

Frank Finach

Sports Medicine Ultrasound

Welcome to the MSK Ultrasound Guided Injection Course

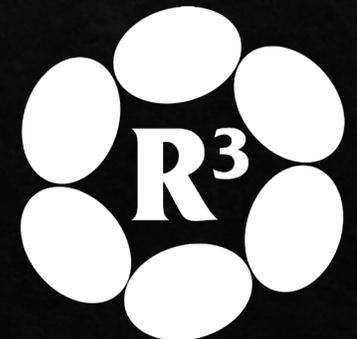


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Ultrasound Basics

MSK Ultrasound. The following anatomical positions are important

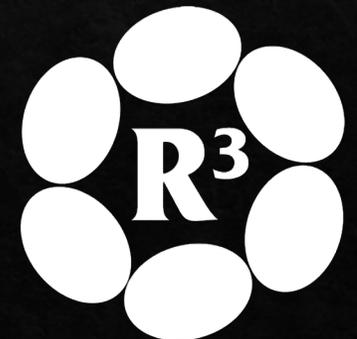
- ◆ Viewing the Left side of the screen. Proximal and Lateral.
- ◆ Viewing the Right side of the screen. Medial and Distal.
- ◆ Two Views: Longitudinal and Transverse
- ◆ Anterior to Posterior
- ◆ Medial to lateral



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Advantages

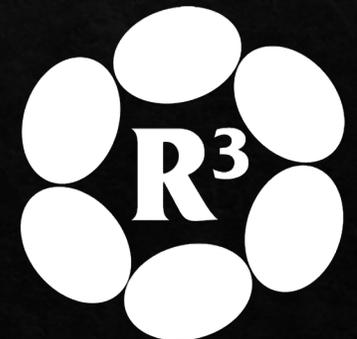
- ◇ Images muscle, tendons, ligaments, nerves and bone
- ◇ Provides Dynamic live images
- ◇ No long term side effects
- ◇ Portable and inexpensive
- ◇ High resolution with high frequency probes (1mm cuts)
- ◇ Not affected by metal like MRI



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Disadvantages

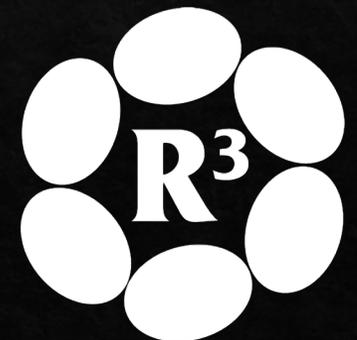
- ◇ Cannot see thru bone, due to density
- ◇ Relatively limited depth of penetration. Cannot view the ACL
- ◇ Operator dependent learning curve
- ◇ No scout image as seen with MRI or CT



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Basic Ultrasound Concepts

- ◆ High resolution probes (10-18 MHz) – Better resolution, less penetration.
- ◆ Lower frequency probes (2-5 MHz) – Lesser resolution, deeper penetration.



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How does ultrasound work?

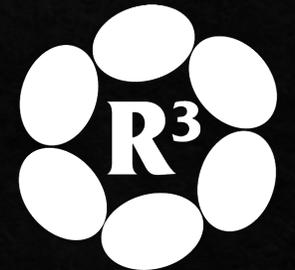
The U/S wave is partially reflected when it hits a density change

The amount of reflection depends on the density of the object

Large density = Larger reflection = Hyperechoic, which is bright white

Low density = small reflection = Hypoechoic, which is greyer in color

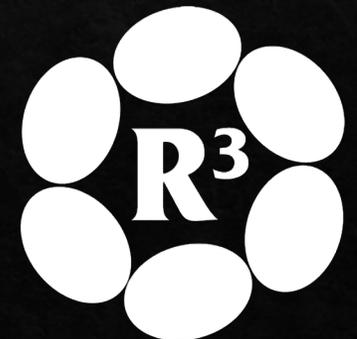
No density = (fluid) is black



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Probe: piezoelectric crystals

- ◇ Electricity converts to vibrations
- ◇ Sound Waves reflect at interfaces
- ◇ Crystal receives an echo > an image



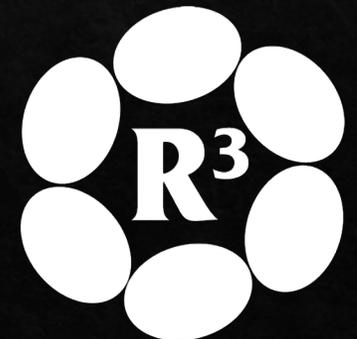
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Anisotropy

- ◆ If the probe is not held with the surface parallel to the tendon or bone, U/S reflection is not back towards the probe and the tendon appears falsely hypoechoic.
- ◆ The Hypoechoic appearance is eliminated with proper transducer alignment.
- ◆ It may simulate pathology
- ◆ Two Views: Longitudinal, (long axis) and Transverse, (short axis)

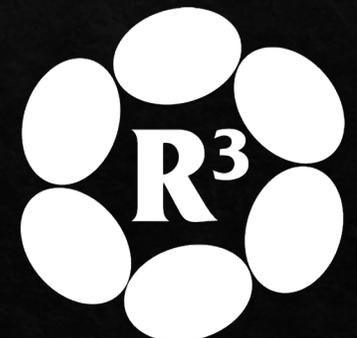


Linear probe



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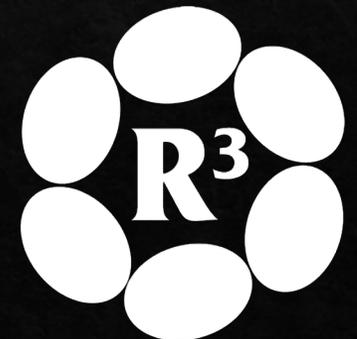
Curved Probe



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Scanning Basics

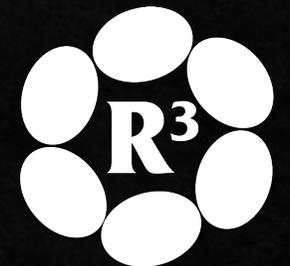
- ◇ Select the appropriate transducer
- ◇ Coupling Gel: transducer makes contact to the skin
- ◇ Stabilize the transducer
- ◇ Anchor the hand & transducer comfortably
- ◇ Move the focus button on the screen to the proper level of anatomy



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Image Appearance

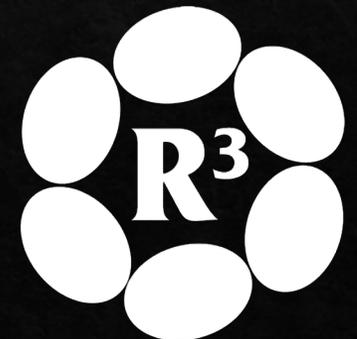
- ◆ Near Field of the screen, located at the top level, skin layer (dermis)
- ◆ Far Field of the screen, located at the bottom level, deeper structures
- ◆ Bone: Cortical bone is hyperechoic, bright white, cannot view cancellous bone
- ◆ Tendon: Hyperechoic, bright fibrillar pattern, like hairs on a paint brush
- ◆ Ligament: Hyperechoic, very compact fibrillar pattern
- ◆ Muscle: Starry night appearance in 1st view, 2nd view, like a piece of marbled meat
- ◆ Nerve: Speckled, Honeycomb looking. Fascicular pattern of fascicles are present
- ◆ Fluid, Blood Vessels are Anechoic. Dark appearance in view



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Scanning Technique

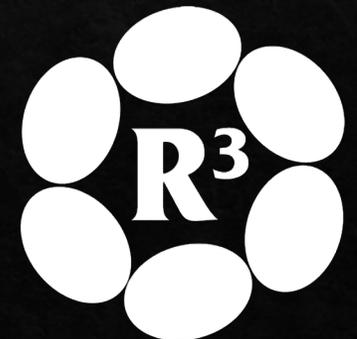
- ◇ Structured Protocols
- ◇ Specific Sequence
- ◇ Checklist of structures
- ◇ Focused Examination
- ◇ Other joints and structures
- ◇ Signs and symptoms



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Color and Power Doppler

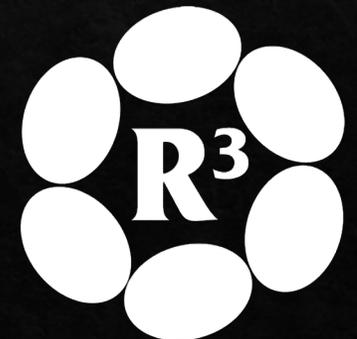
- ◆ Turn on the Color or Power Doppler button
- ◆ Blood Flow to and from transducer
- ◆ Benefits: View veins and arteries. Hyperemia



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Needle Guidance

- ◆ In Plane Needle Guidance. Longitudinal View. See the whole needle
- ◆ Line up the transducer to your anatomical injection site. Place the needle about a finger width from the injection site at slight angle, in plane.
- ◆ Out of Plane Needle Guidance. Transverse View. See the tip of the needle, a dot. Place the needle about a finger width from then injection site at a slight angle.



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Ultrasound is your first line of information

- ◇ Ultrasound is your first of information
- ◇ Ultrasound scanning is like using a stethoscope for soft tissue evaluation
- ◇ Evaluate information on the pathology side and contralateral side for comparison
- ◇ Ultrasound scanning takes time
- ◇ Take your time and practice
- ◇ Continue the learning process with further education, courses and books



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Thank You

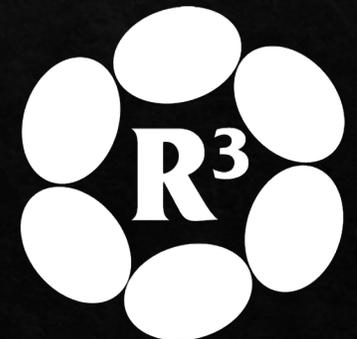
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