## $\begin{array}{c} \textbf{American College of Radiology} \\ \textbf{ACR Appropriateness Criteria}^{\circledR} \end{array}$

## **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.

	Appropriateness	GOT.	A L IV DDI	Adults RRL Peds RRL Rating Me					F	inal '	Tabu	latio	ns		
Procedure	Category	SOE	Adults RRL	Peds RRL	Rating	Median	1	2	3	4	5	6	7	8	9
MRA chest without and with IV contrast	Usually appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	8	8	0	0	0	0	4	2	2	6	7
MRI heart function and morphology without IV contrast	Usually appropriate	Limited	O 0 mSv	O 0 mSv [ped]	8	8	0	0	0	0	2	2	4	9	4
		References		Study	Quality										
		15 (7677083)			3										
		16 (32653300)			4										
		17 (33022183)	17 (33022183)		3										
MRI heart function and morphology without and with IV contrast	Usually appropriate	Limited	O 0 mSv	O 0 mSv [ped]	8	8	0	0	1	0	1	0	3	7	9
		References		Study	Quality				-						
		15 (7677083)			3										
		16 (32653300)			4										
		17 (33022183)			3										
CTA chest with IV contrast	Usually appropriate	Expert Consensus	��� 1-10 mSv	ଡେଡେଡେ 3- 10 mSv [ped]	7	7	0	0	1	0	5	2	8	5	0
CT heart function and morphology with IV contrast	Usually appropriate	Limited	<b>≎≎≎≎</b> 10-3 mSv	0	7	7	0	0	0	0	2	4	6	4	5

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			References		Study	Quality										
			14 (26679548)			4										
			13 (26272851)		1	4						ı				
Radiography chest	Usua approp		Limited	<b>≎</b> <0.1 mS		7	7	0	0	0	2	3	3	8	4	0
			References		Study	Quality										
			9 (18377431)			4										
CTA coronary arteries with IV contrast	May approp		Expert Consensus	��� 1-10 mSv	9	6	6	0	0	0	2	5	4	8	1	0
MRA chest without IV contrast	May approp		Expert Consensus	O 0 mSv	O 0 mSv [ped]	6	6	1	0	0	2	5	5	4	3	1
Perfusion scan lung	May approp		Limited	��� 1-10 mSv	9	6	6	1	1	0	2	7	6	3	0	1
			References		Study	Quality										
			12 (24468055)			4										
Arteriography pulmonary	May approp		Limited	<b>⊕⊕⊕⊕</b> 10-3 mSv	30	5	5	0	0	0	5	11	4	0	0	0
			References		Study	Quality										
			12 (24468055)			4										
Arteriography coronary with ventriculography	May approp		Limited	<b>≎≎≎</b> 1-10 mSv	9	5	5	0	0	0	2	16	2	0	0	0
			References		Study	Quality										
			9 (18377431)		4											
			10 (16638542)		4											
			11 (20837914)			1										
US echocardiography transesophageal	May approp		Limited	O 0 mSv	O 0 mSv [ped]	5	5	1	0	1	5	8	5	0	0	0
					Study	/ Quality										
	12 (24468055) 4															
	12 (24468055) 4															

6 (22790360)	3
18 (15975339)	3

		10 (15) (1555)			-										
MRI heart function with stress without IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	2	2	7	6	3	4	1	0	0	0	0
MRI heart function with stress without and with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	2	2	7	5	3	3	2	0	0	0	1
SPECT or SPECT/CT MPI rest and stress	Usually not appropriate	Expert Consensus	୫୫୫୫ 10-30 mSv	����� 10-30 mSv [ped]	2	2	7	5	7	1	0	0	0	0	0
MRA abdomen without IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	19	1	1	0	0	0	0	0	0
MRA abdomen without and with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	19	1	1	0	0	0	0	0	0
MRA neck without IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	18	1	2	0	0	0	0	0	0
MRA neck without and with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	18	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	15	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.

D 1	Appropriateness	COF	A L L DDI	D I DDI	D 4	3.6.11			F	inal '	Гаbu	latio	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 contrast	Usually appropriate	Limited	O 0 mSv	O 0 mSv [ped]	9	9	0	0	1	0	1	0	2	4	13

References	Study Quality
22 (15851616)	3

MRA chest without and with IV contrast	Usual appropi	Expert Consensus	O 0 mSv	O 0 mSv [ped]	8	8	1	0	1	0	2	3	2	8	4
MRI heart function and morphology without IV contrast	Usual appropi	Limited	O 0 mSv	O 0 mSv [ped]	8	8	0	0	1	0	1	0	5	8	6
		References		Study	/ Quality										
		22 (15851616)			3										
CTA chest with IV contrast	Usual appropi	Expert Consensus	��� 1-10 mSv	ଡେଡେଡେ 3- 10 mSv [ped]	7	7	0	1	1	1	3	5	7	3	0
CT heart function and morphology with IV contrast	Usual appropi	Expert Consensus	���� 10-30 mSv	0	7	7	0	0	0	1	3	2	7	4	4
MRA chest without IV contrast	Usual appropi	Expert Consensus	O 0 mSv	O 0 mSv [ped]	7	7	0	1	0	0	1	1	8	9	0
CTA coronary arteries with IV contrast	May appropri	Expert Consensus	��� 1-10 mSv	���� 3- 10 mSv [ped]	5	5	0	2	0	6	8	3	1	0	0
US echocardiography transesophageal	May appropr	Expert Consensus	O 0 mSv	O 0 mSv [ped]	5	5	0	1	0	3	7	7	2	0	0
Radiography chest	May appropr	Expert Consensus	<b>≎</b> <0.1 mSv	v <0.03 mSv [ped]	5	5	0	1	0	4	13	2	0	0	0
Arteriography pulmonary	May appropri	Limited	���� 10-30 mSv	0	4	4	1	1	3	6	4	5	1	0	0
		References		Study	Quality										
		21 (27372954)			4		_								
Arteriography coronary with ventriculography	Usually appropr	Limited	��� 1-10 mSv	���� 3- 10 mSv [ped]	2	2	9	6	5	0	0	0	0	0	0
		References		Study	Quality										
		 21 (27372954)			4			1	1			1	1		
MRI heart function with stress without IV contrast	Usually appropi	Expert Consensus	O 0 mSv	O 0 mSv [ped]	2	2	8	8	4	0	0	0	0	0	0

MRI heart function with stress without and with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	2	2	8	6	5	1	0	0	0	0	0
MRA abdomen without IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	20	0	0	0	0	0	1	0	0
MRA abdomen without and with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	20	0	0	0	0	0	1	0	0
MRA neck without IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	19	0	2	0	0	0	0	0	0
MRA neck without and with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	19	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	16	2	3	0	0	0	0	0	0
SPECT or SPECT/CT MPI rest and stress	Usually not appropriate	Expert Consensus	୫୫୫୫ 10-30 mSv	����� 10-30 mSv [ped]	1	1	14	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.

ъ 1	Appropriateness	COF	A L L DDI	n i nnr	D 41	3.6 11			F	inal [	Гаbu	latio	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 contrast	Usually appropriate	Strong	O 0 mSv	O 0 mSv [ped]	9	9	0	0	0	1	2	0	1	4	13

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

MRA chest without and with IV contrast	Usually appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	8	8	0	0	0	1	3	3	4	5	5
MRI heart function and morphology without IV contrast	Usually appropriate	Strong	O 0 mSv	O 0 mSv [ped]	8	8	0	0	0	0	3	0	4	8	6
		References		Study	Quality										
		28 (29748700)			3										
		21 (27372954)			4										
		26 (15591430)			2										
		27 (20452235)			2										
CTA chest with IV contrast	Usually appropriate	Expert Consensus	��� 1-10 mSv	���� 3- 10 mSv [ped]	7	7	0	1	0	0	5	4	8	3	0
CT heart function and morphology with IV contrast	Usually appropriate	Expert Consensus	���� 10-30 mSv	0	7	7	0	0	0	1	3	2	7	5	3
MRA chest without IV contrast	Usually appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	7	7	0	1	0	1	3	5	5	4	2
MRI heart function with stress without and with IV contrast	Usually appropriate	Limited	O 0 mSv	O 0 mSv [ped]	7	7	0	0	1	1	4	3	7	4	0
		References		Study	Quality										
		28 (29748700)			3										
		26 (15591430)			2										
		29 (20416135)			4		_								
Radiography chest	Usually appropriate	Expert Consensus	<b>⊕</b> <0.1 mSv		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
					Quality										
		24 (29090351)	`												
		19 (28632651)	, ,												
		25 (19356445)		2											

			23 (33028389)				Good										
MRI heart function with stress without IV contrast	May approp (Disagre	riate	Expert Opinion	O 0 mSv	v	O 0 mSv [ped]	5	5	0	0	2	1	6	3	6	2	0
			References			Study	Quality										
			28 (29748700)				3										
			26 (15591430)				2										
	•		29 (20416135)				4										
SPECT or SPECT/CT MPI rest and stress	May approp		Limited		0	0	2	2	12	3	1	0	0				
			References			Study	Quality										
			30 (31119712)	<u> </u>													
Arteriography pulmonary	Usuall approp		Expert Consensus	���� 10- mSv	-30	���� 3- 10 mSv [ped]	3	3	3	3	7	2	4	1	0	0	0
Arteriography coronary with ventriculography	Usuall: approp		Limited	��� 1-1 mSv	0	���� 3- 10 mSv [ped]	3	3	4	2	6	4	2	2	0	0	0
			References			Study	Quality		•			•	•	•		•	
			21 (27372954)				4										
US echocardiography transesophageal	Usuall approp		Expert Consensus	O 0 mSv	v	O 0 mSv [ped]	3	3	4	2	5	3	4	2	0	0	0
FDG-PET/CT heart	Usuall approp		Expert Consensus	���� 10- mSv	-30	���� 3- 10 mSv [ped]	3	3	8	2	2	1	6	1	1	0	0
MRA abdomen without IV contrast	Usuall approp		Expert Consensus	O 0 mSv	v	O 0 mSv [ped]	1	1	19	0	1	0	0	0	1	0	0
MRA abdomen without and with IV contrast	Usuall approp		Expert Consensus	O 0 mSv	v	O 0 mSv [ped]	1	1	19	0	1	0	0	0	1	0	0
MRA neck without IV contrast	Usuall approp		Expert Consensus	O 0 mSv	v	O 0 mSv [ped]	1	1	18	1	2	0	0	0	0	0	0

MRA neck without and with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	18	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.

	Appropriateness	GOT		D 1 DD1		3.5 31			F	inal '	Tabu	lation	ns		
Procedure	Category	SOE	Adults RRL	Peds RRL	Rating	Median	1	2	3	4	5	6	7	8	9
CTA coronary arteries with IV contrast	Usually appropriate	Limited	<b>⊕⊕⊕</b> 1-10 mSv	���� 3- 10 mSv [ped]	9	9	0	0	0	0	1	0	0	4	16
		References		Study	Quality										
		35 (33755749)			2										
MRA chest without IV contrast	Usually appropriate	Limited	O 0 mSv	O 0 mSv [ped]	7	7	1	0	0	0	1	5	9	4	0
		References		Study	Quality										
		36 (31371063)			3										
		38 (21921132)			2										
		37 (34540764)			3										
MRA chest without and with IV contrast	Usually appropriate	Limited	O 0 mSv	O 0 mSv [ped]	7	7	0	0	0	0	2	5	9	4	0
		References		Study	Quality										
		36 (31371063)			3										
		38 (21921132)			2										
		37 (34540764)			3										
MRI heart function and morphology without IV contrast	Usually appropriate	Expert Consensus	O 0 mSv	O 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	O 0 mSv	O 0 mSv [ped]	7	7	0	0	0	0	4	5	8	3	0

Arteriography coronary with ventriculography	May approp		Limited	��� 1-10 mSv	0	���� 3- 10 mSv [ped]	6	6	0	0	0	2	3	6	4	1	5
			References			Study	/ Quality		-								
			33 (33614558)				2										
MRI heart function with stress without and with IV contrast	May approp		Limited	O 0 mSv	,	O 0 mSv [ped]	6	6	0	0	0	0	9	7	2	2	0
			References			Study	Quality										
			39 (32069111)				2										
			36 (31371063)				3										
CTA chest with IV contrast	May approp		Limited	��� 1-1( mSv	0	���� 3- 10 mSv [ped]	5	5	1	1	6	1	4	7	0	0	1
			References		•	Study	Quality										
			34 (28356445)			_	4										
CT heart function and morphology with IV contrast	May approp		Expert Consensus	���� 10-3 mSv	30	���� 3- 10 mSv [ped]	5	5	0	0	0	1	10	6	1	1	1
MRA abdomen without and with IV contrast	May approp		Expert Consensus	O 0 mSv	,	O 0 mSv [ped]	5	5	2	0	1	5	9	3	0	0	0
MRI heart function with stress without IV contrast	May approp		Limited	O 0 mSv	,	O 0 mSv [ped]	5	5	1	0	0	0	13	5	0	1	0
			References			Study	Quality										
			39 (32069111)				2										
			36 (31371063)				3										
SPECT or SPECT/CT MPI rest and stress	May approp (Disagre	oriate	Expert Opinion	���� 10-3 mSv	30	����� 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	Usuall approp		Expert Consensus	O 0 mSv	,	O 0 mSv [ped]	3	3	9	2	2	3	3	1	1	0	0

US echocardiography transesophageal	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	3	3	5	0	10	1	3	1	1	0	0
Arteriography pulmonary	Usually not appropriate	Expert Consensus	���� 10-30 mSv	���� 3- 10 mSv [ped]	1	1	12	4	2	1	0	0	2	0	0
MRA neck without IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	16	1	2	1	0	1	0	0	0
MRA neck without and with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	15	1	2	1	0	2	0	0	0
Radiography chest	Usually not appropriate	Expert Consensus	<b> </b>		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	4	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.

	Appropri	ateness	COF	4.1.4. DD		D I DDI	D (1	3.5 31			F	inal '	Tabu	latio	ns		
Procedure	Categ		SOE	Adults RR	KL	Peds RRL	Rating	Median	1	2	3	4	5	6	7	8	9
MRA chest without and with IV contrast	Usua approp		Expert Consensus	O 0 mSv	/	O 0 mSv [ped]	8	8	0	0	0	0	0	0	6	10	4
MRI heart function and morphology without IV contrast	Usua approp		Limited	O 0 mSv	/	O 0 mSv [ped]	8	8	0	0	0	1	2	1	4	8	5
			References			Study	Quality										
			42 (19616678)				2										
MRI heart function and morphology without and with IV contrast	Usua approp		Limited	O 0 mSv	/	O 0 mSv [ped]	8	8	0	0	1	1	1	0	2	8	8
			References			Study	Quality										
	42 (19616678) 2																

CTA chest with IV contrast	Usua approp	Moderate	��� 1-10 mSv	0	���� 3- 10 mSv [ped]	7	7	0	0	0	0	5	5	6	4	1
		References		•	Study	Quality		•				•	•	•		
		44 (33078501)				2										
CT heart function and morphology with IV contrast	Usua approp	Limited	���� 10-3 mSv	30	���� 3- 10 mSv [ped]	7	7	0	0	1	1	4	2	4	5	4
		References			Study	Quality										
		43 (24930614)				4										
Arteriography pulmonary	Usua approp	Limited	���� 10-3 mSv	30	���� 3- 10 mSv [ped]	7	7	0	0	2	0	6	1	6	5	1
		References			Study	Quality										
		41 (26356648)				4										
Arteriography coronary with ventriculography	Usua approp	Limited	��� 1-10 mSv	0	���� 3- 10 mSv [ped]	7	7	0	0	0	0	0	0	11	8	1
		References			Study	Quality										
		42 (19616678)				2										
		41 (26356648)				4										
MRA chest without IV contrast	Usua approp	Expert Consensus	O 0 mSv	,	O 0 mSv [ped]	7	7	0	0	0	0	1	1	11	5	2
US echocardiography transesophageal	May approp	Expert Consensus	O 0 mSv	,	O 0 mSv [ped]	5	5	1	0	0	2	8	9	0	0	0
Radiography chest	Usuall approp	Expert Consensus	<b>≎</b> <0.1 mS	Sv		3	3	3	4	5	1	6	0	0	1	1
CTA coronary arteries with IV contrast	Usuall approp	Expert Consensus	��� 1-1( mSv	0		2	2	6	8	4	1	1	0	0	0	0
MRI heart function with stress without IV contrast	Usuall approp	Expert Consensus	O 0 mSv	,	O 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	O 0 mSv	O 0 mSv [ped]	2	2	10	7	3	0	0	0	0	0	0
MRA abdomen without IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	19	0	1	0	0	0	0	1	0
MRA abdomen without and with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	19	0	1	0	0	0	0	1	0
MRA neck without IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	19	0	1	0	0	1	0	0	0
MRA neck without and with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	19	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	17	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	15	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.

D 1	Appropria	ateness	COF	4 1 14 DD		D I DDI	D 41	24.11			F	inal '	Гаbu	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 IV contrast	Usual appropr		Limited	O 0 mSv	,	O 0 mSv [ped]	8	8	0	0	1	1	2	1	3	7	6
			References			Study	Quality										
			49 (-3194075)				4										
			50 (24254479)				4										
MRI heart function and morphology without and with IV contrast	Usual appropr		Limited	O 0 mSv	,	O 0 mSv [ped]	8	8	0	0	2	0	1	0	2	6	10
			References		•	Study	Quality		•	•		•		•	•		

				1												
		49 (-3194075)				4										
		50 (24254479)		<u> </u>		4										
CTA chest with IV contrast	Usua approp	Limited	��� 1-1 mSv		&	7	7	0	0	0	0	5	6	7	2	1
		References			Study	Quality										
		48 (27618316)				4										
CT heart function and morphology with IV contrast	Usua approp	Limited	���� 10- mSv		2000 3- 10 mSv [ped]	7	7	0	0	1	0	2	3	8	4	3
		References			Study	Quality										
		47 (28889811)				3										
Arteriography pulmonary	Usua approp	Expert Consensus	���� 10- mSv		2	7	7	0	0	0	0	2	3	10	4	1
Arteriography coronary with ventriculography	Usua approp	Strong	��� 1-1 mSv		2000 3- 10 mSv [ped]	7	7	0	0	0	0	0	1	11	7	1
		References			Study	Quality										
		45 (19660367)				2										
		46 (22077996)				2										
MRA chest without and with IV contrast	Usua approp	Expert Consensus	O 0 mSv	,	O 0 mSv [ped]	7	7	1	0	1	0	3	4	4	6	2
MRA chest without IV contrast	May approp	Expert Consensus	O 0 mSv	,	O 0 mSv [ped]	6	6	0	0	0	1	8	8	3	0	0
US echocardiography transesophageal	May approp	Expert Consensus	O 0 mSv	,	O 0 mSv [ped]	5	5	0	0	0	2	9	7	2	0	0
Radiography chest	May approp	Expert Consensus	<b>�</b> <0.1 mS			5	5	0	1	3	4	10	2	0	0	0
CTA coronary arteries with IV contrast	Usually approp	Expert Consensus	��� 1-1 mSv		2000 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	O 0 mSv	O 0 mSv [ped]	2	2	10	2	4	1	3	0	0	1	0
MRI heart function with stress without and with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	2	2	9	2	5	0	3	0	1	1	0
MRA abdomen without IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	18	0	1	1	0	0	0	1	0
MRA abdomen without and with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	17	1	1	1	0	0	0	0	1
MRA neck without IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	18	1	1	0	0	0	1	0	0
MRA neck without and with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	18	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	17	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	14	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.

n 1	Appropriateness	COF	A L L DDI	D I DDI	D 41	3.6 11			F	inal '	Гаbu	llatio	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 contrast	Usually appropriate	Moderate	O 0 mSv	O 0 mSv [ped]	9	9	0	0	0	0	2	0	3	3	13

References	Study Quality
53 (12234957)	3
55 (-3194077)	4
54 (28548989)	4

		56 (34934948)			2										
MRI heart function and morphology without IV contrast	Usually appropriate	Moderate	O 0 mSv	O 0 mSv [ped]	8	8	0	0	1	0	2	1	4	7	6
		References		Study	Quality				•						
		53 (12234957)			3										
		55 (-3194077)			4										
		54 (28548989)			4										
		56 (34934948)			2										
CTA chest with IV contrast	Usually appropriate	Limited	��� 1-10 mSv	���� 3- 10 mSv [ped]	7	7	0	0	0	0	2	8	5	4	2
		References		Study	Quality										
		53 (12234957)			3										
		48 (27618316)			4										
		52 (-3194076)			4										
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	2	6	8	2	2
MRA chest without IV contrast	Usually appropriate	Limited	O 0 mSv	O 0 mSv [ped]	7	7	1	0	1	0	5	1	9	3	1
		References		Study	Quality										
		53 (12234957)			3										
		52 (-3194076)			4										
MRA chest without and with IV contrast	Usually appropriate	Limited	O 0 mSv	O 0 mSv [ped]	7	7	0	0	0	0	2	1	8	5	4
		References		Study	Quality										
		53 (12234957)			3										
		52 (-3194076)			4										
CTA coronary arteries with IV contrast	May be appropriate	Limited	��� 1-10 mSv	���� 3- 10 mSv [ped]	6	6	0	0	0	0	9	8	3	0	0
		References		Study	Quality										
		52 (-3194076)			4										

Arteriography coronary with ventriculography	May appropr	Limited	��� 1-1 mSv	0	���� 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 appropr	Expert Consensus	O 0 mSv	/	O 0 mSv [ped]	6	6	0	0	1	1	6	11	1	0	0
Arteriography pulmonary	May lappropi	Limited	<b>≎≎≎≎</b> 10- mSv	-30	���� 3- 10 mSv [ped]	5	5	0	0	0	0	13	5	2	0	0
		References			Study	Quality										
		52 (-3194076)				4										
Radiography chest	May lappropi	Expert Consensus	<b>≎</b> <0.1 mS	Sv		4	4	3	2	5	5	4	0	0	1	1
MRI heart function with stress without IV contrast	Usually appropi	Limited	O 0 mSv	/	O 0 mSv [ped]	3	3	7	2	7	2	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 appropi	Limited	O 0 mSv	/	O 0 mSv [ped]	3	3	7	0	6	4	3	0	0	1	0
		References			Study	Quality										
		57 (26917538)				2										
		58 (20631032)				3										
SPECT or SPECT/CT MPI rest and stress	Usually appropr	Expert Consensus	<b>���</b> 10- mSv	-30	<b>99999</b> 10-30 mSv [ped]	2	2	10	3	5	3	0	0	0	0	0
MRA abdomen without IV contrast	Usually appropi	Expert Consensus	O 0 mSv	/	O 0 mSv [ped]	1	1	17	2	1	0	0	0	0	1	0
MRA abdomen without and with IV contrast	Usually appropi	Expert Consensus	O 0 mSv	/	O 0 mSv [ped]	1	1	17	1	2	0	0	0	0	0	1

MRA neck without IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	19	0	2	0	0	0	0	0	0
MRA neck without and with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	19	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	13	3	1	3	0	0	1	0	0

Variant 8: Child or adult. Known or suspected anomalous pulmonary venous return with inadequate evaluation after transthoracic echocardiography. Next imaging study.

	Appropri	iateness	GOT	4.1.1. DD			<b>.</b>	3.5 31			F	inal '	Tabu	latio	ns		
Procedure	Categ	gory	SOE	Adults RRI	L Ped	ls RRL	Rating	Median	1	2	3	4	5	6	7	8	9
CTA chest with IV contrast	Usua approp		Limited	<b>≎≎≎</b> 1-10 mSv	'   10	●	9	9	0	0	0	0	0	2	6	3	10
			References			Study	Quality										
			64 (11044048)				3										
			65 (23341089)				2										
			66 (19506848)				3										
			67 (29550261)				4										
			68 (22236895)				4										
MRA chest without and with IV contrast	Usua approp	ally oriate	Limited	O 0 mSv		0 mSv ped]	9	9	0	0	1	0	0	0	3	6	11
			References			Study	Quality		-								
			68 (22236895)				4										
			69 (19184180)				4										
			70 (8126275)				4										
MRI heart function and morphology without and with IV contrast	Usua approp	lly priate	Limited	O 0 mSv		0 mSv ped]	8	8	0	0	0	0	0	2	8	6	4
		References				Study	Quality										
			68 (22236895)				4										

		71 (12804753)			2										
MRA chest without IV contrast	Usually appropriate	Limited	O 0 mSv	O 0 mSv [ped]	7	7	0	0	0	1	3	4	5	5	3
		References		Study	Quality		•	•		•		•			
		68 (22236895)		•	4										
		69 (19184180)			4										
		70 (8126275)			4										
MRI heart function and morphology without IV contrast	Usually appropriate	Limited	O 0 mSv	O 0 mSv [ped]	7	7	0	0	0	0	0	1	12	5	2
		References		Study	Quality										
		68 (22236895)	ı		4										
		71 (12804753)			2										
CT heart function and morphology with IV contrast	May be appropriate	Expert Consensus	���� 10-30 mSv	<b>⊕⊕⊕⊕</b> 3- 10 mSv [ped]	6	6	0	0	0	0	10	6	4	0	0
MRA abdomen without IV contrast	May be appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	5	5	0	0	1	4	10	4	1	0	0
MRA abdomen without and with IV contrast	May be appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	5	5	0	0	1	1	13	3	2	0	0
US echocardiography transesophageal	Usually not appropriate	Limited	O 0 mSv	O 0 mSv [ped]	3	3	6	3	8	2	1	0	0	0	0
		References		Study	Quality										
		72 (1772706)			4										
		73 (9137235)			4										
		74 (16238553)			4										
Radiography chest	Usually not appropriate	Limited	<b>⊕</b> <0.1 mSv		3	3	7	3	4	2	4	0	0	0	0
		References		Study	Quality										
		65 (23341089)			2										

CTA coronary arteries with IV contrast	Usuall approp	Expert Consensus	&& 1-10 mSv	���� 3- 10 mSv [ped]	2	2	10	2	4	1	3	1	0	0	0
Arteriography pulmonary	Usuall approp	Expert Consensus	<b>≎≎≎≎</b> 10-3 mSv	0	2	2	6	5	8	0	1	0	0	0	0
Arteriography coronary with ventriculography	Usuall approp	Limited	��� 1-10 mSv	���� 3- 10 mSv [ped]	2	2	5	6	7	2	0	0	0	0	0
		References		Study	y Quality										
		61 (16784931)			3										
		62 (6235060)			4										
		63 (16580428)			4										
,		60 (27831520)			4										
MRI heart function with stress without and with IV contrast	Usuall approp	Expert Consensus	O 0 mSv	O 0 mSv [ped]	2	2	10	3	4	3	1	0	0	0	0
MRA neck without IV contrast	Usuall approp	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	19	0	2	0	0	0	0	0	0
MRA neck without and with IV contrast	Usuall approp	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	18	1	2	0	0	0	0	0	0
MRI heart function with stress without IV contrast	Usuall approp	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	11	3	5	2	0	0	0	0	0
FDG-PET/CT heart	Usuall approp	Expert Consensus	���� 10-3 mSv	0	1	1	19	0	1	1	0	0	0	0	0
SPECT or SPECT/CT MPI rest and stress	Usuall approp	Expert Consensus	୫୫୫୫ 10-3 mSv	0 \$€\$\$\$ 10-30 mSv [ped]	1	1	17	2	2	0	0	0	0	0	0

Variant 9: Child or adult. Suspected aortic coarctation with inadequate evaluation after transthoracic echocardiography. Next imaging study.

ъ .	Appropriaten	ess cor	A L L DDI	D I DDI	D 41	3.7.11			F	inal '	Tabu	latio	ns		
Procedure	Category	ess SOE	Adults RRL	Peds RRL	Rating	Median	1	2	3	4	5	6	7	8	9
CTA chest with IV contrast	Usually appropriate	Limited	<b>≎≎≎</b> 1-10 mSv	���� 3- 10 mSv [ped]	8	8	0	0	1	0	1	0	4	6	9
		References		Study	Quality										
		78 (28377475)			4										
		77 (14975985)			3										
		79 (25714305)			4										
MRA chest without and with IV contrast	Usually appropriate	Limited	O 0 mSv	O 0 mSv [ped]	8	8	0	0	1	0	0	1	5	4	10
		References		Study	Quality										
		81 (15699283)			3										
		79 (25714305)			4										
		80 (8489869)			3										
		82 (21861960)			3									_	
MRA chest without IV contrast	Usually appropriate	Limited	O 0 mSv	O 0 mSv [ped]	7	7	1	0	0	1	1	3	7	4	4
		References		Study	Quality										
		81 (15699283)			3										
		79 (25714305)			4										
		80 (8489869)			3										
		82 (21861960)			3										
MRI heart function and morphology without IV contrast	Usually appropriate	Limited	O 0 mSv	O 0 mSv [ped]	7	7	0	0	0	0	1	5	9	4	1
		References		Study	Quality		-								
		75 (21947983)			4										
MRI heart function and morphology without and with IV contrast	Usually appropriate	Limited	O 0 mSv	O 0 mSv [ped]	7	7	0	0	0	0	0	2	10	6	2
		References		Study	Quality										
		75 (21947983)			4										

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	<b>≎⊕⊕</b> 1-10 mSv	���� 3- 10 mSv [ped]	5	5	0	1	2	4	9	4	0	0	0
		References		Study	y Quality										
		76 (7585760)			2		_								
US echocardiography transesophageal	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	3	3	7	1	9	2	1	0	0	0	0
Radiography chest	Usually not appropriate	Expert Consensus	<b>⊕</b> <0.1 mSv		3	3	7	1	7	2	3	0	0	0	0
CTA coronary arteries with IV contrast	Usually not appropriate	Expert Consensus	<b>≎≎≎</b> 1-10 mSv	���� 3- 10 mSv [ped]	2	2	10	2	3	3	2	0	1	0	0
Arteriography pulmonary	Usually not appropriate	Expert Consensus	���� 10-30 mSv	���� 3- 10 mSv [ped]	1	1	13	4	2	0	0	2	0	0	0
MRA abdomen without IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	17	1	1	1	0	0	1	0	0
MRA abdomen without and with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	17	0	2	1	0	0	0	1	0
MRA neck without IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	17	0	3	0	0	0	1	0	0
MRA neck without and with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	17	0	3	0	0	0	0	1	0
MRI heart function with stress without IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	12	2	6	0	0	0	1	0	0
MRI heart function with stress without and with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	11	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	1	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	16	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.

<b>D</b> 1	Appropriateness	COF	A L L DDI	D I DDI	D (1	3.5 31			F	inal '	Tabu	latio	ns		
Procedure	Category	SOE	Adults RRL	Peds RRL	Rating	Median	1	2	3	4	5	6	7	8	9
MRA chest without and with IV contrast	Usually appropriate	Strong	O 0 mSv	O 0 mSv [ped]	9	9	0	0	1	0	0	0	0	6	14
		References		Study	Quality										
		91 (32453278)			2										
		92 (32531300)			4										
		93 (32167203)			2				_						
CTA chest with IV contrast	Usually appropriate	Expert Consensus	<b>≎≎≎</b> 1-10 mSv	���� 3- 10 mSv [ped]	8	8	0	0	0	0	3	3	3	4	8
MRA chest without IV contrast	Usually appropriate	Strong	O 0 mSv	O 0 mSv [ped]	8	8	0	0	1	0	2	1	5	6	6
		References		Study	Quality										
		91 (32453278)			2										
		92 (32531300)			4										
		93 (32167203)		1	2		_								
MRA abdomen without IV contrast	Usually appropriate	Limited	O 0 mSv	O 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	O 0 mSv	O 0 mSv [ped]	7	7	0	0	0	0	2	0	13	4	1
		References		Study	Quality										

		86 (20687249)			4										
MRA neck without IV contrast	Usually appropriate	Limited	O 0 mSv	O 0 mSv [ped]	7	7	0	0	1	0	1	1	12	5	0
		References		Study	y Quality		•	•		•				•	
		94 (21730308)			2										
MRA neck without and with IV contrast	Usually appropriate	Limited	O 0 mSv	O 0 mSv [ped]	7	7	0	0	0	1	0	1	11	6	1
		References		Study	y Quality										
		94 (21730308)			2										
MRI heart function and morphology without and with IV contrast	May be appropriate	Limited	O 0 mSv	O 0 mSv [ped]	6	6	0	0	0	1	7	8	3	1	0
		References		Study	y Quality			•		•				•	
		95 (2913733)			4										
		96 (31342116)			3										
		97 (20861133)			3										
CTA coronary arteries with IV contrast	May be appropriate	Expert Consensus	��� 1-10 mSv	���� 3- 10 mSv [ped]	5	5	0	0	0	3	8	5	4	0	0
MRI heart function and morphology without IV contrast	May be appropriate	Limited	O 0 mSv	O 0 mSv [ped]	5	5	0	0	0	3	8	6	2	1	0
		References		Study	y Quality										
		95 (2913733)			4										
		96 (31342116)			3										
		97 (20861133)			3										
US echocardiography transesophageal	May be appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	4	4	4	1	3	7	4	1	0	0	1
CT heart function and morphology with IV contrast	Usually not appropriate	Limited	��� 10-30 mSv	≎≎≎≎ 3- 10 mSv [ped]	3	3	1	4	6	4	4	1	0	0	0
		References		Study	y Quality										
		90 (19375878)			2										

Radiography chest	Usuall approp	Limited	<b>≎</b> <0.1 mSv		3	3	5	3	6	4	2	0	0	0	0
		References		Study	Quality										
		98 (20591885)			4										
Arteriography pulmonary	Usuall approp	Expert Consensus	���� 10-30 mSv	0	2	2	8	5	3	3	0	1	0	0	1
Arteriography coronary with ventriculography	Usuall approp	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	Usuall approp	Expert Consensus	O 0 mSv	O 0 mSv [ped]	2	2	11	5	5	0	0	0	0	0	0
MRI heart function with stress without IV contrast	Usuall approp	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	13	3	5	0	0	0	0	0	0
FDG-PET/CT heart	Usuall approp	Expert Consensus	���� 10-30 mSv	0	1	1	17	0	2	1	0	0	0	0	1
SPECT or SPECT/CT MPI rest and stress	Usuall approp	Expert Consensus	୫୫୫୫ 10-30 mSv	⊕⊕⊕⊕⊕ 10-30 mSv [ped]	1	1	17	1	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.