

American College of Radiology ACR Appropriateness Criteria®

Congenital or Acquired Heart Disease

Variant 1: Child or adult. Repaired tetralogy of Fallot or pulmonary valve stenosis with concern for pulmonary valve dysfunction or branch pulmonary artery stenosis. Incomplete or inadequate assessment of cardiovascular morphology and function after transthoracic echocardiography. Next imaging study.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations									
							1	2	3	4	5	6	7	8	9	
MRA chest without and with IV contrast	Usually appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	8	8	0	0	0	0	5	2	3	6	7	
MRI heart function and morphology without IV contrast	Usually appropriate	Limited	○ 0 mSv	○ 0 mSv [ped]	8	8	0	0	0	0	2	2	4	10	5	
		References	Study Quality													
		17 (33022183)	3													
		16 (32653300)	4													
		15 (7677083)	3													
MRI heart function and morphology without and with IV contrast	Usually appropriate	Limited	○ 0 mSv	○ 0 mSv [ped]	8	8	0	0	1	0	1	0	3	8	10	
		References	Study Quality													
		17 (33022183)	3													
		16 (32653300)	4													
		15 (7677083)	3													
CTA chest with IV contrast	Usually appropriate	Expert Consensus	☼☼☼ 1-10 mSv	☼☼☼☼ 3-10 mSv [ped]	7	7	0	0	1	0	5	2	9	6	0	
CT heart function and morphology with IV contrast	Usually appropriate	Limited	☼☼☼☼ 10-30 mSv	☼☼☼☼ 3-10 mSv [ped]	7	7	0	0	0	0	2	4	7	5	5	

			12 (24468055)		4													
			18 (15975339)		3													
MRI heart function with stress without IV contrast	Usually not appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	2	2	8	7	3	4	1	0	0	0	0			
MRI heart function with stress without and with IV contrast	Usually not appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	2	2	8	6	3	3	2	0	0	0	0	1		
SPECT or SPECT/CT MPI rest and stress	Usually not appropriate	Expert Consensus	⊕⊕⊕⊕ 10-30 mSv	⊕⊕⊕⊕⊕ 10-30 mSv [ped]	2	2	7	5	8	1	0	0	0	0	0			
MRA abdomen without IV contrast	Usually not appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	1	1	21	1	1	0	0	0	0	0	0			
MRA abdomen without and with IV contrast	Usually not appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	1	1	21	1	1	0	0	0	0	0	0			
MRA neck without IV contrast	Usually not appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	1	1	20	1	2	0	0	0	0	0	0			
MRA neck without and with IV contrast	Usually not appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	1	1	20	1	2	0	0	0	0	0	0			
FDG-PET/CT heart	Usually not appropriate	Expert Consensus	⊕⊕⊕⊕ 10-30 mSv	⊕⊕⊕⊕ 3-10 mSv [ped]	1	1	17	4	2	0	0	0	0	0	0			

Variant 2: Child or adult. Transposition of the great arteries after atrial switch. Incomplete or inadequate assessment of cardiovascular morphology and function after transthoracic echocardiography. Next imaging study.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations											
							1	2	3	4	5	6	7	8	9			
MRI heart function and morphology without and with IV contrast	Usually appropriate	Limited	○ 0 mSv	○ 0 mSv [ped]	9	9	0	0	1	0	1	0	2	5	13			
		References				Study Quality												
		22 (15851616)				3												

MRA chest without and with IV contrast	Usually appropriate	Expert Consensus	0 0 mSv	0 0 mSv [ped]	8	8	1	0	1	0	2	3	3	8	4	
MRI heart function and morphology without IV contrast	Usually appropriate	Limited	0 0 mSv	0 0 mSv [ped]	8	8	0	0	1	0	1	0	5	9	6	
		References			Study Quality											
		22 (15851616)			3											
CTA chest with IV contrast	Usually appropriate	Expert Consensus	☼☼☼ 1-10 mSv	☼☼☼☼ 3-10 mSv [ped]	7	7	0	1	1	1	3	5	8	3	0	
CT heart function and morphology with IV contrast	Usually appropriate	Expert Consensus	☼☼☼☼ 10-30 mSv	☼☼☼☼ 3-10 mSv [ped]	7	7	0	0	0	1	3	3	7	4	4	
MRA chest without IV contrast	Usually appropriate	Expert Consensus	0 0 mSv	0 0 mSv [ped]	7	7	0	1	0	0	1	1	9	9	0	
CTA coronary arteries with IV contrast	May be appropriate	Expert Consensus	☼☼☼ 1-10 mSv	☼☼☼☼ 3-10 mSv [ped]	5	5	0	2	0	7	8	3	1	0	0	
US echocardiography transesophageal	May be appropriate	Expert Consensus	0 0 mSv	0 0 mSv [ped]	5	5	0	1	0	3	8	7	2	0	0	
Radiography chest	May be appropriate	Expert Consensus	☼ <0.1 mSv	☼ <0.03 mSv [ped]	5	5	0	1	0	4	14	2	0	0	0	
Arteriography pulmonary	May be appropriate	Limited	☼☼☼☼ 10-30 mSv		4	4	1	1	3	7	4	5	1	0	0	
		References			Study Quality											
		21 (27372954)			4											
Arteriography coronary with ventriculography	Usually not appropriate	Limited	☼☼☼ 1-10 mSv	☼☼☼☼ 3-10 mSv [ped]	2	2	9	6	6	0	0	0	0	0	0	
		References			Study Quality											
		21 (27372954)			4											
MRI heart function with stress without IV contrast	Usually not appropriate	Expert Consensus	0 0 mSv	0 0 mSv [ped]	2	2	8	8	5	0	0	0	0	0	0	

MRI heart function with stress without and with IV contrast	Usually not appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	2	2	8	6	6	1	0	0	0	0	0
MRA abdomen without IV contrast	Usually not appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	1	1	21	0	0	0	0	0	1	0	0
MRA abdomen without and with IV contrast	Usually not appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	1	1	21	0	0	0	0	0	1	0	0
MRA neck without IV contrast	Usually not appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	1	1	20	0	2	0	0	0	0	0	0
MRA neck without and with IV contrast	Usually not appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	1	1	20	0	2	0	0	0	0	0	0
FDG-PET/CT heart	Usually not appropriate	Expert Consensus	⊗⊗⊗⊗ 10-30 mSv	⊗⊗⊗⊗ 3-10 mSv [ped]	1	1	17	2	3	0	0	0	0	0	0
SPECT or SPECT/CT MPI rest and stress	Usually not appropriate	Expert Consensus	⊗⊗⊗⊗ 10-30 mSv	⊗⊗⊗⊗⊗ 10-30 mSv [ped]	1	1	15	3	3	0	0	0	1	0	0

Variant 3: Child or adult. Transposition of the great arteries after arterial switch. Incomplete or inadequate assessment of cardiovascular morphology and function after transthoracic echocardiography. Next imaging study.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
MRI heart function and morphology without and with IV contrast	Usually appropriate	Strong	○ 0 mSv	○ 0 mSv [ped]	9	9	0	0	0	1	2	0	1	5	13

References	Study Quality
28 (29748700)	3
27 (20452235)	2
26 (15591430)	2
21 (27372954)	4

MRA chest without and with IV contrast	Usually appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	8	8	0	0	0	1	3	3	4	6	5
MRI heart function and morphology without IV contrast	Usually appropriate	Strong	○ 0 mSv	○ 0 mSv [ped]	8	8	0	0	0	0	3	0	4	9	6

References	Study Quality
28 (29748700)	3
27 (20452235)	2
26 (15591430)	2
21 (27372954)	4

CTA chest with IV contrast	Usually appropriate	Expert Consensus	⊕⊕⊕ 1-10 mSv	⊕⊕⊕⊕ 3-10 mSv [ped]	7	7	0	1	0	0	5	4	9	3	0
CT heart function and morphology with IV contrast	Usually appropriate	Expert Consensus	⊕⊕⊕⊕ 10-30 mSv	⊕⊕⊕⊕ 3-10 mSv [ped]	7	7	0	0	0	1	3	3	7	5	3
MRA chest without IV contrast	Usually appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	7	7	0	1	0	1	3	5	5	5	2
MRI heart function with stress without and with IV contrast	Usually appropriate	Limited	○ 0 mSv	○ 0 mSv [ped]	7	7	0	0	1	1	4	3	7	4	0

References	Study Quality
29 (20416135)	4
28 (29748700)	3
26 (15591430)	2

Radiography chest	Usually appropriate	Expert Consensus	⊕ <0.1 mSv	⊕ <0.03 mSv [ped]	7	7	0	0	1	2	5	1	10	1	0
CTA coronary arteries with IV contrast	May be appropriate	Moderate	⊕⊕⊕ 1-10 mSv	⊕⊕⊕⊕ 3-10 mSv [ped]	6	6	0	0	0	0	6	8	4	2	0

References	Study Quality
19 (28632651)	4
25 (19356445)	2
24 (29090351)	3

		23 (33028389)		Good													
MRI heart function with stress without IV contrast	May be appropriate (Disagreement)	Expert Opinion	○ 0 mSv	○ 0 mSv [ped]	5	5	0	0	2	1	6	3	6	2	0		
		References	Study Quality														
		29 (20416135)	4														
		28 (29748700)	3														
		26 (15591430)	2														
SPECT or SPECT/CT MPI rest and stress	May be appropriate	Limited	⊗⊗⊗⊗ 10-30 mSv	⊗⊗⊗⊗⊗ 10-30 mSv [ped]	5	5	0	0	2	2	12	3	1	0	0		
		References	Study Quality														
		30 (31119712)	4														
Arteriography pulmonary	Usually not appropriate	Expert Consensus	⊗⊗⊗⊗ 10-30 mSv		3	3	3	3	7	2	4	1	0	0	0		
Arteriography coronary with ventriculography	Usually not appropriate	Limited	⊗⊗⊗ 1-10 mSv	⊗⊗⊗⊗ 3-10 mSv [ped]	3	3	4	2	6	4	2	2	0	0	0		
		References	Study Quality														
		21 (27372954)	4														
US echocardiography transesophageal	Usually not appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	3	3	4	2	5	3	4	2	0	0	0		
FDG-PET/CT heart	Usually not appropriate	Expert Consensus	⊗⊗⊗⊗ 10-30 mSv	⊗⊗⊗⊗ 3-10 mSv [ped]	3	3	8	2	2	1	7	1	1	0	0		
MRA abdomen without IV contrast	Usually not appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	1	1	20	0	1	0	0	0	1	0	0		
MRA abdomen without and with IV contrast	Usually not appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	1	1	20	0	1	0	0	0	1	0	0		
MRA neck without IV contrast	Usually not appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	1	1	19	1	2	0	0	0	0	0	0		

MRA neck without and with IV contrast	Usually not appropriate	Expert Consensus	0 0 mSv	0 0 mSv [ped]	1	1	19	1	2	0	0	0	0	0	0
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Variant 4: Child. Suspected or confirmed congenital or acquired coronary artery abnormality. Incomplete or inadequate assessment of coronary morphology after transthoracic echocardiography. Next imaging study.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations									
							1	2	3	4	5	6	7	8	9	
CTA coronary arteries with IV contrast	Usually appropriate	Limited	⊕⊕⊕ 1-10 mSv	⊕⊕⊕⊕ 3-10 mSv [ped]	9	9	0	0	0	0	1	0	0	4	17	
		References	Study Quality													
		35 (33755749)	2													
MRA chest without IV contrast	Usually appropriate	Limited	0 0 mSv	0 0 mSv [ped]	7	7	1	0	0	0	1	5	9	4	0	
		References	Study Quality													
		38 (21921132)	2													
		37 (34540764)	3													
		36 (31371063)	3													
MRA chest without and with IV contrast	Usually appropriate	Limited	0 0 mSv	0 0 mSv [ped]	7	7	0	0	0	0	2	5	9	4	0	
		References	Study Quality													
		38 (21921132)	2													
		37 (34540764)	3													
		36 (31371063)	3													
MRI heart function and morphology without IV contrast	Usually appropriate	Expert Consensus	0 0 mSv	0 0 mSv [ped]	7	7	0	0	0	1	5	4	7	3	0	
MRI heart function and morphology without and with IV contrast	Usually appropriate	Expert Consensus	0 0 mSv	0 0 mSv [ped]	7	7	0	0	0	0	4	5	8	3	0	

Arteriography coronary with ventriculography	May be appropriate	Limited	☼☼☼ 1-10 mSv	☼☼☼☼ 3-10 mSv [ped]	6	6	0	0	0	2	3	7	4	1	5
		References	Study Quality												
		33 (33614558)	2												
MRI heart function with stress without and with IV contrast	May be appropriate	Limited	○ 0 mSv	○ 0 mSv [ped]	6	6	0	0	0	0	9	7	2	2	0
		References	Study Quality												
		36 (31371063)	3												
		39 (32069111)	2												
CTA chest with IV contrast	May be appropriate	Limited	☼☼☼ 1-10 mSv	☼☼☼☼ 3-10 mSv [ped]	5	5	1	1	7	1	4	7	0	0	1
		References	Study Quality												
		34 (28356445)	4												
CT heart function and morphology with IV contrast	May be appropriate	Expert Consensus	☼☼☼☼ 10-30 mSv	☼☼☼☼☼ 3-10 mSv [ped]	5	5	0	0	0	1	10	6	1	1	1
MRA abdomen without and with IV contrast	May be appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	5	5	2	0	1	5	9	3	0	0	0
MRI heart function with stress without IV contrast	May be appropriate	Limited	○ 0 mSv	○ 0 mSv [ped]	5	5	1	0	0	0	13	5	0	1	0
		References	Study Quality												
		36 (31371063)	3												
		39 (32069111)	2												
SPECT or SPECT/CT MPI rest and stress	May be appropriate (Disagreement)	Expert Opinion	☼☼☼☼ 10-30 mSv	☼☼☼☼☼ 10-30 mSv [ped]	5	5	0	0	2	1	4	3	8	2	0
		References	Study Quality												
		40 (28385257)	4												
MRA abdomen without IV contrast	Usually not appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	3	3	9	2	2	3	4	1	1	0	0

US echocardiography transesophageal	Usually not appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	3	3	5	0	10	1	4	1	1	0	0
Arteriography pulmonary	Usually not appropriate	Expert Consensus	⊕⊕⊕⊕ 10-30 mSv		1	1	12	5	2	1	0	0	2	0	0
MRA neck without IV contrast	Usually not appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	1	1	17	1	2	1	0	1	0	0	0
MRA neck without and with IV contrast	Usually not appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	1	1	16	1	2	1	0	2	0	0	0
Radiography chest	Usually not appropriate	Expert Consensus	⊕ <0.1 mSv	⊕ <0.03 mSv [ped]	1	1	11	6	2	0	1	0	0	0	0
FDG-PET/CT heart	Usually not appropriate	Expert Consensus	⊕⊕⊕⊕ 10-30 mSv	⊕⊕⊕⊕ 3-10 mSv [ped]	1	1	13	5	1	0	1	1	0	1	0

Variant 5: Child. Known single ventricle physiology. Preoperative evaluation for stage 2 single ventricle palliation. Incomplete or inadequate assessment of cardiovascular morphology and function after transthoracic echocardiography. Next imaging study.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
MRA chest without and with IV contrast	Usually appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	8	8	0	0	0	0	0	0	6	10	4
MRI heart function and morphology without IV contrast	Usually appropriate	Limited	○ 0 mSv	○ 0 mSv [ped]	8	8	0	0	0	1	2	1	4	8	6
		References				Study Quality									
		42 (19616678)				2									
MRI heart function and morphology without and with IV contrast	Usually appropriate	Limited	○ 0 mSv	○ 0 mSv [ped]	8	8	0	0	1	1	1	0	2	9	8
		References				Study Quality									
		42 (19616678)				2									

CTA chest with IV contrast	Usually appropriate	Moderate	☼☼☼ 1-10 mSv	☼☼☼☼ 3-10 mSv [ped]	7	7	0	0	0	0	5	5	7	4	1
		References	Study Quality												
		44 (33078501)	2												
CT heart function and morphology with IV contrast	Usually appropriate	Limited	☼☼☼☼ 10-30 mSv	☼☼☼☼ 3-10 mSv [ped]	7	7	0	0	1	1	5	2	4	5	4
		References	Study Quality												
		43 (24930614)	4												
Arteriography pulmonary	Usually appropriate	Limited	☼☼☼☼ 10-30 mSv		7	7	0	0	2	0	6	1	6	6	1
		References	Study Quality												
		41 (26356648)	4												
Arteriography coronary with ventriculography	Usually appropriate	Limited	☼☼☼ 1-10 mSv	☼☼☼☼ 3-10 mSv [ped]	7	7	0	0	0	0	0	0	11	8	1
		References	Study Quality												
		41 (26356648)	4												
		42 (19616678)	2												
MRA chest without IV contrast	Usually appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	7	7	0	0	0	0	1	1	11	5	2
US echocardiography transesophageal	May be appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	5	5	1	0	0	2	8	9	0	0	0
Radiography chest	Usually not appropriate	Expert Consensus	☼ <0.1 mSv	☼ <0.03 mSv [ped]	3	3	3	4	5	1	7	0	0	1	1
CTA coronary arteries with IV contrast	Usually not appropriate	Expert Consensus	☼☼☼ 1-10 mSv	☼☼☼☼ 3-10 mSv [ped]	2	2	6	8	4	1	1	0	0	0	0
MRI heart function with stress without IV contrast	Usually not appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	2	2	10	9	1	0	0	0	0	0	0

MRI heart function with stress without and with IV contrast	Usually not appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	2	2	10	7	3	0	0	0	0	0	0
MRA abdomen without IV contrast	Usually not appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	1	1	20	0	1	0	0	0	0	1	0
MRA abdomen without and with IV contrast	Usually not appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	1	1	20	0	1	0	0	0	0	1	0
MRA neck without IV contrast	Usually not appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	1	1	20	0	1	0	0	1	0	0	0
MRA neck without and with IV contrast	Usually not appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	1	1	20	0	1	0	0	1	0	0	0
FDG-PET/CT heart	Usually not appropriate	Expert Consensus	⊗⊗⊗⊗ 10-30 mSv	⊗⊗⊗⊗ 3-10 mSv [ped]	1	1	18	2	1	0	0	1	0	0	0
SPECT or SPECT/CT MPI rest and stress	Usually not appropriate	Expert Consensus	⊗⊗⊗⊗ 10-30 mSv	⊗⊗⊗⊗⊗ 10-30 mSv [ped]	1	1	16	3	1	0	0	1	1	0	0

Variant 6: Child. Known single ventricle physiology. Preoperative evaluation for stage 3 single ventricle palliation (total cavopulmonary connection). Incomplete or inadequate assessment of cardiovascular morphology and function after transthoracic echocardiography. Next imaging study.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations									
							1	2	3	4	5	6	7	8	9	
MRI heart function and morphology without IV contrast	Usually appropriate	Limited	○ 0 mSv	○ 0 mSv [ped]	8	8	0	0	1	1	2	1	3	8	6	
		References				Study Quality										
		50 (24254479)				4										
		49 (-3194075)				4										
MRI heart function and morphology without and with IV contrast	Usually appropriate	Limited	○ 0 mSv	○ 0 mSv [ped]	8	8	0	0	2	0	1	0	2	7	10	
		References				Study Quality										

			50 (24254479)		4													
			49 (-3194075)		4													
CTA chest with IV contrast	Usually appropriate	Limited	☼☼☼ 1-10 mSv	☼☼☼☼ 3-10 mSv [ped]	7	7	0	0	0	0	5	6	8	2	1			
			References		Study Quality													
			48 (27618316)		4													
CT heart function and morphology with IV contrast	Usually appropriate	Limited	☼☼☼☼ 10-30 mSv	☼☼☼☼ 3-10 mSv [ped]	7	7	0	0	1	0	2	3	9	4	3			
			References		Study Quality													
			47 (28889811)		3													
Arteriography pulmonary	Usually appropriate	Expert Consensus	☼☼☼☼ 10-30 mSv		7	7	0	0	0	0	2	3	10	4	1			
Arteriography coronary with ventriculography	Usually appropriate	Strong	☼☼☼ 1-10 mSv	☼☼☼☼ 3-10 mSv [ped]	7	7	0	0	0	0	0	1	11	7	1			
			References		Study Quality													
			46 (22077996)		2													
			45 (19660367)		2													
MRA chest without and with IV contrast	Usually appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	7	7	1	0	1	0	3	5	4	6	2			
MRA chest without IV contrast	May be appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	6	6	0	0	0	1	8	8	3	0	0			
US echocardiography transesophageal	May be appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	5	5	0	0	0	2	9	7	2	0	0			
Radiography chest	May be appropriate	Expert Consensus	☼ <0.1 mSv	☼ <0.03 mSv [ped]	5	5	0	1	3	4	10	2	0	0	0			
CTA coronary arteries with IV contrast	Usually not appropriate	Expert Consensus	☼☼☼ 1-10 mSv	☼☼☼☼ 3-10 mSv [ped]	3	3	5	3	8	2	0	2	0	0	0			

MRI heart function with stress without IV contrast	Usually not appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	2	2	11	2	4	1	3	0	0	1	0
MRI heart function with stress without and with IV contrast	Usually not appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	2	2	10	2	5	0	3	0	1	1	0
MRA abdomen without IV contrast	Usually not appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	1	1	19	0	1	1	0	0	0	1	0
MRA abdomen without and with IV contrast	Usually not appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	1	1	18	1	1	1	0	0	0	0	1
MRA neck without IV contrast	Usually not appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	1	1	19	1	1	0	0	0	1	0	0
MRA neck without and with IV contrast	Usually not appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	1	1	19	1	1	0	0	0	1	0	0
FDG-PET/CT heart	Usually not appropriate	Expert Consensus	⊗⊗⊗⊗ 10-30 mSv	⊗⊗⊗⊗ 3-10 mSv [ped]	1	1	18	1	3	0	0	0	0	0	0
SPECT or SPECT/CT MPI rest and stress	Usually not appropriate	Expert Consensus	⊗⊗⊗⊗ 10-30 mSv	⊗⊗⊗⊗⊗ 10-30 mSv [ped]	1	1	15	2	2	0	1	1	1	0	0

Variant 7: Child or adult. Known single ventricle physiology. Postoperative evaluation after stage 3 single ventricle palliation (total cavopulmonary connection). Incomplete or inadequate assessment of cardiovascular morphology and function after transthoracic echocardiography. Next imaging study.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
MRI heart function and morphology without and with IV contrast	Usually appropriate	Moderate	○ 0 mSv	○ 0 mSv [ped]	9	9	0	0	0	0	2	0	3	4	13
			References		Study Quality										
			56 (34934948)		2										
			55 (-3194077)		4										
			54 (28548989)		4										

Arteriography coronary with ventriculography	May be appropriate	Limited	☼☼☼ 1-10 mSv	☼☼☼☼ 3-10 mSv [ped]	6	6	0	0	0	0	10	8	2	0	0
		References	Study Quality												
		52 (-3194076)	4												
US echocardiography transesophageal	May be appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	6	6	0	0	1	1	6	11	1	0	0
Arteriography pulmonary	May be appropriate	Limited	☼☼☼☼ 10-30 mSv		5	5	0	0	0	0	13	5	2	0	0
		References	Study Quality												
		52 (-3194076)	4												
Radiography chest	May be appropriate	Expert Consensus	☼ <0.1 mSv	☼ <0.03 mSv [ped]	4	4	3	2	5	6	4	0	0	1	1
MRI heart function with stress without IV contrast	Usually not appropriate	Limited	○ 0 mSv	○ 0 mSv [ped]	3	3	7	2	7	3	2	0	1	0	0
		References	Study Quality												
		57 (26917538)	2												
		58 (20631032)	3												
MRI heart function with stress without and with IV contrast	Usually not appropriate	Limited	○ 0 mSv	○ 0 mSv [ped]	3	3	7	0	6	5	3	0	0	1	0
		References	Study Quality												
		57 (26917538)	2												
		58 (20631032)	3												
SPECT or SPECT/CT MPI rest and stress	Usually not appropriate	Expert Consensus	☼☼☼☼ 10-30 mSv	☼☼☼☼☼ 10-30 mSv [ped]	2	2	10	3	5	4	0	0	0	0	0
MRA abdomen without IV contrast	Usually not appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	1	1	18	2	1	0	0	0	0	1	0
MRA abdomen without and with IV contrast	Usually not appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	1	1	18	1	2	0	0	0	0	0	1

CT heart function and morphology with IV contrast	May be appropriate (Disagreement)	Expert Opinion	☼☼☼☼ 10-30 mSv	☼☼☼☼ 3-10 mSv [ped]	5	5	1	4	3	2	7	3	0	0	0
Arteriography coronary with ventriculography	May be appropriate	Limited	☼☼☼ 1-10 mSv	☼☼☼☼ 3-10 mSv [ped]	5	5	0	1	2	4	9	4	0	0	0
		References	Study Quality												
		76 (7585760)	2												
US echocardiography transesophageal	Usually not appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	3	3	7	1	9	2	1	0	0	0	0
Radiography chest	Usually not appropriate	Expert Consensus	☼ <0.1 mSv	☼ <0.03 mSv [ped]	3	3	7	1	7	2	3	0	0	0	0
CTA coronary arteries with IV contrast	Usually not appropriate	Expert Consensus	☼☼☼ 1-10 mSv	☼☼☼☼ 3-10 mSv [ped]	2	2	10	3	3	3	2	0	1	0	0
Arteriography pulmonary	Usually not appropriate	Expert Consensus	☼☼☼☼ 10-30 mSv		1	1	13	5	2	0	0	2	0	0	0
MRA abdomen without IV contrast	Usually not appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	1	1	18	1	1	1	0	0	1	0	0
MRA abdomen without and with IV contrast	Usually not appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	1	1	18	0	2	1	0	0	0	1	0
MRA neck without IV contrast	Usually not appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	1	1	18	0	3	0	0	0	1	0	0
MRA neck without and with IV contrast	Usually not appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	1	1	18	0	3	0	0	0	0	1	0
MRI heart function with stress without IV contrast	Usually not appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	1	1	13	2	6	0	0	0	1	0	0
MRI heart function with stress without and with IV contrast	Usually not appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	1	1	12	3	6	0	0	0	0	1	0
FDG-PET/CT heart	Usually not appropriate	Expert Consensus	☼☼☼☼ 10-30 mSv	☼☼☼☼ 3-10 mSv [ped]	1	1	18	2	1	1	0	0	0	0	0

SPECT or SPECT/CT MPI rest and stress	Usually not appropriate	Expert Consensus	☼☼☼☼ 10-30 mSv	☼☼☼☼☼ 10-30 mSv [ped]	1	1	17	1	4	0	0	0	0	0	0
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Variant 10: Child. Known aortopathy or connective tissue disease. Surveillance of the aorta after inadequate or incomplete evaluation by transthoracic echocardiography. Next imaging study.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
MRA chest without and with IV contrast	Usually appropriate	Strong	○ 0 mSv	○ 0 mSv [ped]	9	9	0	0	1	0	0	0	0	7	14
			References	Study Quality											
			91 (32453278)	2											
			92 (32531300)	4											
			93 (32167203)	2											
CTA chest with IV contrast	Usually appropriate	Expert Consensus	☼☼☼ 1-10 mSv	☼☼☼☼ 3-10 mSv [ped]	8	8	0	0	0	0	4	3	3	4	8
MRA chest without IV contrast	Usually appropriate	Strong	○ 0 mSv	○ 0 mSv [ped]	8	8	0	0	1	0	2	1	5	7	6
			References	Study Quality											
			91 (32453278)	2											
			92 (32531300)	4											
			93 (32167203)	2											
MRA abdomen without IV contrast	Usually appropriate	Limited	○ 0 mSv	○ 0 mSv [ped]	7	7	0	0	1	0	0	2	12	5	0
			References	Study Quality											
			86 (20687249)	4											
MRA abdomen without and with IV contrast	Usually appropriate	Limited	○ 0 mSv	○ 0 mSv [ped]	7	7	0	0	0	0	2	0	13	4	1
			References	Study Quality											

Radiography chest	Usually not appropriate	Limited	☼ <0.1 mSv	☼ <0.03 mSv [ped]	3	3	5	3	6	4	2	0	0	0	0
		References		Study Quality											
		98 (20591885)		4											
Arteriography pulmonary	Usually not appropriate	Expert Consensus	☼☼☼☼ 10-30 mSv		2	2	8	5	4	3	0	1	0	0	1
Arteriography coronary with ventriculography	Usually not appropriate	Limited	☼☼☼ 1-10 mSv	☼☼☼☼ 3-10 mSv [ped]	2	2	8	3	5	2	1	1	0	0	0
		References		Study Quality											
		89 (27733430)		2											
MRI heart function with stress without and with IV contrast	Usually not appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	2	2	11	6	5	0	0	0	0	0	0
MRI heart function with stress without IV contrast	Usually not appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	1	1	13	4	5	0	0	0	0	0	0
FDG-PET/CT heart	Usually not appropriate	Expert Consensus	☼☼☼☼ 10-30 mSv	☼☼☼☼ 3-10 mSv [ped]	1	1	18	0	2	1	0	0	0	0	1
SPECT or SPECT/CT MPI rest and stress	Usually not appropriate	Expert Consensus	☼☼☼☼ 10-30 mSv	☼☼☼☼☼ 10-30 mSv [ped]	1	1	17	2	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.