



# Musculoskeletal Ultrasound Applications

Division of Musculoskeletal Radiology  
University of Wisconsin School of Medicine & Public Health  
University of Wisconsin Hospital & Clinics

# Research Park US



- Phillips HDI 5000 unit
- Specially trained sonographers: Amy Huari and Rhonda Arbogast
- Weekdays: 8:30am – 5:00pm
- Daily add-ons

# Why Ultrasound ?

- Quick
- Easy
- Accessible
- Patient satisfaction

# Advantages of Ultrasound

- No Radiation
- Directed, real time examinations
  - Patient feedback is helpful
- Dynamic
  - Multiplanar capability
  - Dynamic motion assessment
  - Tendon subluxation
  - Guided needle aspiration, injection
- Contralateral comparison
- Not affected by implanted devices / metal
- No claustrophobia
- Cost-effective
- Color / Power Doppler sonography for vascularity
- Non-radiopaque FB

# Limitations

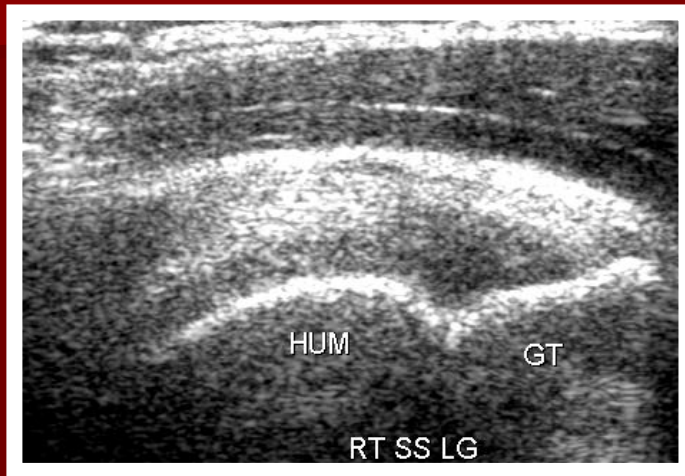
- Operator-dependent
  - extensive training required
- Limited field of view
- Requires patient cooperation
- Body habitus dependent
  - $> 5$  cm deep hard to evaluate



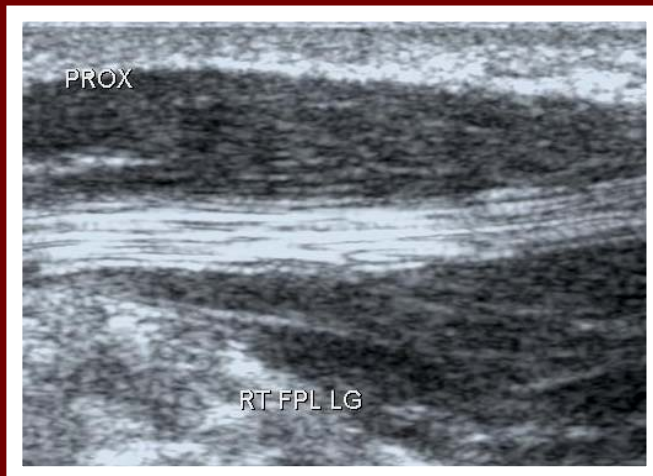
# Technical Advances in Ultrasound

## 10 yrs ago vs. present

Supraspinatus



Flexor pollicis longus



# When to evaluate with ultrasound?

- Shoulder
- Elbow
- Hand/Wrist
- Hip Knee
- Ankle/Foot
- Nerves

# Shoulder Indications

- Rotator cuff tears
- Calcified tendinitis of the cuff
- Subdeltoid-subacromial bursitis
- Biceps tendinitis / tenosynovitis
- Glenohumeral effusion
- Impingement syndrome
- Acromioclavicular joint
- Suprascapular Ganglion Cyst



# Elbow

- Ulnar collateral ligament evaluation
  - Unknown accuracy vs. MRI
- Triceps / biceps tendons
  - Unknown accuracy vs. MRI
- Epicondylitis
- Olecranon bursa
- Effusion
- US- guided aspiration/injection



# Wrist / Hand Evaluation

- Ganglion cysts
- Tenosynovitis
  - DeQuervain's
- Carpal Tunnel Syndrome
- Foreign Bodies (esp. radiolucent)
- Tendon Tears (Flexor & Extensor)
- Gamekeeper Thumb (UCL)
  - Stener Lesion
- Extensor Hood Injury
- Pulley Tears

# Foot / Ankle

- Joint effusion
- Achilles Tendon
- Posterior Tibialis Tendon
- Peroneal Tendon
- Joint / Tarsal Tunnel Injection
- Plantar Fasciitis
- Morton's Neuroma
  - Steroid or 20% ethanol injections

# Knee

- Quad / Patellar tendon injuries
- Effusion – Arthrocentesis
- Baker's Cyst
- Bursitis

# Hip

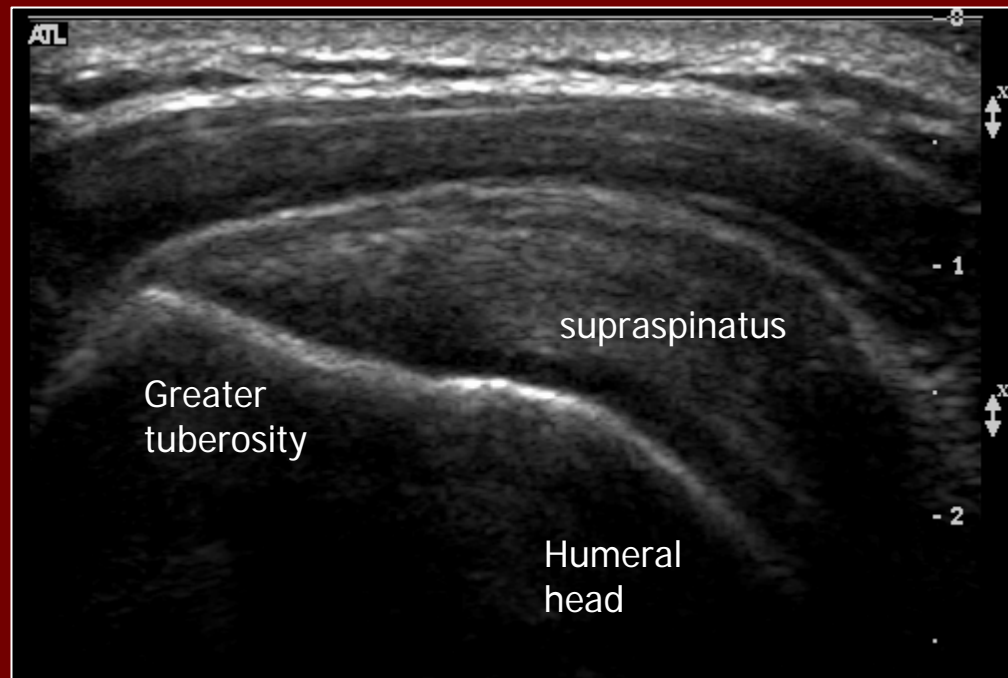
- Bursitis
  - Greater Trochanter
  - Iliopsoas
- Joint effusion
- US-guided aspiration/injection

# Sonographic Evaluation of Masses

- Lipomas
- Hematomas
- Nerve Sheath Tumors
- Hemangiomas
- Cysts
- Ganglia
- Foreign body not apparent on xray
  - Glass, wood, plastic

# Shoulder Sonography

## Normal Rotator Cuff



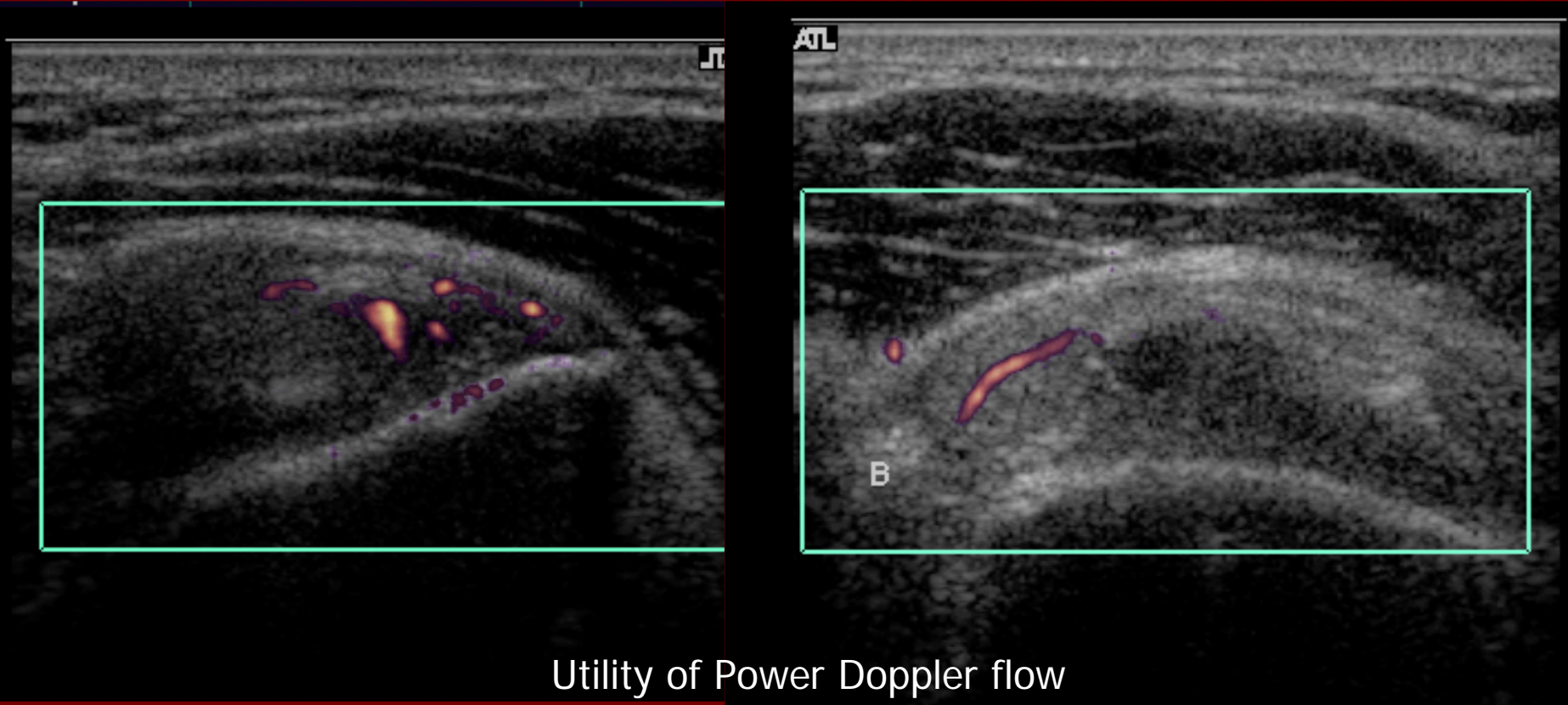
# Ultrasound Accuracy for Rotator Cuff Imaging

- Difficult to differentiate:
  - Partial-thickness articular vs. tendinopathy
  - High-grade partial vs full-thickness
- With Modern Equipment
  - Full-thickness:
    - Sensitivity: 95-100 %
    - Specificity: 94 %
  - Partial-thickness:
    - Sensitivity: 93 %
    - Specificity: 87 %

Van Holsbeeck et al. *Radiology* 1995;197:443-446  
Teefey et al. *JBJS* 2000; 82:498

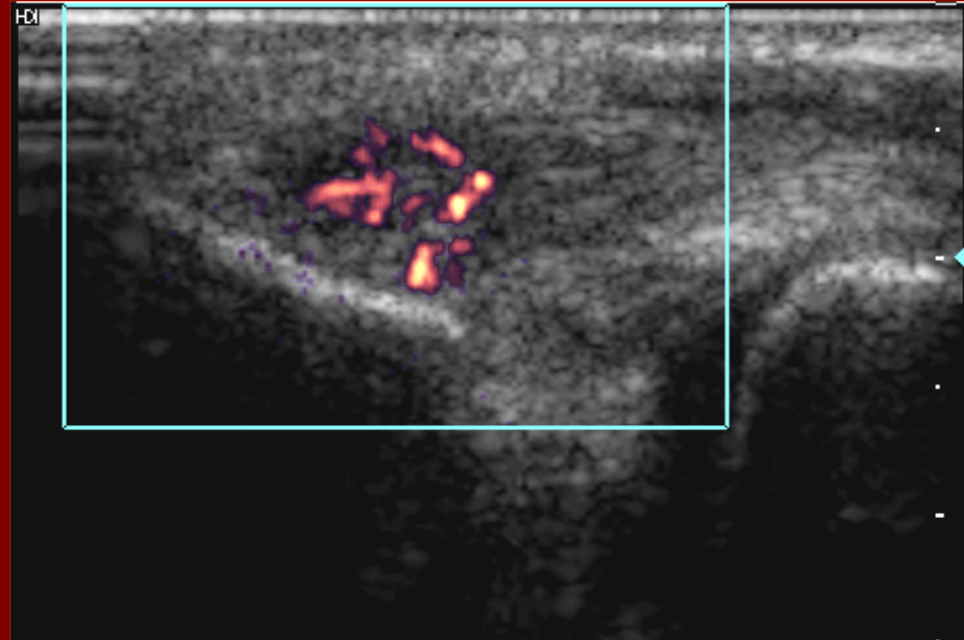


# Tendinosis of the Supraspinatus



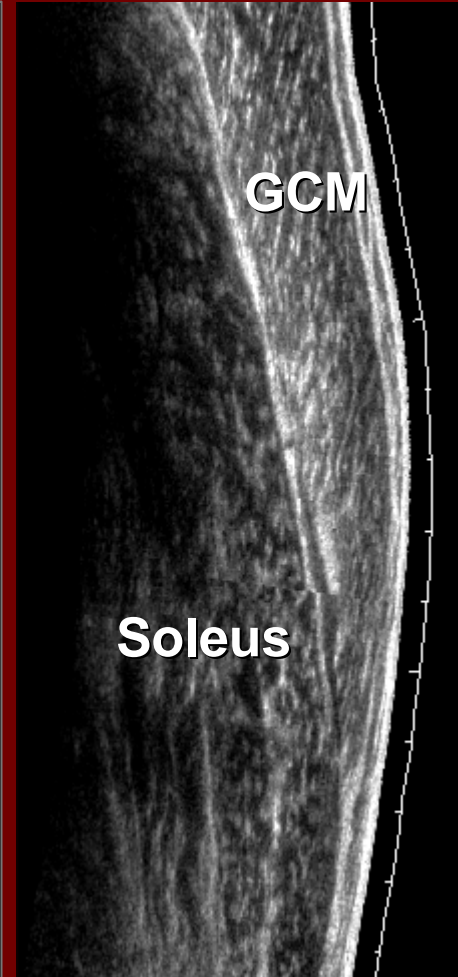
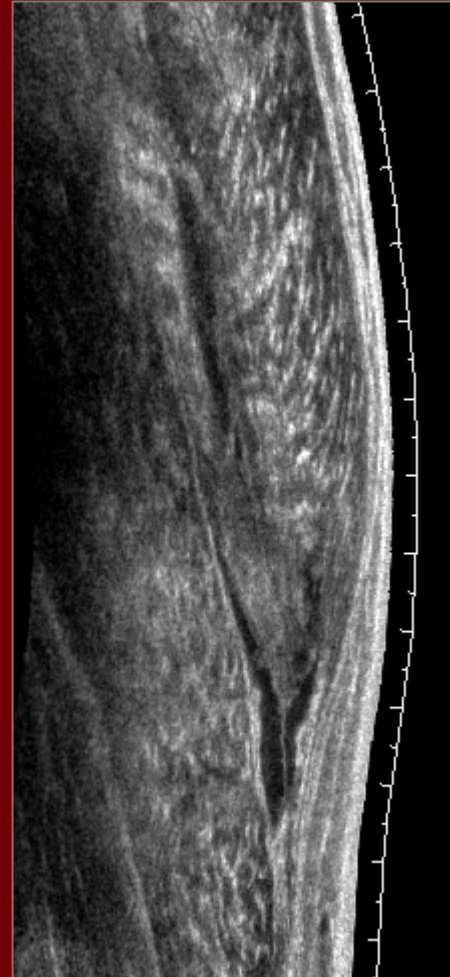
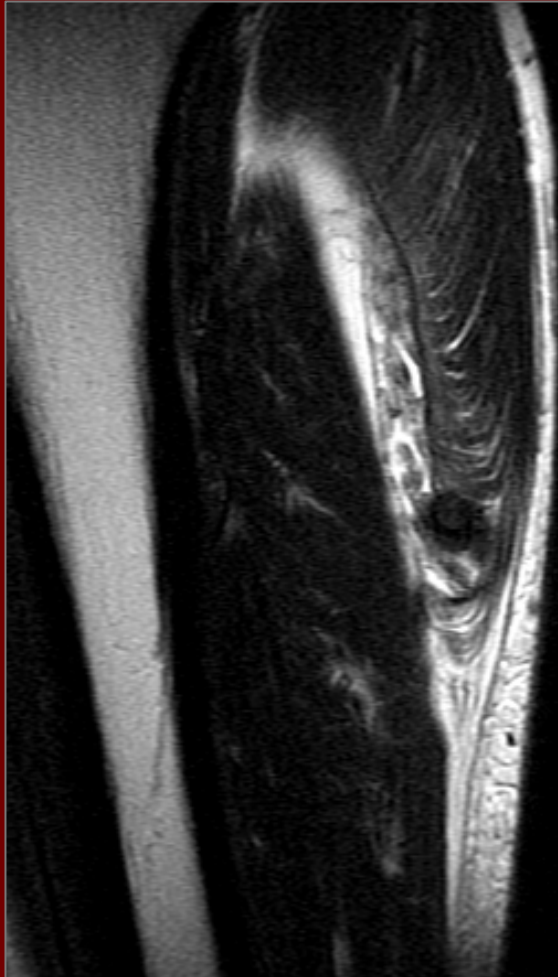
Utility of Power Doppler flow

# Tennis Elbow

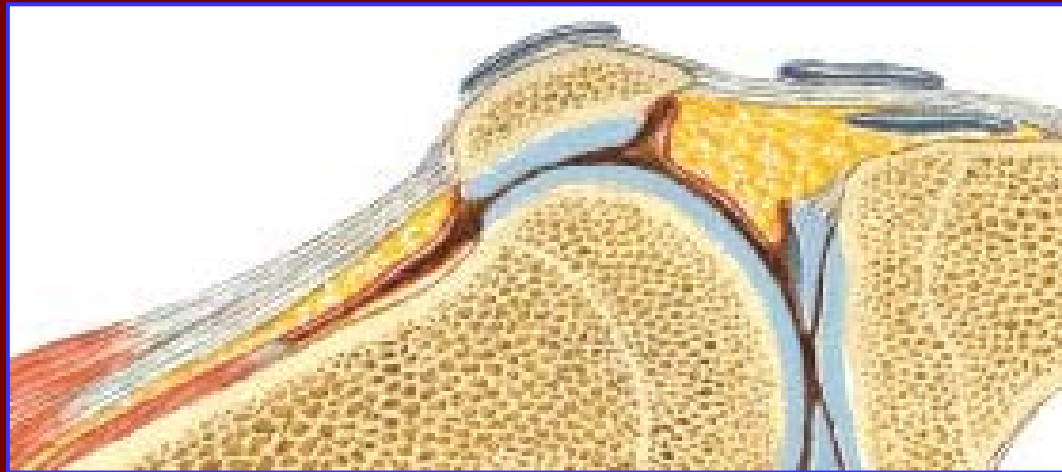
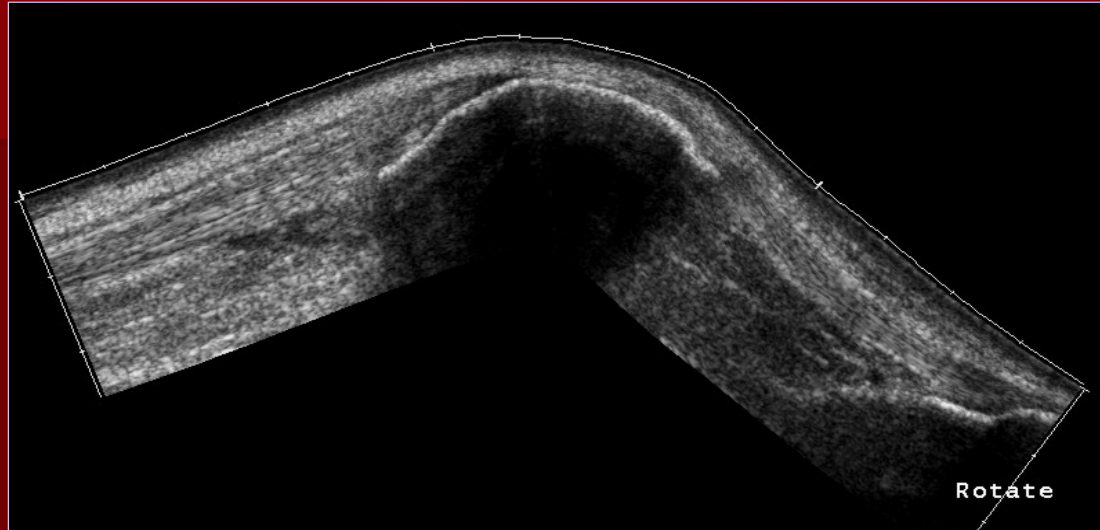


Hypoechoic common extensor tendon with hyperemia

# Muscle Strain Grade II



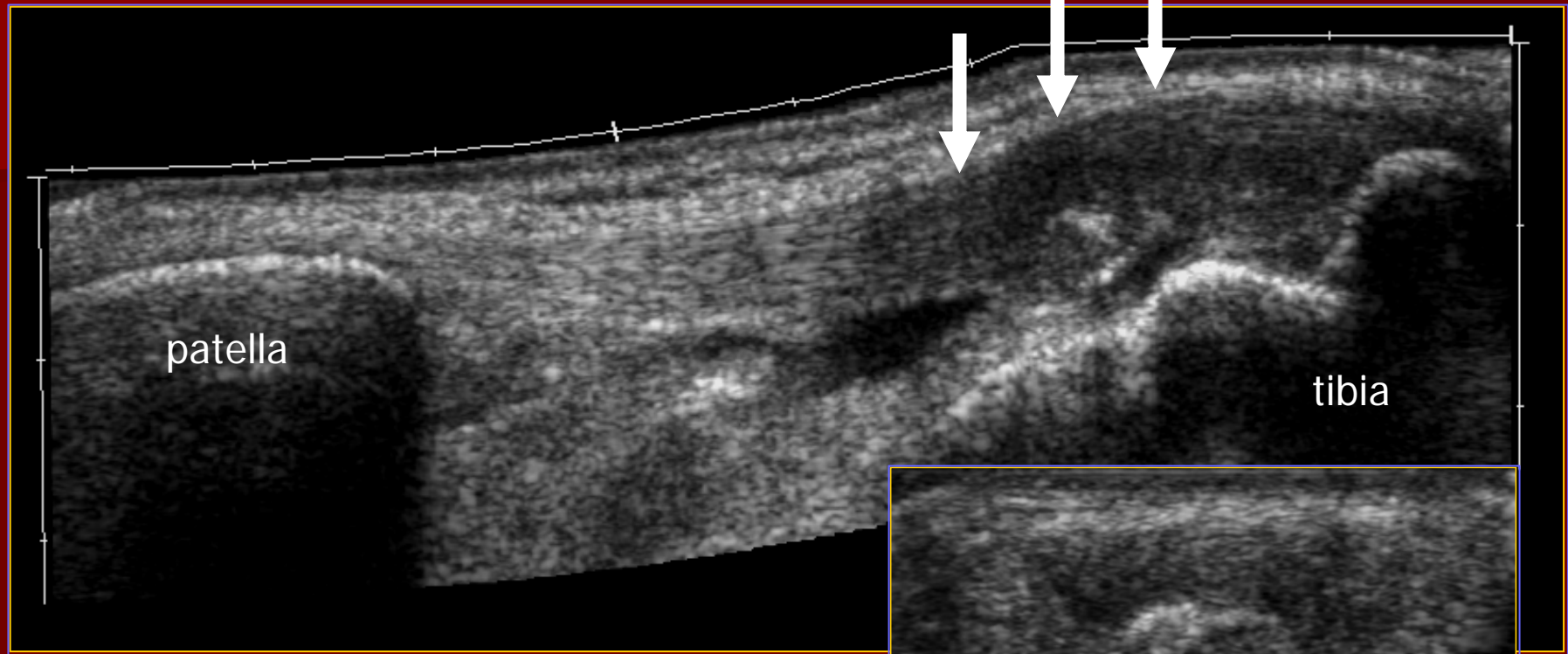
# Extended Field-of-View



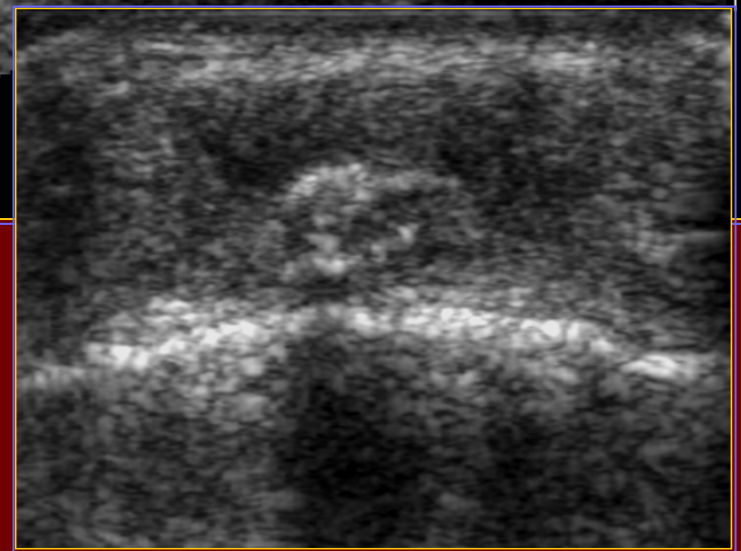
Extensor Mechanism



# Distal Patellar Tendinosis



Osgood-Schlatter

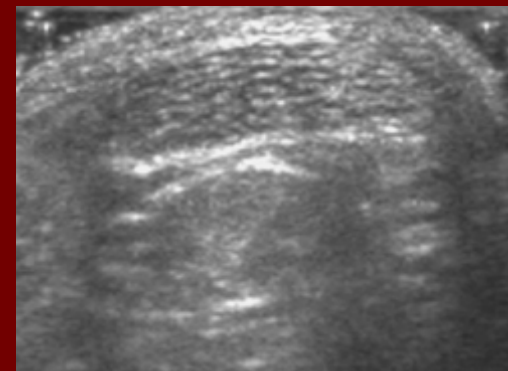
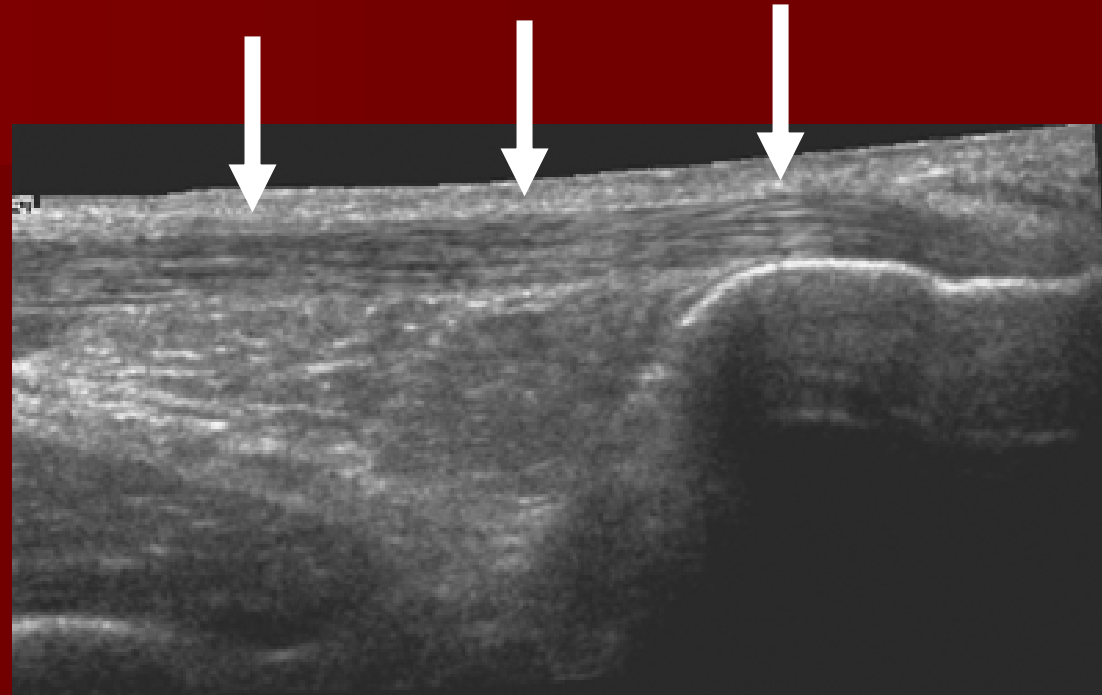
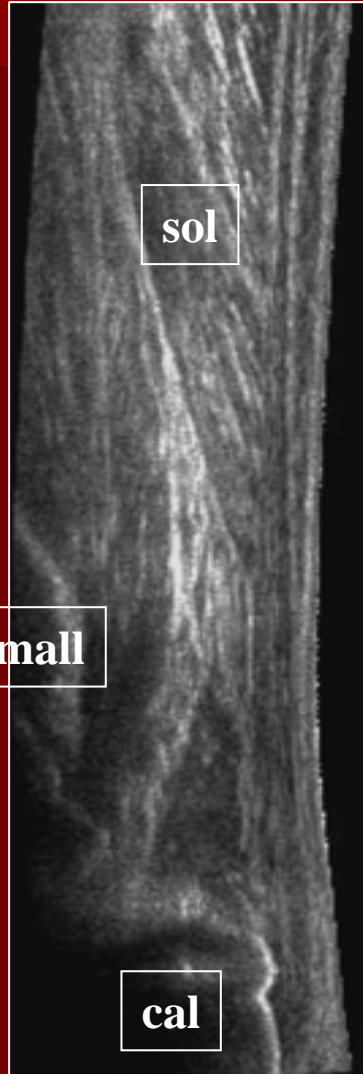


Short axis

# Foot / Ankle

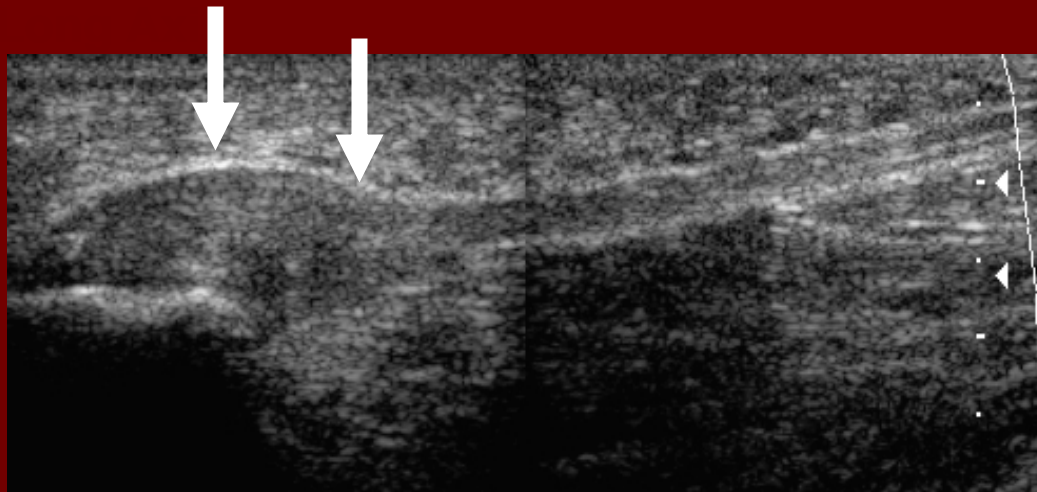
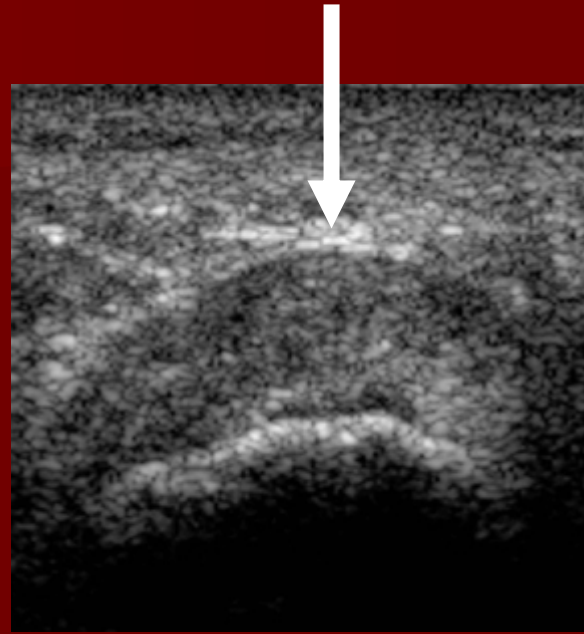
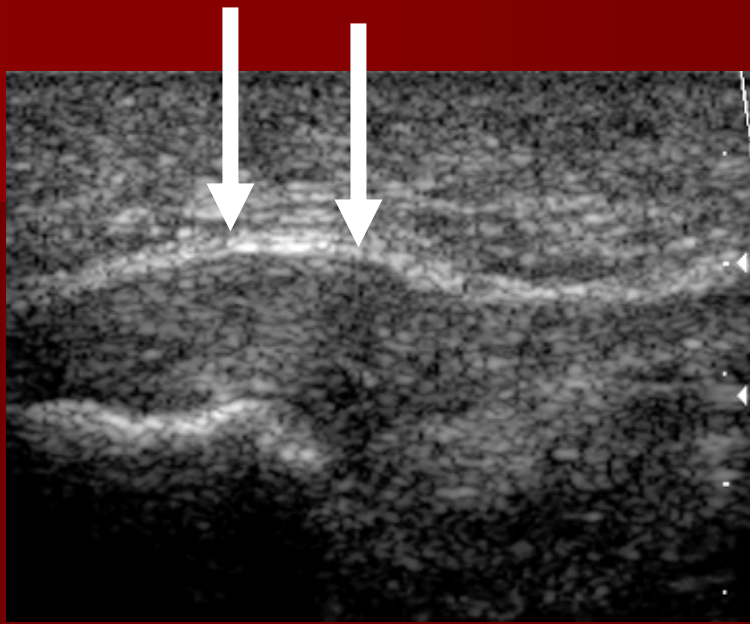
- Joint effusion
- Achilles Tendon
- Posterior Tibial Tendon
- Peroneal Tendon
- Joint / Tarsal Tunnel Injection
- Ankle sprains
- Plantar Fasciitis
- Morton's Neuroma
  - Ethanol injections

# Achilles Tendon: Anatomy



SHORT AXIS

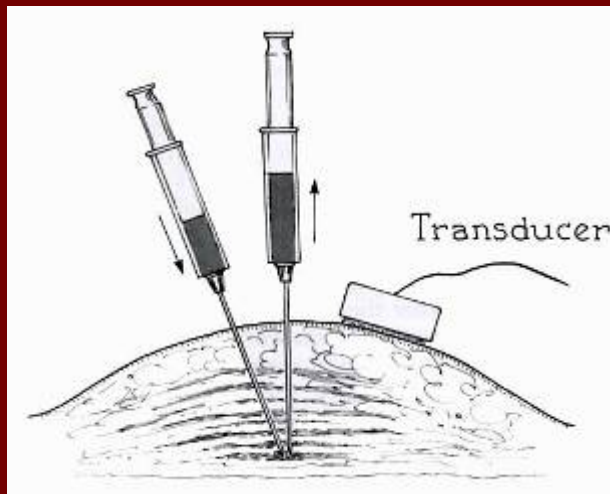
# Plantar Fasciitis





# US-guided Interventions

- Very useful technique
  - Multiplanar imaging of target
  - Information about surrounding tissues
    - Nerves, vessels



# Summary

- Ultrasound is very useful for performing a focused exam for a specific question
- Ultrasound technology has improved
- Ultrasound can be used in conjunction with MRI
- Excellent for dynamic evaluation and guided procedures
- Safe, inexpensive, accessible, portable

# Acknowledgments

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