

# Sonography of Foot & Ankle

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Lack of ionizing radiation  
Non-invasiveness  
Real-time, dynamic exam  
Less expensive  
Focused evaluation correlated with  
the painful site of clinical concern  
Guidance of aspiration or injection

## Advantages of US

Anatomy, surface bony landmark  
Adequate positioning  
Patient  
Transducer  
Proper setting of the machine  
Frequency, focus, intensity, gain, etc

## To get a good image

Echogenicity: hyper-, hypo-, eu-, an-  
Echotexture: homo- or hetero-  
Thickness  
Continuity (tendon, bony cortex)  
Compressibility  
Vascularity  
Underlying bony involvement

## Terminology

After this session, you should know...  
Structures in routine examination  
Positioning of patient and transducer  
Normal and common abnormal US findings

### Anterior

Anterior ankle pouch  
AITFL

### Lateral

ATFL  
CFL  
Peroneus tendons

### Medial

Deltoid ligament  
Tarsal tunnel  
Navicular bone

### Posterior

Achilles tendon  
Plantar fascia

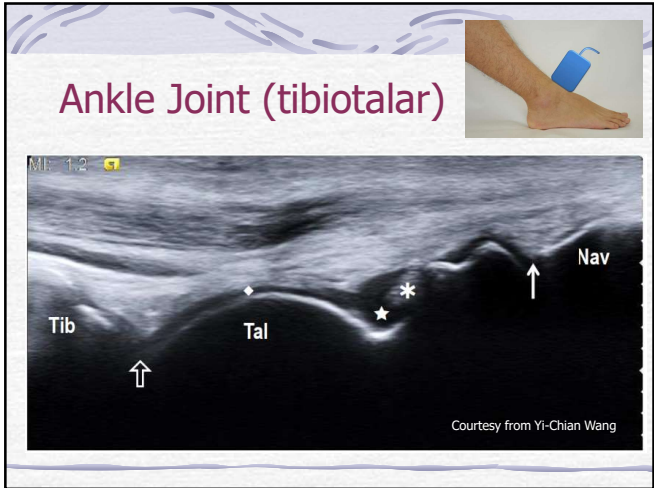
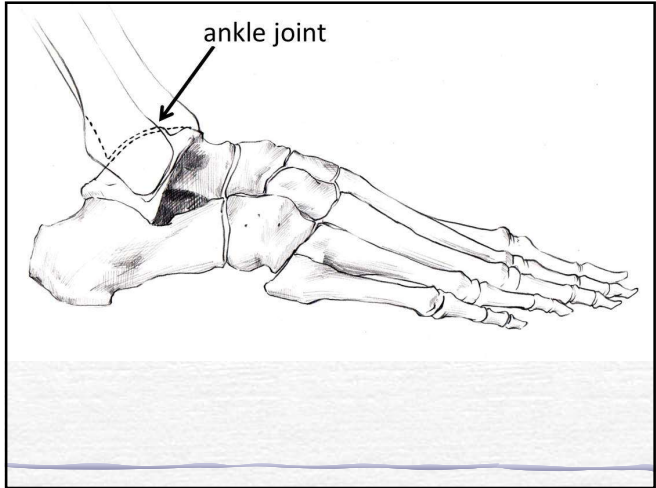
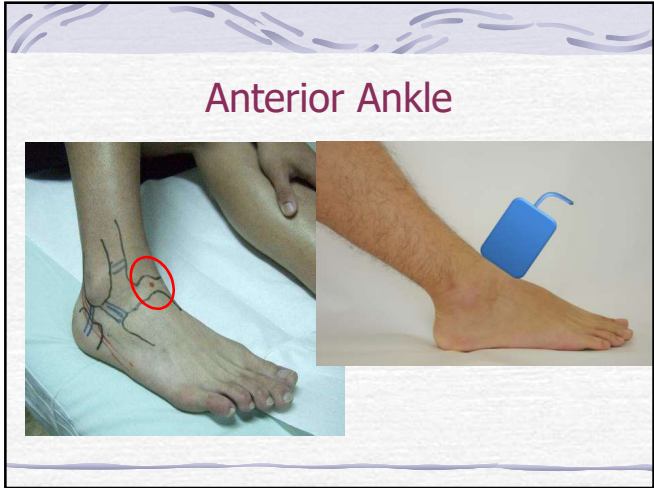
## Common structures

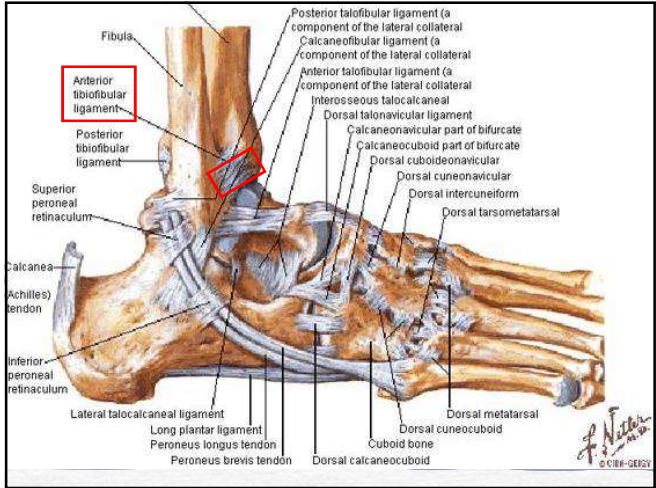
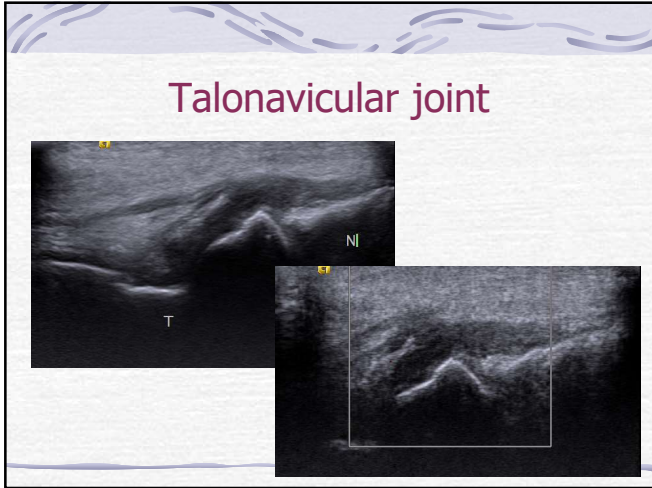
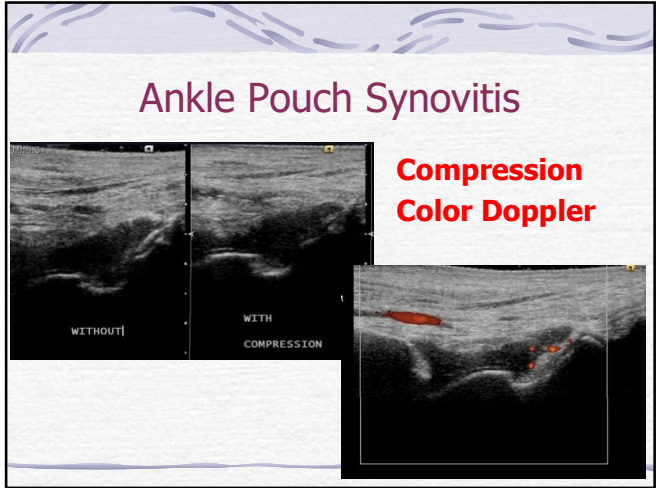
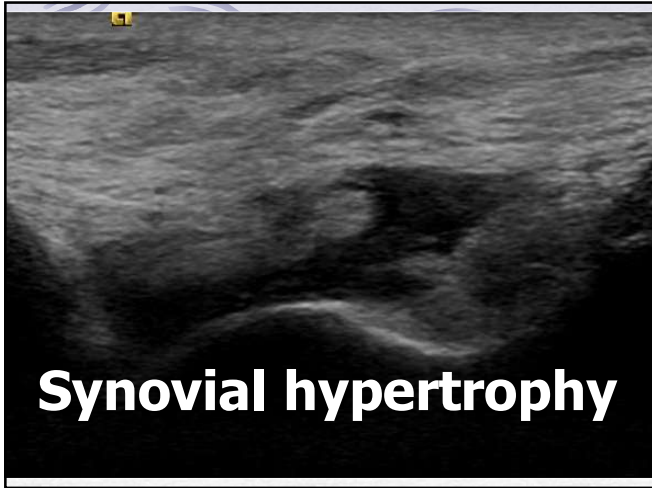
# Anterior

**Anterior Ankle pouch**

受檢者擺位: 仰躺，膝蓋彎曲，讓腳底平放於檢查床上，踝關節盡可能蹠曲(plantar flexion)以完整檢查距骨

探頭擺位: 踝關節前方，平行下肢的長軸。





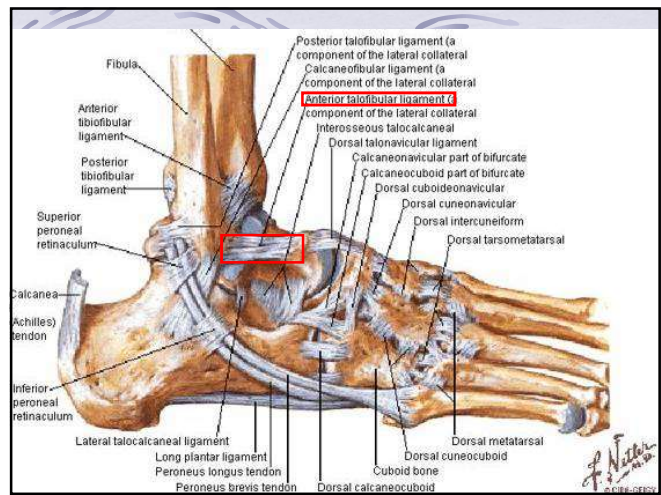
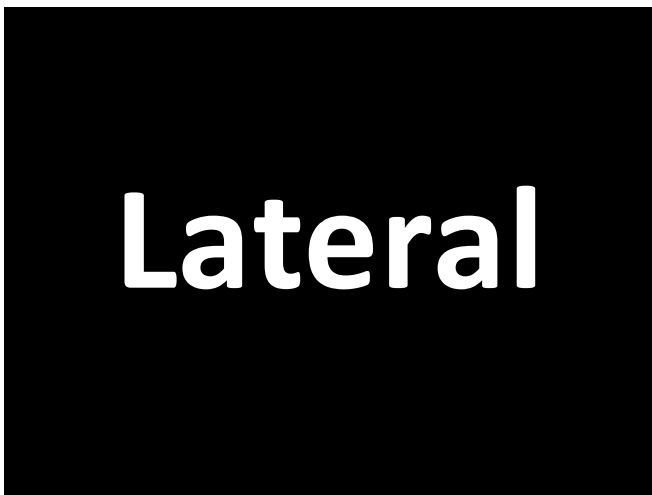
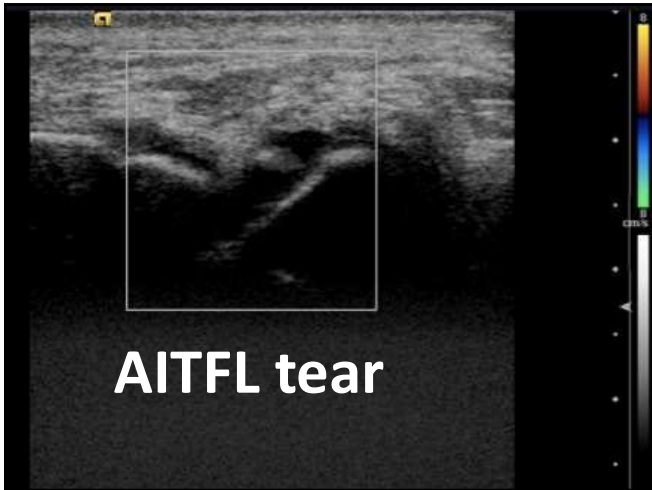
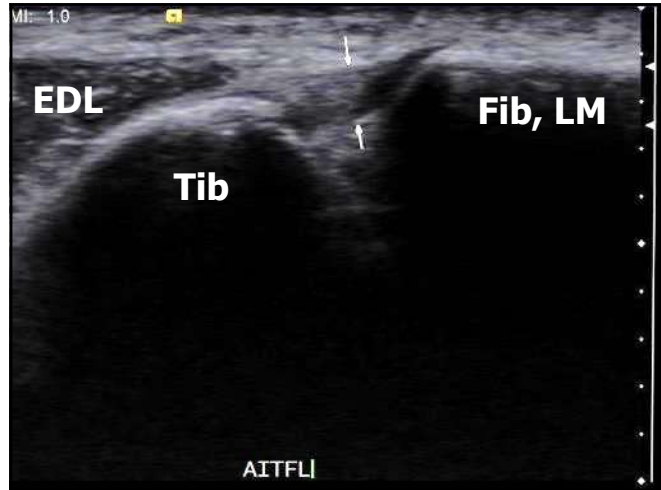
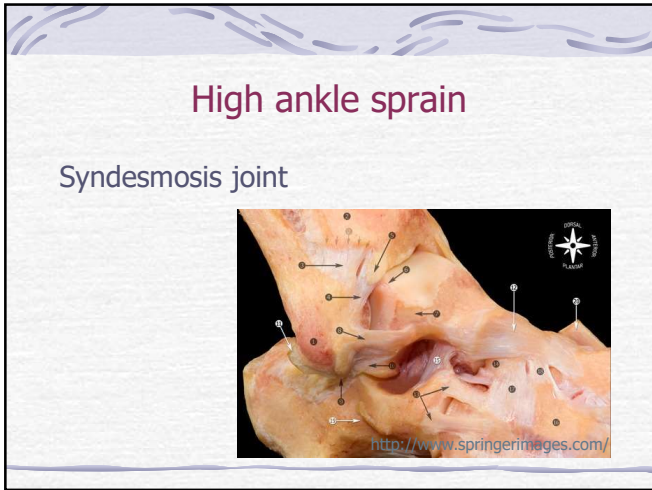
**Anterior Inferior Tibiofibular Ligament (AITFL)**

受檢者擺位: 仰躺, 膝蓋彎曲, 讓腳底平放於檢查床上

探頭擺位: 脛骨(tibia)和腓骨(fibula)末端前側之連線

**Anterior Inferior Tibiofibular Ligament (AITFL)**

Stabilize distal tibiofibular joint



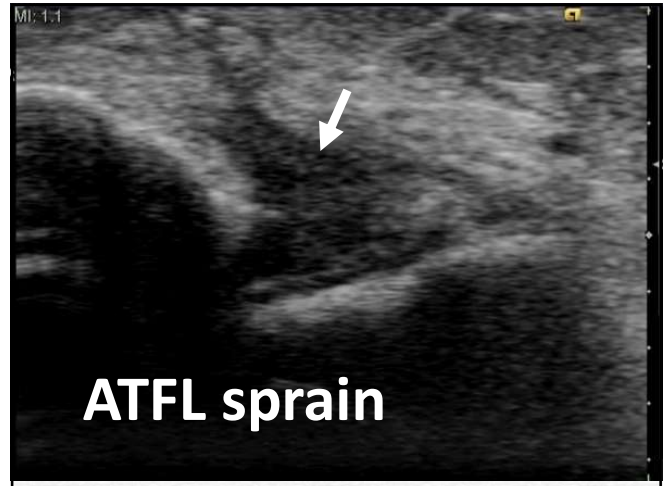
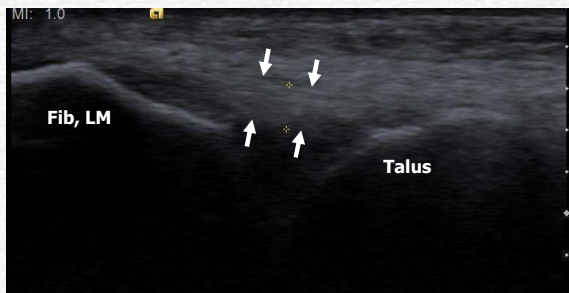
### Anterior Talofibular Ligament (ATFL)

受檢者擺位: 側躺, 讓患腳在上, 以枕頭支撐踝部成稍微蹠屈(plantar flexion)及內翻(inversion)姿勢。  
 探頭擺位: 介於外踝(lateral malleolus)與距骨(talus)間, 平行足底方向。

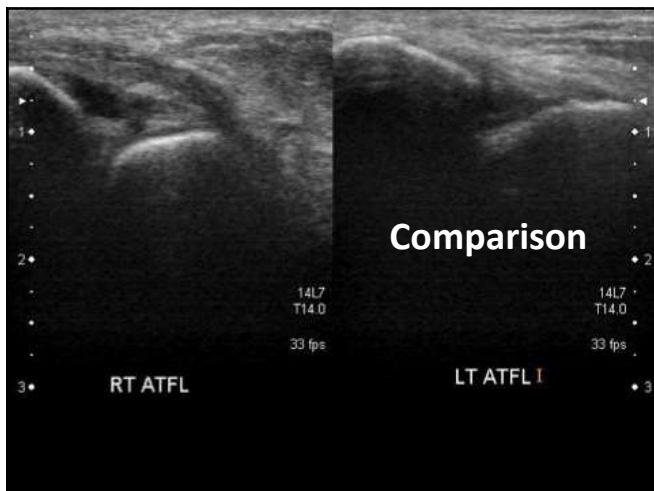
### Anterior Talofibular Ligament (ATFL)



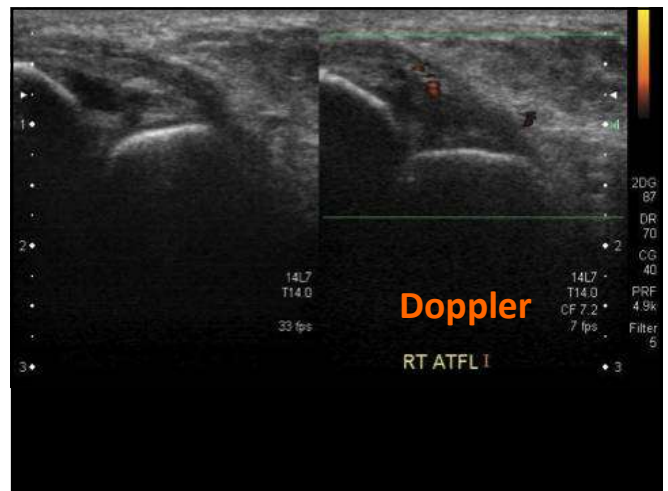
### ATFL



### Comparison

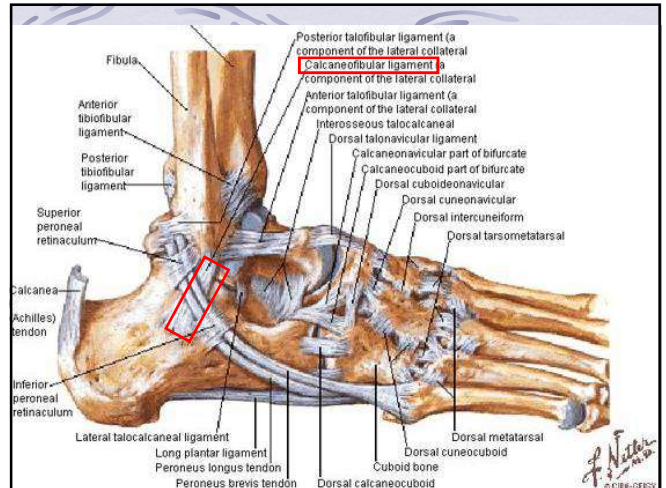
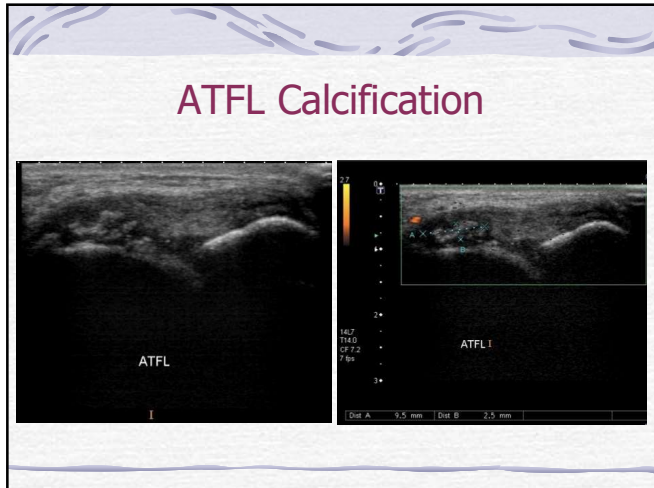


### Doppler



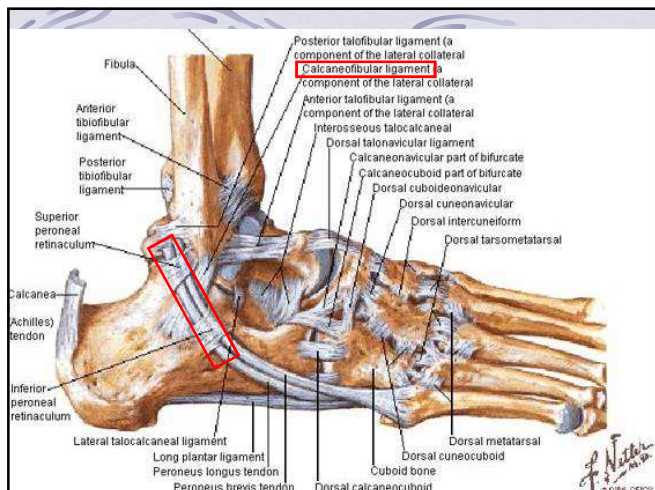
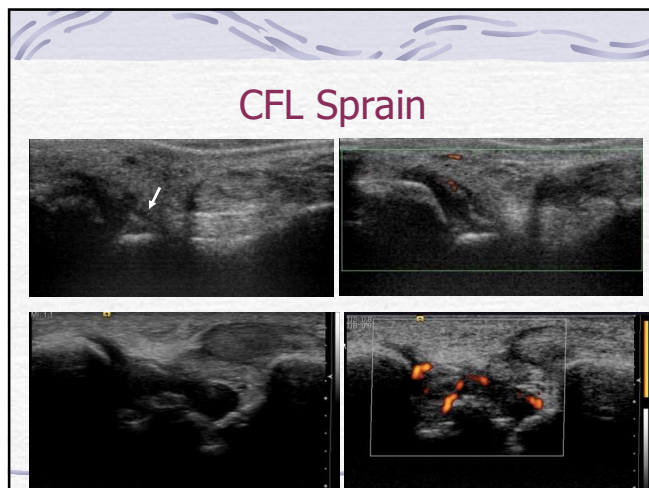
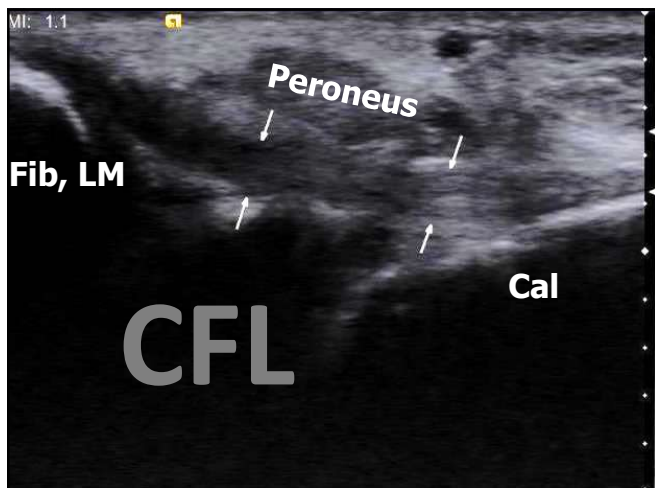


**Normal**  
**I: swelling, hypoechoic**  
**II: partial tear**  
**III: complete tear**



**Calcaneofibular Ligament (CFL)**  
 受檢者擺位：側躺，讓患腳在上，請患者將足背屈(dorsiflexion)，有時加一點內翻可使CFL被拉緊而較易呈像。  
 探頭擺位：介於外踝與跟骨(calcaneus)間，垂直腳底方向，有時探頭遠端需稍向後傾。





### Peroneus Longus/Brevis

受檢者擺位：側躺，讓患腳在上，請患者將足背屈。

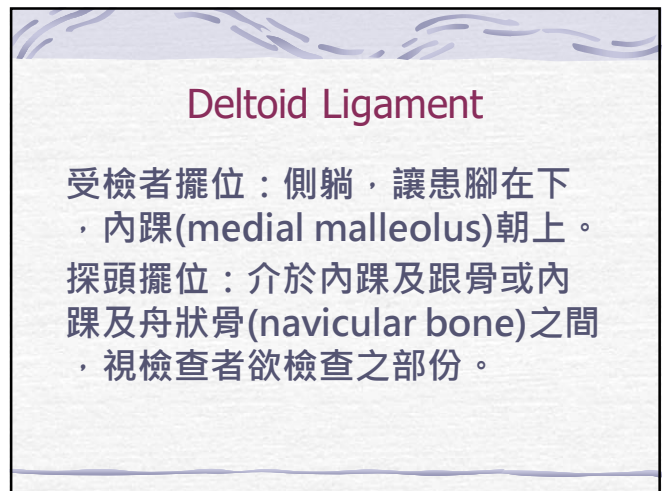
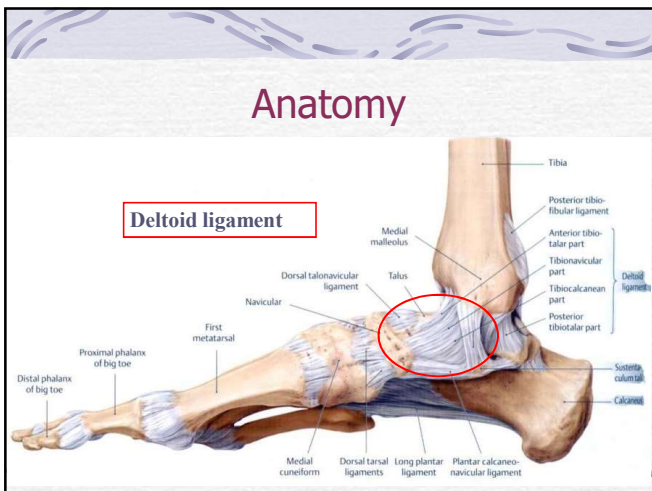
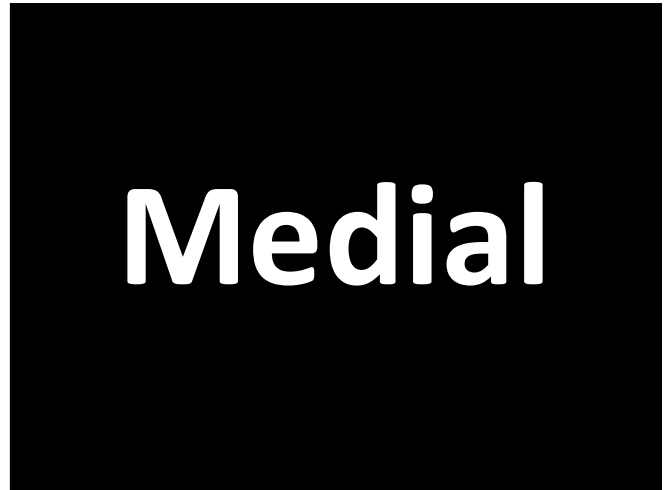
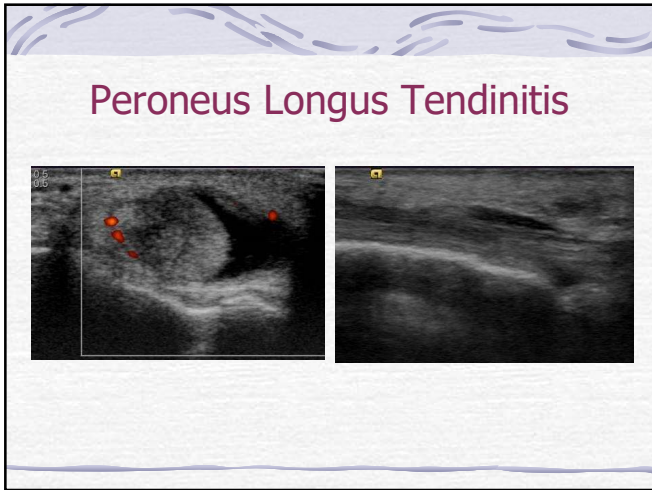
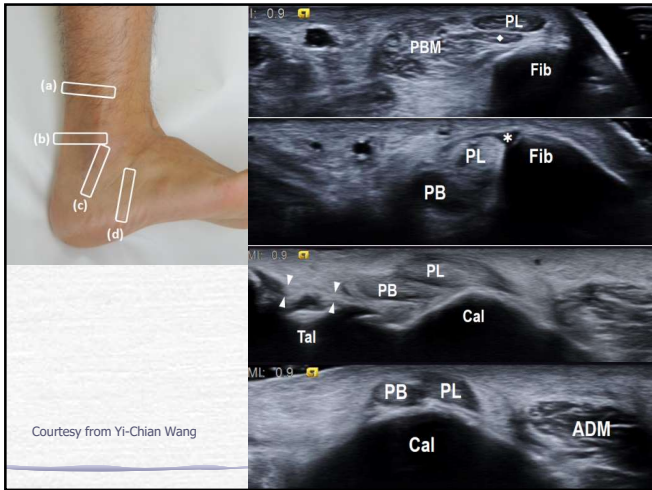
探頭擺位：介於外踝與跟骨間，垂直腳底方向，可檢查兩肌腱之橫切。若沿肌腱走向放置，則可檢查縱切。

**Peroneus brevis (PB)**  
 → 5<sup>th</sup> metatarsal base  
 Usually smaller

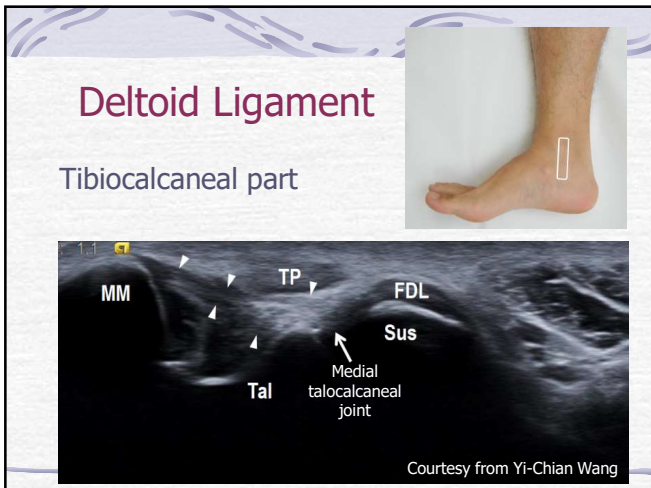
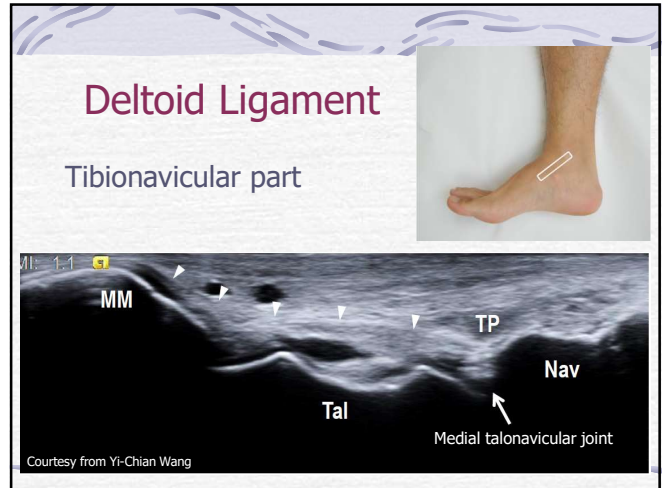
**Peroneus longus (PL)**  
 → medial cuneiform, 1<sup>st</sup> metatarsal base

Share a common sheath at retro-malleolus level  
 Separate sheath at infra-malleolus level

### Peroneus Longus/Brevis







## Tarsal tunnel

**Tom, Dick, and very nervous Harry**

Tibialis posterior (oval shape)  
 Twice the size of FDL  
 Fans out, diverging, thickening, and hypoechoic when inserting on Navicular  
 Strong inverter, maintain longitudinal arch  
 FDL (round): close to TP, half the size of TP  
 Tarsal nerve and posterior tarsal artery  
 FHL: separated from FDL by neurovascular structures

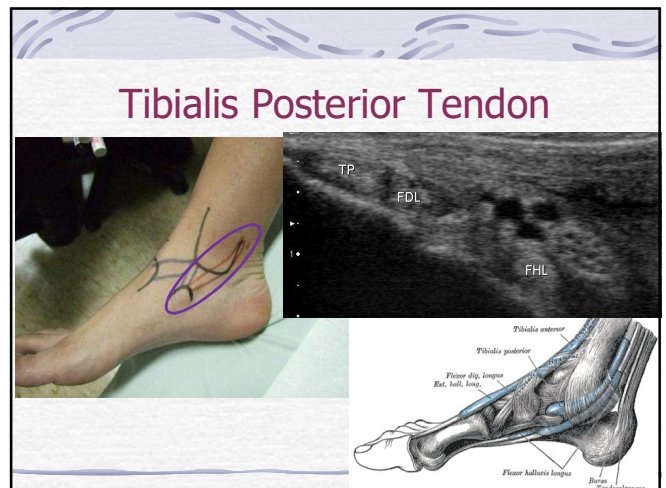
### Tibialis Posterior Tendon

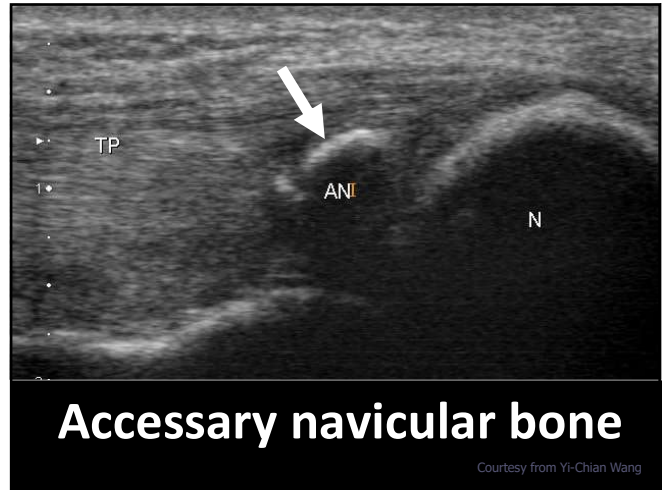
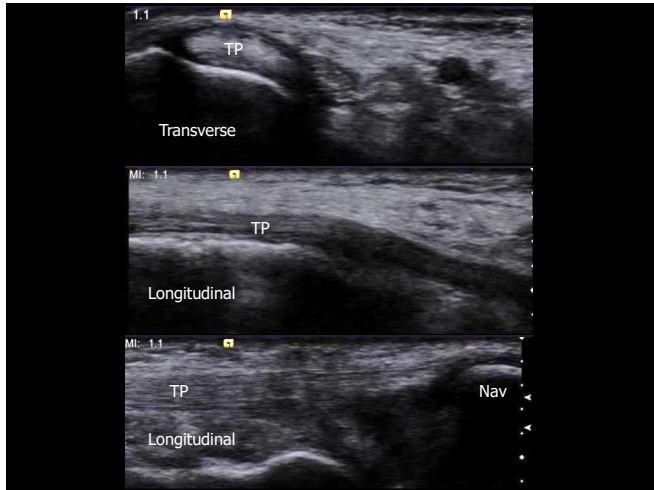
受檢者擺位：側躺，讓患腳在下，內踝朝上。

探頭擺位：內踝與阿基里斯腱之間，平行腳底方向，可檢查橫切。

旋轉九十度，沿內踝後緣，可以檢查肌腱近端之縱切。

將探頭移到內踝下方，介於內踝與舟狀骨之間，可檢查肌腱遠端之縱切。



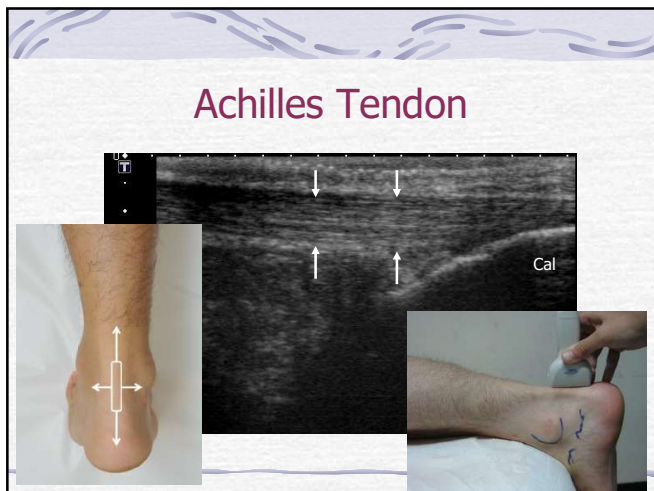


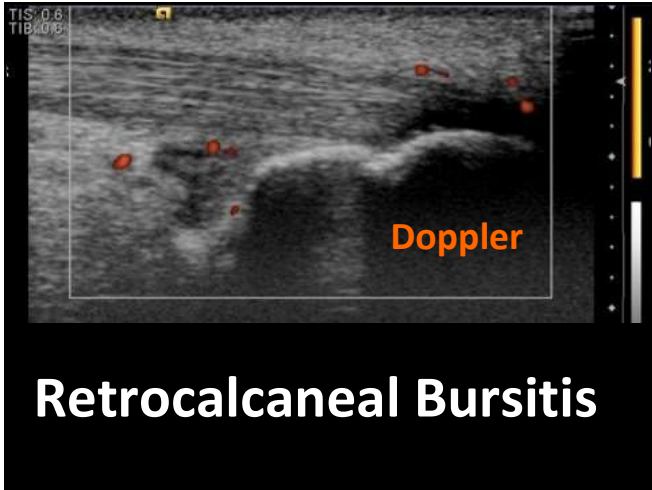
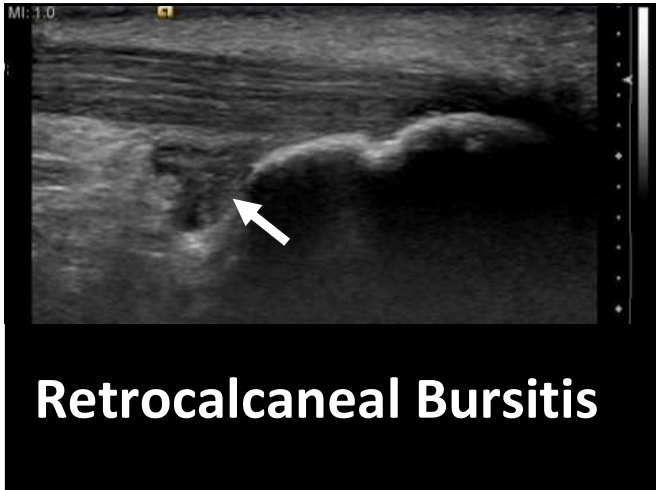
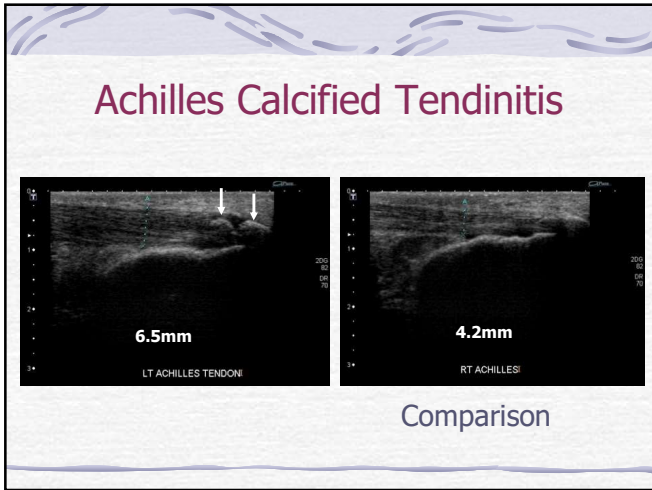
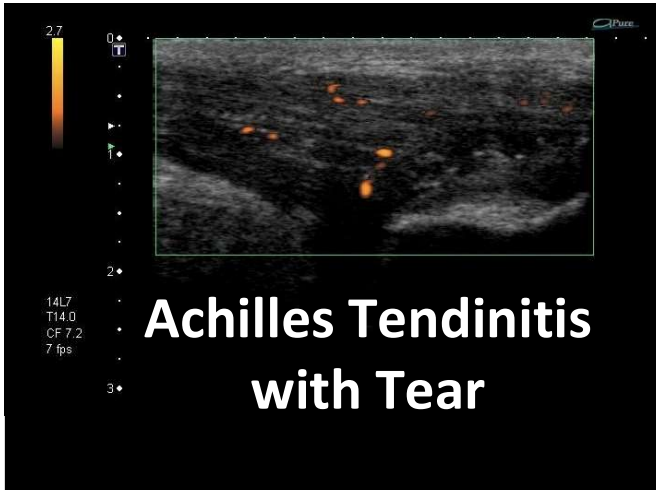
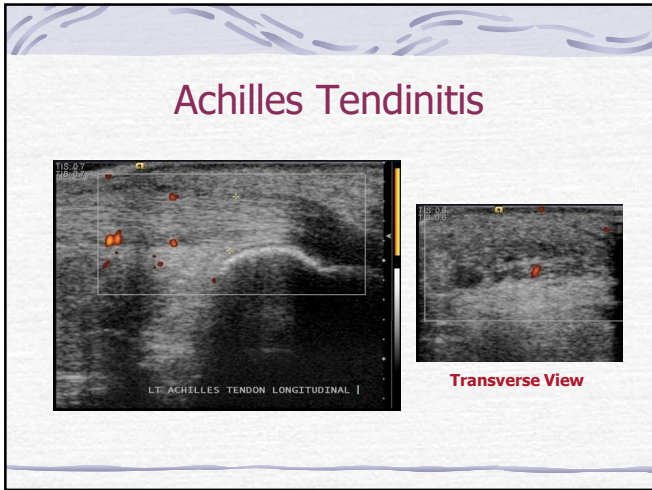
# Posterior

**Achilles Tendon**

受檢者擺位：俯臥，將足踝垂出床緣，檢查者若為坐姿可用膝蓋頂住受檢者之腳尖以拉緊肌腱。

探頭擺位：直接置於肌腱上，平行肌腱走向，可以檢查縱切。旋轉九十度，垂直肌腱走向，可以檢查橫切，通常需使用較大量之傳導膠，使影像較清晰。

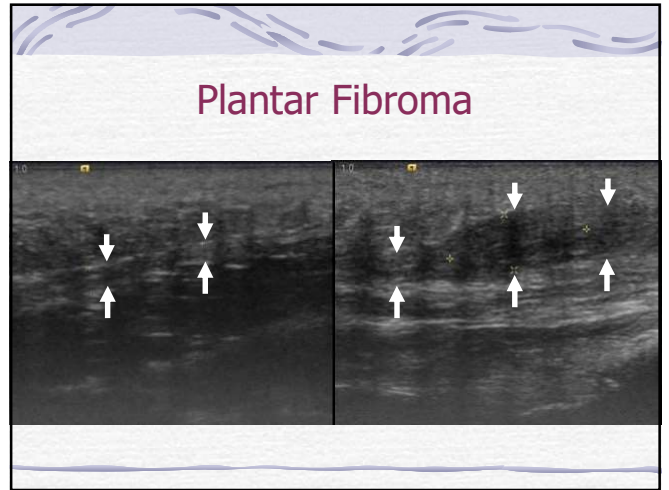
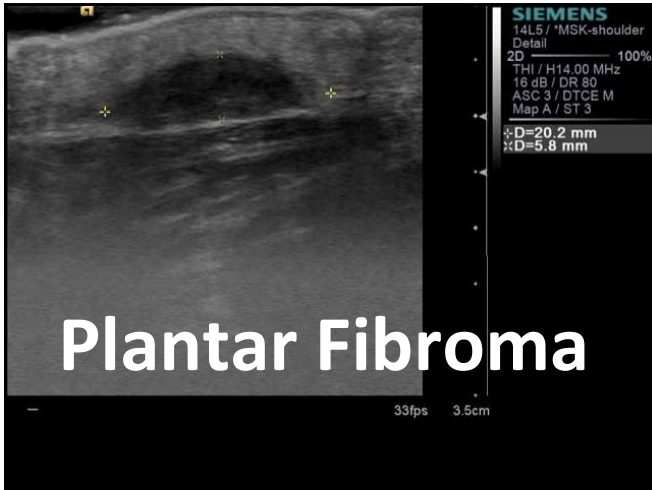
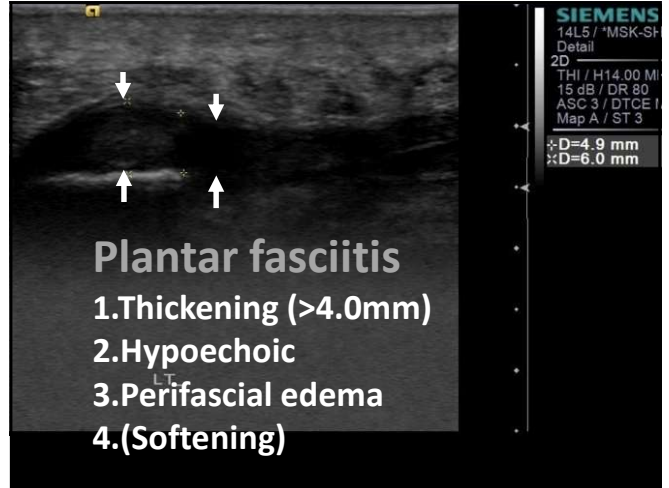
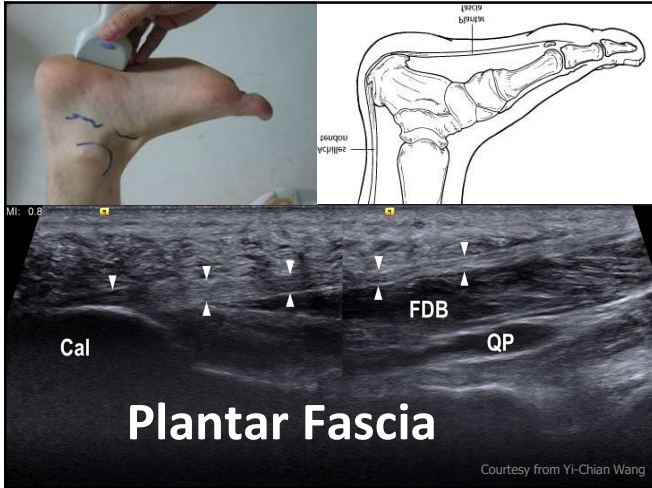




### Plantar Fascia

受檢者擺位：俯臥，將膝彎曲九十度，足底朝上。

探頭擺位：摸到跟骨內側，沿足底筋膜炎走向，檢查縱切面。



Anatomy  
Practice  
Compression  
Comparison  
Color Doppler **3C**  
Chueh-Hung Wu, MD



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