

SPINE EXAMS

2-1-2021

OK to Decrease FOV for anatomy, no need to adjust other parameters! **C-Spine Sag shouldn't cover lower than T-3**, 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.

CERVICAL SPINE

****Add Foraminal Obl Sag T2 if protocolled by community rads as a C-sp w/o. No need to run obl if it's ordered with contrast, or with a total spine order. Please run even if they have had a prior surgery/fusion. Thanks.**

1. 3 pl loc
2. Sag T1 ****IMAGES****
3. Sag T2
4. Sag FSTIR (STIR PROPELLER on 750w scanners)
5. Ax T1
6. Ax T2* MERGE (Ax T2 FRFSE for metal)
▶ **OPTIONAL CONTRAST**
7. +c Sag T1 fat sat --SHIM on 3T
8. +c Ax T1 fat sat (no fat for MS or Drop Mets)-SHIM 3T

OPT Contrast:
Multihance
.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 ****IMAGES****
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

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
8. +c Sag T1 fat sat **SHIM on 3T**
9. +c Ax T1 fat sat (no fat for MS or Drop Mets) **SHIM on 3T**

Can scan upper/lower axials for better fat sat and so they are angled to the disc spaces

OPT Contrast:
Multihance
.1 mmol/kg
max 20 mL
Low eGFR
inpatient dosing:
no change
****IMAGES****

LUMBAR SPINE

1. 3 pl loc ****IMAGES****
2. Sag T1 **Superior FOV at top of T-11**
▶ Cover through neuro foramina
3. Sag T2 fat sat **Superior FOV at top of T-11**
4. Sag PD
5. Ax T2 **Bottom 3 disks, higher as needed**
▶ Extend axials through terminal end of thecal sac
▶ **OPTIONAL CONTRAST**
6. Ax T1 PRE contrast **Bottom 3 disks, higher as needed**
7. +c Sag T1 fat sat **Superior FOV at top of T-11**
8. +c Ax T1 fat sat **Bottom 3 disks, higher as needed**
SHIM FAT SAT Sequences on 3T
****Add Sag PD MAVRIC and Sag FLUID MAVRIC if requested by Dr. Bice---request should mention "MAVRIC" Please e-mail Megan with examples. Thank you**

OPT Contrast:
Multihance
.1 mmol/kg
max 20 mL
Low eGFR
inpatient dosing:
no change

QUICK SPINE (Syrinx or Tethered Cord/Dimple)

1. 3 pl loc ssfse TOP **INCLUDE SKULL BASE**
2. 3 pl loc ssfse BOT **INCLUDE COCCYX**
3. Sag T2 SSFSE TOP **PLACE Ant SAT**
4. Cor T2 SSFSE TOP **PLACE Ant SAT**
5. Sag T2 SSFSE BOT **PLACE Ant SAT**
6. Cor T2 SSFSE BOT **PLACE Ant SAT**
7-10. Ax T2 SSFSE C, T & L sp (thru Coccyx) **PLACE Ant SAT**
STOP if protocolled Syring
If protocol Tethered Cord/Dimple add:
run when child at calmest
7. Ax T1 FSE T-11- Coccyx **PLACE Ant SAT**
8. Sag T1 FSE T-11- Coccyx **PLACE Ant SAT**
Repeat Sag T1 with 2 nex if motion. Important scan to repeat

USE ANTERIOR SAT BAND ON SAGITTALS

REPEAT ONLY ONCE!

PLACE MARKER TO THE RIGHT OF THE DIMPLE IF THERE IS ONE.

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 - 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 1 slice - midline cord, center at C-3
OPTIONAL: FLEXION & EXTENSION:
4. 3 pl loc FLEX 5. FLEX Sag T2 7 - 8 slices, anatomical images
6. 3 pl loc EXT 7. EXT Sag T2 7 - 8 slices, anatomical images

Peripheral gating

+C ONLY Total Spine Drop Mets

****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

Contrast:
Multihance
.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-ALLI 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. T Ax T2 FRFSE (No fat)/Peds Ax T2* GRE
9. L Ax T2
****only do Pre-Ax T1 if requested or looking for tethered cord (T8-Coccyx)**
▶ **OPTIONAL CONTRAST (Multihance .1mmol/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 Drop Mets, MS, intra dural pathologies use +c Ax T1 no fat**
****All MSK and some neuro cases use Ax T1 FAT **call rad if unsure**

****OK to do upper/lower axials in 0-2yr olds****

TOTAL SPINE 3 PARTS (6YR OLD-ADULT)

1. 3 pl loc **TO INCLUDE SKULL BASE**
2. 3 pl loc BOT **INCLUDE COCCYX**
3. C-Sag T1 6. T-Sag T1 9. L-Sag T1
4. C-Sag T2 FAT 7. T-Sag T2 FAT 10. L-Sag T2 FAT
5. C-Ax T2 * MERGE 8. T-Ax T2 FRFSE 11. L-Ax T2 (T-Peds Ax T2 * GRE)
****only do Pre-Ax T1 if requested or looking for tethered cord (T8-Coccyx)**
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 Drop Mets, MS, intra dural pathologies use +c Ax T1 no fat**
****All MSK and some neuro cases use Ax T1 FAT**
****call rad if unsure**

Contrast:
Multihance
.1 mmol/kg
Max 20 mL
Low eGFR
inpatient dosing:
no change

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

TRAUMA: (C, T and L spine)
Add: Cor T2 IDEALarc
C-SP ADD: Sag T2 fat sat (instead of Sag T2)
L-SP ADD: Sag FSTIR
CCJ Trauma (3T ONLY):
Ax PD CUBE FOCUS—C1-C3

Tethered Cord:
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):
Cor SSFSE upper & lower
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"

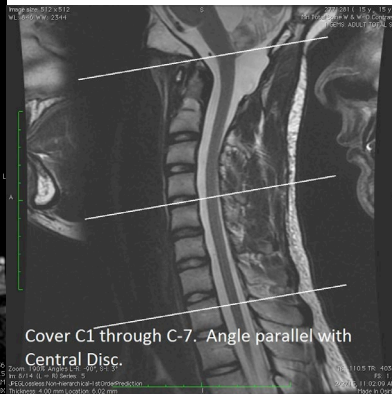
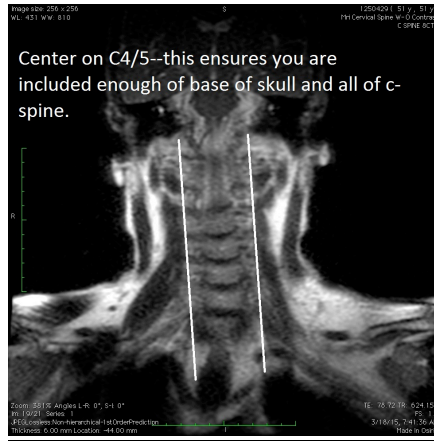
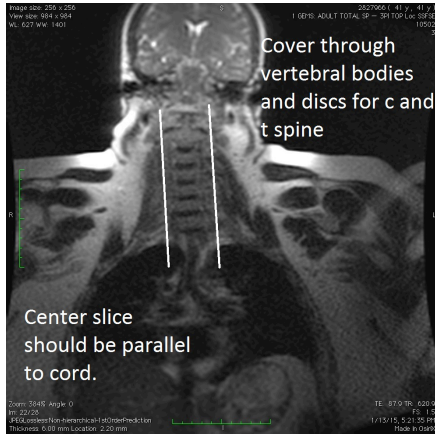
SCREENING LOCS—
UPPER/LOWER SAG SSFSE
Localizers—Place Sat bands so Abdomen doesn't show in the FOV
Spondylo CUBE—ONLY RUN Sag T2 CUBE in addition to routine protocol.
PEDS can protocol a "SPONDYLO" protocol. See AFCH SPINE

Osseous METS:
1. Sag FSPGR InPhase
2. Sag FSPGR Out of Phase
3. Ax DWI b900 (diff dir 3in1)—post process ADC map in Functool— send to ALI

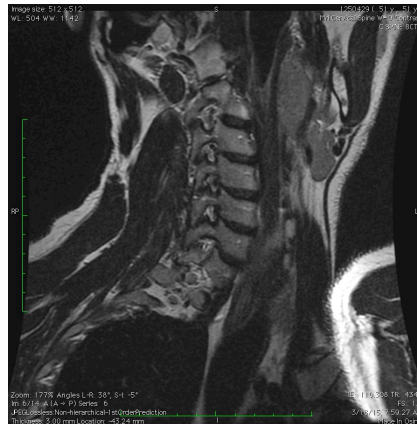
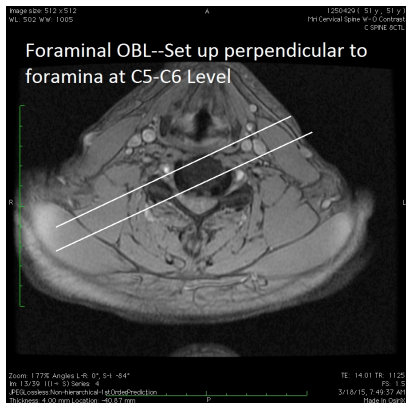
****PLACE ANTERIOR SAT ON ALL AXIAL AND SAGITTAL SEQUENCES**

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:

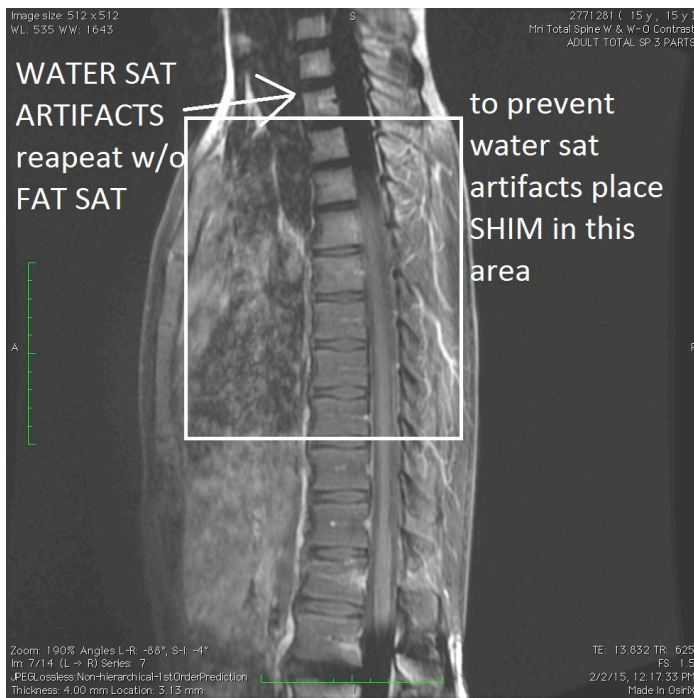
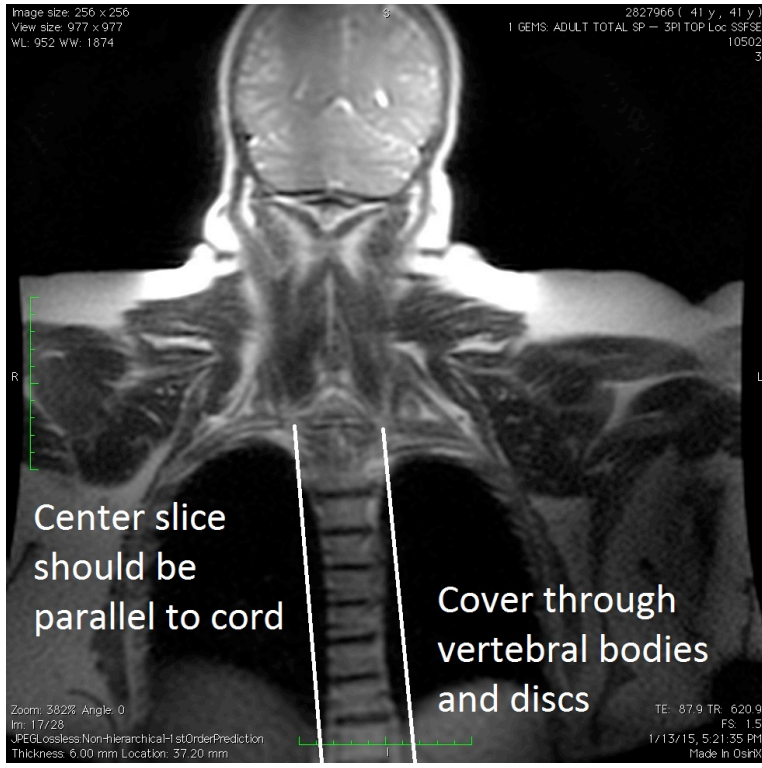


Foraminal OBL SAG:



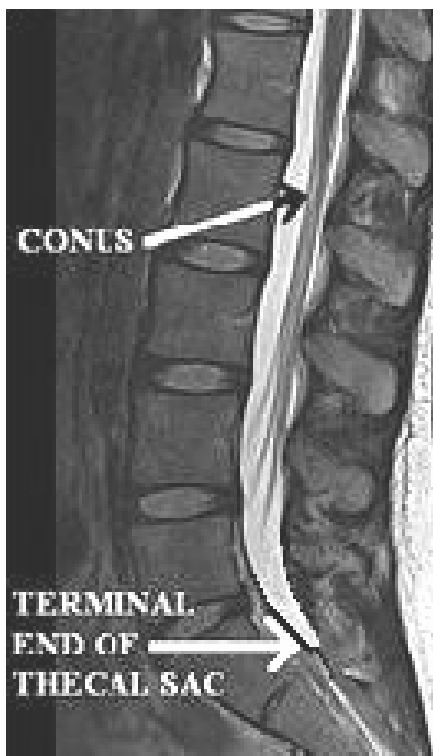
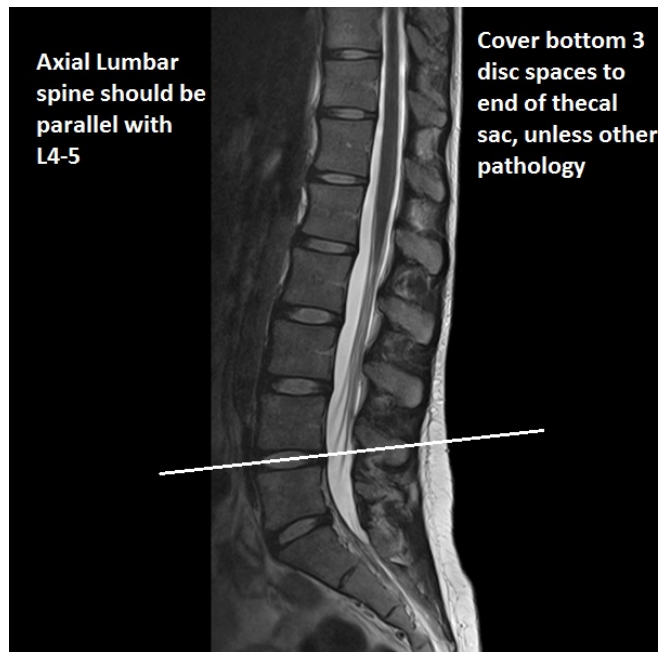
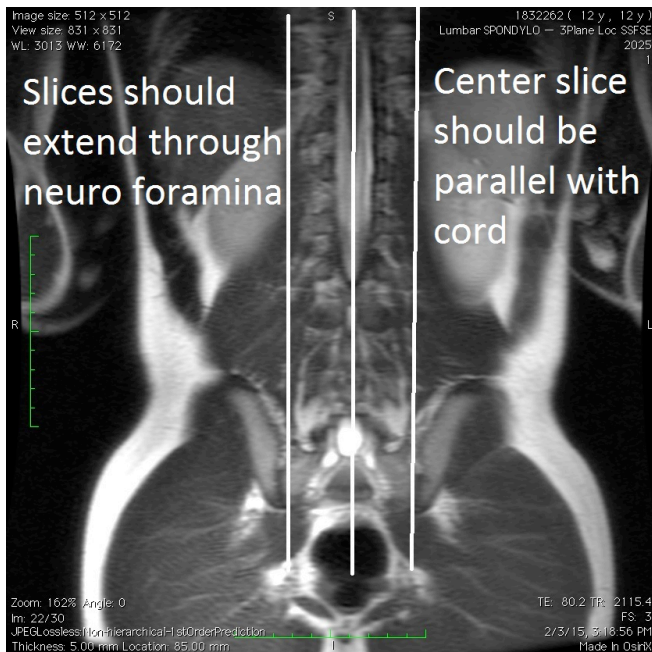
****Back to Protocol****

Thoracic Spine Set up:



****Back to Protocol****

Lumbar Spine Set up:



****Back to Protocol* ***

- 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:**