Cardiac Imaging Protocols

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Cardiac Mass

Last updated: 11/7/2001

EKG leads.

Right sided IV.

Coils: phased array over chest.

20 cc Gadolinium contrast **(*)**

Assess the patient's breath holding capability. If poor capability, give oxygen. If pt can't hold his/her breath call body radiologist.

Call body radiologist.

Sequence	Plane	Comment	Film #
TrueFISP	Ax		
DB Haste	Cor	Gated. 5mm, 20% gap	0
STIR	Ax	Only through mass Gated. Single slice	2
T1 TSE	Ax	Only through mass Gated. Try 6mm, 20% gap, no fat sat. If poor quality, try single slice gated sequence.	2
			2
GRE or TrueFISP cine	Best	Cine images through the lesion., if no lesion seen, at least get a 4 chamber cine Try short and long axis.	0
3D VIBE	Ax	1 measure. Use FOV 450-475. 512 matrix.	0
Timing Run	Ax	Thru region of interest. 1cc of the contrast mix at 2cc/sec followed by 20 cc saline at 2cc/sec. Use standard timing formula.	0
3D VIBE	Ax	3 measures (0,35,120 seconds) Inject 20cc of mix at 2cc/sec followed by 20cc saline at 2cc/sec. Standard timing formula.	0
MIP		Subtract if necessary.	2

(*) The use of gadolinium contrast material for these applications represents off-label usage in the U.S. Outside the U.S., please consult your country's regulations for local guidelines.

NOTE: These protocols apply to Siemens Symphony (with Quantum gradients) and Sonata systems. While they reflect the protocols used at NYU Medical Center, NYU is not responsible for their application elsewhere.

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Arrhythmogenic Right Ventricular Dysplasia

Last updated: 1/2002

EKG Leads
Phased Array Coil over chest
Call Body MD

Sequence	Plane	Comment	Film #
True FISP	AX	scout	0
DB HASTE	AX	gated	2
True FISP Cine	AX	6mm through entire RV from apex to outflow tract sat band over LV, gap of 2mm, film one image from each cine (the new FISPS are under left atrial anatomy)	1
T1 TSE	AX	Same position as cine, 1 slice/breath hold, turn off posterior elements and get the smallest FOV possible	2

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Left Atrium/Pulmonary Vein Protocol

Last updated: 1/2002

EKG Leads
20 cc Gadolinium contrast (*)
IV in right arm
Phased array coil over chest

Sequence	Plane	Comment	Film #
True FISP	AX	scout	0
DB HASTE	AX	Gated, 5mm, no gaps	2
True FISP Cine	AX	6mm through entire RV from apex to outflow tract sat band over LV, gap of 2mm (the new FISPS are under left atrial anatomy)	2
VIBE	Ax		0
3D FLASH	Ax		0
Timing run	Ax	Timed to Left Atrium	0
3D FLASH	Ax	2 measures with 7 sec gap	0
VIBE	Ax		0
MIP		Subtract and MIP first 3D FLASH	2

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Cardiac Viability

Last updated: 1/4/2002

Only done on the Symphony system.
Consent for viability study (only if referred for equivocal nuclear medicine scan).
EKG leads. Make sure you get a good tracing before you start with HIGH POSITIVE R PEAKS.
Right sided IV.
Coils: phased array over chest.
All patients get NC O_2.
25-30 cc Gadolinium contrast **(*)**. Use more if the patient is obese.

Do entire study at end-expiration, if you think patient can do it; else do entire study at end-inspiration
Follow specific research protocol sheet to run the case.

Sequence	Plane	Comment	Film #
Scout			0
True Fisp		3 Plane TrueFISP scout (BH)	0
DB HASTE	AX	20 slices (BH)	2
Scouts: 2 Chamber, 4 chamber and short axis		One slice each (BH)	0
Perfusion	Short Axis	SET UP: History to short axis scout, center in mid LV Use perfusion Fisp, 6 slices, 8mm, distance factor of 25% Change acq window to 10% less than 2 RR (1400-1600 ms) Run 5 test measures first (BH)	0
Inject 25- 30 cc gad			0
Perfusion	Short Axis	8 second scan delay, 30 measures (BH as long as possible)	0
9-slice fisp	Short axis	History to perfusion, center in mid LV Change acq window to 10% less than 1 RR (600-900 ms)	0
CINES: 4 chamber, 2 chamber and short axis	4 chamber	True FISP cine with 3 slices per BH 8mm 0.25 distance factor; Slice posn shift 30 mm/3 short axis	2 (1/ slice pos)
Flow Quant	Obl Ax	Aortic root (perpendicular to flow), Set acq window Venc 250 (unless patient has AS, then use Venc 500)	0
TI mapping	Short ax	Choose TT, nulled myocard (acq window 10% less than 1 RR)	
Viability	All planes	3 slices/BH, set inversion time according to T1 mapping History to 4 chamber, 2 chamber and short axis cines Set acq window to 10% less than 1 RR	2
Viability	Short Axis 3D	History to central slice of short axis slices, BIGGER FOV Set acq window; Set inversion time according to T1 mapping	

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<u>Helpful hints</u>

- 2 chamber-use 4 chamber and coronal as scouts
- Short Axis-use 2-chamber and axial as scouts
- 4 chamber-short axis and 2 chamber scout
- For all cardiac sequences, must set acquisition window (typically 10-15% less than 1 RR interval (one heart beat), typically 600-900 ms!!!!!!

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General Congenital Cardiac Anomaly Study

Last updated: 4/9/02

These cases are typically performed on pediatric patients and are often run and read by the pediatric radiologist.

Patients will usually have an IV placed for sedation.
Typically double dose IV Gadolinium contrast (*****) is used to obtain the MRA
(2cc/10 lb instead of 1cc/10 lb) (0.1 – 0.2 mmol/kg gd)

EKG leads

The protocol is variable, depending on the patient's history and the clinical question, and sequences are under body coil or head coil (for small babies). The typical protocol is:

Sequence	Plane	Comment	Film #
DB Haste	Ax, Cor	Gated.	2
Cine GRE	Ax, Cor	Gated. 10-20 slices; 4-10mm; Ax from above aortic arch to base of heart. Coronal images from anterior to posterior to the descending aorta. Under WIP-Cardiac function. TR 60; 23 beat (don't use grid tagging) # of phases usu 7-15 based on heart rate (TR * phases < RR interval) Acq time 24-35 sec using 2 acquisitions.	2 (film 1st image of each cine)
3D FLASH	Cor	1 measure. Use 3D FLASH 2b488 {fl3d_itn_2b488ykc: NOT qfs} (System #2) or ITN 2b488 (System #1) For pulmonary artery studies the goal is 9-15sec acquisition. Otherwise, 15-24 sec for aortic studies (allows better resolution). Minimum FOV; actual effective thickness 1-2mm.	0
Timing Run	Ax	Thru region of interest. Typically level of PA also showing aorta. Use 10% of the contrast dose up to 1cc and inject by power injector at 2cc/sec(if IV and patient are large enough) followed by 10-20 cc saline at 2cc/sec or hand injection if patient and IV are too small	0
3D FLASH	Cor	2 measures with no gap. Contrast at 2cc/sec with 20 cc saline flush or by hand if IV too small. Use the standard timing formula.	0
MIP		Subtract if necessary.	2

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Aortic Coarctation Study

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These cases are typically performed on pediatric patients and are often run and read by the pediatric radiologist.

Patients will usually have an IV placed for sedation.
Typically double dose IV Gadolinium contrast (*) is used to obtain the MRA
(2cc/10 lb instead of 1cc/10 lb) (0.1 – 0.2 mmol/kg Gd)

EKG leads
The protocol is variable, depending on the patient's history and the clinical question, and sequences are under body coil or head coil (for small babies). The typical protocol is:

Sequence	Plane	Comment	Film #
DB Haste	Ax, Cor	Gated.	2
DB Haste	Obl Sag	Gated.	2
Cine GRE	Obl Sag	Gated. 10-20 slices; 4-6mm; Run through the aorta. Repeat several times at slightly different angles to maximize image quality. Under WIP-cardiac function. TR 60; 23 beat (don't use grid tagging) # of phases usu 7-15 based on heart rate (TR * phases < RR interval) Acq time 24-35 sec using 2 acquisitions.	2 (film 1st image of each cine)
3D FLASH	Obl Sag	1 measure. Use 3D FLASH 2b488 {fl3d_itn_2b488ykc: NOT qfs} (System #2) or ITN 2b488 (System #1) Otherwise, 15-24 sec for aortic studies (allows better resolution). Minimum FOV; actual effective thickness 1-2mm.	0
Timing Run	Ax	Thru region of interest. Use 10% of the contrast dose up to 1cc and inject by power injector at 2cc/sec(if IV and patient are large enough) followed by 10-20 cc saline at 2cc/sec or hand injection if patient and IV are too small	0
3D FLASH	Obl Sag	2 measures with no gap. Contrast at 2cc/sec with 20 cc saline flush or by hand if IV too small. Use the standard timing formula.	0
Flow Quant	Perpend-icular to the aorta	Typically 2-4 min – be sure patient is well sedated or told not to move. Choose VENC 500 sequence. Done as a through plane. Use a level at the area of maximal signal loss on the oblique sagital cine (for $P=4v^2$). DON'T PLACE IT: at the narrowest point Alternatively, place above and at the diaphragm, to determine collateral flow volumes rather than percent stenosis.	0
MIP		Subtract if necessary.	2

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Gradient calculation:

- Found in the menu system under EVALUATE > FLOW QUANT.
- Place a SMALL ROI circle at the area of greatest signal loss (dephasing) and press GO.
- The gradient across the coarct is (mmHg) = 4 * [Peak gradient (m/s)]^2

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Tetralogy of Fallot Study

Last updated: 4/9/02

These cases are typically performed on pediatric patients and are often run and read by the pediatric radiologist. Patients who are preoperative for TET with pulmonary atresia are done with the general protocol above.

Patients will usually have an IV placed for sedation.
Typically double dose IV Gadolinium contrast (*) is used to obtain the MRA
(2cc/10 lb instead of 1cc/10 lb) (0.1 – 0.2 mmol/kg Gd)

EKG leads

Sequence	Plane	Comment	Film #
DB Haste	Ax, Cor	Gated.	2
Cine GRE	Ax, Obl Cor, and Sag	Under WIP-cardiac fn. TR 60; 23 beat (don't use grid tagging) Gated. 10-14 slices; 4-10mm; Ax from above PA's to base of heart. Oblique coronal slices through right and left PA. Sagital slices through pulmonic valve and MPA (1-2 slices). # of phases usu 7-15 based on heart rate (TR * phases < RR interval) Acq time 24-35 sec using 2 acquisitions. Smallest FOV without wrap.	2 (film 1st image of each cine)
Flow Quant	Perpend-icular to MPA	Typically 2-4 min – be sure patient is well sedated or told not to move. Choose VENC 150 sequence. Phases 30-32. Done as a through plane through the MPA. Plan off the sagital cine images. Use a level in the area of laminar flow (non-turbulent flow).	0
3D FLASH	Obl Sag or Coronal	1 measure. Use 3D FLASH 2b488 {fl3d_itn_2b488ykc: NOT qfs}(System #2) or ITN 2b488 (System #1) For pulmonary artery studies the goal is 9-15 sec acquisition. Otherwise, 9-24 sec (but shorter is better if you can maintain resolution) Minimum FOV; actual effective thickness 1-2mm.	0
Timing Run	Ax	Thru the main PA. Time to the PA. Use 10% of the contrast dose up to 1cc and inject by power injector at 2cc/sec(if IV and patient are large enough) followed by 10-20 cc saline at 2cc/sec or hand injection if patient and IV are too	0
3D FLASH	Obl Sag or Coronal	2 measures with no gap. Contrast at 2cc/sec with 20 cc saline flush or by hand if IV too small. Use the standard timing formula.	0
MIP		Subtract if necessary.	2

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<u>Pulmonary flow calculation</u>:

- Found in the menu system under EVALUATE > FLOW QUANT.
- Place an ROI circle over the entire MPA and press GO.
- There should be a smooth curve with an early positive peak and negative late flow.

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