الجامعة التقنية الوسطى
كلية التقنيات الصحية والطبية/ بغداد
قسم: تقنيات الاشعة المادة: التصوير بالرنين المغناطيسي
المرحلة: الرابعة

Title: MRI of the knee joint. **العنوان:**

Name of the instructor: **اسم المحاضر:**

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Target population: **الفئة المستهدفة:**

طلبه المرحلة الرابعة في قسم تقنيات الاشعة

Introduction: المقدمة:

learning about MRI of the knee is essential for MRI technicians to perform MRI exams effectively, interpret MRI results accurately, ensure patient safety, understand anatomy and pathology, and collaborate with other healthcare professionals. MRI technicians can acquire this knowledge through specialized training programs, continuing education courses, and on-the-job experience.

Pretest: الاختبار القبلي:

What the uses of the T1 and T2 with knee joints?

Scientific Content: المحتوى العلمي:

Common indications

•• Internal derangement of the joint (meniscal tears, cruciate ligament tears, post-repair cruciate ligament tears, bursae)
•• Chondromalacia patella and patella tracking
•• Bone tumours and bony damage within the knee joint
•• Almost all other knee disorders can also be visualized

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Equipment

•• Knee phased array coil/extremity knee coil/pair of small circular coils combined as a phased/multi-coil array/large flexible coil
•• Immobilization pads
•• Earplugs or headphones

Patient positioning

The patient lies supine on the examination couch with their knee in a relaxed, slightly flexed position within the coil. The knee is well immobilized with pads. The coil can be offset so that the other leg rests comfortably at the side. The patient is positioned so that the longitudinal alignment light lies either along the midline of the leg under examination, or displaced from it if the knee has been offset. The horizontal alignment light passes through the centre of the coil. The knee is placed within the coil so that the centre of the coil corresponds to the lower border of the patella.

A clear display of the anterior cruciate ligament is essential in knee examinations for pain, trauma or suspected joint damage. The ligament is best seen in oblique sagittal scans oriented to the appropriate anatomical plane. If your equipment is not capable of oblique imaging, or oblique scan prescription compromises other

significant technical choices, thepatient's knee should be positioned with a slight (5–10°) external rotation(under-rotation is better than over-rotation). If the scanner can only employ a single-plane oblique, the sagittal scan plane can be prescribed along the internal margin of the lateral femoral condyle from an axial localizer. A more accurate approach is described within the Suggested protocol section.



Patient Position-Extremity coil



Coronal localizer for sagittal slices



Sagittal localizer for coronal slices



Coronal localizer for axial slices

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Common Knee MRI Sequences:

1. T1-Weighted Imaging:
    - Parameters:
        - Slice thickness: 3-4 mm
        - TR (Repetition Time): 400-800 ms
        - TE (Echo Time): 10-20 ms
    - Use: Provides detailed anatomical information of the knee joint, including bones, cartilage, and soft tissues. T1-weighted images are good for assessing the knee's anatomy.
2. T2-Weighted Imaging:
    - Parameters:
        - Slice thickness: 3-4 mm
        - TR: 2000-5000 ms
        - TE: 80-120 ms
    - Use: Highlights differences in tissue water content and is valuable for assessing soft tissues within and around the knee, including ligaments, tendons, muscles, and detecting inflammation.

3. Proton Density (PD)-Weighted Imaging:
    - Parameters:
        - Slice thickness: 3-4 mm
        - TR: 1500-3000 ms
        - TE: 20-40 ms
    - Use: Provides intermediate contrast between T1 and T2 and is useful for evaluating soft tissue structures in the knee, including ligaments, tendons, and menisci.
4. Short Tau Inversion Recovery (STIR):
    - Parameters:
        - Slice thickness: 3-4 mm
        - TR: 3000-5000 ms
        - TE: 40-60 ms
        - Inversion Time (TI): 150-200 ms
    - Use: Suppresses fat signal and enhances the visibility of fluid and edema, which can be helpful in detecting injuries, such as ligament tears and bone marrow abnormalities.

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Posttest: :الاختبار البعدي

- Numerate the slice thickness for each sequence?

References: :المصادر

Handbook of MRI Technique Catherine Senior 5TH EDITION 2022
Step by step MRI Jaganmohan Reddy v parsed

Radiopedia