## American College of Radiology ACR Appropriateness Criteria®

## **Imaging After Total Knee Arthroplasty**

Variant 1: Follow-up of symptomatic or asymptomatic patients with a total knee arthroplasty. Initial imaging.

D 1	Appropriateness	COE	A L L DDI	D I DDI	D 4	34.11			F	inal I	Гabu	latio	ns		
Procedure	Category	SOE	Adults RRL	Peds RRL	Rating	Median	1	2	3	4	5	6	7	8	9
Radiography knee	Usually appropriate	Strong	<b></b> <0.1 mSv		9	9	0	0	0	0	0	0	0	0	11

References	Study Quality
42 (7871170)	4
41 (31954608)	3
40 (15864052)	3
39 (16980893)	3
38 (16672885)	4
37 (16958475)	4
36 (14566740)	3
35 (19826813)	2
34 (20218424)	3
33 (14658097)	4
32 (15284990)	4
31 (16485456)	4
30 (18310744)	4
29 (15837396)	4
28 (16595481)	4
27 (8713906)	4
26 (19057730)	4

25 (34017659)	3
24 (21641179)	2
23 (32490778)	4
22 (16846767)	4
21 (24370168)	4
20 (16514580)	4
19 (18612008)	4
18 (8895629)	3
4 (24261390)	4

CT arthrography knee	Usually not appropriate	Expert Consensus	<b> </b>	�� 0.03- 0.3 mSv [ped]	1	1	11	0	0	0	0	0	0	0	0
CT knee with IV contrast	Usually not appropriate	Expert Consensus	<b>⊕</b> <0.1 mSv	�� 0.03- 0.3 mSv [ped]	1	1	11	0	0	0	0	0	0	0	0
CT knee without IV contrast	Usually not appropriate	Expert Consensus	<b>ଡ</b> <0.1 mSv	�� 0.03- 0.3 mSv [ped]	1	1	11	0	0	0	0	0	0	0	0
CT knee without and with IV contrast	Usually not appropriate	Expert Consensus	<b>ଡ</b> <0.1 mSv	�� 0.03- 0.3 mSv [ped]	1	1	11	0	0	0	0	0	0	0	0
Fluoroscopy knee	Usually not appropriate	Expert Consensus	<b></b> <0.1 mSv		1	1	11	0	0	0	0	0	0	0	0
Image-guided aspiration knee	Usually not appropriate	Expert Consensus	Varies	Varies	1	1	11	0	0	0	0	0	0	0	0
MRI knee without IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	10	1	0	0	0	0	0	0	0
MRI knee without and with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	11	0	0	0	0	0	0	0	0
3-phase bone scan knee	Usually not appropriate	Expert Consensus	��� 1-10 mSv		1	1	11	0	0	0	0	0	0	0	0

FDG-PET/CT whole body	Usually not appropriate	Expert Consensus	���� 10-30 mSv	���� 3- 10 mSv [ped]	1	1	11	0	0	0	0	0	0	0	0
US knee	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	10	1	0	0	0	0	0	0	0
Fluoride PET/CT whole body	Usually not appropriate	Expert Consensus	���� 10-30 mSv	���� 3- 10 mSv [ped]	1	1	11	0	0	0	0	0	0	0	0
WBC scan and sulfur colloid scan knee	Usually not appropriate	Expert Consensus	���⊕ 10-30 mSv		1	1	11	0	0	0	0	0	0	0	0

## Variant 2: Suspected infection after total knee arthroplasty. Additional imaging following radiographs.

D 1	Appropriateness	COE	A L I/ DDI	D I DDI	D 4	34.11			F	inal '	Гаbu	latio	ns		
Procedure	Category	SOE	Adults RRL	Peds RRL	Rating	Median	1	2	3	4	5	6	7	8	9
Image-guided aspiration knee	Usually appropriate	Strong	Varies	Varies	9	9	1	0	0	0	0	0	0	2	8

References	Study Quality
92 (21776555)	4
91 (34587890)	3
90 (17823024)	3
89 (9418615)	3
88 (16520210)	3
87 (16434514)	4
86 (15465503)	3
85 (14658109)	3
84 (8836084)	3
83 (21427339)	4
54 (-3195822)	4
50 (15307559)	3
49 (12164519)	3

		47 (16224857)			4										
		46 (17918072)			2										
		45 (12168179)			2										
		44 (19692690)			4										
		30 (18310744)			4										
		18 (8895629)			3										
MRI knee without and with IV contrast	May be appropriate	Strong	O 0 mSv	O 0 mSv [ped]	6	6	0	0	0	0	2	4	5	0	0
		References		Study	Quality										
		22 (16846767)			4										
		97 (16950034)			3										
		96 (16627160)			4										
		95 (27232641)			2										
		94 (23091176)			2										
		93 (26295591)			4										
WBC scan and sulfur colloid scan knee	May be appropriate	Strong	<b>≎≎≎≎</b> 10-30 mSv		6	6	0	0	0	1	4	1	4	1	0
		References		Study	Quality										
		109 (-3195826)	)		3										
		108 (31218592)	)		3										
		107 (2027967)			3										
		106 (11547374)	)		3										
		105 (17138732)	)		2										
		104 (10810483)	)		3										
		103 (9785394)			4										
		102 (2208853)			3										
		101 (8496202)			3										
		100 (10794224)	)		3										
		99 (15001684)			2										
		98 (3733846)			4										
		70 (3733010)													
		69 (15534056)			3										

		66 (-3195824)			4										
		64 (19038601)			4										
		63 (19182727)	1		4										
		50 (15307559)	1		3										
		49 (12164519)			3										
MRI knee without IV contrast	May be appropriate	Strong	O 0 mSv	O 0 mSv [ped]	5	5	1	0	0	1	4	2	2	1	0
		References		Study	Quality										
		22 (16846767)	1		4										
		97 (16950034)	ı		3										
		96 (16627160)	1		4										
		95 (27232641)	ı		2										
		94 (23091176)	ı		2										
		93 (26295591)			4										
3-phase bone scan knee	May be appropriate	Strong	��� 1-10 mSv		5	5	0	1	0	1	5	1	2	0	1
		References		Study	Quality										
		66 (-3195824)			4										
		65 (25071885)			4										
		64 (19038601)	1		4										
		63 (19182727)	ı		4										
		62 (2225613)			3										
		61 (2354603)			2										
		60 (11247700)	ı		3										
		59 (22361912)	ı		4										
		30 (18310744)	ı		4										
		18 (8895629)			3										
CT knee with IV contrast	May be appropriate	Expert Consensus	<b>⊕</b> <0.1 mSv	�� 0.03- 0.3 mSv [ped]	4	4	3	0	2	3	3	0	0	0	0

US knee	May appropri	Expert Consensus	O 0 mSv	O 0 mSv [ped]	4	4	0	1	3	3	2	1	1	0	0
CT knee without IV contrast	Usually appropr	Limited	<b>⊕</b> <0.1 mS	v 0.03- 0.3 mSv [ped]	3	3	4	0	2	3	2	0	0	0	0
		References		Stud	ly Quality										
		20 (16514580)			4										
		67 (17080648)			3										
FDG-PET/CT whole body	Usually appropr	Strong	<b>≎≎≎≎</b> 10-3 mSv	0	3	3	1	2	3	3	2	0	0	0	0
		References		Stud	ly Quality										
		82 (11685492)			2										
		81 (24873788)			2										
		80 (12271415)			3										
		80 (12271415) 79 (16721569)			4										
		78 (17448973)			3										
		77 (-3195825)			4										
		76 (12766596)			3										
		75 (16829764)			M										
		74 (16512924)			3										
		73 (18704405)			M										
		72 (32145890)			4										
		71 (12089487)			3										
		70 (24196917)			3										
		69 (15534056)			3										
		68 (11197979)			3										
CT arthrography knee	Usually approp	Expert Consensus	<b>⊕</b> <0.1 mS	v 0.03- 0.3 mSv [ped]	1	1	9	1	0	0	0	1	0	0	0
CT knee without and with IV contrast	Usually appropr	Limited	<b>⊕</b> <0.1 mS	v 0.03- v 0.3 mSv [ped]	1	1	6	1	1	2	1	0	0	0	0

		References			Study	/ Quality										
		20 (16514580)				4										
		67 (17080648)				3										
Fluoroscopy knee	Usuall approp	Limited	<b>�</b> <0.1 m\$	Sv		1	1	8	0	2	0	1	0	0	0	0
		References			Study	Quality										
		30 (18310744)				4										
Fluoride PET/CT whole body	Usuall approp	Expert Consensus	<b>≎≎≎≎</b> 10- mSv	-30	���� 3- 10 mSv [ped]	1	1	11	0	0	0	0	0	0	0	0

Variant 3: Pain after total knee arthroplasty. Infection excluded. Suspect aseptic loosening or osteolysis or instability. Additional imaging following radiographs.

Day or James	Appropri	ateness	COE	A J14 DD	Sv 0.03- 0.3 mSv 7 [ped]			M - 12		_	F	inal '	Tabu	latio	ns		
Procedure	Categ	gory	SOE	Adults RR	L	reas KKL	Kating	Median	1	2	3	4	5	6	7	8	9
CT knee without IV contrast	Usua approp		Limited	<b>≎</b> <0.1 mS	Sv	0.3 mSv	7	7	0	0	0	0	1	0	5	3	2
			References			Study	Quality										
			20 (16514580)				4										
			67 (17080648)				3										
			116 (25633024)	)			4										
			124 (16514583)	)			4										
			125 (15993602)	)			4										
MRI knee without IV contrast	Usua approp		Limited	O 0 mSv	,		7	7	0	0	0	1	0	2	4	2	2
			References			Study	Quality										
			131 (35315718)	)			2										
			116 (25633024)	)			4										
			116 (25633024) 97 (16950034)				3										
			96 (16627160)				4										
			93 (26295591)				4										

		22 (16846767)			4				_						
3-phase bone scan knee	May be appropriate	Strong	<b>≎≎≎</b> 1-10 mSv		5	5	1	1	0	2	6	1	0	0	0
		References		Study	Quality										
		123 (3655908)			3										
		122 (31263926	)		3										
		121 (11553828	)		4										
		120 (14579084	)		3										
		119 (2295172)			3										
		66 (-3195824)			4										
		62 (2225613)			3										
		61 (2354603)			2										
		60 (11247700)			3										
		20 (16514580)													
Fluoroscopy knee	Usually not appropriate	Limited	<b> </b>		3	3	3	0	5	2	0	1	0	0	0
		References		Study	Quality										
		20 (16514580)			4										
		129 (8895643)			4										
		130 (2793887)			4										
WBC scan and sulfur colloid scan knee	Usually not appropriate	Strong	���� 10-30 mSv		3	3	3	1	2	3	2	0	0	0	0
		References		Study	Quality										
		66 (-3195824)			4										
		134 (2266391)			3										
		127 (15100514	)		2										
		109 (-3195826)	)		3										
		107 (2027967)			3										
		106 (11547374	)		3										
		101 (8496202)			3										

CT arthrography knee	Usually approp	Expert Consensus	<b> </b>		�� 0.03- 0.3 mSv [ped]	2	2	5	2	1	2	1	0	0	0	0
CT knee with IV contrast	Usually approp	Expert Consensus	<b>⊕</b> <0.1 mS	Sv		1	1	10	1	0	0	0	0	0	0	0
CT knee without and with IV contrast	Usually approp	Expert Consensus	<b>≎</b> <0.1 mS		�� 0.03- 0.3 mSv [ped]	1	1	10	1	0	0	0	0	0	0	0
MRI knee without and with IV contrast	Usually approp	Expert Consensus	Consensus		O 0 mSv [ped]	1	1	11	0	0	0	0	0	0	0	0
FDG-PET/CT whole body	Usually approp	Limited	msv		���� 3- 10 mSv [ped]	1	1	6	1	3	0	1	0	0	0	0
		References		Study Quality												
		126 (27468360)	)	Study Quanty 4												
		121 (11553828)	)			4										
		78 (17448973)				3										
		74 (16512924)				3										
		66 (-3195824)				4										
		127 (15100514)	)			2										
US knee	Usually approp	Limited	O 0 mSv	<u>,                                    </u>	O 0 mSv [ped]	1	1	8	1	2	0	0	0	0	0	0
		References			Study	/ Quality										
		132 (18751851)	)			4										
		133 (27726755)	)	4												
Fluoride PET/CT whole body	Usually approp	Limited	���� 10- mSv			1	9	0	1	1	0	0	0	0	0	
		References			Study	Quality										
		128 (31040911)	)	3												

Variant 4: Pain after total knee arthroplasty. Suspect periprosthetic or hardware fracture. Additional imaging following radiographs.

	Appropriateness	COF	A L L DDI	D I DDI	D 41	3.5.11			F	inal '	Tabu	latio	ns		
Procedure	Category	SOE	Adults RRL	Peds RRL	Rating	Median	1	2	3	4	5	6	7	8	9
CT knee without IV contrast	Usually appropriate	Limited	References		8	8	1	0	0	0	0	0	2	3	5
		References		Study	y Quality										
,		20 (16514580)			4										
MRI knee without IV contrast	May be appropriate	Limited	O 0 mSv	O 0 mSv [ped]	6	6	0	0	1	0	3	2	1	3	1
		References		Study	y Quality										
		22 (16846767)			4										
3-phase bone scan knee	May be appropriate	Limited	��� 1-10 mSv		4	4	3	1	1	2	4	0	0	0	0
	,	References		Study	y Quality										
		137 (22733959)	)												
		138 (24647514)	)		4										
CT arthrography knee	Usually not appropriate	Expert Consensus	<b>≎</b> <0.1 mSv	�� 0.03- 0.3 mSv [ped]	1	1	10	1	0	0	0	0	0	0	0
CT knee with IV contrast	Usually not appropriate	Expert Consensus	<b>≎</b> <0.1 mSv	�� 0.03- 0.3 mSv [ped]	1	1	11	0	0	0	0	0	0	0	0
CT knee without and with IV contrast	Usually not appropriate	Expert Consensus	<b>≎</b> <0.1 mSv	�� 0.03- 0.3 mSv [ped]	1	1	11	0	0	0	0	0	0	0	0
Fluoroscopy knee	Usually not appropriate	Expert Consensus	<b>≎</b> <0.1 mSv		1	1	11	0	0	0	0	0	0	0	0
MRI knee without and with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	10	1	0	0	0	0	0	0	0
FDG-PET/CT whole body	Usually not appropriate	Expert Consensus	���� 10-30 mSv	���� 3- 10 mSv [ped]	1	1	11	0	0	0	0	0	0	0	0

US knee	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	8	1	1	1	0	0	0	0	0
Fluoride PET/CT whole body	Usually not appropriate	Expert Consensus	���� 10-30 mSv	���� 3- 10 mSv [ped]	1	1	11	0	0	0	0	0	0	0	0
WBC scan and sulfur colloid scan knee	Usually not appropriate	Expert Consensus	���� 10-30 mSv		1	1	10	1	0	0	0	0	0	0	0

Variant 5: Pain after total knee arthroplasty. Measuring component rotation. Additional imaging following radiographs.

	Appropr	iateness	207		RRL Peds RRL Rating Media						I	inal '	Tabu	latio	ns		
Procedure	Categ	gory	SOE	Adults RR	RL .	Peds RRL	Rating	Median	1	2	3	4	5	6	7	8	9
CT knee without IV contrast	Usua approp		Strong	<b>⊕</b> <0.1 mS	Sv	�� 0.03- 0.3 mSv [ped]	9	9	0	0	0	0	0	0	0	2	9
	•		References			Study	Quality										
			20 (16514580)				4										
			145 (30473230)	)			3										
			144 (23906867)	)			2										
			143 (7497664)				2										
			142 (11021452)	)			3										
			140 (11689376)	)			4										
			139 (9917679)				3										
			40 (15864052)				3										
MRI knee without IV contrast	May approp	be oriate	Limited	O 0 mSv	/	O 0 mSv [ped]	6	6	0	0	1	0	4	4	1	0	1
			References			Study	Quality			_							
			148 (22933492)				3										
			147 (21741843)	)			4										
			146 (10794232)			4											

CT arthrography knee	Usuall approp	Expert Consensus	<b>⊕</b> <0.1 mS		�� 0.03- 0.3 mSv [ped]	1	1	11	0	0	0	0	0	0	0	0
CT knee with IV contrast	Usuall approp	Expert Consensus	<b>�</b> <0.1 mS		�� 0.03- 0.3 mSv [ped]	1	1	11	0	0	0	0	0	0	0	0
CT knee without and with IV contrast	Usuall approp	Expert Consensus	<b>� &lt;</b> 0.1 mS		�� 0.03- 0.3 mSv [ped]	1	1	11	0	0	0	0	0	0	0	0
Fluoroscopy knee	Usuall approp	Expert Consensus	<b>⊕</b> <0.1 mS	Sv		1	1	8	2	1	0	0	0	0	0	0
MRI knee without and with IV contrast	Usuall approp	Expert Consensus	O 0 mSv	,	O 0 mSv [ped]	1	1	11	0	0	0	0	0	0	0	0
3-phase bone scan knee	Usuall approp	Expert Consensus	<b>⊕⊕⊕</b> 1-10 mSv	0		1	1	11	0	0	0	0	0	0	0	0
FDG-PET/CT whole body	Usuall approp	Limited	���� 10- mSv	30	���� 3- 10 mSv [ped]	1	1	10	0	1	0	0	0	0	0	0
		References			Study	Quality										
		79 (16721569)				4			1	1						
US knee	Usuall approp	Expert Consensus	O 0 mSv	,	O 0 mSv [ped]	1	1	11	0	0	0	0	0	0	0	0
Fluoride PET/CT whole body	Usuall approp	Expert Consensus	���� 10- mSv	-30	���� 3- 10 mSv [ped]	1	1	11	0	0	0	0	0	0	0	0
WBC scan and sulfur colloid scan knee	Usuall approp	Expert Consensus	���� 10-30 mSv			1	1	10	1	0	0	0	0	0	0	0

Variant 6: Pain after total knee arthroplasty. Suspect periprosthetic soft-tissue abnormality unrelated to infection, including quadriceps or patellar tendinopathy (quadriceps or patellar tendon tears, postoperative arthrofibrosis, patellar clunk syndrome, or impingement of nerves or other soft tissues). Additional imaging following radiographs.

	Appropriat	teness	607	4.1.4. DD	RRL Peds RRL Rating Medi						F	inal '	Tabu	lation	ıs		
Procedure	Catego		Limited O 0 mSv		L P	eds RRL	Rating	Median	1	2	3	4	5	6	7	8	9
MRI knee without IV contrast	Usuall appropri		Limited	, C	0 mSv [ped]	8	8	0	0	0	0	0	0	2	5	4	
			References		·	Study	Quality										
			93 (26295591)				4										
			154 (27022733)	)			4										
			153 (32993344)	)			3										
			152 (12579011)	)			4										
			147 (21741843)	)			4										
US knee	Usuall appropri		Limited O 0 mSv		,   0	0 mSv [ped]	7	7	0	0	0	0	2	2	4	2	1
			References	•	Study												
			160 (27613578)														
			159 (2273390)			4											
			158 (14736658)	)			3										
			157 (17543487)	)	4 4												
			156 (32803377)	)													
			155 (29395745)	)	2												
CT arthrography knee	Usually appropri		Expert Consensus	<b>≎</b> <0.1 mS	Sv C	● 0.03- 0.3 mSv [ped]	1	1	9	0	2	0	0	0	0	0	0
CT knee with IV contrast	Usually appropri		Expert Consensus	<b>≎</b> <0.1 mS		0.03- 0.3 mSv [ped]	1	1	10	0	1	0	0	0	0	0	0
CT knee without IV contrast	Usually appropri		Expert Consensus	<b>≎</b> <0.1 mS		0.03- 0.3 mSv [ped]	1	1	6	1	1	3	0	0	0	0	0
CT knee without and with IV contrast	Usually appropri		Expert Consensus	<b>≎</b> <0.1 mS		⊕ 0.03- ).3 mSv [ped]	1	1	11	0	0	0	0	0	0	0	0
Fluoroscopy knee	Usually appropri		Expert Consensus		Sv		1	1	11	0	0	0	0	0	0	0	0

MRI knee without and with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	7	3	1	0	0	0	0	0	0
3-phase bone scan knee	Usually not appropriate	Expert Consensus	<b>≎≎≎</b> 1-10 mSv		1	1	10	1	0	0	0	0	0	0	0
FDG-PET/CT whole body	Usually not appropriate	Expert Consensus	���� 10-30 mSv	���� 3- 10 mSv [ped]	1	1	11	0	0	0	0	0	0	0	0
Fluoride PET/CT whole body	Usually not appropriate	Expert Consensus	���� 10-30 mSv	���� 3- 10 mSv [ped]	1	1	11	0	0	0	0	0	0	0	0
WBC scan and sulfur colloid scan knee	Usually not appropriate	Expert Consensus	���⊕ 10-30 mSv		1	1	11	0	0	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.