

الجامعة التقنية الوسطى

كلية التقنيات الصحية والطبية/ بغداد

قسم: تقنيات الاشعة المادة: التصوير بالرنين المغناطيسي
المرحلة: الرابعة

Title: MRI of the chest (lung + mediastinum). العنوان:

Name of the instructor: اسم المحاضر:

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Target population: الفئة المستهدفة:

طلبة المرحلة الرابعة في قسم تقنيات الاشعة

Introduction: المقدمة:

MRI (Magnetic Resonance Imaging) of the chest, including the lungs and mediastinum, can be valuable in certain clinical scenarios, but it is less commonly used compared to other imaging modalities like CT (Computed Tomography) for this region. MRI is particularly useful when radiation

exposure needs to be minimized or when specific soft tissue characterization is required.

Scientific Content:

المحتوى العلمي:

Common indications

- Mediastinal lymphadenopathy
- Central and superior sulcus bronchial tumours
- Distinction between neoplasm and consolidated lung
- Alternative to CT of the mediastinum and chest wall when the patient is hypersensitive to contrast medium
- Vascular evaluation of aortic dissection, pulmonary embolus, aortic aneurysm or vascular stenosis
- Lung perfusion studies
- Assessment of diaphragmatic motion
- Chest wall infections
- Pleural disease
- Rib lesions or metastases

Equipment

- Body coil/volume torso multi-coil array
- RC bellows
- ECG or peripheral gating leads
- Earplugs/headphones

Patient positioning

The patient lies supine on the examination couch with the RC bellows (if required) and ECG gating leads attached. Pads can be placed under the patient's knees (for comfort) and beside the patient's elbows (for optimal MR imaging). In some cases, if the patient is not comfortable supine and/or if the patient has trouble in confined spaces, prone positioning may be a suitable alternative.

The patient is positioned so that the longitudinal alignment light lies in the midline, and the horizontal alignment light passes through the level of the fourth thoracic vertebra, or the nipples. The patient can be placed feet first into the magnet if the ECG trace is unsatisfactory as this changes the patient's polarity relative to the main field (see *Gating and respiratory*

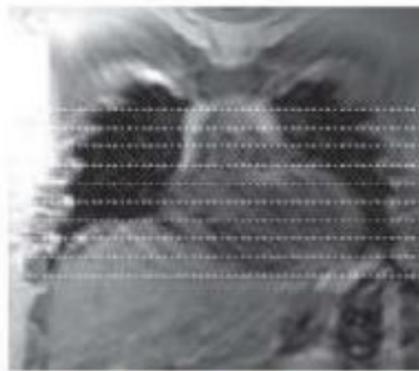
compensation techniques in Part 1).



Placement of the gating leads



Patient position: Torso array coil
Place the patient supine, feet first on the table.



Coronal localizer for axial slices



Coronal localizer for sagittal slices



Axial image through the ascending and descending Aorta showing correct placement of the first and last oblique slices for examining the arch of aorta

HAYL

ADER

Main MRI Sequences for Chest Imaging:

1. T1-Weighted Imaging:

- Parameters:
 - Slice thickness: 5-8 mm
- Use: Provides detailed anatomical information, including visualization of chest structures such as the heart, main vessels, and mediastinum.
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2. T2-Weighted Imaging:

- Parameters:
 - Slice thickness: 5-8 mm
- Use: Highlights differences in tissue water content, making it useful for identifying areas of inflammation, edema, or abnormal tissue within the chest.

3. Fat Suppression Sequences:

- Parameters:
 - Utilizes fat saturation techniques
- Use: Helps distinguish between fat-containing and non-fat tissues, aiding in the assessment of lesions and structures within the chest.

4. Diffusion-Weighted Imaging (DWI):

- Parameters:
 - Slice thickness: 5-8 mm
 - b-values: Typically, 0 and 1000 sec/mm²
- Use: Measures the diffusion of water molecules in tissues and can be helpful in assessing tissue cellularity and identifying certain chest lesions.

5. Dynamic Contrast-Enhanced Imaging:

- Parameters:
 - Slice thickness: 5-8 mm
 - Temporal resolution: 5-10 seconds
 - Contrast agent: Gadolinium-based contrast agent
- Use: Evaluates tissue perfusion and can help in characterizing lesions based on their vascularity, particularly useful for assessing vascular lesions and tumors.

6. Magnetic Resonance Angiography (MRA):

- Parameters:
 - Slice thickness: 1-2 mm
- Use: Visualizes blood vessels within the chest, including the main arteries and veins, and can be used to detect vascular abnormalities.

References:

المصادر:

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

Mriquestions.com

Essential of body MRI 2018