

Decrease FOV for anatomy, no need to adjust other parameters! C-Spine Sag shouldn't cover lower than T2, small stature adults can have Axial T and L spine sequences decreased to better view cord.

**Watch SAR at 3T. Talk to patients and ensure they aren't getting too warm. Fan on High.

**PLACE ANTERIOR SAT ON ALL AXIAL AND SAGITTAL SEQUENCES

**Watch slice order for Axial scans! Please ensure slices go superior to inferior. Rads are noticing sometimes they go different directions in the same study. Do not do that. Thank you

CERVICAL SPINE	
1. 3 pl loc 2. Sag T1 (Just below pons to not lower than mid-T2) 3. Sag FSTIR 4a. Sag T2 (450w, 750, Explorer, any scanner less than 30.0) 4b. Sag T2 CUBE (Obl on Sag to Spinal Cord-this will ensure automatic Axial reformats are angled correctly to cord. Reformat Rt & Lt Foraminal Obliques off Axial Reformat for all sections (Community, Peds, and Neuro). No need to run 2d Foraminal Obliques if requested. If motion on CUBE, Run Sag T2 Propeller 5. Ax T1 6. Ax T2* MERGE (Ax T2 for metal or if motion on MERGE) **Community patients on any scanner without CUBE—always run 2d Rt and Lt Foraminal Obliques unless protocol with contrast. ▶ OPTIONAL CONTRAST 4. +c Sag T1 fat sat -- SHIM 8. +c Ax T1 fat sat (no fat Neuro, Peds, and Community cases!)-SHIM	Optional Contrast: Vueway 0.05mmol/kg Max 10 Peds under 2yo or scanned with Head that has Perfusion Multihance 0.1 mmol/kg Max 20 mL Low eGFR inpatient dosing: no change

FORAMINAL OBLIQUE CERVICAL SPINE (Dr. Hanna/Guebbels)	
1. 3 pl loc 2. Sag T1 3. Sag T2 FAT 4. Ax T2* MERGE 5. OBL Sag T2—Angle Perpendicular to RT C-5/6 Foramina on Axial image 6. OBL Sag T2—Angle Perpendicular to LT C-5/6 Foramina on Axial image	**IMAGES**

THORACIC SPINE	
1. 3 pl loc TOP INCLUDE SKULL BASE 2. 3 pl loc BOT INCLUDE COCCYX 3. Sag T1 ▶ T1 through conus (usually about L1) 4. Sag T2 5. Sag FSTIR 6. Adults: Ax T2 FRFSE no fat Peds: Ax T2* GRE OPTIONAL CONTRAST: 7. Ax T1 PRE contrast (Always run for Neuro, Peds, and Community cases!) 8. +c Sag T1 fat sat SHIM 9. +c Ax T1 fat sat (no fat Neuro, Peds and Community) SHIM **BIND Upper and Lower Axials together and send to ALL, no need to send un-bound images to SOURCE	Optional Contrast: VUEWAY 0.05mmol/kg Max 10 Peds under 2yo or scanned with Head that has Perfusion Multihance 0.1 mmol/kg Max 20 mL Low eGFR inpatient dosing: no change **IMAGES**

MSK LUMBAR SPINE	
1. 3 pl loc 2. Sag T1 FSE (FSE on 1.5T and 3T) ▶ Cover through neuro foramina ▶ FOV to include Superior T12 through inferior endplate of S2 3. Sag T2 fat sat 4. Sag PD 5. Ax T2 ▶ Bottom 3 disks angled to L4-5, higher if needed ▶ Extend axials through terminal end of thecal sac OPTIONAL CONTRAST: 6. Ax T1 PRE contrast Bottom 3 disks angled to L4-5, higher if needed 7. +c Sag T1 fat sat Superior FOV at top of T-12 8. +c Ax T1 fat sat Bottom 3 disks angled to L4-5, higher if needed SHIM FAT SAT Sequences **BIND Upper and Lower Axials together and send to ALL, no need to send un-bound images to SOURCE Add Sag PD MAVRIC and Sag FLUID MAVRIC if requested by Dr. Bice---request should mention "MAVRIC"	Optional Contrast: VUEWAY 0.05mmol/kg Max 10 Peds under 2yo or scanned with Head that has Perfusion Multihance 0.1 mmol/kg Max 20 mL Low eGFR inpatient dosing: no change 3T—Sag seq freq A/P Phase (Flow Artifacts) go S/L, ensure to place a inferior sat band angled to sacrum to reduce flow, especially post con

Neuro (Peds and Community) Lumbar Spine	
1. 3 pl loc 2. Sag T1 ▶ FOV to include Superior T12 through inferior endplate of S2 ▶ Cover through neuro foramina (3T-FLAIR must be scanned in 1 Acquisition. For some patients you will need to run a Sag T1 FSE if on normal mode) 3. Sag T2 4. Sag FSTIR 5. Ax T2 ▶ One stack Conus- S2 angled to L3-4 6. Ax T1 ▶ One stack Conus- S2 angled to L3-4 ▶ OPTIONAL CONTRAST 7. +c Sag T1 fat sat ▶ Superior FOV at top of T-12 8. +c Ax T1 ▶ One stack Conus- S2 angled to L3-4	Optional Contrast: VUEWAY 0.05mmol/kg Max 10 Peds under 2yo or scanned with Head that has Perfusion Multihance 0.1 mmol/kg Max 20 mL Low eGFR inpatient dosing: no change 3T—Sag seq freq A/P Phase (Flow Artifacts) go S/L, ensure to place a inferior sat band angled to sacrum to reduce flow, especially post con

QUICK SPINE (see Peds Neuro QB QS instruction sheet)	
--	--

FLOW – FORAMEN MAGNUM	
NEUTRAL: 1. Sag T2 FSE CUBE Non gated, centered at C 1-2 **If done with a spine, it can be a limited slab. No Fat Sat or FC on this scan 2. Ax Fast PC VENC 10 - 8 slices → Perpendicular to cord at C 1-2 level → 1st slice just above foramen magnum → Place slices superior to inferior 3. Sag Cine PC VENC 10 1 slice - midline cord, center at C-3 4. Axial CIESTA SHIM (Copy from Ax CSF FLOW) 5. Sag Midline CIESTA SHIM Single slice centered over spinal cord OPTIONAL: FLEXION & EXTENSION: 6. 3 pl loc FLEX 7. FLEX Sag T2 7 - 8 slices, anatomical images 8. 3 pl loc EXT 9. EXT Sag T2 7 - 8 slices, anatomical images	Peripheral gating

+C ONLY Total Spine Drop Mets (ADULT, please see Peds Neuro for Pediatric pts)	
**Pick sequences from total spine protocol. **not to be used with first time eval for drop mets, **to be used for brain tumor follow up where they are looking for drop mets **Only Ax T2 if requested **Always run Sag T2's!!! 1. 3 pl loc INCLUDE SKULL BASE 2. 3 pl loc BOT INCLUDE COCCYX 3. +C-C-Sag T1 FAT 4. +C-C-Sag T2 5. +C-C-Ax T1 no fat 6. +C T-Sag T1 FAT 7. +C T-Sag T2 8. +C T-Ax T1 no fat 9. +C L-Sag T1 FAT 10. +C L-Sag T2 FAT 11. +C L-Ax T1 no fat	Optional Contrast: VUEWAY 0.05mmol/kg Max 10 Peds under 2yo or scanned with Head that has Perfusion Multihance 0.1 mmol/kg Max 20 mL Low eGFR inpatient dosing: no change

ED Total Spine Fast Screen Best on Gems Scanners	
1. 3 pl Loc TOP 2. 3 pl Loc Bot (not thru coccyx) 3. C-Sag STIR 4. C-Sag Cube T1 5. T-Sag STIR 6. T-Sag CUBE T1 7. L-Sag STIR 8. L-Sag T1 CUBE ▶ OPTIONAL CONTRAST: 9. C-Sag CUBE T1 FAT 10. T-Sag T1 CUBE FAT 11. L-Sag T1 CUBE FAT ** CUBE sequences—Don't decrease #slices in. Place Right & Left Sat Bands---Do Not place an anterior sat band—this increases wrap. **Ax Reformats of CUBE Series-ALI check images after running STIR sequences *If no additional scanning required, change order to Pediatric Quick Spine. *If Ax T2's of entire spine requested, keep order as Total Spine w/o *If additional imaging in one level requested, change that level to a wo (or w/wo) and add the other two levels as limited charges. *If contrast is needed, run Sag T1 CUBE FAT, change order to Total Spine w/wo. Radiologist might request additional axial scans. There is no limited charge available if contrast is given.	ED will Order Tot Sp w/o- or Total Spine w/wo—radiologist will protocol Tot Sp Fast ED Screen (wo or w/wo)—change order as needed (see instructions in protocol)

PEDIATRIC 2 PART (0-2yr or 2-under 6yr) TOTAL SPINE	
1.3 pl loc TO INCLUDE SKULL BASE 2. 3 pl loc BOT INCLUDE COCCYX 3. TOP Sag T1 C1-Bottom of T8 4. TOP Sag T2 Fat (if fat sat issues, turn flex on) 5. BOT Sag T1 Top of T7- end of thecal sac 6. BOT Sag T2 FS 7. C-Ax T2* MERGE (Ax T2 FRFSE for metal) 8. C-Ax T1 9. T-Ax T2 FRFSE (No fat)/PIDS AX T2* GRE 10. T-Ax T1 11. L-Ax T2 12. L-Ax T1—if looking for tethered cord go through coccyx ▶ OPTIONAL CONTRAST VUEWAY 0.05mmol/kg Max 10 Peds under 2yo Multihance 0.1 mmol/kg Max 20 mL 10.+c C Sag T1 fat sat 11. +c T Sag T1 fat sat 12. +c L Sag T1 fat sat 13.+c C Ax T1 (fat sat) 14. +c T Ax T1 (fat sat) 15. +c L Ax T1 (fat sat) **NEURO (Community and Peds) use +c Ax T1 no fat **MSK use +c Ax T1 FAT	**OK to do upper/lower axials in 0-2yr olds**

TOTAL SPINE 3 PARTS (6YR OLD-ADULT)	
1. 3 pl loc TOP INCLUDE SKULL BASE 2. 3 pl loc BOT INCLUDE COCCYX 3. C-Sag T1 7. T-Sag T1 11. L-Sag T1 4. C-Sag T2 FAT 8. T-Sag T2 FAT 12. L-Sag T2 FAT 5. C-Ax T2* MERGE 9. T-Ax T2 FRFSE 13. L-Ax T2 6. C-Ax T1 10.T-Ax T1 14. L-Ax T1 (T-PIDS Ax T2 * GRE) If looking for tethered cord go through coccyx for Ax T1 OPT Contrast (Multihance 1mmol/kg, Max 20 mL) 10. C-Sag T1 FAT 12. T-Sag T1 FAT 14. L-Sag T1 FAT 11. C-Ax T1 (FAT) 13. T-Ax T1 (FAT) 15. L-Ax T1 (FAT) **NEURO, Community, and Peds use +c Ax T1 no fat **All MSK +c Ax T1 FAT	Optional Contrast: VUEWAY 0.05mmol/kg Max 10 Peds under 2yo or scanned with Head that has Perfusion Multihance 0.1 mmol/kg Max 20 mL

Total Spine CSF Leak w/o contrast	
1. 3pl loc TOP 2. 3pl loc Bot 3. C-Sag T1 4. T-Sag T1 5. L-Sag T1 6. C-Sag T2 FAT 7. T-Sag T2 FAT 8. L-Sag T2 FAT 9. C-Ax T2 FAT 10. T Ax T2 FAT 11. L-Ax T2 FAT	Request: MRI Total Spine w/o contrast

NAT Total Spine (see Peds Neuro instruction sheet)	
--	--

OPTIONAL ADDITIONS TO EXAMS		
DWI (Diff Dir All, Asset on) (C, T or Lsp) Ax DWI Sag DWI Process ADC maps Send everything to ALI	Osseous METS: 1. Sag DWI (OK to keep on RP1 and RP2) Process ADC maps Send everything to ALI	Tethered Cord: Sag SSFSE C/T Spine Loc (Overlapping L-sp Loc to help with counting) Ax T1 T8 thru coccyx Cor T2 fat sat- T6 through coccyx (PLACE MARKER TO THE RIGHT OF THE DIMPLE IF THERE IS ONE)

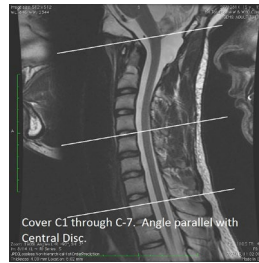
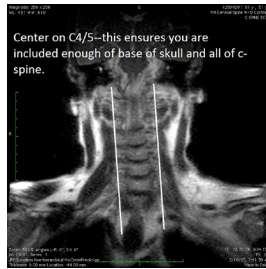
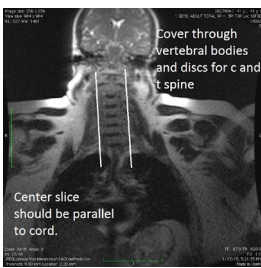
SCOLIOSIS (in addition to total spine): Upper Cor SSFSE--C2-T7▶ posterior spinous processes through vertebral body Lower Cor SSFSE--T7-S2 Axial T2(all levels from tot sp protocol) Ax T1 Conus through thecal sac	SI joints or Sacrum: Add to L-sp Cor T1 Obl ▶ sacrum Cor STIR Obl▶ sacrum If contrast given: Cor T1 FAT +c ▶ sacrum	VETERBROPLASTY Add: Sag FSTIR & Ax T1 through compressed vertebrae
---	--	--

Sag 3d Fiesta (NAT) Non Accidental Trauma (found in 3d spine folder)	
--	--

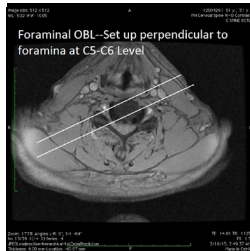
TRICKS for MRA-AVM: Multihance Request: MRA Spinal Canal w contrast Peds: .05 mmol/kg per inj. ADULTS: 10 mL per inj. MAX 20 mL inj @ 2mL/sec Monitored, 2 injections 1. Sag TRICKS 2. Cor TRICKS ▶ scan mask, scanner pauses, inject and scan with a 5 second scan delay (2 seconds for small peds) May request "slow flow"	SCREENING LOCS—UPPER/LOWER SAG SSFSE Localizers—Place Sat bands so Abdomen doesn't show in the FOV Spondylo CUBE—ONLY RUN Sag T2 CUBE in addition to routine protocol. If scanner has oZTEo (Artists, MR5, MR6, SMC3) Instead of CUBE, Scan Sag oZTEo *Peds can protocol a "SPONDYLO" protocol. See AFCH SPINE	TRAUMA: C-sp: Add: Cor CUBE STIR (if issues or not available run Cor T2 IDEAL) Add: Sag 3D FIESTA 14 FOV (Centered over C2 (midbrain through C4) SHIM T and L spine. Add: Cor T2 IDEALarc L-SP ADD: Sag FSTIR
--	--	--

FOR METAL: Use MARS **T2 FAT-use STIR **T1 FAT Take off FAT SAT IDEAL ONLY if requested **If images are undiagnostic, MR3, MR4, and TAC1 have a "MAVRIC Spine" protocol. Pt can be brought back if deemed necessary by radiologist or if already on scanner you can TRY to run a SAG T1 MAVRIC, SAG FLUID MAVRIC, Ax PD MAVRIC, and Ax FLUID MAVRIC.

Cervical Spine Set up:

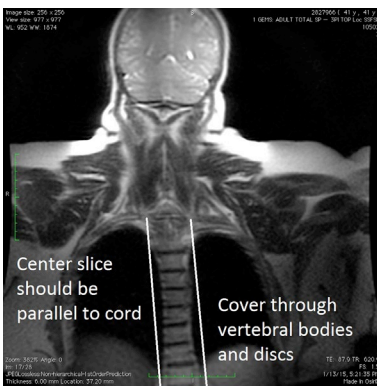


Foraminal OBL SAG:

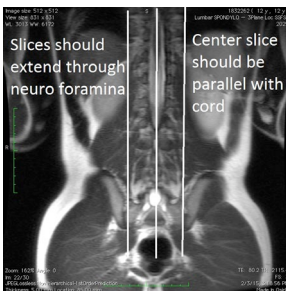


Thoracic Spine Set up:

****Back to Protocol****



Lumbar Spine Set up:



- MSK--When scanning a lumbar spine with a disc higher than the surgical site (lower 3 Lsp. Discs), acquire an upper T2 through the disc. A pre/post contrast axial T1 in an area other than surgical site is not needed.
 - **No upper axial T1 imaging needed for herniated disc for MSK L-spine**