

Liver DYNAMIC protocol using hepatobiliary contrast (MultiHance/Primovist/Eovist)

- Coverage: upper abdomen up to lower pole of kidneys
- Good for **any focal liver lesion, especially FNH.**
- Hepatobiliary phase images can be helpful for evaluated the biliary tree and bile leaks
- Adjust slice thickness (3-5mm) and matrix based on pt size and scan time requirements
- Good for **any mass in upper abdomen** in organs like spleen, pancreas, adrenal and kidneys
- ***Hepatobiliary phase of contrast enhancement at 20 minutes post-injection for Primovist/Eovist and 45-60 mins post-injection for Multhance***
- ***If using Multihance, consider performing contrast injection early in scan, moving T2 FSE and bSSFP imaging post-contrast***

Sequence	Vendor Specific name	Plane	Fat suppression	Motion compensation	Other relevant parameters	Additional info
T2 single shot	HASTE, SSFSE, SSH-TSE	Coronal	Yes	Free Breathing (FB) in smaller or breath-hold (BH) in older children		
Balanced steady state free precession	TrueFISP, FIESTA, balanced FFE	Coronal	No	Free Breathing (FB) in smaller or breath-hold (BH) in older children		

T2 fast spin echo (radial if available)	BLADE/PROPELLER/MultiVane	Axial	Yes	RT	Navigator trigger for small children	Consider adding forced recovery pulse to dec scan time
In-and-out-phase imaging	T1 In and out-phase	Ax		BH or FB	TEs- 2.3/4.6ms on 1.5T; 1.15/2.3ms on 3T	
T1 3D GRE Pre-Gad	VIBE/THRIVE/LAVA	Ax	By default	BH or FB		Pre-contrast images as mask
<i>Dynamic IV MultiHance or Primovist at approx 1-3 ml/sec. After a delay of 10 sec start breathing instruction for first run</i>						
T1 3D GRE Dynamic 4 runs	VIBE/THRIVE/LAVA	Ax	By default	BH or FB	2-5 averages if done FB, consider Stack of Stars variant if available for FB acq	4 runs: Gap of only breathing instruction between runs 1&2; give a gap of 15 sec between runs 2 & 3 and 3 & 4).
T1 3D GRE Delayed	VIBE/THRIVE/LAVA	Coronal	By default	BH or FB		
DWI	DWI	Ax	Default	FB variable NEX or RT	b-values: 0, 100 and 600-800	Can use 2 or 3 B-values
<i>Delayed "hepatobiliary phase" imaging: at 20 minutes for Primovist and between 45-</i>						

60 min for Multihance after gad injection.

T1 3D GRE Hepatobiliary phase	VIBE/LAVA /THRIVE	Ax	By default	BH or FB	2-5 averages if done FB	
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Ax = axial; Cor = coronal; BH = Breath-hold; FB = Free Breathing; FS = fat sat; RT = Respiratory Triggered; sSH = single-shot; DWI = diffusion weighted imaging; NSA = number of signal averages (Nex); T/FSE = Turbo/Fast Spin-echo

OPTIONAL

1 Ax T2 FS with high TE (150-200msec) to characterize cysts and hemangiomas

2 Phase contrast flow quantification in portal hypertension

References:

Chavhan GB, Shelmerdine SC, Jhaveri K, Babyn PS. Liver MRI in Children: Current Concepts and Technique. Radiographics. 2016 Sep-Oct; 36(5):1517-32.