

MRI PROTOCOLS-ABILENE R.A.
CNS

Last revision: 3/24/09

BRAIN- Routine- Stroke or TIA

T1 SAGITTAL
FLAIR AXIAL
T2 AXIAL
DIFFUSION AXIAL

BRAIN – w/ & w/out (Tumor or Metastases)

T1 SAGITTAL
T2 AXIAL
FLAIR AXIAL
DIFFUSION AXIAL
T1 AXIAL PRE & POST GAD
T1 COR FAT SAT POST GAD

BRAIN WITH- (Brain w/o already done, returning for gad.)

T1 AXIAL pre & post
T1 CORONAL FAT SAT post

BRAIN- Parkinson's

Routine brain
T2 AXIAL 3 x 0.3 (bottom of pons through mid brain)

BRAIN - Multiple Sclerosis:

ROUTINE BRAIN PLUS
FLAIR SAGITTAL-lat. ventricle to lat. Ventricle
T1 AXIAL whole brain pre/post contrast
T1 COR FAT SAT GAD

BRAIN -Seizure:

Routine Brain plus
Flair coronal through temporal lobes
T2 CORONAL FSE through temporal lobes
T1 Axial post gad
T1 coronal fat sat gad

BRAIN- Aneurysm:

Routine Brian
COW MRA

BRAIN- Trauma or Hemorrhage:

Routine Brain
GRE AXIAL

BRAIN –Child under 2 years of age, or Infant Meningocele:

Routine Brain

T1 AXIAL

BRAIN -Sinuses:

Routine Brain plus

T1 AXIAL pre/post contrast through sinuses

T1 CORONAL pre contrast through sinuses

T1 CORONAL FAT SAT post through sinuses

BRAIN- (Pulsatile Tinnitus)

Routine Brain

T1 AXIAL 5 x 0 (whole brain) interleave 2 acquisitions

T1 AXIAL Fat Sat post contrast 5 x 0 (whole brain) interleave 2 acquisitions

T1 CORONAL Fat Sat 5 x 0 post contrast (whole brain) interleave 2 acquisitions

BRAIN- IAC'S:

T2 AXIAL 3 x 0.3 IAC

T1 CORONAL 3 x 0.3 through IAC pre/post (post with fat sat)

T1 AXIAL 3 x 0.3 through IAC pre/post (post with fat sat)

BRAIN-Orbits:

T2 AXIAL FSE FAT SAT 3 x 0.3 from bottom of **pons** through **orbits**

T1 AXIAL 3 x 0.3 (positioned the same as above)

T1 CORONAL 3 x 0.3 (positioned the same as above)

T1 CORONAL 3 x 0.3 POST FAT SAT (positioned the same as above)

T1 AXIAL 3 x 0.3 POST FAT SAT (positioned the same as above)

BRAIN-Cranial Nerves:

(for trigeminal neuralgia add T2 AX 3D centered to IAC)

T2 AXIAL FSE 3 X 0.3 FAT SAT (from top of **orbits** to top of **C2**-Cranial nerve region)

T1 AXIAL 3 x 0.3 (cranial nerve region)

T1 CORONAL 3 x 0.3 (back of pons through orbits)

T1 AXIAL 3 x 0.3 FAT SAT post contrast (cranial nerve region)

T1 CORONAL 3 x 0.3 FAT SAT post contrast (back of pons through orbits)

BRAIN- Pituitary:

T2 CORONAL 3 x 0.3 through pituitary gland

T1 SAGITTAL 3 x 0.3 through pituitary gland

T1 CORONAL 3 x 0.3 through pituitary gland

T1 SAGITTAL FAT SAT 3 x 0.3 post contrast through pituitary gland

T1 CORONAL FAT SAT 3 x 0.3 post contrast through pituitary gland

CERVICAL SPINE:

T2 SAGITTAL 3 x 1.0

T1 SAGITTAL 3 x 1.0

~~FGRE AXIAL oblique C3-T1 (Angled through disc)~~

T2 AXIAL

+ STIR
+ Cosmic Ax

C- T- OR L SPINE'S (new trauma 1 month or less) or Vertebroplasty

Routine

STIR SAGITTAL

CERVICAL SPINE- Multiple sclerosis- Do not fat sat any images

Routine Cervical Spine (no GRE AX)

T2 AXIAL Area of interest

T1 AXIAL Area of interest pre/post contrast

T1 SAGITTAL post contrast

CERVICAL-THORACIC -(syrinx) do not fat sat any images

Routine Cervical Spine (no GRE AX)

T1 AXIAL Area of interest

T1 SAGITTAL post contrast if newly found syrinx

T1 AXIAL post contrast (area of interest)only if newly found

COVER ENTIRE SYRINX

*****Do not give contrast on follow-up syrinx studies*****

THORACIC SPINE:

T2 SAGITTAL

T1 SAGITTAL

T1 AXIAL through any bulging disc or compression fx.

T2 AXIAL through any bulging disc or compression fx.

STIR SAGITTAL If trauma or vertebroplasty

IF GAD DO T1 SAG AND AX FAT SAT POST

LUMBAR SPINE:

T2 SAGITTAL

T1 SAGITTAL

T2 AXIAL FAT SAT straight L2 -L5

T2 AXIAL OBLIQUE L3-S1 Unless bulging at L1-L2

T1 AXIAL OBLIQUE L3-S1 Unless bulging at L1-L2

(Vertebroplasty or Truama do STIR sag)

LUMBAR SPINE - Post surgery

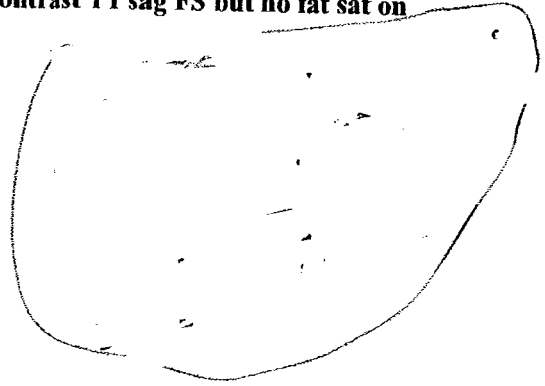
Routine Lumbar Spine

T1 AXIAL OBLIQUE (post only FAT SAT)

T1 SAGITTAL (post only FAT SAT)

SPINE – with and without (if metal is present do post contrast T1 sag FS but no fat sat on axials

- T2 SAGITTAL
- T1 SAGITTAL
- T1 AXIAL (Area of interest)
- T1 AXIAL FAT SAT Post (copy rx)
- T1 SAGITTAL FAT SAT Post (copy rx)



SPINE- Hematoma

- ROUTINE SPINE
- T1 AXIAL Straight stack through area of interest
- T2 AXIAL Straight stack through area of interest

SPINE- Osteomyelitis

- T2 SAGITTAL
- T1 SAGITTAL
- STIR SAGITTAL
- T2 AXIAL FAT SAT
- T2 AXIAL Straight Stack
- T1 AXIAL Straight Stack
- T1 AXIAL FAT SAT with Contrast Straight Stack
- T1 SAGITTAL FAT SAT with Contrast

SACRUM- also covers mass protocol always gad

- T2 SAGITTAL
- T2 CORONAL Oblique FAT SAT (angle to sacrum)
- T1 AXIAL FAT SAT Pre/Post
- T1 CORONAL Oblique FAT SAT Post (angle to sacrum)

Feet stopped
T2 FS con FSE
T1 con
T2 sag FSE
T2 AX FS

Newborn Spinal Mass/Cyst- Infant Meningiomyelocele/Spina Bifida

- T2 SAGITTAL
- T1 SAGITTAL
- T2 AXIAL FAT SAT straight stack
- T2 AXIAL straight stack
- T1 AXIAL straight stack

T1 AX FSE

Post
T1 con/AX
FIS

marker on area of interest if indicated

STERNUM or STERNOCLAVICULAR JOINTS

- Prone Torso PA Coil
- T1 AXIAL FAT SAT Pre/Post
- T2 AXIAL Breath-Hold
- T2 CORONAL FAT SAT
- T1 CORONAL
- T1 SAGITTAL
- T1 CORONAL FAT SAT Post

SOFT TISSUE NECK

T2 AXIAL FAT SAT 4 x 0.4 (top of pons to apex of lungs)
T1 AXIAL 4 x 0.4 (top of pons to apex of lungs)
T1 AXIAL 4 x 0.4 (apex of lungs to below arch)
T1 CORONAL (from back of medulla through esophagus)
T1 SAG(top of pons to apex of lungs)
T1 AXIAL 4 x 0.4 FAT SAT Post contrast (top of pons to apex of lungs)
T1 CORONAL FAT SAT Post contrast(back of medulla through esophagus)

PAROTID

T2 AXIAL FAT SAT 4 x 0.4 (top of mandibular condyle through mandible)
T1 AXIAL 4 x 0.4 (same coverage)
T1 CORONAL(back of ear through mid mandible)
T1 AXIAL 4 x 0.4 FAT SAT Post contrast
T1 CORONAL FAT SAT Post contrast (back of ear through mid mandible)

CAROTID MRA:

2D TOF AXIAL Non Contrast
3D TOF CORONAL SLAB-Delay (1.5T-18-20 sec.)
(1.0T-14-16 sec.)

BRACHIAL PLEXUS:

T2 AXIAL FAT SAT 4 x 0.4 (C3-T2) large FOV(Bilat.to include
Both brachial plexus)
T2 AXIAL FAT SAT 4 x 0.4 (C3-T2) Smaller FOV(Unilat Brachial Plexus
of interest)
T1 AXIAL 4 x 0.4 (C3-T2) Smaller FOV Unilat. Brachial plexus of interest
T1 AXIAL 4 x 0.4 (C3-T2) Smaller FOV 2nd Set through superior arch appr. 15 slices
T1 CORONAL 3 x 0.3 (from posterior cord to anterior aspect of esophagus/neck unilat)
T1 SAGITTAL 4 x 0.5 (perpendicular to brachial plexus on coronal view)
T1 AXIAL 4 x 0.4 (C3-T2) Smaller FOV FAT SAT post contrast(unilat.
Brachial plexus of interest)
T1 CORONAL 3 x 0.3 FAT SAT post contrast (posterior cord to anterior aspect of
Esophagus/neck unilat.)

MRI ABDOMINAL PROTOCOLS

ROUTINE ABDOMEN AND PELVIS:

- T2 AXIAL SE FAT SAT cover entire abdomen and pelvis
- T2 AXIAL SSFSE Breath-Hold FAT SAT cover entire abdomen and pelvis
- T2 CORONAL SSFSE Breath-Hold
- GRE AXIAL (In & Out of Phase)
- T1 AXIAL In Phase Breath-Hold FAT SAT PRE AND POST CONTRAST

KIDNEY:

- T2 AXIAL FAT SAT Breath-Hold (Liver through Kidneys)
- T2 AXIAL BH 7mm kidneys
- T1 AXIAL FAT SAT
- IN AND OUT PHASE AX BH GRE 7mm kidneys
- T2 CORONAL SSFSE Breath-Hold 7mm kidneys
- T1 CORONAL FAT SAT breath-Hold pre and post 5mm kidneys & 2 min. delay
- SPGR AXIAL BREATH HOLD post fat sat (liver through kidneys)

PELVIS : (genito-urinary)

- T1 CORONAL Whole Pelvis
- T2 AXIAL FAT SAT (include below symphysis pubis)
- T2 SAGITTAL FAT SAT (include both femoral heads)
- T1 SAGITTAL PRE AND POST CONTRAST (BOTH SEQUENCES ARE FAT SAT)
- T1 AXIAL In Phase FAT SAT POST CONTRAST

PANCREAS-BILIARY:

Pt. Must be NPO 6 Hours

- T2 Coronal SSFSE Breath-Hold
- T2 AXIAL SSFSE FAT SAT Breath-Hold (Liver through Kidneys)
- T2 AXIAL FAT SAT
- T2 AXIAL (pancreas)
- T1 AXIAL breath hold 5-0 PANCREAS ONLY
- GRE AXIAL (In & Out Of Phase) 5mm through Pancreas
- Thick slab MRCP radial biliary tree 11 slices 18degrees loc before pause 1
- T1 AXIAL ~~in-phase~~ fat sat pre & post contrast breath-hold (Liver through pancreas)
- T1 ~~in-phase~~ fat sat breath hold 5mm post (liver through kidneys)

ABD W/O (MRCP) (charge ABD w/o only)

Pt. Must be NPO 6 hours

- T2 Axial breath hold fat sat
- T2 axial fat sat
- T2 axial breath hold liver through kidneys
- Thick slab MRCP radial biliary tree 11 slices 18degrees loc before pause 1

MUSCULOSKELETAL PROTOCOLS

HIP:

STIR CORONAL or T2 CORONAL FAT SAT (Whole Pelvis)
T2 CORONAL FSE
T1 CORONAL FSE (Whole Pelvis)
T1 SAGITTAL
T1 AXIAL (Whole Pelvis)

PELVIS: (MUSCULOSKELETAL)

STIR CORONAL (whole pelvis)
T1 CORONAL (whole pelvis)
T2 AXIAL (whole pelvis)
T1 AXIAL (whole pelvis)

KNEE:

PD SAGITTAL FSE
T2 SAGITTAL FSE FAT SAT
PD CORONAL FSE FAT SAT
T1 CORONAL
PD AXIAL FSE FAT SAT

ANKLE : (Cover as high up into gastrocnemius as possible)

PD SAGITTAL
T2 SAGITTAL FSE FAT SAT
T2 AXIAL
T1 CORONAL
PD CORONAL FAT SAT

FOOT/ANKLE For Plantar Fascia Rupture/Hematoma:

PD SAGITTAL FRFSE
T2 SAGITTAL FRFSE
T2 AXIAL FRFSE
T2 CORONAL FRFSE FAT SAT
T1 CORONAL

FOOT:

T1 CORONAL FSE
PD CORONAL FSE FAT SAT
PD SAGITTAL
T2 SAGITTAL FSE FAT SAT
T2 AXIAL

FOOT OSTEOMYELITIS:

T1 CORONAL FSE
STIR CORONAL FSE
T1 SAGITTAL
T1 SAGITTAL FSE FAT SAT PRE-POST CONTRAST
T2 SAGITTAL FSE FAT SAT
T2 AXIAL FSE

MUSCULOSKELETAL MASS OR OSTEOMYELITIS:

T1 SAGITTAL
—T1 AXIAL FSE FAT SAT PRE-POST CONTRAST
T2 AXIAL FSE
T2 CORONAL/SAGITTAL FSE FAT SAT
—T1 CORONAL/SAGITTAL FAT SAT PRE-POST CONTRAST
(Last 2 sequences depend on location of mass)
if mass on anterior or posterior side-do sagittal
if mass on lateral or medial side-do coronal

MUSCLE TEAR/STRAIN (IE. THIGH) (FOV & Slice thickness to cover extent of injury):

STIR AXIAL FSE
T1 AXIAL FSE FAT SAT
T2 AXIAL FSE
T2 CORONAL/SAGITTAL FSE FAT SAT depending on mass location
T1 CORONAL/SAGITTAL FSE depending on mass location
T1 AXIAL FSE FAT SAT POST If mass
T1 CORONAL/SAGITTAL FSE post depending on location

SHOULDER ROUTINE:

PD AXIAL FSE FAT SAT
T1 CORONAL OBLIQUE FSE
PD CORONAL OBLIQUE FSE FAT SAT
T2 CORONAL OBLIQUE FSE
T2 SAGITTAL OBLIQUE FSE

INJECTED SHOULDER:

T1 AXIAL SE FAT SAT
T1 CORONAL OBLIQUE FSE FAT SAT
PD CORONAL OBLIQUE FSE
T2 CORONAL OBLIQUE FSE
T1 SAGITTAL OBLIQUE FSE

LIVER:

T2 CORONAL SSFSE Breath-Hold
T2 AXIAL FAT SAT Breath-Hold (Liver through Kidneys)
T2 AXIAL FAT SAT
T1 CORONAL BREATH HOLD FAT SAT pre-post contrast
SPGR AXIAL T1 OUTPHASE
SPGR AXIAL T1 INPHASE
SPGR AXIAL T1 INPHASE (IMMEDIATE POST CONTRAST,
5 MINUTES POST

**LIVER Lesion Characterization- do immediate post,45 sec.delay,2 min. delay,5min. delay,
10 min. delay**

LIVER for Hemochromatosis:

T2 CORONAL SSFSE Breath-Hold
T2 AXIAL SSFSE FAT SAT Breath-Hold
*GRASS AXIAL FX Breath-Hold 8x1.0 (in phase TE)
AXIAL GRE (In Phase & Out of Phase)
T2 Fast SPGR FAT SAT Breath-Hold
CINE of L. Ventricle I Myocardial iron indicated

ADRENAL:

T2 CORONAL SSFSE Breath-Hold
T2 AXIAL FAT SAT
T2 AXIAL SSFSE Breath-Hold
FGRE AXIAL OUTPHASE Breath-Hold 5mm adrenals
FGRE AXIAL INPHASE Breath-Hold 5mm adrenals
FGRE CORONAL OUTPHASE Breath-hold
FGRE CORONAL INPHASE Breath-hold
T1 AXIAL FAT SAT PRE& POST CONTRAST

ABDOMINAL AORTA/ RENAL MRA:

T2 AXIAL FAT SAT Breath-Hold (Liver through Kidneys)
T1 SAGITTAL Breath-Hold
3D CORONAL Slab with contrast (from posterior 1/3 kidneys to anterior
margin SMA/Aorta) upper margin of slab below diaphragm when using 2ml/sec
18-24 sec. Delay

AFRO MRA:

3 series

SCAPULA:

T1 AXIAL OBLIQUE FSE FAT SAT

T2 AXIAL OBLIQUE FSE FAT SAT

PD CORONAL OBLIQUE FSE

T2 SAGITTAL OBLIQUE FSE

If mass is present or suspected add T1 axial fat sat pre-post

Increase FOV to cover area

ELBOW:

T1 CORONAL FSE

PD CORONAL FAT SAT FSE

PD AXIAL FSE

T2 AXIAL FSE FAT SAT

T1 SAGITTAL FSE

T2 SAGITTAL FSE

Film hand toward bottom of film

WRIST or HAND:

T1 CORONAL FSE

PD CORONAL FSE FAT SAT

PD AXIAL

T2 AXIAL FAT SAT

T1 SAG FSE

T2 SAG

RADIOLOGIST RECOMMENDATION:

1. DMG will get a BUN and Creatinine on all contrast patients having gadolium. The lab work must be no more than 30 days old. If the pts. GFR is 31 or above they can safely receive contrast anyone with a GFR of 15-30 will be at the radiologist discretion and it's highly unlikely contrast will be given. Anyone with a GFR below 15 will NOT receive contrast. To calculate GFR go to www.davita.com.
2. Breast feeding infants post contrast- Breast feeding mothers should pump breast milk On routine feeding schedule & discard all milk for 72 hours post contrast prior to Allowing their infant to nurse post procedure, (Pump & Dump all breast milk for 72 Hours post contrast.)
3. Never run a T1 fat sat unless your giving contrast. If your T2 fat sat's are not good please do a STIR.

STERNUM MASS

*Positioning – feet first – on stomach with arms above head

*Use HD BREAST COIL

*Contrast per body weight – 20ml MAX – connect patient to injector 2 ml/sec

- 3 Plane Localizer
- IR Coronal FSE
- IR Sagittal FSE
- T1 Sagittal FSE
- T1 Coronal FSE
- T2 Axial
- T2 Axial F.S.
- T1 Axial

POST CONTRAST

- T1 Axial F.S.
- T1 Sagittal F.S.
- T1 Coronal F.S.

CONTRAST GAITED MR CHEST (DUMAS)

T1 AX SE GAITED W/ BELLOWS

T1 COR F.S. BH

T1 AX F.S.PGR BH

T2 AX F.S. SS BH

3D MRA PULMONARY PROTOCOL (CENTERED LOW)

T1 AX SE POST

T1 AX F.S. PGR BH POST