

American College of Radiology
ACR Appropriateness Criteria®

Staging and Follow-up of Primary Liver Cancer

Variant 1: Adult. Primary liver cancer. Screening.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
US abdomen	Usually appropriate	Moderate	0-0 mSv	0-0 mSv [ped]	8	8	0	0	0	1	0	0	6	4	6
		References		Study Quality											
		16 (27775821)		3											
		15 (29981779)		4											
		14 (15042359)		1											
		4 (29624699)		4											
		13 (11592607)		4											
MRI abdomen without and with IV contrast	May be appropriate	Moderate	0-0 mSv	0-0 mSv [ped]	6	6	0	0	0	2	1	5	6	0	0
		References		Study Quality											
		11 (31524775)		3											
		10 (25714281)		2											
		9 (27657493)		3											
		8 (29268722)		4											
CT abdomen with IV contrast multiphase	May be appropriate	Limited	☢☢☢☢ 10-30 mSv		5	5	0	0	1	1	6	4	2	0	0
		References		Study Quality											
		4 (29624699)		4											

MRI abdomen without IV contrast	May be appropriate	Limited	0 0 mSv	0 0 mSv [ped]	4	4	1	1	0	8	2	2	0	0	0
		References		Study Quality											
		8 (29268722)		4											
		12 (27558976)		3											
CT abdomen with IV contrast	Usually not appropriate	Limited	☼☼☼ 1-10 mSv	☼☼☼☼ 3-10 mSv [ped]	3	3	2	2	5	3	4	1	0	0	0
		References		Study Quality											
		4 (29624699)		4											
CT abdomen without and with IV contrast	Usually not appropriate	Limited	☼☼☼☼ 10-30 mSv	☼☼☼☼☼ 10-30 mSv [ped]	3	3	2	2	9	1	0	0	0	0	0
		References		Study Quality											
		4 (29624699)		4											
MRI abdomen without IV contrast with MRCP	Usually not appropriate	Expert Consensus	0 0 mSv	0 0 mSv [ped]	3	3	6	2	3	6	0	0	0	0	0
MRI abdomen without and with IV contrast with MRCP	Usually not appropriate	Expert Consensus	0 0 mSv	0 0 mSv [ped]	3	3	7	0	3	3	2	1	1	0	0
US abdomen with IV contrast	Usually not appropriate	Limited	0 0 mSv	0 0 mSv [ped]	3	3	5	2	7	0	0	0	0	0	0
CT abdomen without IV contrast	Usually not appropriate	Expert Consensus	☼☼☼ 1-10 mSv	☼☼☼☼ 3-10 mSv [ped]	1	1	11	4	2	0	0	0	0	0	0
FDG-PET/CT skull base to mid-thigh	Usually not appropriate	Expert Consensus	☼☼☼☼ 10-30 mSv	☼☼☼☼☼ 3-10 mSv [ped]	1	1	10	5	2	0	0	0	0	0	0

Variant 2: Adult. Primary liver cancer. Staging.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
CT abdomen with IV contrast multiphase	Usually appropriate	Limited	⊕⊕⊕⊕ 10-30 mSv		9	9	0	0	0	0	2	1	3	1	7
		References		Study Quality											
		4 (29624699)		4											
MRI abdomen without and with IV contrast	Usually appropriate	Limited	○ ○ mSv	○ ○ mSv [ped]	7	7	0	0	0	0	1	0	7	1	5
		References		Study Quality											
		23 (28859233)		4											
		4 (29624699)		4											
CT abdomen and pelvis with IV contrast	May be appropriate (Disagreement)	Expert Opinion	⊕⊕⊕ 1-10 mSv	⊕⊕⊕⊕ 3-10 mSv [ped]	5	5	1	1	6	1	3	2	1	0	0
CT chest with IV contrast	May be appropriate (Disagreement)	Expert Opinion	⊕⊕⊕ 1-10 mSv	⊕⊕⊕⊕ 3-10 mSv [ped]	5	5	1	1	1	1	1	0	6	3	1
CT chest without IV contrast	May be appropriate (Disagreement)	Expert Opinion	⊕⊕⊕ 1-10 mSv	⊕⊕⊕⊕ 3-10 mSv [ped]	5	5	0	2	0	1	1	1	10	0	0
CT pelvis with IV contrast	May be appropriate	Limited	⊕⊕⊕ 1-10 mSv	⊕⊕⊕⊕ 3-10 mSv [ped]	4	4	0	2	1	7	2	2	1	0	0
MRI abdomen without and with IV contrast with MRCP	May be appropriate	Expert Consensus	○ ○ mSv	○ ○ mSv [ped]	4	4	1	1	5	3	2	2	0	0	0
Bone scan whole body	May be appropriate	Limited	⊕⊕⊕ 1-10 mSv	⊕⊕⊕⊕ 3-10 mSv [ped]	4	4	0	2	2	5	3	2	0	0	0
CT abdomen and pelvis without and with IV contrast	Usually not appropriate	Limited	⊕⊕⊕⊕ 10-30 mSv	⊕⊕⊕⊕⊕ 10-30 mSv [ped]	3	3	3	2	3	4	0	1	1	0	0
FDG-PET/MRI skull base to mid-thigh	Usually not appropriate	Limited	⊕⊕⊕ 1-10 mSv		3	3	2	2	7	0	2	0	0	1	0

References	Study Quality
21 (10845666)	3
20 (29518452)	3

CT abdomen and pelvis without IV contrast	Usually not appropriate	Limited	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	2	2	6	5	2	0	1	0	0	0	0
CT chest without and with IV contrast	Usually not appropriate	Limited	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	2	2	5	4	2	1	1	1	0	0	0
CT pelvis without IV contrast	Usually not appropriate	Limited	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	2	2	3	5	5	0	1	0	0	0	0
CT pelvis without and with IV contrast	Usually not appropriate	Limited	☢☢☢☢ 10-30 mSv	☢☢☢☢ 3-10 mSv [ped]	2	2	4	4	4	1	1	0	0	0	0
MRI abdomen without IV contrast	Usually not appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	2	2	5	3	5	1	0	0	0	0	0
MRI abdomen without IV contrast with MRCP	Usually not appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	2	2	5	3	5	0	0	0	0	1	0
US abdomen with IV contrast	Usually not appropriate	Limited	○ 0 mSv	○ 0 mSv [ped]	1	1	9	2	1	0	1	1	0	0	0
US abdomen transabdominal	Usually not appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	1	1	9	2	3	0	0	0	0	0	0

Variant 3: Adult. Primary liver cancer. Liver observations under active surveillance.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
MRI abdomen without and with IV contrast	Usually appropriate	Moderate	0 0 mSv	0 0 mSv [ped]	9	9	0	0	0	0	0	0	1	2	11
CT abdomen with IV contrast multiphase	Usually appropriate	Moderate	⊕⊕⊕⊕ 10-30 mSv		9	9	0	0	0	0	0	0	1	4	9

CT abdomen without and with IV contrast	May be appropriate	Expert Consensus	☼☼☼☼ 10-30 mSv	☼☼☼☼☼ 10-30 mSv [ped]	4	4	0	3	4	2	4	0	1	0	0
MRI abdomen without and with IV contrast with MRCP	May be appropriate	Expert Consensus	○ ○ mSv	○ ○ mSv [ped]	4	4	1	0	4	3	3	3	0	0	0
CT abdomen with IV contrast	Usually not appropriate	Moderate	☼☼☼ 1-10 mSv	☼☼☼☼ 3-10 mSv [ped]	3	3	1	3	5	4	1	0	0	0	0
US abdomen with IV contrast	Usually not appropriate	Limited	○ ○ mSv	○ ○ mSv [ped]	3	3	1	6	4	1	2	0	0	0	0
MRI abdomen without IV contrast	Usually not appropriate	Expert Consensus	○ ○ mSv	○ ○ mSv [ped]	2	2	4	5	4	1	0	0	0	0	0
MRI abdomen without IV contrast with MRCP	Usually not appropriate	Expert Consensus	○ ○ mSv	○ ○ mSv [ped]	2	2	3	5	5	0	1	0	0	0	0
FDG-PET/CT skull base to mid-thigh	Usually not appropriate	Expert Consensus	☼☼☼☼ 10-30 mSv	☼☼☼☼ 3-10 mSv [ped]	2	2	6	4	2	1	1	0	0	0	0
US abdomen transabdominal	Usually not appropriate	Limited	○ ○ mSv	○ ○ mSv [ped]	2	2	3	6	2	2	1	0	0	0	0
		References			Study Quality										
		6 (27158749)			4										
CT abdomen without IV contrast	Usually not appropriate	Expert Consensus	☼☼☼ 1-10 mSv	☼☼☼☼ 3-10 mSv [ped]	1	1	11	1	2	0	0	0	0	0	0

Variant 4: Adult. Primary liver cancer. Posttreatment evaluation after liver directed therapy or neoadjuvant chemotherapy.

[illegible]

		References		Study Quality													
		4 (29624699)		4													
		24 (33596330)		3													
		25 (-3197194)		4													
CT abdomen with IV contrast multiphase	Usually appropriate	Limited	☼☼☼☼ 10-30 mSv		8	8	0	0	0	0	0	0	1	7	6		
		References		Study Quality													
		4 (29624699)		4													
		24 (33596330)		3													
CT abdomen without and with IV contrast	Usually appropriate	Expert Consensus	☼☼☼☼ 10-30 mSv	☼☼☼☼☼ 10-30 mSv [ped]	7	7	1	0	0	0	1	0	8	4	0		
MRI abdomen without and with IV contrast with MRCP	May be appropriate	Expert Consensus	○ ○ mSv	○ ○ mSv [ped]	4	4	2	1	2	5	3	1	0	0	0		
CT abdomen with IV contrast	Usually not appropriate	Limited	☼☼☼ 1-10 mSv	☼☼☼☼ 3-10 mSv [ped]	3	3	3	1	9	0	1	0	0	0	0		
FDG-PET/CT skull base to mid-thigh	Usually not appropriate	Expert Consensus	☼☼☼☼ 10-30 mSv	☼☼☼☼ 3-10 mSv [ped]	3	3	5	2	6	0	1	0	0	0	0		
US abdomen with IV contrast	Usually not appropriate	Limited	○ ○ mSv	○ ○ mSv [ped]	3	3	3	2	4	2	3	0	0	0	0		
MRI abdomen without IV contrast	Usually not appropriate	Limited	○ ○ mSv	○ ○ mSv [ped]	2	2	7	3	4	0	0	0	0	0	0		
MRI abdomen without IV contrast with MRCP	Usually not appropriate	Expert Consensus	○ ○ mSv	○ ○ mSv [ped]	2	2	6	4	3	0	1	0	0	0	0		
CT abdomen without IV contrast	Usually not appropriate	Limited	☼☼☼ 1-10 mSv	☼☼☼☼ 3-10 mSv [ped]	1	1	9	2	3	0	0	0	0	0	0		
US abdomen transabdominal	Usually not appropriate	Expert Consensus	○ ○ mSv	○ ○ mSv [ped]	1	1	9	2	3	0	0	0	0	0	0		

Variant 5: Adult. Primary liver cancer. Treated. Routine surveillance.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
MRI abdomen without and with IV contrast	Usually appropriate	Limited	O 0 mSv	O 0 mSv [ped]	9	9	0	0	0	0	0	0	0	4	10
		References		Study Quality											
		24 (33596330)		3											
CT abdomen with IV contrast multiphase	Usually appropriate	Limited	⊕⊕⊕⊕ 10-30 mSv		9	9	0	0	0	0	0	0	1	3	10
		References		Study Quality											
		24 (33596330)		3											
CT abdomen without and with IV contrast	May be appropriate	Expert Consensus	⊕⊕⊕⊕ 10-30 mSv	⊕⊕⊕⊕⊕ 10-30 mSv [ped]	5	5	2	0	1	4	5	1	1	0	0
MRI abdomen without and with IV contrast with MRCP	May be appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	5	5	2	0	1	3	6	2	0	0	0
CT abdomen with IV contrast	Usually not appropriate	Limited	⊕⊕⊕ 1-10 mSv	⊕⊕⊕⊕ 3-10 mSv [ped]	3	3	5	1	3	3	1	1	0	0	0
MRI abdomen without IV contrast	Usually not appropriate	Limited	O 0 mSv	O 0 mSv [ped]	2	2	5	6	3	0	0	0	0	0	0
MRI abdomen without IV contrast with MRCP	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	2	2	7	4	3	0	0	0	0	0	0
FDG-PET/CT skull base to mid-thigh	Usually not appropriate	Expert Consensus	⊕⊕⊕⊕ 10-30 mSv	⊕⊕⊕⊕ 3-10 mSv [ped]	2	2	4	4	5	0	1	0	0	0	0
US abdomen with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	2	2	7	5	2	0	0	0	0	0	0

CT abdomen without IV contrast	Usually not appropriate	Expert Consensus	☢☢☢ 1-10 mSv	☢☢☢☢☢ 3-10 mSv [ped]	1	1	9	1	4	0	0	0	0	0	0
US abdomen transabdominal	Usually not appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	1	1	10	2	2	0	0	0	0	0	0

Appendix Key

A more complete discussion of the items presented below can be found by accessing the supporting documents at the designated hyperlinks.

Appropriateness Category: The panel's recommendation for a procedure based on the assessment of the risks and benefits of performing the procedure for the specified clinical scenario.

SOE: Strength of Evidence. The assessment of the amount and quality of evidence found in the peer reviewed medical literature for an appropriateness recommendation.

- **References:** The citation number and PMID for the reference(s) associated with the recommendation.
- **Study Quality:** The assessment of the quality of an individual reference based on the number of study quality elements described in the reference.

RRL: Relative Radiation Level. A population based assessment of the amount of radiation a typical patient may be exposed to during the specified procedure.

Rating: The final rating (1-9 scale) for the procedure as determined by the panel during rating rounds.

Median: The median rating (1-9 scale) for the procedure as determined by the panel during rating rounds.

Final tabulations: A histogram showing the number of panel members who rated the procedure as noted in the column heading (ie, 1, 2, 3, etc.).

Additional supporting documents about the AC methodology and processes can be found at www.acr.org/ac.