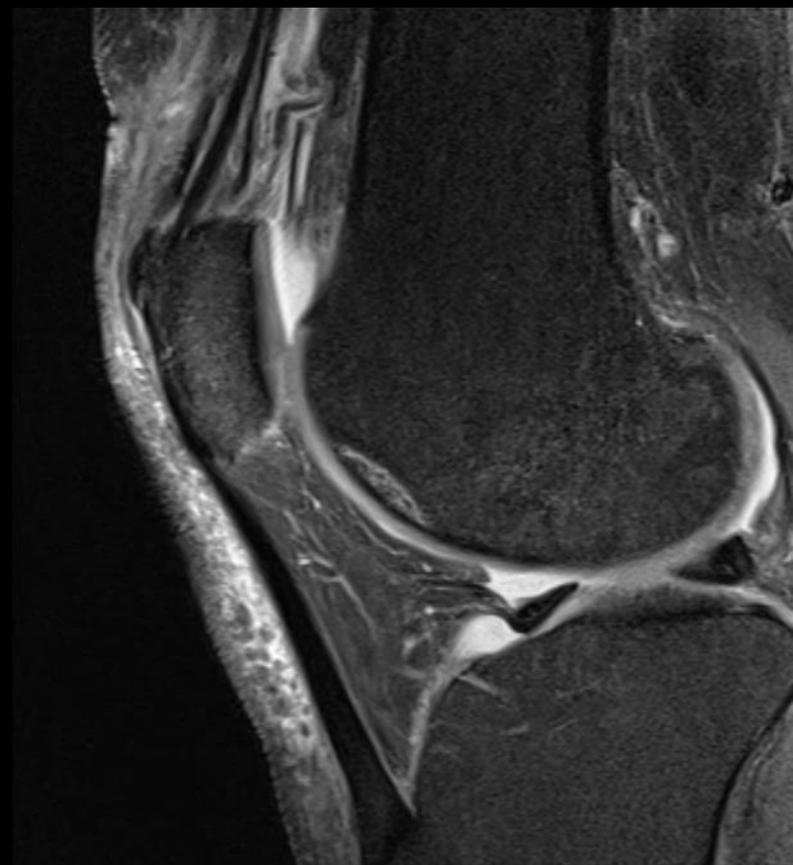
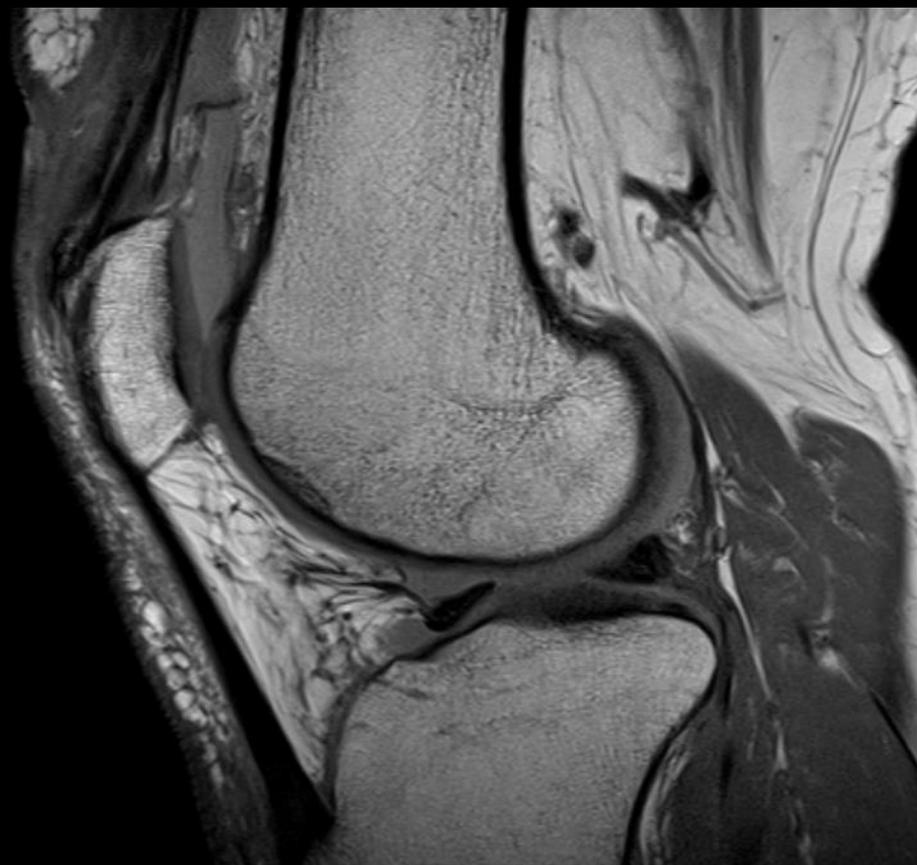




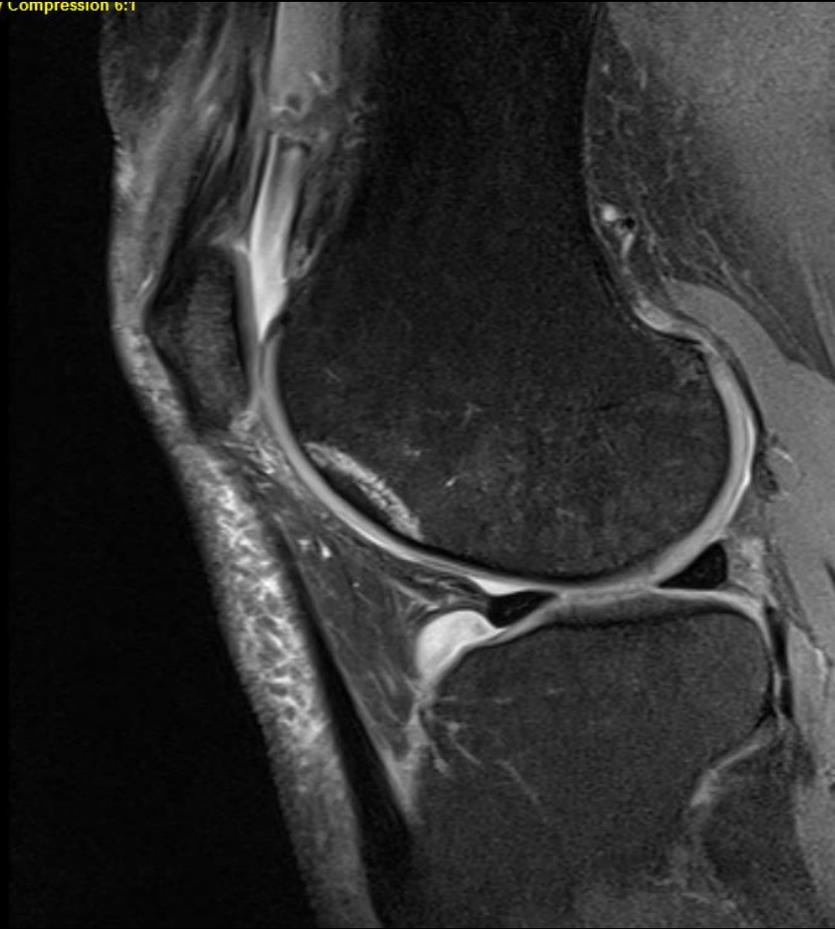
55 yo male with MC accident 4 months ago, right knee stuck under MC. Persistent right knee pain.



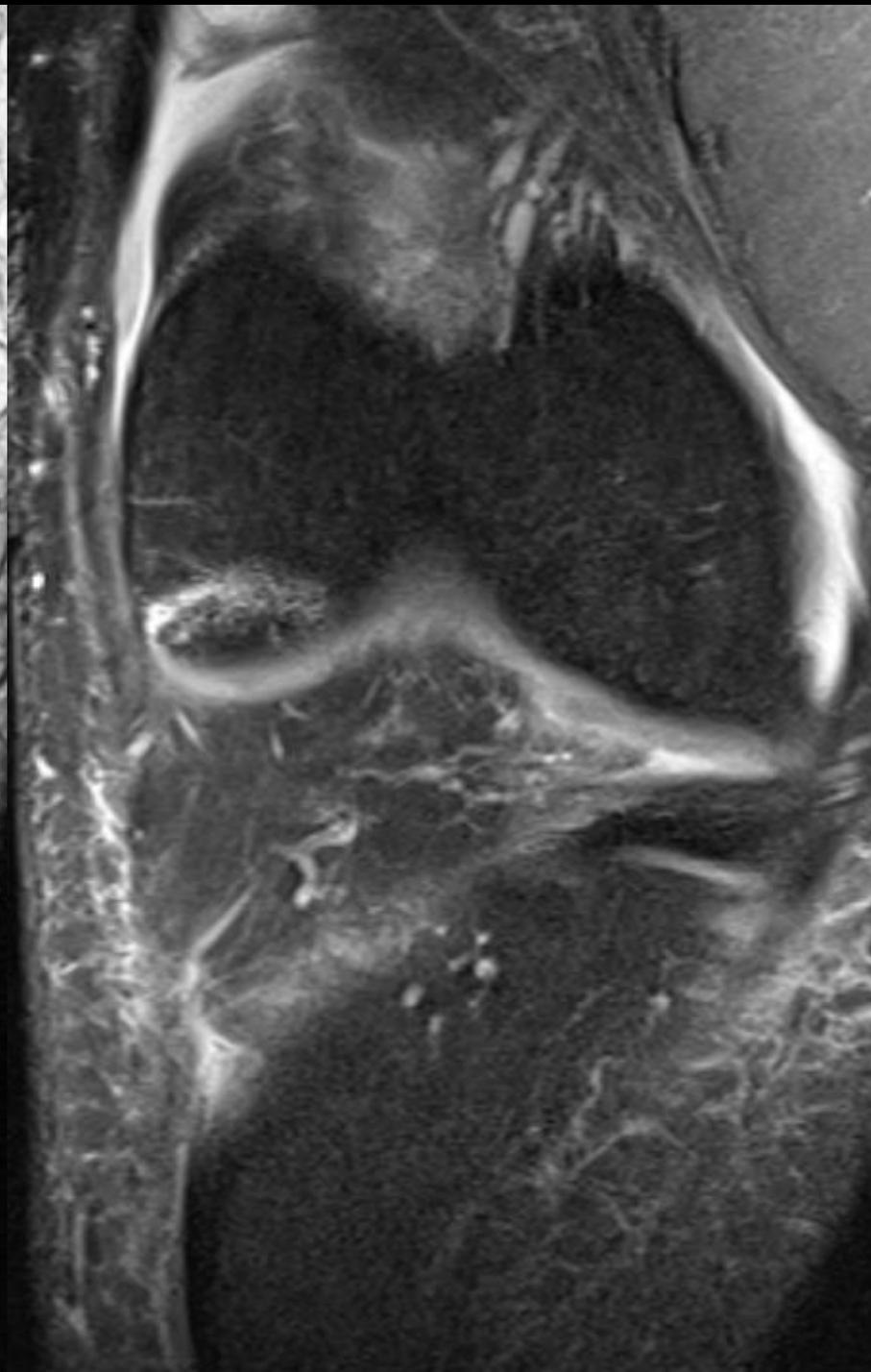
ion 6:1

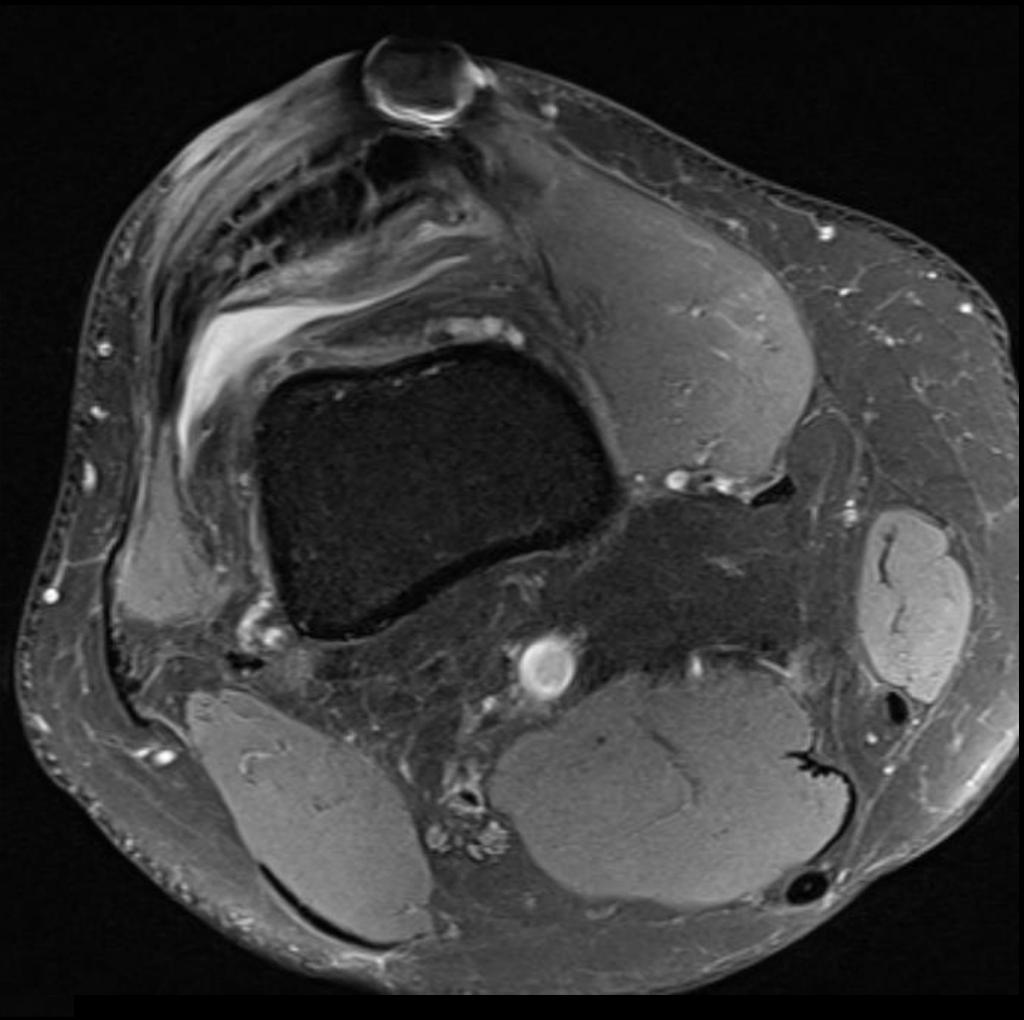
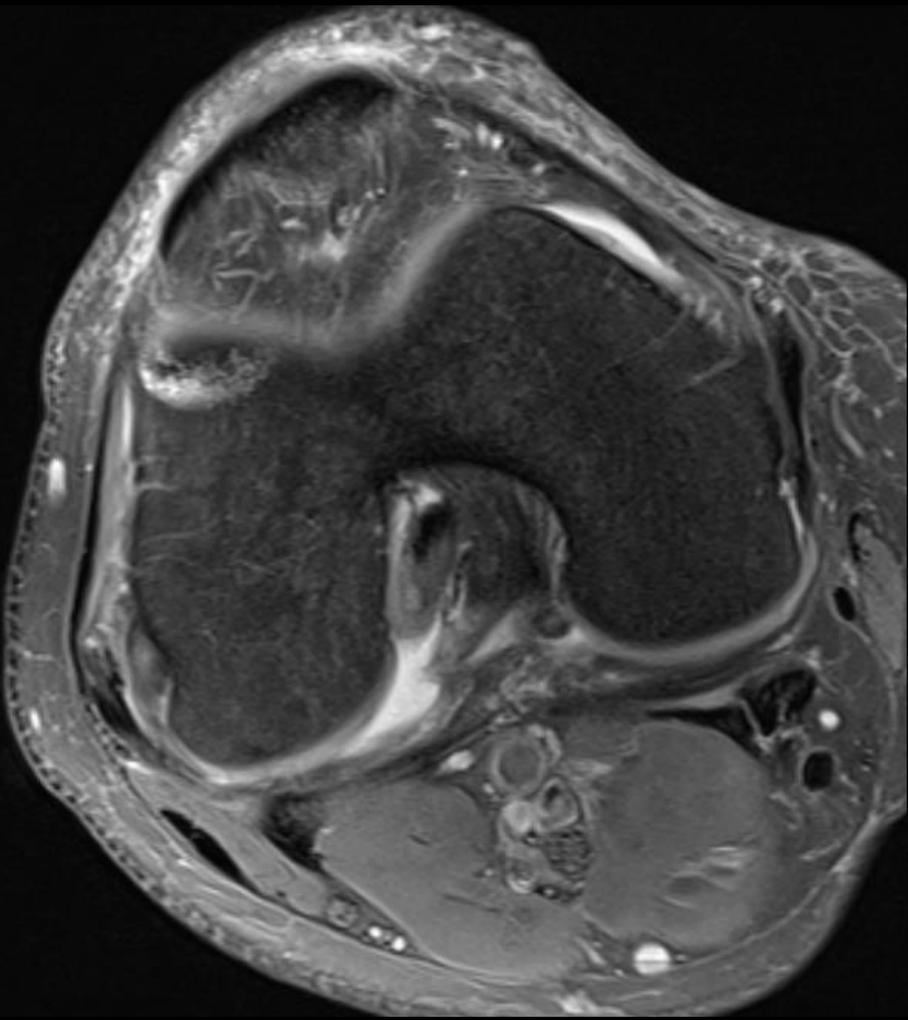


12 of 36 Lossy Compression 6:1









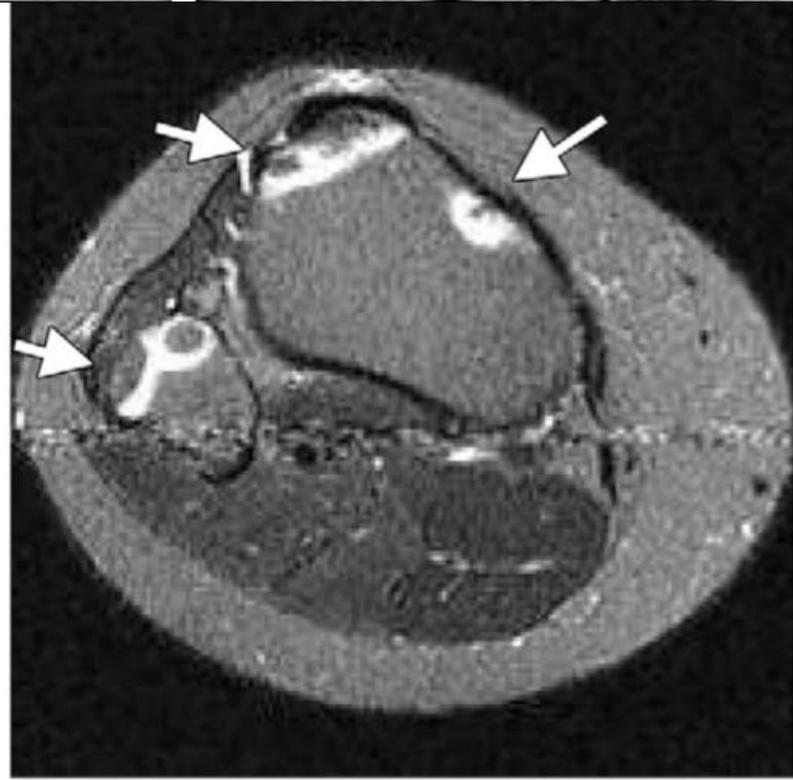
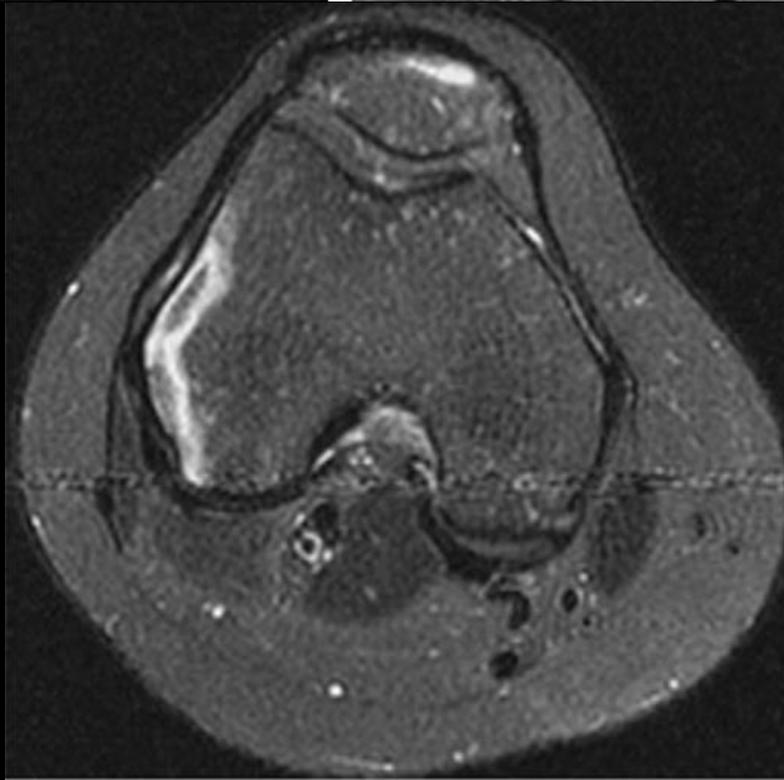
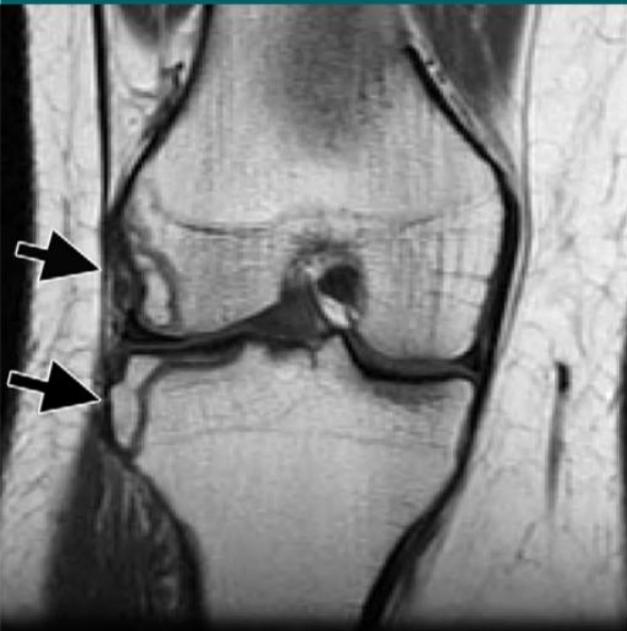
Presumed bone marrow abnormality due to thermal injury

**Focal Bone Abnormality as a
Complication of Ultrasound
Diathermy: A Report of Eight Cases¹**

Radiology

Background: Heat used in Physiotherapy

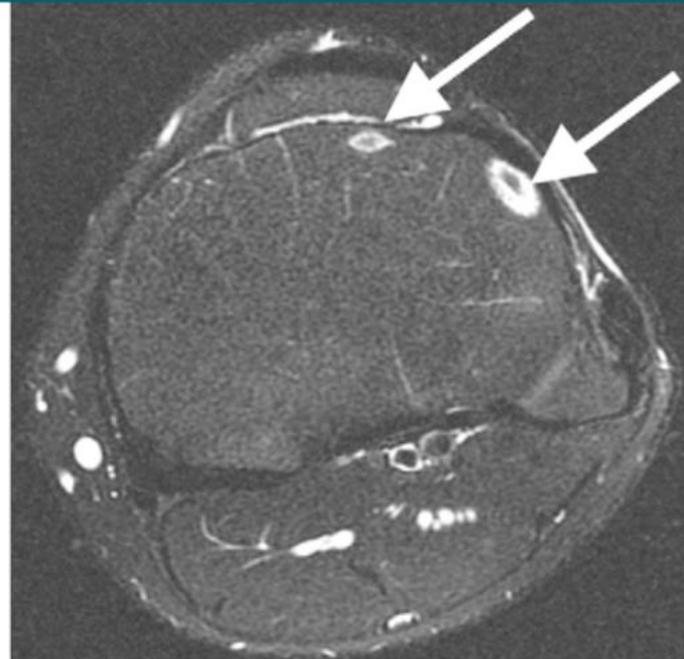
- Superficial- Raise temperature of soft tissues skin surface
 - Hot packs, hot tub, heating pads, infrared lamps (infrared lasers)
- Deep or diathermy therapy- used to raise temp of deeper soft tissues
 - Shortwave, microwave and ultrasound
 - Ultrasound- energies of less than 0.1 W/cm^2 for deep soft tissue injury and bone healing. Safe?



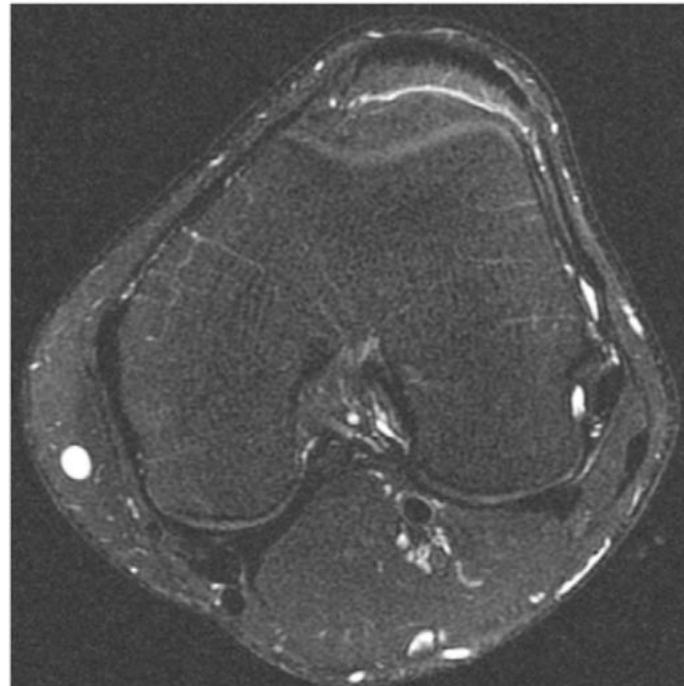
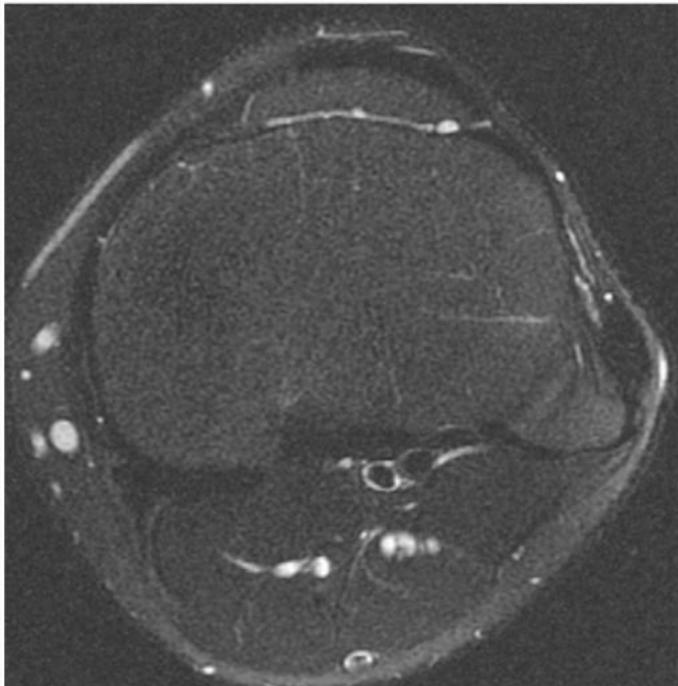
Yeh LR, Chen CK et al. Focal Bone Abnormality as a Complication of Ultrasound Diathermy: A Report of Eight Cases. *Radiology* 2011; 260:192-198.



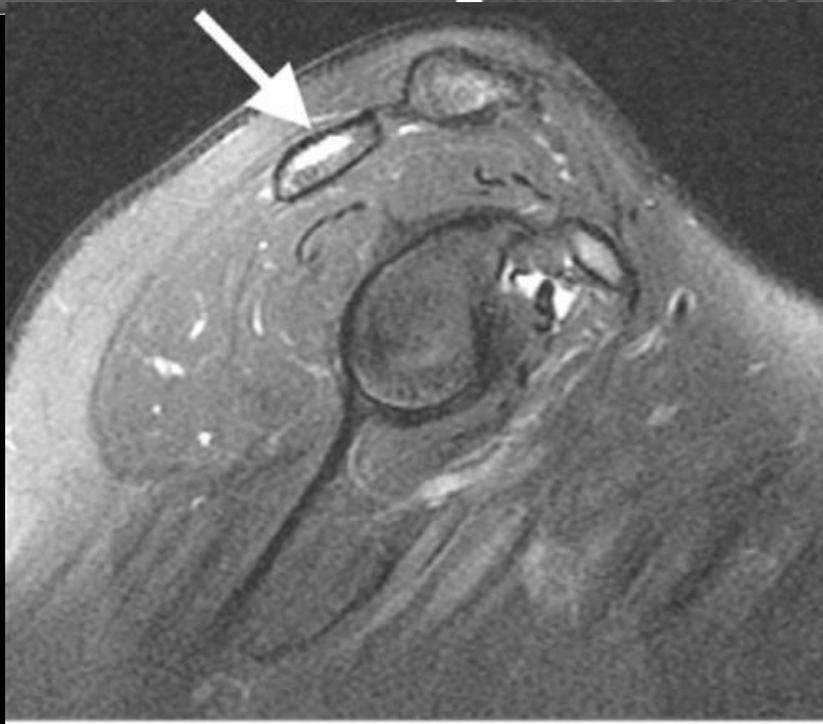
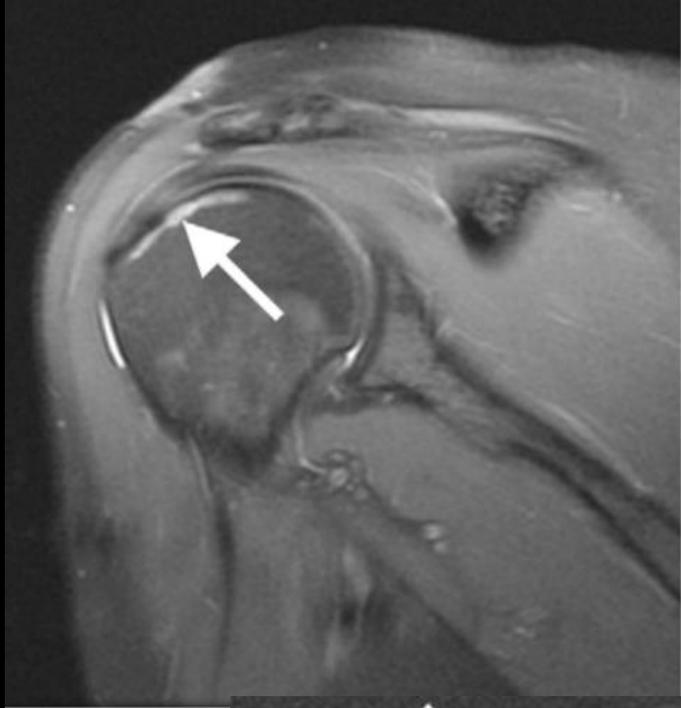
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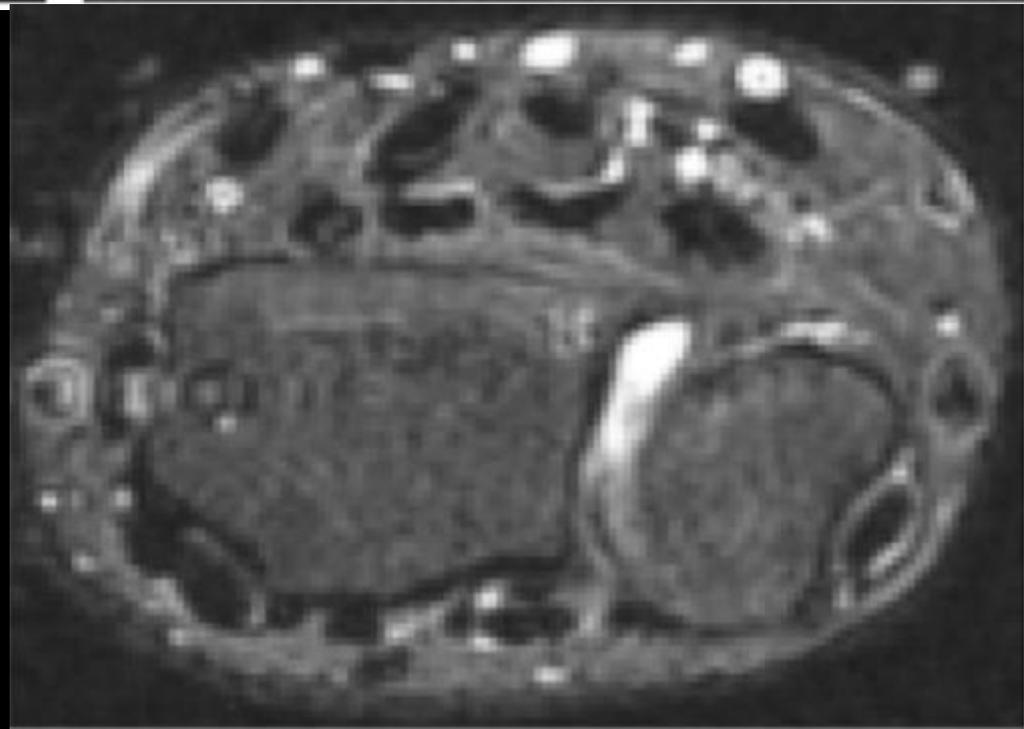
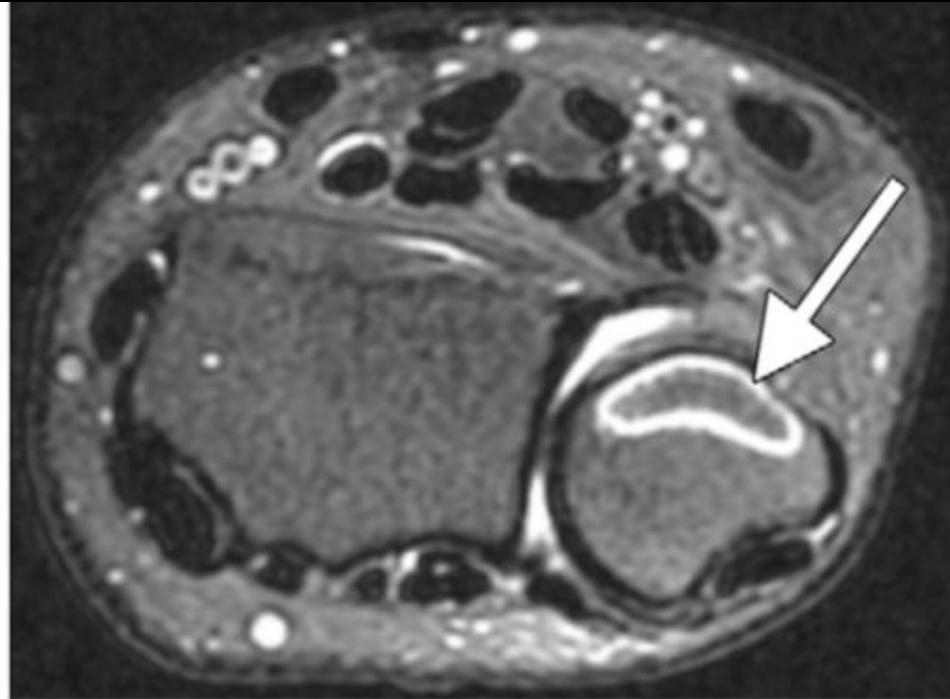
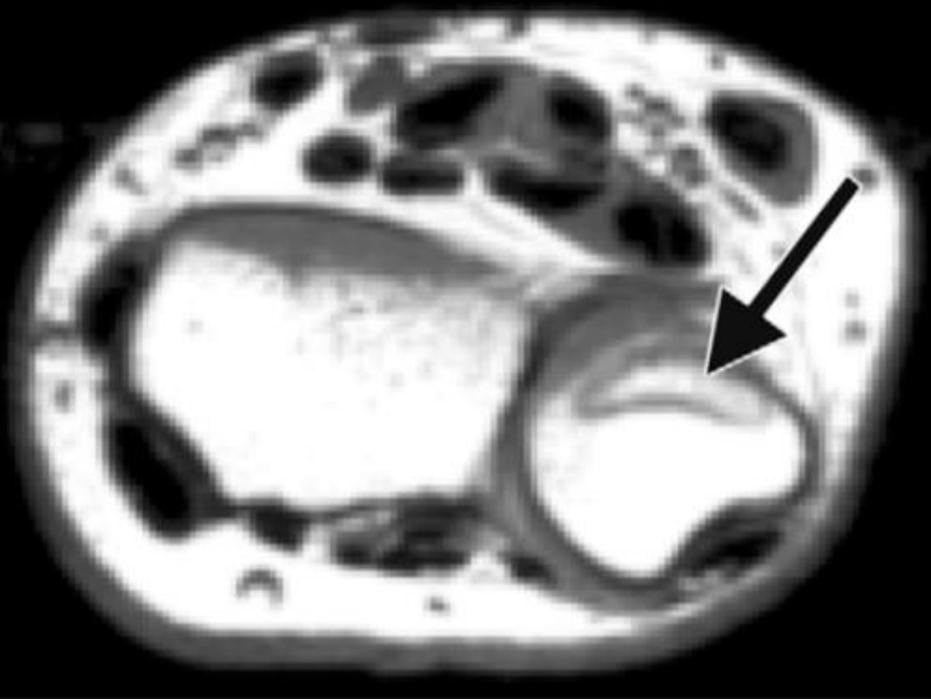
b.



Yeh LR, Chen CK et al.
Focal Bone
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Radiology 2011;
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Yeh LR, Chen CK et al. Focal Bone Abnormality as a Complication of Ultrasound Diathermy: A Report of Eight Cases. *Radiology* 2011; 260:192-198.

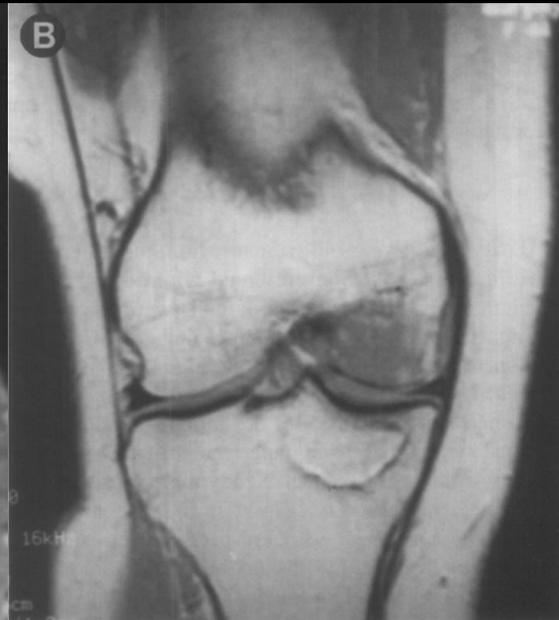
Summary Thermal Related Bone Marrow Abnormality

- MRI findings
 - subcortical rim, dome or arc of low T1, high T2 (similar to osteonecrosis)
 - Location is key to differentiate from osteonecrosis
 - Smaller
 - Superficial/subcortical, thinner overlying soft tissue and on the side facing the body surface
 - Normal subchondral bone plate and cartilage
 - Differentiate from OC injury
 - History

Thermal Related Bone Marrow Abnormality Discussion

- Specifically US diathermy
 - No consensus in the literature regarding the efficacy of ultrasound diathermy
 - Low intensity US has shown efficacy
 - time to healing in both fresh diaphyseal (tibia) and metaphyseal (distal radius) fractures
 - Decreased likelihood of delayed union of tibial fx and a loss of reduction in distal radial fractures
 - Mechanism of therapeutic effects unsure
 - Unsure if Bone marrow changes on MRI correlated with pain/symptoms but do know imaging changes are potentially reversible
 - Degree of changes possibly dose related (higher energy)

Discussion

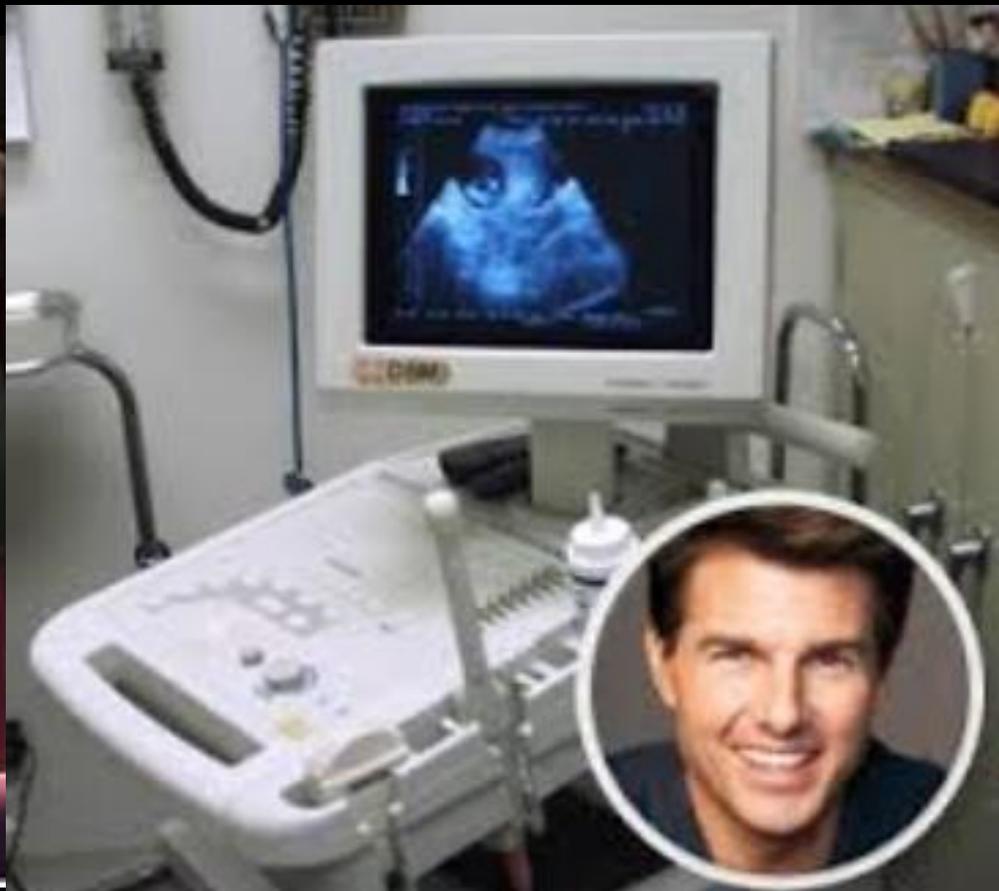


Garino JP, Lotke PA et al. Osteonecrosis of the Knee Following Laser-Assisted Arthroscopic Surgery: A Report of Six Cases. *Arthroscopy* 1995; 11(4):467-474.

- Laser assisted meniscectomy and chondroplasty
- Occasional complication of osteonecrosis
- Is thermal related bone marrow abnormality on spectrum of injury? With more severe injury resulting in irreversible osteonecrosis?



Garino JP, Lotke PA et al.
Osteonecrosis of the Knee
Following Laser-Assisted
Arthroscopic Surgery: A Report of
Six Cases. *Arthroscopy* 1995;
11(4):467-474.



References

1. Yeh LR, Chen CK et al. Focal Bone Abnormality as a Complication of Ultrasound Diathermy: A Report of Eight Cases. *Radiology* 2011; 260:192-198.
2. Garino JP, Lotke PA et al. Osteonecrosis of the Knee Following Laser-Assisted Arthroscopic Surgery: A Report of Six Cases. *Arthroscopy* 1995; 11(4):467-474.