

MRI: Head and Neck

Image quality in the multicenter setting can be greatly influenced by variances in acquisition protocols. These variances may be related not only to equipment manufacturer and model, but also technique.

The study may permit imaging per institutional standard-of-care. However, aligning image acquisition to established standards is essential for robust quality data.

All scans are *preferred* to be acquired on a 1.5T or 3.0T MRI scanner if clinically indicated (unless protocol does not allow low field magnets to participate).

The table below is provided as a guideline and overview for MRI Head and Neck exams at both 1.5 and 3 tesla. Some modification may be needed to ensure similar SNR in the resulting images. Please refer to your site's specific MRI manufacturer's imaging protocols for the optimal scanning protocol.

The MRI Head and Neck exam should contain, at a minimum, the following series:

1. 3-plane localization scan
2. Coronal STIR
3. Axial T1 **pre-contrast**
4. Axial T2 FSE
5. Coronal T1
6. Axial T1 **post-contrast**
7. Coronal T1 **post-contrast**

The choice of imaging planes depends on the anatomy to be demonstrated. For most head and neck lesions, axial and coronal imaging would suffice. Sagittal may be necessary for certain structures

Exam and Patient Preparation

Magnet Strength	1.5T or 3T	Low field (e.g., 1.0T) permissible if protocol allows.
Coil	Vendor head or neck coil.	According to lesion location
FOV	Sag/Cor plane = 280–300 mm Axial Plane = 180-200 mm	FOV must be big enough to cover from frontal sinus down to clavicle for long axis sequences
Patient Position	Supine	Position the head in the head and neck coil, immobilize. Please instruct patient to try and refrain from swallowing during scanning. Give a few seconds in between sequences to allow for swallowing.
Contrast Injection	Dual-chamber power injector recommended Contrast Bolus = 0.1 mmol/kg Bolus Rate = 2 mL/s Saline Flush = 20 mL	Insertion of intravenous catheter in upper extremity prior to the start of imaging.

Image Acquisition

Localization Scan	3-plane localization scan	
Coronal STIR	Slice thickness = 3.0 mm Gap = 0 mm FOV = 280x280 mm Matrix = 320x320 TR = 4000–5000 ms TE = 110 ms TI = 130 ms Flip angle = 90° NEX = 2	Angle parallel to the cervical spine off the sagittal localizer. Using inferior saturation bands can reduce arterial pulsation artifacts.
Axial T1 pre-contrast	Slice thickness = 3.0 mm Gap = 0 mm FOV = 180x180 mm Matrix = 320x320 TR = 400–600 ms TE = 15–25 ms Flip angle = 90° Phase = A→P	Plan the axial scans off the sagittal plane, making sure they are perpendicular to the cervical spine.
Axial T2 FSE	Slice thickness = 3.0 mm Gap = 0 mm FOV = 180x180 mm Matrix = 320x320 TR = 4000–5000 ms TE = 110 ms Flip angle = 90° NEX = 2 Phase = A→P No Fat Sat	
Coronal T1 SE	Slice thickness = 3.0 mm Gap = 0 mm FOV = 280x280 mm Matrix = 320x320 TR = 400–600 ms TE = 15–25 ms Phase = R→L	Phase direction in the coronal scans must be right to left, this is to avoid the artifacts from the chest and heart.
Axial T1 Fat Sat	Slice thickness = 3.0 mm Gap = 0 mm FOV = 180x180 mm Matrix = 320x320 TR = 400–600 ms TE = 15–25 ms Use Fat Sat	Slice locations should match Axial T1 pre contrast.
Coronal T1 Fat Sat	Slice thickness = 3.0 mm Gap = 0 mm FOV = 280x280 mm Matrix = 320x320 TR = 400–600 ms TE = 15–25 ms Use Fat Sat	Slice locations should match Coronal T1 pre contrast.

Additional Sequences

Axial 2D DWI (SS-EPI)	Slice thickness = 5.0 mm	Usually done <u>prior to injection</u> . Can be done in any plane depending the location of the lesion.
	Gap = 0 mm	
	FOV = 210–230 mm	
	x 210–230 mm	
	Matrix = 192x192	
	TR = 5000–6000 ms	
	TE = 110 ms	
	FA = 130°	
	NEX = 7	
	<i>b</i> -values = 0, 800 s/mm ²	

References

1. ACR–ASNR–SPR Practice Parameter for the Performance of Magnetic Resonance Imaging (MRI) of the Head and Neck, Res. 16 – 2018. <https://www.acr.org/-/media/ACR/Files/Practice-Parameters/MR-HeadNeck.pdf>, accessed February 16, 2021.
2. MRI Exam-Specific Parameters: Spine Module (Revised 4-15-2020). <https://accreditation.support.acr.org/support/solutions/articles/11000061020-mri-exam-specific-parameters-spine-module-revised-4-15-2020->, accessed June 10, 2021.
3. Soft Tissue Neck. <https://mrimaster.com/PLAN%20SOFT%20TISSUE%20NECK.html>, accessed February 16, 2021.