Austin Radiological Association

MRI Neuro Protocols

Adult 3T

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Last Update: 11/12/2024 9:27 AM

3T Neuro Protocols

***3T Preferred Exams**

ACR Requirement – Do Not Adjust

General Guidelines

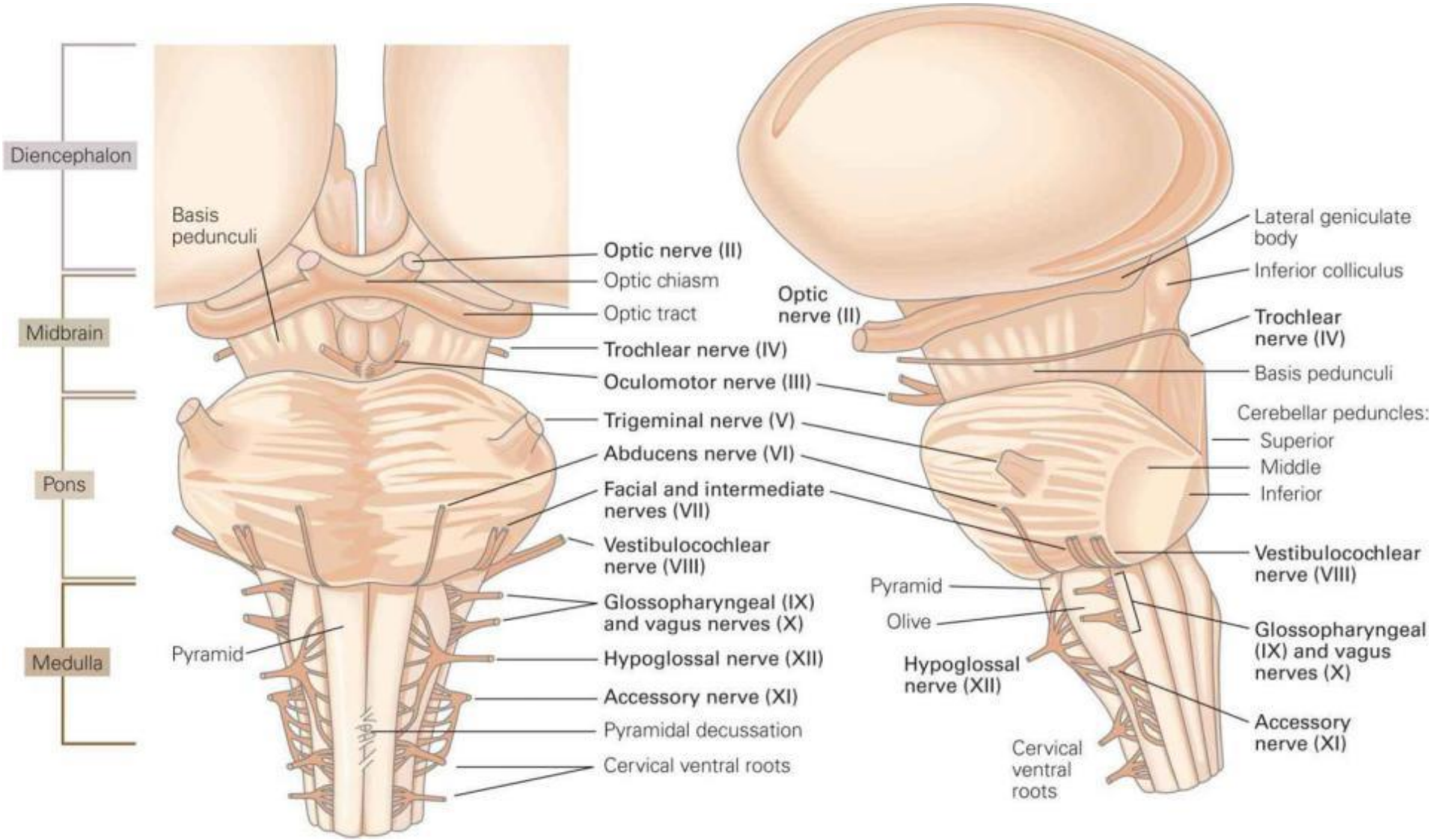
NEURO	

General	• NEVER hesitate to reach out to a radiologist for guidance!
	• Siemens / GE terminology, other abbreviations:
	  ○ CISS / Fiesta
	  ○ FLASH / SPGR
	• ARA performs SWI standard for susceptibility weighted imaging, replaces conventional GRE Cor
	• ***Recommended*** to remove eye makeup for all exams that include the orbital region.
	  ○ Eye makeup ***must be*** removed for dedicated MRI of the orbits.

Technique	• Use "Weak" FS (Siemens) or "Classic" FS (GE) on all sequences with FS

Protocol	• Metal Reduction
	  ○ Non-FS, FSE/TSE technique
	• Multiple Sclerosis – UTHA Only. Brain, orbits, cervical or thoracic spine, 10/6/20
	• SWI with motion
	  ○ Conventional GRE coronal may be performed instead of repeating SWI

Contrast	• X-ray / CT abdomen and pelvis imaging must be performed prior to MR contrast exams. • DatScan must be performed prior to MR contrast exam.
Sedation	


Diencephalon
Midbrain
Pons
Medulla
Basis pedunculi
Optic nerve (II)
Optic chiasm
Optic tract
Trochlear nerve (IV)
Oculomotor nerve (III)
Trigeminal nerve (V)
Abducens nerve (VI)
Facial and intermediate nerves (VII)
Vestibulocochlear nerve (VIII)
Glossopharyngeal (IX) and vagus nerves (X)
Pyramid
Hypoglossal nerve (XII)
Accessory nerve (XI)
Pyramidal decussation
Cervical ventral roots
Optic nerve (II)
Lateral geniculate body
Inferior colliculus
Trochlear nerve (IV)
Basis pedunculi
Cerebellar peduncles:
Superior
Middle
Inferior
Vestibulocochlear nerve (VIII)
Pyramid
Olive
Glossopharyngeal (IX) and vagus nerves (X)
Hypoglossal nerve (XII)
Accessory nerve (XI)
Cervical ventral roots

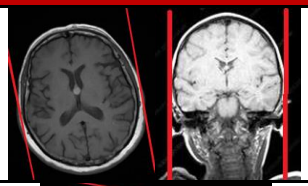
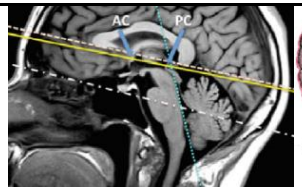
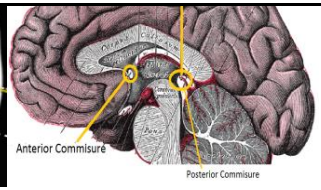
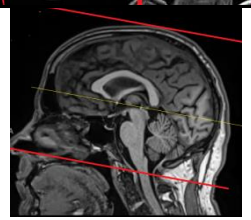
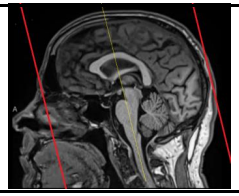
1.5T and 3T Preferred Exams

1.5T	3T
• Cholesteatoma • Brain Anosmia • Spine (Cervical / Thoracic / Lumbar)	• Brachial Plexus • Brain ARIA • Brain CSF Leak • Brain Neuroquant • Brain Perfusion • Brain Seizure (Adult/Pedi) • Brain Temporal Arteritis • Brain Vasculitis • Multiple Sclerosis – UTHA Referring Physician's Only - Brain - Orbits - Cervical Spine - Thoracic Spine • Neuro Pelvis / Sacral Plexus • Skull Base / Face (lesion staging) • Soft Tissue Neck (also available at GTN and SW Aera)
Updated 6/7/2024	

Brain – Routine

(HA, trauma, CVA, dizziness, AMS)

(Updated 4/26/23)

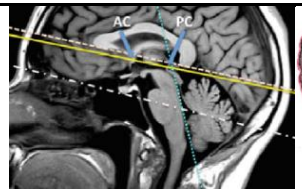
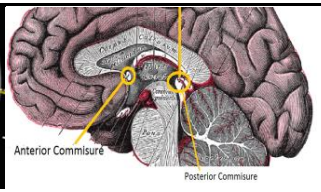
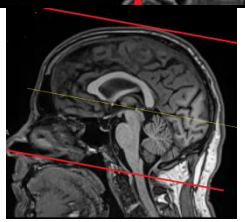
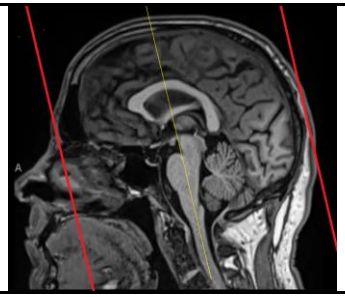
SEQUENCE	FOV (mm)	SLICE (mm)	COMMENTS	IMAGES
T1 dark fluid Sag	220	4 x 1.2		
Diffusion Ax	230	5 x 1	  Axials parallel to AC-PC line	
T2 FS FLAIR Ax	220	4 x 1		
SWI Ax *(Only send SWI & Phase series)* *Administer contrast*	220	3 x 0 TE 20		
T2 Ax	220	1.5		Copies to T2 FLAIR Ax
T2 FS Cor	220	5 x 2	Coronals parallel to the brainstem	
T1 FS SPACE Ax post	256	1 x 0	Post-processing • MPR - Cor 4x0mm, ~49 slices • Thin MIP – Ax 6x1mm, ~157 slices	Copies to T1 SPACE Ax

- Patients with braces or other metallic implants causing susceptibility artifact – remove FS & perform GRE Cor instead of SWI.
- Conventional GRE coronal may be performed if motion is noted on SWI axial.
- Consult a radiologist for PRN gad orders or ARA referrals where gad is not specified

Routine Non-contrast

(HA, trauma, CVA, dizziness, AMS)

(Updated 4/26/23)

SEQUENCE	FOV (mm)	SLICE (mm)	COMMENTS	IMAGES
T1 dark fluid Sag	220	4 x 1.2		
Diffusion Ax	230	5 x 1	  Axials parallel to AC-PC line	
T2 FS FLAIR Ax T2 Ax	220	4 x 1		
SWI Ax *(Only send SWI & Phase series)*	220	3 x 0 TE 20		
T2 FS Cor	220	5 x 2	Coronals parallel to the brainstem	

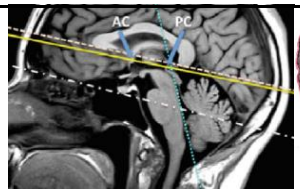
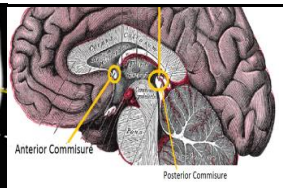
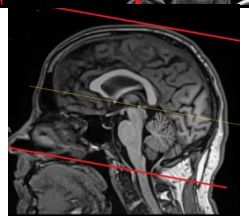
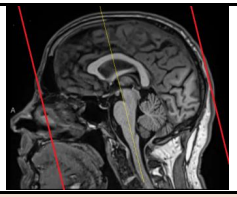
- Patients with braces or other metallic implants causing susceptibility artifact – remove FS & perform GRE Cor instead of SWI.
- Conventional GRE coronal may be performed if motion is noted on SWI axial.
- Consult a radiologist for PRN gad orders or ARA referrals where gad is not specified

Amyloid*

MRBRSAB / MRBRCSAB
(Alzheimer therapy with Aducanumab, ARIA)

(Updated 6/21/22)

- Primarily ordered without contrast
- Follow up imaging must be performed on same magnet type 3T vs 1.5T

SEQUENCE	FOV (mm)	SLICE (mm)	COMMENTS	IMAGES
T1 dark fluid Sag	220	4 x 1.2		
Diffusion Ax	230	5 x 1	  Axials parallel to AC-PC line	
T2 FLAIR Ax T2 FS Ax T2 GRE Ax	220	4 x 1		
T2 FS Cor	220	5 x 2	Coronals parallel to the brainstem	
Contrast, if ordered				
T1 FS SPACE Ax post	256	1 x 0	Post-processing • MPR - Cor 4x0mm, ~49 slices • Thin MIP – Ax 6x1mm, ~157 slices	Copies center to Diff Ax

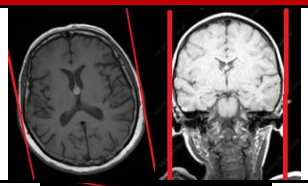
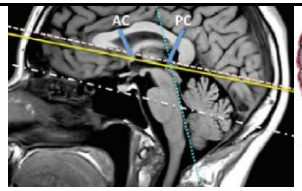
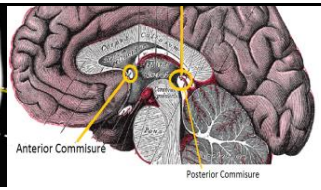
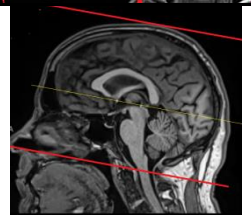
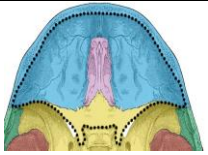
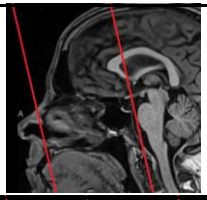
TECH NOTE:

- Document if baseline exam or date of baseline, all follow ups must be compared to baseline

Anosmia *1.5T Preferred

(Loss of sense of smell, smell disorders, 1st CN Olfactory nerve)

(Updated 10/26/23)

SEQUENCE	FOV (mm)	SLICE (mm)	COMMENTS	IMAGES
T1 dark fluid Sag	220	4 x 1.2		
Diffusion Ax	230	5 x 1	  Axials parallel to AC-PC line	
T2 FS FLAIR Ax T2 Ax	220	4 x 1		
SWI Ax *(Only send SWI & Phase series)* *Administer contrast*	220	3 x 0 TE 20		
T2 FS hr Cor	180	2.5 x 0.5	 Include Anterior Cranial Fossa	
T2 FS Cor	220	5 x 2	Coronals parallel to the brainstem	
T1 FS SPACE Ax post	256	1 x 0	Post-processing • MPR - Cor 4x0mm, ~49 slices • Thin MIP – Ax 6x1mm, ~157 slices	Copies to T1 SPACE Ax

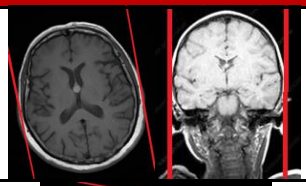
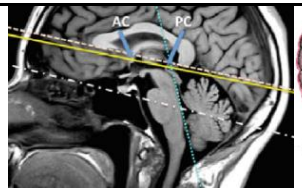
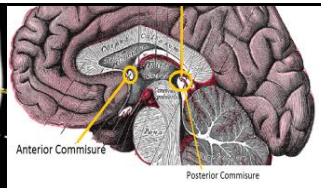
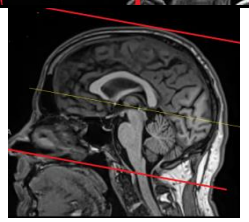
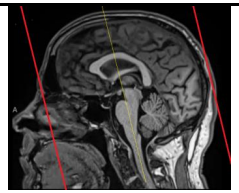
- Patients with braces or other metallic implants causing susceptibility artifact – remove FS & perform GRE Cor instead of SWI.
- Conventional GRE coronal may be performed if motion is noted on SWI axial.
- Consult a radiologist for PRN gad orders or ARA referrals where gad is not specified

ARIA Baseline*

(MRBRSARB: Amyloid segregating monoclonal antibodies –
aducanumab, lecanemab, bapineuzemab, gantenerumab, ponezumba)

(Updated 6/7/24)

- Referred by neurologists treating patients with mild cognitive impairment or mild Alzheimer's disease with monoclonal antibodies.

SEQUENCE	FOV (mm)	SLICE (mm)	COMMENTS	IMAGES
T1 dark fluid Sag	220	4 x 1 ~29 slices		
Diffusion Ax	230	4 x 1 ~32 slices	  Axials parallel to AC-PC line	
T2 FS FLAIR Ax T2 Ax	220			
SWI Ax *(Only send SWI & Phase series)*		3 x 0 TE 20		
T2 FS Cor GRE Cor T2 FLAIR Cor **optional*	220	5 x 2 ~26 slices	Coronals parallel to the brainstem	

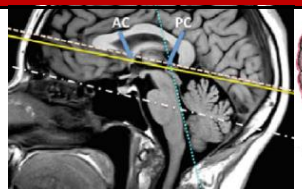
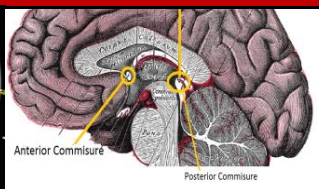
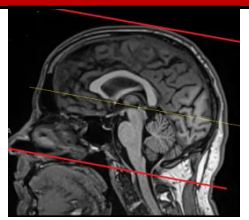
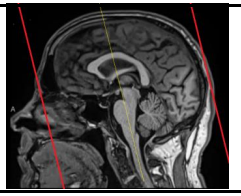
- If referring is adamant about contrast, perform routine brain.

ARIA Follow-Up*

(MRBRSARFU: Amyloid segregating monoclonal antibodies –
aducanumab, lecanemab, bapineuzemab, gantenerumab, ponezumba)

(Updated 6/7/24)

- Referred by neurologists treating patients with mild cognitive impairment or mild Alzheimer's disease with monoclonal antibodies.

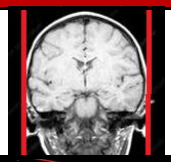
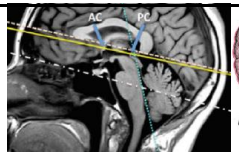
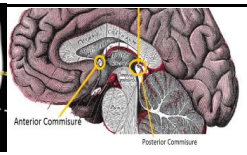
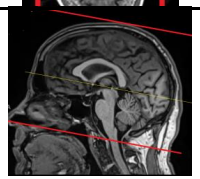
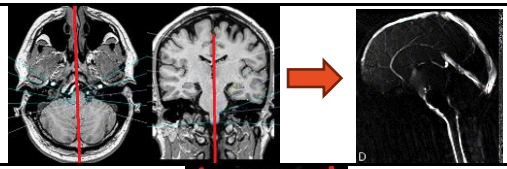
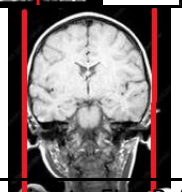
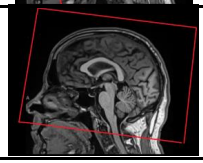
SEQUENCE	FOV (mm)	SLICE (mm)	COMMENTS	IMAGES
Diffusion Ax	230	4 x 1 ~32 slices	  Axials parallel to AC-PC line	
T2 FS FLAIR Ax	220			
SWI Ax *(Only send SWI & Phase series)*		3 x 0 TE 20		
GRE Cor T2 FLAIR Cor **optional*	220	5 x 2 ~26 slices	Coronals parallel to the brainstem	

- If referring is adamant about contrast, perform routine brain.

CSF Flow

(Updated 10/26/23)

- Position head straight
- May be performed on 3T or the following 1.5T: CIC, CP MR1O Espree, GTN, SW MR3, VIL
- Ensure proper placement of the peripheral pulse unit on finger, a steady pulse is needed

SEQUENCE	FOV (mm)	SLICE (mm)	COMMENTS	IMAGES
T1 dark fluid Sag	250	1 x 0		
Diffusion Ax	230	5 x 1	 	
T2 FS FLAIR Ax	220	4 x 1		
SWI Ax *(Only send SWI & Phase series)*	220	3 x 0 TE 20	Parallel to AP_PC line	
FLASH 6 In Plane	180	6	• Mid sagittal plane • ECG gated	
T2 SPACE Sag *Administer contrast*	250	1		
T2 Ax	220	4 x 1		Copies to FLAIR Ax
T2 FS Cor	220	5 x 2	Coronals parallel to the brainstem	
T1 FS SPACE Ax post	256	1 x 0	Post-processing • MPR - Cor 4x0mm, ~49 slices • Thin MIP – Ax 6x1mm, ~157 slices	

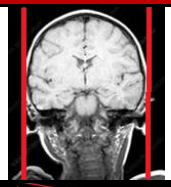
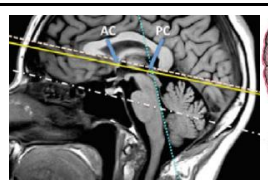
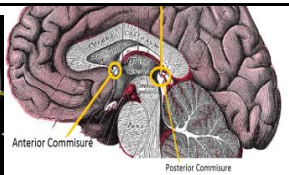
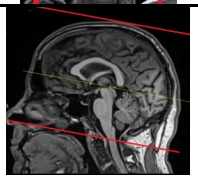
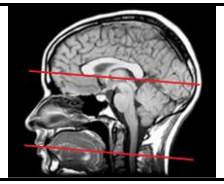
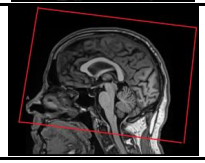
- Patients with braces or other metallic implants causing susceptibility artifact – remove FS & perform GRE Cor instead of SWI.
- Conventional GRE coronal may be performed if motion is noted on SWI axial.
- Consult a radiologist for PRN gad orders or ARA referrals where gad is not specified
- An alternative for the peripheral pulse unit on finger is the ECG monitor
- If the flash 6 In plane sequence shows poor signal and little to no flow, try changing the flow velocity to 4 instead of 6

CSF Leak*

(Leak, rhinorrhea, otorrhea, cephalocele)

(Updated 4/26/23)

- May be performed on 3T or the following 1.5T: CIC, CP MR1O Espree, GTN, SW MR3, VIL

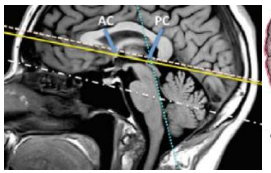
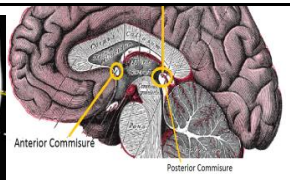
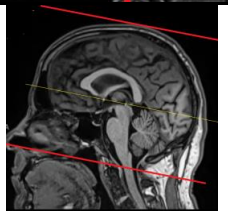
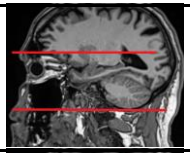
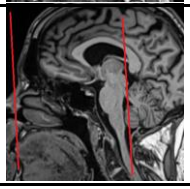
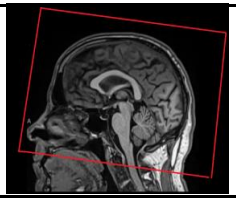
SEQUENCE	FOV (mm)	SLICE (mm)	COMMENTS	IMAGES
T1 dark fluid Sag	250	1 x 0		
Diffusion Ax	230	5 x 1	  Parallel to AP_PC line	
T2 FS FLAIR Ax	220	4 x 1		
SWI Ax *(Only send SWI & Phase series)*	220	3 x 0 TE 20		
T2 SPACE Ax *Administer contrast*	200	0.8	Post-processing • MPR – Sag 0.8mm • MPR - Cor 0.8mm	
T2 Ax	220	4 x 1		Copies to FLAIR Ax
T2 FS Cor	200	3 x 0	• Coronals parallel to the brainstem • Include mastoids through orbits	
T1 FS SPACE Ax post	256	1 x 0	Post-processing • MPR - Cor 4x0mm, ~49 slices • Thin MIP – Ax 6x1mm, ~157 slices	

- Patients with braces or other metallic implants causing susceptibility artifact – remove FS & perform GRE Cor instead of SWI.
- Conventional GRE coronal may be performed if motion is noted on SWI axial.
- Consult a radiologist for PRN gad orders or ARA referrals where gad is not specified

Cranial Nerve

(Facial pain, facial tingling and numbness, 4th Trochlear nerve for nerve palsy, 5th Trochlear nerve for trigeminal neuralgia, 6th Abducens nerve, 9th Glossopharyngeal nerve, 10th Vagus nerve, 11th Spinal accessory nerve, 12th Hypoglossal nerve)

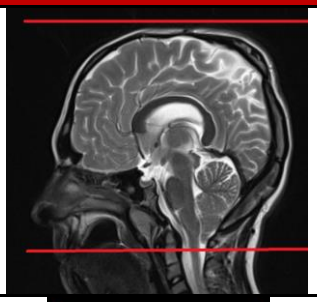
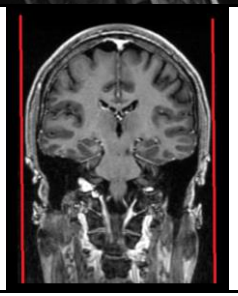
(Updated 10/26/23)

SEQUENCE	FOV (mm)	SLICE (mm)	COMMENTS	IMAGES
T1 dark fluid Sag	220	4 x 1.2		
Diffusion Ax	230	5 x 1	  Axials parallel to AC-PC line	
T2 FS FLAIR Ax T2 Ax	220	4 x 1		
SWI Ax *(Only send SWI & Phase series)*	220	3 x 0 TE 20		
T2 SPACE Ax	200	1 x 0 ~56 slices	Posterior fossa, foramen magnum through orbits	
T2 FS hr Cor *Administer contrast*	180	2.5 x 0.5	Posterior to the pons through face	
T1 FS hr VIBE Cor post	180	2.5		Copies center slice T2 FS hr Cor
T1 FS hr VIBE Ax post	180	2.5 ~14 slices		Copies center slice T2 SPACE Ax
T1 FS SPACE Ax post	256	1 x 0	Post-processing • MPR - Cor 4x0mm, ~49 slices • Thin MIP – Ax 6x1mm, ~157 slices	

- Patients with braces or other metallic implants causing susceptibility artifact – remove FS & perform GRE Cor instead of SWI.
- Conventional GRE coronal may be performed if motion is noted on SWI axial.
- Consult a radiologist for PRN gad orders or ARA referrals where gad is not specified

Fast Acquisition

- Typically performed for evaluation of Hydrocephalus. It is normal to see a Ventriculoperitoneal (VP) shunt implanted in these patients.
- Programmable shunts may require an X-ray before and/or after MRI or a neurological follow-up appointment.
- Swaddle uncooperative children/infants. Use papoose at CIC, parents or other staff may help stabilize uncooperative patients

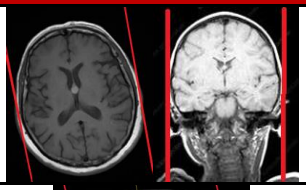
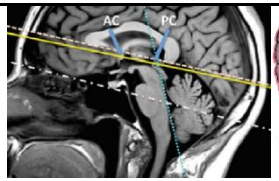
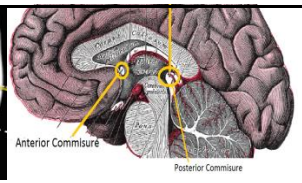
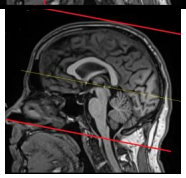
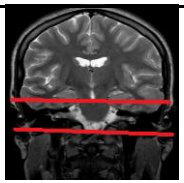
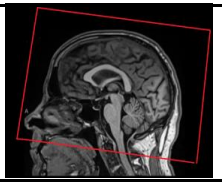
SEQUENCE	FOV (mm)	SLICE (mm)	COMMENTS	IMAGES
T2 HASTE Ax	200	4 x 1.2		
T2 HASTE Sag	200	4 x 1.2		

IAC

(7th CN Facial nerve for cerebellopontine angle, 8th CN Vestibulocochlear nerve, tinnitus, hearing loss, dizziness / vertigo, facial drooping / spasms / twitching, acoustic neuroma, vestibular schwannoma, Bell's palsy)

(Updated 10/26/23)

Routine brain MRI ordered from and ENT/Otolaryngology for any of the above indications should follow the IAC protocol

SEQUENCE	FOV (mm)	SLICE (mm)	COMMENTS	IMAGES
T1 dark fluid Sag	220	4 x 1.2		
GRE Cor	220	5 x 1		
Diffusion Ax	230	5 x 1	  Axials parallel to AC-PC line	
T2 FS FLAIR Ax T2 Ax	220	4 x 1		
T2 SPACE Ax (If wo contrast, MPR Cor 1mm)	200	0.8	Posterior fossa	
T1 VIBE Ax Pre *Administer contrast*	160	1.5	Always perform, even if not contrasting	Copies center slice to T2 SPACE
T1 FS VIBE Ax post	160	1.5		Copies to T1 VIBE Ax Pre
T1 FS SPACE Ax post	256	1.0	Post-processing • MPR – IAC Cor 1x0mm, 14CM FOV, ~28 slices • MPR - Cor 4x0mm, ~49 slices • Thin MIP – Ax 6x1mm, ~157 slices	

NOTE:

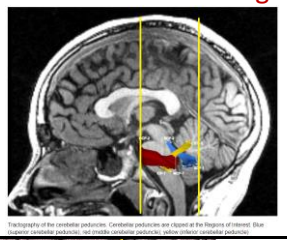
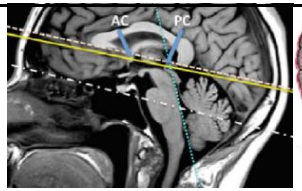
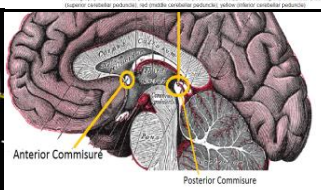
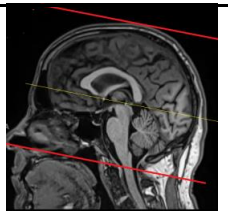
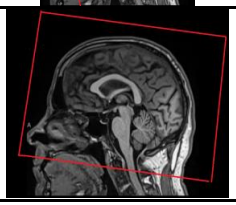
• Follow up or known schwannoma studies may be ordered without contrast, specifically Dr. Kemper

Movement Disorder

(Middle Cerebellar Peduncle width)

(Updated 12/4/23)

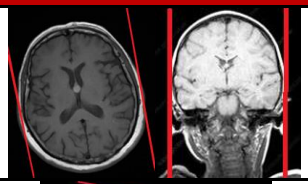
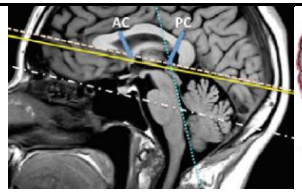
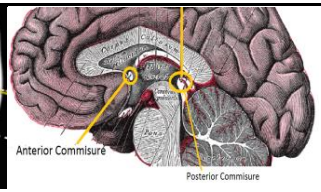
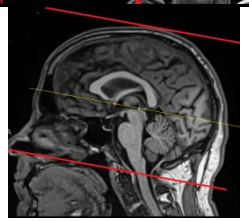
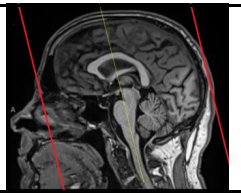
- Specialty exam, only perform if specifically requested. Generally ordered by neurologist for neurodegenerative movement disorders
- Do not perform for general practice physicians.
- Keep head straight

SEQUENCE	FOV (mm)	SLICE (mm)	COMMENTS	IMAGES
T1 3D MPRAGE Sag (MPR 1mm Cor)	240	0.9 ~192 slices	Coronal MPR – orthogonal, mid-cerebellum through the pons 	
Diffusion Ax	230	5 x 1	  Axials parallel to AC-PC line	
T2 FS FLAIR Ax	220	4 x 1		
SWI Ax *(Only send SWI & Phase series)* *Administer contrast*	220	3 x 0 TE 20		
T2 Ax	220	4x1		Copies to T2 FLAIR Ax
T2 FS Cor	220	5 x 2	Coronals parallel to the brainstem	
T1 FS SPACE Ax post	256	1 x 0	Post-processing • MPR - Cor 4x0mm, ~49 slices • Thin MIP – Ax 6x1mm, ~157 slices	

- Patients with braces or other metallic implants causing susceptibility artifact – remove FS & perform GRE Cor instead of SWI.
- Conventional GRE coronal may be performed if motion is noted on SWI axial.
- Consult a radiologist for PRN gad orders or ARA referrals where gad is not specified

Multiple Sclerosis

(Updated 4/26/23)

SEQUENCE	FOV (mm)	SLICE (mm)	COMMENTS	IMAGES
T1 dark fluid Sag T2 FS FLAIR Sag	220	4 x 1.2	Must include entire brain from left to right and superior edge of C2 through the skull vertex	
Diffusion Ax	230	5 x 1	 	
T2 FS FLAIR Ax	220	4 x 1		
SWI Ax *(Only send SWI & Phase series)* *Administer contrast*	220	3 x 0 TE 20	• Axials parallel to AC-PC line • Must include entire brain from foramen magnum through the skull vertex	
T2 Ax	220	4 x 1		Copies to T2 FLAIR Ax
T2 FS Cor	220	5 x 2	• Coronals parallel to the brainstem • Must include entire brain from posterior to anterior cranial vault	
T1 FS SPACE Ax post	256	1 x 0	Post-processing • MPR - Cor 4x0mm, ~49 slices • Thin MIP – Ax 6x1mm, ~157 slices	Copies to T1 SPACE Ax

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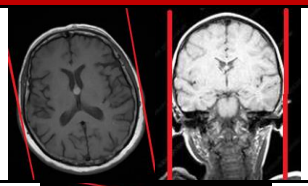
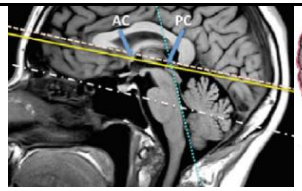
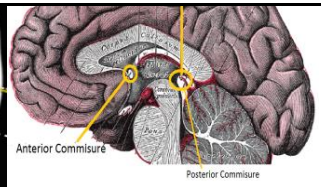
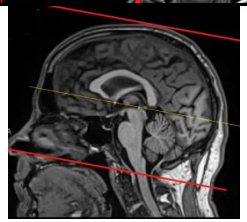
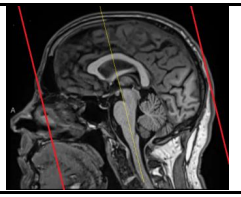
- Conventional GRE coronal may be performed if motion is noted on SWI axial.
- Consult a radiologist for PRN gad orders or ARA referrals where gad is not specified.

ACR Requirement

Multiple Sclerosis – UTHA Only *

(Perform for UTHA RPs only)

(Updated 4/26/23)

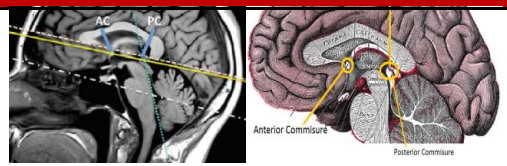
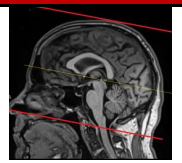
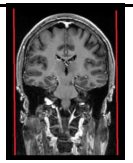
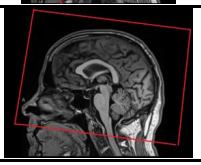
SEQUENCE	FOV (mm)	SLICE (mm)	COMMENTS	IMAGES
T2 FS FLAIR Sag	220	3 x 0 ~49 slices		
Diffusion Ax T2 FS FLAIR Ax	220	3 x 0 ~53 slices	  Axials parallel to AC-PC line	
T1 3D MPRAGE Ax (MPR Sag 3x0mm, ~52 slices)	230	1.0		
SWI Ax *(Only send SWI & Phase series)* *Administer contrast*		3 x 0 TE 20		
T2 Ax	220	3 x 0		
T2 FS Cor	220	5 x 1 ~30 slices	Coronals parallel to the brainstem	
T1 SPAIR FS SPACE Ax post	256	1 x 0	Post-processing • MPR - Cor 4x0mm, ~49 slices • Thin MIP – Ax 6x1mm, ~157 slices	Copies to Diff Ax

- Patients with braces or other metallic implants causing susceptibility artifact – remove FS & perform GRE Cor instead of SWI.
- Conventional GRE coronal may be performed if motion is noted on SWI axial.
- Consult a radiologist for PRN gad orders or ARA referrals where gad is not specified.
- Perform for UTHA only, see General Guidelines or Provider Comments in MI for protocol instructions.

NeuroQuant *

(Updated 4/26/23)

- Position head straight.
- Landmark must be at glabella for proper post processing of T1 MPRAGE Sag, even for multiple studies.

SEQUENCE	FOV (mm)	SLICE (mm)	COMMENTS	IMAGES
Diffusion Ax	230	5 x 1	 Axials parallel to AC-PC line	
T2 FS FLAIR Ax	220	4 x 1		
SWI Ax *(Only send SWI & Phase series)*	220	3 x 0 TE 20		
T1 3D MPRAGE Sag, p2 *Administer contrast*	256 100% 192 base resolution	1.2 x 1.2 160 – 170 0% phase or slice over sampling	Do not adjust parameters, no angle. iPat: 2, Avg.: 1, Concatenations: 1 Gradient mode: Fast, RF Pulse Type: Fast Mag. Prep: Non-Sel IR TR: 2300, TE: min, TI 900, Flip Angle: 9, BW: 240 Filters: None	
T2 Ax	220	4x1		Copies to T2 FLAIR Ax
T2 FS Cor	220	5 x 2	Parallel to the brainstem	
T1 FS SPACE Ax post	256	1 x 0	Post-processing • MPR - Cor 4x0mm, ~49 slices • Thin MIP – Ax 6x1mm, ~157 slices	

- Conventional GRE coronal may be performed if motion is noted on SWI axial.

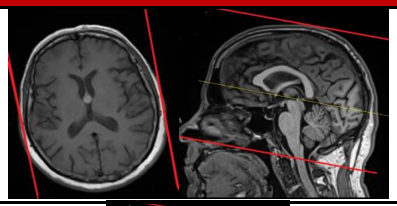
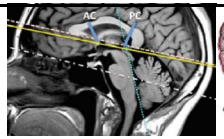
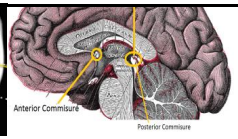
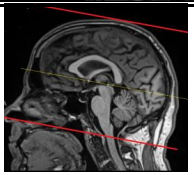
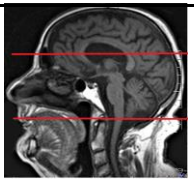
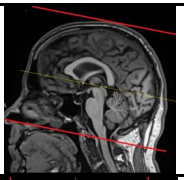
NOTE

- Send T1 MPRAGE to ClearCanvas
- Reserve study in "pending Documents" for 2 hours if done before 5 pm. If done after hours, reserve for appropriate time allowing for at least 2 hours of processing time the following day.
- Notify NQProcessing@ausrad.com to upload the T1 mprage sag to Neuroquant for report processing.
- Standard reports: General Morphometry and Age-Related Atrophy, others upon request: Brain Development, Hippocampal Volume Asymmetry, Multi-structure Atrophy and Triage Brain Atrophy

Perfusion *

(Updated 10/5/22)

Only performed at: CP MR2, CP MR3, MPT MR1, SW MR2, and WP

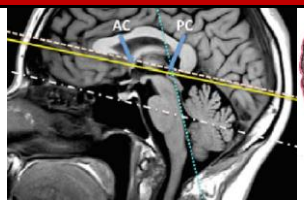
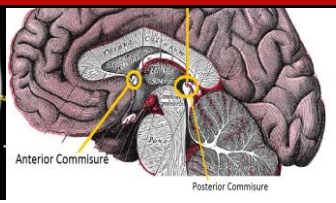
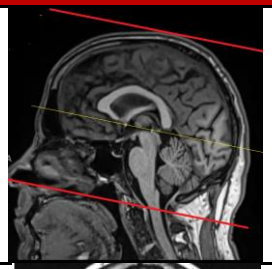
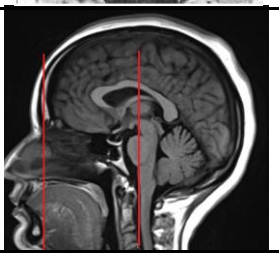
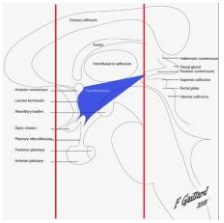
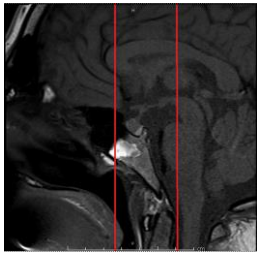
SEQUENCE	FOV (mm)	SLICE (mm)	COMMENTS	IMAGES
T1 SPACE Ax Pre (MPR 4x0mm Sag)	256	1 x 0		
Diffusion Ax	230	5 x 1	  Axials parallel to AC-PC line	
T2 FS FLAIR Ax	220	4 x 1		
SWI Ax *(Only send SWI & Phase series)*	220	3 x 0 TE 20		
EP2D Ax Perfusion *Contrast bolus full dose after 1 min of scanning 3ml/sec followed by 15ml saline*	240	5 x 0	• Mass-include entire mass/swelling, only cover 1/3 of brain, DO NOT add slices if not necessary. • TR 1600, consult Rad with any coverage concerns. • GBP, PBP, TTP, relCBV, relCBVCorr maps	
T2 Ax	220	4 x 1		
T2 Cor	220	5 x 2		
T1 FS SPACE Ax post	256	1 x 0	Post-processing • MPR - Cor 4x0mm, ~49 slices • Thin MIP – Ax 6x1mm, ~157 slices	Copies to T1 FS SPACE Ax pre

- Reserve Read: Dr. Farhataziz if unavailable contact *MR Leads
- Conventional GRE coronal may be performed if motion is noted on SWI axial.
- Send to PACS: all standard series plus EP2D perfusion & CBV maps only, do not request color map images from MPT unless specifically requested by radiologist. Post-processing is performed by radiologist. If a perfusion is scheduled on a weekend, make sure Dr. Farhataziz is available to read the exam on Monday.

Pituitary: Adult / Pediatric

(Updated 9/26/22)

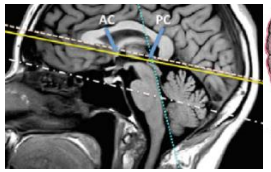
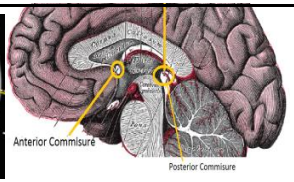
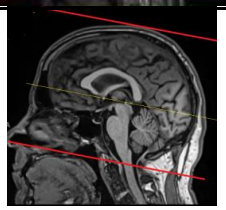
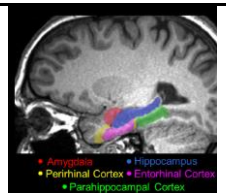
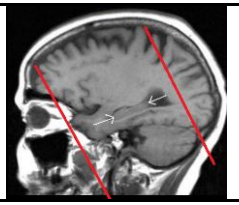
- Always to be scanned as an individual exam, separate ACC/charge.
- For multi-exams perform post contrast immediately after contrast injection.

SEQUENCE	FOV (mm)	SLICE (mm)	COMMENTS	IMAGES
Diffusion Ax *(Pedi only)*	230	5 x 1	  Axials parallel to AC-PC line	
T2 FS FLAIR Ax	220	4 x 1		
T1 hr Sag	140	2 x 0 ~16 slices		
T2 hr Cor	140	2 x 0 (Adult: ~16 slices) (Pedi: ~38 slices)	Adult – standard pituitary coverage Pediatric 0-17 y/o – include frontal lobes	
T1 hr Cor Pre *Administer contrast* T1 hr Cor Post	140	2 x 0 ~16 slices	Include mid-pons through pituitary and optic chiasm  Optional, dynamic imaging • T1 hr TSE Cor Pre *Administer contrast* • T1 hr TSE Cor Post x5 measurements • T1 hr Cor Post • T1 hr Sag Post	
T1 hr Sag Post	140	2 x 0		Copies to T1 hr Sag

Seizure *

(Updated 12/8/22)

- Protocol performed for patients 0-49 Y/O with seizure disorder. Patients over 50 Y/O must have neurologist specifically requesting seizure protocol.
- Perform tumor protocol for diagnosis or symptoms of seizures with history of brain tumor/metastasis.
- Remove fat suppression if there are metal causing artifact on images

SEQUENCE	FOV (mm)	SLICE (mm)	COMMENTS	IMAGES
T1 3D MPRAGE Ax (MPR 1x0mm Cor & Sag)	230	1.0	Pedi patients must have air around skull for future MEG planning.	
Diffusion Ax	230	5 x 1	  Parallel to AC-PC line	
T2 FS FLAIR Ax	220	4 x 1		
SWI Ax *(Only send SWI & Phase series)*	220	3 x 0 TE 20		
T2 FS FLAIR Obl Cor hr *Administer contrast* T2 Obl Cor hr	180	2.5 x 0.5 ~28 slices	Include entire temporal lobe 	
T2 Ax	220	4 x 1		Copies to T2 FLAIR Ax
T1 FS SPACE Ax post	256	1 x 0	Post-processing • MPR - Cor 4x0mm, ~49 slices • Thin MIP – Ax 6x1mm, ~157 slices	Copies to T1 3D MPRAGE Ax
DIR Sag (MPR 1x0mm Ax & Cor)	260	1.2 x 0	Only perform for Austin Epilepsy	
T2 SPACE FLAIR 3D Sag post	250	1 x 0	Only perform for Dr. Briggs	

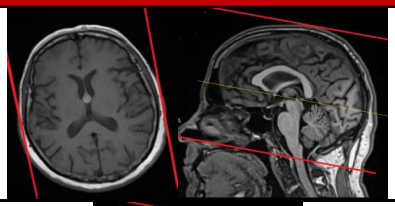
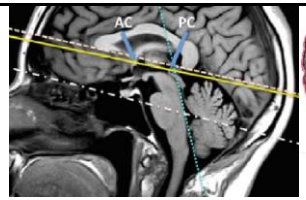
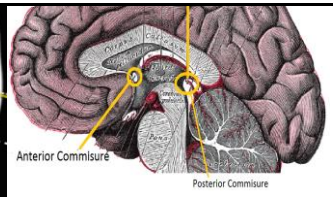
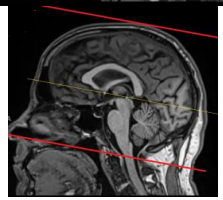
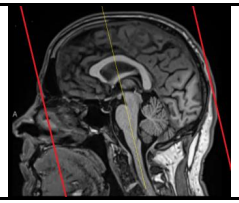
- Perform DIR Sag for Austin Epilepsy group (Sami Aboumatar, MD, Daniel Schere, M.D., Jeanne Beattie, MD., Diego Tovar Quiroga, MD., Richard Stovall, MD.
- Perform T2 SPACE FLAIR 3D Sag post for Dr. Briggs
- Conventional GRE coronal may be performed if motion is noted on SWI axial

Tumor

(Mass, oncology, metastasis)

(Updated 4/26/23)

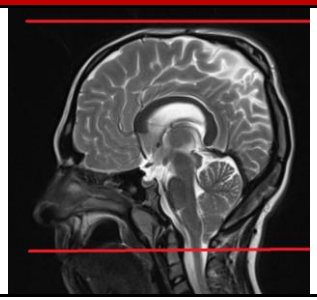
- If ordered without contrast perform routine brain. Pre 3D is not necessary if unable to compare with post 3D.

SEQUENCE	FOV (mm)	SLICE (mm)	COMMENTS	IMAGES
T1 SPACE Ax Pre	256	1 x 0	Post-processing • MPR – Sag 4x0mm, ~39 slices	
Diffusion Ax	230	5 x 1	  Axials parallel to AC-PC line	
T2 FS FLAIR Ax	220	4 x 1		
SWI Ax *(Only send SWI & Phase series)* *Administer contrast*	220	3 x 0 TE 20		
T2 Ax	220	4 x 1		Copies to T2 FLAIR Ax
T2 FS Cor	220	5 x 1	Coronals parallel to the brainstem	
T1 FS SPACE Ax post	256	1 x 0	Post-processing • MPR – Sag 4x0mm, ~39 slices • MPR - Cor 4x0mm, ~49 slices • Thin MIP – Ax 6x1mm, ~157 slices	Copies to T1 SPACE Ax

- Patients with braces or other metallic implants causing susceptibility artifact – remove FS & perform GRE Cor instead of SWI.
- Conventional GRE coronal may be performed if motion is noted on SWI axial.
- Consult a radiologist for PRN gad orders or ARA referrals where gad is not specified

DBS Planning *

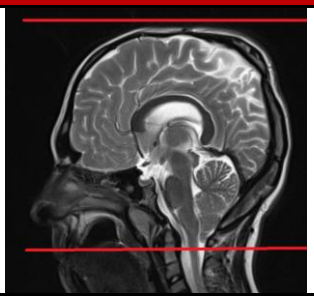
- Keep head straight. Pad head well to prevent any movement.
- Must include all external contours of the head.
- Do not adjust parameters

SEQUENCE	FOV (mm)	SLICE (mm)	COMMENTS	IMAGES
FGATIR Ax	240	1 ~176 slices	No angles	
T2 Ax *Administer contrast*	250	2 ~54 slices		Copies center slice to FGATIR
T1 MPRAGE Ax Post	250	1		Copies center slice to FGATIR

DBS Planning – Mazor *

(Neuro Texas)

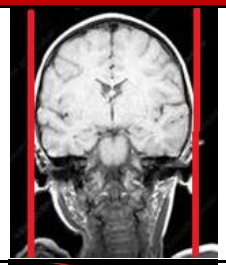
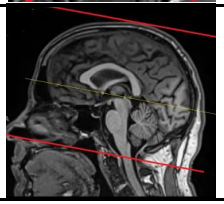
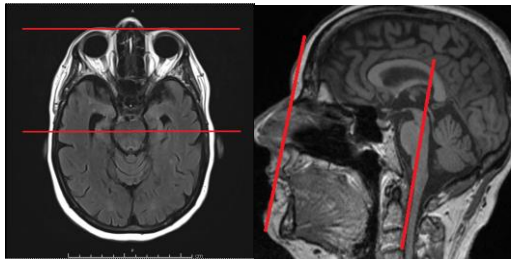
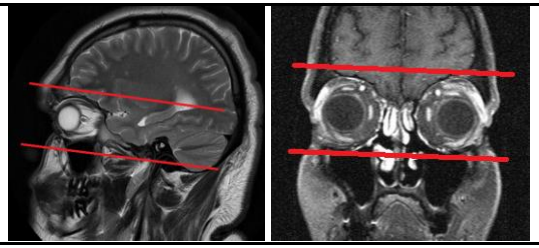
- Keep head straight. Pad head well to prevent any movement.
- Must include all external contours of the head.
- Do not adjust parameters

SEQUENCE	FOV (mm)	SLICE (mm)	COMMENTS	IMAGES
T2 SPACE Ax (Bright fluid) *Administer contrast*	240 100% pFOV 256 x 256	1 ~176 slices	No angles	
T1 MPRAGE Ax Post	240	1		Copies center slice to FGATIR

Orbits

(Updated 5/16/22)

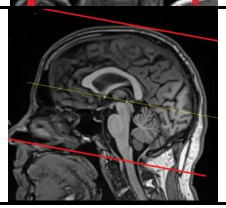
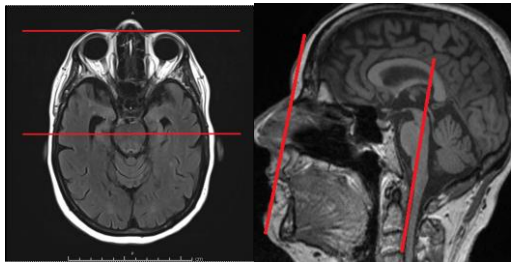
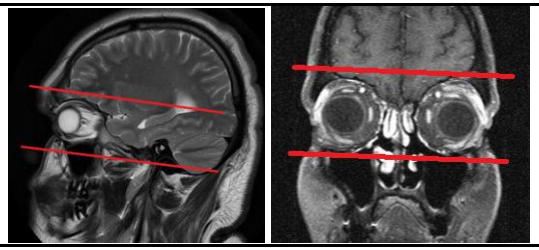
- Always to be scanned as an individual exam, separate ACC/charge
- Eye make-up must be removed prior to exam

SEQUENCE	FOV (mm)	SLICE (mm)	COMMENTS	IMAGES
T1 dark fluid Sag	220	4 x 1.2		
Diffusion Ax	230	5 x 1		
T2 STIR hr Cor	180	2.5 x 0.5 ~31 slices	Mid pons through globe	
T1 hr Cor Pre *Administer contrast*	160			
T1 FS hr Cor Post	160	2.5 x 0.5		
T2 FS hr Ax T1 FS hr Ax Post	180	2.5 x 0.5	Slices parallel to the optic nerve	

Orbits Multiple Sclerosis – UTHA Only *

(Updated 5/16/22)

- Always to be scanned as an individual exam, separate ACC/charge
- Eye make-up must be removed prior to exam

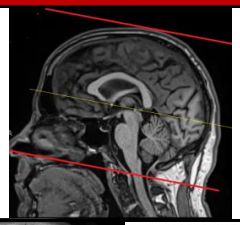
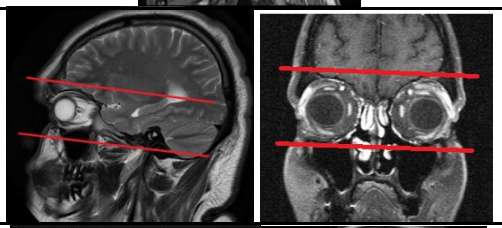
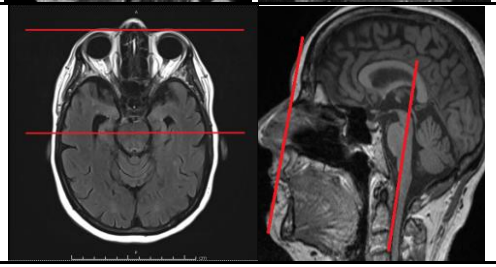
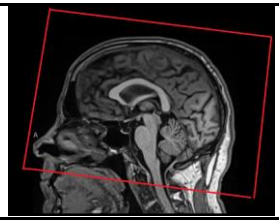
SEQUENCE	FOV (mm)	SLICE (mm)	COMMENTS	IMAGES
T1 dark fluid Sag	220	4 x 1		
Diffusion Ax	230	2 x 0		
T2 STIR hr Cor	180	2 x 0 ~44 slices	Mid pons to through globe	
T1 hr Cor Pre *Administer contrast*	160			
T1 FS hr Cor Post	160	2 x 0		
T2 FS hr Ax T1 FS hr Ax Post	180	2 x 0	Slices parallel to the optic nerve	

- Perform for UTHA only, see General Guidelines or Provider Comments in MI for protocol instructions

Optic Glioma

(Updated 9/26/22)

- Always to be scanned as an individual exam, separate ACC/charge
- Eye make-up must be removed prior to exam

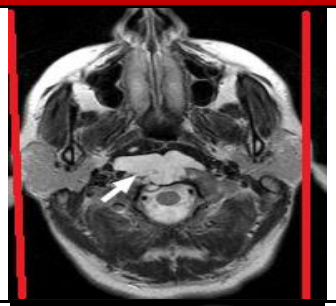
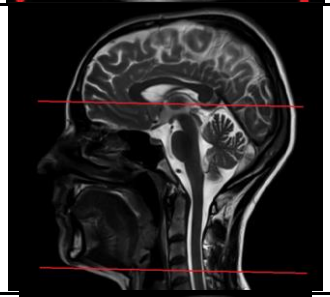
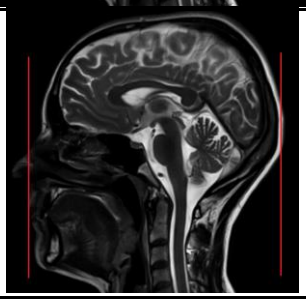
SEQUENCE	FOV (mm)	SLICE (mm)	COMMENTS	IMAGES
T2 FS FLAIR Ax	220	4 x 1		
T1 hr Ax	180	2.5 x 0.5		
T2 STIR hr Cor *Administer contrast*	180	2.5 x 0.5 ~31 slices	Mid pons to through globe	
T1 FS hr Cor Post	160	2.5 x 0.5		
T2 FS hr Obl Ax	180	2.5 x 0.5		Copies to T1 hr Ax
T1 FS SPACE Ax post	256	1	Post-processing • MPR – Sag 4x0mm, ~39 slices • MPR - Cor 4x0mm, ~49 slices • Thin MIP – Ax 6x1mm, ~157 slices	

Skull Base/Face *

(Staging of facial skin, salivary, or sinonasal CA, mandible)

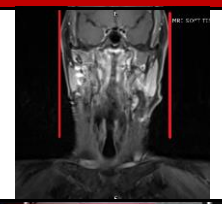
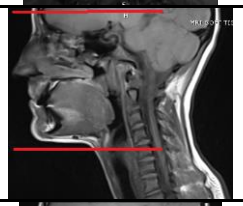
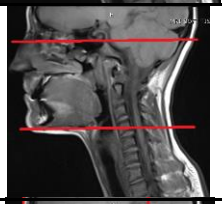
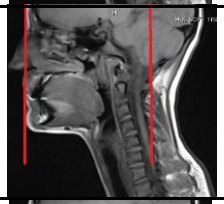
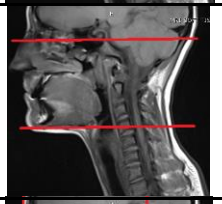
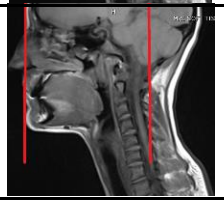
(Updated 1/5/22)

- Confirm protocol with radiologist before performing this protocol, typically referred by ENT or oncology.
- Primarily used for facial lesions, include P>A / L>R diameter of skull / face orbital roof through C1, including mandible
- Coverage can vary based on extent and location of pathology

SEQUENCE	FOV (mm)	SLICE (mm)	COMMENTS	IMAGES
T1 Sag	200	3 x 0.5		
T1 Ax T2 FS Dixon Ax (STIR, if Dixon fails) Diff Ax	220	3 x 0.5		
STIR Cor *Administer contrast:*	180	3 x 1		
T1 FS Dixon Ax Post (Perform conventional T1 FS if Dixon fails)	220	3 x 0.5		Copies to T1 Ax
T1 FS Dixon Cor Post	180	3 x 1		Copies to STIR Cor

Sialogram

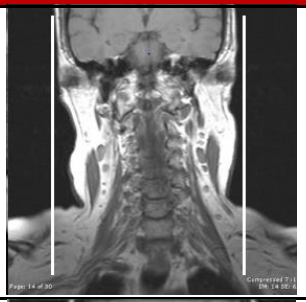
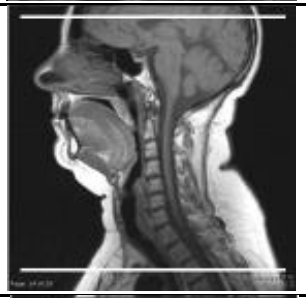
- Include orbits to mandible to ear lobes.
- Reserve read for Dr. Hassibi or Dr. Farhataziz

SEQUENCE	FOV (mm)	SLICE (mm)	COMMENTS	IMAGES
T1 Sag	240	5 x 1		
T1 Ax T2 FS Dixon Ax	200	3 x 0.5		
T2 SPACE Ax (MPR 1.2 x 0 Cor to focus on salivary glands)	160	1.2 x 0		
STIR Cor *Administer contrast:*	180	3 x 0.5		
T1 FS Dixon Ax Post	200	2 x 0.5		
T1 FS Dixon Cor Post	180	2 x 0.5		

Soft Tissue Neck *

(Updated 10/3/23)

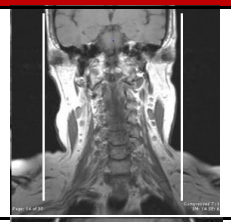
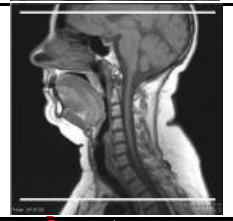
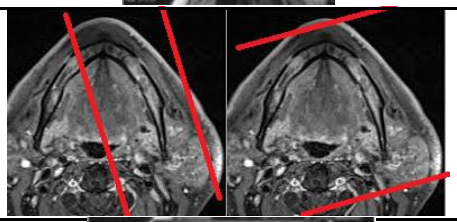
- The FOV and # of slices used should be appropriate to the size of the patient. Included sternum to the orbital roof F to H on all sequences.
- Evaluate all Dixon sequences for "Dixon fail artifact"

SEQUENCE	FOV (mm)	SLICE (mm)	COMMENTS	IMAGES
T1 Sag	280	5 x 1		
T1 Ax	220	4 x 1		
T2 FS Dixon Ax (Perform STIR Ax if Dixon fails)				
DIFF Ax		5 x 1	B values – 0, 1000	
STIR Cor T1 Cor (if wo gad) *Administer contrast:*	280	5 x 1		
T1 FS Dixon Ax Post immediate	220	4 x 1	For DIXON failures add T1 TSE FS	Copies to T1 Ax
T1 FS Dixon Cor Post	280	5 x 1		Copies to STIR Cor

Soft Tissue Neck Mandible

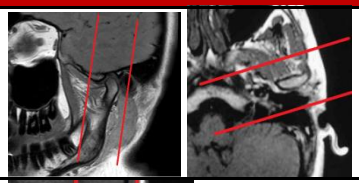
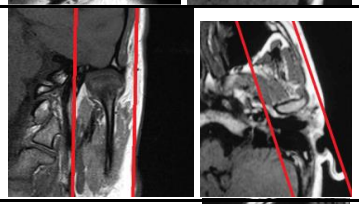
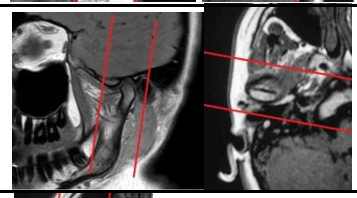
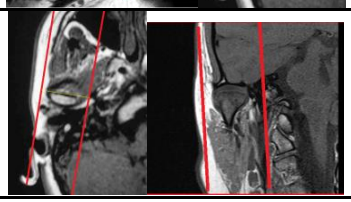
(Dr. Peter Scholl)

- The FOV and # of slices used should be appropriate to the size of the patient. Included sternum to the orbital roof F to H on all sequences.
- Evaluate all Dixon sequences for "Dixon fail artifact"

SEQUENCE	FOV (mm)	SLICE (mm)	COMMENTS	IMAGES
T1 Sag		5 x 1		
T1 Ax T2 FS Dixon Ax (Perform STIR Ax if Dixon fails)		4 x 1		
T1 hr Obl Sag			T1 hires Cor (3x0, 160 FOV, RT or LT affected side only, perpendicular to the long axis of the mandible)	
T1 hr Obl Cor				
STIR Cor T1 Cor (if wo gad) *Administer contrast:*		5 x 1		
T1 FS Dixon Ax Post immediate		4 x 1	For DIXON failures add T1 TSE FS	Copies to T1 Ax
T1 FS Dixon Cor Post		5 x 1		Copies to STIR Cor

TMJ

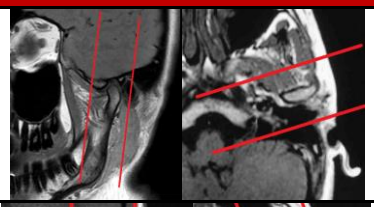
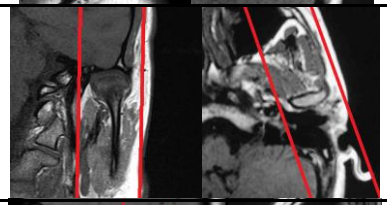
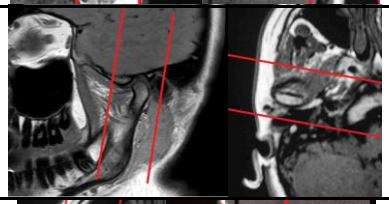
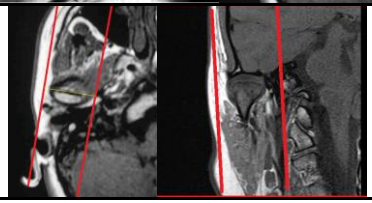
- Open series performed with patient in maximum open mouth. Measure how wide the patient can open their mouth in cm before starting.
- Document # of cm that the mouth was open.
- Contrast is not used for TMJ studies generally; however, contrast is recommended for RA, infection, abscess, etc.
- Acquire sequences in the following order

SEQUENCE	FOV (mm)	SLICE (mm)	COMMENTS	IMAGES
LT T1 Cor	130	2.5 x 0.5		
LT PD Sag LT T2 FS Sag	130	2.5 x 0.5		
RT T1 Cor	130	2.5 x 0.5		
RT PD Sag RT T2 FS Sag	130	2.5 x 0.5		
Open mouth RT PD Sag Open LT PD Sag Open *Administer contrast, if needed*	130	2.5 x 0.5		Copies prescription to Sag closed mouth as appropriate
LT T1 FS Cor Closed Post	130	2.5 x 0.5		Copies to LT T1 Cor
LT T1 FS Sag Closed Post	130	2.5 x 0.5		Copies to LT PD Sag
RT T1 FS Cor Closed Post	130	2.5 x 0.5		Copies to RT T1 Cor
RT T1 FS Sag Closed Post	130	2.5 x 0.5		Copies to RT PD Sag

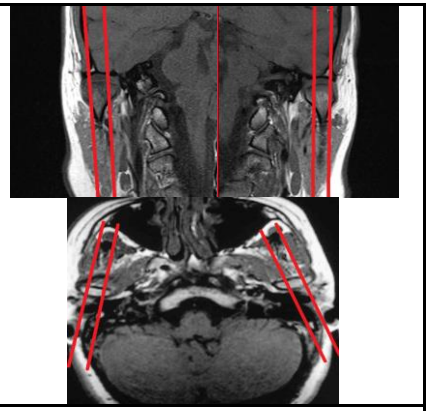
- Send axial localizer to PACS

Cine

- Open series performed with patient in maximum open mouth. Measure how wide the patient can open their mouth in cm before starting.
- Document # of cm that the mouth was open.
- Contrast is not used for TMJ studies generally; however, contrast is recommended for RA, infection, abscess, etc.
- On larger patients, spine coil or anterior head coil can be removed to easily fit the bite block. Not done on GE. Acquire sequences in the following order

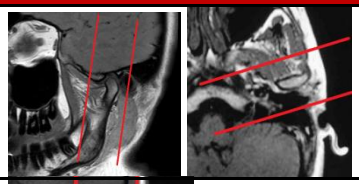
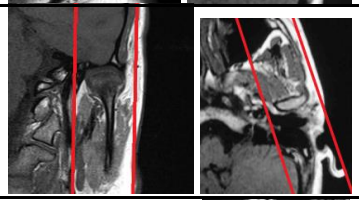
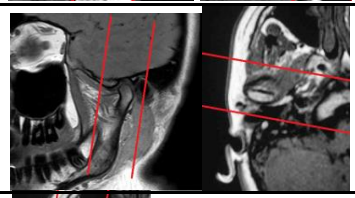
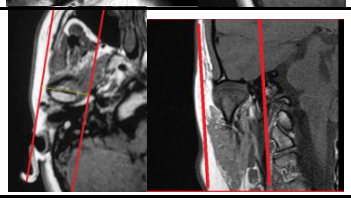
SEQUENCE	FOV (mm)	SLICE (mm)	COMMENTS	IMAGES
LT T1 Cor	130	2.5 x 0.5		
LT PD Sag LT T2 FS Sag	130	2.5 x 0.5		
RT T1 Cor	130	2.5 x 0.5		
RT PD Sag RT T2 FS Sag	130	2.5 x 0.5		
Open mouth RT PD Sag Open LT PD Sag Open	130	2.5 x 0.5		Copies prescription to Sag closed mouth as appropriate

Do not send the dynamic sequences to PACS, only the resulting cine series. To create the cine, save the center slice from each of the 8 sequences into a separate sequence, named “RT PD Sag Cine” and/or “LT PD Sag Cine” in separate series. Once this is complete you will need to label each slice with the appropriate opening, “CLOSED” “BITE” “4MM”, etc. Additional instructions. • If patient is unable to complete cine up to the 24mm, document in Tech Notes as to why.

PD Sag Bilat Closed PD Sag Bilat bite (biting down) PD Sag Bilat 4mm / 10mm PD Sag Bilat 8mm / 15mm PD Sag Bilat 12mm / 20mm PD Sag Bilat 16mm / 24mm PD Sag Bilat 20mm / 28mm PD Sag Bilat 24mm / 32mm PD Sag Bilat 36mm, optional patient dependent PD Sag Bilat 40mm, optional patient dependent *Administer contrast, if needed*	130	3 x 0.5	Both measurements listed for old & new device.	
LT T1 FS Cor Closed Post	130	2.5 x 0.5		Copies to T1 LT Cor
LT T1 FS Sag Closed Post	130	2.5 x 0.5		Copies to LT PD Sag
RT T1 FS Cor Closed Post	130	2.5 x 0.5		Copies to RT T1 Cor
RT T1 FS Sag Closed Post	130	2.5 x 0.5		Copies to RT PD Sag
• Send axial localizer to PA				

Pedi - JRA

- Open series performed with patient in maximum open mouth. Measure how wide the patient can open their mouth in cm before starting.
- Document # of cm that the mouth was open.
- Contrast is not used for TMJ studies generally; however, contrast is recommended for RA, infection, abscess, etc.
- Acquire sequences in the following order

SEQUENCE	FOV (mm)	SLICE (mm)	COMMENTS	IMAGES
LT T1 Cor	130	2.5 x 0.5		
LT PD Sag LT T2 FS Sag	130	2.5 x 0.5		
RT T1 Cor	130	2.5 x 0.5		
RT PD Sag RT T2 FS Sag	130	2.5 x 0.5		
Open mouth RT PD Sag Open LT PD Sag Open *Administer contrast*	130	2.5 x 0.5		Copies prescription to Sag closed mouth as appropriate
LT T1 FS Cor Closed Post	130	2.5 x 0.5		Copies to LT T1 Cor
LT T1 FS Sag Closed Post	130	2.5 x 0.5		Copies to LT PD Sag
RT T1 FS Cor Closed Post	130	2.5 x 0.5		Copies to RT T1 Cor
RT T1 FS Sag Closed Post	130	2.5 x 0.5		Copies to RT PD Sag
T1 FS Cor Bilat Closed Post				

- Send axial localizer to PACS

Spine

(Updated 10/3/23)

- If metal, repeat T1 FS without FS. Repeat T2 FS without FS instead of STIR.
- Follow referral requests for non-contrast/non-ARA orders. Consider the following for PRN orders:
  - Contrast is ***recommended*** for:
    - Cervical: history of cancer, myelopathy, MS, infection, abscess, or mass
    - Thoracic: history of cancer, myelopathy, MS, infection, abscess, mass, or prior surgery within 10 years
    - Lumbar: history of cancer, myelopathy, infection, abscess, mass, or prior surgery within 10 years
  - Contrast is ***required*** for:
    - Spinal cord lesions
    - Leptomeningeal disease
- New MS protocols for cervical and thoracic spine are to be performed for UTHA RPs only, 3T preferred, 10/6/20.

Diffusion

- Do not perform on A40 (WLK, WMC, SM)

- Add to routine protocol if specifically requested.
- Consult rad for appropriate plane.
- To evaluate spinal cord infarct, epidermoid cyst, osteomyelitis, and metastasis

SEQUENCE	FOV (mm)	SLICE (mm)	COMMENTS	IMAGES
Thoracic				
DIFF Ax	200	4 x 1		
DIFF Sag Upper / Lower *no angle	260	4 x 1	• Perform upper & lower to avoid end of bore artifact. • Anterior & posterior sat bands to cover fat signal.	
Lumbar				
DIFF Ax	200	5 x 1		
DIFF Sag	280	5 x 1		

Radiation Treatment Planning

-

SEQUENCE	FOV (mm)	SLICE (mm)	COMMENTS	IMAGES

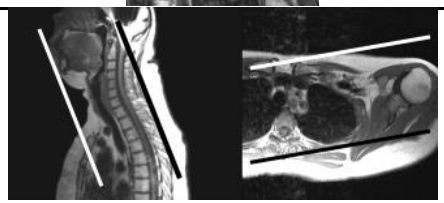
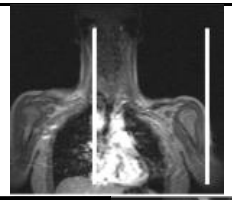
Scoliosis

- Add to routine protocol if exam specifically ordered for scoliosis

SEQUENCE	FOV (mm)	SLICE (mm)	COMMENTS	IMAGES
Adult: T1 Cor Pedi: T2 Cor				

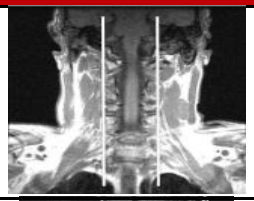
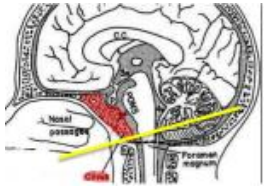
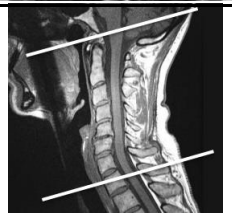
Brachial Plexus *

- Scan the affected side only.
- Oblique the images toward the Axial plane by matching the angle of the lower half of the Cervical Spine. Then oblique the images toward the Sagittal plane to match the path of the brachial plexus. Use the Subclavian artery as a reference point, the brachial plexus should parallel it.
- Perform these exams with contrast if there is a suspicion of a mass or tumor, infection, history of cancer, or history of radiation therapy to the area.

SEQUENCE	FOV (mm)	SLICE (mm)	COMMENTS	IMAGES
T1 Ax	240	3 x 1	Scan from mid C3 to below the shoulder joint (affected side only)	
STIR Ax	240	3 x 1		
T2 FS Dixon Obl Cor	230	3 x 1	Oblique the images toward the Axial plane by matching the angle of the lower half of the Cervical Spine. Then oblique the images toward the Sagittal plane to match the path of the brachial plexus. Use the Subclavian artery as a reference point, the brachial plexus should parallel it.	
T1 Sag	240	5 x 1	Scan from the lateral side of the humerus through the spine (affected side only)	
STIR Cor Bilat *Administer contrast, if needed*	400	3 x 1	Include both sides. Scan from the posterior spine through the sternoclavicular joints.	
T1 FS Dixon Ax Post	240	3 x 1		Copies to T1 Ax
T1 FS Dixon Obl Cor Post	230	3 x 1		Copies to T2 Dixon FS Obl Cor

Cervical

- Document presence or absence of radiculopathy (i.e., Neck pain with left arm radiculopathy for two months)
- If hardware limits the FS on post imaging, add non-FS series.
- Contrast is beneficial for history of cancer, myelopathy, MS, infection, abscess, or mass.
- Add a Cor T1 (3 x 1) if exam is ordered for scoliosis

SEQUENCE	FOV (mm)	SLICE (mm)	COMMENTS	IMAGES
T1 TSE Sag T2 TSE Sag STIR Sag	180	3 x 0.3 ~15 slices	Limit FOV to include inferior half of the Clivus to mid T2	
T2* GRE Ax T2 DIXON TSE Ax T2 TSE Ax (if hardware is present) *Administer contrast, if needed*	160	3 x 0.3	Inferior tip of Clivus to mid T1 	
T1 FS TSE Sag Post T1 TSE Sag Post (if hardware is present)	180	3 x 0.3		Copies to T1 Sag
T1 VIBE Ax Post	140	3 x 0.3		Copies coverage to T2* GRE Ax

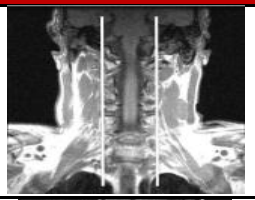
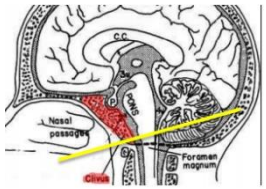
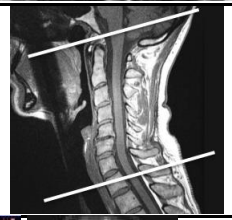
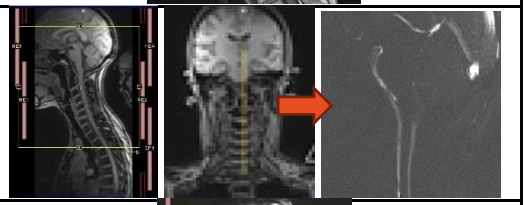
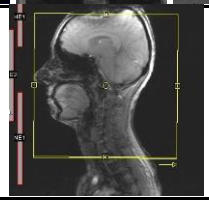
- Send coronal localizer for scoliosis, if not performing T1 Cor

Cervical CSF Flow

Positioning

- Set up patient with Peripheral Pulse Unit on index finger.

- Document presence or absence of radiculopathy (i.e., Neck pain with left arm radiculopathy for two months)
- If hardware limits the FS on post imaging, add non-FS series.
- Contrast is beneficial for history of cancer, myelopathy, MS, infection, abscess, or mass.
- Add a Cor T1 (3 x 1) if exam is ordered for scoliosis

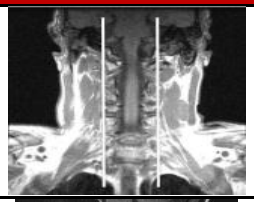
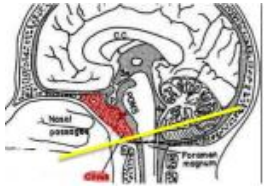
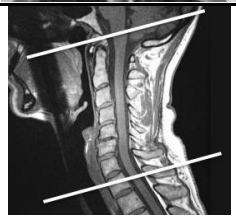
SEQUENCE	FOV (mm)	SLICE (mm)	COMMENTS	IMAGES
T1 TSE Sag T2 TSE Sag STIR Sag	180	3 x 0.3 ~15 slices	Limit FOV to include inferior half of the Clivus to mid T2	
T2* GRE Ax T2 DIXON TSE Ax T2 TSE Ax (if hardware is present)	160	3 x 0.3	Inferior tip of Clivus to mid T1 	
FLASH 6 In Plane **pulse gated*	180	6	• Mid sagittal plane	
T2 SPACE Sag *Administer contrast, if needed*	230	1 176 slices/slab	• Mid brain to C7 (to avoid shoulder wrap, do not include below C7)	
T1 FS TSE Sag Post T1 TSE Sag Post (if hardware is present)	180	3 x 0.3		Copies to T1 Sag
T1 VIBE Ax Post	140	3 x 0.3		Copies coverage to T2* GRE Ax
• Send coronal localizer for scoliosis, if not performing T1 Cor				

Cervical with Flexion

(Hirayama)

(Updated 8/12/22)

- Document presence or absence of radiculopathy (i.e., Neck pain with left arm radiculopathy for two months)
- If hardware limits the FS on post imaging, add non-FS series.
- Contrast is beneficial for history of cancer, myelopathy, MS, infection, abscess, or mass.
- Add a Cor T1 (3 x 1) if exam is ordered for scoliosis

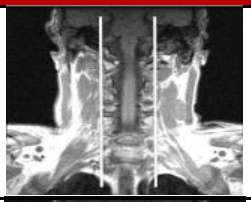
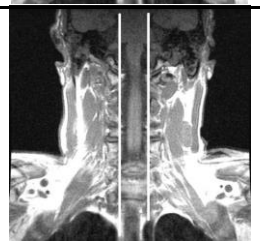
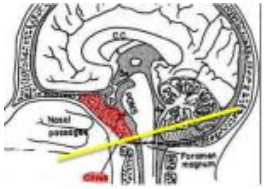
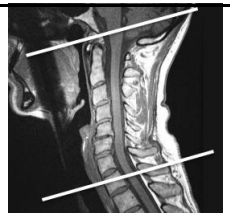
SEQUENCE	FOV (mm)	SLICE (mm)	COMMENTS	IMAGES
T1 TSE Sag T2 TSE Sag STIR Sag	180	3 x 0.3 ~15 slices	Limit FOV to include inferior half of the clivus to mid T2	
T2* GRE Ax T2 TSE Ax	160	3 x 0.3	Inferior tip of clivus to mid T1 	
T2 TSE Sag Flexion	180			Copies T1 Sag
T2 TSE Ax Flexion	160			Copies T2* GRE Ax

- Send coronal localizer for scoliosis, if not performing T1 Cor

Multiple Sclerosis – UTHA Only *

(Updated 10/6/20)

- Document presence or absence of radiculopathy (i.e., Neck pain with left arm radiculopathy for two months)
- If hardware limits the FS on post imaging, add non-FS series

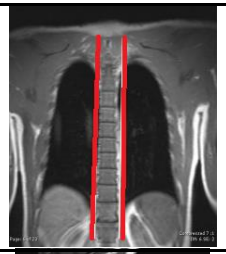
SEQUENCE	FOV (mm)	SLICE (mm)	COMMENTS	IMAGES
T1 TSE Sag T2 TSE Sag STIR Sag	180	3 x 0 ~17 slices 256 x 224 min matrix	Limit FOV to include inferior half of the Clivus to mid T2	
T1 PSIR Sag	180	3 x 0.3		 Copies center slice of T1 Sag
T2* GRE Ax	160	4 x 0 256 x 192 min matrix, if using rectangular FOV the # of phase encoding lines must be >/= pFOV	Inferior tip of Clivus to mid T1 	
T2 FS TSE Ax T2 TSE Ax (add if hardware is present) *Administer contrast, if needed*		256 x 160 min matrix		
T1 FS TSE Sag Post T1 TSE Sag Post (if hardware is present)	180	3 x 0		Copies to T1 Sag
T1 VIBE Ax Post	160	2		Copies coverage to T2* GRE Ax

- Send coronal localizer for scoliosis, if not performing T1 Cor
- Perform for UTHA only, see General Guidelines or Provider Comments in MI for protocol instructions

Thoracic

(Updated 10/2023)

- Sagittal coverage includes mid C7 to mid L1 S-I and fully covering the vertebral bodies side to side. Axials to cover from mid C7 to mid L1.
- Document presence of radiculopathy (i.e., Upper back pain with radiating pain in the left chest-wall for two months)
- If hardware limits the FS on post imaging, add non-FS series.
- Contrast is beneficial for history of cancer, myelopathy, MS, infection, abscess, mass, and surgery within 10 years.
- Add a Cor T1 (3 x 1) if exam is ordered for scoliosis

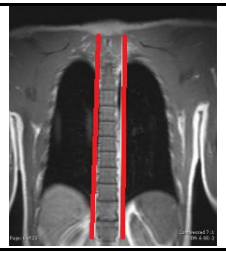
SEQUENCE	FOV (mm)	SLICE (mm)	COMMENTS	IMAGES
T1 Sag Total Spine Loc	~360	6 x 4 ~5 slices	3T Auto composing - Be sure to include all the vertebrae. Might have to repeat with more slices in patients with scoliosis. Must be able to count from C1-S2.	
T1 Sag T2 Sag STIR Sag	~320	3 x 1		
T2 Ax Upper T2 Ax Lower *Administer contrast, if needed*	160	4 x 1	Overlap at least 1 full vertebra between the upper and lower sections	
T1 Sag FS Post T1 Sag Post (if hardware is present)	~320	3 x 1		Copies to T1 Sag
T1 VIBE Ax Post Upper	160	2		Copies coverage to T2 Ax Upper
T1 VIBE Ax Post Lower	160	2		Copies coverage to T2 Ax Lower

- Send coronal localizer for scoliosis, if not performing T1 Cor

Multiple Sclerosis – UTHA Only *

(Updated 10/2023)

- Sagittal coverage includes mid C7 to mid L1 S-I and fully covering the vertebral bodies side to side. Axials to cover from mid C7 to mid L1.
- Document presence of radiculopathy (i.e., Upper back pain with radiating pain in the left chest-wall for two months)
- If hardware limits the FS on post imaging, add non-FS series

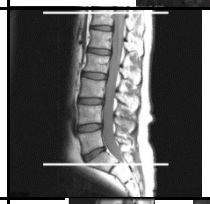
SEQUENCE	FOV (mm)	SLICE (mm)	COMMENTS	IMAGES
T1 Sag Total Spine Loc	~360	6 x 4 ~5 slices	3T Auto composing - Be sure to include all the vertebrae. Might have to repeat with more slices in patients with scoliosis. Must be able to count from C1-S2.	
T1 Sag T2 Sag STIR Sag	~320	3 x 0		
T1 SPIR Sag	~320		Cord coverage only	
T2 Ax Upper T2 Ax Lower *Administer contrast, if needed*	160	5 x 0	Overlap at least 1 full vertebra between the upper and lower sections	
T1 Sag FS Post T1 Sag Post (if hardware is present)	~320	3 x 0		Copies to T1 Sag
T1 VIBE Ax Post Upper	160	2		Copies coverage to T2 Ax Upper
T1 VIBE Ax Post Lower	160	2		Copies coverage to T2 Ax Lower

- Send coronal localizer for scoliosis, if not performing T1 Cor
- Perform for UTHA only, see General Guidelines or Provider Comments in MI for protocol instructions

Lumbar

(Updated 10/2003)

- Sagittal coverage includes mid T11 to mid S3 S-I and fully covering the vertebral bodies side to side. Axials to cover from mid T12 to mid S1.
- Document presence of radiculopathy (i.e., lower back pain with left leg radiculopathy for two months)
- If hardware limits the FS on post imaging, add non-FS series.
- Contrast is beneficial for history of cancer, myelopathy, infection, abscess, mass, and surgery within 10 years.
- Add a Cor T1 (3 x 1) if exam is ordered for scoliosis

SEQUENCE	FOV (mm)	SLICE (mm)	COMMENTS	IMAGES
T1 Sag Total Spine Loc	~360	6 x 4 ~5 slices	3T Auto Composing – be sure to include all the vertebrae. Might have to repeat with more slices in patients with scoliosis. Must be able to count from C1-S2.	
T1 Sag T2 Sag STIR Sag	~260	3 x 0 ~19 slices	• Must include inferior endplate of S2 through the superior endplate of T12. • Must include pedicle left to right	
T2 Ax T1 Ax	180	4 x 1 Pixel Area </- 1.5 mm²	Must include S1 superior endplate	 or 
T2 Obl Ax *Continue If contrast is needed:*	180	4 x 1 Pixel Area </- 1.5 mm²	Add T2 Axial sequence at L3/4 or L4/L5 when the angle of those disk SPACEs requires a separate scan or pathology is seen	 or 
T1 Sag FS Post T1 Sag Post (if hardware is present)	~260	3 x 0		Copies to T1 Sag
T1 Ax Post	180	4 x 1		Copies to T2 Ax
• For Dr. Wallis and Dr. Geibel: replace the T2 Ax Oblique with individual slice groups (5 slices each) through lumbar disc spaces. • For Dr. Bergeson extent coverage on T2 Ax Oblique to include mid L4-mid S1. Scan as one group parallel to these disc spaces			 Dr. Geibel & Dr. Wallis	 Dr. Bergeson

- Send coronal localizer for scoliosis, if not performing T1 Cor

ACR Requirement – Do Not Adjust

Sacral Plexus Neurography *

• All Series and reformats are orthogonal, no angles

SEQUENCE	FOV (mm)	SLICE (mm)	COMMENTS	IMAGES
IR 3D SPACE Cor (MPR 1x0 Ax/Sag)	340	1.3	Include all L2	
T1 Cor PD SPAIR Cor	360	3 x 1		
T1 Axial	330	3 x 0	Mid-L2 down	
T2 SPAIR Axial *Continue If with Contrast:*	330	3 x 0	Mid-L3 down	
T1 Cor FS Post	360	3 x 1		Copies to T1 Cor
T1 Ax FS Post	330	3 x 0		Copies to T1 Ax

Radiation Treatment Planning

For RTP protocol, unless otherwise stated. Follow these guidelines:

- Do not angle images.
- Scan from inferior to superior
- Include entire brain skin to skin and hard palate to skull vertex.
- Do not cut off tip of nose, top of head, or ear lobes with the smallest FOV to include patient's external contours.
- 100% FOV with 100! pFOV, no rectangular FOV
- Slice thickness of 1x0 mm
- Matrix of 256x256
- Contrast full dose.

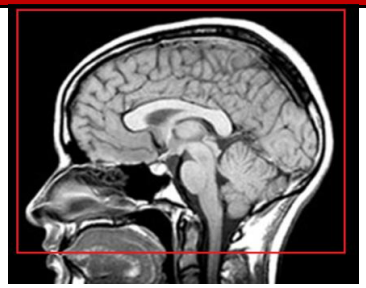
Routine Brain RTP

- Keep head straight, scan orthogonal, no angle.
- Scan I to S, include hard palate and skull vertex, include tip of nose, both ears, small FOV to include patient's external contours.

- Perform for TOPA (Texas Oncology Professional Association) includes Dr. Wu, Dr. Tierney, Dr. Sheinbein and others.
- Perform for ACC (Austin Cancer Center) includes Dr. Ghafoori and others.
- In the rare instance, if an ACC referral specifies Dr. Ghafoori protocol, perform ACC Dr. Ghafoori protocol that has four sequences.

- If a brain RTP referral states W & W/O, contact office for verbal order for with only.

- Do not perform on GE or Symphony A40 scanners (SW MR1, SM, WLK, WMC)

SEQUENCE	FOV (mm)	SLICE (mm)	COMMENTS	IMAGES
Administer contrast T2 3D FLAIR SPACE FS Ax post (MPR 1x0mm Cor/Sag)	230 100% pFOV	1 x 0 256 x 230	• Interpolation ON • Dark fluid = CSF suppressed	
T1 3D FLASH Ax post (MPR 1x0mm Cor/Sag)	230 100% pFOV	1 256 x 230	• Interpolation ON	
Send all original series and reformats to PACS				

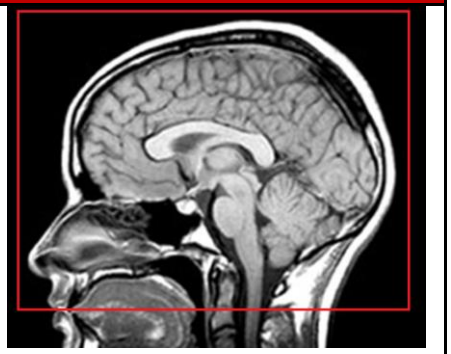
Cranial Nerve RTP

- Keep head straight, scan orthogonal, no angle.
- Scan I to S, include hard palate and skull vertex, include tip of nose, both ears, small FOV to include patient's external contours.

- Perform for TOPA (Texas Oncology Professional Association) includes Dr. Wu, Dr. Tierney, Dr. Sheinbein and others.
- Perform for ACC (Austin Cancer Center) includes Dr. Ghafoori and others.
- In the rare instance, if an ACC referral specifies Dr. Ghafoori protocol, perform ACC Dr. Ghafoori protocol that has four sequences.

- If a brain RTP referral states W & W/O, contact office for verbal order for with only.

- Do not perform on GE or Symphony A40 scanners (SW MR1, SM, WLK, WMC)

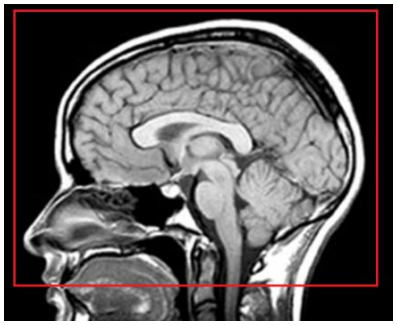
SEQUENCE	FOV (mm)	SLICE (mm)	COMMENTS	IMAGES
Administer contrast T2 3D SPACE Ax post (MPR 1x0mm Cor/Sag)	230	1 x 0 256 x 230	• Interpolation ON • Bright fluid	
T1 3D FLASH Ax post (MPR 1x0mm Cor/Sag)	230	1 256 x 230	• Interpolation ON	

Send all scanned series and reformats to PACS

Brain or Pituitary Austin Cancer Center (ACC) Therapy Planning

(Dr. Ghafoori protocol)

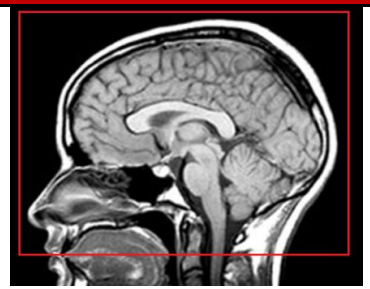
- Keep head straight, scan orthogonal; no angle, Scan I to S, include hard palate and skull vertex, include tip of nose, both ears, small FOV to include patient's external contours, 100% FOV-phase, slice thickness 1 x 0 mm.
- Run this protocol only if referral specifies Dr. Ghafoori protocol.
- Do not perform on GE or Symphony scanners

SEQUENCE	FOV (mm)	SLICE (mm)	COMMENTS	IMAGES
T1 3D MPRAGE Ax (MPR 1x0 Cor/Sag)	250	1 256 x 256		
T2 3D FLAIR FS SPACE Ax (MPR 1x0mm Cor/Sag) *Administer contrast*	250	1 192 x 192		
T2 3D SPACE Ax post (MPR 1x0mm Cor/Sag)	250	1 256 x 256		
T1 3D MPRAGE Ax post (MPR 1x0mm Cor/Sag)	250	1 256 x 256		

Stealth

(Updated 6/1/23)

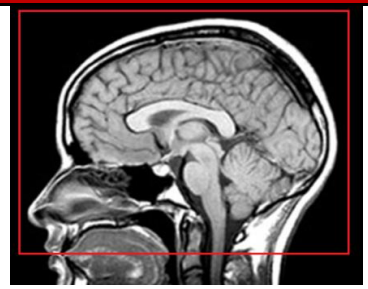
- Keep head straight, scan orthogonal; no angle, scan I to S, include hard palate and skull vertex, include tip of nose, both ears, small FOV to include patient's external contours, 100% FOV-phase, slice thickness 1 x 0 mm.
- Commonly ordered by Dr. Dzuik and Dr. Thatikonda
- Do not perform on GE or Symphony scanners

SEQUENCE	FOV (mm)	SLICE (mm)	COMMENTS	IMAGES
Administer contrast T2 3D SPACE Ax	250	1 256 x 256	No pre-contrast imaging.	
T1 3D MPRAGE Ax post	250 250	1 x 0 256 x 256		
Optional, Dr. Tumu				
FLAIR FS Cor	220	3 x 0.5		
If DTI requested; MPT MR1 3T only				
Ep2d Diff MMDW axial (DTI)	260	4 x 0		Copies center T2 3D SPACE Ax

D

Stryker / CyberKnife / Stereotactic Radiosurgery (SRS)

- Keep head straight, scan orthogonal; no angle, Scan I to S, include hard palate and skull vertex, include tip of nose, both ears, small FOV to include patient's external contours, 100% FOV-phase, slice thickness 1 x 0 mm.
- SRS commonly ordered by Dr. Dzuik and Dr. Thatikonda
- Do not perform on GE or Symphony scanners

SEQUENCE	FOV (mm)	SLICE (mm)	COMMENTS	IMAGES
T2 3D SPACE Ax	250	1 x 0 256 x 256		
T1 3D MPRAGE Ax Pre *Administer contrast*				
T1 3D MPRAGE Ax Post				

Soft Tissue Neck Austin Cancer Center (ACC) Therapy Planning

- The FOV and # of slices used should be appropriate to the size of the patient. Included sternum to the orbital roof F to H on all sequences.
- Evaluate all Dixon sequences for "Dixon fail artifact"

SEQUENCE	FOV (mm)	SLICE (mm)	COMMENTS	IMAGES
T2 FS Dixon Ax (Perform STIR Ax if Dixon fails) T2 3D CISS Ax *Administer contrast*		3 x 0 ~65 slices		
T1 2D FLASH Ax Post T1 3D MPRAGE Ax Post		3 x 0		

Spine Stereotactic Therapy Planning

(Dr. Dzuik & Dr. Thatikonda)

- Full spine locs not needed for cervical spine.
- Do not angle scans

SEQUENCE	FOV (mm)	SLICE (mm)	COMMENTS	IMAGES
T1 Sag Total Spine Loc			• 3T Auto composing; to include all the vertebrae. • May need to repeat with more slices in patients with scoliosis. • Must be able to count from C1-S2.	
T2 3D Ax T1 3D Pre T1 3D Post	180	1 – 2	• Thickness depending on requested coverage. • Do not angle. • If area of coverage is not specified, include one vertebra above and below area of interest.	

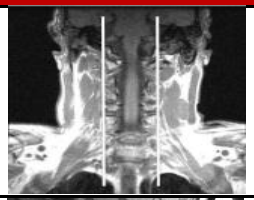
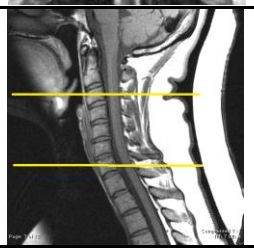
Spine Stryker

- Full spine locs not needed for cervical spine.
- Position feet first, spine
- Do not angle scans, scan inferior to superior

SEQUENCE	FOV (mm)	SLICE (mm)	COMMENTS	IMAGES
T1 Sag Total Spine Loc			• 3T Auto composing; to include all the vertebrae. • May need to repeat with more slices in patients with scoliosis. • Must be able to count from C1-S2.	
T2 Ax T1 Ax Pre T1 Ax Post	180	3 x 0 256 x 256 100% pFOV	• Thickness depending on requested coverage. • Do not angle. • If area of coverage is not specified, include one vertebra above and below area of interest.	

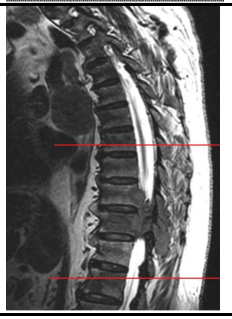
Cervical RTP

- Do not angle
- Document presence or absence of radiculopathy (i.e., Neck pain with left arm radiculopathy for two months)

SEQUENCE	FOV (mm)	SLICE (mm)	COMMENTS	IMAGES
T1 Sag	190	3 x 0 ~19 slices	Limit FOV to include inferior half of the Clivus to mid T2	
T2 SPC Ax T1 VIBE Ax Pre T1 VIBE Ax Post	180	2mm ~96 slices	• Do not angle • Included 1 full vertebra above & below the region of interest, add additional series as needed	
T1 SPC Ax Post	200	2mm		Copies to T2 SPC Ax

Thoracic RTP

- Do not angle
- Document presence or absence of radiculopathy (i.e., Neck pain with left arm radiculopathy for two months)

SEQUENCE	FOV (mm)	SLICE (mm)	COMMENTS	IMAGES
T1 Sag Total Spine Loc			• 3T Auto composing; to include all the vertebrae. • May need to repeat with more slices in patients with scoliosis. • Must be able to count from C1-S2.	
T1 Cor	320	5 x 0.5 ~21 slices	•	
T2 SPC Ax T1 VIBE Ax Pre T1 VIBE Ax Post	200	1 ~96 slices	• Do not angle • Included 1 full vertebra above & below the region of interest, add additional series as needed	

Lumbar RTP

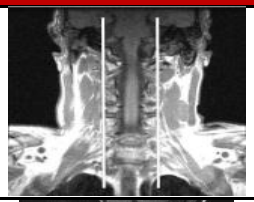
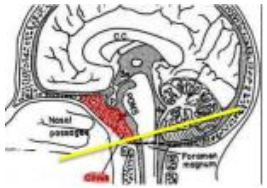
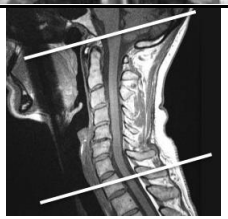
- Do not angle
- Document presence of radiculopathy (i.e., lower back pain with left leg radiculopathy for two months)

SEQUENCE	FOV (mm)	SLICE (mm)	COMMENTS	IMAGES
T1 Sag Total Spine Loc	~360		3T Auto Composing – be sure to include all the vertebrae. Might have to repeat with more slices in patients with scoliosis. Must be able to count from C1-S2.	
T1 Cor	~260	5 x 0.5 ~21 slices		
T2 SPC Ax (straight)	200	1 ~208 slices	• Do not angle • Included 1 full vertebra above & below the region of interest, add additional series as needed	
T1 VIBE Ax Pre T1 VIBE Ax Post	200	1 ~192 slices		
T1 Sag FS Post T1 Sag Post (if hardware is present)	~260	3 x 0		Copies to T1 Sag

Hospital Specific Protocols

Cervical - Trauma

- Limit FOV to include inferior half of the Clivus to mid T2 on sagittal planes and inferior tip of Clivus to mid T1 on axial series.
- Document presence or absence of radiculopathy (i.e., Neck pain with left arm radiculopathy for two months)

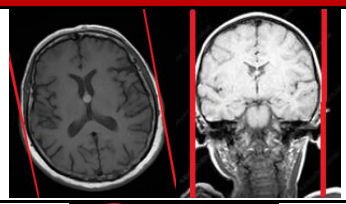
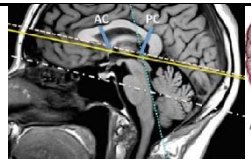
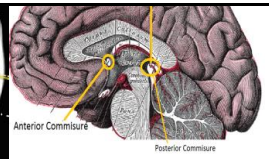
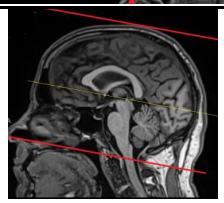
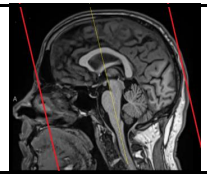
SEQUENCE	FOV (mm)	SLICE (mm)	COMMENTS	IMAGES
T1 TSE Sag T2 TSE Sag STIR Sag	180	3 x 0.3		
T2* GRE Ax T2 FS TSE Ax T2 TSE Ax (if hardware is present)	160	3 x 0.3	Inferior tip of Clivus to mid T1 	
PD 3D Axial	140	1 x 0	Craniocervical junction	

Christus

Brain – Routine

(HA, trauma, CVA, dizziness, AMS)

(Updated 6/21/23)

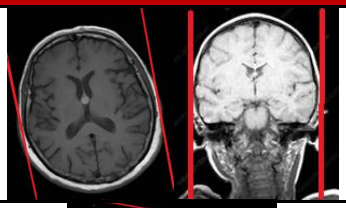
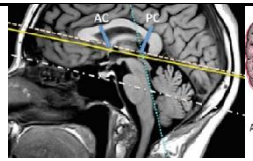
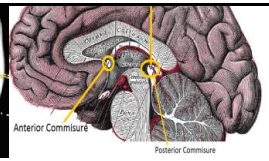
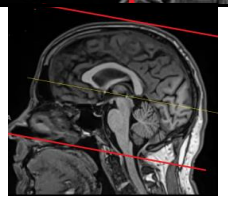
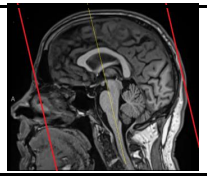
SEQUENCE	FOV (mm)	SLICE (mm)	COMMENTS	IMAGES
T1 Sag	230	5 x 2 ~19 slices		
T2 FLAIR Ax	220	5 x 1 ~24 slices	  Axials parallel to AC-PC line	
Diffusion Ax *Administer contrast*	230			
T2 FS Ax	220			
GRE Cor T2 FS Cor T1 FS SE Cor post	200	5 x 1 ~28 slices	Coronals parallel to the brainstem	
T1 FS SE Ax post	220	5 x 1		Copies center to T2 FLAIR Ax
• Consult a radiologist for PRN gad orders or ARA referrals where gad is not specified				

CPRMC

Brain – Routine

(HA, trauma, CVA, dizziness, AMS)

(Updated 6/21/23)

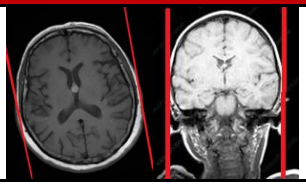
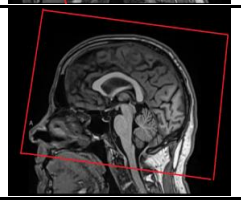
SEQUENCE	FOV (mm)	SLICE (mm)	COMMENTS	IMAGES
T1 Sag	230	5 x 2 ~19 slices	Tumor – perform T1 3D FS Ax pre, 1mm. Post-processing • MPR – Sag, 4x0mm, ~39 slices	
T2 FLAIR Ax	220	5 x 1 ~24 slices	  Axials parallel to AC-PC line	
Diffusion Ax *Administer contrast*	230			
T2 FS Ax	220			
GRE Cor T2 FS Cor T1 FS SE Cor post	200	5 x 1 ~28 slices	Coronals parallel to the brainstem	
T1 FS SE Ax post	220	5 x 1	Tumor – perform T1 3D FS Ax, 1mm Post-processing • MPR – Sag 4x0mm, ~39 slices • MPR - Cor 4x0mm, ~49 slices	Copies center to T2 FLAIR Ax
• Consult a radiologist for PRN gad orders or ARA referrals where gad is not specified				

Seton

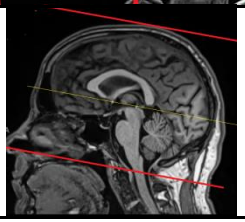
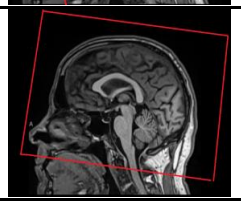
NEURO	
Brain	Pediatric @ DSMC UT • MPRs: 1x1mm Axial 1x1mm Cor • Thin MIP: 6x1mm Axial

Brain – Routine

(Tumor, headache, trauma, dizziness, altered metal status, etc.)

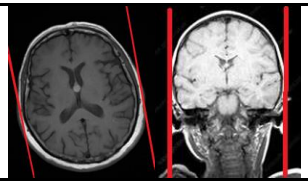
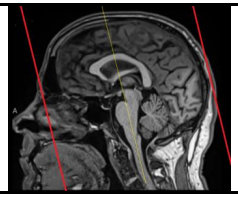
SEQUENCE	FOV (mm)	SLICE (mm)	COMMENTS	IMAGES
T1 dark fluid Sag	220	4 x 1.2		
Diffusion Axial	230	5 x 1		
T2 FLAIR Axial *Administer Contrast*	220	4 x 1		
T2 FS Axial GRE Axial	220	4 x 1		Copies to T2 FLAIR Ax
T2 FS Cor GRE Cor	220	5 x 1	Coronals parallel to the brainstem	
T1 FS SPACE Axial post		1 x 0	Post-processing • MPR – Sag 4x0mm, ~39 slices • MPR - Cor 4x0mm, ~49 slices	
• Patients with **braces** or other metallic implants causing susceptibility artifact, perform T2 Ax, Cor, and T1 SPACE post **without fat suppression**				

Brain – Stroke

SEQUENCE	FOV (mm)	SLICE (mm)	COMMENTS	IMAGES
T1 MPRAGE Sag	250	1.3mm		
Diffusion Axial	230	5 x 0		
T2 FLAIR Axial	220	5 x 0		Copies center to DIFF Ax
SWI	220	2.5 x 0.5		Copies center to DIFF Ax
T2 FS Cor GRE Cor	220	5 x 1	Coronals parallel to the brainstem	
T1 FS SPACE Axial post		1 x 0	Post-processing • MPR – Sag 4x0mm, ~39 slices • MPR - Cor 4x0mm, ~49 slices	
• Patients with **braces** or other metallic implants causing susceptibility artifact, perform T2 Ax, Cor, and T1 SPACE post **without fat suppression**				

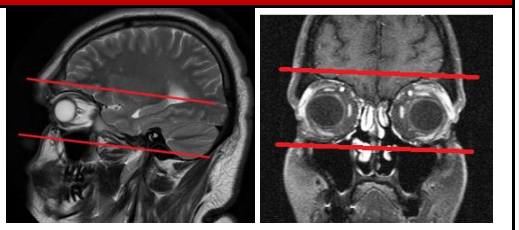
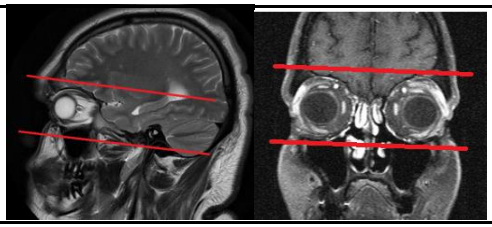
Brain – Non-contrast

SEQUENCE	FOV (mm)	SLICE (mm)	COMMENTS	IMAGES

T1 dark fluid Sag	220	4 x 1.2		
Diffusion Axial	230	5 x 1		
T2 FLAIR Axial	220	4 x 1		
T2 FS Axial GRE Axial	220	4 x 1		Copies to T2 FLAIR Ax
T2 FS Cor GRE Cor	220	5 x 1	Coronals parallel to the brainstem	
• Patients with **braces** or other metallic implants causing susceptibility artifact, perform T2 Ax, Cor, and T1 SPACE post **without fat suppression**				

Orbits – Retinoblastoma

- Eye make-up must be removed prior to exam

SEQUENCE	FOV (mm)	SLICE (mm)	COMMENTS	IMAGES
T2 SPACE hr Ax	200	1 x 0		
T1 hr Ax Pre *Administer Contrast*	160	3 x 0		
T2 SPACE Sag	250	1.5 x 0		
T2 FS Ax	220	4 x 1		
T2 hr Ax	160	3 x 0		
T2 StarVIBE Ax	160	1 x 0		
T1 MPRAGE Sag Post	250	1		
RT T1 FS hr Sag Post LT T1 FS hr Sag Post	160	3 x 0		

St. David's

Brain for Seizure / ICTAL

(Updated 9/30/20)

SEQUENCE	FOV (mm)	SLICE (mm)	COMMENTS	IMAGES
Diffusion Ax	230	5 x 1		
T1 3D FSPGR/MPRAGE Ax (MPR 1x0 Cor & Sag – mandatory for MIM software)		1 x 0		
T2 FLAIR Ax	220	4 x 1		
FLAIR Obl hr Cor *Administer Contrast*	180	2.5 x 0.5 ~26 slices	Include entire temporal lobe	
T2 Obl Cor hires (include entire temporal lobe, 26+ slices)				
T2 FS Axial	220	4 x 1		
GRE Cor	220	5 x 1		
T1 FS SPACE Axial post		1 x 0	Post-processing • MPR - Cor 4x0mm, ~49 slices • Thin MIP – Ax 6x1mm, ~157 slices	