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.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
Radiography knee	Usually appropriate	Strong	☢ <0.1 mSv	☢ <0.03 mSv [ped]	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	☢ <0.1 mSv	☢☢ 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	☢ <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	☢ <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	☢ <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	☢ <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

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	1	2	3	4	5	6	7	8	9
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.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							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									

Procedure	Appropriateness													
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

Procedure	Appropriateness													
WBC scan and sulfur colloid scan knee	May be appropriate	Strong	☢☢☢☢ 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
69 (15534056)	3

References	Study Quality
66 (-3195824)	4
64 (19038601)	4
63 (19182727)	4
50 (15307559)	3
49 (12164519)	3

Procedure	Appropriateness	Strength	Adult Dose	Pediatric Dose											
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)	4
97 (16950034)	3
96 (16627160)	4
95 (27232641)	2
94 (23091176)	2
93 (26295591)	4

Procedure	Appropriateness	Strength	Adult Dose	Pediatric Dose											
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)	4
63 (19182727)	4
62 (2225613)	3
61 (2354603)	2
60 (11247700)	3
59 (22361912)	4
30 (18310744)	4
18 (8895629)	3

Procedure	Appropriateness	Strength	Adult Dose	Pediatric Dose											
CT knee with IV contrast	May be appropriate	Expert Consensus	☢ <0.1 mSv	☢☢ 0.03-0.3 mSv [ped]	4	4	3	0	2	3	3	0	0	0	0

Procedure	Appropriateness	Strength	Adult Radiation	Pediatric Radiation											
US knee	May be appropriate	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 not appropriate	Limited	☢ <0.1 mSv	☢☢ 0.03-0.3 mSv [ped]	3	3	4	0	2	3	2	0	0	0	0

References	Study Quality
20 (16514580)	4
67 (17080648)	3

Procedure	Appropriateness	Strength	Adult Radiation	Pediatric Radiation											
FDG-PET/CT whole body	Usually not appropriate	Strong	☢☢☢☢ 10-30 mSv	☢☢☢☢ 3-10 mSv [ped]	3	3	1	2	3	3	2	0	0	0	0

References	Study Quality
82 (11685492)	2
81 (24873788)	2
80 (12271415)	3
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

Procedure	Appropriateness	Strength	Adult Radiation	Pediatric Radiation											
CT arthrography knee	Usually not appropriate	Expert Consensus	☢ <0.1 mSv	☢☢ 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 not appropriate	Limited	☢ <0.1 mSv	☢☢ 0.03-0.3 mSv [ped]	1	1	6	1	1	2	1	0	0	0	0

		References			Study Quality									
		20 (16514580)			4									
		67 (17080648)			3									
Fluoroscopy knee	Usually not appropriate	Limited	☢ <0.1 mSv		1	1	8	0	2	0	1	0	0	0	0
		References			Study Quality									
		30 (18310744)			4									
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

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

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
CT knee without IV contrast	Usually appropriate	Limited	☢ <0.1 mSv	☢☢ 0.03-0.3 mSv [ped]	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

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	1	2	3	4	5	6	7	8	9
MRI knee without IV contrast	Usually appropriate	Limited	O 0 mSv	O 0 mSv [ped]	7	7	0	0	0	1	0	2	4	2	2

	References	Study Quality
	131 (35315718)	2
	116 (25633024)	4
	97 (16950034)	3
	96 (16627160)	4
	93 (26295591)	4

Procedure	Appropriateness	Strength	Radiation												
		22 (16846767)			4										
3-phase bone scan knee	May be appropriate	Strong	☢☢☢ 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)	4

Procedure	Appropriateness	Strength	Radiation												
Fluoroscopy knee	Usually not appropriate	Limited	☢ <0.1 mSv		3	3	3	0	5	2	0	1	0	0	0

References	Study Quality
20 (16514580)	4
129 (8895643)	4
130 (2793887)	4

Procedure	Appropriateness	Strength	Radiation												
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

Procedure	Appropriateness	Evidence	Adult Radiation	Pediatric Radiation										
CT arthrography knee	Usually not appropriate	Expert Consensus	☢ <0.1 mSv	☢☢ 0.03-0.3 mSv [ped]	2	2	5	2	1	2	1	0	0	0	0
CT knee with IV contrast	Usually not appropriate	Expert Consensus	☢ <0.1 mSv	☢☢ 0.03-0.3 mSv [ped]	1	1	10	1	0	0	0	0	0	0	0
CT knee without and with IV contrast	Usually not appropriate	Expert Consensus	☢ <0.1 mSv	☢☢ 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 not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	11	0	0	0	0	0	0	0	0
FDG-PET/CT whole body	Usually not appropriate	Limited	☢☢☢☢ 10-30 mSv	☢☢☢☢ 3-10 mSv [ped]	1	1	6	1	3	0	1	0	0	0	0

References	Study Quality
126 (27468360)	4
121 (11553828)	4
78 (17448973)	3
74 (16512924)	3
66 (-3195824)	4
127 (15100514)	2

Procedure	Appropriateness	Evidence	Adult Radiation	Pediatric Radiation										
US knee	Usually not appropriate	Limited	O 0 mSv	O 0 mSv [ped]	1	1	8	1	2	0	0	0	0	0	0

References	Study Quality
132 (18751851)	4
133 (27726755)	4

Procedure	Appropriateness	Evidence	Adult Radiation	Pediatric Radiation										
Fluoride PET/CT whole body	Usually not appropriate	Limited	☢☢☢☢ 10-30 mSv	☢☢☢☢ 3-10 mSv [ped]	1	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.

Procedure	Appropriateness 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	☢ <0.1 mSv	☢☢ 0.03-0.3 mSv [ped]	8	8	1	0	0	0	0	0	2	3	5

	References	Study Quality
	20 (16514580)	4

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	1	2	3	4	5	6	7	8	9
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 Quality
	22 (16846767)	4

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	1	2	3	4	5	6	7	8	9
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 Quality
	137 (22733959)	4
	138 (24647514)	4

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	1	2	3	4	5	6	7	8	9
CT arthrography knee	Usually not appropriate	Expert Consensus	☢ <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	☢ <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	☢ <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	☢ <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

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	1	2	3	4	5	6	7	8	9
US knee	Usually not appropriate	Expert Consensus	☢ 0 mSv	☢ 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.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
CT knee without IV contrast	Usually appropriate	Strong	☢ <0.1 mSv	☢☢ 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

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	1	2	3	4	5	6	7	8	9
MRI knee without IV contrast	May be appropriate	Limited	☢ 0 mSv	☢ 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

Procedure	Appropriateness	Evidence	Adult RRL	Pediatric RRL										
CT arthrography knee	Usually not appropriate	Expert Consensus	☢ <0.1 mSv	☢☢ 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	☢ <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	☢ <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	☢ <0.1 mSv		1	1	8	2	1	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	Limited	☢☢☢☢ 10-30 mSv	☢☢☢☢ 3-10 mSv [ped]	1	1	10	0	1	0	0	0	0	0	0

References	Study Quality
79 (16721569)	4

Procedure	Appropriateness	Evidence	Adult RRL	Pediatric RRL										
US knee	Usually not appropriate	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	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 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.**

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
MRI knee without IV contrast	Usually appropriate	Limited	O 0 mSv	O 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

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	1	2	3	4	5	6	7	8	9
US knee	Usually appropriate	Limited	O 0 mSv	O 0 mSv [ped]	7	7	0	0	0	0	2	2	4	2	1

References	Study Quality
160 (27613578)	4
159 (2273390)	4
158 (14736658)	3
157 (17543487)	4
156 (32803377)	4
155 (29395745)	2

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	1	2	3	4	5	6	7	8	9
CT arthrography knee	Usually not appropriate	Expert Consensus	☢ <0.1 mSv	☢☢ 0.03-0.3 mSv [ped]	1	1	9	0	2	0	0	0	0	0	0
CT knee with IV contrast	Usually not appropriate	Expert Consensus	☢ <0.1 mSv	☢☢ 0.03-0.3 mSv [ped]	1	1	10	0	1	0	0	0	0	0	0
CT knee without IV contrast	Usually not appropriate	Expert Consensus	☢ <0.1 mSv	☢☢ 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 not appropriate	Expert Consensus	☢ <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	☢ <0.1 mSv		1	1	11	0	0	0	0	0	0	0	0

Procedure	Appropriateness	Category	Adult RRL	Pediatric RRL										
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	☢☢☢ 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.**