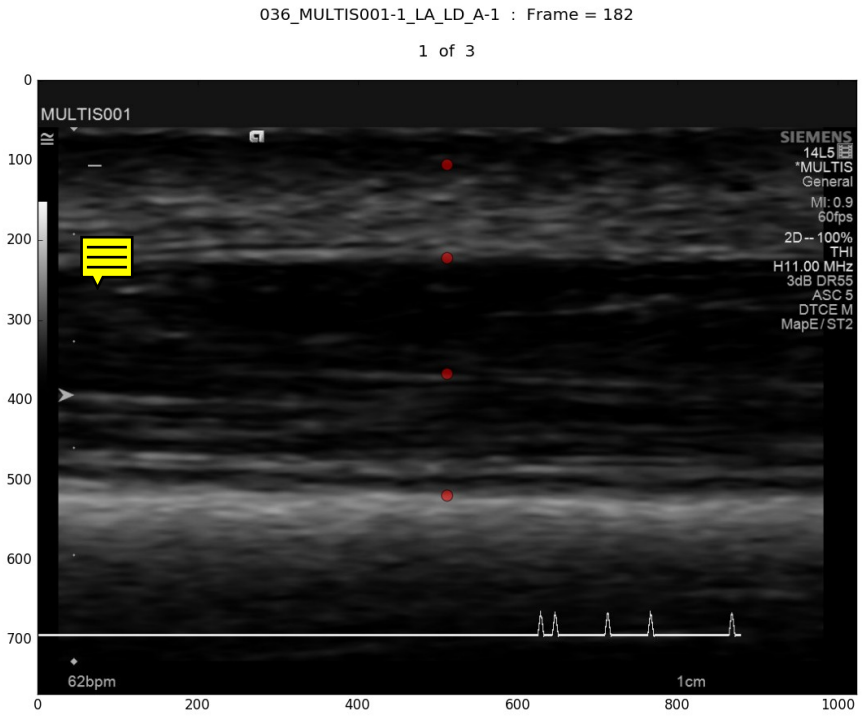
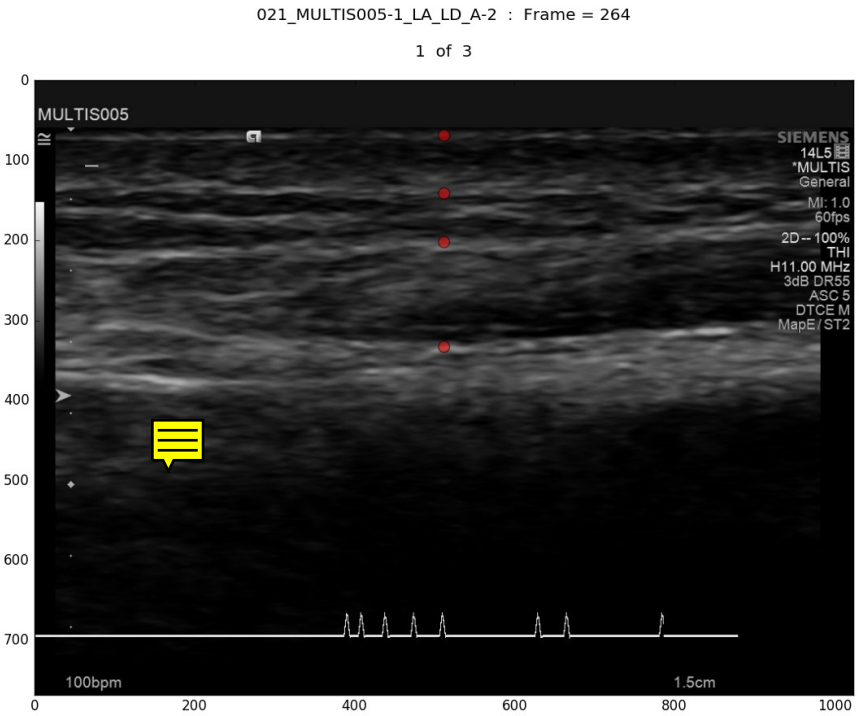
MULTIS Project

- **Goal:** Identify skin, fat, and muscle layers in extremities using Ultrasound B-mode imaging.
  - Locations of analysis
    - 48 independent locations
    - Lower arm, Upper arm, Lower leg, Upper leg
      - Anterior, Posterior, Lateral, Medial
        - Proximal, Central, Distal
- **Problem:** Boundary identification is unclear for certain areas.
  - Boundaries are marked with red dots (note that for simplicity, tendons and arteries are included in the “muscle” layer)
    -

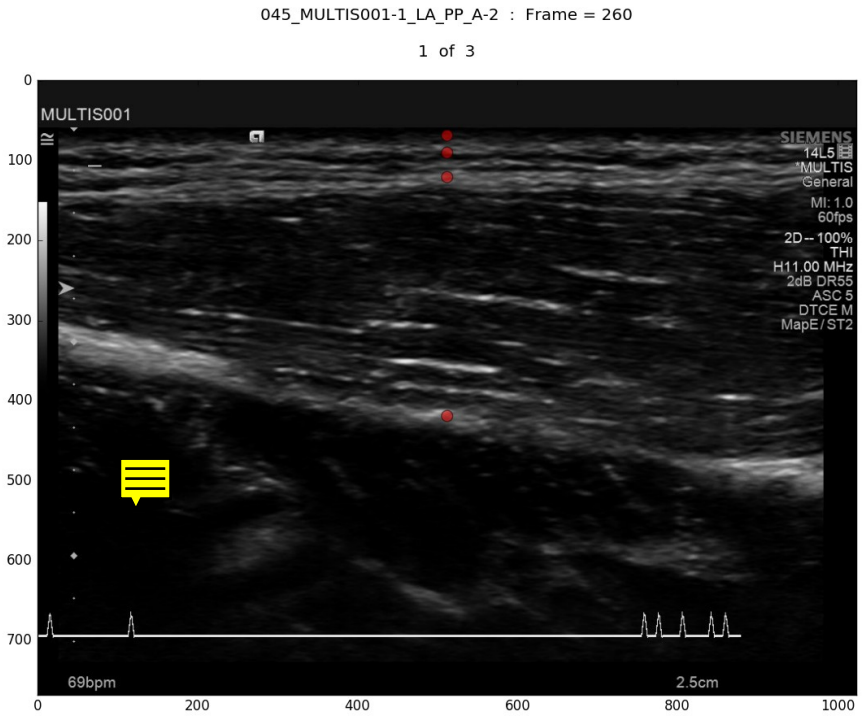
Lower Arm, Lateral Distal

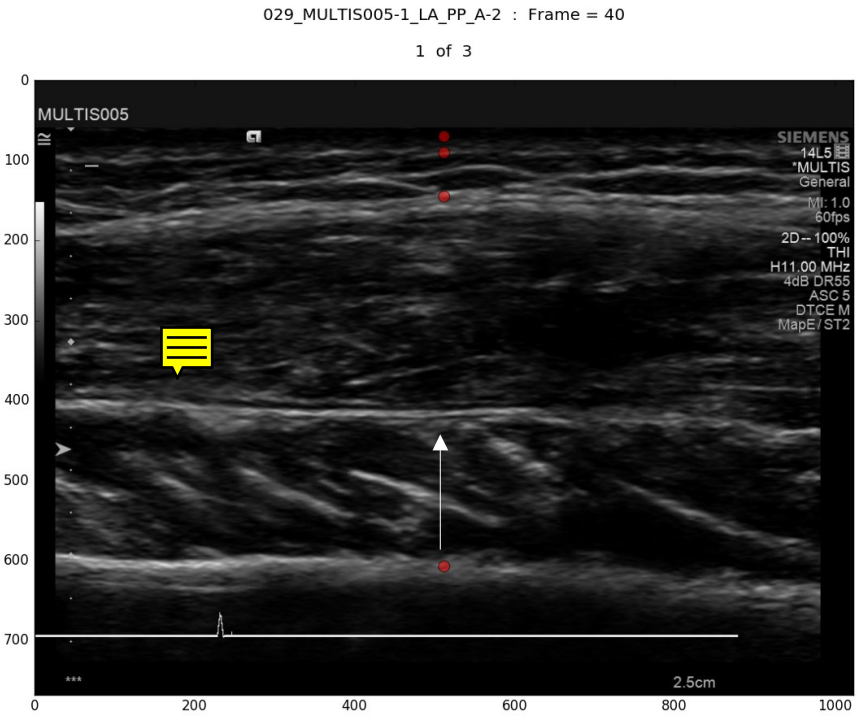




Two different patients, unsure of skin/fat and fat/muscle boundaries.

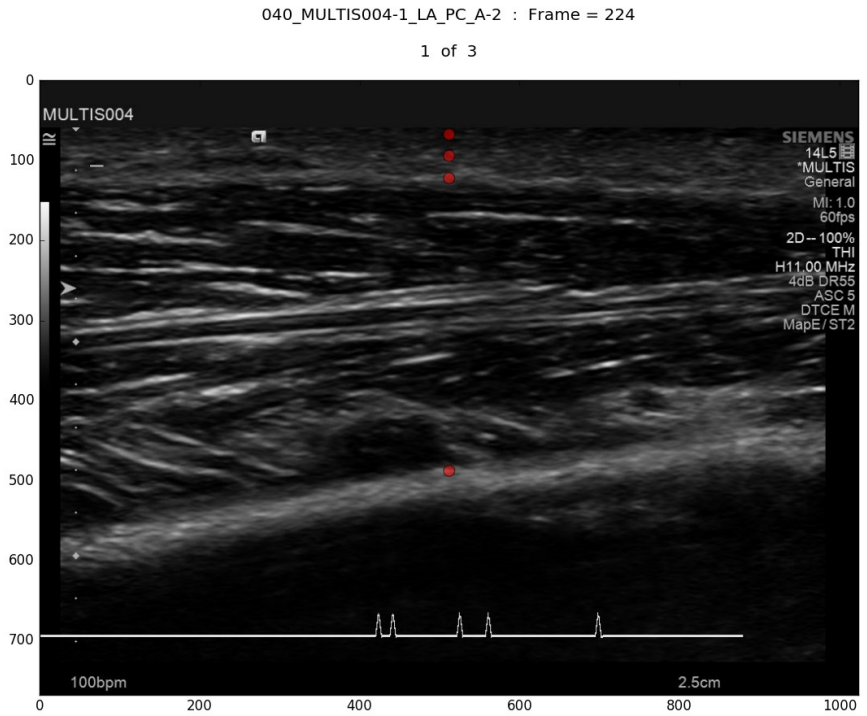
Lower Arm, Posterior Proximal

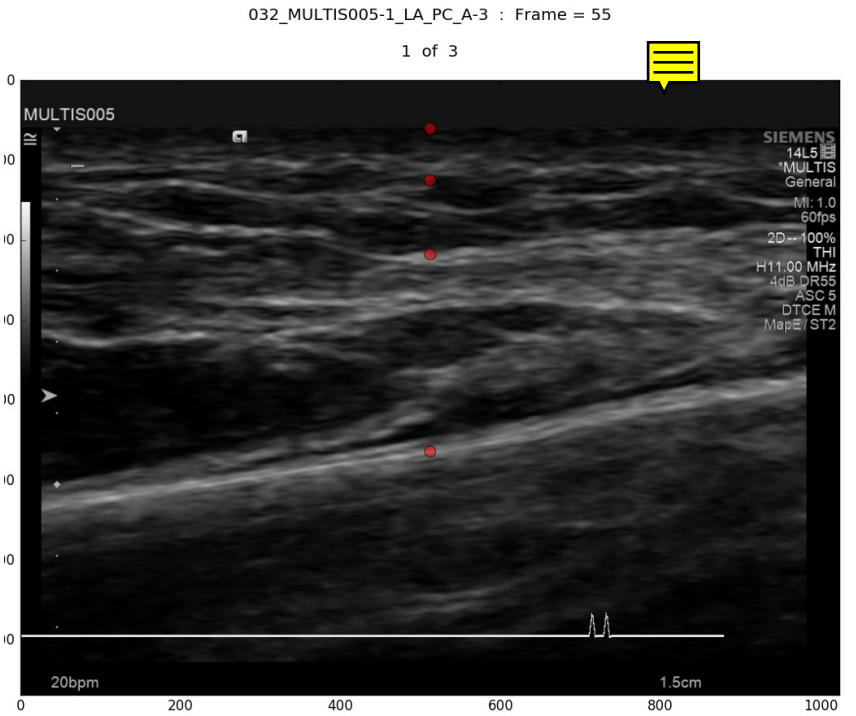




Two different patients, unsure of muscle/fat boundary. Left seems like it is missing the bone boundary when comparing it to the right image, or should the bone boundary be moved up in the right image (see white arrow)?

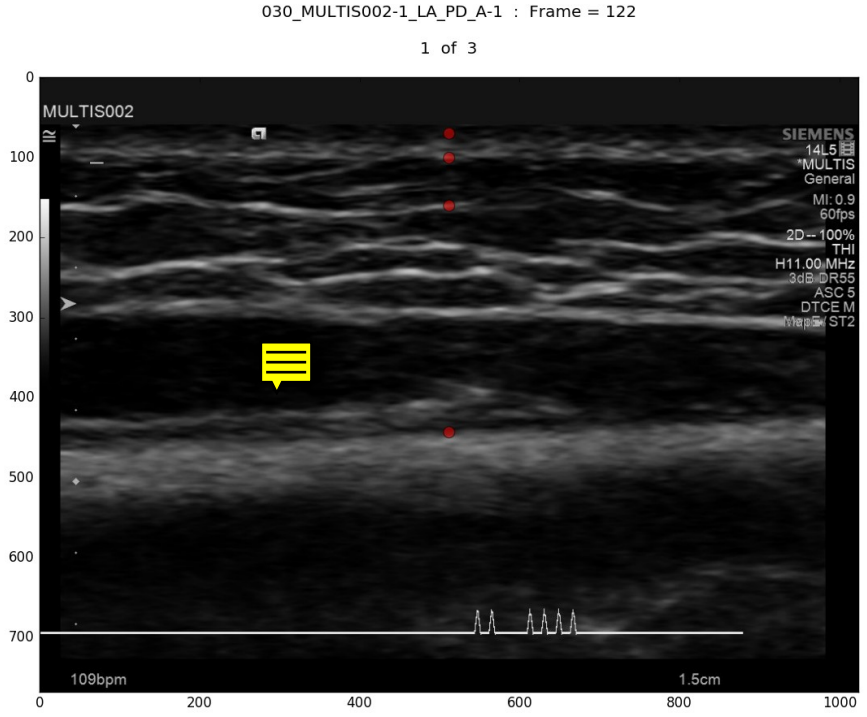
Lower Arm, Posterior Central





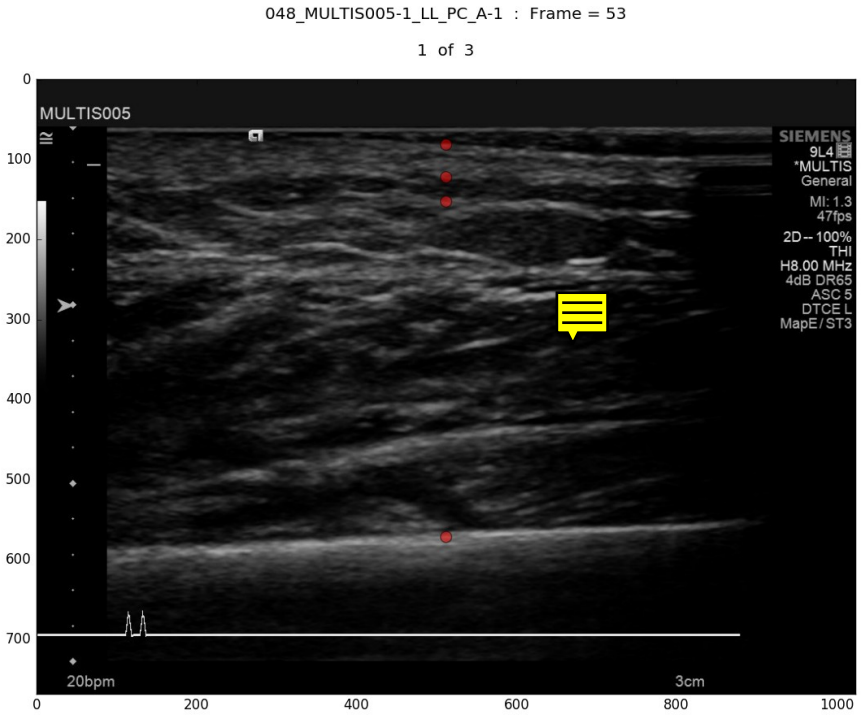
Two different patients, are the skin and fat layers properly placed in the left image and are we missing the bone boundary in the right image?

Lower Arm, Posterior Distal



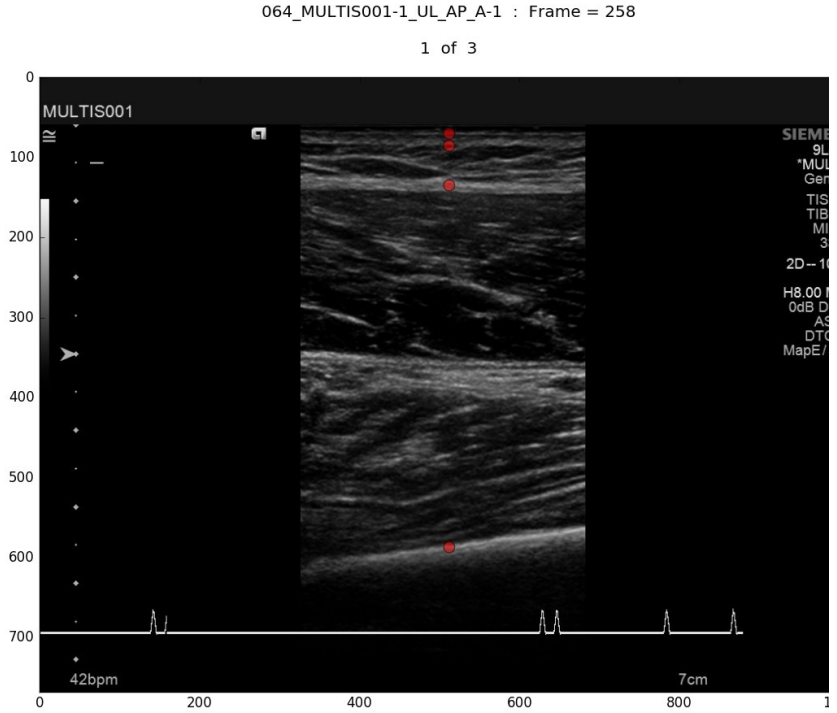
Two different patients (left is female, right is male), is the fat/muscle boundary placement correct for the left image? Are we seeing dense tendons in the right image or are the skin and fat layers identified correctly?

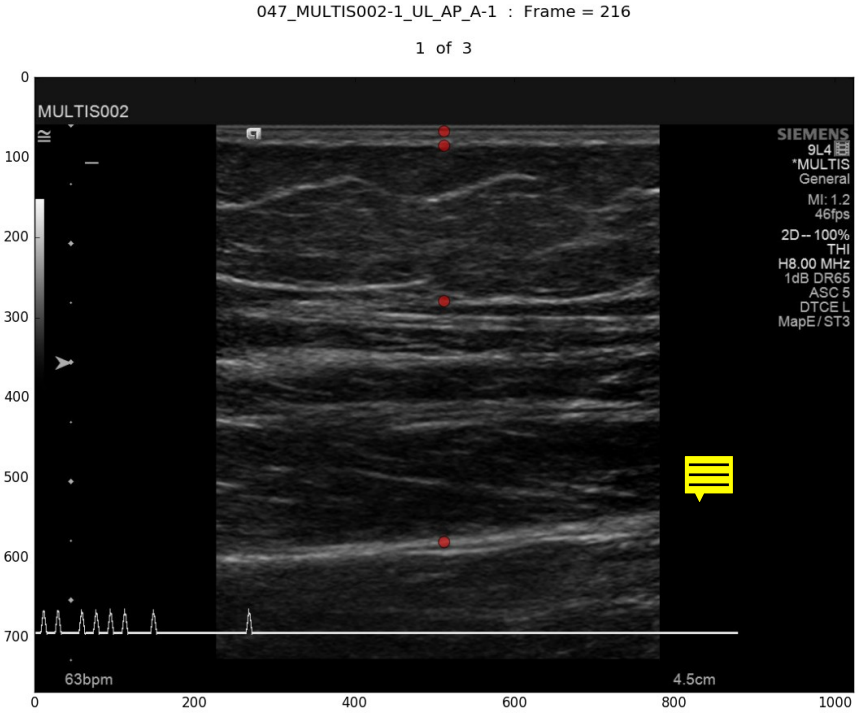
Lower Leg, Anterior Distal



Is the fat/muscle boundary identified correctly?

Upper Leg, Anterior Proximal





Two different patients (left is male, right is female), zoom is much different (7 cm vs. 4.5 cm) are we missing the bone boundary in the right image because the we are zoomed in too far?

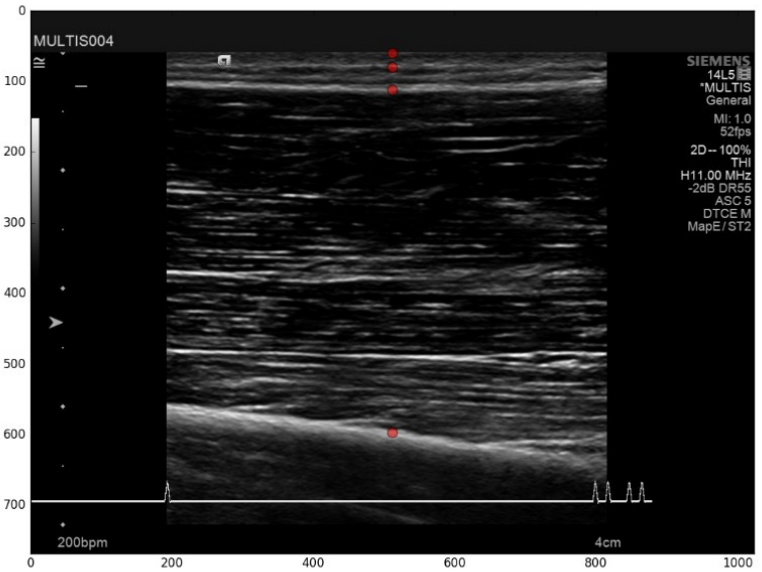
Comparison of the same images by two different people:

Which one is correct? Or neither?

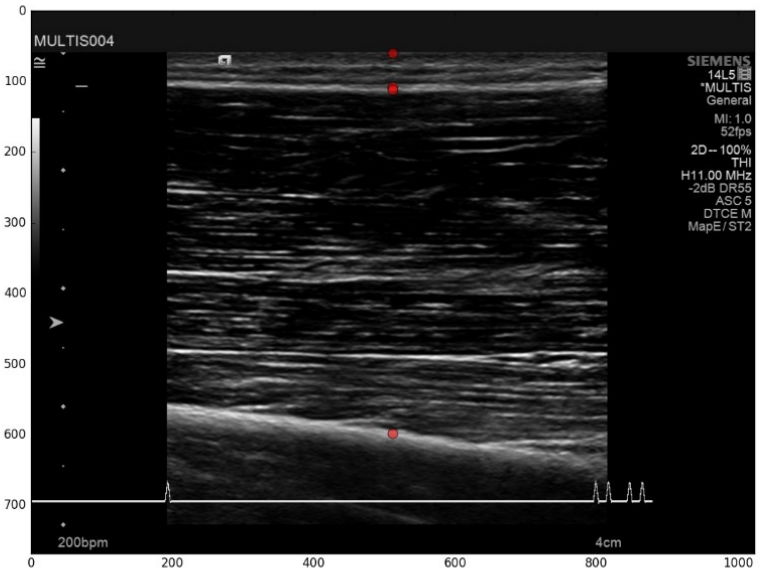
Upper Arm, Anterior Central

Skin

Rici



Ahmet

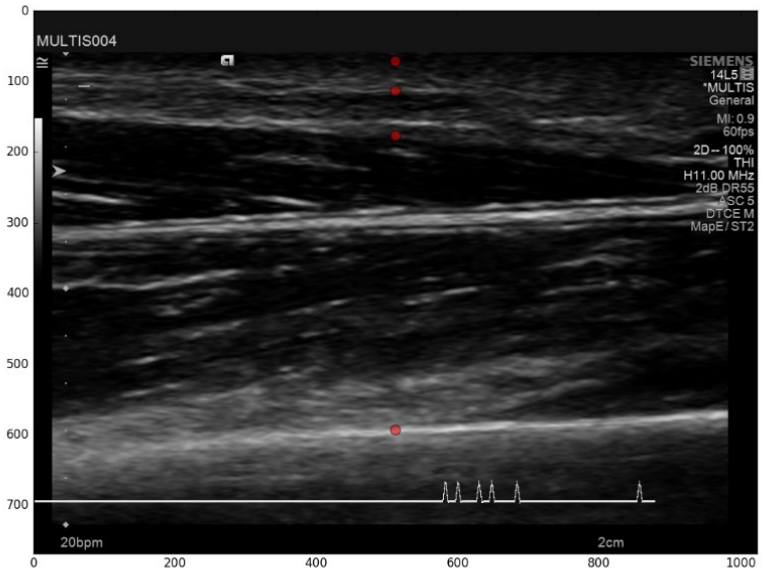


Skin/Fat boundary: Left shows a fat layer, while right has almost no fat layer.

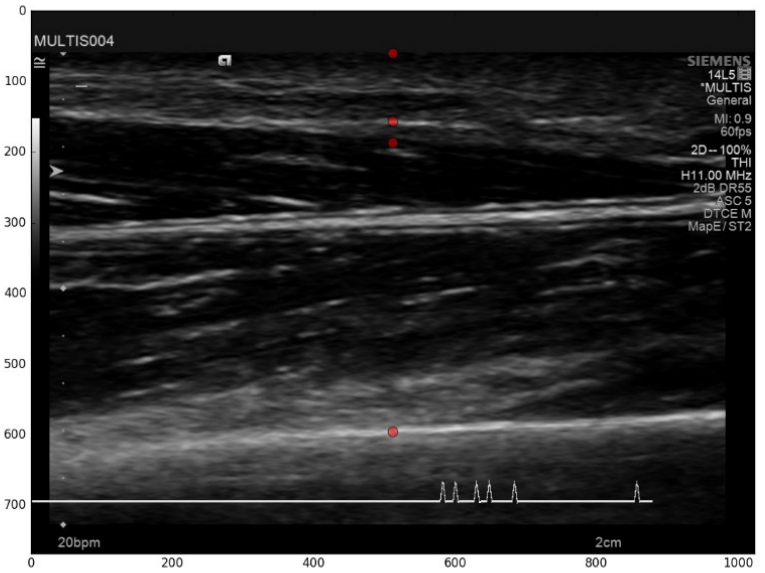
Lower Arm, Anterior Central

Skin

Rici



Ahmet



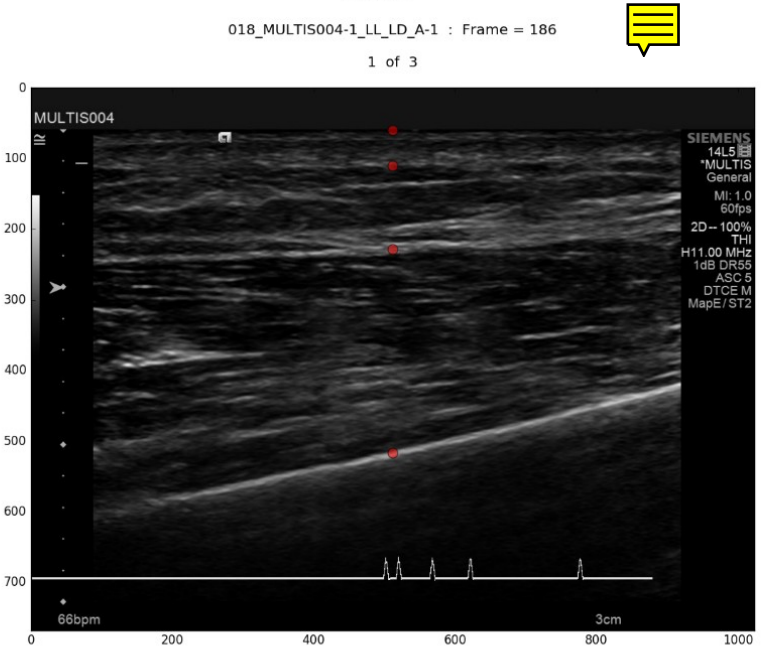
Skin/Fat boundary: Left shows a larger fat layer, while right has smaller fat layer and skin/transducer boundary is closer to top of image.

Lower Leg, Lateral Distal

Fat

Rici

Ahmet

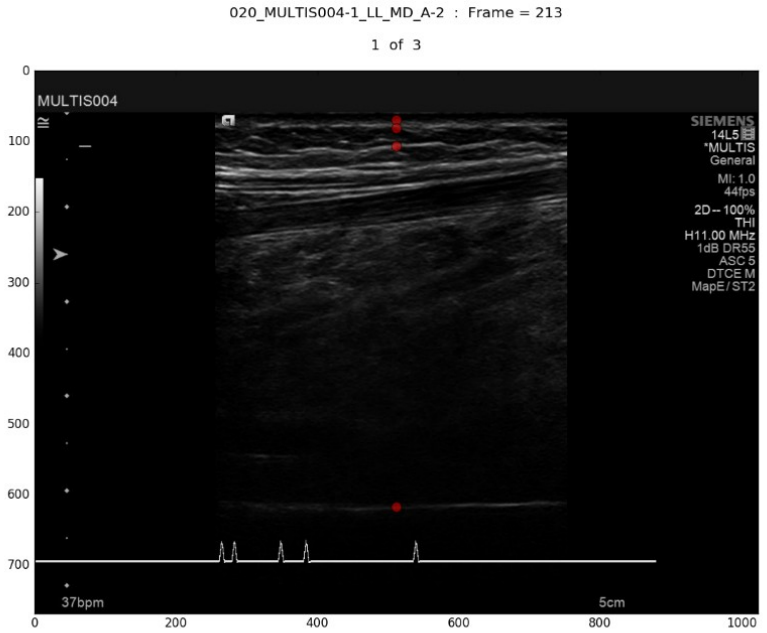


Fat/Muscle boundary: Left shows a smaller fat layer, while right has larger fat layer.

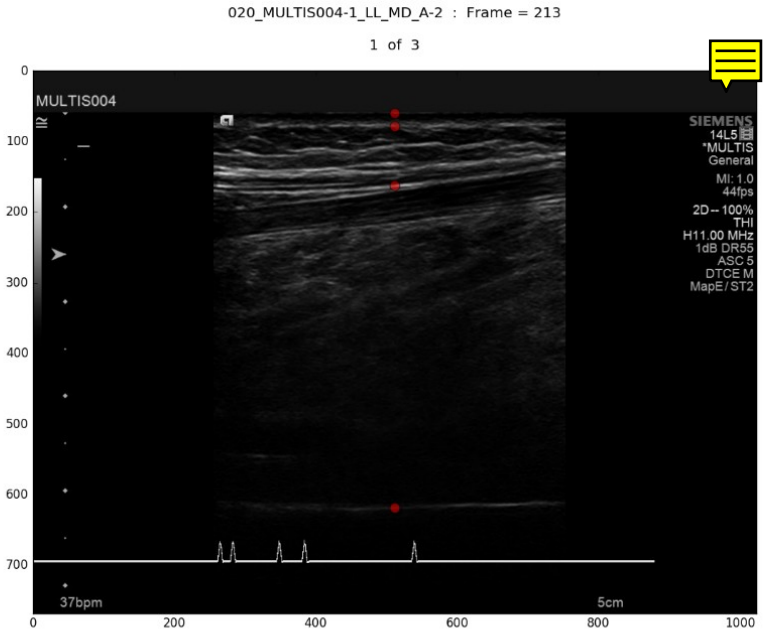
Lower Leg, Medial Distal

Fat

Rici



Ahmet

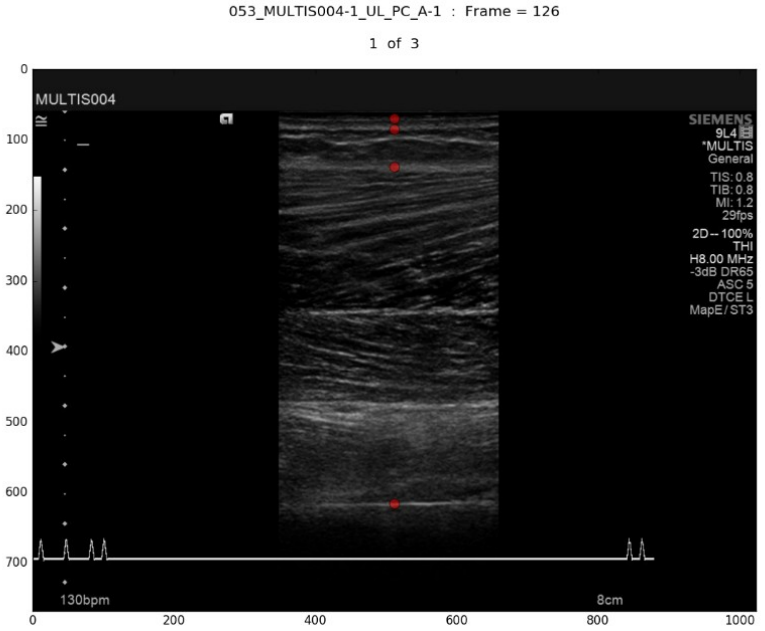


Fat/Muscle boundary: Left shows a smaller fat layer, while right has larger fat layer.

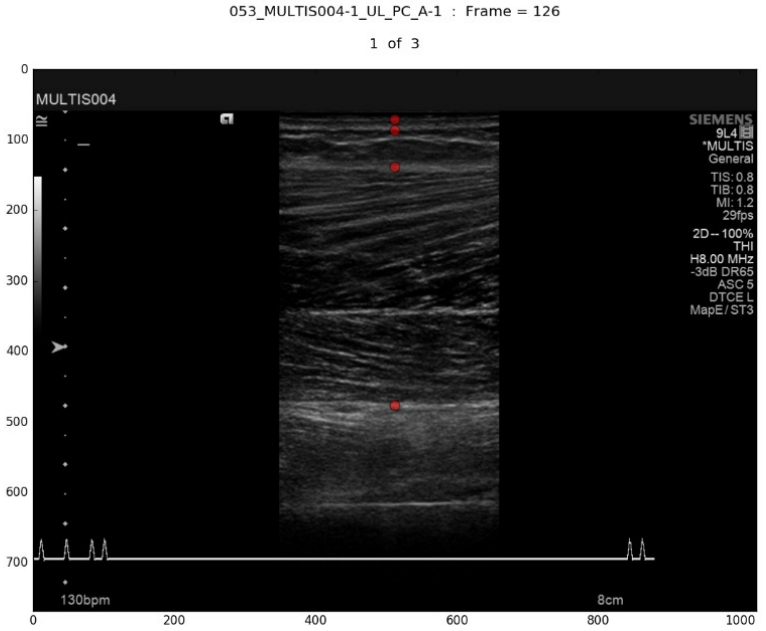
Upper Leg, Posterior Central

Muscle

Rici



Ahmet

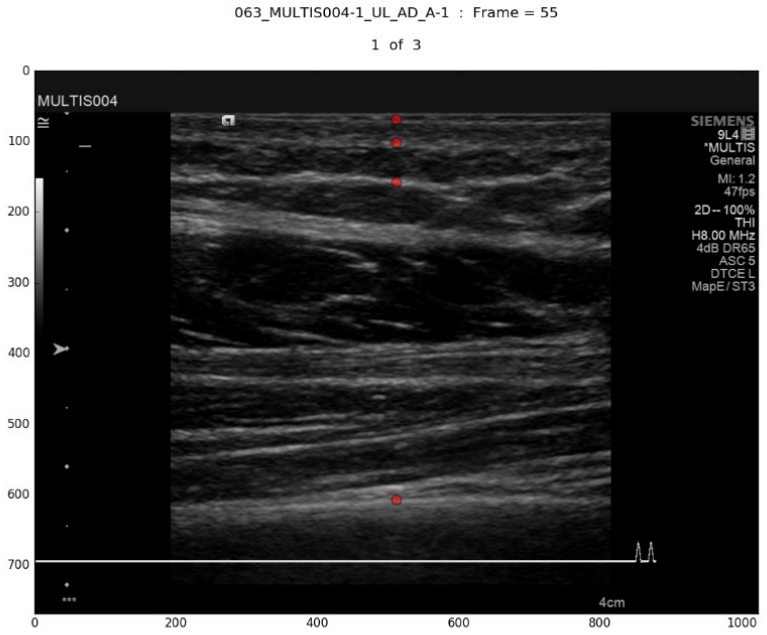


Muscle/Bone boundary: Are we seeing both sides of the bone? Left shows larger muscle layer than right.

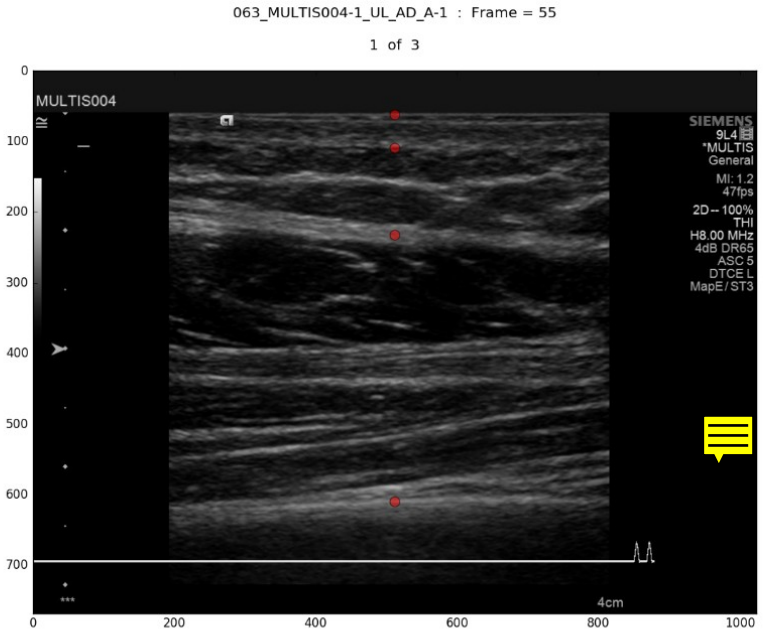
Upper Leg, Anterior Distal

Fat

Rici



Ahmet

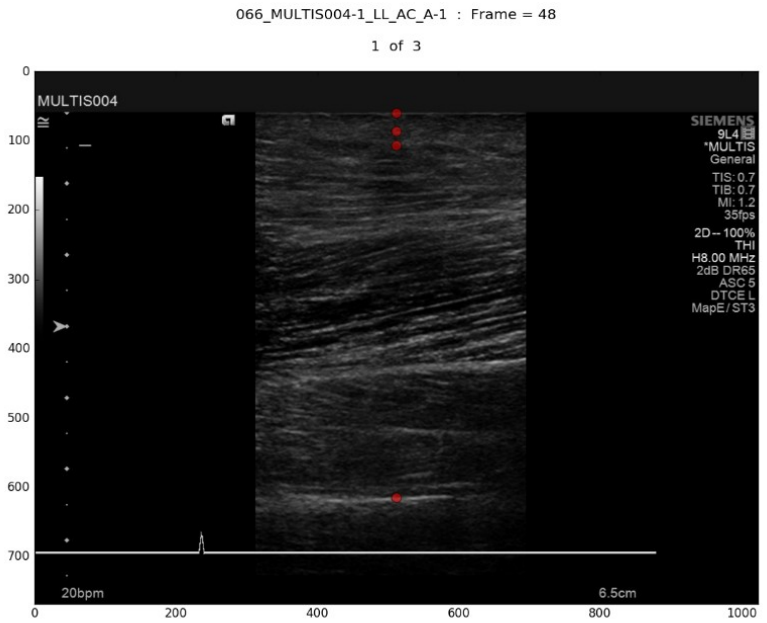


Fat/Muscle boundary: Left shows smaller fat layer than right.

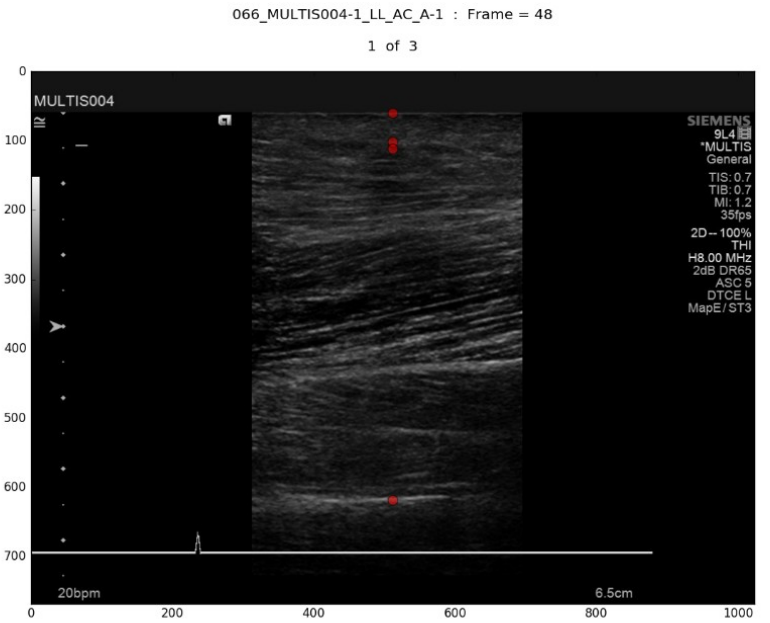
Lower Leg, Anterior Central

Skin

Rici



Ahmet



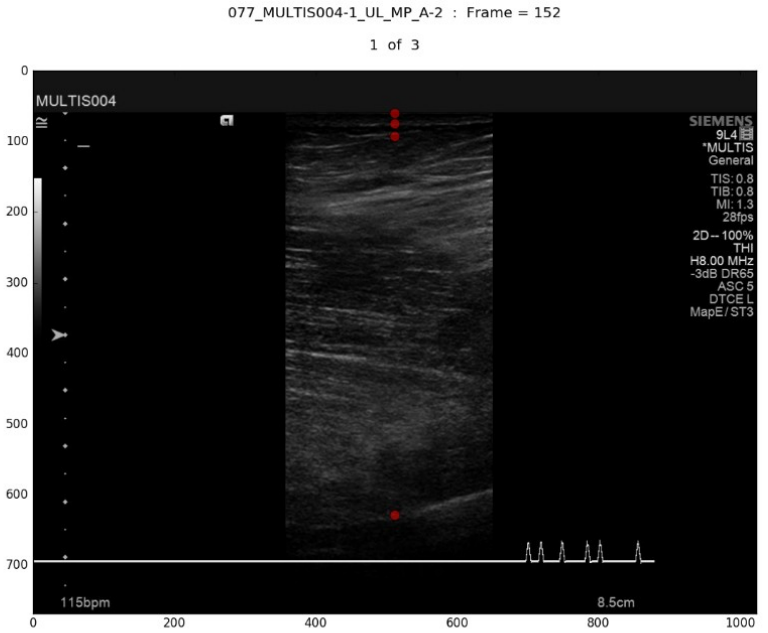
Skin/Fat boundary: Discrepancy of skin/fat boundary.

Upper Leg, Medial Proximal

Fat

Rici

Ahmet

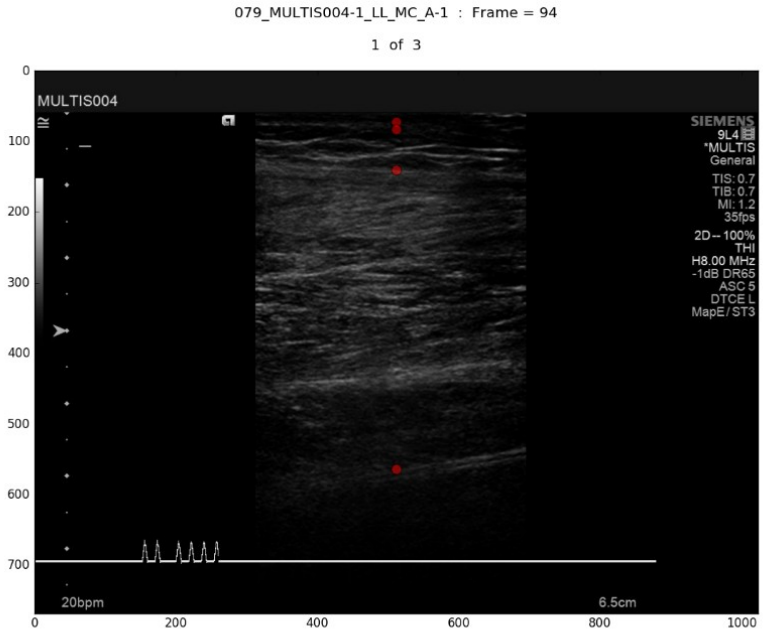


Fat/Muscle boundary: Larger fat layer in the left image.

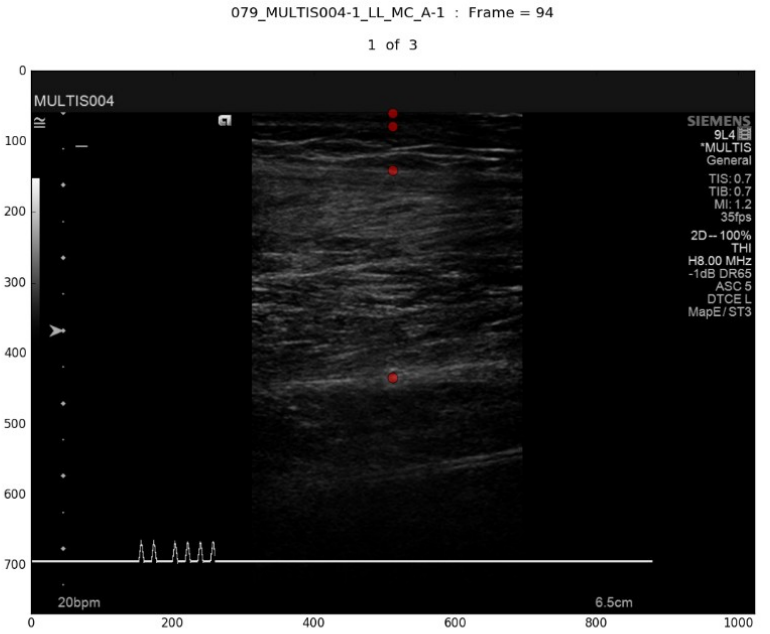
Upper Leg, Medial Central

Muscle

Rici



Ahmet



Muscle/Bone boundary: Seeing both sides of bone? Larger muscle layer on left.