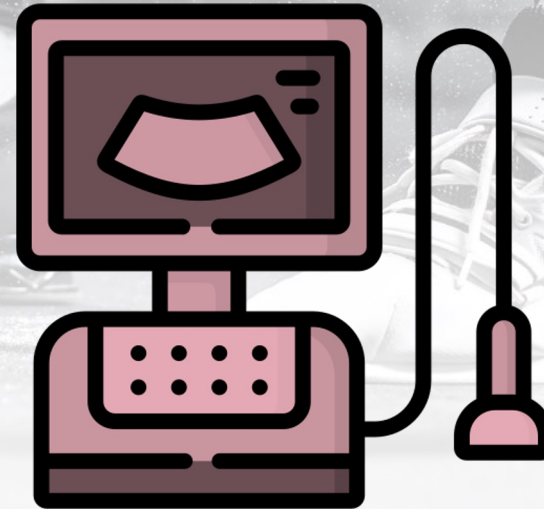


EVALUACIÓN DE LA HIPERTROFIA Y ARQUITECTURA MUSCULAR CON DISPOSITIVOS ECOGUIADOS

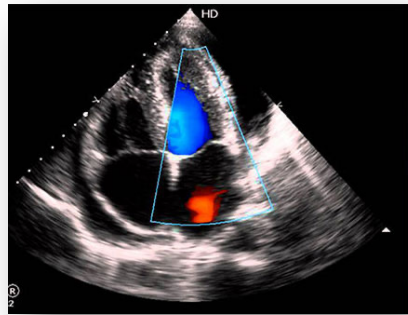


Alejandro Hernández
Eduardo Cimadevilla

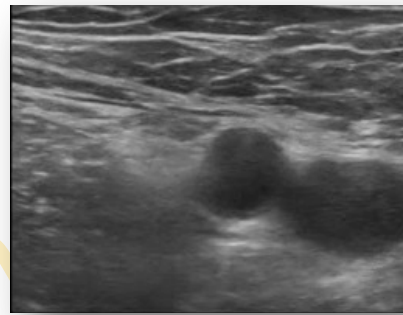


APLICACIONES PRÁCTICAS

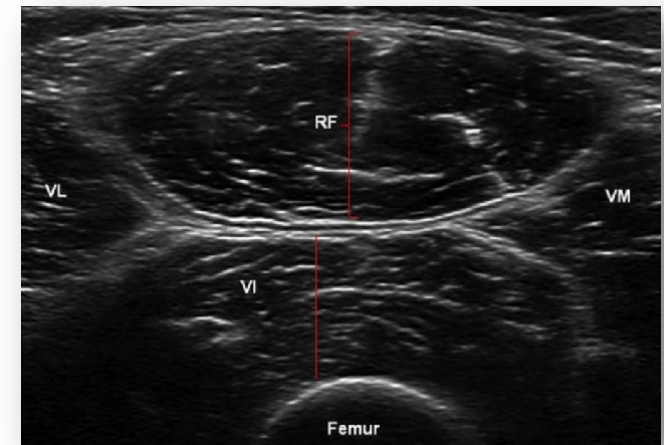
Órganos



Nervios y vasos sanguíneos



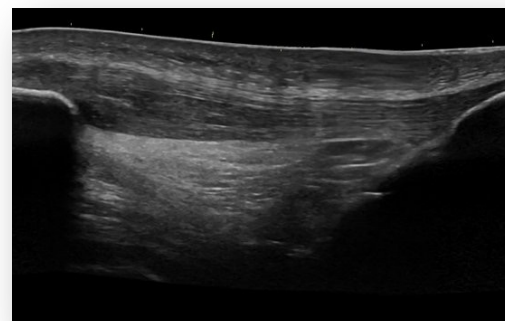
Músculos



Huesos



Ligamentos y tendones

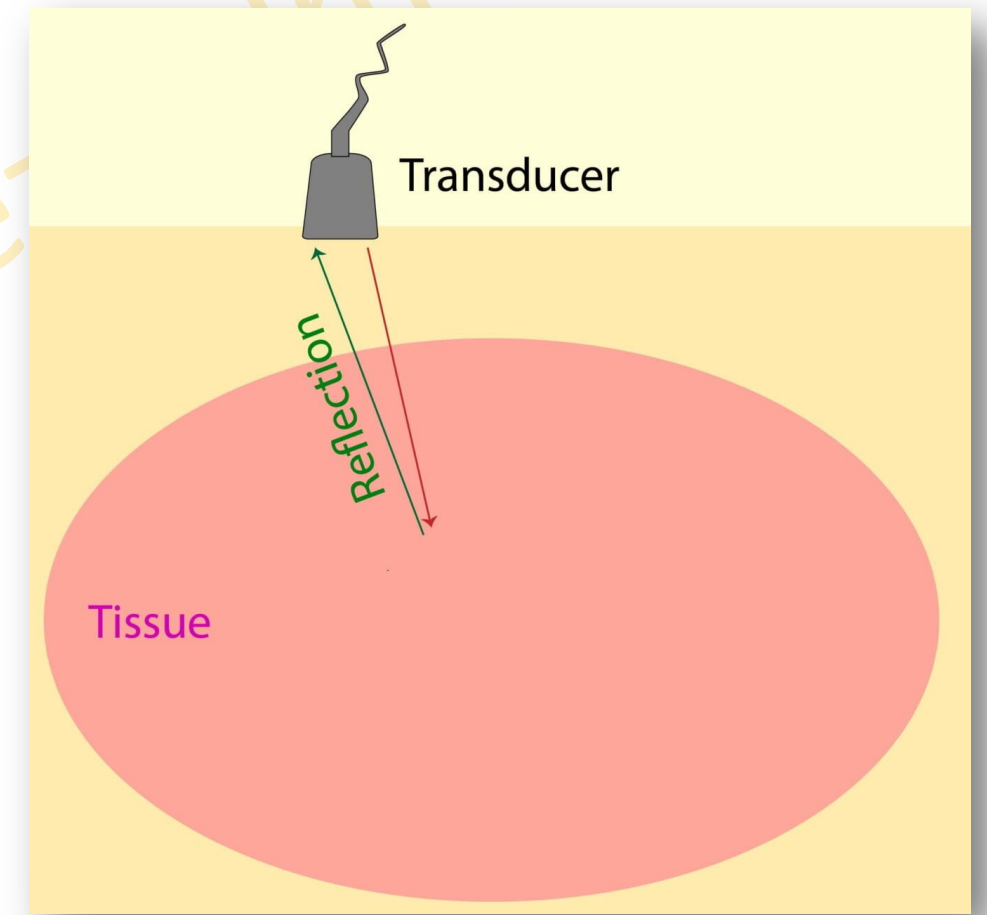
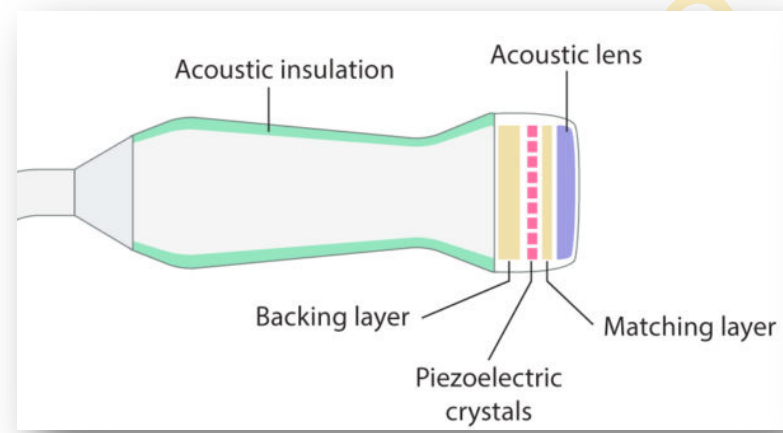


Aleja...
Hern...

Belmonte

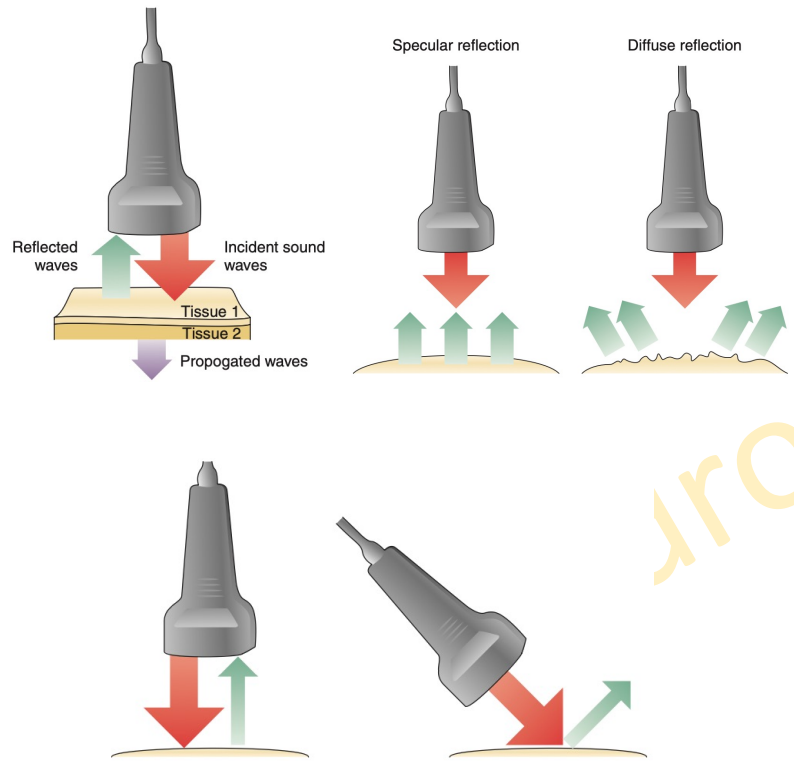
BASES DE LA ECOGRAFÍA

sound waves with frequencies above 20,000 Hz

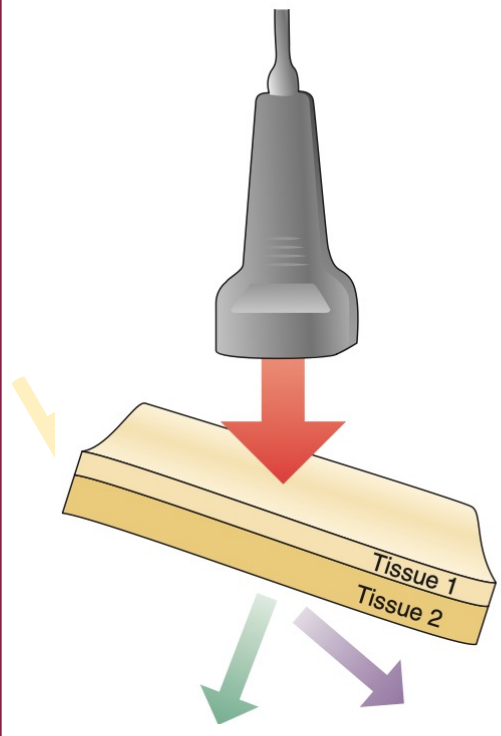


REFLEJO, REFRACCIÓN, DISPERSIÓN, ABSORCIÓN

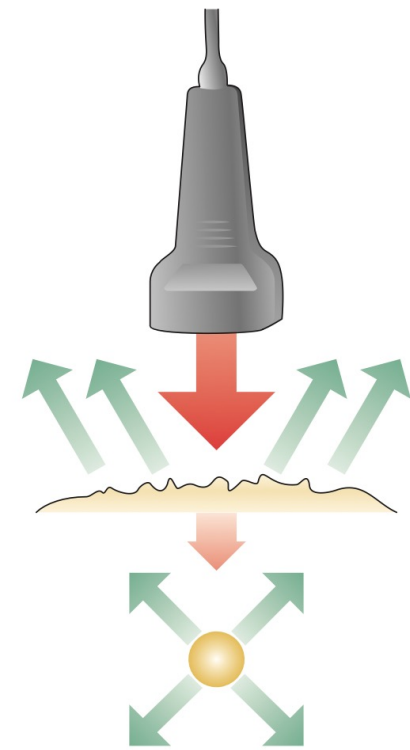
REFLEJO



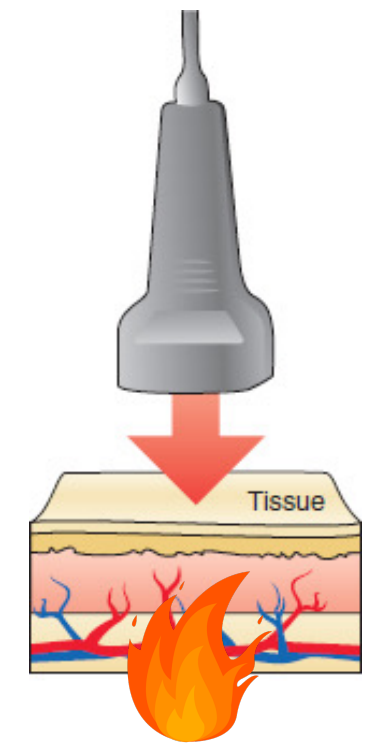
REFRACCIÓN



DISPERSIÓN



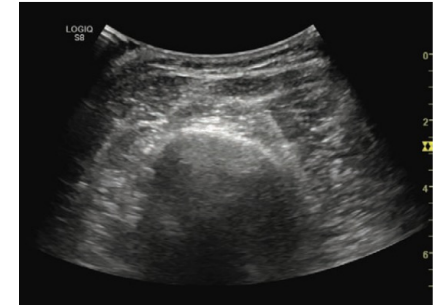
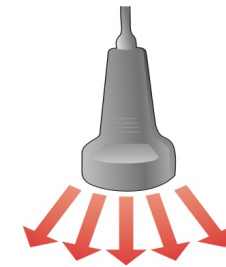
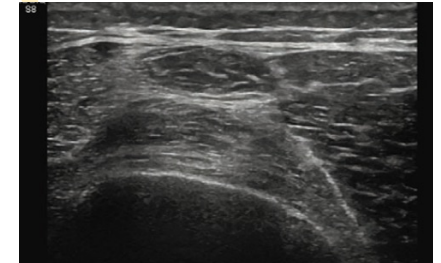
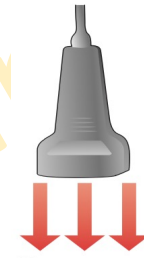
ABSORCIÓN



ASPECTOS A TENER EN CUENTA: SONDA

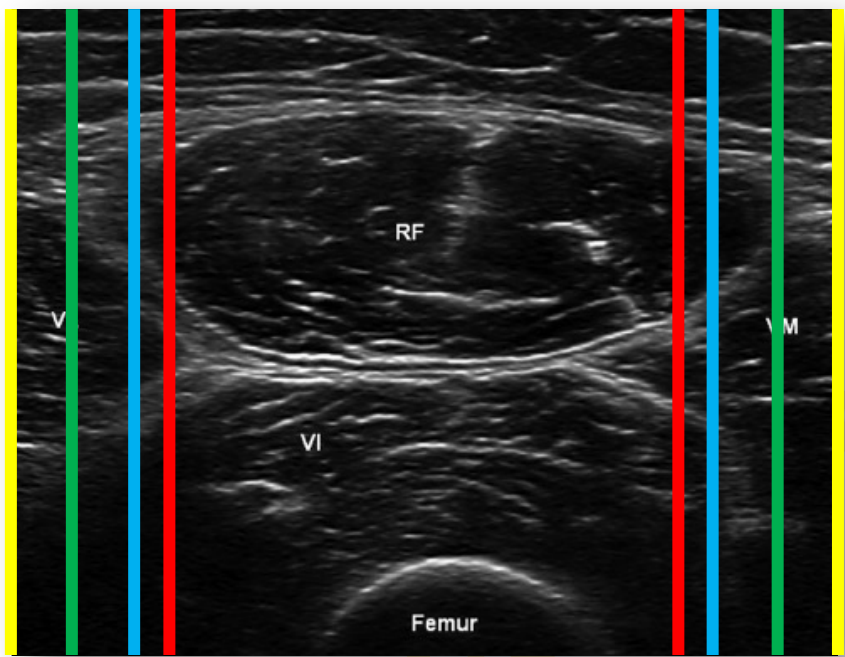


- Componente más importante
- Recibe las ondas y las convierte en impulsos eléctricos
- Determina la resolución de la imagen
- Sondas lineales: Altas frecuencias / tejidos superficiales
- Sondas curvilíneas: Bajas frecuencias / tejidos profundos
- Campo de visión (footprint)

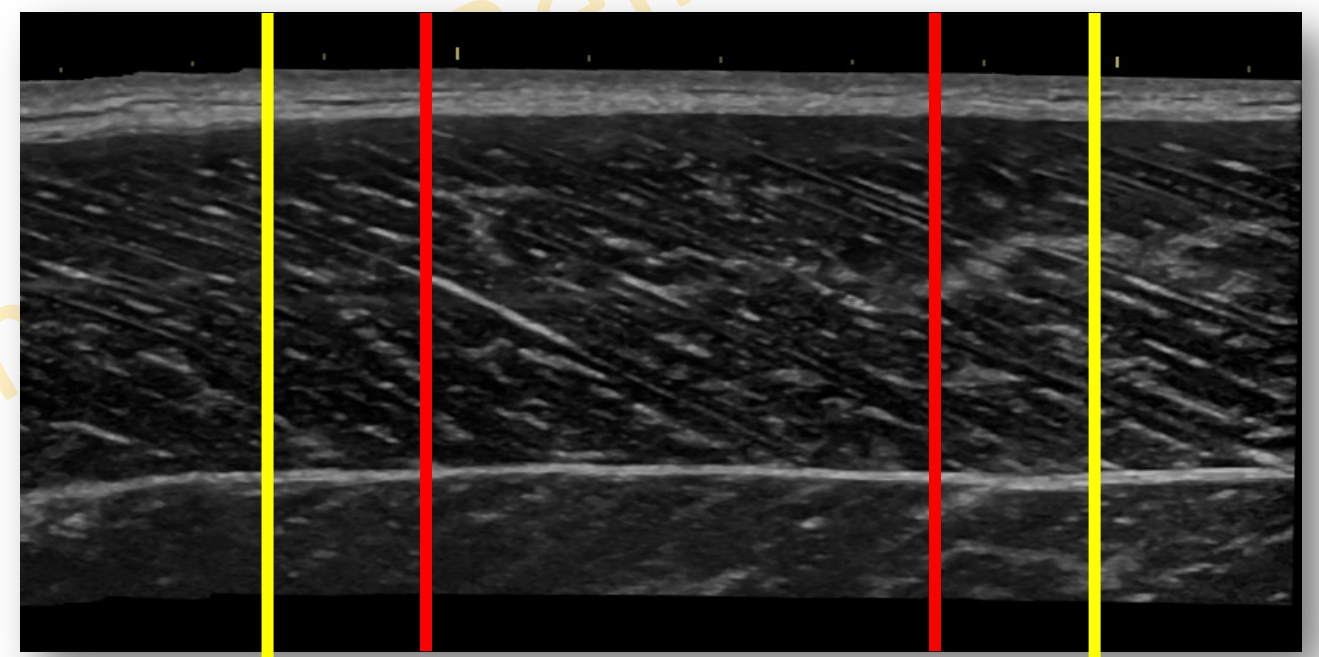


ASPECTOS A TENER EN CUENTA: SONDAS

Campo de visión (footprint)

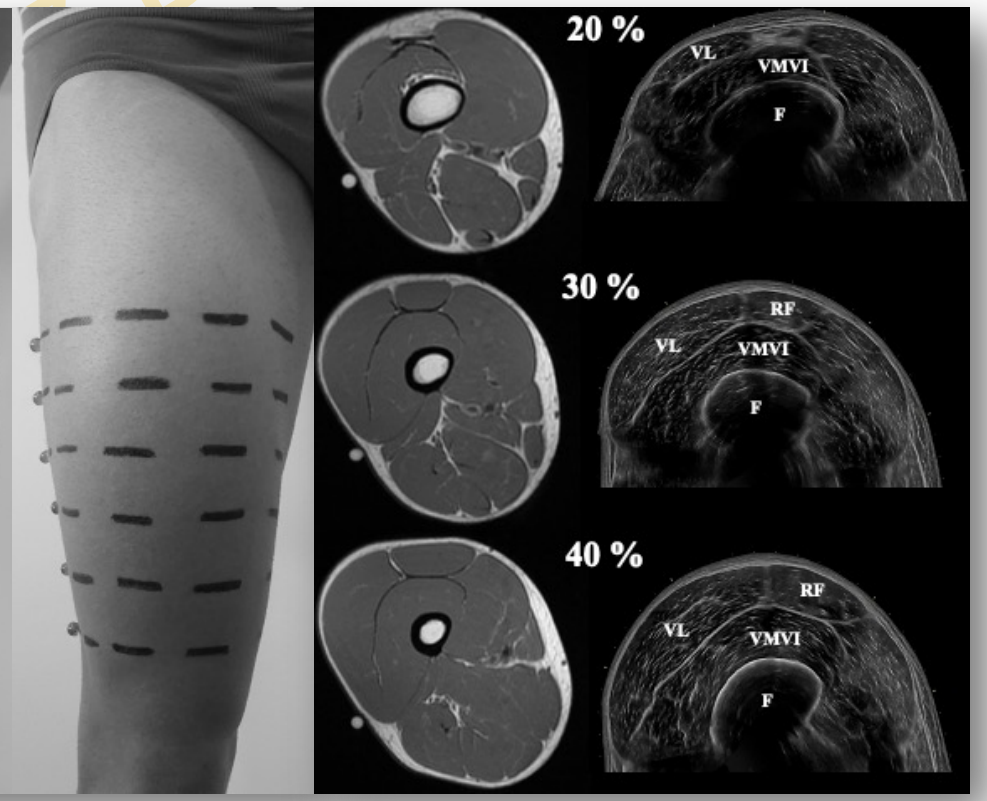
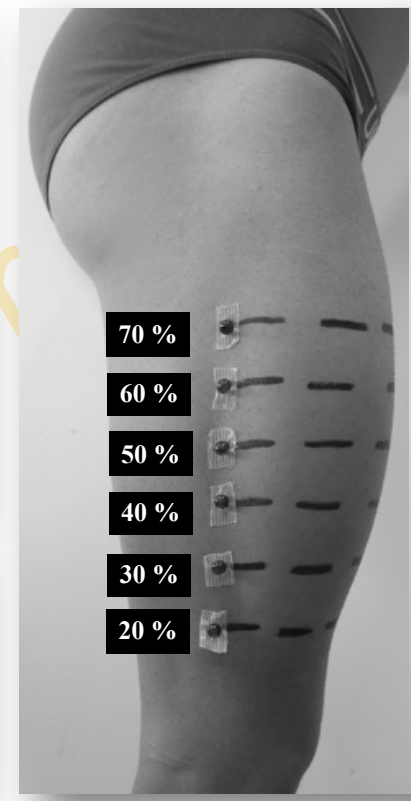
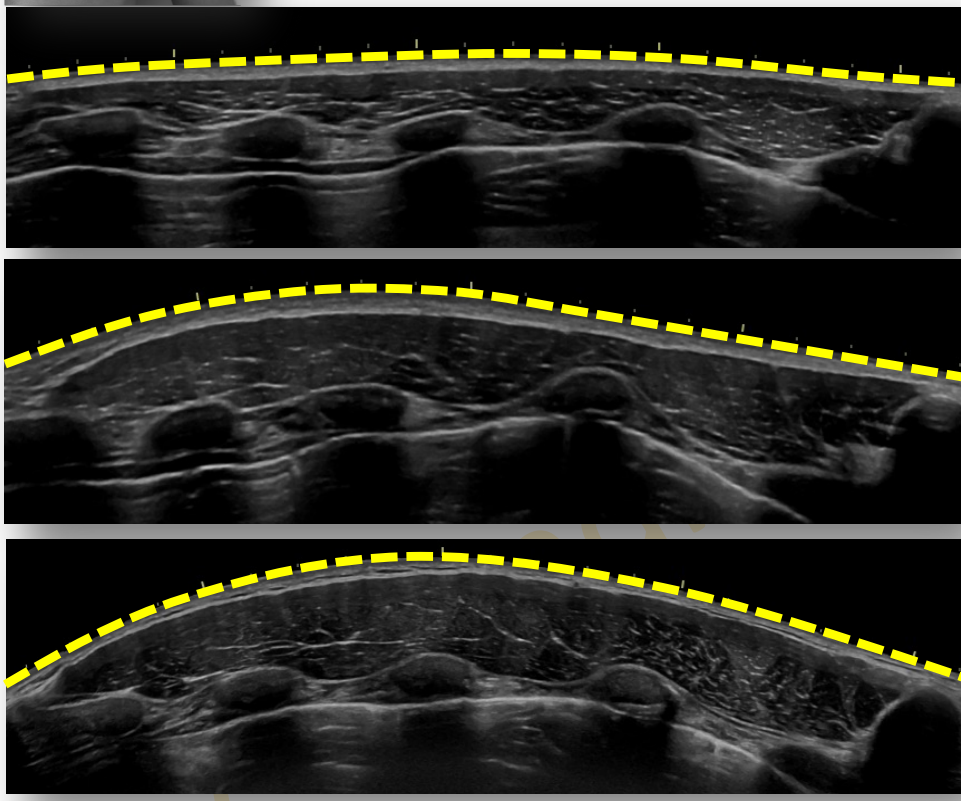
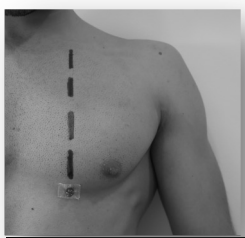


5.0 cm	4.5 cm
4.0 cm	3.8 cm



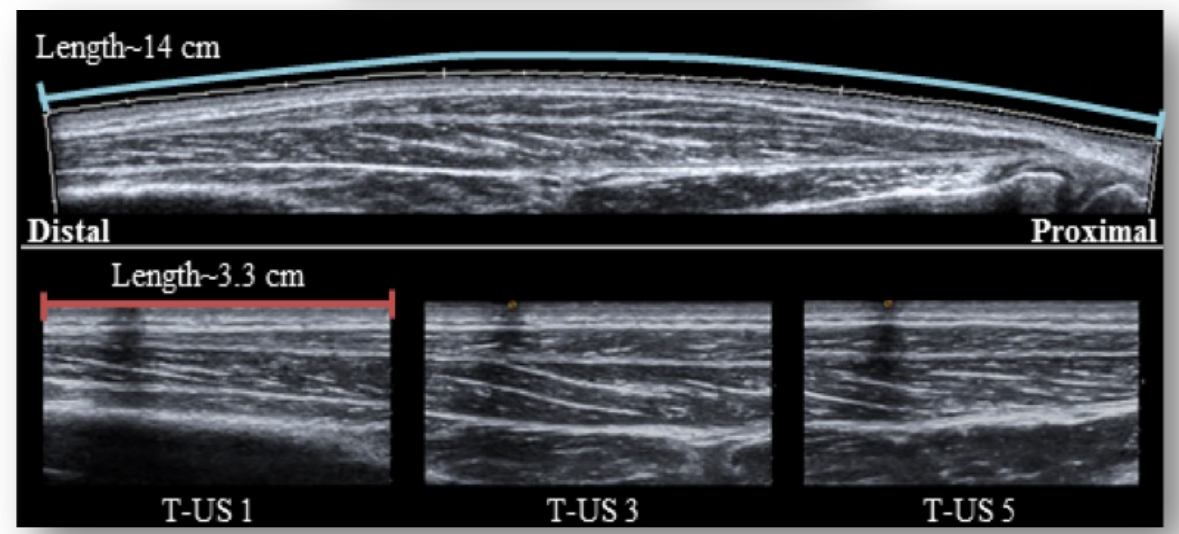
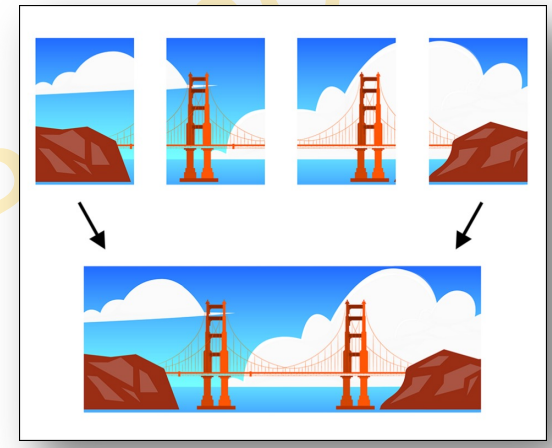
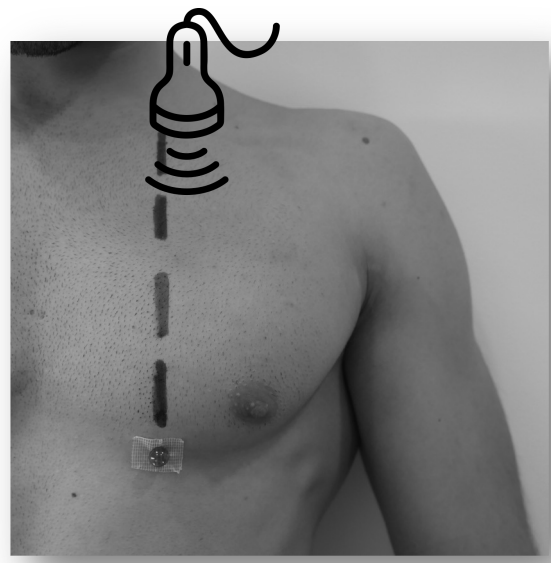
ASPECTOS A TENER EN CUENTA: SONDAS

Campo de visión (footprint)



ASPECTOS A TENER EN CUENTA: PANORÁMICA

Extended field of view



Alejandro

ASPECTOS A TENER EN CUENTA: ADQUISICIÓN

PLANO

Sin desviaciones del plano principal



VELOCIDAD

Controlada y constante



INCLINACIÓN

Perpendicular a la superficie objetivo



PRESIÓN

Mínima presión necesaria



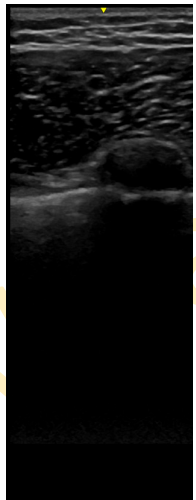
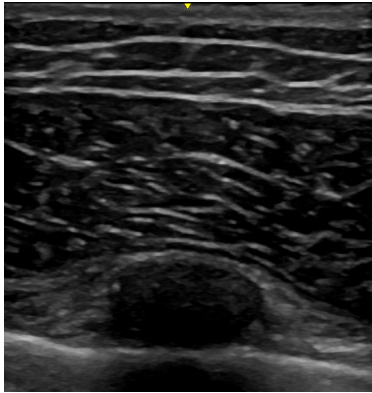
REFERENCIAS ANATÓMICAS

Inicio y final de la adquisición

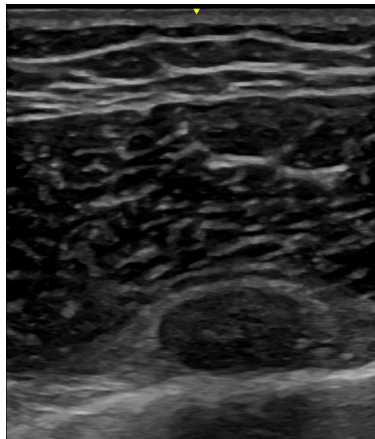
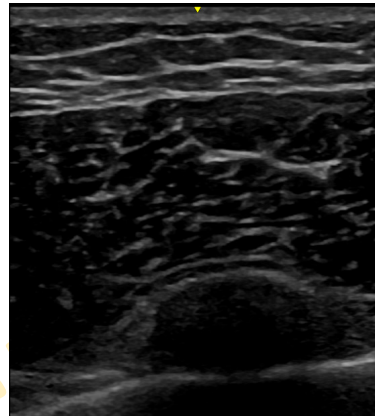


ASPECTOS A TENER EN CUENTA: PARÁMETROS

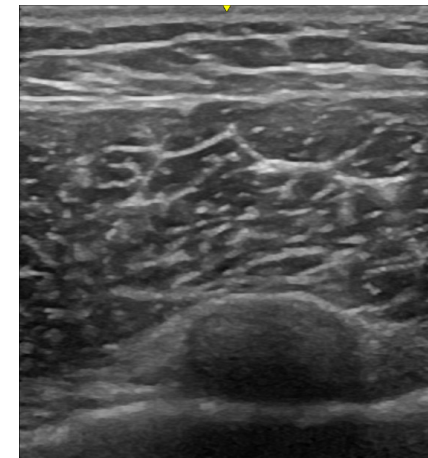
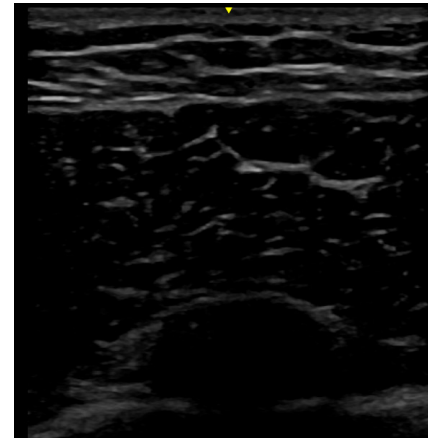
PROFUNDIDAD



FRECUENCIA



GANANCIA

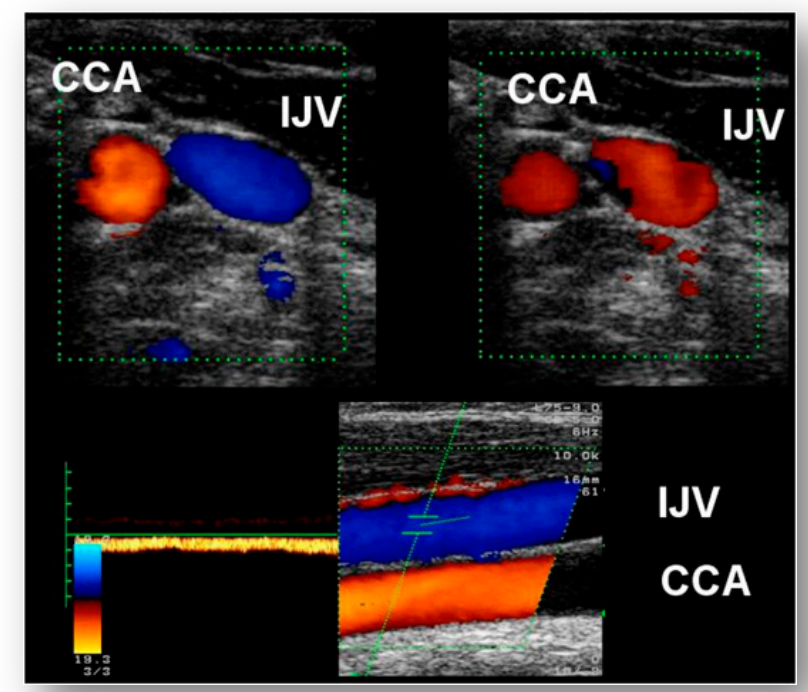
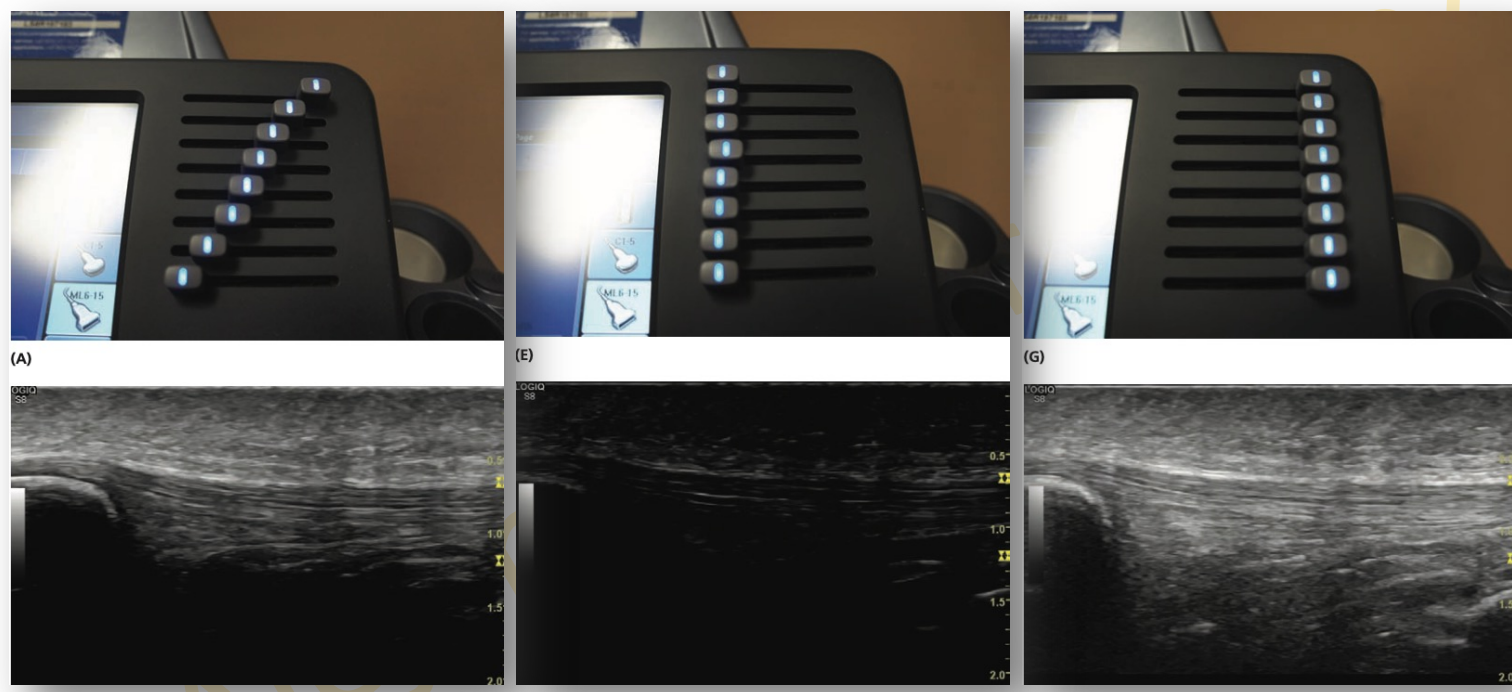


Andrés Belmonte

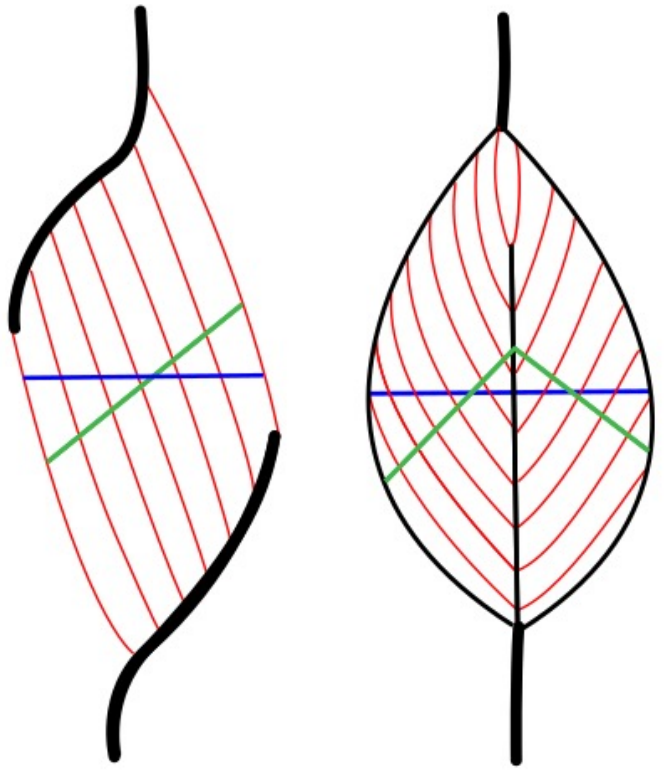
ASPECTOS A TENER EN CUENTA: PARÁMETROS

COMPENSACIÓN DE GANANCIA

DOPPLER



ASPECTOS A TENER EN CUENTA: ANÁLISIS CSA

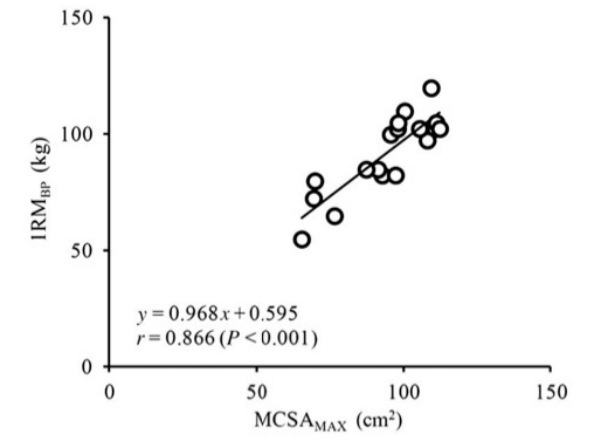


ACSA

PCSA

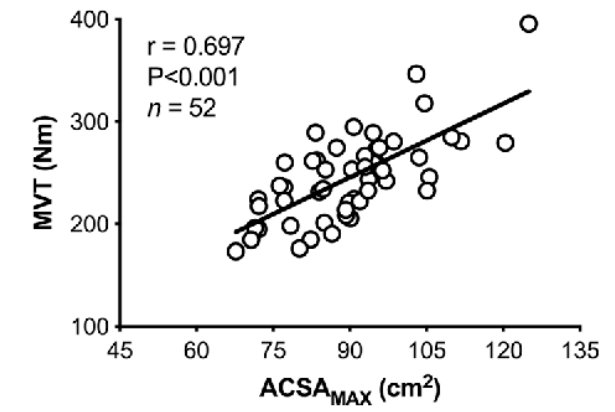
Relationship of pectoralis major muscle size with bench press and bench throw performances

Ryota Akagi¹, Yukihiro Tohdoh, Kuniaki Hirayama, Yuji Kobayashi



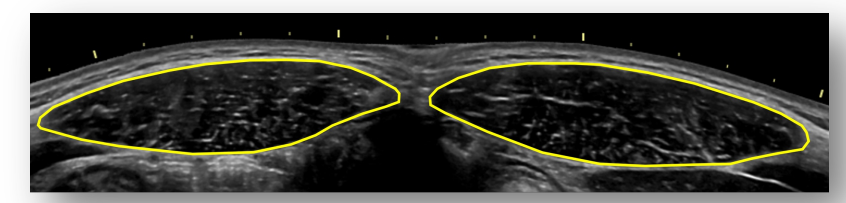
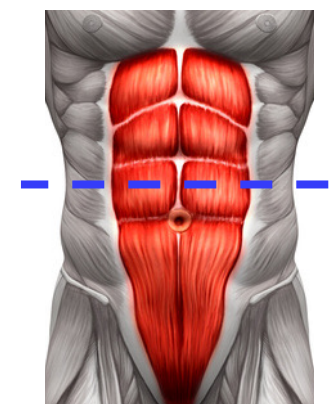
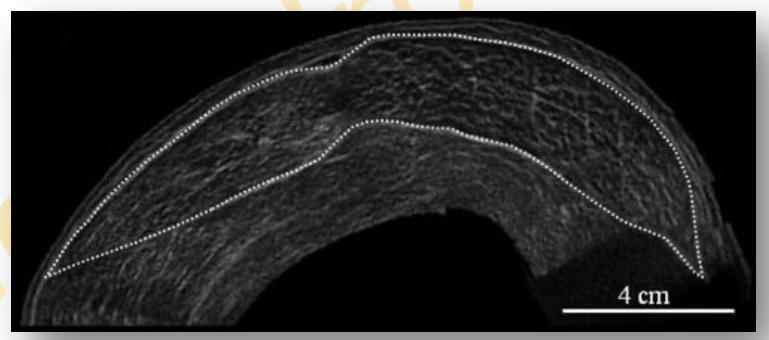
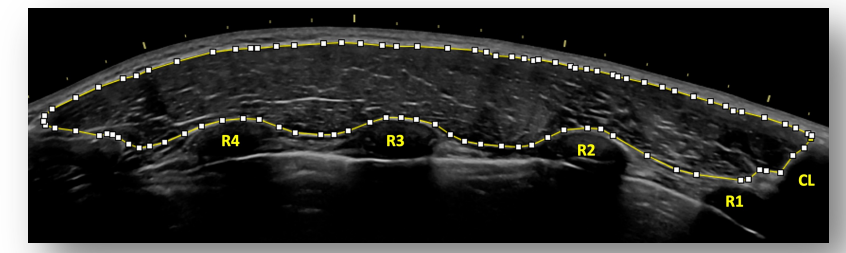
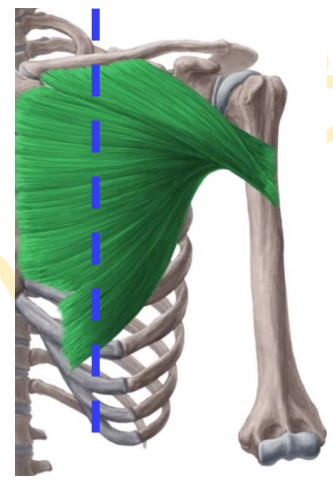
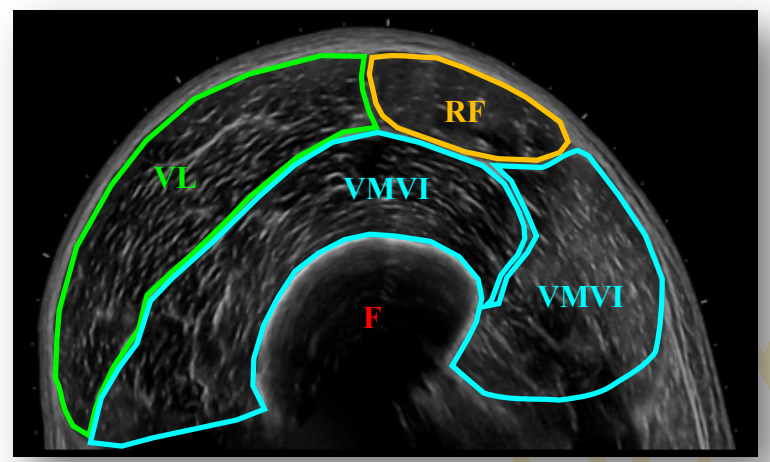
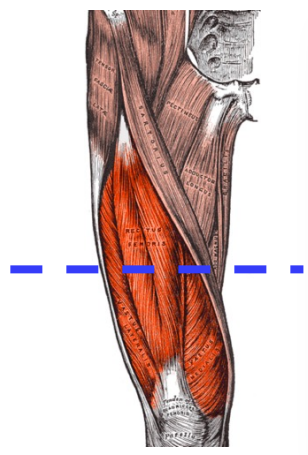
The Human Muscle Size and Strength Relationship: Effects of Architecture, Muscle Force, and Measurement Location

Thomas G Balshaw, Thomas M Maden-Wilkinson, Garry J Massey, Jonathan P Folland

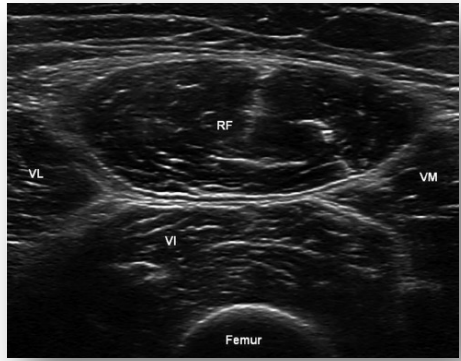


ASPECTOS A TENER EN CUENTA: ANÁLISIS ACSA

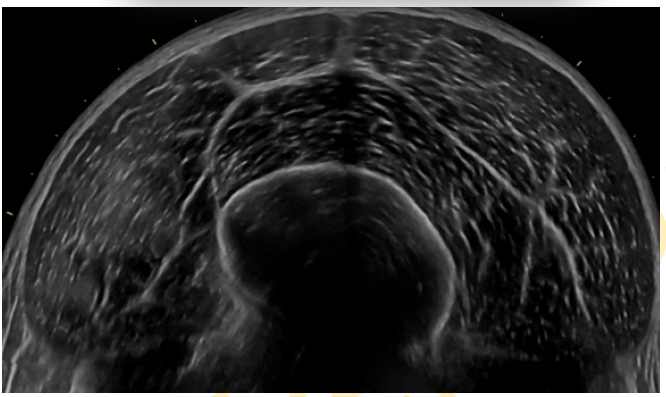
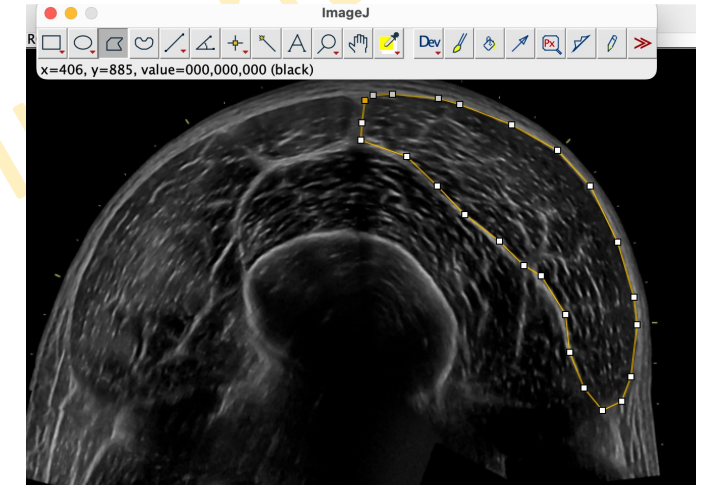
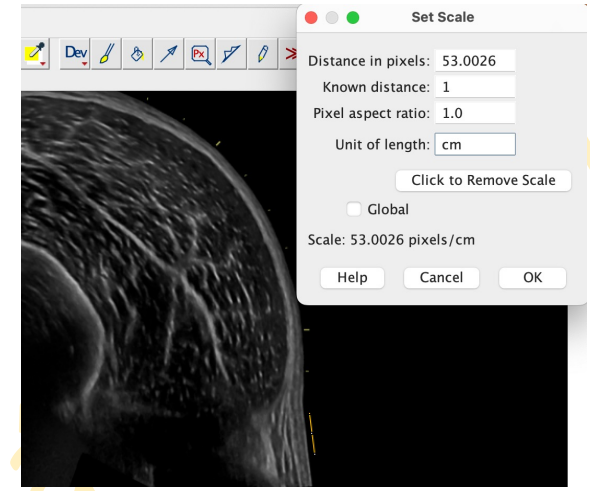
Corte perpendicular al eje (origen-inserción) del músculo



ASPECTOS A TENER EN CUENTA: ANÁLISIS ACSA



Análisis manual

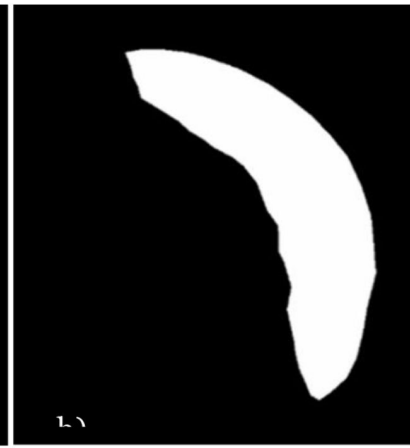
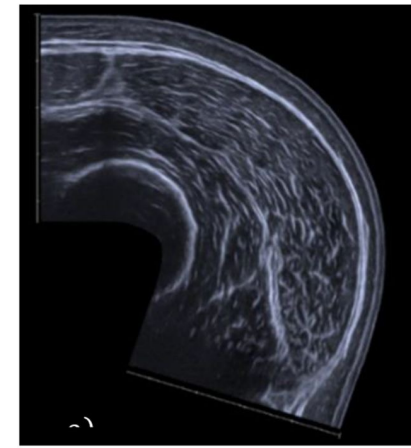


Análisis automático

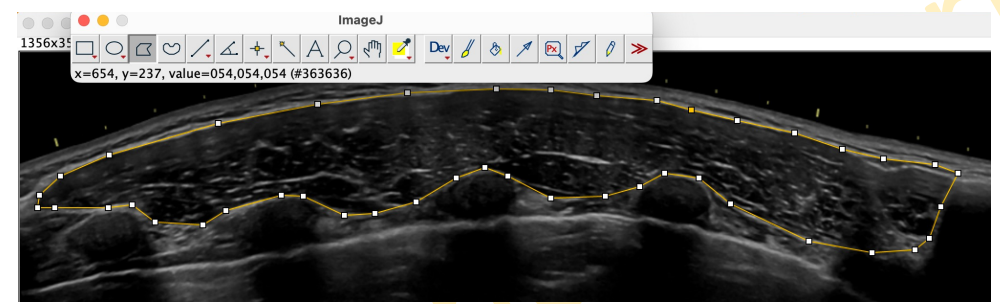
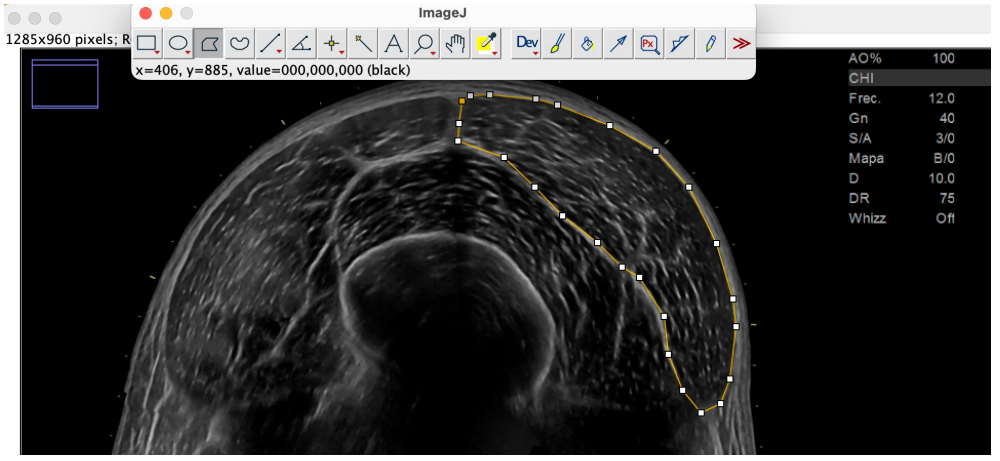


DeepACSA: Automatic Segmentation of Cross-Sectional Area in Ultrasound Images of Lower Limb Muscles Using Deep Learning

RITSCHÉ, PAUL; WIRTH, PHILIPP; CRONIN, NEIL J.; SARTO, FABIO; NARICI, MARCO V.; FAUDE, OLIVER; FRANCHI, MARTINO V.



ASPECTOS A TENER EN CUENTA: ANÁLISIS ACSA



Results				
	Area	Mean	Min	Max
1	29.096	29.573	0	186

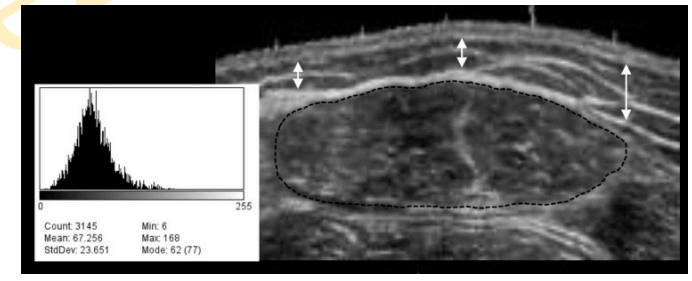
ACSA ECOINTENSIDAD

ECOINTENSIDAD

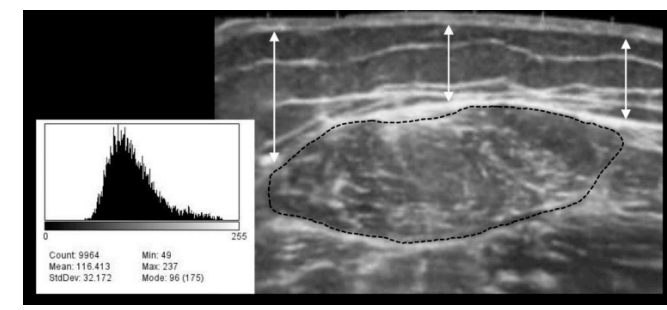
“Calidad” muscular

Echo intensity as an indicator of skeletal muscle quality: applications, methodology, and future directions

Matt S Stock ^{1 2}, Brennan J Thompson ^{3 4}



↓ ECO = ↓ Tejido no contráctil = ↑ Calidad muscular

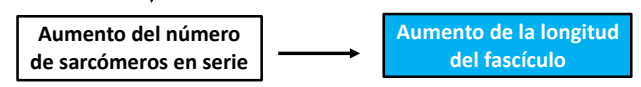
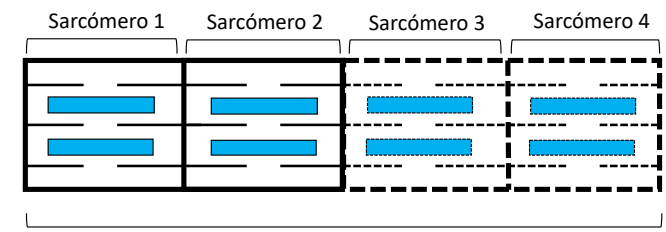
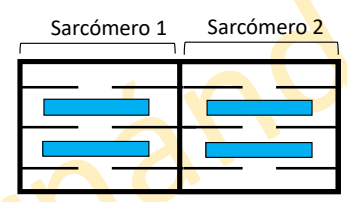
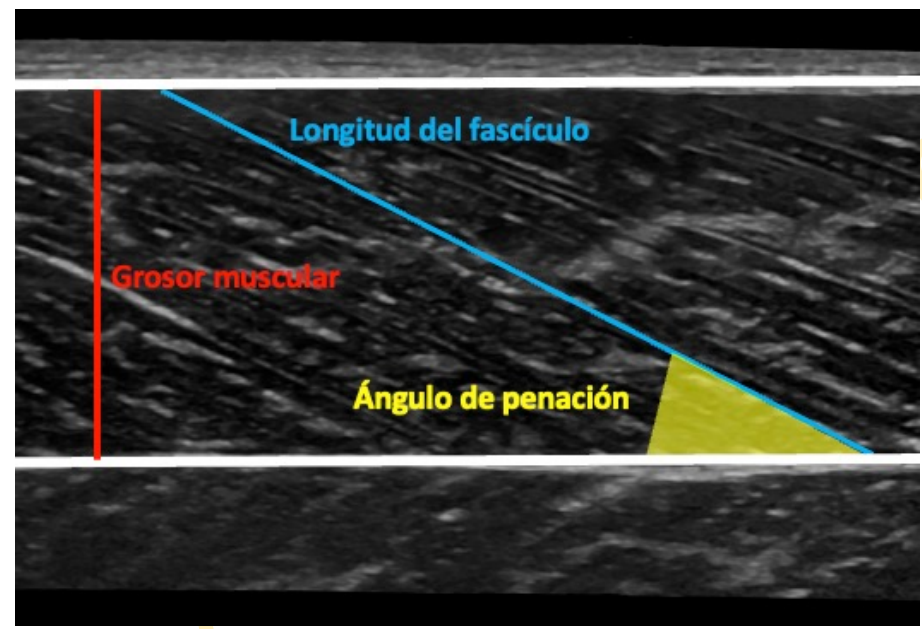
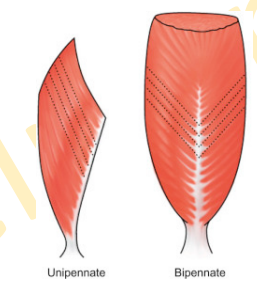


↑ ECO = ↑ Tejido no contráctil = ↓ Calidad muscular

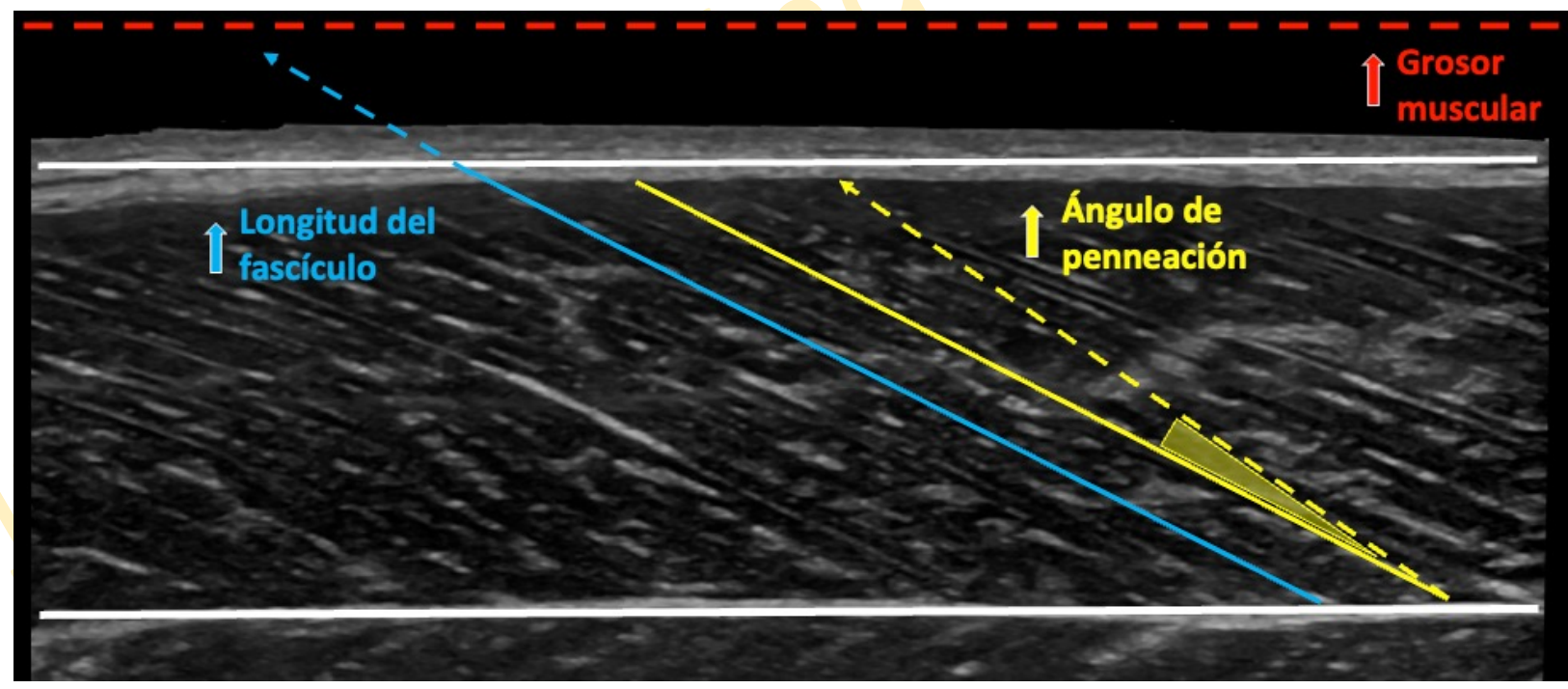
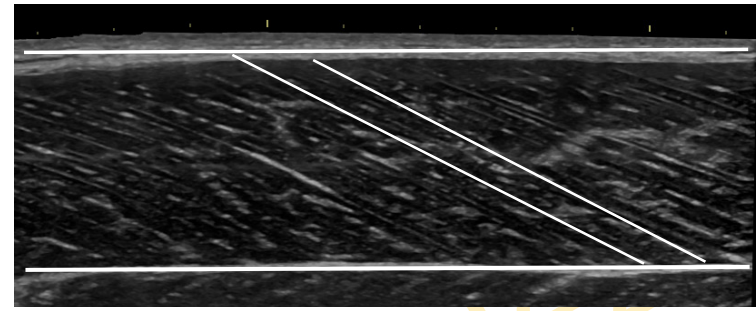
ASPECTOS A TENER EN CUENTA: ANÁLISIS ARQUITECTURA

Muscle architecture in relation to function

C Gans¹, A S Gaunt

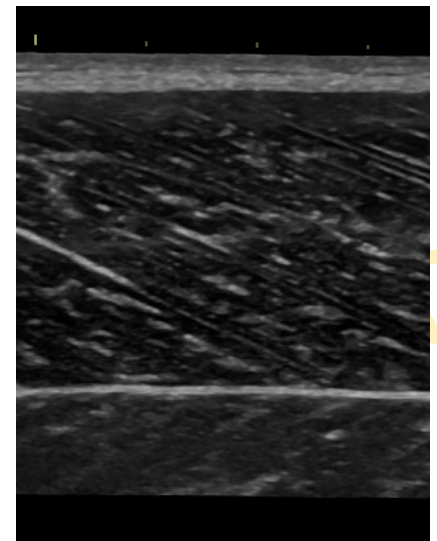
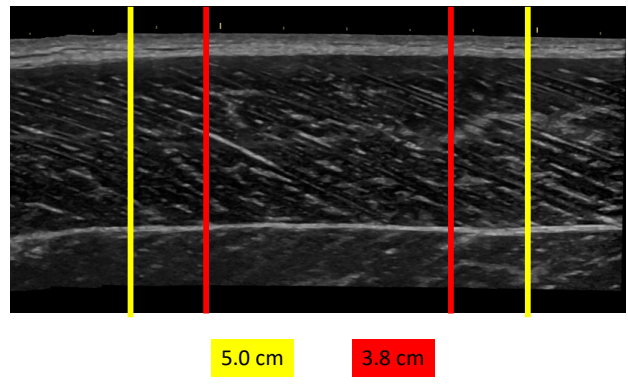


ASPECTOS A TENER EN CUENTA: ANÁLISIS ARQUITECTURA



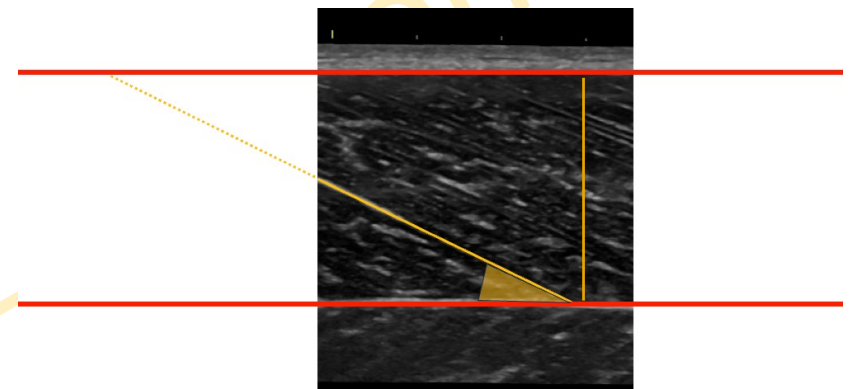
Alejandro Belmonte

ASPECTOS A TENER EN CUENTA: ANÁLISIS ARQUITECTURA

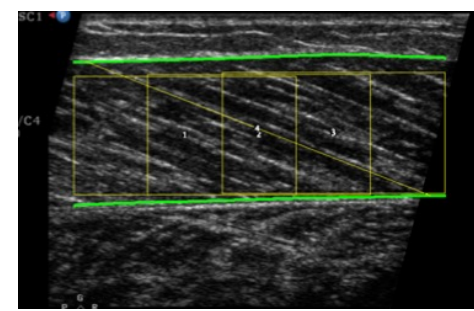


Extrapolación lineal

Análisis manual



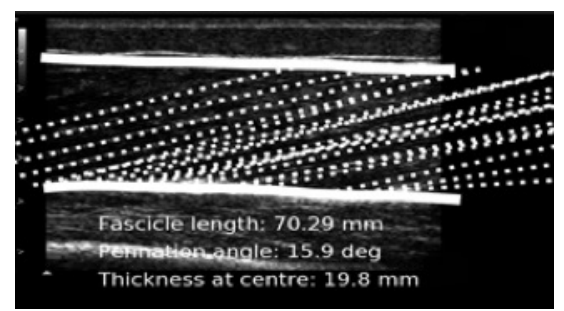
Simple Muscle Architecture Analysis



Simple Muscle Architecture Analysis (SMA): An ImageJ macro tool to automate measurements in B-mode ultrasound scans
Olivier R Seynnes¹, Neil J Cronin²

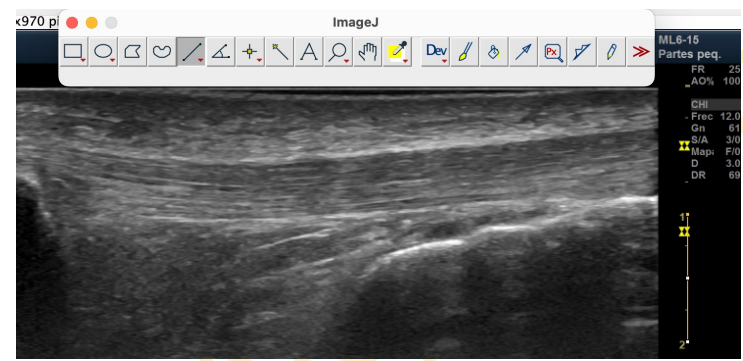
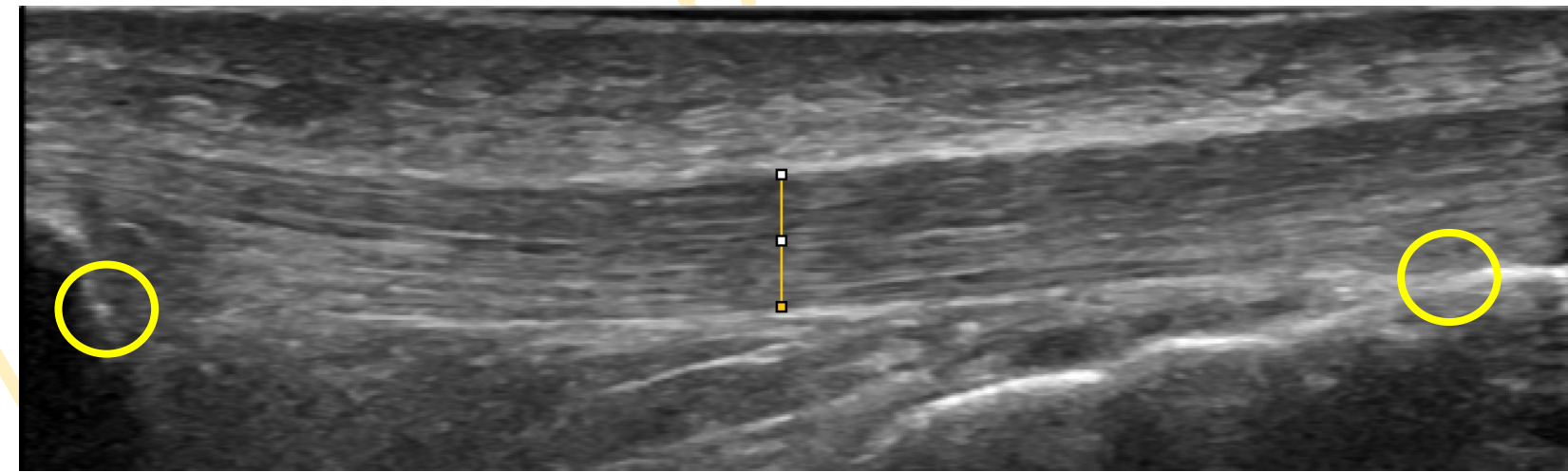


DL_Track



DL_Track_US: a python package to analyse muscle ultrasonography images
Paul Ritsche^{1*}, Olivier Seynnes², and Neil Cronin^{3,4}

ASPECTOS A TENER EN CUENTA: ANÁLISIS TENDÓN



Results						
	Area	Mean	Min	Max	Angle	Length
1	0.002	82.712	47	117.418	-88.958	0.423

ASPECTOS A TENER EN CUENTA: ANÁLISIS

ÁREA DE SECCIÓN TRANSVERSAL (ACSA)

Media de los resultados obtenidos en 2 adquisiciones analizadas 1 vez.

ECOINTENSIDAD

Media de los resultados obtenidos en 2 adquisiciones analizadas 1 vez.

CUIDADO CON GANANCIA DE LA IMAGEN

ARQUITECTURA MUSCULAR

Media de los resultados obtenidos en 2 fascículos de la misma adquisición.

Análisis de una 3^a adquisición si $CV \geq 5.0\%$

Análisis de un 3^{er} fascículo si $CV \geq 5.0\%$