

**American College of Radiology  
ACR Appropriateness Criteria®**

**Osteonecrosis**

**Variant 1: Clinically suspected osteonecrosis. Initial imaging.**

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
Radiography area of interest	Usually appropriate	Limited	Varies	Varies	9	9	0	0	0	0	0	0	0	1	11
		References		Study Quality											
		27 (32767711)		2											
		28 (26088795)		4											
CT area of interest with IV contrast	Usually not appropriate	Expert Consensus	Varies	Varies	1	1	10	2	0	0	0	0	0	0	0
CT area of interest without IV contrast	Usually not appropriate	Expert Consensus	Varies	Varies	1	1	10	1	0	0	1	0	0	0	0
CT area of interest without and with IV contrast	Usually not appropriate	Expert Consensus	Varies	Varies	1	1	10	1	0	0	1	0	0	0	0
MRI area of interest without IV contrast	Usually not appropriate	Expert Consensus	0 0 mSv	0 0 mSv [ped]	1	1	11	1	0	0	0	0	0	0	0
MRI area of interest without and with IV contrast	Usually not appropriate	Expert Consensus	0 0 mSv	0 0 mSv [ped]	1	1	10	0	0	1	0	0	1	0	0
Bone scan area of interest	Usually not appropriate	Limited	☼☼☼ 1-10 mSv		1	1	9	2	0	0	1	0	0	0	0
		References		Study Quality											
		30 (12163624)		1											
		29 (3336682)		3											

31 (18360802)	3
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**Variant 2: Clinically suspected osteonecrosis. Normal radiographs or radiographs that show findings suspicious for osteonecrosis. 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 area of interest without IV contrast	Usually appropriate	Moderate	0 0 mSv	0 0 mSv [ped]	9	9	0	0	0	0	0	0	1	1	10
		References		Study Quality											
		5 (25019438)		4											
		13 (18310696)		4											
		43 (29973239)		Good											
		47 (27519911)		4											
		40 (27905865)		4											
		48 (28355130)		3											
		46 (30676781)		4											
		14 (18350349)		3											
		28 (26088795)		4											
		42 (26009009)		4											
		24 (24966252)		4											
		44 (30112253)		4											
		45 (26397350)		4											
CT area of interest without IV contrast	May be appropriate (Disagreement)	Expert Opinion	Varies	Varies	5	5	1	0	1	0	6	1	1	2	0
		References		Study Quality											
		36 (2732252)		4											
		37 (12540435)		2											
		38 (19234700)		2											
MRI area of interest without and with IV contrast	May be appropriate	Limited	0 0 mSv	0 0 mSv [ped]	5	5	0	0	1	2	6	1	2	0	0

References	Study Quality
41 (25129825)	3
39 (21343508)	2
40 (27905865)	4

Bone scan area of interest	Usually not appropriate	Strong	☢☢☢ 1-10 mSv		2	2	5	3	0	3	1	0	0	0	0
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References	Study Quality
30 (12163624)	1
34 (30646869)	2
32 (28089085)	3
33 (32746824)	2
35 (32251061)	4

CT area of interest with IV contrast	Usually not appropriate	Expert Consensus	Varies	Varies	1	1	10	1	1	0	0	0	0	0
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CT area of interest without and with IV contrast	Usually not appropriate	Expert Consensus	Varies	Varies	1	1	10	1	1	0	0	0	0	0
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**Variant 3: Known osteonecrosis with articular collapse by radiographs. Surgery planned. Next imaging study.**

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
CT area of interest without IV contrast	Usually appropriate	Strong	Varies	Varies	8	8	1	0	0	0	1	1	1	3	5

References	Study Quality
37 (12540435)	2
38 (19234700)	2
50 (29848357)	1
49 (31571188)	4

MRI area of interest without IV contrast	Usually appropriate	Limited	0 0 mSv	0 0 mSv [ped]	8	8	0	0	0	0	2	1	1	3	5
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References	Study Quality
13 (18310696)	4
52 (18712375)	2
14 (18350349)	3

MRI area of interest without and with IV contrast	Usually not appropriate	Limited	0 0 mSv	0 0 mSv [ped]	2	2	6	0	1	3	1	1	0	0	0
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References	Study Quality
51 (30697641)	3

CT area of interest with IV contrast	Usually not appropriate	Expert Consensus	Varies	Varies	1	1	9	1	2	0	0	0	0	0	0
CT area of interest without and with IV contrast	Usually not appropriate	Expert Consensus	Varies	Varies	1	1	9	1	2	0	0	0	0	0	0
Bone scan area of interest	Usually not appropriate	Expert Consensus	☢☢☢ 1-10 mSv		1	1	8	0	2	2	0	0	0	0	0
MR arthrography area of interest	Usually not appropriate	Expert Consensus	0 0 mSv	0 0 mSv [ped]	1	1	11	0	0	1	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](http://www.acr.org/ac).