

磁共振规范化扫描方案（3.0T）

---中华磁共振应用学院系列教材

心脏



imagination at work

患者摆位:

1. 患者体位偏右，心脏接近磁场中心，线圈中心置于左心室中心。
2. VCG向量式心电门控，一对白电极与一对黑电极贴于心脏周围（电极下方必须是软组织而不能是肋骨），白与黑互相垂直，同时添加PG以防心电门控失败（建议虎口夹住PG导线）。
3. 因为心脏扫描时间较长，患者双手可垂放于身体两侧。
4. 点击SCAN后出现“实时定位”界面，点击DRAW LINE，在心脏横断面上以二尖瓣和心尖连线进行定位，出现心脏斜矢状面，再在斜矢状面上二尖瓣和心尖连线定位四腔心。再将四腔心的空间位置导出给Oblique Fiesta序列。

摆位照片：



摆位照片:

Gating Control

Waveform and Gating Selection

- Independent Vector Gating
- Standard Gating (ECG)
 - ECG Noise Filter
- 3rd party Patient Monitoring with Gating
- Respiratory PG Display

Cardiac Sweep Rate

- 10mm/sec
- 21mm/sec
- 41mm/sec
- Sync Cardiac and Respiratory Sweep Rates

Trigger Lead

- VCG I+II Inverted
- VCG-I Inverted
- VCG-II Inverted
- PG
- Auto

Cardiac Trigger Level

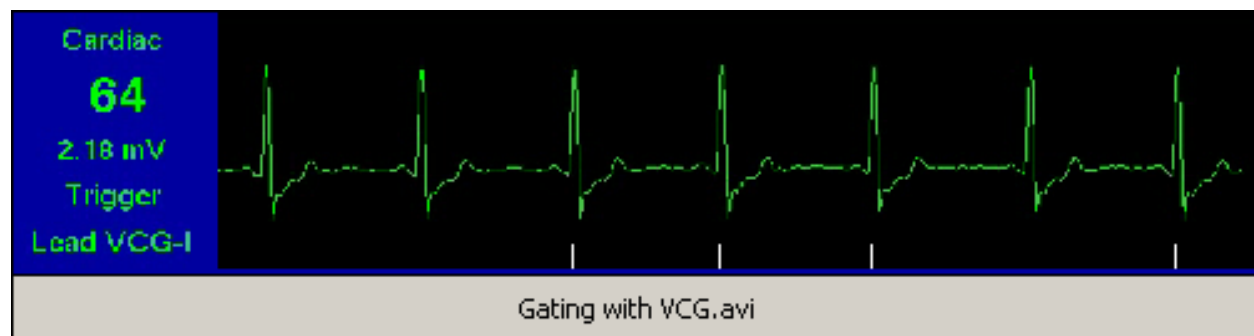
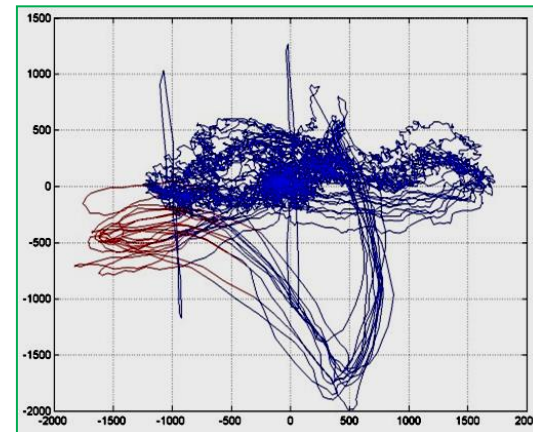
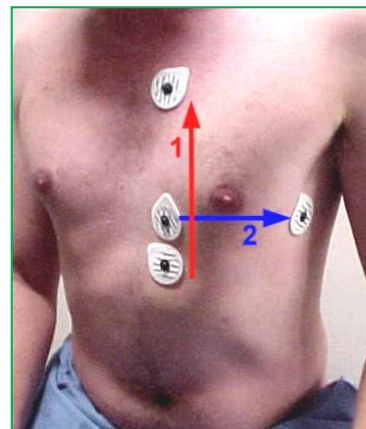
- 50%
- 60%
- 70%
- Auto

Trigger Level: %

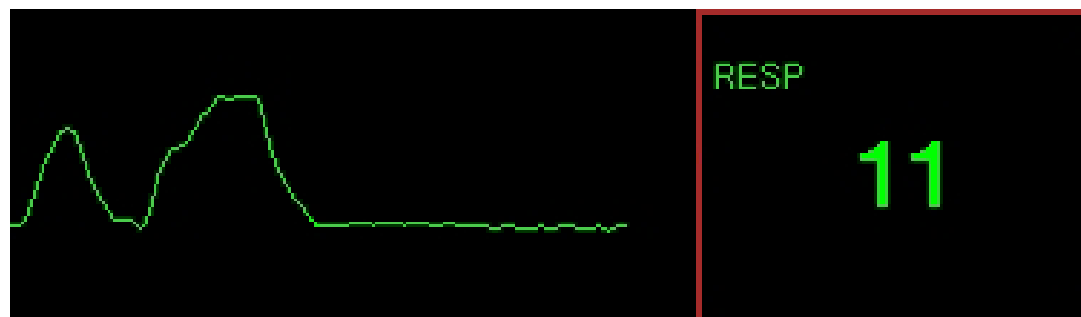
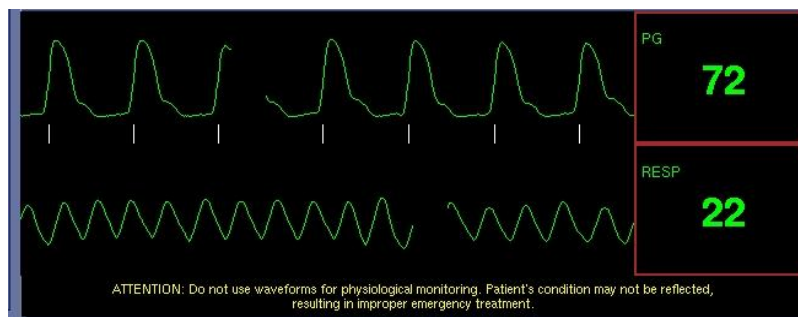
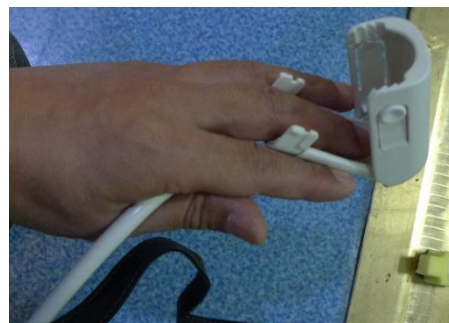
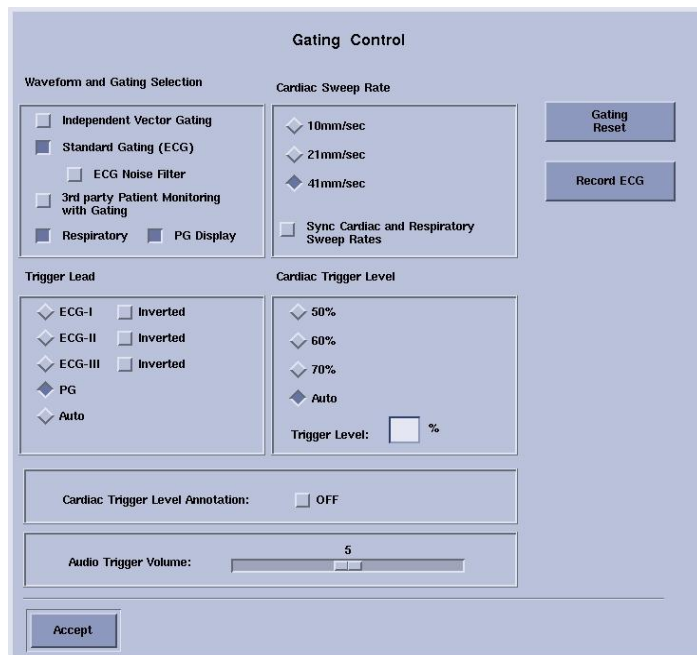
Cardiac Trigger Level Annotation: OFF

Audio Trigger Volume:

Buttons: Gating Reset, Record ECG, Accept



摆位照片:



心脏规范化扫描方案:

1	RealTime Loc	心脏实时定位	
2	BH Calibration Scan	屏气校准扫描	
3	Fiesta Cine	屏气心脏白血电影序列	
4	Double IR	双翻转恢复黑血序列	
5	FATSAT Double IR	脂肪抑制双翻转恢复黑血序列	
6	Tagging	心肌运动标记成像	

RealTime Loc, 实时透视定位

Ex: 7247
Se: 3
In: 101
Ac: 50.0

chen ya di
F 47Y 20110608
Jun 08 2011

Define New Home

HD Cardiac
FOV:36x36/Z

1/00:00.279
128/96/1.00 NEX
SF/R/TI

Average: 1

P 180 W = 562 L = 201

Rx Manager

State	#	Series Description
SCND	1	RealTime FGR
SCND	2	RealTime FGR
ACT		RealTime FGRE
NEW		BH Cal Scan
NEW		INRX Fiesta Cine
NEW		Double IR
NEW		T2 fs Double Tagging
NEW		3-pl Loc Files
NEW		Triple IR

View Edit
Download
Save Rx as Protocol
AutoScan
AutoStop

Locs Applied: Lrs/Acq:1, Acqs:1, Thickness:6.0, Spacing:0.0

June 8 11:40 PM 117983 left @ 256°
31824 left @ 512°
Disk 88% full

ECGI MISSING

Scanning

Printed
Mid+Ref Ex:
7246 Ser: 36

Removed Series
7228/1100

Seal: 7247/1
(av-1)

Ex: 7247
Se: 2
In: 775
Ac: 15.0

chen ya di
F 47Y 20110608
Jun 08 2011

Define New Home

HD Cardiac
FOV:36x36/Z

1/00:00.279
128/96/1.00 NEX
SF/R/TI

Average: 1

W = 572 L = 240

Rx Manager

State	#	Series Description
SCND	1	RealTime FGR
SCND	2	RealTime FGR
ACT		RealTime FGRE
NEW		BH Cal Scan
NEW		INRX Fiesta Cine
NEW		Double IR
NEW		T2 fs Double Tagging
NEW		3-pl Loc Files
NEW		Triple IR

View Edit
Download
Save Rx as Protocol
AutoScan
AutoStop

Locs Applied: Lrs/Acq:1, Acqs:1, Thickness:6.0, Spacing:0.0

Ex: 7247
Se: 3
In: 200
Cor: 943.6

chen ya di
F 47Y 20110608
Jun 08 2011

Define New Home

HD Cardiac
FOV:36x36/Z

1/00:00.279
128/96/1.00 NEX
SF/R/TI

Average: 1

I 180 W = 562 L = 201

Save Image

Ex: 7247
Se: 3
In: 423
Ac: 17.0

chen ya di
F 47Y 20110608
Jun 08 2011

Define New Home

HD Cardiac
FOV:36x36/Z

1/00:00.279
128/96/1.00 NEX
SF/R/TI

Average: 1

P 136 W = 626 L = 262

Save Image

Ex: 7247
Se: 3
In: 955
GSag: L36.2

chen ya di
F 47Y 20110608
Jun 08 2011

Define New Home

HD Cardiac
FOV:36x36/Z

1/00:00.279
128/96/1.00 NEX
SF/R/TI

Average: 1

I 187 W = 554 L = 194

Save Image

Ex: 7247
Se: 3
In: 661
Dir: 36.0

chen ya di
F 47Y 20110608
Jun 08 2011

Define New Home

HD Cardiac
FOV:36x36/Z

1/00:00.279
128/96/1.00 NEX
SF/R/TI

Average: 1

W = 572 L = 240

Save Image

For GE Internal Use Only. Not for External Distribution.

RealTime Loc, 实时透视定位

The screenshot displays a GE medical software interface for RealTime Loc. The main window shows a cardiac MRI scan with a yellow line indicating the location of the RealTime Loc. The interface includes a top status bar with patient information (June 8, 11:40 PM, 117983 left @ 256°, 31024 left @ 512°), a left sidebar with system icons (Disk 88% full, ECG1 MISSING, Scanning, Ling, etc.), and a bottom control panel with various settings and buttons.

Top Status Bar: June 8 11:40 PM, 117983 left @ 256°, 31024 left @ 512°, Disk 88% full

Left Sidebar: ECG1 MISSING, Scanning, Ling, Printed MID+Ref Ex: 7246 Se: 36, Removed Series 7228/1100, Sent: 7247/1 (av-1)

Top Control Panel: Delete Bookmarks, Add Bookmark, Define New Home, Define Scout

Main Image: IRL, Ex: 7247, Se: 3, In: 775, Or: 16,0, chen ya di, F 47Y 20110608, Jun 08 2011, Average: 1, HD Cardiac, FOV: 36x36/Z, 1/00:100,279, 128x36/1.00 NEX, SLP/RTI, W = 572 L = 240

Bottom Control Panel: Rx Manager (Scan Modes, Gating Control, New Series, End Exam), Rx Start/End, Rx Center, Movement (Drive, Step, 10 mm, 15 degrees), Undo, Redo, Orientation (Axial, Sagittal, Coronal, Normal), Contrast (IR, SAT, Fat SAT, SPGR, FC, SS), Tools (Center, Draw Line, 2 Point Tool, 3 Point Tool), Stack (10 mm), FOV (360 mm), SliceThickness (16.0 mm), FlipAngle (12 degrees), Average (1 images), Pause Scanning, Save Series, Acquire/Review, Locs Applied: -, Locs/Acq:1, Acqs:1, Thickness:6.0, Spacing:0.0, Close

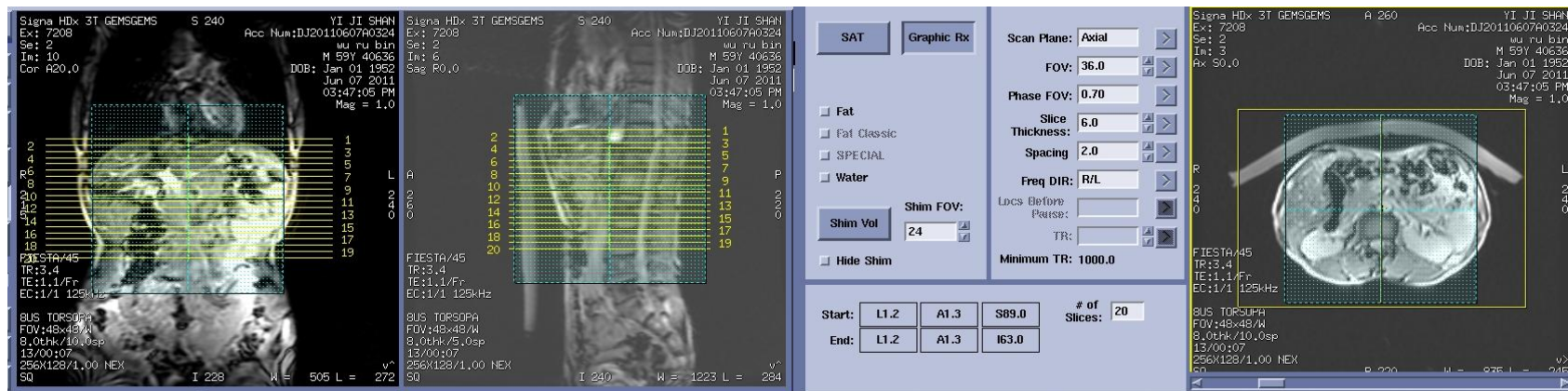
RealTime Loc, 实时透视定位

Cardiac Gating / Triggering		Resp. Gating / Triggering	
Trigger Type	PG	# Resp Intervals	[Slider]
# of RR Interval	[Slider]	Trigger Point	[Slider]
Arrhythmia Rejec. Window	50 [Slider] <input type="checkbox"/> Auto	Trigger Window	[Slider]
Trigger Delay	Minimum [Slider]	Inter-Seq. Delay	[Slider]
Inter-Seq. Delay	[Slider]	Resp Rate	[Slider] <input type="button" value="Update Rate"/>
Cardiac Phases	<input type="checkbox"/> Single <input type="checkbox"/> Multi	Effective TR	msec
Phases	[Slider] Min. 24 Max. 1		
Slices	[Slider] 1 20		
# of Card. Phases to Reconstruct	20 [Slider] <input type="checkbox"/> Auto 1 512		
Views per Segment	8		
Heart Rate	71 BPM		
<input type="checkbox"/> Projected HR	[Slider] BPM		
Effective TR	msec		

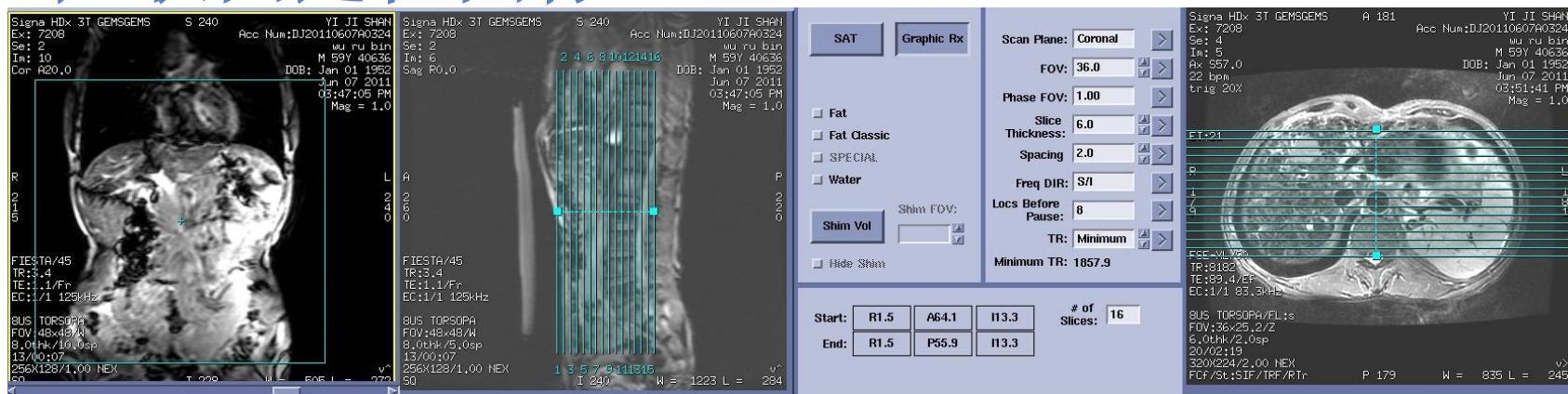
BH Calibration Scan

大范围全视野覆盖，**FOV**中心位于解剖中心。呼气末屏气扫描，屏气线保持水平，否则重新扫描。注意，必须是呼气末屏气扫描。在扫描整个过程中，屏气方法要保持一致（无法屏气者可捏紧鼻孔和嘴巴），这是影响图像质量的关键因素。

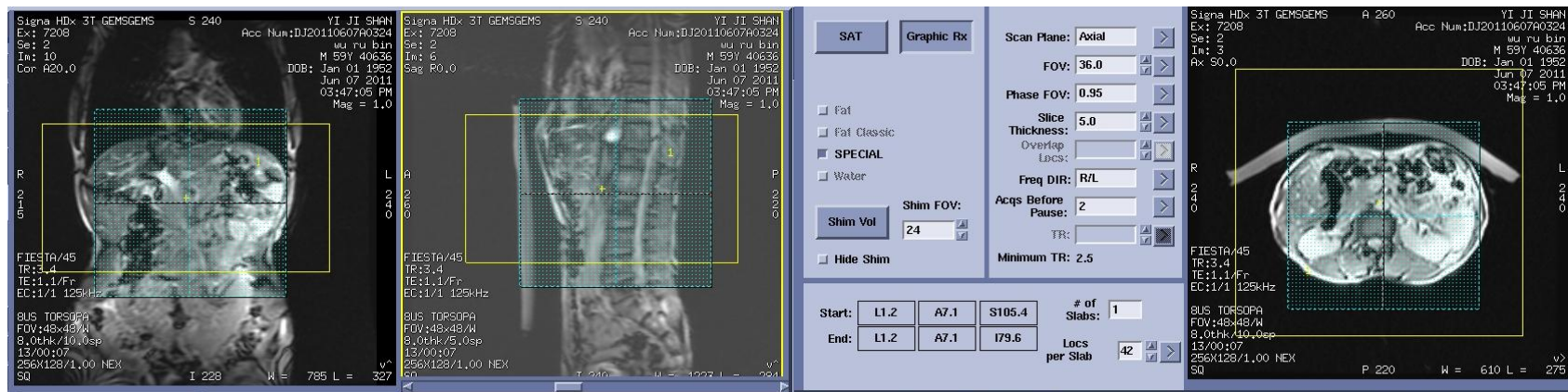
横断面T2FSE和DWI定位图像:



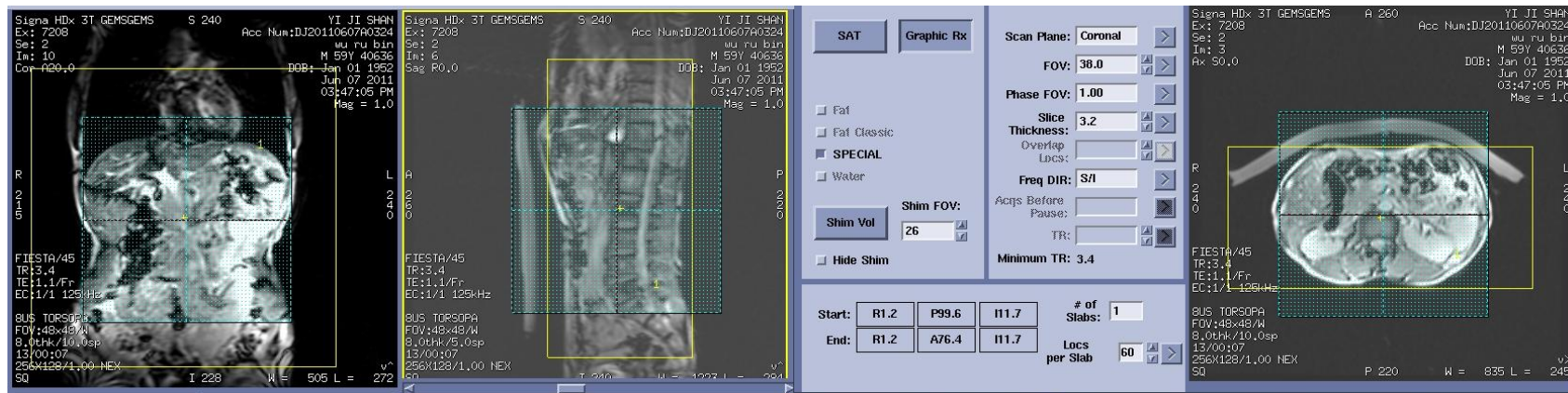
冠状面定位图像:



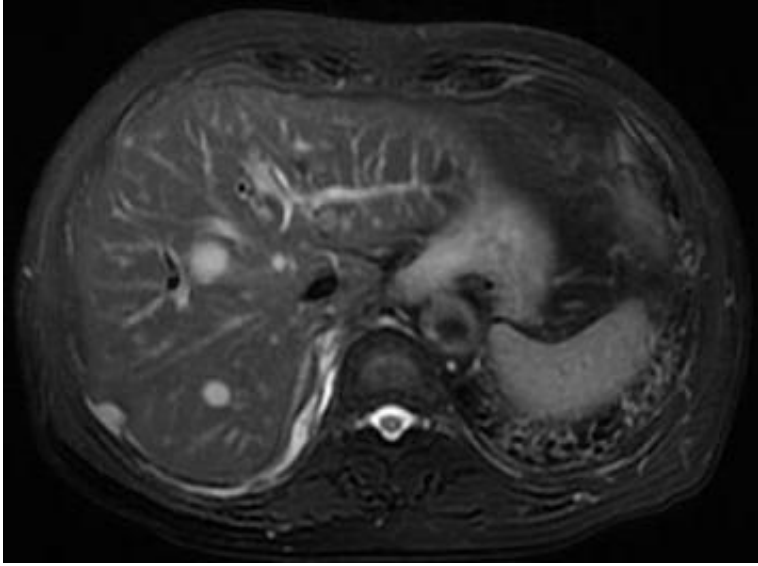
横断面3D序列定位图像:



冠状面LAVA定位图像:



RTr Ax fs T2FSE



扫描定位图像

扫描方法:

- 在最大肝脏冠状面图像上定横断面，以20层为标准，第一层要超过肝脏上缘一层。
- 必须更新呼吸频率，在更新呼吸频率时要有前瞻性估计患者的平均每分钟呼吸次数。
- 根据经验，当呼吸频率低于14时，ETL=21，当呼吸频率高于20时，呼吸间隔由2改成3。

图像参数特点:

- 化学饱和法脂肪抑制，软组织对比最佳，对磁场均匀性要求高。
- 肝脏生理性含脂，脂肪在T2WI呈高信号，病变亦呈高信号，故肝脏的脂肪信号可能会掩盖病变信号，所以常规使用脂肪抑制技术去除脂肪的高信号。

临床应用:

- 对病灶检出最敏感的序列。
- 对于呼吸均匀的患者，图像质量稳定，软组织对比度好，明显优于BH FSE T2WI、SSFSE T2WI及Fiesta序列。

RTr Ax fs T2FSE, 病例

血管瘤
肝癌
胆管癌

磁共振规范化扫描方案（3.0T）

---中华磁共振应用学院系列教材



imagination at work