American College of Radiology ACR Appropriateness Criteria®

Evaluation of Cardiac Masses

Variant 1: Adult. Suspected cardiac mass. No known cardiac mass. Initial imaging.

	Appropriateness	~ ~ -							F	inal	Tabu	latio	ns		
Procedure	Category	SOE	Adults RRL	Peds RRL	Rating	Median	1	2	3	4	5	6		8	9
US echocardiography transthoracic resting	Usually appropriate	Strong	O 0 mSv	O 0 mSv [ped]	9	9	1	0	0	0	0	0	2	2	8
		References		Study	Quality										
		39 (21757159)			3										
		38 (2768712)			4										
		29 (16824834)			3										
		35 (32036237)			2										
		32 (19679285)			1										
		37 (32279620)			4										
		19 (26765302)			4										
		9 (34396236)			4		_								
MRI heart function and morphology without and with IV contrast	Usually appropriate	Strong	O 0 mSv	O 0 mSv [ped]	8	8	0	1	1	0	0	0	2	7	3
		References		Study	Quality										
		36 (25913472)			4										
		35 (32036237)			2										
		31 (26476503)			1										
		32 (19679285)			1										
		33 (12460863)			4										
		34 (18598895)			2										

		29 (16824834)				3										
		28 (36216604)				4										
		20 (32936016)				4										
		30 (25129516)				3										
		19 (26765302)				4										
CT heart function and morphology with IV contrast	Usually appropriate	Strong	���� 10- mSv	30	���� 3- 10 mSv [ped]	7	7	0	0	1	1	2	1	4	3	1
		References			Study	Quality										
		26 (32900226)				4										
		25 (19179202)				2										
		24 (22495682)				1										
		22 (36779342)				2										
		21 (35918169)				1										
		23 (35935656) 20 (32936016)				1										
		20 (32936016)				4										
		19 (26765302)				4										
CTA chest with IV contrast	May be appropriate (Disagreement)	19 (26765302) De late ment) Expert Opinion MSv 19 (26765302) Expert Opinion			���� 3- 10 mSv [ped]	5	5	1	2	4	0	4	3	0	0	0
		References			Study	Quality										
		27 (23406625)			G	lood										
		22 (36779342)				2										
		19 (26765302)				4										
MRI heart function and morphology without IV contrast	May be appropriate (Disagreement)	19 (26765302) e			O 0 mSv [ped]	5	5	0	1	1	0	2	4	6	0	0
		ment) References			Study	Quality		•							•	
		References 36 (25913472)				4										
		36 (25913472) 35 (32036237)				2										
		32 (19679285)				1										
		33 (12460863)				4										
		34 (18598895)				2										
		·			·											

US echocardiography transesophageal	May approp (Disagre	riate	Expert Opinion	O 0 mSv	,	O 0 mSv [ped]	5	5	0	0	2	0	3	6	2	1	0
			References			Study	Quality										
			19 (26765302)				4										
			28 (36216604)				4										
			29 (16824834)				3										
			37 (32279620)				4										
			38 (2768712)				4										
CT chest with IV contrast	Usuall approp		Expert Consensus	⊕⊕⊕ 1-10 mSv	0	���� 3- 10 mSv [ped]	3	3	3	4	6	1	0	0	0	0	0
CT chest without IV contrast	Usuall approp		Limited	��� 1-10 mSv	0	���� 3- 10 mSv [ped]	3	3	4	2	4	2	0	0	1	0	0
			References			Study	Quality										
			18 (23926237)				4										
FDG-PET/CT heart	Usuall approp		Limited			���� 3- 10 mSv [ped]	3	3	2	4	5	2	1	0	0	0	0
			References			Study	Quality										
			28 (36216604)				4										
FDG-PET/MRI heart	Usuall approp		Limited	��� 1-10 mSv	0		3	3	2	4	4	1	2	0	1	0	0
			References			Study	Quality										
			3 (34081218)				4										
CTA coronary arteries with IV contrast	Usuall approp		Expert Consensus	��� 1-10 mSv	0	���� 3- 10 mSv [ped]	2	2	3	5	5	0	1	0	0	0	0
CT chest without and with IV contrast	Usuall approp		Expert Consensus	��� 1-10 mSv	0	���� 3- 10 mSv [ped]	2	2	3	5	6	0	0	0	0	0	0
Arteriography coronary with ventriculography	Usuall approp		Expert Consensus	��� 1-10 mSv	0	���� 3- 10 mSv [ped]	2	2	6	4	1	0	2	0	0	0	0

MRA coronary arteries without and with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	2	2	5	4	5	0	0	0	0	0	0
MRI chest without IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	2	2	5	6	3	0	0	0	0	0	0
MRI chest without and with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	2	2	2	7	5	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	7	3	3	0	1	0	0	0	0
MRA chest with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	2	2	4	4	6	0	0	0	0	0	0
DOTATATE PET/CT skull base to mid-thigh	Usually not appropriate	Expert Consensus	≎≎≎ 1-10 mSv		2	2	7	2	4	0	1	0	0	0	0
MRI chest with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	2	2	3	6	5	0	0	0	0	0	0
Octreotide scan with SPECT or SPECT/CT chest and abdomen	Usually not appropriate	Expert Consensus	���� 10-30 mSv		1	1	8	2	3	1	0	0	0	0	0
Radiography chest	Usually not appropriate	Expert Consensus	≎ <0.1 mSv		1	1	12	1	1	0	0	0	0	0	0
MIBG scan whole body with SPECT or SPECT/CT chest	Usually not appropriate	Expert Consensus	≎≎≎ 1-10 mSv	���� 3- 10 mSv [ped]	1	1	8	4	2	0	0	0	0	0	0

Variant 2: Adult. Known cardiac mass in echocardiography. Unknown etiology. Next imaging study.

n ,	Appropria	ateness	COF	4.1.14 DD		D I DDI	D 41	3.6.11			F	inal '	Tabu	latio	ns		
Procedure	Catego		SOE	Adults RR	L	Peds RRL	Rating	Median	1	2	3	4	5	6	7	8	9
MRI heart function and morphology without and with IV contrast	Usuall appropr	.*	Strong	O 0 mSv	,	O 0 mSv [ped]	9	9	0	0	1	0	0	1	1	3	7
		•	References			Study	Quality				•						

85 (33419643)	2
84 (27904982)	4
81 (28138817)	4
80 (26552505)	4
82 (2131359)	4
83 (38502734)	2
73 (27236529)	3
76 (27146445)	2
79 (34545397)	4
74 (30084570)	2
78 (30616453)	2
77 (30551963)	2
75 (26838354)	4
72 (22002687)	4
71 (28092290)	4
40 (33629237)	4
5 (35347934)	4
48 (30337716)	3
68 (34825795)	4
46 (32040684)	3
30 (25129516)	3
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CT heart function and morphology with IV contrast

Strong

Str

References	Study Quality
43 (27352354)	3
50 (35581366)	2
48 (30337716)	3
46 (32040684)	3
47 (25011535)	2
49 (23828946)	4
24 (22495682)	1

		44 (26178177)		G	Good										
		51 (32444502)			4										
		45 (32563654)			3										
		23 (35935656)			1										
US echocardiography transthoracic resting	Usually appropriate	Strong	O 0 mSv	O 0 mSv [ped]	7	7	0	0	0	0	1	3	7	2	1
		References		Study	Quality										
		9 (34396236)			4										
		52 (22918770)			4										
		91 (28793276)			2										
		92 (32003068)			1										
		94 (24691169)			4										
		93 (25933602)			1										
		90 (29183343)			3										
		88 (36218203)			4										
		68 (34825795)		4											
		87 (22805540)		4											
		89 (36610495)		3											
US echocardiography transesophageal	Usually appropriate	Limited	O 0 mSv [ped]	7	7	0	0	0	0	2	2	7	3	0	
		References		Study	Quality										
		46 (32040684)			3										
		82 (2131359)			4										
		86 (22283202)			4										
		87 (22805540)			4				,						
FDG-PET/CT heart	Usually appropriate	Strong	999993- 10 mSv [ped]	7	7	0	0	1	0	1	3	5	3	0	
		References	Study	Quality								-			
		recremees													
		66 (35790691)			4										
			·		4										

		64 (34318397)			3										
		61 (31933156)			3										
		63 (22577239)			3										
		58 (31376028)			4										
		13 (23653245)			4										
		14 (35612548)		C	Good										
		59 (28390532)			4										
		60 (31807883)			3										
		46 (32040684)			3										
		45 (32563654)			3										
		3 (34081218)			4										
FDG-PET/MRI heart	Usually appropriate	Limited	≎≎≎ 1-10 mSv		7	7	0	0	0	0	1	0	11	1	1
		References	Study	Quality	•	•	•	•		•					
		70 (25552667)		2											
		69 (34476778)		3											
		68 (34825795)			4										
MRI heart function and morphology without IV contrast	May be appropriate	Strong	O 0 mSv [ped]	6	6	0	0	1	1	3	4	3	1	0	
		References		Study	/ Quality										
		85 (33419643)			2										
		84 (27904982)			4										
		73 (27236529)			3										
		48 (30337716)			3										
		30 (25129516)			3				1						
DOTATATE PET/CT skull base to mid-thigh	May be appropriate	Limited		5	5	0	2	0	3	4	3	1	0	0	
		References		Study	/ Quality										
		57 (25397775)			4										
		56 (34622428)			4										
		52 (22918770)			4										
	L	,													

				ı												
			53 (30236163)			4										
			54 (31254038)			4										
			55 (20972943)			4										
			58 (31376028)			4										
			51 (32444502)			4										
MIBG scan whole body with SPECT or SPECT/CT chest	May approp		Limited	≎≎≎ 1-10 mSv	���� 3- 10 mSv [ped]	5	5	0	0	2	3	7	2	0	0	0
			References		Study	y Quality										
			51 (32444502)			4										
Octreotide scan with SPECT or SPECT/CT chest and abdomen	May approp		Limited	���� 10-30 mSv		4	4	0	0	0	8	5	1	0	0	0
			References		Study	y Quality										
						4										
CTA chest with IV contrast		52 (22918770) ally not Expert Consensus				3	3	1	3	5	2	1	2	0	0	0
CTA coronary arteries with IV contrast	Usuall approp		Expert Consensus	��� 1-10 mSv		3	3	3	3	4	1	2	1	0	0	0
CT chest with IV contrast	Usuall approp		Expert Consensus	��≎ 1-10 mSv		3	3	3	4	5	2	0	0	0	0	0
CT chest without IV contrast	Usuall approp		Limited	≎≎≎ 1-10 mSv	���� 3- 10 mSv [ped]	3	3	3	2	3	3	2	0	0	0	0
			References		Study	y Quality										
			18 (23926237)			4										
Arteriography coronary with ventriculography	Usuall approp		Limited	��� 1-10 mSv	≎≎≎≎ 3- 10 mSv [ped]	3	3	5	0	3	2	2	1	0	0	0
	<u> </u>		References		Study	y Quality										
			42 (31749186)			3										
			43 (27352354)			3										
			· · · · · · · · · · · · · · · · · · ·													

FDG-PET/CT skull base to mid-thigh	Usuall approp	Limited	���� 10-3 mSv	30	3	3	0	3	8	0	1	2	0	0	0
		References		Study	Quality										
		3 (34081218)			4										
		60 (31807883)			3										
		67 (31072171)			2										
		59 (28390532)			4										
		68 (34825795)			4										
CT chest without and with IV contrast	Usuall approp	Expert Consensus	��� 1-10 mSv	���� 3- 10 mSv [ped]	2	2	3	5	4	2	0	0	0	0	0
MRA coronary arteries without and with IV contrast	Usuall approp	Expert Consensus	O 0 mSv	O 0 mSv [ped]	2	2	5	4	4	1	0	0	0	0	0
MRI chest without IV contrast	Usuall approp	Expert Consensus	O 0 mSv	O 0 mSv [ped]	2	2	3	6	5	0	0	0	0	0	0
MRI chest without and with IV contrast	Usuall approp	Expert Consensus	O 0 mSv	O 0 mSv [ped]	2	2	4	5	5	0	0	0	0	0	0
MRA chest with IV contrast	Usuall approp	Expert Consensus	O 0 mSv	O 0 mSv [ped]	2	2	4	4	6	0	0	0	0	0	0
MRI chest with IV contrast	Usuall approp	Expert Consensus	O 0 mSv	O 0 mSv [ped]	2	2	4	5	5	0	0	0	0	0	0
Radiography chest	Usuall approp	Expert Consensus	⊕ <0.1 mSv		1	1	12	0	0	2	0	0	0	0	0

Variant 3: Adult. Known cardiac mass. Established etiology. Follow-up imaging.

D 1	Appropriateness	COF	A L L DDI	D I DDI	D (1	3.5 31			F	inal [[abu]	latior	ns		
Procedure	Category	SOE	Adults RRL	Peds RRL	Rating	Median	1	2	3	4	5	6	7	8	9
MRI heart function and morphology without and with IV	Usually appropriate	Limited	O 0 mSv	O 0 mSv [ped]	8	8	0	0	0	2	0	0	3	4	4

Procedure	Appropriateness Category	SOE Adults RRL Peds RRL Rating Median					1	2	F 3	inal	Tabu			8	9
contrast	04009023						1	4	<u> </u>	 	<u> </u> 5	<u>l</u>	<i>1</i>	U	<i>y</i>
		References		Study	Quality										
		5 (35347934)			4										
US echocardiography transthoracic resting	Usually appropriate	Limited	O 0 mSv	O 0 mSv [ped]	8	8	0	0	1	0	1	0	2	5	5
		References		Study	Quality										
		89 (36610495)			3										
		33 (12460863)													
CT heart function and morphology with IV contrast	Usually appropriate	Moderate	≎≎≎≎ 10-30 mSv	���� 3- 10 mSv [ped]	7	7	0	0	0	0	0	0	11	3	0
		References		Study	Quality							•			
		5 (35347934)			4										
		44 (26178177)			Good					_					
MRI heart function and morphology without IV contrast	Usually appropriate	Limited	O 0 mSv	O 0 mSv [ped]	7	7	0	0	0	2	1	1	7	2	0
		References		Study	Quality		-	-	-						
		49 (23828946)			4										
		31 (26476503)			1										
FDG-PET/MRI heart	Usually appropriate	Limited	��� 1-10 mSv		7	7	0	0	0	0	1	5	6	1	1
		References		Study Quality								•			
		96 (28401505)		4											
US echocardiography transesophageal	May be appropriate	Limited	O 0 mSv	O 0 mSv [ped]	6	6	0	0	0	2	5	6	1	0	0
		References		Study	Quality										
		28 (36216604)			4										
		82 (2131359)			4										

FDG-PET/CT heart	May approp		Limited	���� 10-30 mSv	0	6	6	0	0	1	0	3	3	4	2	0
		References			Study											
		95 (36995946)														
			13 (23653245)													
			8 (33040219)													
		5 (35347934)			4											
DOTATATE PET/CT skull base to mid-thigh	May approp		Limited	��� 1-10 mSv		5	5	1	0	0	4	6	2	1	0	0
			References		Study											
			53 (30236163)													
			52 (22918770)													
			54 (31254038)													
CTA chest with IV contrast	Usuall: approp		Moderate	��� 1-10 mSv	���� 3- 10 mSv [ped]	3	3	0	4	5	0	3	1	1	0	0
			References		Study		•		•							
		44 (26178177)			(
CTA coronary arteries with IV contrast	Usuall: approp	y not oriate	Expert Consensus	��� 1-10 mSv	���� 3- 10 mSv [ped]	3	3	3	4	4	0	3	0	0	0	0
CT chest with IV contrast			Expert Consensus	��� 1-10 mSv	���� 3- 10 mSv [ped]	3	3	4	2	8	0	0	0	0	0	0
CT chest without IV contrast			Expert Consensus	��� 1-10 mSv	���� 3- 10 mSv [ped]	3	3	5	1	2	3	1	0	1	0	0
CT chest without and with IV contrast		Usually not Expert Consensus		��� 1-10 mSv	���� 3- 10 mSv [ped]	3	3	4	3	7	0	0	0	0	0	0
Octreotide scan with SPECT or SPECT/CT chest and abdomen	Usuall approp		Expert Consensus	୫୫୫୫ 10-30 mSv)	3	3	4	2	1	2	3	0	1	0	0

FDG-PET/CT skull base to mid-thigh	Usually not appropriate		Limited	���� 10-30 mSv	9999 3- 10 mSv [ped]	3	3	3	0	9	2	0	0	0	0	0
	References			Study Quality												
	29 (16824834)				3											
MRA coronary arteries without and with IV contrast	Usually not appropriate		Expert Consensus	O 0 mSv	O 0 mSv [ped]	2	2	7	0	6	1	0	0	0	0	0
MRI chest without IV contrast	Usually not appropriate		Expert Consensus	O 0 mSv	O 0 mSv [ped]	2	2	5	4	5	0	0	0	0	0	0
MRI chest without and with IV contrast	Usually not appropriate		Expert Consensus	O 0 mSv	O 0 mSv [ped]	2	2	7	1	6	0	0	0	0	0	0
MRA chest with IV contrast	Usually not appropriate		Expert Consensus	O 0 mSv	O 0 mSv [ped]	2	2	7	0	7	0	0	0	0	0	0
MRI chest with IV contrast	Usually not appropriate		Expert Consensus	O 0 mSv	O 0 mSv [ped]	2	2	7	1	6	0	0	0	0	0	0
Arteriography coronary with ventriculography	Usually not appropriate		Expert Consensus	��� 1-10 mSv	���� 3- 10 mSv [ped]	1	1	8	1	3	1	0	0	0	0	0
Radiography chest	Usually not appropriate		Expert Consensus	≎ <0.1 mSv		1	1	9	2	1	0	1	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.