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
27 (8713906)	4
35 (19826813)	2
32 (15284990)	4
33 (14658097)	4
18 (8895629)	3
31 (16485456)	4
29 (15837396)	4
21 (24370168)	4
20 (16514580)	4
22 (16846767)	4
19 (18612008)	4
24 (21641179)	2
42 (7871170)	4
36 (14566740)	3
38 (16672885)	4
40 (15864052)	3
39 (16980893)	3

37 (16958475)	4
28 (16595481)	4
4 (24261390)	4
30 (18310744)	4
34 (20218424)	3
41 (31954608)	3
23 (32490778)	4
25 (34017659)	3
26 (19057730)	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

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
44 (19692690)	4
45 (12168179)	2
46 (17918072)	2
47 (16224857)	4
18 (8895629)	3
49 (12164519)	3
50 (15307559)	3
83 (21427339)	4
84 (8836084)	3
85 (14658109)	3
86 (15465503)	3
87 (16434514)	4
88 (16520210)	3

89 (9418615)	3
90 (17823024)	3
92 (21776555)	4
30 (18310744)	4
54 (-3195822)	4
91 (34587890)	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
97 (16950034)	3
93 (26295591)	4
22 (16846767)	4
96 (16627160)	4
95 (27232641)	2
94 (23091176)	2

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
107 (2027967)	3
49 (12164519)	3
50 (15307559)	3
98 (3733846)	4
100 (10794224)	3
101 (8496202)	3
104 (10810483)	3
103 (9785394)	4
102 (2208853)	3
105 (17138732)	2
69 (15534056)	3
99 (15001684)	2
106 (11547374)	3

References	Study Quality
64 (19038601)	4
63 (19182727)	4
108 (31218592)	3
66 (-3195824)	4
109 (-3195826)	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
97 (16950034)	3
93 (26295591)	4
22 (16846767)	4
96 (16627160)	4
95 (27232641)	2
94 (23091176)	2

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
18 (8895629)	3
59 (22361912)	4
60 (11247700)	3
61 (2354603)	2
62 (2225613)	3
64 (19038601)	4
63 (19182727)	4
65 (25071885)	4
30 (18310744)	4
66 (-3195824)	4

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

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

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
73 (18704405)	M
82 (11685492)	2
75 (16829764)	M
70 (24196917)	3
78 (17448973)	3
80 (12271415)	3
76 (12766596)	3
79 (16721569)	4
74 (16512924)	3
71 (12089487)	3
69 (15534056)	3
68 (11197979)	3
81 (24873788)	2
72 (32145890)	4
77 (-3195825)	4

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

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
97 (16950034)	3
93 (26295591)	4
22 (16846767)	4
116 (25633024)	4
96 (16627160)	4

131 (35315718)					2											
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											
20 (16514580)					4											
60 (11247700)					3											
120 (14579084)					3											
61 (2354603)					2											
62 (2225613)					3											
119 (2295172)					3											
121 (11553828)					4											
123 (3655908)					3											
122 (31263926)					3											
66 (-3195824)					4											
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											
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											
107 (2027967)					3											
101 (8496202)					3											
106 (11547374)					3											
134 (2266391)					3											
127 (15100514)					2											
66 (-3195824)					4											
109 (-3195826)					3											

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

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

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	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]	8	8	1	0	0	0	0	0	2	3	5
		References		Study 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 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 Quality											
		137 (22733959)		4											
		138 (24647514)		4											
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

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.

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
139 (9917679)	3
140 (11689376)	4
143 (7497664)	2
40 (15864052)	3
144 (23906867)	2
142 (11021452)	3
145 (30473230)	3

MRI knee without IV contrast	May be appropriate	Limited	O 0 mSv	O 0 mSv [ped]	6	6	0	0	1	0	4	4	1	0	1

References	Study Quality
147 (21741843)	4
146 (10794232)	4
148 (22933492)	3

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

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
147 (21741843)	4
93 (26295591)	4
152 (12579011)	4
154 (27022733)	4
153 (32993344)	3

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

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

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.**