Appendix- VI: Clinical Neonatal MRI Protocols at BWH

This document outlines the available clinical MRI imaging protocols for newborns at Brigham & Women's Hospital (BWH). Non-contrast brain MRIs can be performed using either the 1.0T Aspect scanner on the NICU floor or the 3.0T scanner on L1, depending on clinical indication and availability. Every effort should be made for an infant to have an MRI at BWH. In certain instances, including if contrast-enhanced imaging or imaging of other body parts not able to be completed at BWH the patient must be scanned at Boston Children's Hospital.

MRI protocols available on both 3T and Aspect scanners:

Brain Neonatal Standard

Common Indication(s): This is standard protocol for all brain MRI for NICU patients unless otherwise specified. Please refer to the relevant CPGs

Epic Orders: MRI BRAIN

Available Scanners: 1.0T Aspect & 3.0T

1.0T Aspect MRI Protocol/Sequences	3.0T MRI Protocol/Sequences
Loc Ax T2 Ax DWI Ax T1 Sag T2 Cor T2 Sag T1 3D Sag T1	Loc Sag 3D T1 MPRAGE Ax T2 Ax DTI Ax SWI Cor T2 Ax T1 FLAIR

Brain Neonatal Critical

This study is often ordered when the patient cannot tolerate lying flat for an extended period but requires an urgent MRI.

Common Indication(s):

- Critically ill infants needing abbreviated imaging
- Rapid screening for acute pathology (e.g., HIE, hemorrhage) when full MRI is not tolerated
- Urgent evaluation of evolving neurologic symptoms or changes in exam
- Follow-up imaging when limited sequences are sufficient for decision-making

Epic Orders: MRI BRAIN (add in comment section: Brain Neonatal Critical)

Available Scanners: 1.0T Aspect & 3.0T

MRI Protocol/Sequences:

1.0T Aspect MRI Protocol/Sequences	3.0T MRI Protocol/Sequences
Loc Ax DWI Ax T2	Loc Ax DTI Ax T2 Ax SWI

MRI protocols available on only 3T:

Brain Neonatal Vent Check

- Evaluation of ventricular size in neonates with post-hemorrhagic hydrocephalus (PHH)
- Monitoring of ventricular dilation in infants with intraventricular hemorrhage (IVH)
- Follow-up after ventricular reservoir or VP shunt placement
- Screening for progressive hydrocephalus in at-risk infants
- Rapid assessment of ventricular size or gross hemorrhage when full MRI is not tolerated

Epic Orders: MRI BRAIN (add in comment section: Brain Neonatal Vent Check)

Available Scanners: 3.0T Only

3.0T MRI Protocol/Sequences
Loc Ax T2 Stealth Cor T2 Haste Sag T2 haste Optional: Ax T2 Haste (if patient unable to tolerate stealth sequence)

Brain Neonatal Vent Check Plus

Common Indication(s):

- Evaluation of ventricular size with additional midline structural assessment
- Follow-up of post-hemorrhagic hydrocephalus with better sagittal detail

Epic Orders: MRI BRAIN (add in comment section: Brain Neonatal Vent Check Plus)

Available Scanners: 3.0T Only

MRI Protocol/Sequences:

3.0T MRI Protocol/Sequences

Loc Ax T2 Stealth Cor T2 Haste Sag T2 haste Midsagittal T2 SPACE Optional: Ax T2 Haste (if patient unable to tolerate stealth sequence)

Brain Neonatal Pituitary

Common Indications:

- Evaluation of congenital hypopituitarism or endocrine abnormalities
- Assessment of midline brain anomalies including septo-optic dysplasia
- Follow-up of abnormal prenatal imaging involving the pituitary region

Epic Orders: MRI BRAIN (add in comment section: Brain Neonatal Pituitary)

Available Scanners: 3.0T ONLY

MRI Protocol/Sequences
Loc Sag 3D T1 MPRAGE Ax T2 Ax DTI Ax SWI Cor T2 Ax T1 FLAIR

Brain Neonatal Standard + Spectroscopy

Common Indication(s):

- Evaluation of suspected metabolic or mitochondrial disorders
- Assessment of neonatal encephalopathy when metabolic etiology is suspected
- Differentiation of HIE from metabolic or genetic leukoencephalopathy

Epic Orders: MRI BRAIN + MR SPECTROSCOPY (two separate orders)

Available Scanners: 3.0T ONLY

MRI Protocol/Sequence

Loc
Sag 3D T1 MPRAGE
Ax T2
Ax DTI
Ax SWI
Cor T2
Ax T1 FLAIR
CSI_SE_30
CSI_SE_135

Brain Neonatal Standard + Orbits

Common Indication(s):

- Evaluation of orbital or optic nerve abnormalities
- Imaging in infants with abnormal ophthalmologic exam
- Follow-up of prenatal diagnosis of orbital mass or facial anomaly
- Evaluation of craniofacial syndromes involving orbital structures

Epic Orders: MRI BRAIN + MRI FACE (two orders)

Available Scanners: 3.0T Only

MRI Protocol/Sequences:

MRI Protocol/Sequences
Loc
Sag 3D T1 MPRAGE
Ax T2
Ax DTI
Ax SWI
Cor T2
Ax T1 FLAIR
Cor T2FS Hi Res (orbits)
Cor T1 Hi Res (orbits)
Ax T2FS Hi Res (orbits)
Ax T2 SPACE (orbits)
Total Scan Time: 36 minutes

Brain Neonatal Standard + IAC/Cranial Nerves

Common Indication(s):

- Evaluation of cranial nerves, especially auditory and facial nerves
- Follow-up for sensorineural hearing loss

- Imaging for suspected brainstem or posterior fossa malformations
- Assessment of congenital syndromes affecting cranial nerves

Epic Orders: MRI BRAIN (add in comment section: Brain Neonatal Standard + IAC/Cranial Nerves)

Available Scanners: 3.0T Only

MRI Protocol/Sequences:

MRI Protocol/Sequences
Loc Sag 3D T1 MPRAGE Ax T2 Ax DTI Ax SWI Cor T2 Ax T1 FLAIR Ax T2 SPACE (IAC) Optional: Right + Left Sag Obl T2 SPACE

Other MRI Imaging available at BWH

- MRI ANGIO BRAIN (MRA and/or MRV of the brain)-available on 1T or 3T
- MRI ANGIO NECK (MRA non contrast carotids)-available on 3T only