


# Ultrasound Guided Injections

Eric W. Lee, MD



Advanced Concepts in Sports Medicine 2015  
Las Vegas, NV

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## Disclosures

- ▶ Speaker: Sonosite, Arthrex
- ▶ Royalties: None
- ▶ Stock Options: None

I do not intend to discuss any off-label use/ unapproved use of drugs or devices

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## Why should I use ultrasound guidance for injections?

- ▶ Better Accuracy
- ▶ Less Procedural Pain

**Better results!**

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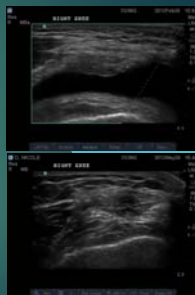
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## Accuracy of Knee Injections

- ▶ **FACT:** Anatomical or Landmark based injections often miss their intended target
- ▶ 7-29% of knee injections are NOT intra-articular
  - ▶ Jackson (2002)
- ▶ Needle placement accuracy ranges from 39-100%
  - ▶ Avg 22.2% miss rate
  - ▶ Berkoff (2012)



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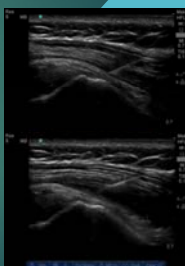
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## Accuracy of Landmark-based Subacromial Injections

- ▶ 30-40% of injections miss the subacromial bursa
  - ▶ Eustace (1997)
  - ▶ Yamakado (2002)
  - ▶ Henkus (2006)
  - ▶ Sethi (2006)



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## US guided injections are more accurate

- ▶ AC joint: 45% vs. 100%
- ▶ Biceps Tendon Sheath: 40% vs. 87%
- ▶ Glenohumeral Joint: 79% vs. 95%
- ▶ Subacromial Space: 63% vs 100%
- ▶ Knee: 79% vs. 99%



AJSM 2011, PEB 2011

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## Do Ultrasound guided knee injections have better results?

- ▶ Sibbitt et al. (2009)
  - ▶ 43% reduction in procedural pain ( $p < 0.001$ )
  - ▶ 59% reduction ( $p < 0.001$ ) in absolute knee pain scores at 2 weeks vs. anatomical-guided injections



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## Do Ultrasound-guided shoulder injections have better results?

- ▶ Naredo et al. (2004)
  - ▶ Randomized cohort (41 patients) to blind vs. US guided subacromial cortisone injections
  - ▶ VAS ( $p=0.001$ ) & SFA ( $p=0.012$ ) significantly better in US group at 6 weeks



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## How do I do it?

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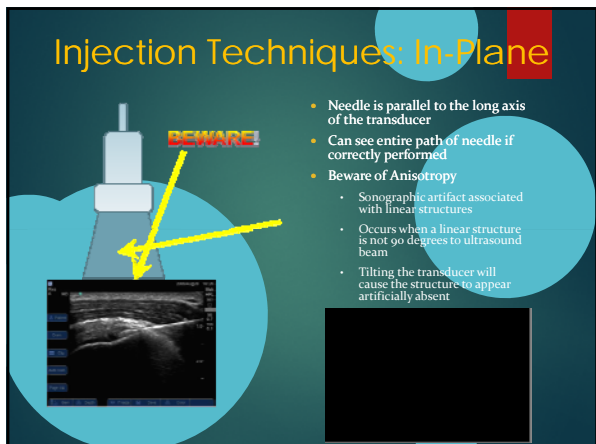
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### Injection Techniques: In-Plane



- Needle is parallel to the long axis of the transducer
- Can see entire path of needle if correctly performed
- Beware of Anisotropy
  - Sonographic artifact associated with linear structures
  - Occurs when a linear structure is not 90 degrees to ultrasound beam
  - Tilting the transducer will cause the structure to appear artificially absent

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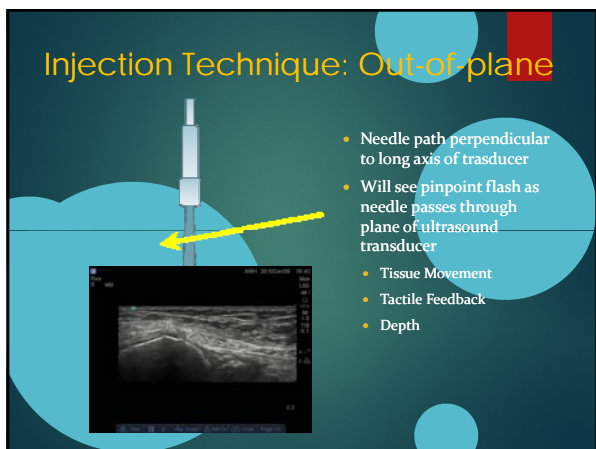
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### Injection Technique: Out-of plane



- Needle path perpendicular to long axis of transducer
- Will see pinpoint flash as needle passes through plane of ultrasound transducer
  - Tissue Movement
  - Tactile Feedback
  - Depth

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### Tips on utilizing ultrasound for needle placement

- ▶ Be cognizant of bony architecture
- ▶ Think Planar
- ▶ Always know your orientation
- ▶ See first, inject second
- ▶ Brace yourself
- ▶ Highly operator dependent. Practice makes perfect!



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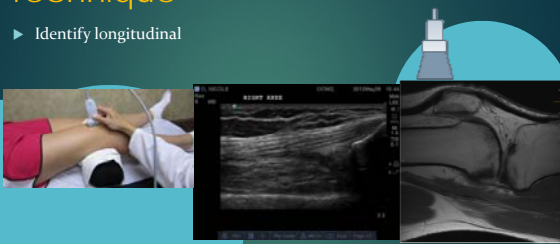
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### Knee Injections: In-Plane Technique

- ▶ Identify longitudinal



- ▶ Proper Leg position: Knee flexed 20-30 degrees

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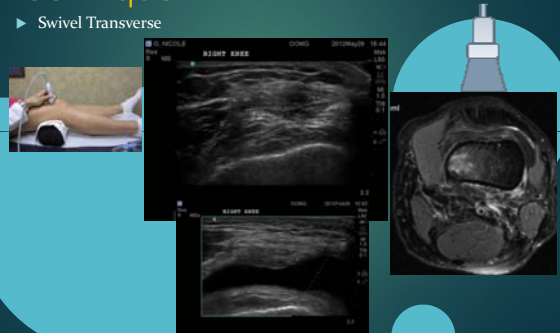
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### Knee Injections: In-Plane Technique

- ▶ Swivel Transverse



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### Knee Injections

- ▶ Superolateral approach into pouch
- ▶ Beware of pre-femoral fat pad



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### Knee Suprapatellar Injection



The image block contains two clinical photographs on the left showing a patient's knee being prepared for an injection. On the right is a large ultrasound image of the knee joint. The ultrasound shows the suprapatellar pouch with a yellow arrow pointing to the injection site. Technical details on the ultrasound include '24 Dec 2013 / 09:18', '3.8 cm', '2D: 0.0', and '0.0'. A small 'oSite' logo is visible in the bottom left of the ultrasound image.

Courtesy of Daniel She

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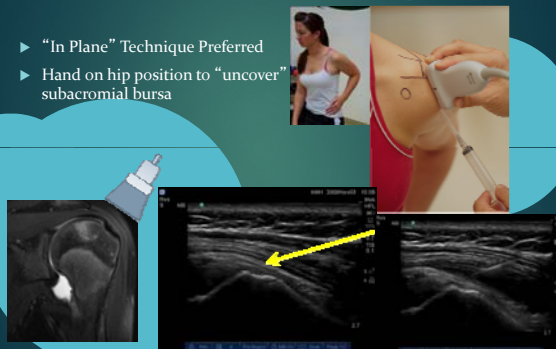
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### Subacromial Injections

- ▶ "In Plane" Technique Preferred
- ▶ Hand on hip position to "uncover" subacromial bursa



The image block includes a clinical photo of a patient standing with one hand on their hip. To the right is a photo of a hand on the hip with a syringe. Below these are two ultrasound images of the shoulder. The left ultrasound shows a cross-section of the shoulder joint with a yellow arrow pointing to the subacromial bursa. The right ultrasound shows a longitudinal view of the bursa. A syringe icon is positioned above the left ultrasound image.

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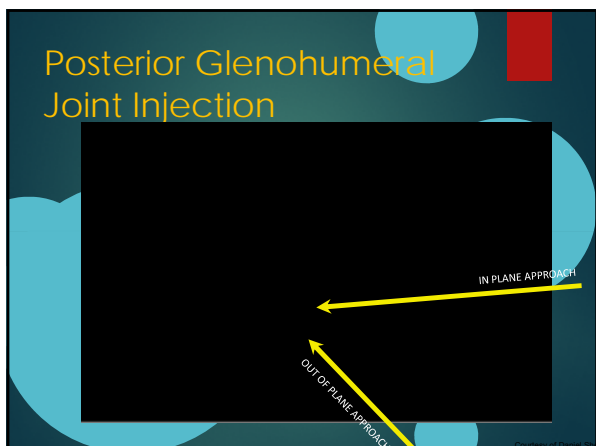
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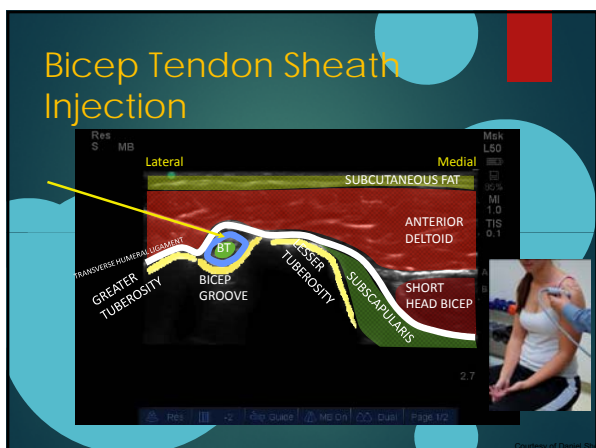
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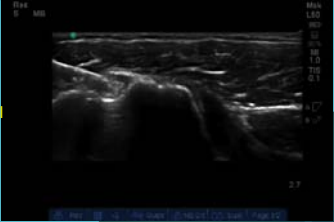
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### Bicep Tendon Sheath Injection

- In plane injection:



Lateral

Medial

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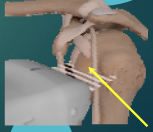

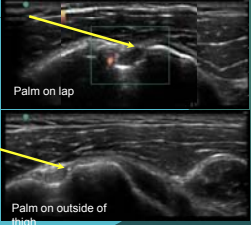
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### Bicep Tendon Sheath Injection

- Transverse Approach:
  - short axis tendon
  - laterally approached needle in long axis to the probe
  - slight external rotation



Palm on lap

Palm on outside of thigh

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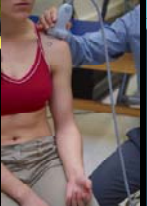
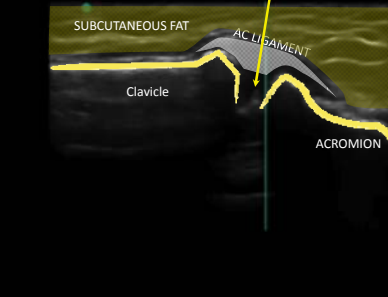
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### AC joint injection short axis needle

Out of plane needle



SUBCUTANEOUS FAT

AC LIGAMENT

Clavicle

ACROMION

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## Ultrasound-Guided Injections

- ▶ **FICTION:** Using ultrasound in my office takes too long
- ▶ **FACT:** Proper US incorporation for in-office injections adds negligible time

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## What do you need?

- ▶ Sterile gown/ gloves, mask/ hat
- ▶ Sterile drapes
- ▶ Sterile transducer sheath or cover
- ▶ Sterile gel
- ▶ Sterile operating room

***NO! Just use standard in-office sterile technique.***



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## Tips on Efficiency

- ▶ Have your staff
  - ▶ Prepare injection, alcohol swabs, band-aid, Ethyl chloride, gauze, and position patient
- ▶ Set up machine
  - Patient identifiers
  - Date
  - Site label
  - Gel probe

***Room time: 30-60 seconds***



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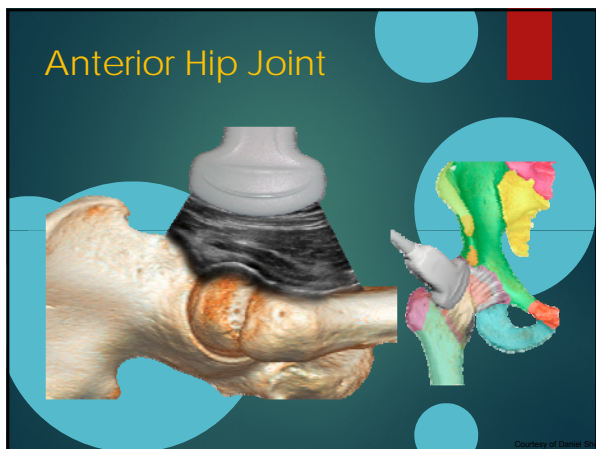
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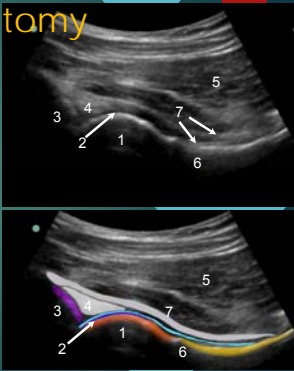
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### Anterior Hip Joint Ultrasound Anatomy

1. Femoral Head
2. Articular Cartilage
3. Acetabulum
4. Labrum
5. Overlying Muscles
6. Femoral Neck
7. Joint Capsule



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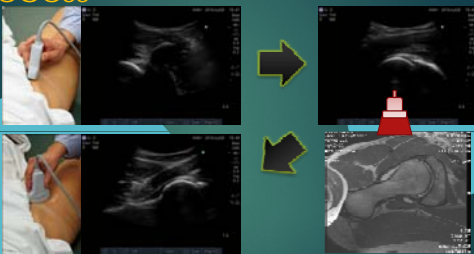
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### Hip Joint – Ant. Synovial Recess



- ▶ Position: supine
- ▶ Tip: Start in the sagittal plane and find ASIS
  - ▶ Move medial and find the femoral head
  - ▶ Tilt probe obliquely in line with neck/head
- ▶ MRI equivalent: Oblique between Sagittal / Axial planes

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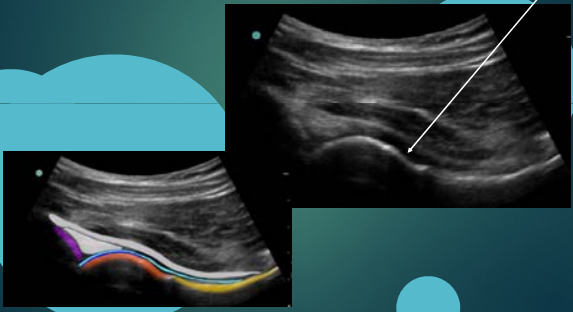
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### Needle Path



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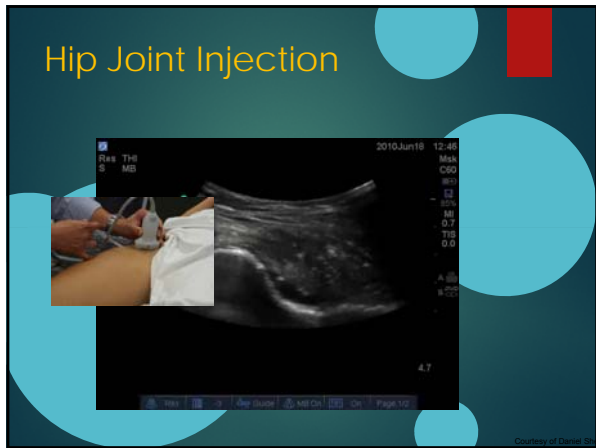
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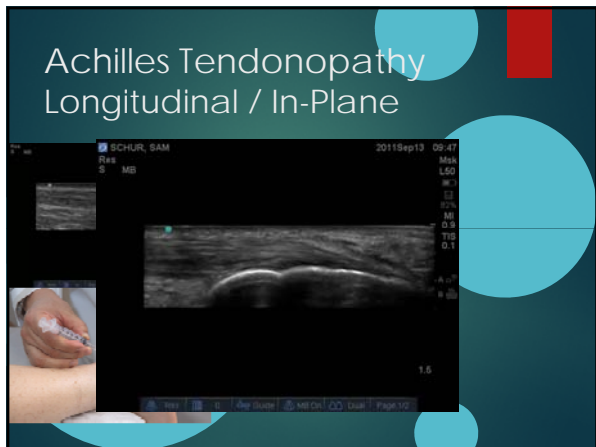
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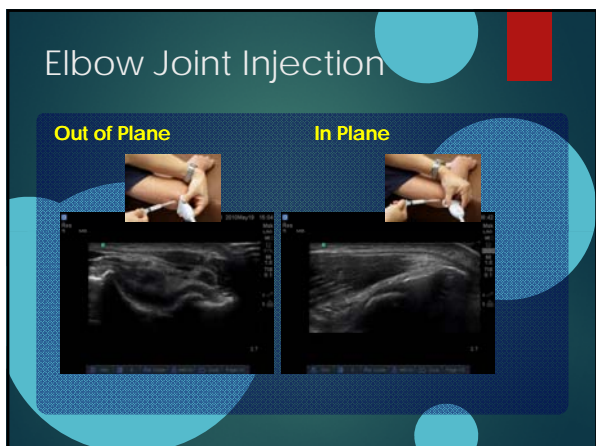
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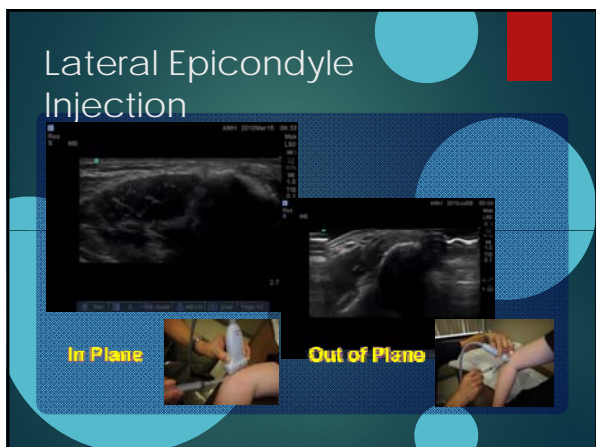
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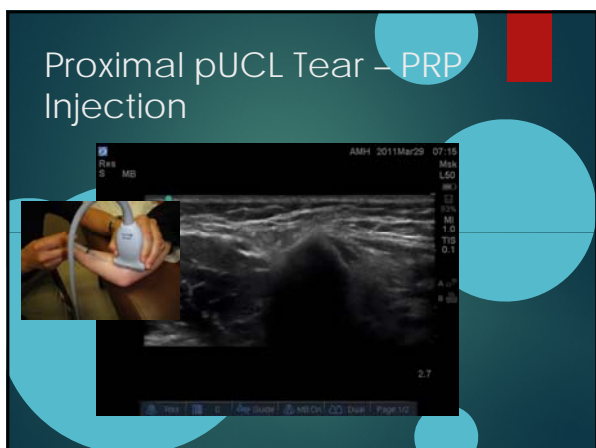
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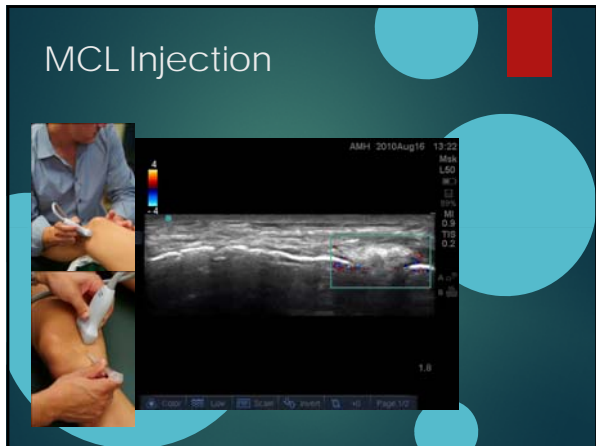
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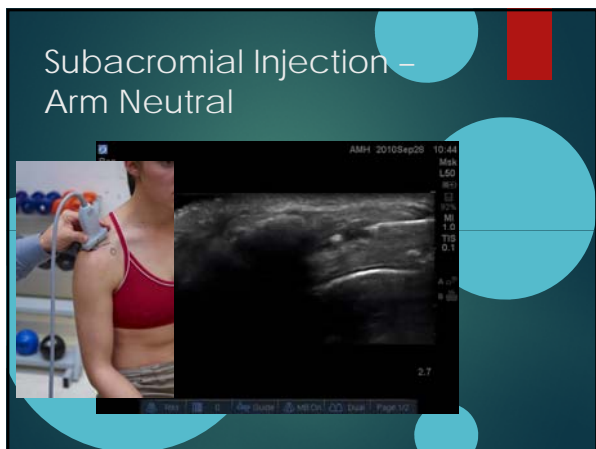
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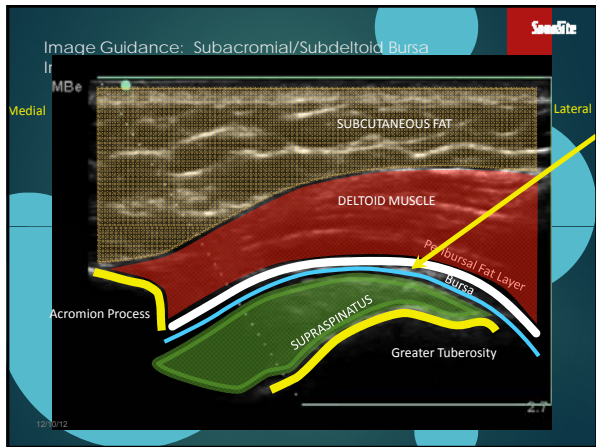
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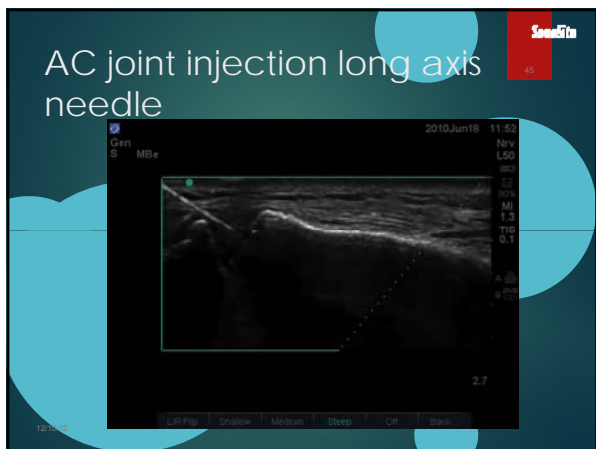
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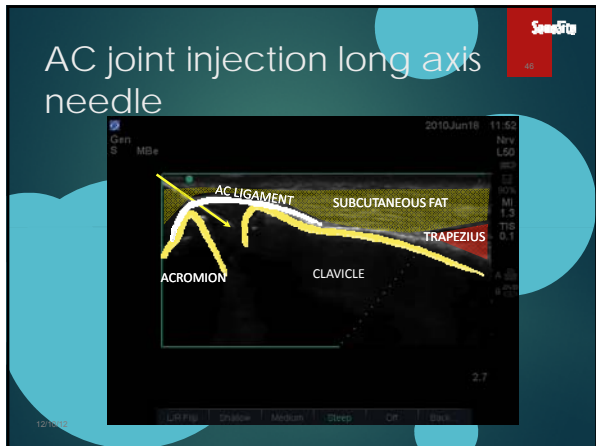
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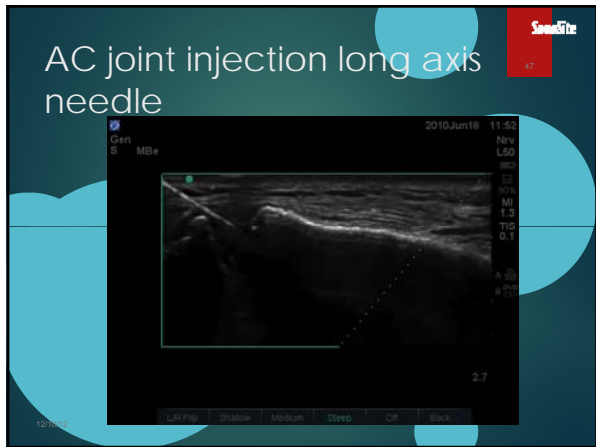
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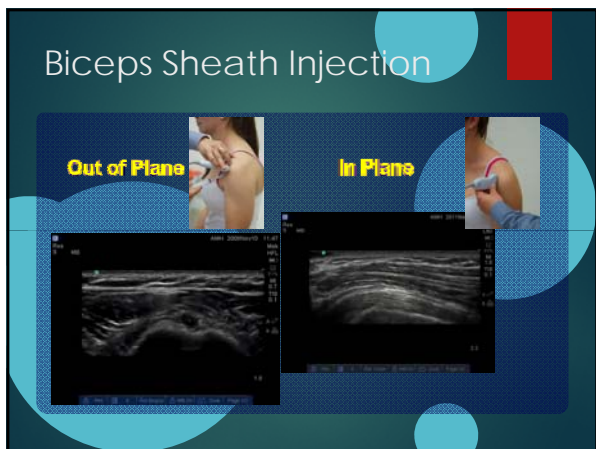
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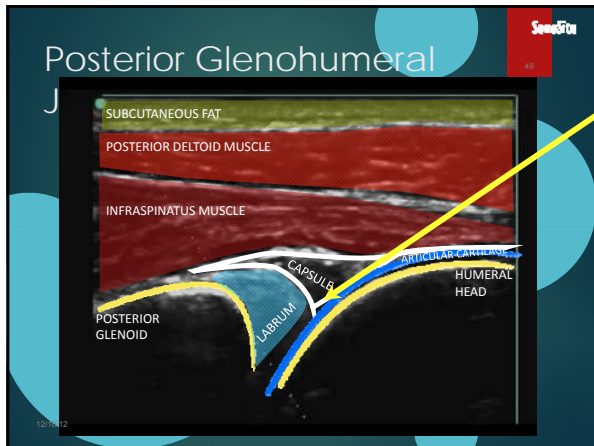
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### Ultrasound Improves Injection Accuracy

- ▶ **FACT:** Anatomical or landmark based injections often miss their intended target.
- ▶ **FICTION:** Other physicians may miss, but I don't

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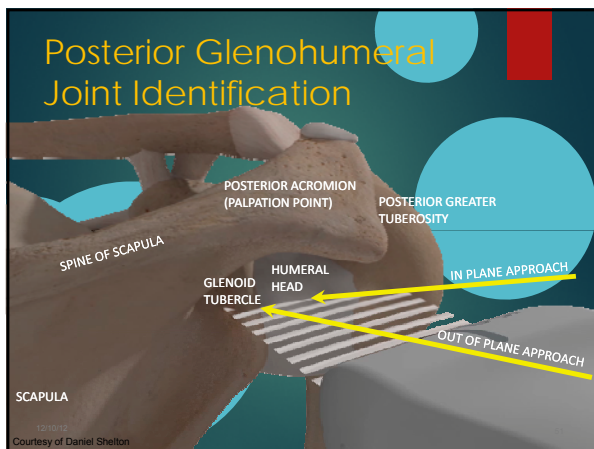
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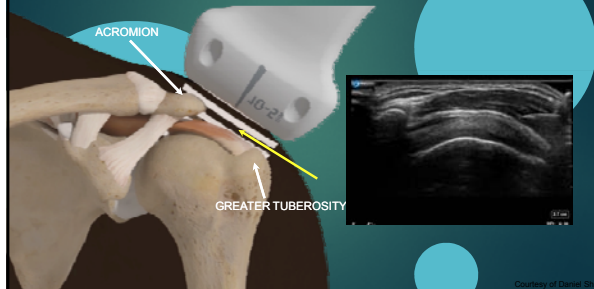
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## Subacromial Injection

- Approach: Lateral long axis to rotator cuff



ACROMION

GREATER TUBerosITY

Courtesy of Daniel S...

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## Knee Injection – No Effusion



AMH 2011Mar22 08:18

Max L50

Min 10

Gain 70%

MB 1.0

TIS 0.1

2.7

Courtesy of Daniel S...

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## MSK Ultrasound Imaging Consideration

- Anisotropy: Sonographic artifact associated with linear structures
  - Occurs when a linear structure is not 90 degrees to ultrasound beam
  - Muscle, Tendon, Ligament, Cortex and Nerve
  - Tilting the transducer will cause the structure to appear artificially absent
  - Shoulder Imaging PEARL: If the bone is bright, the tendon typically is also



Courtesy of Daniel S...

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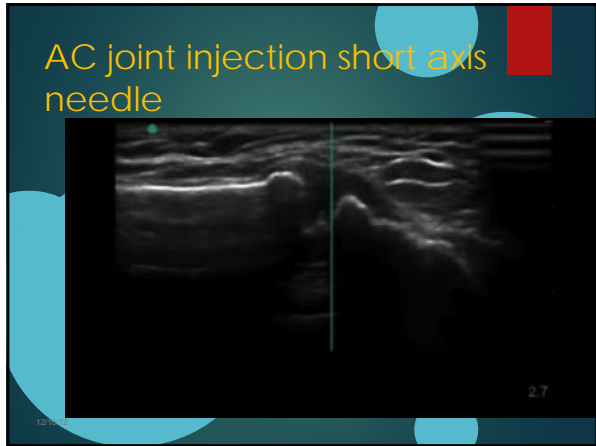
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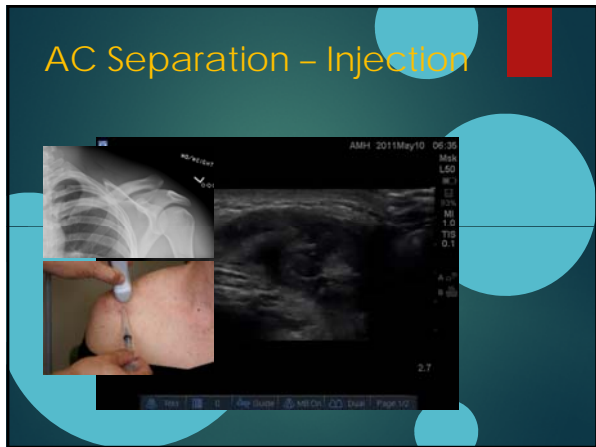
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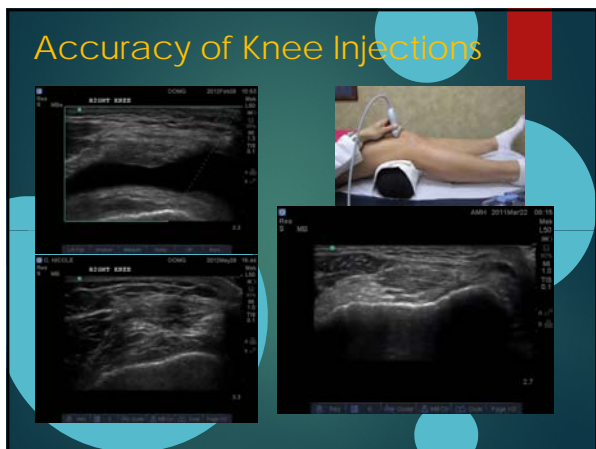
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