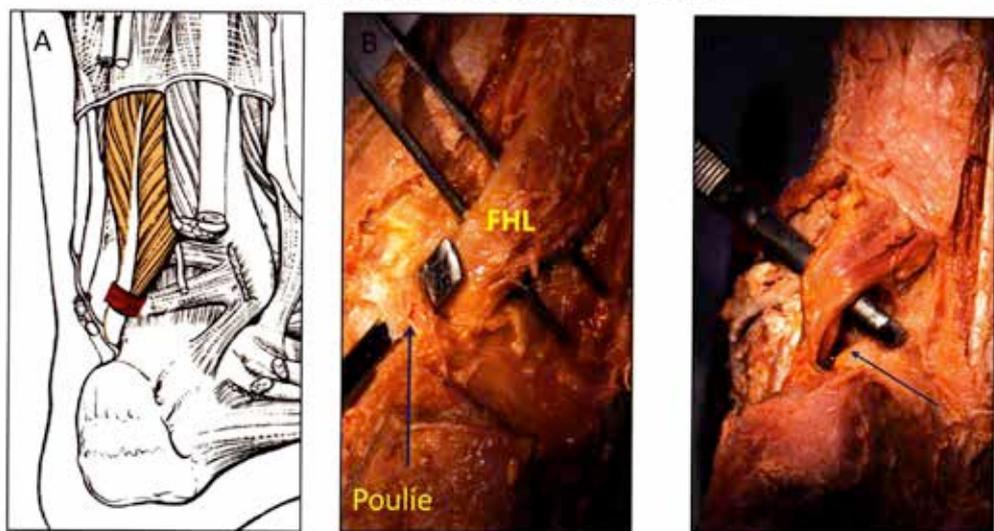
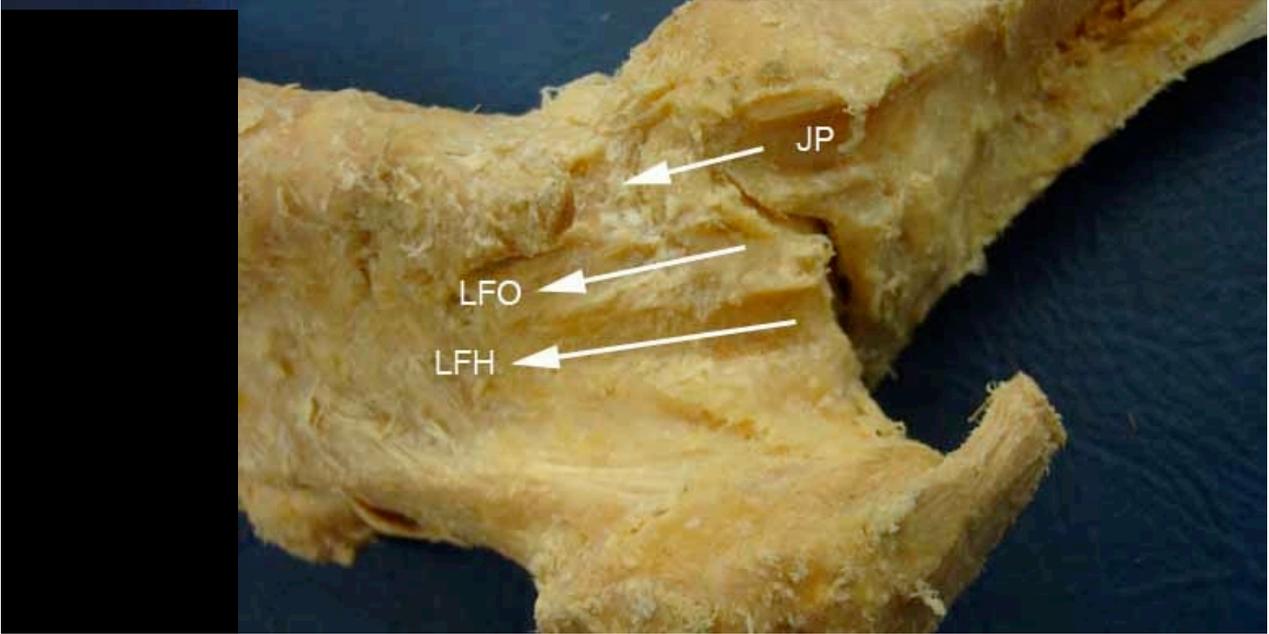


Image C : Après section, mise en évidence de la zone de rétrécissement à la jonction musculo-tendineuse du FHL et visualisation de la sous-talienne (flèche)



# Trajectories of flexors





**La poulie rétro-talienne**

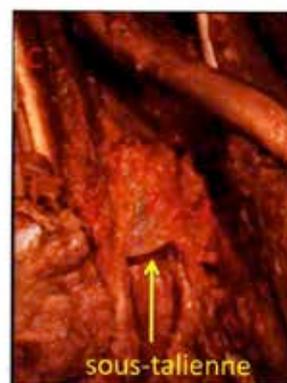
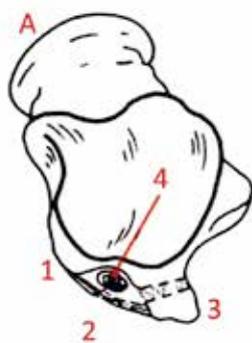
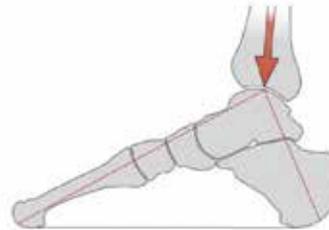
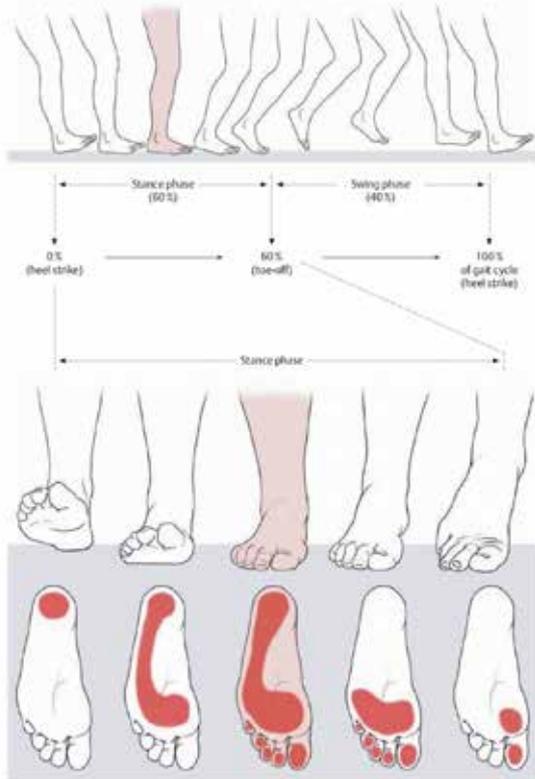


Image A : Vue axiale du talus: 1.Tubercule talien postéro-médial, 2. Poulie rétro-talienne, 3. Tubercule talien postéro-latéral, 4. Tendon du Fhl



Illustrator: Karl Wesker

pp. 412-413

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#### D Movements of the leg during one gait cycle

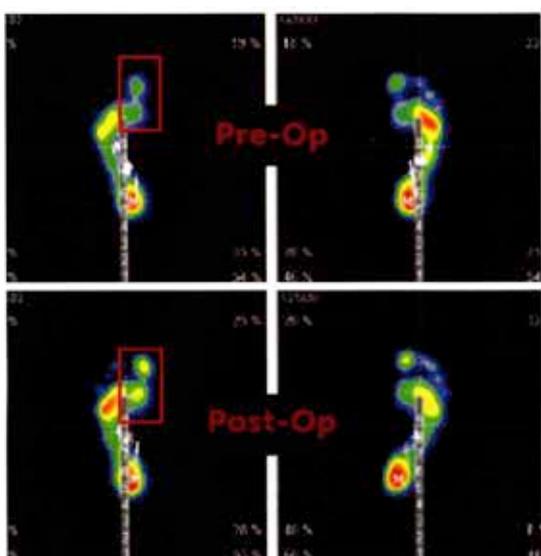
Illustrator: Karl Wesker

pp. 418-419

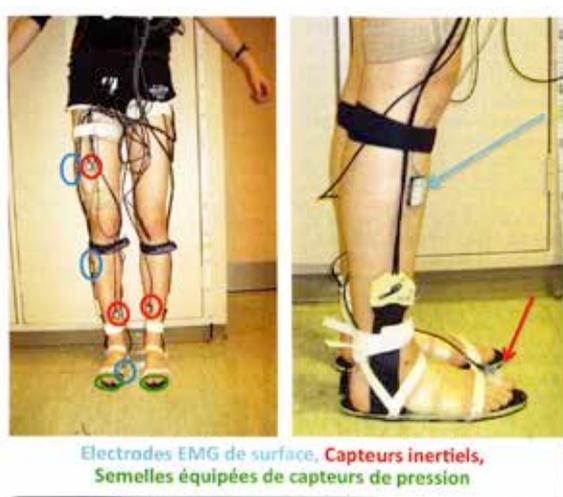
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## The art of podogrammes



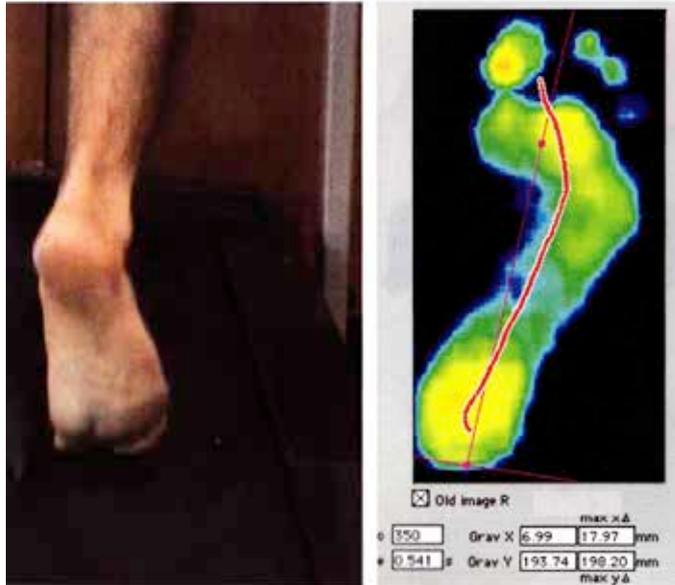
En comparant l'image podologique du pied gauche avant et après ténolyse du FHL, on observe une remise en charge de la première tête métatarsienne.



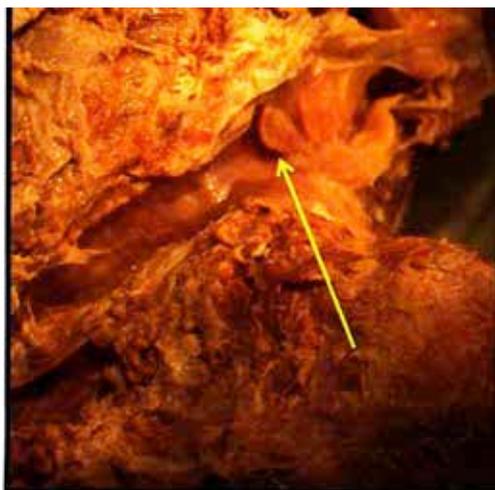
Electrodes EMG de surface, Capteurs inertiels, Semelles équipées de capteurs de pression

Figure 13.

## Image podologique dynamique



Le déroulement du pas est schématisé sur la courbe rouge. On observe un manque de stabilité à l'attaque du talon et, en fin de phase d'appui, un rapide passage en pronation caractérisé par une brusque inflexion de la courbe.



En regard de l'interligne talo-calcanéen, on observe une structure synoviale « ménisçôïde » qui fait saillie à l'extérieur



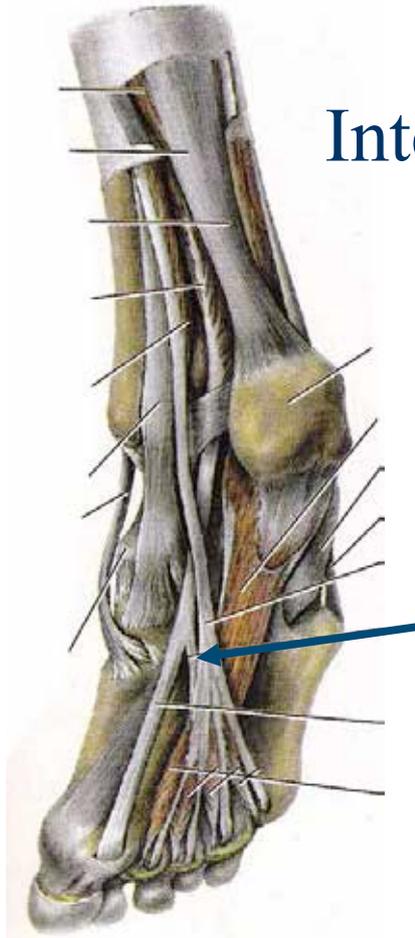
Le scope est introduit parallèlement au grand axe du pied jusqu'au contact de l'os.

Tenolyse 1 M.S.

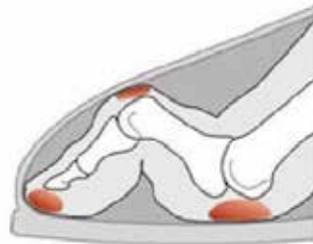


Tenolyse 2 M.S.

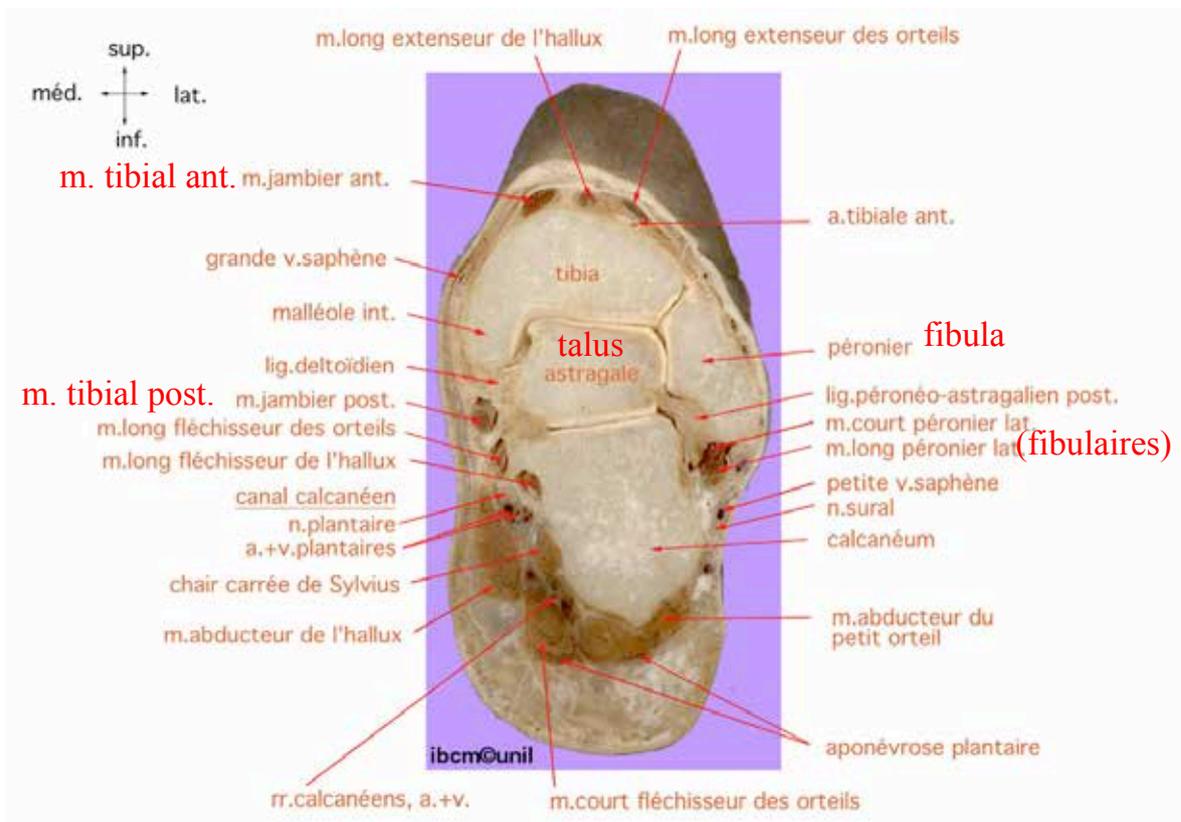
# Intertendineous connections



Observez la connexions entre le muscle long fléchisseur de l'hallux et des orteils.  
Raccourcissement du LFH amène à la formation d'orteils comme des griffes.



<http://www-ibcm.unil.ch/teaching/anatomie/membreinferieur/indexanatomieminf.html>

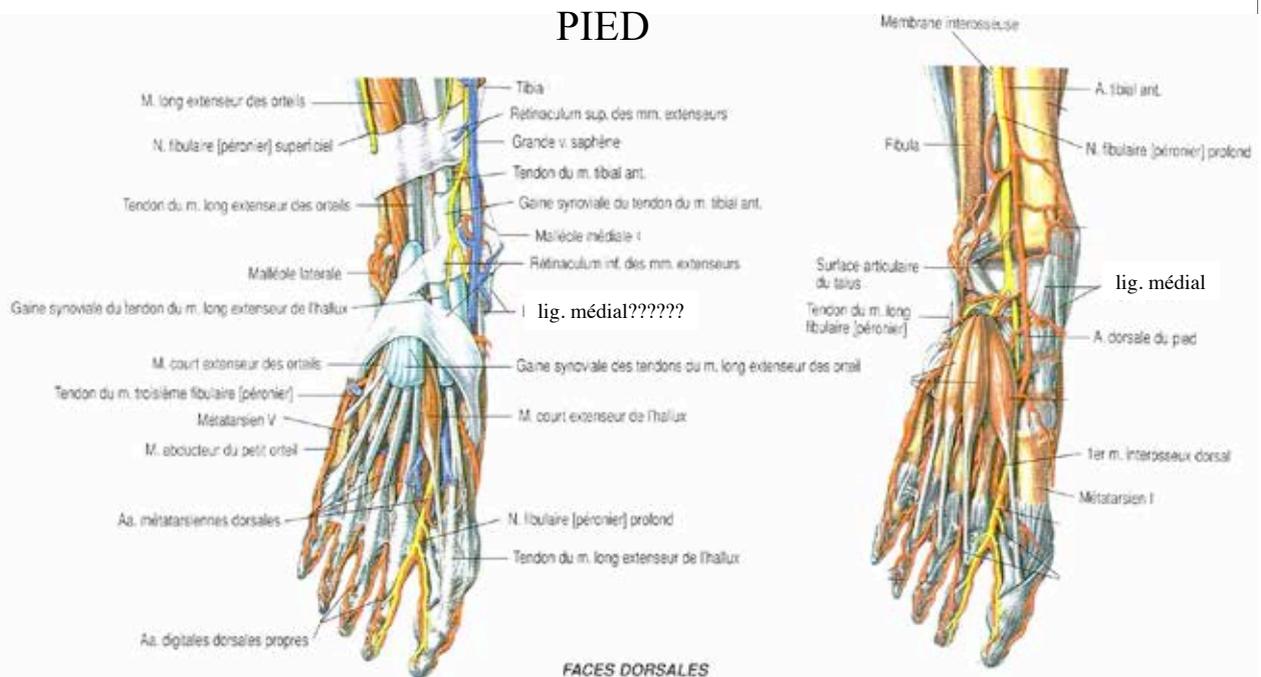


# La Topographie du Pied

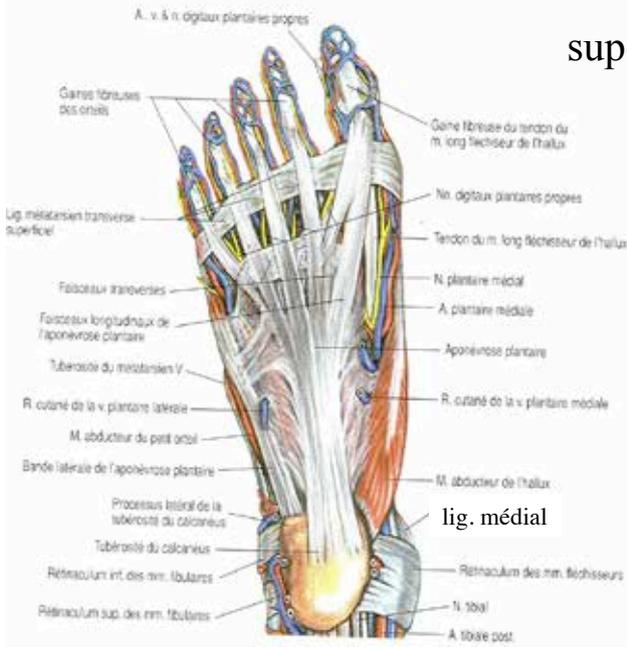


Merci pour votre attention!

## PIED

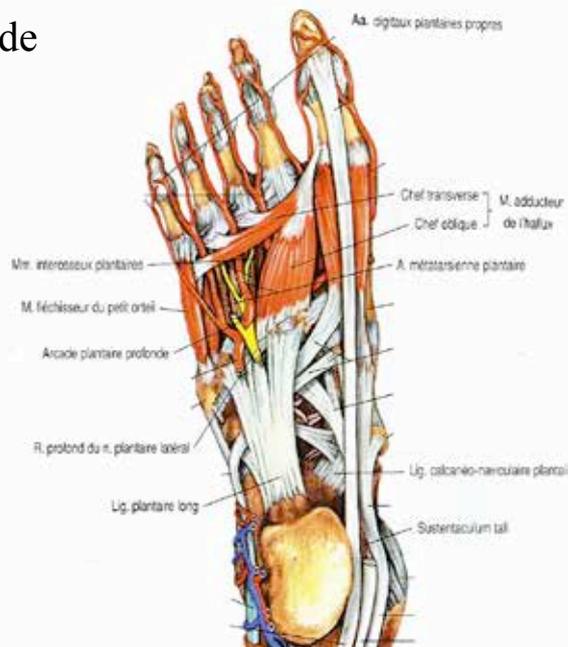
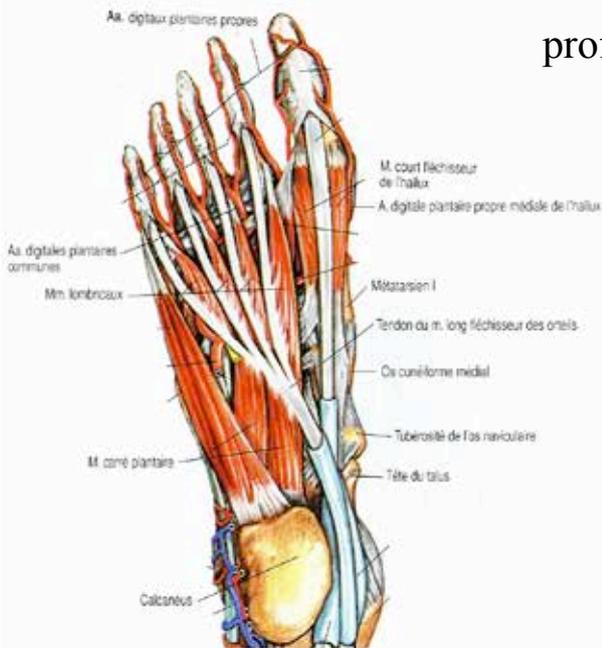


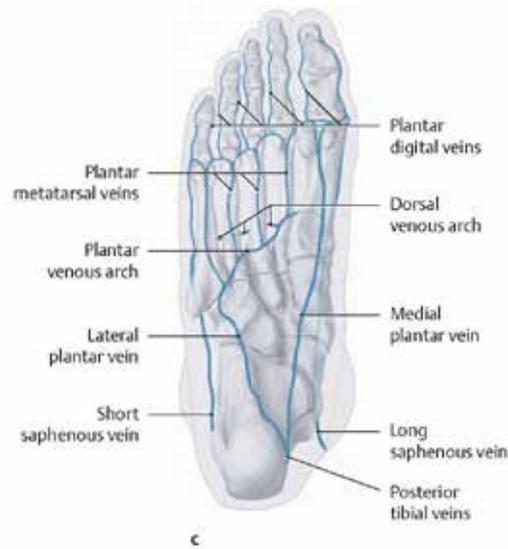
# PLANTE superficielle



lig. médial

# PLANTE profonde





**A The deep and superficial veins of the right lower limb**

c Sole of the foot, plantar view.

Illustrator: Karl Wesker

pp. 466-467

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**D The arteries of the sole of the foot**

Right foot, plantar view.

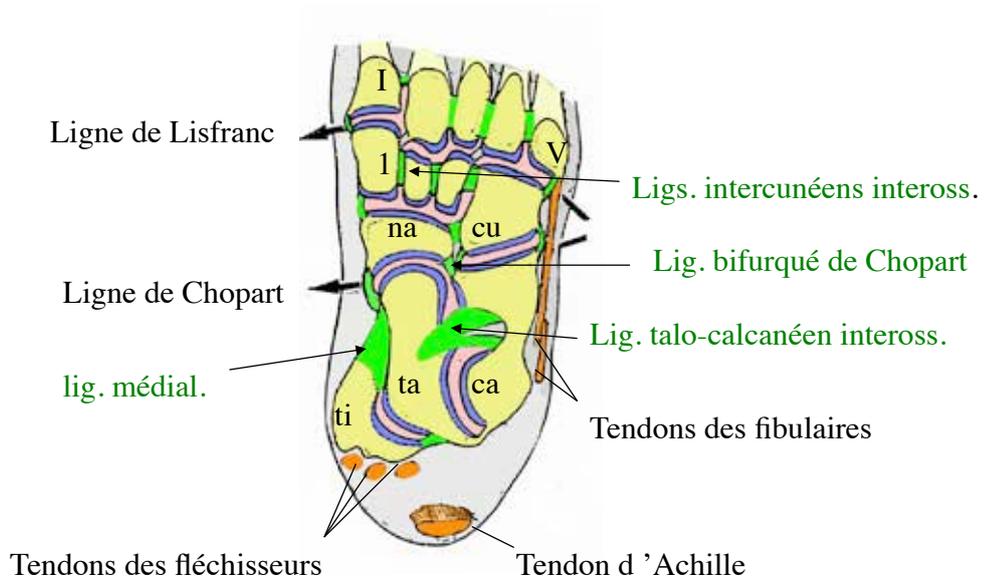
Illustrator: Karl Wesker

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# Les articulations du tarse



## Mouvements: cheville et pied

