

Renal – MRI Abdomen Body Protocol

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Contact: (866) 761-4200, Option 1

Standard uses: Evaluate indeterminate renal lesions.

Notes: Like liver protocol but with renal FOV.

Patient prep: Should be NPO for 4 hours prior to study if possible (minimize bowel motion). Have patient void prior to scan.

Oral contrast: None

Coverage: Position the coil such that there is good coverage and optimal signal from the kidneys and adrenal glands.

Intravenous contrast: Single dose gadolinium @ 2 cc / sec (Gadavist, MultiHance if Gadavist unavailable)

Anti-peristaltic agent: None

Sequences:

1. Localizer
 - a. Breath hold
2. Coronal T2 Ultra fast SE (HASTE, SSFSE, FASE)
 - a. Breath hold, concatenation/Multi-breath hold is less desirable than single breath hold
 - b. Complete front to back coverage (skin to skin)
 - c. Goal parameters
 - i. Large FOV (400-450 mm)
 - ii. 7 mm thickness, 25% gap (1.5 mm)
 - d. Complete front to back coverage
3. Axial T1 in-phase and out-of-phase GRE
 - a. Breath hold, concatenation/Multi-breath hold is less desirable than single breath hold
 - b. Slices extend from above adrenal glands to below kidneys
 - c. Goal parameters
 - i. 6 mm thickness, 25% gap (1.5mm)
4. Axial T2 Ultra fast SE (HASTE, SSFSE, FASE)
 - a. Breath hold, concatenation/multi-breath hold is less desirable than single breath hold
 - b. Slices extend from above adrenal glands to below kidneys
 - c. Goal parameters
 - i. 6 mm thickness, 25% gap (1.5mm)
5. Axial T2 Ultra fast SE (HASTE, SSFSE, FASE) with fat suppression
 - a. as in 4, but with fat suppression

6. Axial DWI with ADC map
 - a. Free breathing
 - b. Same coverage
 - c. Goal parameters
 - i. B-values of 0, 100, 500, 1000, and ADC map
7. Axial T1 Ultra fast 3D-GE with fat suppression (VIBE, LAVA, TIGRE) precontrast
 - a. Breath hold
 - b. Slices extend from above adrenal glands to below kidneys
 - c. Goal parameters
 - i. Slab slices ≤ 3 mm
8. Coronal T1 Ultra fast 3D-GE with fat suppression (VIBE, LAVA, TIGRE) precontrast
 - a. Breath hold
 - b. Slices extend from above adrenal glands to below kidneys
9. Axial T1 Ultra fast 3D-GE with fat suppression (VIBE, LAVA, TIGRE) postcontrast x3 (late arterial, portal venous, nephrographic phases)
 - a. Breath holds
 - b. Slices extend from above adrenal glands to below kidneys
 - c. Goal parameters
 - i. Slab slices ≤ 3 mm
 - ii. Scan at 30 seconds and 2 minutes
10. Coronal T1 Ultra fast 3D-GE with fat suppression (VIBE, LAVA, TIGRE) postcontrast
 - a. Breath hold
 - b. Slices extend from above adrenal glands to below kidneys
 - c. Timing – performed immediately after 2nd postcontrast phase in 8 above (between 2 and 5 minute scans).
11. Axial VIBE postcontrast x3 (late arterial, portal venous, nephrographic phases)
 - a. Breath holds
 - b. Slices extend from above adrenals to below kidneys
 - c. Goal parameters
 - i. Slab slices ≤ 3 mm
 - ii. Scan at 5 minutes
12. Ensure that post-contrast subtractions are included for all planes and phases (4 total: 3 axial, 1 coronal)

Table 1. 3T MRI protocol for Renal Masses

Sequence	TR (msec)	TE (msec)	Flip Angle (°)	Bandwidth (Hz/pix)	Section Thickness/Gap (mm)	FOV (cm)	Matrix
Coronal T2-weighted SS TSE	960	80	90	652	5/1	40 x 45	312 x 279
Axial T2-weighted fat suppressed SS TSE	920	80	90	543	5/1	40 x 30	304 x 168
Axial DWI	1060	53	90	36.5	7/1	44 x 35	144 x 115
Axial 2D T1-weighted dual echo IP/OP GRE	120	2.3/1.15	55	1215	5/1	40 x 38	400 x 269
Coronal mDIXON	3.8	1.7/2.1	10	1923	3/-1.5	39 x 40	260 x 223
Sagittal mDIXON	3.7	1.32/2.3	10	1568	3/-1.5	30 x 30	248 x 230
Axial mDIXON	3.3	1.16/2.1	10	1852	3/-1.5	38 x 33	252 x 218

Radiologist's perspective:

Kidney lesions are frequently found incidentally on imaging studies performed for other purposes (US, CT, non-abdominal MRI). While cysts can frequently be characterized adequately by these other modalities, a significant number of kidney lesions remain indeterminate. Multiphase imaging with MRI or CT are used to characterize these lesions by looking for lesion enhancement. Hemorrhagic and proteinaceous cysts are frequently discovered indeterminate lesions and are readily characterized by both CT and MRI. Hemorrhagic and proteinaceous cysts typically demonstrate intrinsic T1 hyperintensity (due to the presence of methemoglobin or protein) and therefore subtraction images are necessary to assess for enhancement (it's hard to tell if something bright gets a little brighter).

Please direct any questions or concerns to any of the body radiologists.