NEURO MRI PROTOCOLS

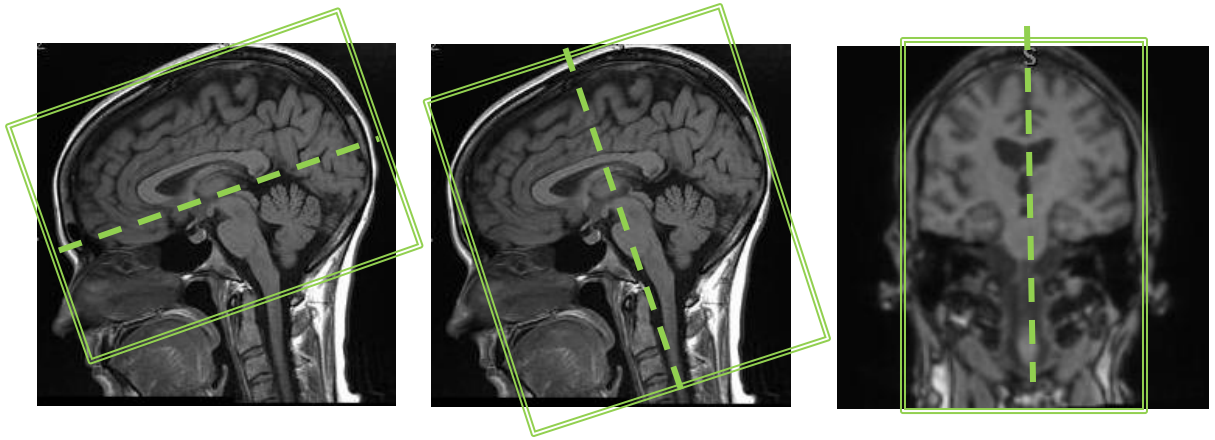
Updated
8/27/2021

BRAIN		NECK	
Brain (-) (+/-)	Orbits (+/-)	Brachial Plexus (-) (+/-)	Soft Tissue Neck (+/-)
Quick Brain (-)	Face (+/-)		
Infant Brain 0-2 yrs. (-) (+/-)	Skull Base (+/-)		
Pedi Brain 2-12 yrs. (-) (+/-)	Pituitary (+/-)	SPINE	
Brain (-) / MRA Cow (-) / MRA Neck (+/-)	Brain + Perfusion (+/-)		
MRA Head Post Coil (-) (Eskey) (***3T Only***)	Diamox Perfusion (+/-)	Single Level Spine	Total Spine
MRA (NEW) Aneurysm (+/-)	Radiation Oncology/Therapy (RT) (+/-)	Cervical Radiculopathy (-)	Bone Mets (+/-)
MRA (No Coil) Aneurysm (-)	Fiducial Med-Stealth (+/-)	Cervical Routine (-) (+/-)	CSF Leak Spine (-)
MRV Head (-)	CSF Flow (-)	Diskitis/Osteo/Abscess Single Level (+/-)	Diskitis/Osteo/Abscess Two - Three Levels (+/-)
Dementia (-)	Sialography (+/-)	Thoracic Radiculopathy (-)	Drop Mets (+/-)
ESP (-)	IAC (+/-)	Thoracic Routine (-) (+/-)	Radiation Spine (+/-)
MS Brain (-) (+/-)	IAC (Cholesteatoma) (+/-) (***3T Preferred***)	Lumbar Radiculopathy (-)	Scoliosis (-)
Pineal (+/-)	Pre-Cochlear Implant (-)	Lumbar Routine (-) (+/-)	Spinal MRA (+/-)
Trigeminal (+/-) (***3T Only***)	TMJ (-)	Lumbar Cauda Equina (-)	Tethered Cord (-)
Oropharyngeal Mass (+/-) (***3T Only***)		Sacrum (-) (+/-)	

Brain (+/-)

Sagittal T1
Axial DWI
Axial T2 FS FLAIR
Axial SWI
Axial T1
Axial T2 **Post**
Sagittal T1 FS Space **Post**
- *(Axial + Coronal Reformat)*

*****IF MASS OR MET SEEN*****
Axial BRAVO **Post**



Axial **Coronal** **Sagittal**

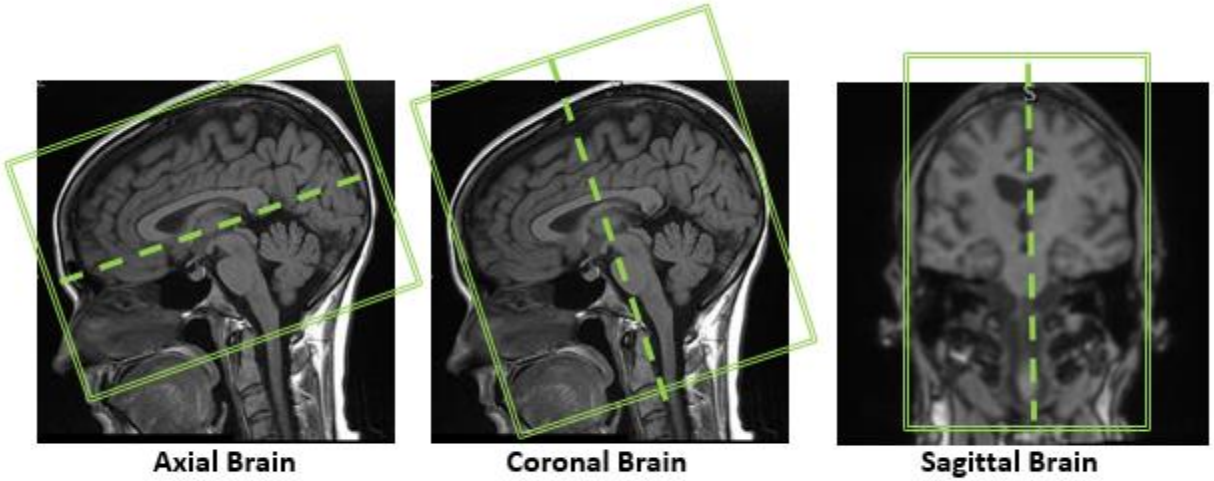
Brain (-)

Sagittal T1, Axial DWI, Axial T2 FS FLAIR, Axial T2, Axial SWI

Sequence	TR	TE	FOV		SLICE	GAP	MATRIX		PHASE DIR	NEX	SCAN DIR	OTHER
			FREQ	PHASE			PHASE	FREQ				
SAG T1	2000	9	240	100	5	1	256	320	A/P	1	L->R	
AX DWI	6400	98	220	100	5	1	192	192	A/P	3	F->H	b-values 0 and 1,000
AX T2 FS FLAIR	9000	81	220	75	5	2	168	320	R/L	1	F->H	
AX SWI	27	20	220	90.6	1.5	.3	220	256	R/L	1	F->H	
AX T1 Pre	2000	9	220	75	5	2	180	320	R/L	2	F->H	
AX T2 Post	5000	100	220	75	5	2	228	512	R/L	2	F->H	
SAG T1 FS Space Post	700	18	240	100	1	0	256	256	A/P	1	L->R	
*****IF MASS OR MET SEEN*****												
AX BRAVO Post	1470	2.62	260	100	1.8	0.75	320	320	A/P	1	F->H	No Angle

Quick Brain (-)

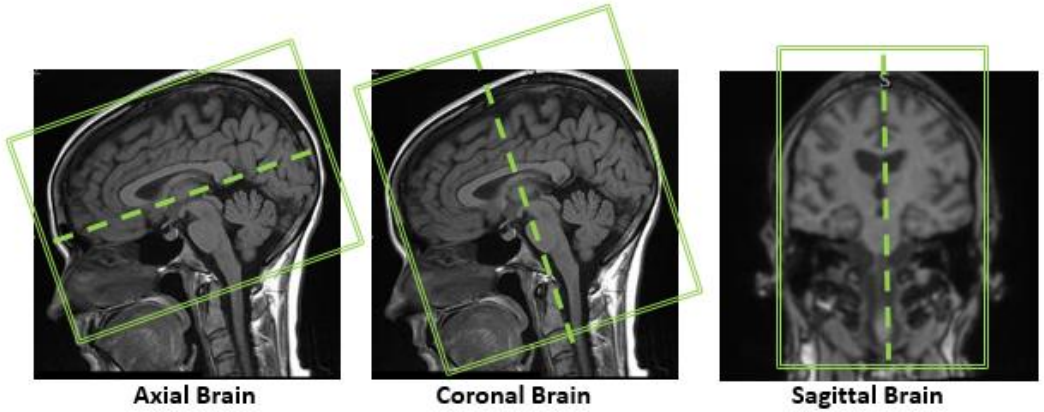
Sagittal T2 SSFSE
Axial T2 SSFSE
Coronal T2 SSFSE



Sequence	TR	TE	FOV		SLICE	GAP	MATRIX		PHASE DIR	NEX	SCAN DIR	OTHER
			FREQ	PHASE			PHASE	FREQ				
SAG T2 SSFSE	1500	80	220	100	5	1	256	320	A/P	1	L->R	
AX T2 SSFSE	1500	80	220	100	5	1	256	320	R/L	1	F->H	
COR T2 SSFSE	1500	80	220	100	5	1	256	320	R/L	1	P->A	

Infant Brain 0-2 Yrs. (+/-)

Sagittal T1
Axial DWI
Axial T2
Axial T2 FLAIR
Axial T1
Coronal BRAVO
Axial SWI
Axial T1 **Post**
Coronal T1 FS **Post**
Axial BRAVO **Post -** *(Sagittal Reformat)*



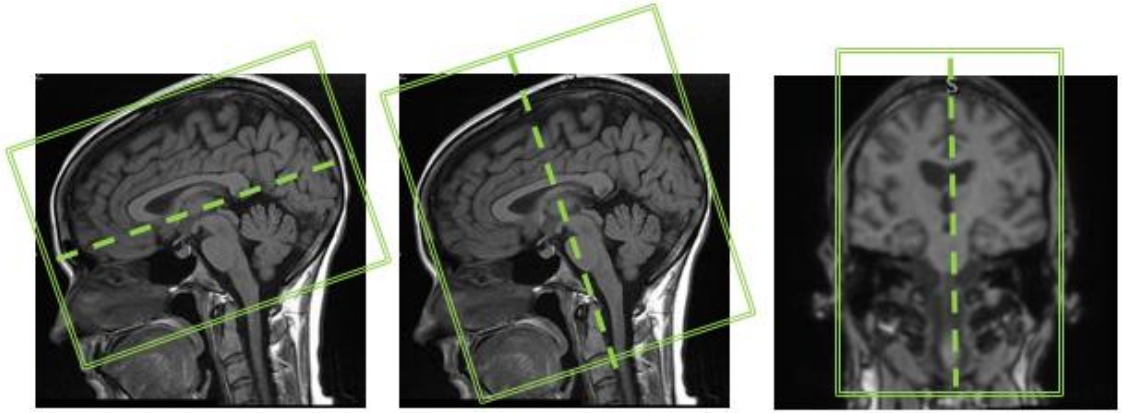
Infant Brain 0-2 Yrs.(-)

Sagittal T1, Axial DWI, Axial T2, Axial T2 FLAIR, Axial T1, Coronal Bravo, Axial SWI

Sequence	TR	TE	FOV		SLICE	GAP	MATRIX		PHASE DIR	NEX	SCAN DIR	OTHER
			FREQ	PHASE			PHASE	FREQ				
SAG T1	650	7.1	160	100	3	1	205	256	A/P	2	L->R	
AX DWI	7100	104	200	100	3	1	192	192	A/P	3	F->H	b-values 0, 800 and 1,000
AX T2	4240	113	180	75	3	1	269	448	R/L	2	F->H	
AX T2 FLAIR	9000	81	180	100	4	1	224	320	R/L	2	F->H	
AX T1	418	8.2	180	75	3	1	154	256	R/L	2	F->H	
COR BRAVO	1900	2.65	180	100	1.5	.75	256	256	R/L	1	A->P	
AX SWI	27	20	220	90.6	1.8	.3	220	256	R/L	1	F->H	
AX T1 Post	418	8.2	180	75	3	1	154	256	R/L	2	F->H	
COR T1 FS Post	541	10	160	100	3	1	240	320	R/L	3	A->P	
AX BRAVO Post	1470	2.62	260	100	1.5	.75	256	256	R/L	1	F->H	No angle

Pedi Brain 2-12 Yrs. (+/-)

Sagittal T1
Axial DWI
Axial T2
Axial T2 FLAIR
Axial T1
Axial SWI
Axial T1 **Post**
Coronal T1 FS **Post**
Axial BRAVO **Post** – *(Sagittal Reformat)*



Axial Brain | Coronal Brain | Sagittal Brain

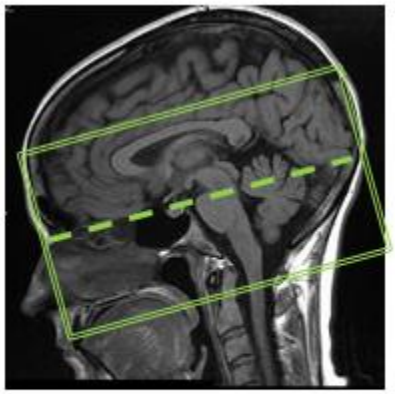
Pedi Brain 2-12 YRS. (-)

Sagittal T1, Axial DWI, Axial T2, Axial T1, Axial FLAIR, Axial SWI

Sequence	TR	TE	FOV		SLICE	GAP	MATRIX		PHASE DIR	NEX	SCAN DIR	OTHER
			FREQ	PHASE			PHASE	FREQ				
SAG T1	650	7.1	180	100	3	1	205	256	A/P	2	L->R	
AX DWI	7100	98	220	100	4	1	192	192	A/P	3	F->H	b-values 0 and 1,000
AX T2	4240	113	180	100	4	1	358	448	R/L	2	F->H	
AX T2 FLAIR	9000	81	180	100	4	1	224	320	R/L	2	F->H	
AX T1	418	6.4	180	100	4	1	205	256	R/L	2	F->H	
AX SWI	27	20	220	90.6	1.8	.3	220	256	R/L	1	F->H	
AX T1 Post	418	6.4	180	100	4	1	205	256	R/L	2	F->H	
COR T1 FS Post	541	10	160	100	4	1	240	320	R/L	2	A->P	
AX BRAVO Post	1470	2.62	260	100	1.5	.75	256	256	R/L	1	F->H	No angle

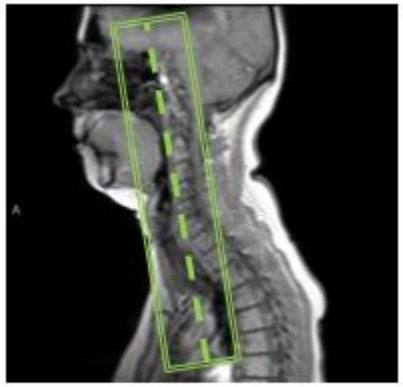
Brain (-)/ MRA Cow (-)/ MRA Neck (+/-)

Sagittal T1
Axial DWI
Axial T2 FS FLAIR
Axial T2
3D TOF COW
Axial SWI
2D PC NECK
Axial 2D TOF
Coronal TRICKS
IF DISSECTION:
Axial T1 FS DIXON



Axial TOF COW

Axial 2D TOF Neck/AX T1 FS Dixon



Coronal Tricks

Sequence	TR	TE	FOV		SLICE	GAP	MATRIX		PHASE DIR	NEX	SCAN DIR	OTHER
			FREQ	PHASE			PHASE	FREQ				
SAG T1	2000	9	240	100	5	1	256	320	A/P	1	L->R	
AX DWI	6400	98	220	100	5	1	192	192	A/P	3	F->H	
AX T2 FS FLAIR	9000	81	220	75	5	2	168	320	R/L	1	F->H	
AX T2	5000	100	220	75	5	2	288	512	R/L	2	F->H	
3D TOF COW	21	3.43	200	90.6	.5	-4	275	320	R/L	1	F->H	
AX SWI	27	20	220	90.6	1.8	.3	220	256	R/L	1	F->H	
2D PC NECK	21	7.3	300	59.4	5	2.5	106	256	A/P	1	L->R	
AX 2D TOF	400	3.9	240	75	3.5	-.9	192	256	A/P	1	F->H	
COR TRICKS	3.17	1.18	260	100	1	0	256	256	R/L		A->P	
*****OPTIONAL IF QUESTIONING DISSECTION*****												
AX T1 FS DIXON	668	12	200	100	3	1	288	384	A/P	1	F->H	

MRA Post Coil (-) (3T Only)

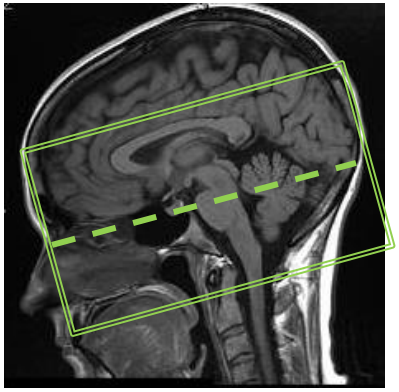
For patients being followed for aneurysm recurrence after treatment (coiling)

2D PC

Axial 3D TOF

*Optional

Axial 3D Dynamic Contrast Enhanced 3 Phases



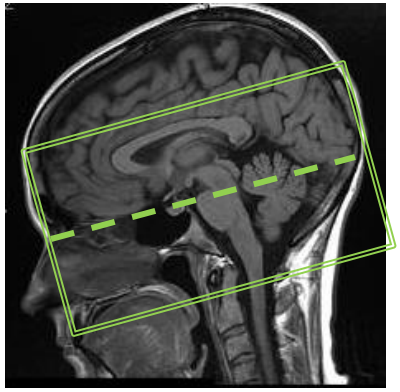
Axial – to include coil

Sequence	TR	TE	FOV		SLICE	GAP	MATRIX		PHASE DIR	NEX	SCAN DIR	OTHER
			FREQ	PHASE			PHASE	FREQ				
2D PC	21	7.3	300	59.4	5	2.5	106	256	A/P	1	L->R	
AX 3D TOF	23	3.98	200	90.6	.5	-4.0	464	512	R/L	1	F->H	Include coil
*****OPTIONAL*****												
AX 3D DYNAMIC CE X 3	3.58	1.36	250	81.3	1.10	.22	270	416	R/L	1	F->H	

MRA (NEW) Aneurysm (+/-)

3T Siemens Only

For patients with a newly discovered aneurysm
Radiologist to determine "Space" coverage
2D PC
Axial 3D TOF
Space (vessel wall imaging)
At the site of the aneurysm
Space (vessel wall imaging) **Post**
At the site of the aneurysm

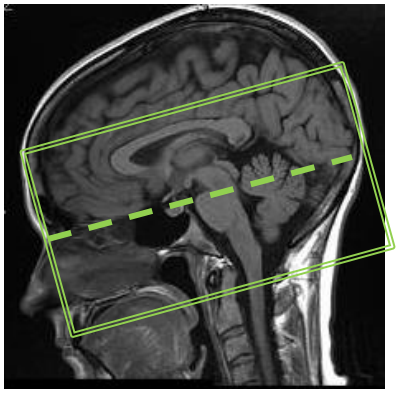


Axial – to include coil

Sequence	TR	TE	FOV		SLICE	GAP	MATRIX		PHASE DIR	NEX	SCAN DIR	OTHER
			FREQ	PHASE			PHASE	FREQ				
2D PC	21	7.3	300	59.4	5	2.5	106	256	A/P	1	L->R	
AX 3D TOF	23	3.98	200	90.6	.5	-4.0	464	512	R/L	1	F->H	Include coil
SPACE	938	25	160	100	0.5	0	320	320	R/L	1	F->H	
SPACE Post	938	25	160	100	0.5	0	320	320	R/L	1	F->H	

MRA (No Coil) Aneurysm (-)
3T Siemens Only

For patients with a known aneurysm being following for aneurysm growth
Excludes patients with previously treated coiling, stenting, or clipping
Radiologist to determine "Space" coverage



Axial – to include the aneurysm

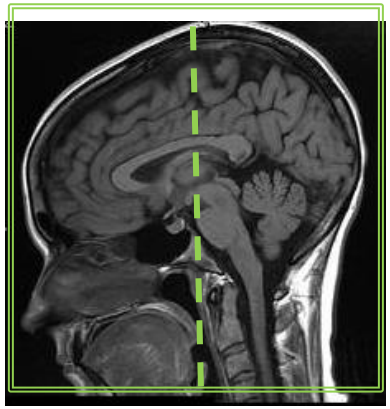
2D PC
Axial 3D TOF
Space (vessel wall imaging)
At the site of the aneurysm

Sequence	TR	TE	FOV		SLICE	GAP	MATRIX		PHASE DIR	NEX	SCAN DIR	OTHER
			FREQ	PHASE			PHASE	FREQ				
2D PC	21	7.3	300	59.4	5	2.5	106	256	A/P	1	L->R	
AX 3D TOF	23	3.98	200	90.6	.5	-4.0	464	512	R/L	1	F->H	Include coil
SPACE	938	25	160	100	0.5	0	320	320	R/L	1	F->H	

MRV Head (-)

VESSEL SCOUT

Coronal 2D MRV

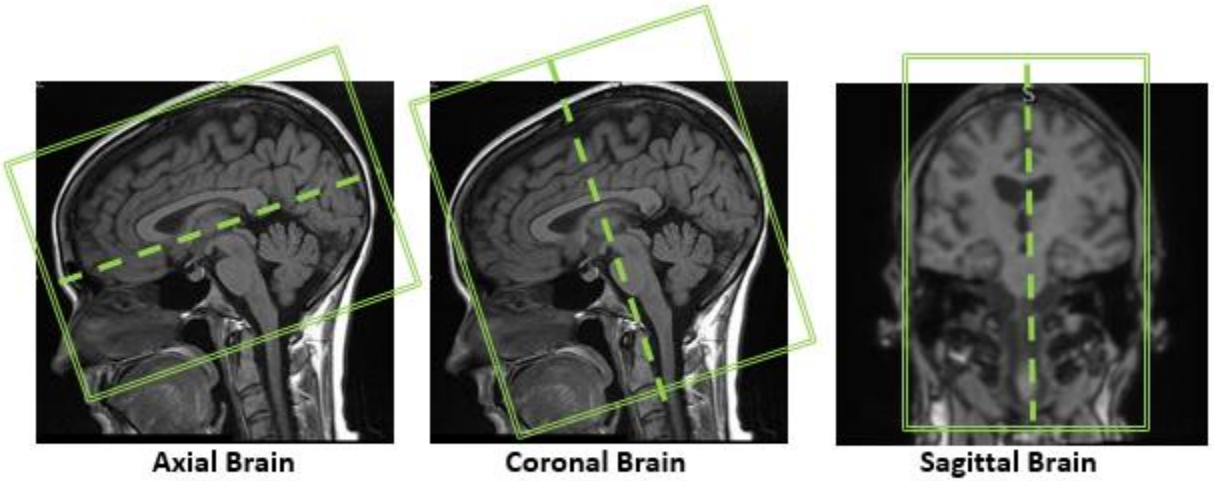


COR 2D MRV

Sequence	TR	TE	FOV		SLICE	GAP	MATRIX		PHASE DIR	NEX	SCAN DIR	OTHER
			FREQ	PHASE			PHASE	FREQ				
VESSEL SCOUT	23	8	300	71.9	6	3	138	256	A/P	1	L->R	
COR 2D MRV	19	4.56	250	100	2.5	-.8	256	256	R/L	1	A->P	PLACE INFERIOR SAT BAND BELOW SLICES

Dementia (-)

Sagittal T1
Axial DWI
Axial T2 FS FLAIR
Axial T2
Axial SWI
Coronal BRAVO
- (Sagittal + Axial Reformat)



Sequence	TR	TE	FOV		SLICE	GAP	MATRIX		PHASE DIR	NEX	SCAN DIR	OTHER
			FREQ	PHASE			PHASE	FREQ				
SAG T1	2000	9	240	100	5	1	256	320	A/P	1	L->R	
AX DWI	6400	98	220	100	5	1	192	192	A/P	3	F->H	
AX T2 FS FLAIR	9000	81	220	75	5	2	168	320	R/L	1	F->H	
AX T2	5000	100	220	75	5	2	228	512	R/L	2	F->H	
AX SWI	27	20	220	90.6	1.50	0.3	220	256	R/L	1	F->H	
COR BRAVO	1470	2.62	260	75	1.0	0.5	200	320	R/L	A	A->P	

ESP (-) (*3T GE Preferred)*

**coverage to include entire brain except coronal T2 thin oblique*

Axial DTI

Coronal BRAVO

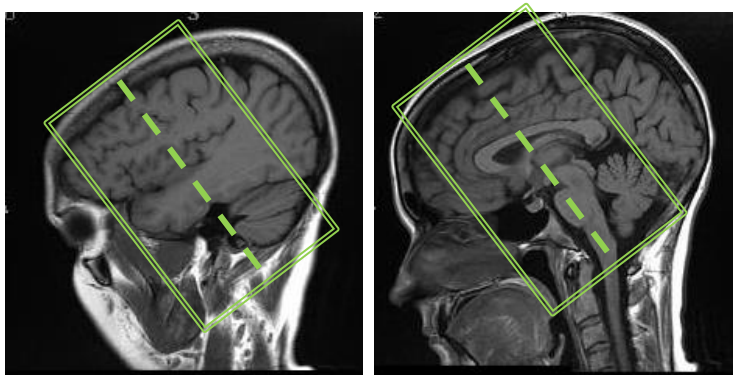
- *(Sagittal Reformat)*

Coronal T2 THIN OBL

Coronal 3D DIR

Coronal 3D FLAIR CUBE

Axial SWI



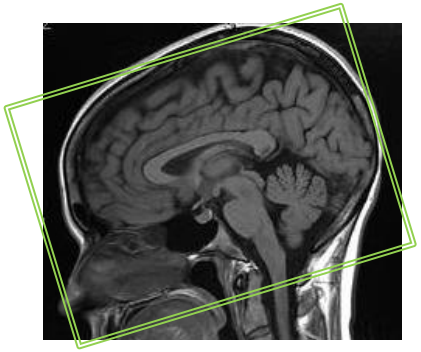
COR T2 Thin OBL

(Perpendicular to the Sylvian Fissure)

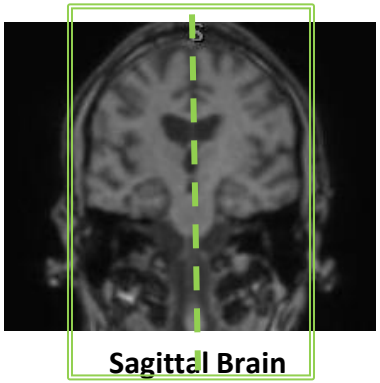
Sequence	TR	TE	FOV		SLICE	GAP	MATRIX		PHASE DIR	NEX	SCAN DIR	OTHER
			FREQ	PHASE			PHASE	FREQ				
AX DTI	8000	95	240	100	2	0.2	128	128	A/P	3	F->H	
COR 3D BRAVO	1470	2.62	220	75	1.50	0.75	320	320	R/L	1	A->P	
COR T2 Thin OBL	4250	79	200	100	1.50	0	346	384	R/L	2	A->P	
COR 3D DIR	6500	120	220	80	1.4	0	200	200	R/L	1	P->A	
COR 3D FLAIR CUBE	6200	76	220	80	1.4	0	240	240	R/L	1	P->A	
AX SWI	27	20	220	90.6	1.8	0.3	220	256	R/L	1	F->H	

MS Brain (-) (+/-)

**whole brain coverage*
Axial SPACE FLAIR
- (Sagittal Reformat)
AXIAL DWI
AXIAL T1
AXIAL T2 **Post**
AXIAL T1 **Post**
Optional
AXIAL T2 FLAIR Thin
SAGITTAL T2 FLAIR Thin



Axial Brain



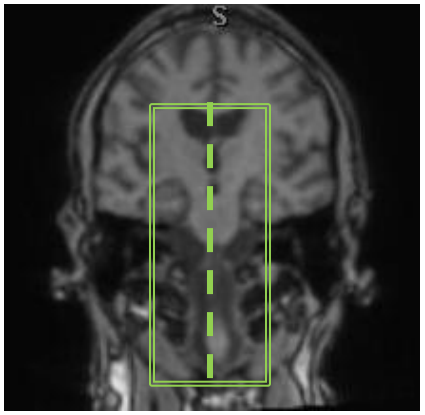
Sagittal Brain

IF MS BRAIN IS ORDERED WO, ADD AX T2 ALSO

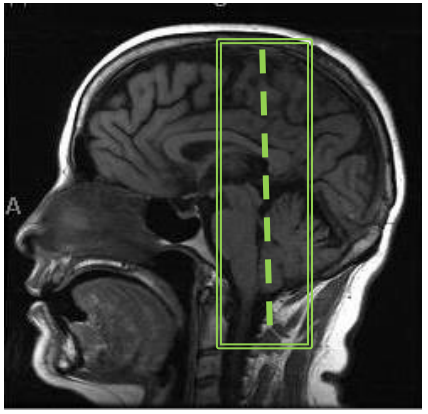
Sequence	TR	TE	FOV		SLICE	GAP	MATRIX		PHASE DIR	NEX	SCAN DIR	OTHER
			FREQ	PHASE			PHASE	FREQ				
AX Space Flair	5000	386	240	100	0.90	0	256	256	A/P	1	L->R	
AX DWI	6400	98	220	100	5	1	192	192	A/P	1	F->H	
AX T1	2000	9	220	75	3	0	180	320	R/L	2	F->H	
AX T2 Post	5000	100	220	75	3	0	288	512	R/L	2	F->H	
AX T1 Post	2000	9	220	75	3	0	180	320	R/L	2	F->H	
*****OPTIONAL*****												
SAG T2 FLAIR THIN	9000	84	240	100	3	0	224	320	A/P	1	L->R	
AX T2 FLAIR THIN	9000	81	220	75	3	0	168	320	R/L	2	F->H	

Pineal (+/-)

Sagittal T1 Thin
Axial T2
Axial T2 FS FLAIR
Sagittal 3D CISS
Axial T1
Axial T1 **Post**
Coronal T1 FS **Post**
Sagittal T1 Thin **Post**



Sagittal Thin

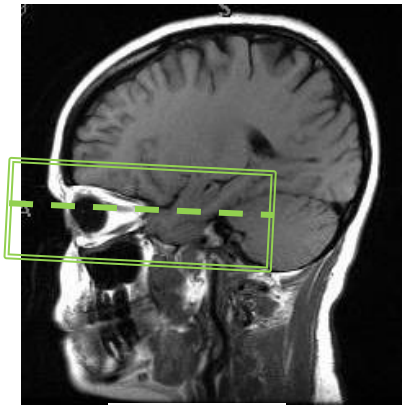


Coronal Thin

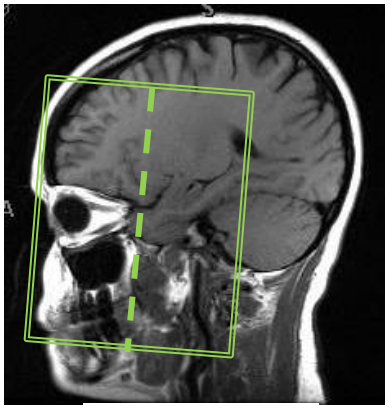
Sequence	TR	TE	FOV		SLICE	GAP	MATRIX		PHASE DIR	NEX	SCAN DIR	OTHER
			FREQ	PHASE			PHASE	FREQ				
SAG T1 THIN	650	6.7	180	100	2	1	205	256	A/P	3	L->R	
AX T2	5000	100	220	75	5	2	288	512	R/L	2	F->H	
AX T2 FS FLAIR	9000	81	220	75	5	2	168	320	R/L	1	F->H	
SAG 3D CISS	136	200	200	100	0.5	0	380	384	A/P	2	L->R	
AX T1	2000	9	220	75	5	2	180	320	R/L	2	F->H	
AX T1 Post	2000	9	220	75	5	2	180	320	R/L	2	F->H	
COR T1 FS Post	500	9	180	100	3	1	240	320	R/L	3	A->P	
SAG T1 THIN Post	650	6.7	180	100	2	1	205	256	A/P	1	L->R	

Orbits (+/-)

Sagittal T1
Coronal STIR
Axial T1 Thin
Coronal T1 Thin
Axial T1 Thin FS **Post**
Coronal T1 Thin FS **Post**



Axial Thin



Coronal Thin

Sequence	TR	TE	FOV		SLICE	GAP	MATRIX		PHASE DIR	NEX	SCAN DIR	OTHER
			FREQ	PHASE			PHASE	FREQ				
SAG T1	2000	9	240	100	5	1	256	320	A/P	1	L->R	
COR STIR	4000	47	180	100	3	1	192	256	R/L	3	A->P	
AX T1 THIN	600	6.4	180	100	3	.5	205	256	R/L	2	F->H	
COR T1 THIN	650	6.7	180	100	3	1	224	320	R/L	2	A->P	
AX T1 THIN FS Post	600	6.4	180	100	3	.5	205	256	R/L	2	F->H	
COR T1 THIN FS Post	650	6.7	180	100	3	1	224	320	R/L	2	A->P	

Face (+/-)

Coronal T1 Thin
Axial DWI Resolve
Axial T2 FS Thin
Coronal T2 FS Thin
Axial T1 Thin
Axial T1 Thin **Post**
Axial T1 FS Thin **Post**
Coronal T1 FS Thin **Post**

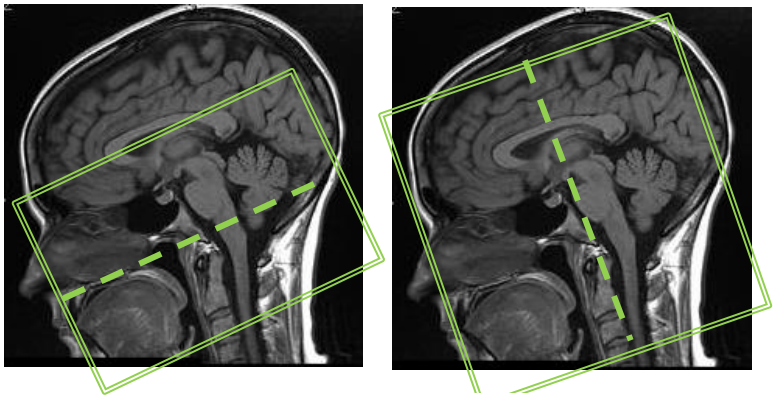
Coronal

Axial

Sequence	TR	TE	FOV		SLICE	GAP	MATRIX		PHASE DIR	NEX	SCAN DIR	OTHER
			FREQ	PHASE			PHASE	FREQ				
COR T1 THIN	400	6.6	180	100	3	1	320	320	R/L	2	A->P	
AX DWI RESOLVE	5100	1: 64 2: 103	220	100	3	1	160	160	A/P	1	F->H	
AX T2 FS THIN	3000	105	180	100	3	1	320	320	R/L	2	F->H	
COR T2 FS THIN	3000	105	180	100	3	1	320	320	R/L	2	A->P	
AX T1 THIN	650	6.7	180	100	3	1	320	320	R/L	2	F->H	
AX T1 THIN Post	650	6.7	180	100	3	1	320	320	R/L	2	F->H	
AX T1 FS THIN Post	488	6.7	180	100	3	1	320	320	R/L	2	F->H	
COR T1 FS THIN Post	310	9.2	180	100	3	1	320	320	R/L	3	A->P	

Skull Base (+/-)

Sagittal T1
Axial DWI
Axial T2 FS FLAIR
Axial T2 FS Thin
Coronal T2 FS Thin
Axial T1 Thin
Axial T1 FS Thin **Post**
Coronal T1 FS Thin **Post**

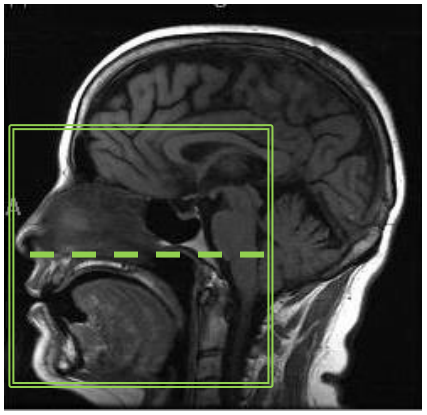


Axial Thin **Coronal Thin**

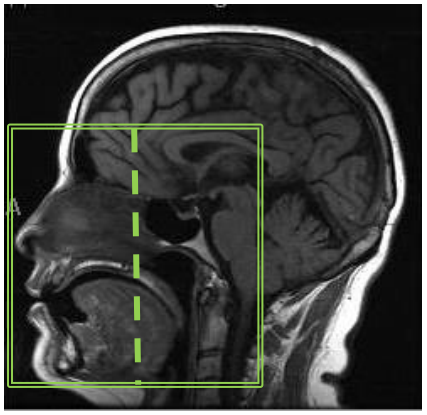
Sequence	TR	TE	FOV		SLICE	GAP	MATRIX		PHASE DIR	NEX	SCAN DIR	OTHER
			FREQ	PHASE			PHASE	FREQ				
SAG T1	600	9.9	180	100	3	1	320	320	A/P	2	L->R	
AX DWI	6400	98	220	100	5	1	192	192	A/P	3	F->H	
AX T2 FS FLAIR	9000	81	220	75	5	2	168	320	R/L	1	F->H	
AX T2 FS THIN	3000	105	200	100	3	1	320	320	R/L	2	F->H	
COR T2 FS THIN	4750	103	180	100	3	0.5	320	320	R/L	3	A->P	
AX T1 THIN	571	6.7	200	100	3	1	320	320	R/L	2	F->H	
AX T1 FS THIN Post	571	6.7	200	100	3	1	320	320	R/L	2	F->H	
COR T1 FS Thin Post	344	9	180	100	3	0.5	320	320	R/L	2	A->P	

Trigeminal (+/-) *(3T Only)*

Axial T2 FS FLAIR
Axial T2 Space
Coronal T2 FS Thin
Axial T1 Thin
Axial T1 FS Thin **Post**
Coronal T1 FS Thin **Post**
Axial Bravo **Post**



Axial Thin



Coronal Thin

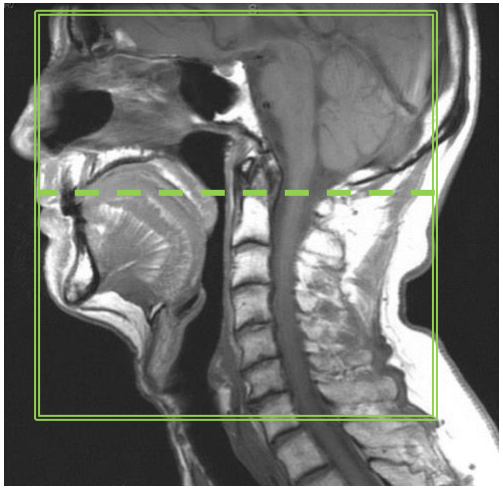
*****Axial Coverage - Top of Orbits – Bottom of Mandible*****
*****Coronal Coverage - Nose – Thru Posterior Brainstem*****

Sequence	TR	TE	FOV		SLICE	GAP	MATRIX		PHASE DIR	NEX	SCAN DIR	OTHER
			FREQ	PHASE			PHASE	FREQ				
AX T2 FS FLAIR	9000	89	220	75	5	2	168	320	R/L	1	F->H	Whole brain
AX T2 SPACE	1400	263	150	75	1	0	307	320	R/L	1	F->H	Thin section
COR T2 FS THIN	2430	107	150	100	3	1	358	448	R/L	2	A->P	Thin section
AX T1 THIN	400	6.4	180	100	3	1	205	256	R/L	2	F->H	Thin section
AX T1 FS THIN Post	400	6.4	180	100	3	1	205	256	R/L	2	F->H	Thin section
COR T1 FS THIN Post	500	10	150	100	3	1	240	320	R/L	2	A->P	Thin section
AX BRAVO Post	1470	2.62	260	100	1.5	0.75	320	320	A/P	1	F->H	No angle

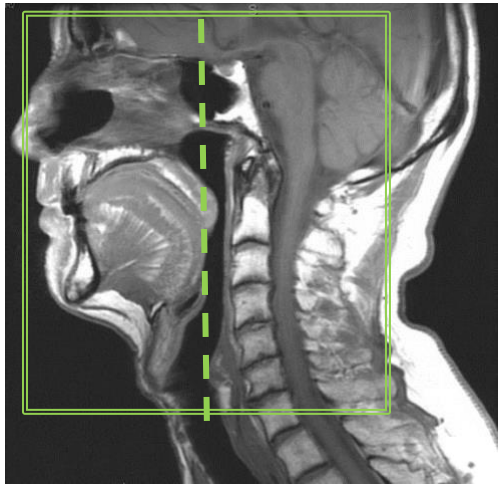
Oropharyngeal Mass (+/-) *(3T Only)*

**Coverage from the base of the orbits through C5/C6*

Axial DWI Resolve (whole neck)
Axial T1
Axial T2 FS DIXON
Axial T1 FS **Post**
Coronal T1 FS **Post**
Sagittal T1 FS **Post**



Axial

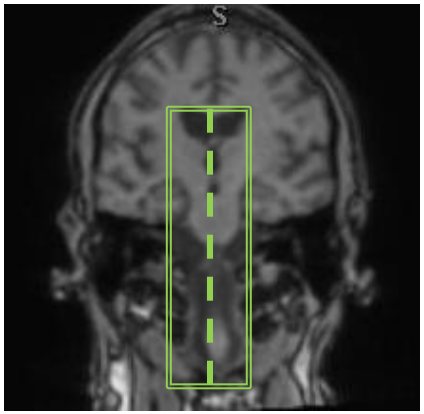


Coronal

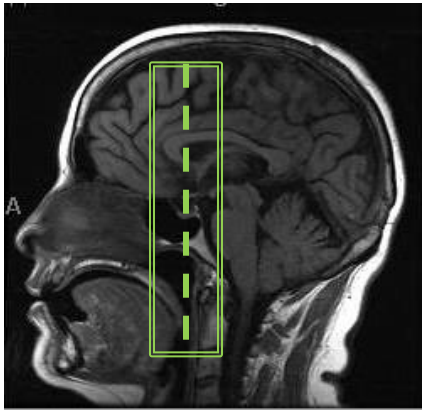
Sequence	TR	TE	FOV		SLICE	GAP	MATRIX		PHASE DIR	NEX	SCAN DIR	OTHER
			FREQ	PHASE			PHASE	FREQ				
AX DWI Resolve	5100	64/103	220	100	3	1	160	160	A/P	2	H->F	Whole neck
AX T1	500	11	180	100	3	1	261	384	A/P	3	H->F	
AX T2 FS DIXON	4290	76	180	100	3	1	288	384	A/P	1	H->F	
AX T1 FS Post	650	11	180	100	3	1	288	384	A/P	1	H->F	
COR T1 FS Post	650	11	180	100	3	1	288	384	R/L	1	A->P	
SAG T1 FS Post	650	11	180	100	3	1	288	384	S/I	1	L->R	

Pituitary (+/-)

Sagittal T1 Space
-(Coronal Reformat)
Coronal T2 Thin
Coronal T1 DYNAMIC
Sagittal T1 FS Space **Post**
-(Coronal Reformat)



Sagittal Thin

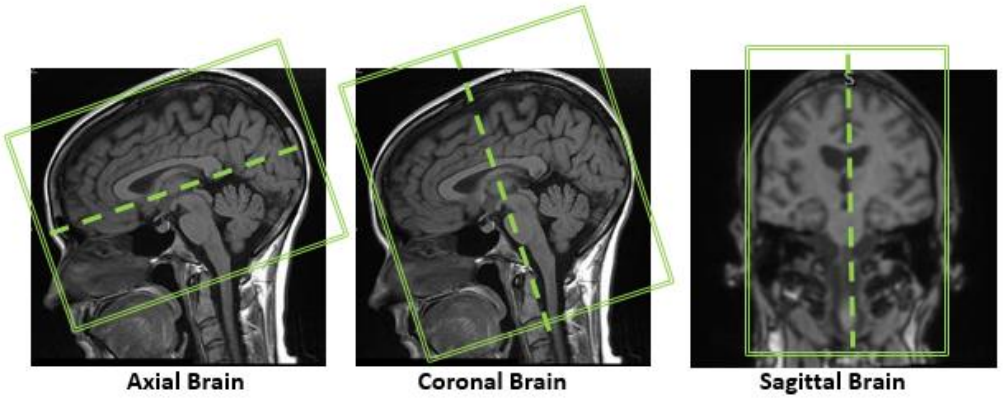


Coronal Thin

Parameters below are for reference. They DO NOT need to be exactly the same on the scanners.

Sequence	TR	TE	FOV		SLICE	GAP	MATRIX		PHASE DIR	NEX	SCAN DIR	OTHER
			FREQ	PHASE			PHASE	FREQ				
SAG T1 Space	600	30	120	100	1	0	224	224	A/P	2	L->R	
COR T2 THIN	4000	105	120	100	2	0	173	384	R/L	4	A->P	
COR T1 DYNAMIC	400	8.9	120	100	3	0	192	192	R/L	2	A->P	~ 3 slices through pituitary
Sag T1 FS Space Post	600	30	120	100	1	0	224	224	R/L	2	A->P	

Brain + Perfusion (+/-)



Sagittal T1
Axial DWI
Axial T2 FS FLAIR
Axial T1
Axial SWI
Axial Perfusion
****Injection at 5mL/second with an 8 second injection delay****
Axial T2 **Post**
Axial T1 **Post**
Coronal T1 FS **Post**
Axial BRAVO **Post**
Sagittal T1 FS Space **Post**
-(Axial Reformat)

*****Spectroscopy Optional*****

Sequence	TR	TE	FOV		SLICE	GAP	MATRIX		PHASE DIR	NEX	SCAN DIR	OTHER
			FREQ	PHASE			PHASE	FREQ				
SAG T1	2000	9	240	100	5	1	256	320	A/P	1	L->R	
AX DWI	6400	98	220	100	5	1	192	192	A/P	3	F->H	
AX T2 FS FLAIR	9000	81	220	75	5	2	168	320	R/L	1	F->H	
AX T1	2000	9	220	75	5	2	180	320	R/L	2	F->H	
AX SWI	27	20	220	90.6	1.50	0.3	220	256	R/L	1	F->H	
AX PERFUSION	1600	30	220	100	5	2	128	128	A/P	1	F->H	
AX T2 Post	5000	100	220	75	5	2	228	512	R/L	2	F->H	
AX T1 Post	2000	9	220	75	5	2	180	320	R/L	2	F->H	
COR T1 FS Post	345	12	220	100	5	2	224	320	R/L	2	A->P	
AX BRAVO Post	1470	2.62	260	100	1.5	0.75	320	320	A/P	1	F->H	No angle
SAG T1 FS Space Post	700	18	240	100	1	0	256	256	A/P	1	L->R	
*****OPTIONAL*****												
SVS SE 135	2000	135	20	20	N/A	N/A	Vector size: 1024			128		Flip Angle: 90 degrees

Diamox Perfusion (+/-)

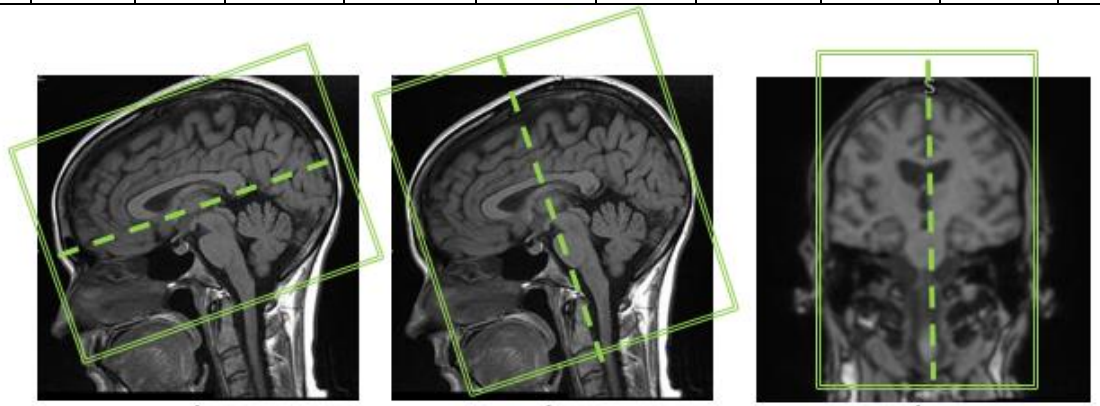
Diamox dosing:
Patients above 140lbs – 10mL
Patients under 140lbs – 17mg/kg
Symptoms of Diamox: feeling flushed and/or dizzy
Instruct patient to drink and rehydrate upon completion of exam
Instructions for scanning:

- *Have MD order Diamox prior to the scan*
- *Do routine brain protocol with first half dose perfusion*
- *MRI nurse will inject Diamox*
- *Wait 20 minutes post Diamox injection then run second half dose perfusion*

Sagittal T1
Axial DWI
Axial T1
Axial T2 FS FLAIR
Axial T2
Axial SWI
Axial Perfusion 1 (half dose of contrast – 5mL/second injection with 8 second injection delay)
Inject Diamox (nurse will inject) and wait 20 minutes before second perfusion
Axial Perfusion 2 (half dose of contrast– 5mL/second injection with 8 second injection delay)
Axial T1 **Post**
Axial BRAVO **Post**
Coronal T1 FS **Post**
Sagittal T1 FS Space **Post**

Diamox Perfusion (continued)

Sequence	TR	TE	FOV		SLICE	GAP	MATRIX		PHASE DIR	NEX	SCAN DIR	OTHER
			FREQ	PHASE			PHASE	FREQ				
SAG T1	2000	9	240	100	5	1	256	320	A/P	1	L->R	
AX DWI	6400	98	220	100	5	1	192	192	A/P	1	F->H	
AX T1	2000	9	220	75	5	2	180	320	R/L	2	F->H	
AX T2 FS FLAIR	9000	81	220	75	5	2	168	320	R/L	1	F->H	
AX T2	5000	100	220	75	5	2	288	512	R/L	2	F->H	
AX SWI	27	20	220	90.6	1.50	0.3	220	256	R/L	1	F->H	
AX PERFUSION 1	1600	30	220	100	5	2	128	128	A/P	1	F->H	Include the vertex of the brain
AX PERFUSION 2	1600	30	220	100	5	2	128	128	A/P	1	F->H	Include the vertex of the brain
AX T1 Post	2000	9	220	75	5	2	180	320	R/L	2	F->H	
AX BRAVO Post	1470	2.62	260	100	1.5	.75	320	320	A/P	1	L->R	
COR T1 FS Post	300	6.5	200	100	5	2	224	320	R/L	2	A->P	
SAG T1 FS Space Post	700	18	240	100	1	0	256	256	A/P	1	L->R	



RT Brain (+/-)

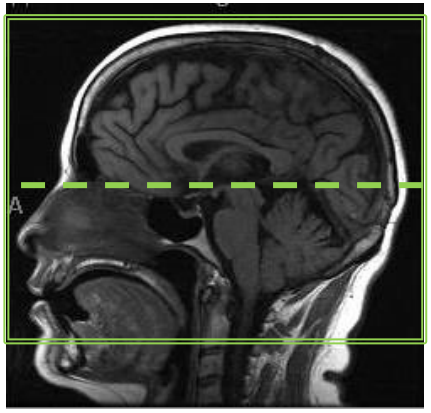
** Bravo should have no angle and should include the nose*

Axial BRAVO

Axial T2 FS FLAIR **Post**

Axial T1 **Post**

Axial BRAVO **Post**



Sequence	TR	TE	FOV		SLICE	GAP	MATRIX		PHASE DIR	NEX	SCAN DIR	OTHER
			FREQ	PHASE			PHASE	FREQ				
AX BRAVO	1900	2.55	240	100	1.5	0.75	256	256	R/L	1	F->H	No angle
AX T2 FS FLAIR Post	9000	81	220	75	3	0	168	320	R/L	1	F->H	
AX T1 Post	2000	9	220	75	5	2	180	320	R/L	2	F->H	
AX BRAVO Post	1900	2.55	240	100	1.5	0.75	256	256	R/L	1	F->H	No angle

Fiducial Medstealth (+/-)

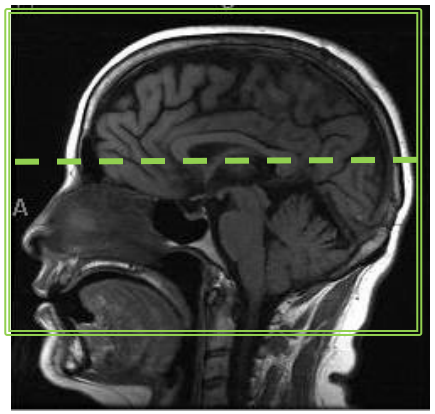
**straight axial images to include the nose*

Axial BRAVO

Axial BRAVO **Post**

Optional if tumor does not enhance:

Axial T2 Thin **Post**



Axial Bravo

Sequence	TR	TE	FOV		SLICE	GAP	MATRIX		PHASE DIR	NEX	SCAN DIR	OTHER
			FREQ	PHASE			PHASE	FREQ				
AX BRAVO	1900	2.55	240	100	1.5	.75	256	256	R/L	1	F->H	No angle
AX BRAVO Post	1900	2.55	240	100	1.5	.75	256	256	R/L	1	F->H	No angle
*****OPTIONAL IF TUMOR DOES NOT ENHANCE*****												
AX T2 THIN Post	3000	103	220	100	2	0	358	448	R/L	2	F->H	
*****OPTIONAL SEQUENCES TO BE DONE BEFORE CONTRAST IF NEEDED*****												
AX DTI	8000	95	240	100	2	.2	128	128	A/P	3	F->H	
AX 3D TOF	21	3.43	200	90.6	.5	-4	275	320	R/L	1	F->H	Whole brain TOF

CSF Flow (-)

Use the pulse oximeter

**One slice centered at the foramen magnum*

Sagittal CINE PC (flash_5_in-plane)

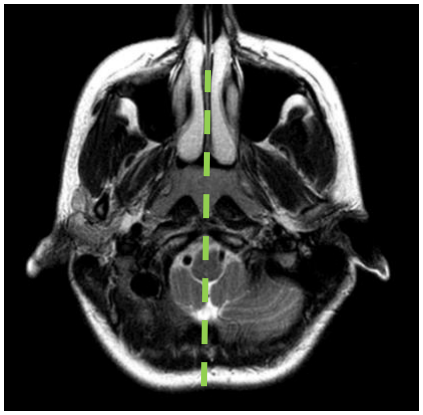
- One sagittal slice centered at the midline of the foramen magnum

Sagittal CINE PC (flash_10_in-plane)

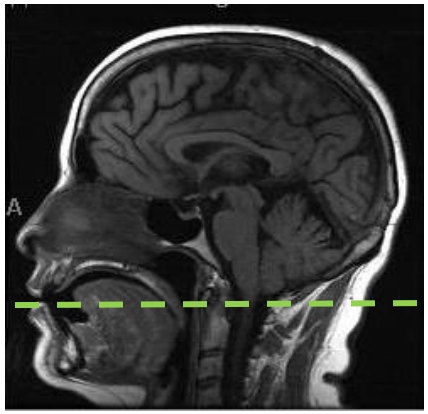
- One sagittal slice centered at the midline of the foramen magnum

Axial CINE PC (flash_10_through-plane)

- One axial slice at the foramen magnum



Sagittal/In-Plane

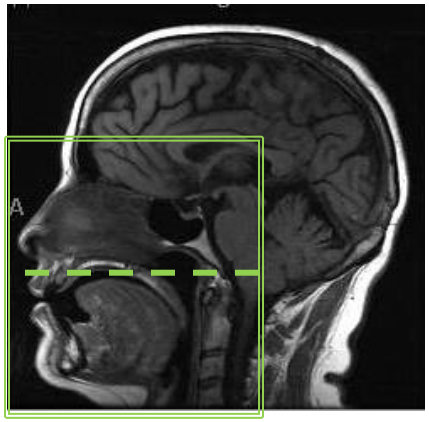


Axial/Through-Plane

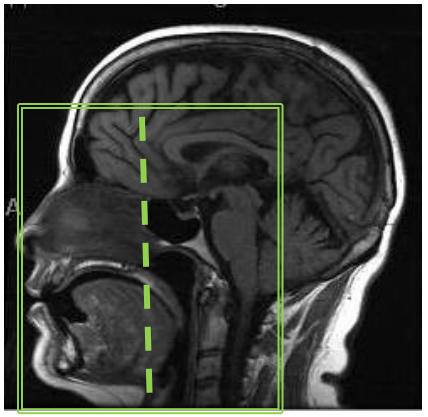
Sequence	TR	TE	FOV		SLICE	GAP	MATRIX		PHASE DIR	NEX	SCAN DIR	OTHER
			FREQ	PHASE			PHASE	FREQ				
SAG CINE PC (In-Plane)	25.14	8.39	200	200	5	1	256	256	A/P	1	N/A	Velocity encoding: 5
SAG CINE PC (In-Plane)	25.14	8.39	200	200	5	1	256	256	A/P	1	N/A	Velocity encoding: 10
AX CINE PC (Through-Plane)	22.94	7.07	160	160	5	1	256	256	A/P	1	N/A	Velocity encoding: 10

Sialography (+/-)

Coronal T2 FS Thin
Coronal T1 Thin
Axial T2 FS Thin
Axial T1 Thin
Axial T2 FS SPACE
Axial T2 CISS
Axial T1 Thin **Post**
Coronal T1 FS Thin **Post**



Axial

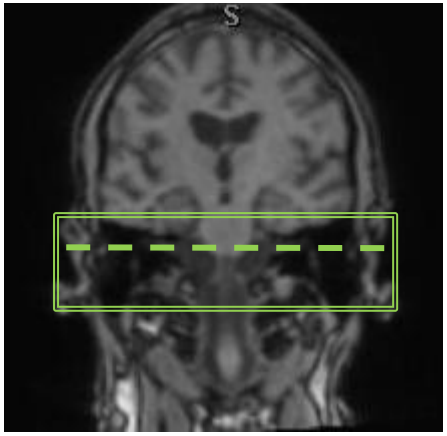


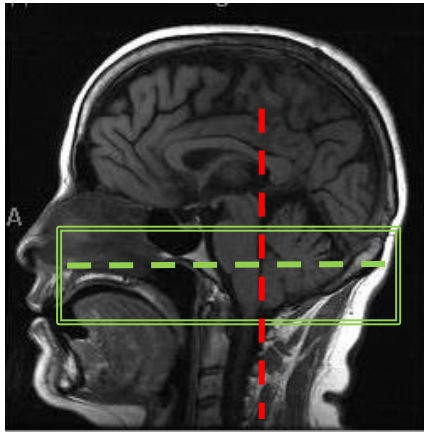
Coronal

Sequence	TR	TE	FOV		SLICE	GAP	MATRIX		PHASE DIR	NEX	SCAN DIR	OTHER
			FREQ	PHASE			PHASE	FREQ				
COR T2 FS THIN	3500	106	180	100	3	1	224	320	R/L	2	A->P	
COR T1 THIN	542	8.9	180	100	3	1	192	256	R/L	1	A->P	
AX T2 FS THIN	3840	106	200	90.6	3	1	218	320	R/L	2	F->H	
AX T1 THIN	467	8.9	200	90.6	3	1	174	256	R/L	2	F->H	
AX T2 FS SPACE	2500	700	200	100	1	0	353	384	R/L	1.5	F-.H	
AX T2 CISS	5.26	2.41	200	100	0.7	0.14	256	256	R/L	1	F->H	
AX T1 THIN Post	467	8.9	200	90.6	3	1	174	256	R/L	3	F->H	
COR T1 FS THIN Post	400	8.9	180	100	3	1	192	256	R/L	1	A->P	

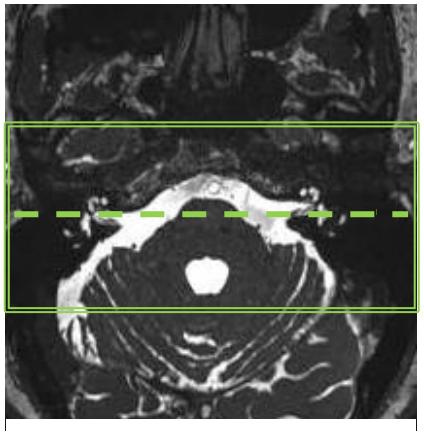
IAC (+/-)

Axial DWI
Axial T2 FS Flair
Axial T2 Space
-(Coronal Reformat)
Axial T1 Space
-(Coronal Reformat)
Ax T1 Space FS **Post**
-(Coronal Reformat)



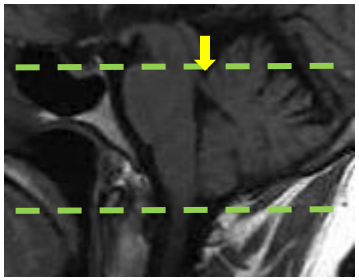


Axial Space T2/T1 Coverage



Coronal Thin Reformat

Angle Perpendicular to posterior aspect of brainstem (Red Line). Cover from bottom of triangle formed by brainstem and cerebellum (Yellow arrow) through the tip of the dens.



Parameters below are for reference. They DO NOT need to be exactly the same on the scanners.

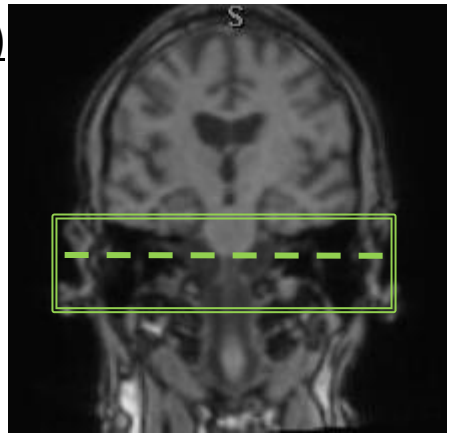
Sequence	TR	TE	FOV		SLICE	GAP	MATRIX		PHASE DIR	NEX	SCAN DIR	OTHER
			FREQ	PHASE			PHASE	FREQ				
AX DWI	6400	98	220	100	5	1	192	192	A/P	1	F->H	Whole Brain
AX T2 FS FLAIR	9000	81	220	75	5	2	168	320	R/L	1	F->H	Whole Brain
AX T2 Space	1400	263	180	90	.8	0	307	320	R/L	2	F->H	
AX T1 Space	650	30	180	90	1	O	256	256	R/L	2	F->H	
AX T1 FS Space Post	650	30	180	90	1	0	256	256	R/L	2	F->H	

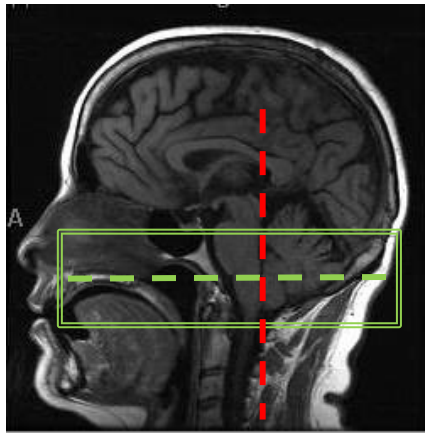
IAC (Cholesteatoma)(+/-)

3T Preferred SIEMENS ONLY

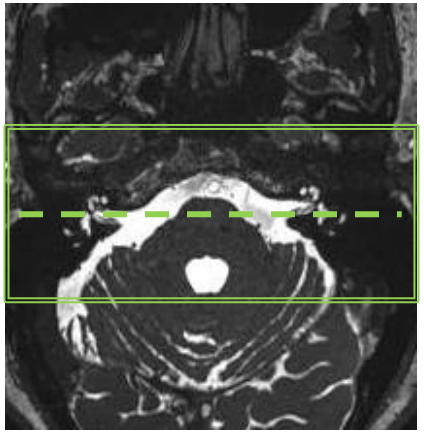
***Cholesteatoma,
Infection, Abscess***

Axial DWI *(Whole Brain)*
Axial T2 FS Flair (*Whole Brain)*
Axial DWI Resolve
Axial T2 Space
-(Coronal Reformat)
Axial T1 Space
-(Coronal Reformat)
Axial T1 FS Space **Post**
-(Coronal Reformat)



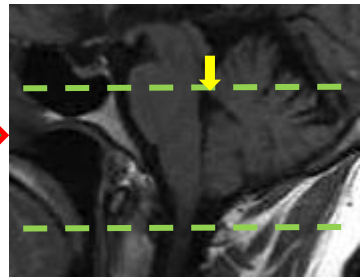


Ax Resolve, Space T2/T1 Coverage



Coronal Thin Reformat Coverage

Angle Perpendicular to posterior aspect of brainstem (Red Line). Cover from bottom of triangle formed by brainstem and cerebellum (Yellow arrow) through the tip of the dens.

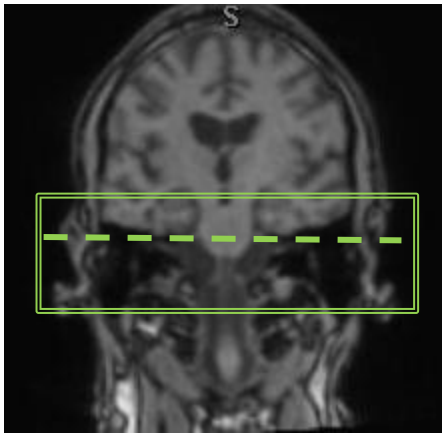


Parameters below are for reference. They DO NOT need to be exactly the same on the scanners.

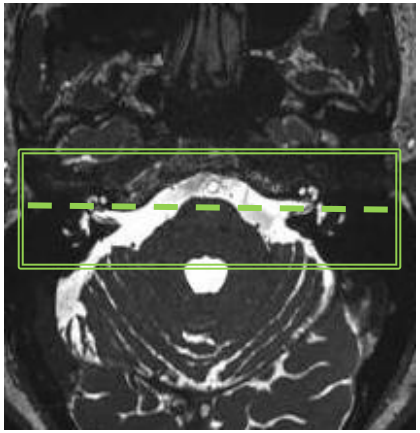
Sequence	TR	TE	FOV		SLICE	GAP	MATRIX		PHASE DIR	NEX	SCAN DIR	OTHER
			FREQ	PHASE			PHASE	FREQ				
AX DWI	6400	98	220	100	5	1	192	192	A/P	1	F->H	Whole Brain
AX T2 FS FLAIR	9000	81	220	75	5	2	168	320	R/L	1	F->H	Whole Brain
AX DWI RESOLVE	5100	1: 64 2: 103	220	100	3	0	160	160	A/P	1	F->H	
AX T2 SPACE	1400	263	180	100	.8	0	307	320	R/L	2	F->H	
AX T1 SPACE	650	30	180	100	1	0	256	256	R/L	2	F->H	
AX T1 FS SPACE POST	650	30	180	100	1	0	256	256	R/L	2	F->H	

Pre-Cochlear Implant (-)

Axial T2 SPACE



Axial Thin



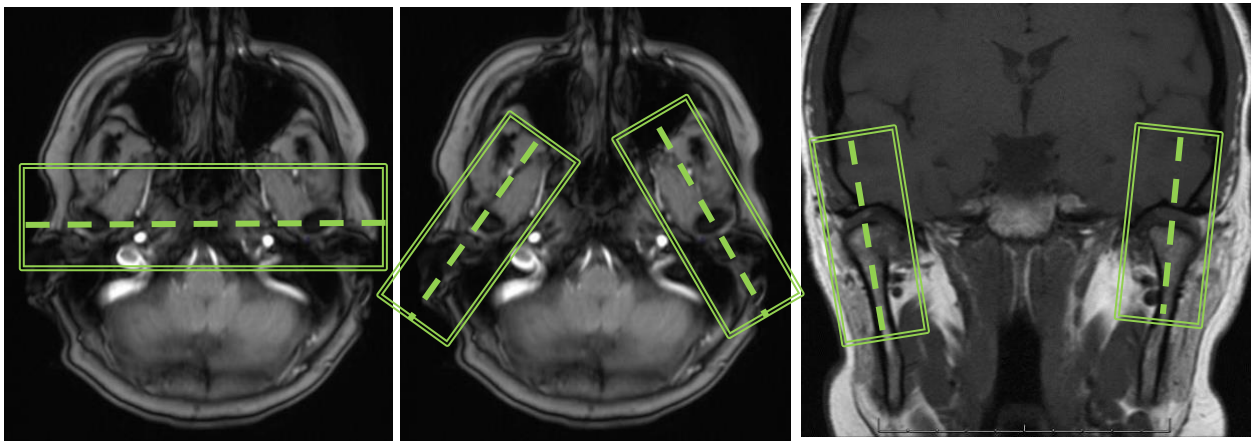
Coronal Thin

Sequence	TR	TE	FOV		SLICE	GAP	MATRIX		PHASE DIR	NEX	SCAN DIR	OTHER
			FREQ	PHASE			PHASE	FREQ				
AX T2 SPACE	1000	136	200	100	.5	0	380	384	R/L	2	F->H	

TMJ (-)

**Use the Burnett TMJ Device and retractor bite plate maximized to patient toleration for the open mouth images. Perform the CINE images twice with the right and left scanned separately. Use the TMJ device with retractor and instruct the patient to click the device 2-3 times between each image until the patient cannot tolerate further widening.*

Coronal T1 Closed Mouth
RT Sagittal PD Closed Mouth
LT Sagittal PD Closed Mouth
RT Sagittal PD Open Mouth
LT Sagittal PD Open Mouth
Sagittal CINE RT
Sagittal CINE LT



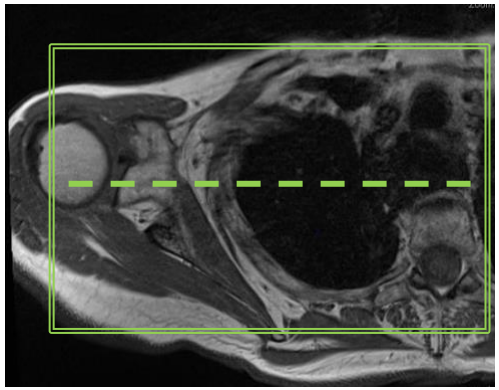
Coronal **Sagittal Imaging Plane – use coronal and axial image**

Sequence	TR	TE	FOV		SLICE	GAP	MATRIX		PHASE DIR	NEX	SCAN DIR	OTHER
			FREQ	PHASE			PHASE	FREQ				
COR T1 CLOSED	406	7.1	150	100	3	.3	205	256	R/L	3	A->P	
RIGHT SAG PD CLOSED	2800	21	120	100	2	.1	288	320	A/P	3	L->R	
LEFT SAG PD CLOSED	2800	21	120	100	2	.1	288	320	A/P	3	L->R	
RIGHT SAG PD OPEN	2800	21	120	100	2	.1	288	320	A/P	3	L->R	
LEFT SAG PD OPEN	2800	21	120	100	2	.1	288	320	A/P	3	L->R	
SAG CINE	240	2.74	150	100	4	0	128	256	A/P	1	L->R	Do left and right separate

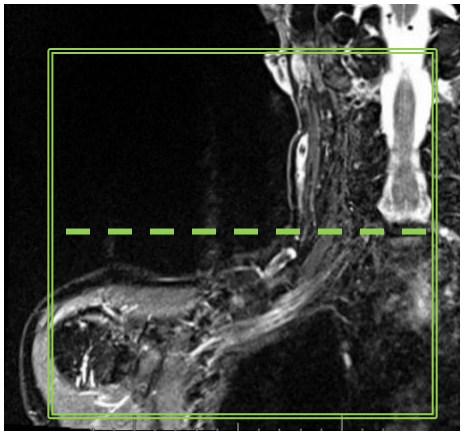
Brachial Plexus (-) (+/-) *(3T Preferred)*

**Cover C2 through T3 and from the spine through the glenohumeral joint*

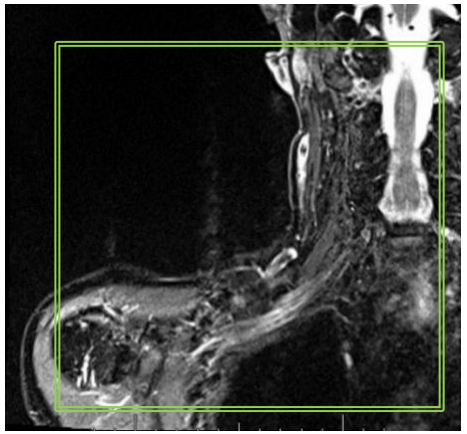
Coronal T1
Coronal STIR SPACE
Sagittal T1
Sagittal STIR
Axial T1
****If Contrast****
Axial T1 FS Pre/**Post**
Sagittal T1 FS **Post**
Coronal T1 FS **Post**



Coronal



Axial



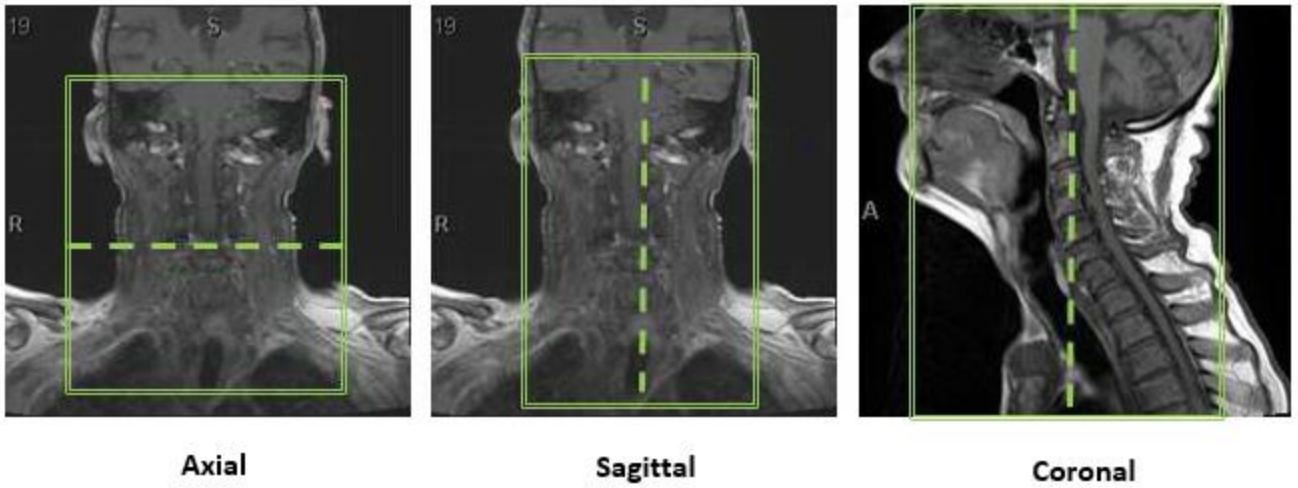
Sagittal

Sequence	TR	TE	FOV		SLICE		GAP	MATRIX		PHASE DIR	NEX	SCAN DIR	OTHER
			FREQ	PHASE				PHASE	FREQ				
COR T1	650	11	240	100	3		1	384	512	H/F	2	A->P	
COR STIR SPACE	1500	91	320	100	1.1		O	256	256	H/F	1.4	A->P	
SAG T1	600	11	220	100	3		1	384	512	H/F	1	L->R	
SAG STIR	4970	41	220	100	3		1	256	320	H/F	1	L->R	
AX T1	650	11	220	100	3		1	384	512	A/P	1	H->F	
	*****OPTIONAL IF CONTRAST*****												
AX T1 FS Pre/Post	650	9.3	220	100	3		1	224	320	A/P	1	H->F	
SAG T1 FS Post	650	9.3	220	100	3		1	224	320	H/F	1	L->R	
COR T1 FS Post	650	9.3	220	100	3		1	224	320	H/F	1	A->P	

Soft Tissue Neck (+/-)

**Coverage from the orbits through the apex of the lungs*

Sagittal T1
Axial T2 FS
Axial DWI Resolve
Axial T1
Axial T1 FS **Post**
Axial T1 **Post**
Coronal T1 FS **Post**

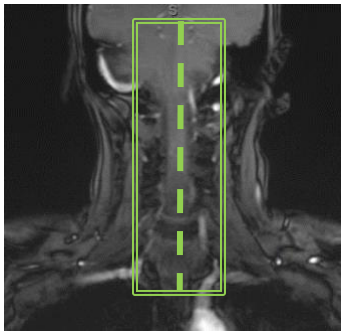


Axial **Sagittal** **Coronal**

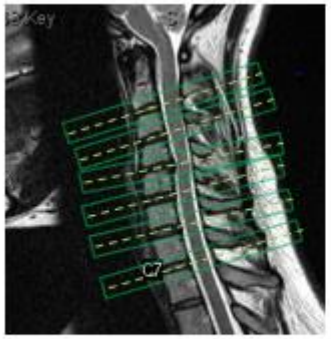
Sequence	TR	TE	FOV		SLICE	GAP	MATRIX		PHASE DIR	NEX	SCAN DIR	OTHER
			FREQ	PHASE			PHASE	FREQ				
SAG T1	650	9.4	240	100	3	1	240	320	A/P	2	L->R	
AX T2 FS	5150	78	200	100	5	1	307	384	A/P	2	H->F	
AX DWI RESOLVE	5100	1: 64 2: 103	220	100	3	0	160	160	A/P	1	F->H	
AX T1	650	11	200	100	5	1	224	320	A/P	2	H->F	
AX T1 FS Post	650	9.3	200	100	5	1	224	320	A/P	2	H->F	
AX T1 Post	650	11	200	100	5	1	224	320	A/P	2	H->F	
COR T1 FS Post	650	9.3	240	100	3	1	224	320	H/F	2	A->P	

C-spine Radiculopathy (-)

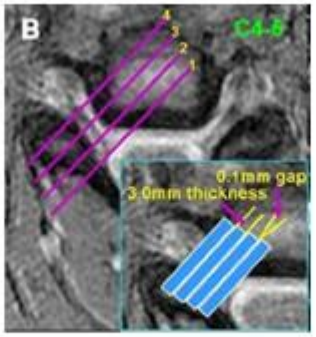
Sagittal T1
Sagittal T2
Axial T2
Sagittal T2 OBLIQUE Right
Sagittal T2 OBLIQUE Left

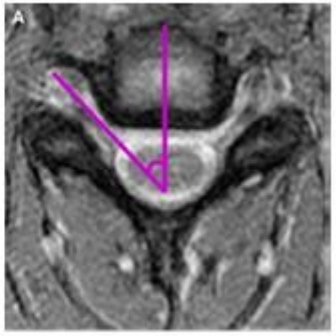


Sagittal
18 FOV



Axial
(5 slices per disk space)



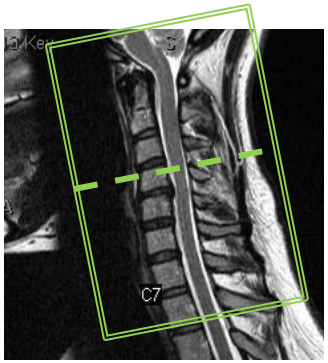


Oblique – 45 degrees from the sagittal
(perpendicular to neural foramen)

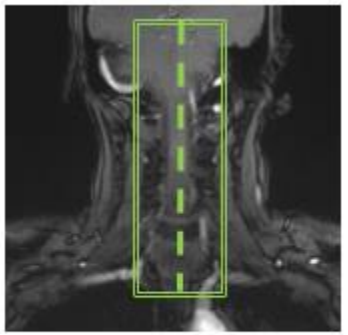
Sequence	TR	TE	FOV		SLICE	GAP	MATRIX		PHASE DIR	NEX	SCAN DIR	OTHER
			FREQ	PHASE			PHASE	FREQ				
SAG T1	400	10	180	100	3	.3	269	384	H/F	3	L->R	*18 FOV
SAG T2	3500	96	180	100	3	.3	256	320	H/F	1	L->R	*18 FOV
AX T2	3720	87	200	100	2	1	256	320	A/P	3	H->F	Multi-slice multi-angle 5 slices per disc
SAG T2 OBLIQUE RIGHT	3000	96	180	100	2	1	256	320	H/F	2	L->R	Perpendicular to the nerve root traveling through the cervical foramina
SAG T2 OBLIQUE LEFT	3000	96	180	100	2	1	256	320	H/F	2	L->R	Perpendicular to the nerve root traveling through the cervical foramina

C-spine Routine (-) (+/-)

Sagittal T1
Sagittal T2
Sagittal STIR
Axial T2
Optional if contrast
Axial T1 Pre
Sagittal T1 **Post**
Axial T1 **Post**



Axial
(Stack from mid cerebellum to T1)

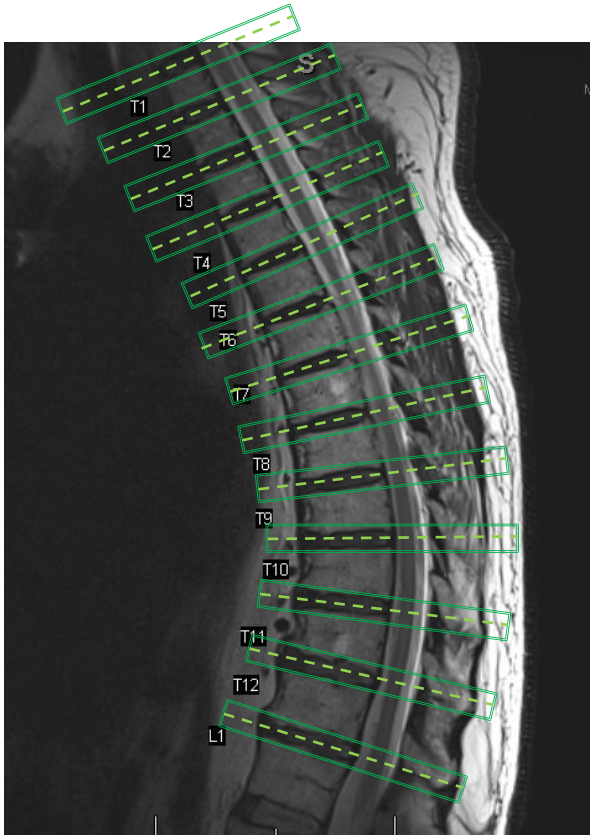


Sagittal
18 FOV

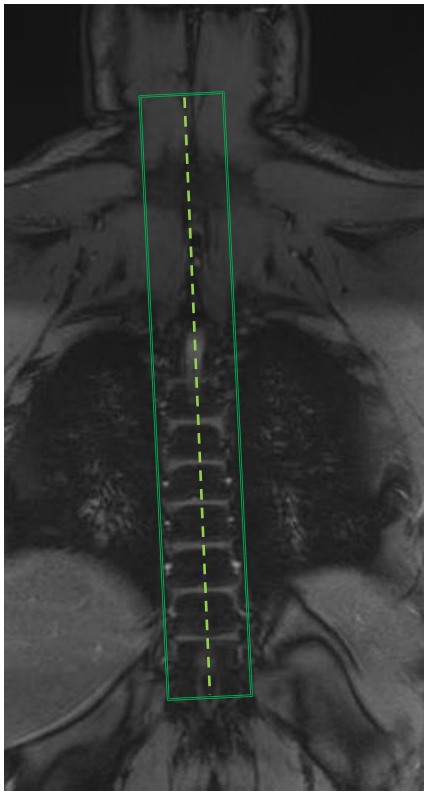
Sequence	TR	TE	FOV		SLICE	GAP	MATRIX		PHASE DIR	NEX	SCAN DIR	OTHER
			FREQ	PHASE			PHASE	FREQ				
SAG T1	400	10	180	100	3	.3	269	384	H/F	3	L->R	
SAG T2	3000	111	180	100	3	.3	307	384	H/F	1	L->R	
SAG STIR	3700	78	180	100	3	.3	256	320	H/F	2	L->R	
AX T2	3500	90	200	100	3	1	256	320	A/P	3	H->F	Stack axials
*****OPTIONAL IF CONTRAST*****												
AX T1	500	10	200	100	3	1	205	256	A/P	3	H->F	Stack axials
SAG T1 Post	400	10	180	100	3	.3	269	384	H/F	3	L->R	
AX T1 Post	500	10	200	100	3	1	205	256	A/P	3	H->F	Stack axials

T-spine Radiculopathy (-)

Sagittal T1
Sagittal T2
Axial T2 – use Tim Planning when possible



Axials - multi-slice, multi angle, 3 slices per disk space

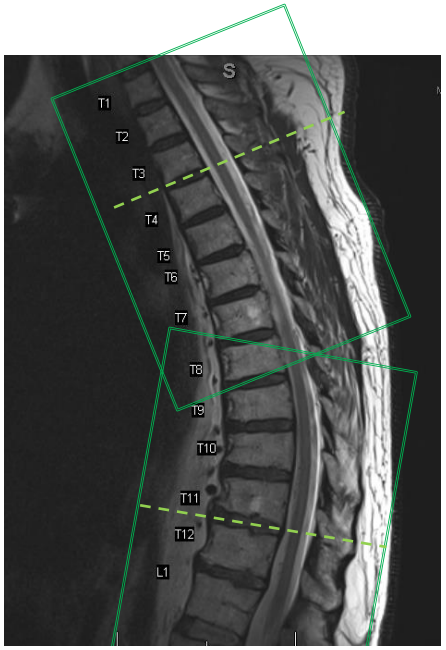


Sagittal Thoracic

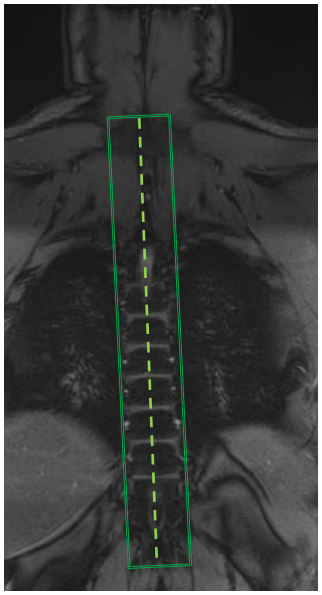
Sequence	TR	TE	FOV		SLICE	GAP	MATRIX		PHASE DIR	NEX	SCAN DIR	OTHER
			FREQ	PHASE			PHASE	FREQ				
SAG T1	400	8.7	320	100	3	.3	307	384	H/F	2	L->R	
SAG T2	3500	101	320	100	3	.3	307	384	H/F	2	L->R	
AX T2	4030	105	200	100	3	1	269	384	A/P	2	H->F	Multi-slice, Multi-angle, 3 slices per disc

T-spine Routine (-) (+/-)

Sagittal T1
Sagittal T2
Sagittal STIR
Axial T2– use Tim Planning when possible
Optional if Contrast
Axial T1 Pre– use Tim Planning when possible
Sagittal T1 **Post**
Axial T1 **Post**– use Tim Planning when possible



Stacked Axials – use Tim Planning when possible



Sagittal Thoracic

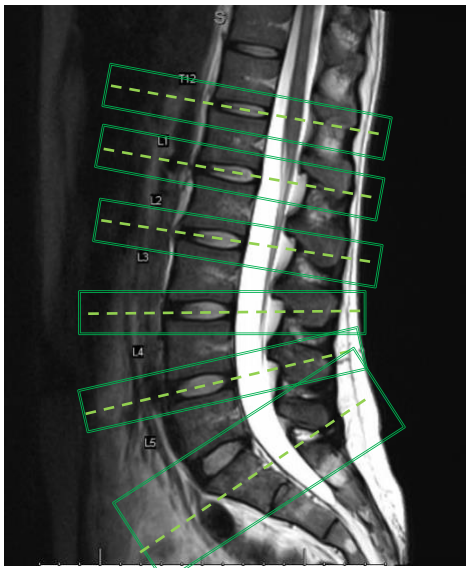
Sequence	TR	TE	FOV		SLICE	GAP	MATRIX		PHASE DIR	NEX	SCAN DIR	OTHER
			FREQ	PHASE			PHASE	FREQ				
SAG T1	400	9	320	100	3	.3	307	384	H/F	3	L->R	Include conus
SAG T2	3500	100	320	100	3	.3	358	448	H/F	1	L->R	Include conus
SAG STIR	3700	71	320	100	3	.3	272	320	H/F	2	L->R	Include conus
AX T2	4000	110	200	100	4	1	269	384	A/P	2	H->F	Stack axials to include past conus
*****OPTIONAL IF CONTRAST*****												
AX T1	405	10	200	100	4	1	218	256	A/P	2	H->F	Stack axials to include past conus
SAG T1 Post	400	9	320	100	3	.3	307	384	H/F	3	L->R	Include conus
AX T1 Post	405	10	200	100	4	1	218	256	A/P	2	H->F	Stack axials to include past conus

L-spine Radiculopathy (-) (+/-)

Sagittal T1
Sagittal T2
Sagittal STIR (omit if giving contrast)
Sagittal SPACE (omit if giving contrast)
- *(Axial + Coronal Reformat)*

Axial T2
Optional if Contrast
Axial T1 Pre
Sagittal T1 **Post**
Axial T1 **Post**

Sagittal Lumbar



Axials – 5 slices per disk T12/L1-L4/L5, 10 slices for L5/S1 to include S1

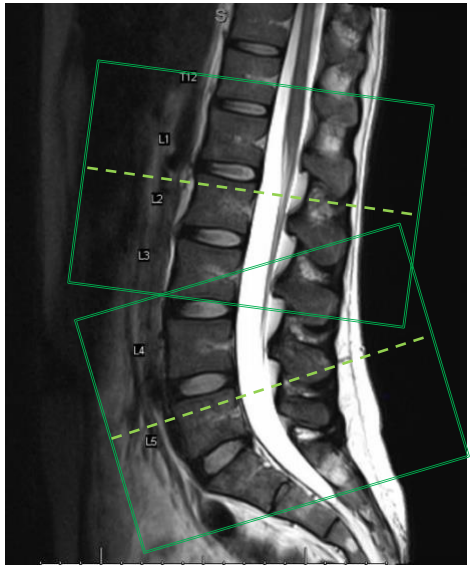
Sequence	TR	TE	FOV		SLICE	GAP	MATRIX		PHASE DIR	NEX	SCAN DIR	OTHER
			FREQ	PHASE			PHASE	FREQ				
SAG T1	2100	8.8	280	100	3	.3	272	320	H/F	2	L->R	Include S1/S2
SAG T2	3000	101	280	100	3	.3	288	384	H/F	1	L->R	Include S1/S2
SAG STIR	3700	70	280	100	3	.3	240	320	H/F	2	L->R	Include S1/S2
SAG SPACE	1500	138	300	100	.7	0	304	320	H/F	1.4	L->R	Siemens
	1500	138	300	100	1.4	0	304	320	H/F	1	L->R	GE (ZIP 2)
AX T2	4990	100	200	100	4	1	288	384	A/P	2	H->F	Multi- angle
AX T1	600	9.8	200	100	4	1	256	320	A/P	2	H->F	Multi- angle
*****OPTIONAL IF GAD. GIVE CONTRAST IF SURGERY WITHIN 5 YEARS OF SCAN*****												
SAG T1 Post	2100	8.8	280	100	3	.3	272	320	H/F	2	L->R	Include S1/S2
AX T1 Post	600	9.8	200	100	4	1	256	320	A/P	2	H->F	Multi- angle

L-spine Routine (-) (+/-)

Sagittal T1
Sagittal T2
Sagittal STIR (omit if giving contrast)
Sagittal SPACE (omit if giving contrast)
- *(Axial + Coronal Reformat)*

Axial T2
Optional if Contrast
Axial T1 Pre– use Tim Planning when possible
Sagittal T1 **Post**
Axial T1 **Post**– use Tim Planning when possible

Sagittal Lumbar



Axials (stacked)

Sequence	TR	TE	FOV		SLICE	GAP	MATRIX		PHASE DIR	NEX	SCAN DIR	OTHER
			FREQ	PHASE			PHASE	FREQ				
SAG T1	2100	8.8	280	100	3	.3	272	320	H/F	2	L->R	Include S1/S2
SAG T2	3000	101	280	100	3	.3	288	384	H/F	1	L->R	Include S1/S2
SAG STIR	3700	70	280	100	3	.3	240	320	H/F	2	L->R	Include S1/S2
AX T2	4196	100	200	100	4	1	288	384	A/P	2	H->F	Axial stack
AX T1	600	9.8	200	100	4	1	256	320	A/P	2	H->F	Axial stack
*****OPTIONAL IF GAD. GIVE CONTRAST IF SURGERY WITHIN 5 YEARS OF SCAN*****												
SAG T1 Post	2100	8.8	280	100	3	.3	272	320	H/F	2	L->R	Include S1/S2
AX T1 Post	600	9.8	200	100	4	1	256	320	A/P	2	H->F	Axial stack

L-spine Cauda Equina (-)

*****CALL RAD TO CHECK*****

Sagittal T1

Sagittal SPACE

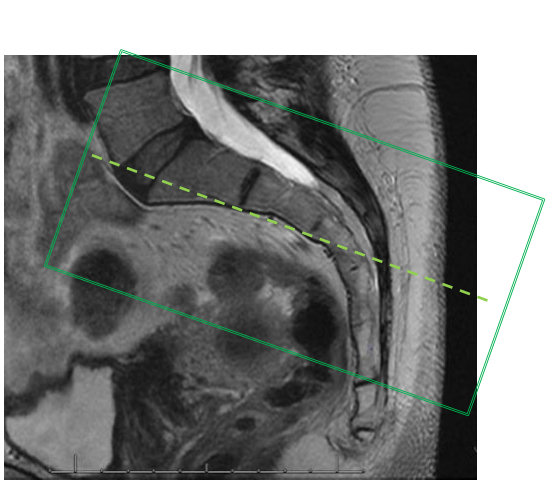
- *(Axial + Coronal Reformat)*

Sagittal Lumbar

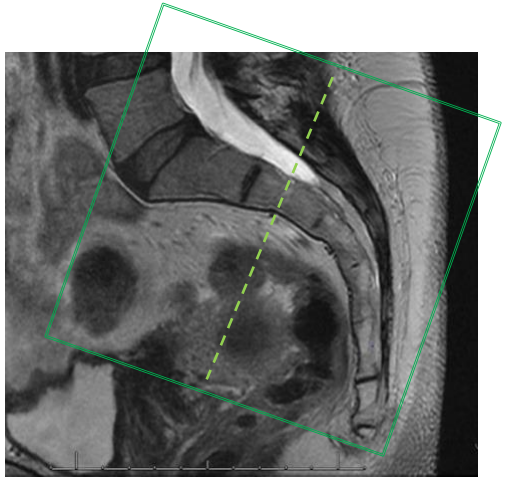
Sequence	TR	TE	FOV		SLICE	GAP	MATRIX		PHASE DIR	NEX	SCAN DIR	OTHER
			FREQ	PHASE			PHASE	FREQ				
SAG T1	2100	8.8	280	100	3	.3	272	320	H/F	2	L->R	Include S1/S2
SAG SPACE	1500	138	300	100	.7	0	304	320	H/F	1.4	L->R	Siemens
	1500	138	300	100	1.4	0	304	320	H/F	1	L->R	GE (ZIP 2)

Sacrum (-) (+/-)

Coronal STIR Oblique
Sagittal T1
Sagittal T2
Axial T1 Oblique
Axial T2 Oblique
****If Contrast****
Coronal T1 FS Oblique **Post**
Axial T1 **Post**



Coronal Oblique



Axial Oblique

Sequence	TR	TE	FOV		SLICE	GAP	MATRIX		PHASE DIR	NEX	SCAN DIR	OTHER
			FREQ	PHASE			PHASE	FREQ				
COR STIR OBL	3700	67	200	100	4	1	240	320	H/F	2	A->P	
SAG T1	400	10	200	100	4	1	269	384	H/F	3	L->R	
SAG T2	3740	87	200	100	4	1	256	320	H/F	2	L->R	
AX T1 OBL	500	11	200	100	4	1	205	256	A/P	3	H->F	
AX T2 OBL	3740	87	200	100	4	1	256	320	A/P	3	H->F	
*****OPTIONAL IF CONTRAST*****												
COR T1 FS OBL Post	400	10	200	100	4	1	240	320	H/F	2	A->P	
AX T1 OBL Post	500	11	200	100	4	1	205	256	A/P	3	H->F	

Bone METS (+/-)

Sagittal T1 CSP
Sagittal STIR CSP
Sagittal T1 TSP
Sagittal STIR TSP
Sagittal T1 LSP
Sagittal STIR LSP
Sagittal T1 FS **Post** CSP
Sagittal T1 FS **Post** TSP
Sagittal T1 FS **Post** LSP

Call MD to Check for Axials (Enhancement)
Document in EPIC who you spoke to.

Axial T1 Post CSP
Axial T2 Post CSP
Axial T1 Post TSP
Axial T2 Post TSP
Axial T1 Post LSP
Axial T2 Post LSP

Bone METS (+/-) Continued

Sequence	TR	TE	FOV		SLICE	GAP	MATRIX		PHASE DIR	NEX	SCAN DIR	OTHER
			FREQ	PHASE			PHASE	FREQ				
SAG T1 CSP	400	10	180	100	3	.3	269	384	H/F	3	L->R	
SAG STIR CSP	3700	68	180	100	3	.3	240	320	H/F	2	L->R	
SAG T1 TSP	400	9	320	100	3	.3	272	320	H/F	3	L->R	
SAG STIR TSP	3700	68	320	100	3	.3	272	320	H/F	2	L->R	
SAG T1 LSP	485	9.5	280	100	3	.3	288	384	H/F	2	L->R	
SAG STIR LSP	3700	70	280	100	3	.3	240	320	H/F	2	L->R	
SAG T1 FS Post CSP	449	9.5	180	100	3	.3	269	384	H/F	3	L->R	
SAG T1 FS Post TSP	497	9	320	100	3	.3	307	384	H/F	3	L->R	
SAG T1 FS Post LSP	583	9.5	280	100	3	.3	288	384	H/F	2	L->R	
*****CALL MD TO CHECK FOR AXIALS (ENHANCEMENT), DOCUMENT WHO YOU SPOKE TO*****												
AX T1 Post CSP	600	9.8	200	100	3	1	256	320	A/P	2	H->F	Stacked
AX T2 Post CSP	3880	100	200	100	3	1	269	384	A/P	3	H->F	Stacked
AX T1 Post TSP	600	9.8	200	100	4	1	256	320	A/P	2	H->F	Stacked
AX T2 Post TSP	3880	100	200	100	4	1	269	384	A/P	3	H->F	Stacked
AX T1 Post LSP	600	9.8	200	100	4	1	256	320	A/P	2	H->F	Stacked
AX T2 Post LSP	5000	101	200	100	4	1	336	448	A/P	1	H->F	Stacked

CSF Leak (-) (Whole Spine)

Sagittal T1 CSP
Sagittal T2 CSP
Sagittal T2 Space FS CSP *-(Coronal and Axial Reformat), -(MIP, Rotate)*
Sagittal T1 TSP
Sagittal T2 TSP
Sagittal T2 Space FS TSP *-(Coronal and Axial Reformat), -(MIP, Rotate)*
Sagittal T1 LSP
Sagittal T2 LSP
Sagittal T2 Space FS LSP *-(Coronal and Axial Reformat), -(MIP, Rotate)*

*****If Space Sequence does not come out, perform CISS Sequence. If neither come out, call rad for further instructions*****

Sequence	TR	TE	FOV		SLICE	GAP	MATRIX		PHASE DIR	NEX	SCAN DIR	OTHER
			FREQ	PHASE			PHASE	FREQ				
SAG T1 CSP	400	10	180	100	3	.3	269	384	H/F	3	L->R	
SAG T2 CSP	3000	111	180	100	3	.3	240	320	H/F	1	L->R	
SAG T2 Space FS CSP	8.07	3.67	180	100	1	0	307	320	A/P	1	L->R	
SAG T1 TSP	400	9	320	100	3	.3	272	320	H/F	3	L->R	
SAG T2 TSP	3500	104	320	100	3	.3	272	320	H/F	1	L->R	
SAG T2 Space FS TSP	8.07	3.67	320	100	1	0	307	320	A/P	1	L->R	
SAG T1 LSP	485	9.5	280	100	3	.3	288	384	H/F	2	L->R	
SAG T2 LSP	3000	101	280	100	3	.3	240	320	H/F	2	L->R	
SAG T2 Space FS LSP	8.07	3.67	280	100	1	0	307	320	A/P	1	L->R	

Diskitis / Osteo / Abscess (+/-) ***Single Level***

****If scanning only single level, entire level (CSP, TSP, LSP) must be covered on axials.****

Sagittal STIR
Sagittal T1
Axial T2
Sagittal T1 FS **Post**
Axial T1 FS **Post**

Sequence	TR	TE	FOV		SLICE	GAP	MATRIX		PHASE DIR	NEX	SCAN DIR	OTHER
			FREQ	PHASE			PHASE	FREQ				
SAG T1	400	10	300	100	3	.3	269	384	H/F	2	L->R	
SAG STIR	3700	73	300	100	3	.3	288	384	H/F	1	L->R	
AX T2	3200	101	200	100	4	1	336	448	A/P	2	H->F	Stacked
SAG T1 FS Post	400	10	280	100	3	.3	269	384	H/F	2	L->R	
AX T1 Post	600	9.8	200	100	4	1	256	320	A/P	2	H->F	Stacked

Diskitis / Osteo / Abscess (+/-) ***Two or More Levels***

Sagittal STIR CSP
Sagittal STIR TSP
Sagittal STIR LSP
Sagittal T1 FS CSP **Post**
Sagittal T1 FS TSP **Post**
Sagittal T1 FS LSP **Post**
Call Radiologist to check
Axial T2- Coverage determined by Rad.
Axial T1 FS **Post-** Coverage determined by Rad.

Questions to ask Radiologist during Check

1. Are we done?
2. If not, what level are we scanning (CSP, LSP, TSP)?
3. What would you like for axial coverage?

Document in EPIC who you spoke to.

Sequence	TR	TE	FOV		SLICE	GAP	MATRIX		PHASE DIR	NEX	SCAN DIR	OTHER
			FREQ	PHASE			PHASE	FREQ				
SAG STIR CSP	3700	73	300	100	3	.3	288	384	H/F	1	L->R	
SAG STIR TSP	3700	73	300	100	3	.3	288	384	H/F	1	L->R	
SAG STIR LSP	3700	73	300	100	3	.3	288	384	H/F	1	L->R	
SAG T1 FS CSP Post	400	10	280	100	3	.3	269	384	H/F	2	L->R	
SAG T1 FS TSP Post	400	10	280	100	3	.3	269	384	H/F	2	L->R	
SAG T1 FS LSP Post	400	10	280	100	3	.3	269	384	H/F	2	L->R	
*****IF ARE OF CONCERN IS NOTICED BY RADILOGIST, CONTINUE PROTOCOL THROUGH THAT LEVEL AS DIRECTED BY RADIOLOGIST (EX. CSP, TSP LSP)*****												
AX T2	3200	101	200	100	4	1	336	448	A/P	2	H->F	Stacked
AX T1 FS Post	600	9.8	200	100	4	1	256	320	A/P	2	H->F	Stacked

Drop METS (Total Spine) (+/-)

Sagittal T1 CSP
Sagittal T2 CSP
Sagittal T1 TSP
Sagittal T2 TSP
Sagittal T1 LSP
Sagittal T2 LSP
Sagittal T1 **Post** CSP
Axial T1 **Post** CSP
Sagittal T1 **Post** TSP
Axial T1 **Post** TSP
Sagittal T1 **Post** LSP
Axial T1 **Post** LSP

Sequence	TR	TE	FOV		SLICE	GAP	MATRIX		PHASE DIR	NEX	SCAN DIR	OTHER
			FREQ	PHASE			PHASE	FREQ				
SAG T1 CSP	400	10	180	100	3	.3	269	384	H/F	3	L->R	
SAG T2 CSP	3000	111	180	100	3	.3	240	320	H/F	1	L->R	
SAG T1 TSP	400	9	320	100	3	.3	272	320	H/F	3	L->R	
SAG T2 TSP	3500	104	320	100	3	.3	272	320	H/F	1	L->R	
SAG T1 LSP	485	9.5	280	100	3	.3	288	384	H/F	2	L->R	
SAG T2 LSP	3000	101	280	100	3	.3	240	320	H/F	2	L->R	
SAG T1 Post CSP	449	9.5	180	100	3	.3	269	384	H/F	3	L->R	
AX T1 Post CSP	497	9	320	100	3	1	307	384	H/F	3	L->R	Stacked
SAG T1 Post TSP	497	9	320	100	3	.3	307	384	H/F	3	L->R	
AX T1 Post TSP	600	9.8	200	100	4	1	256	320	A/P	2	H->F	Stacked
SAG T1 Post LSP	583	9.5	280	100	3	.3	288	384	H/F	2	L->R	
AX T1 Post LSP	600	9.8	200	100	4	1	256	320	A/P	2	H->F	Stacked

Radiation Spine (+/-)

**Axials need skin to skin coverage with no angles*

Sagittal T1
Sagittal T2
Axial SPACE
Axial BRAVO
Axial BRAVO **Post**

Sequence	TR	TE	FOV		SLICE	GAP	MATRIX		PHASE DIR	NEX	SCAN DIR	OTHER
			FREQ	PHASE			PHASE	FREQ				
SAG T1	2100	8.8	280	100	3	.3	272	320	H/F	2	L->R	
SAG T2	3000	101	280	100	3	.3	288	384	H/F	1	L->R	
AX SPACE	1500	136	400	100	1.5	.75	304	320	A/P	1.4	H->F	
AX BRAVO	1470	2.14	400	100	1.5	.75	320	320	A/P	1	H->F	
AX BRAVO Post	1470	2.14	400	100	1.5	.75	320	320	A/P	1	H->F	

Scoliosis (-) (Total Spine)

**Angle sagittal images to each curve of the spine; scan coronal images first if necessary*

Sagittal T1 CSP
Sagittal T2 CSP
Coronal T1 CSP
Sagittal T1 TSP
Sagittal T2 TSP
Coronal T1 TSP
Sagittal T1 LSP
Sagittal T2 LSP
Coronal T1 LSP
Axial T2 TSP/LSP **(T11-L3, Conus Coverage)**
Axial T1 LSP **(T10-Sacrum)**

Sequence	TR	TE	FOV		SLICE	GAP	MATRIX		PHASE DIR	NEX	SCAN DIR	OTHER
			FREQ	PHASE			PHASE	FREQ				
SAG T1 CSP	400	10	180	100	3	.3	269	384	H/F	3	L->R	
SAG T2 CSP	3000	111	180	100	3	.3	240	320	H/F	1	L->R	
COR T1 CSP	400	9.5	180	100	3	1	269	384	R/L	3	A->P	
SAG T1 TSP	400	9	320	100	3	.3	272	320	H/F	3	L->R	
SAG T2 TSP	3500	104	320	100	3	.3	272	320	H/F	1	L->R	
COR T1 TSP	400	9.5	320	100	4	1	269	384	R/L	3	A->P	
SAG T1 LSP	485	9.5	280	100	3	.3	288	384	H/F	2	L->R	
SAG T2 LSP	3000	101	280	100	3	.3	240	320	H/F	2	L->R	
COR T1 LSP	400	9.5	280	100	4	1	269	384	R/L	3	A->P	
AX T2 TSP/LSP	4000	104	200	100	4	1	256	256	A/P	2	H->F	**AX STACK T11-L3**
AX T1 LSP	600	9.8	200	100	4	1	256	320	A/P	2	H->F	**AXIAL STACK T 10 - SACRUM**

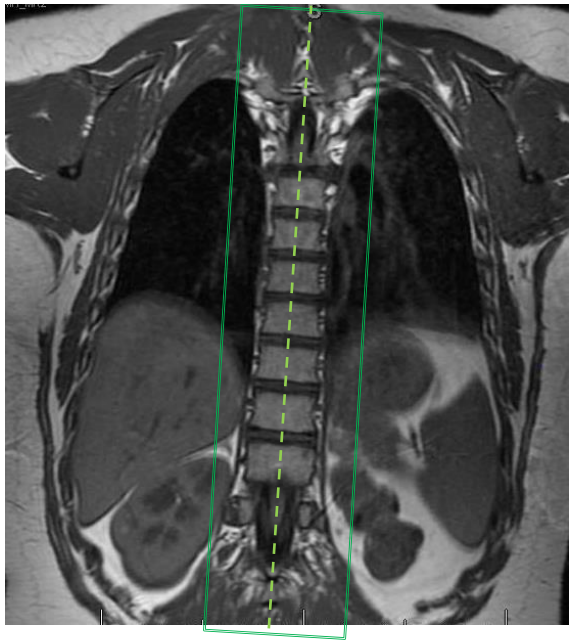
Spinal MRA (+/-)

**Cover the area of interest as specified and scan in the sagittal plane. Use fluoro trigger with timing as the contrast is bright in the aorta.*

Sagittal 3D MRA Pre

Sagittal 3D MRA **Post** – 3 phases

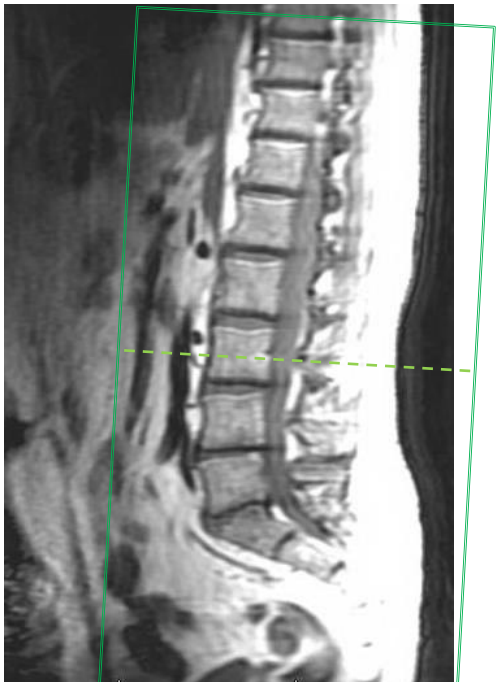
- *(Coronal and Axial Reformat), -(MIP, Rotate)*



Sequence	TR	TE	FOV		SLICE	GAP	MATRIX		PHASE DIR	NEX	SCAN DIR	OTHER
			FREQ	PHASE			PHASE	FREQ				
SAG 3D MRA Pre	3	1.07	360	100	1	.2	262	320	A/P	1	L->R	
SAG 3D MRA Post X 3	3	1.07	360	100	1	.2	262	320	A/P	1	L->R	

Tethered Cord (-) (Total Spine)

Sagittal T2 CSP
Sagittal T2 TSP
Sagittal T2 LSP
Sagittal T1 LSP
Axial T2 FS LSP
Axial T1 LSP
Optional
Coronal T1 Conus



Axial (T10-Coccyx)

Sequence	TR	TE	FOV		SLICE	GAP	MATRIX		PHASE DIR	NEX	SCAN DIR	OTHER
			FREQ	PHASE			PHASE	FREQ				
SAG T2 CSP	3000	111	180	100	3	.3	307	384	H/F	1	L->R	
SAG T2 TSP	3500	104	320	100	3	.3	358	448	H/F	1	L->R	
SAG T2 LSP	3000	101	280	100	3	.3	288	384	H/F	1	L->R	
SAG T1 LSP	485	9.5	280	100	3	.3	288	384	H/F	2	L->R	
AX T2 FS LSP	3290	101	200	100	4	1	336	448	A/P	2	H->F	Axial stack from T10 – through Coccyx
AX T1 LSP	600	9.8	200	100	4	1	256	320	A/P	2	H->F	Axial stack from T10 – through Coccyx
*****OPTIONAL*****												
COR T1 CONUS	485	9.5	280	100	4	1	288	384				