

US abdomen with IV contrast	Usually appropriate	Strong	0 0 mSv	0 0 mSv [ped]	7	7	0	0	0	1	3	4	6	2	1
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References	Study Quality
9 (19542399)	2
35 (20652854)	3
13 (19688670)	3
34 (21655534)	4
31 (21390342)	3
32 (21188330)	4
29 (19666405)	3
37 (17206071)	2
14 (19673015)	3
36 (26649337)	4
18 (25971695)	4
33 (25666723)	4
30 (24689098)	4

MRI abdomen without IV contrast	May be appropriate	Strong	0 0 mSv	0 0 mSv [ped]	5	5	0	1	2	2	4	7	1	0	0
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References	Study Quality
11 (24270109)	4
12 (18580333)	1
15 (21597893)	2
16 (22194486)	3
14 (19673015)	3
18 (25971695)	4
10 (23776623)	4

CT abdomen without IV contrast	Usually not appropriate	Strong	☼☼☼ 1-10 mSv	☼☼☼☼☼ 3-10 mSv [ped]	3	3	2	3	9	2	0	1	0	0	0
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References	Study Quality
11 (24270109)	4
9 (19542399)	2

13 (19688670)	3
12 (18580333)	1
10 (23776623)	4

CT abdomen without and with IV contrast	Usually not appropriate	Strong	☼☼☼☼ 10-30 mSv	☼☼☼☼☼ 10-30 mSv [ped]	3	3	1	7	6	2	2	0	0	0	0
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References	Study Quality
11 (24270109)	4
9 (19542399)	2
13 (19688670)	3
12 (18580333)	1
10 (23776623)	4

Image-guided biopsy liver	Usually not appropriate	Limited	Varies	Varies	2	2	3	7	8	0	0	0	0	0	0
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References	Study Quality
21 (27623001)	4
20 (28119260)	4
28 (27080009)	4
23 (27017289)	3
22 (26649339)	3
26 (24531352)	3
25 (23980215)	3
4 (28927870)	4
24 (29299367)	3
27 (26847020)	4

Liver spleen scan	Usually not appropriate	Expert Consensus	☼☼☼ 1-10 mSv		2	2	8	5	3	0	1	0	0	0	0
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RBC scan abdomen and pelvis	Usually not appropriate	Expert Consensus	☼☼☼ 1-10 mSv	☼☼☼ 0.3-3 mSv [ped]	2	2	8	4	3	1	1	0	0	0	0
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Octreotide scan with SPECT or SPECT/CT chest and abdomen	Usually not appropriate	Expert Consensus	⊕⊕⊕⊕ 10-30 mSv		1	1	12	2	2	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]	1	1	9	4	3	1	0	0	0	0	0
DOTATATE PET/CT skull base to mid-thigh	Usually not appropriate	Expert Consensus	⊕⊕⊕ 1-10 mSv		1	1	10	4	2	0	1	0	0	0	0

Variant 2: Indeterminate, greater than 1 cm liver lesion on initial imaging with CT (noncontrast or single-phase) or noncontrast MRI. Normal liver. No suspicion or evidence of extrahepatic malignancy or underlying liver disease.

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	Strong	0 0 mSv	0 0 mSv [ped]	8	8	0	0	1	0	0	0	2	7	7
		References		Study Quality											
		38 (19459531)		2											
		12 (18580333)		1											
		15 (21597893)		2											
		19 (20578020)		2											
		10 (23776623)		4											
CT abdomen with IV contrast multiphase	Usually appropriate	Strong	⊕⊕⊕⊕ 10-30 mSv		8	8	0	0	0	0	1	0	6	9	1
		References		Study Quality											
		9 (19542399)		2											
		12 (18580333)		1											
		10 (23776623)		4											
US abdomen with IV contrast	May be appropriate	Moderate	0 0 mSv	0 0 mSv [ped]	6	6	0	0	0	1	3	5	6	1	1
		References		Study Quality											
		9 (19542399)		2											

			37 (17206071)		2													
			39 (24387826)		3													
US abdomen	May be appropriate (Disagreement)	Expert Opinion	0 0 mSv	0 0 mSv [ped]	5	5	0	0	3	6	6	1	1	0	1			
		References	Study Quality															
			9 (19542399)		2													
			29 (19666405)		3													
CT abdomen without and with IV contrast	Usually not appropriate	Strong	⊕⊕⊕⊕ 10-30 mSv	⊕⊕⊕⊕⊕ 10-30 mSv [ped]	3	3	0	8	8	2	0	0	0	0	0			
		References	Study Quality															
			9 (19542399)		2													
			12 (18580333)		1													
			10 (23776623)		4													
Image-guided biopsy liver	Usually not appropriate	Limited	Varies	Varies	3	3	4	4	5	3	2	0	0	0	0			
		References	Study Quality															
			21 (27623001)		4													
			20 (28119260)		4													
			28 (27080009)		4													
			23 (27017289)		3													
			22 (26649339)		3													
			26 (24531352)		3													
			25 (23980215)		3													
			24 (29299367)		3													
			27 (26847020)		4													
Liver spleen scan	Usually not appropriate	Expert Consensus	⊕⊕⊕ 1-10 mSv		1	1	10	2	2	1	1	0	1	0	0			
Octreotide scan with SPECT or SPECT/CT chest and abdomen	Usually not appropriate	Expert Consensus	⊕⊕⊕⊕ 10-30 mSv		1	1	11	3	2	0	0	1	0	0	0			

			49 (21702068)		2														
			41 (21293130)		3														
			48 (28449169)		3														
			50 (25025151)		4														
			47 (24289722)		4														
US abdomen with IV contrast	May be appropriate	Limited	0 0 mSv	0 0 mSv [ped]	5	5	0	0	0	0	10	6	1	0	1				
			References		Study Quality														
			35 (20652854)		3														
			37 (17206071)		2														
			48 (28449169)		3														
DOTATATE PET/CT skull base to mid-thigh	May be appropriate	Limited	☼☼☼ 1-10 mSv		5	5	0	1	0	5	7	2	2	0	0				
			References		Study Quality														
			8 (25143861)		4														
Octreotide scan with SPECT or SPECT/CT chest and abdomen	May be appropriate	Limited	☼☼☼☼ 10-30 mSv		4	4	2	1	1	6	5	1	1	0	0				
			References		Study Quality														
			46 (19713709)		4														
CT abdomen without IV contrast	Usually not appropriate	Limited	☼☼☼ 1-10 mSv	☼☼☼☼☼ 3-10 mSv [ped]	3	3	2	3	6	5	0	0	1	0	0				
			References		Study Quality														
			45 (19077417)		4														
			42 (19057427)		2														
			41 (21293130)		3														
			43 (27397022)		4														
			44 (24331274)		4														
			40 (24089057)		4														
Liver spleen scan	Usually not appropriate	Expert Consensus	☼☼☼ 1-10 mSv		1	1	9	3	2	2	0	0	1	0	0				

RBC scan abdomen and pelvis	Usually not appropriate	Expert Consensus	☹☹☹ 1-10 mSv	☹☹☹ 0.3-3 mSv [ped]	1	1	10	3	2	2	0	0	0	0	0
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Variant 4: Indeterminate, greater than 1 cm liver lesion on initial imaging with CT (noncontrast or single-phase) or noncontrast MRI. Known history of an extrahepatic malignancy.

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	0 0 mSv	0 0 mSv [ped]	8	8	0	1	0	0	0	0	2	7	7

References	Study Quality
49 (21702068)	2
41 (21293130)	3
48 (28449169)	3
50 (25025151)	4
47 (24289722)	4

FDG-PET/CT skull base to mid-thigh	Usually appropriate	Limited	☹☹☹☹ 10-30 mSv	☹☹☹☹ 3-10 mSv [ped]	7	7	0	0	0	0	1	6	6	3	1
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References	Study Quality
42 (19057427)	2
40 (24089057)	4

CT abdomen with IV contrast multiphase	Usually appropriate	Limited	☹☹☹☹ 10-30 mSv		7	7	0	0	0	0	1	0	8	7	1
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References	Study Quality
45 (19077417)	4
41 (21293130)	3
43 (27397022)	4
44 (24331274)	4
40 (24089057)	4

Octreotide scan with SPECT or SPECT/CT chest and abdomen	May be appropriate	Limited	⊕⊕⊕⊕ 10-30 mSv		5	5	1	1	2	3	9	0	1	0	0
		References	Study Quality												
		46 (19713709)	4												
DOTATATE PET/CT skull base to mid-thigh	May be appropriate	Limited	⊕⊕⊕ 1-10 mSv		5	5	0	0	0	2	13	1	2	0	0
		References	Study Quality												
		8 (25143861)	4												
US abdomen	May be appropriate	Limited	○ 0 mSv	○ 0 mSv [ped]	4	4	2	5	0	3	5	0	1	1	0
		References	Study Quality												
		9 (19542399)	2												
Liver spleen scan	Usually not appropriate	Expert Consensus	⊕⊕⊕ 1-10 mSv		2	2	8	4	1	2	0	2	0	0	0
RBC scan abdomen and pelvis	Usually not appropriate	Expert Consensus	⊕⊕⊕ 1-10 mSv	⊕⊕⊕ 0.3-3 mSv [ped]	1	1	9	3	1	3	0	1	0	0	0

Variant 5: Incidental liver lesion, greater than 1 cm on US, noncontrast or single-phase CT, or noncontrast MRI. Known chronic liver disease.

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	Strong	○ 0 mSv	○ 0 mSv [ped]	9	9	0	0	0	0	0	1	2	4	10
		References	Study Quality												
		35 (20652854)	3												
		65 (20882620)	2												
		64 (21563246)	2												
		73 (20657216)	3												
		61 (21969663)	3												
		57 (20098330)	2												

71 (28723741)	4
70 (28078512)	3
62 (27835984)	2
63 (25192607)	3
72 (23116806)	4
67 (23011874)	4
56 (20806437)	3

CT abdomen with IV contrast multiphase	Usually appropriate	Moderate	☼☼☼☼ 10-30 mSv		8	8	0	0	0	0	0	1	5	10	1
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References	Study Quality
57 (20098330)	2
59 (23883211)	3
56 (20806437)	3

US abdomen with IV contrast	Usually appropriate	Limited	0 0 mSv	0 0 mSv [ped]	7	7	1	0	0	1	4	2	7	1	1
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References	Study Quality
35 (20652854)	3
31 (21390342)	3
32 (21188330)	4
77 (18834687)	3
78 (25812115)	4
79 (25202903)	4
72 (23116806)	4
56 (20806437)	3
76 (25717230)	4

Image-guided biopsy liver	May be appropriate	Limited	Varies	Varies	4	4	1	2	5	2	5	1	0	0	1
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References	Study Quality
54 (25170868)	4
6 (-3148733)	4
27 (26847020)	4

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations												
							1	2	3	4	5	6	7	8	9				
		References		Study Quality															
		84 (19501995)		2															
		15 (21597893)		2															
CT abdomen with IV contrast multiphase	May be appropriate	Limited	☼☼☼☼ 10-30 mSv		6	6	0	0	0	1	7	5	4	1	0				
		References		Study Quality															
		82 (9885589)		4															
		83 (24674191)		4															
		81 (12439304)		4															
		80 (19842564)		4															
US abdomen with IV contrast	May be appropriate	Limited	○ 0 mSv	○ 0 mSv [ped]	6	6	0	0	0	0	8	8	1	1	0				
		References		Study Quality															
		9 (19542399)		2															
		30 (24689098)		4															
MRI abdomen without IV contrast	May be appropriate	Strong	○ 0 mSv	○ 0 mSv [ped]	5	5	0	0	0	8	8	1	1	0	0				
		References		Study Quality															
		84 (19501995)		2															
		15 (21597893)		2															
Image-guided biopsy liver	Usually not appropriate	Expert Consensus	Varies	Varies	3	3	4	2	3	5	3	0	0	0	0				
DOTATATE PET/CT skull base to mid-thigh	Usually not appropriate	Expert Consensus	☼☼☼ 1-10 mSv		3	3	3	4	4	1	4	1	0	0	0				
CT abdomen without IV contrast	Usually not appropriate	Limited	☼☼☼ 1-10 mSv	☼☼☼☼ 3-10 mSv [ped]	2	2	5	6	4	1	1	0	0	0	0				

		References	Study Quality													
		82 (9885589)	4													
		83 (24674191)	4													
		81 (12439304)	4													
		80 (19842564)	4													
CT abdomen without and with IV contrast	Usually not appropriate	Limited	⊕⊕⊕⊕ 10-30 mSv	⊕⊕⊕⊕⊕ 10-30 mSv [ped]	2	2	2	8	8	0	0	0	0	0	0	0
		References	Study Quality													
		82 (9885589)	4													
		83 (24674191)	4													
		81 (12439304)	4													
		80 (19842564)	4													
Octreotide scan with SPECT or SPECT/CT chest and abdomen	Usually not appropriate	Expert Consensus	⊕⊕⊕⊕ 10-30 mSv		2	2	5	4	3	2	2	1	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	6	6	1	1	0	0	0	0	
Liver spleen scan	Usually not appropriate	Expert Consensus	⊕⊕⊕ 1-10 mSv		1	1	10	4	2	0	0	0	1	0	0	
RBC scan abdomen and pelvis	Usually not appropriate	Expert Consensus	⊕⊕⊕ 1-10 mSv	⊕⊕⊕ 0.3-3 mSv [ped]	1	1	10	4	2	1	0	0	0	0	0	

Variant 7: Indeterminate, less than 1 cm liver lesion on initial imaging with CT (noncontrast or single-phase) or noncontrast MRI. Known history of an extrahepatic malignancy.

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	0 0 mSv	0 0 mSv [ped]	8	8	0	0	0	0	1	3	4	6	3	
			References	Study Quality												

			86 (16845289)			3												
			87 (20829538)			M												
CT abdomen with IV contrast multiphase	Usually appropriate	Limited	☼☼☼☼ 10-30 mSv		7	7	0	0	1	0	5	2	9	1	0			
			References		Study Quality													
			82 (9885589)		4													
			85 (15833992)		4													
US abdomen with IV contrast	May be appropriate	Limited	0 0 mSv	0 0 mSv [ped]	6	6	0	0	1	2	4	4	5	1	0			
			References		Study Quality													
			88 (20517816)		4													
			9 (19542399)		2													
Image-guided biopsy liver	May be appropriate	Expert Consensus	Varies	Varies	4	4	3	0	4	6	3	1	0	0	0			
US abdomen	Usually not appropriate	Limited	0 0 mSv	0 0 mSv [ped]	3	3	3	3	3	3	4	1	0	0	0			
			References		Study Quality													
			88 (20517816)		4													
CT abdomen without and with IV contrast	Usually not appropriate	Limited	☼☼☼☼ 10-30 mSv	☼☼☼☼☼ 10-30 mSv [ped]	2	2	2	8	8	0	0	0	0	0	0			
			References		Study Quality													
			82 (9885589)		4													
			85 (15833992)		4													
Octreotide scan with SPECT or SPECT/CT chest and abdomen	Usually not appropriate	Expert Consensus	☼☼☼☼ 10-30 mSv		2	2	6	4	2	3	1	0	1	0	0			
FDG-PET/CT skull base to mid-thigh	Usually not appropriate	Expert Consensus	☼☼☼☼ 10-30 mSv	☼☼☼☼ 3-10 mSv [ped]	2	2	5	6	6	1	0	0	0	0	0			
DOTATATE PET/CT skull base to mid-thigh	Usually not appropriate	Expert Consensus	☼☼☼ 1-10 mSv		2	2	5	4	2	2	2	1	1	0	0			

54 (25170868)	4
93 (20616581)	4
27 (26847020)	4
75 (18669577)	4
52 (29404497)	3

CT abdomen without and with IV contrast	Usually not appropriate	Strong	⊕⊕⊕⊕ 10-30 mSv	⊕⊕⊕⊕⊕ 10-30 mSv [ped]	2	2	2	8	8	0	0	0	0	0	0
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References	Study Quality
57 (20098330)	2
91 (23932636)	2

Liver spleen scan	Usually not appropriate	Expert Consensus	⊕⊕⊕ 1-10 mSv		1	1	10	4	2	0	0	1	0	0	0
Octreotide scan with SPECT or SPECT/CT chest and abdomen	Usually not appropriate	Expert Consensus	⊕⊕⊕⊕ 10-30 mSv		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	9	6	2	0	0	0	0	0	0
DOTATATE PET/CT skull base to mid-thigh	Usually not appropriate	Expert Consensus	⊕⊕⊕ 1-10 mSv		1	1	10	5	2	0	0	0	0	0	0
RBC scan abdomen and pelvis	Usually not appropriate	Expert Consensus	⊕⊕⊕ 1-10 mSv	⊕⊕⊕ 0.3-3 mSv [ped]	1	1	10	4	3	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.