American College of Radiology
ACR Appropriateness Criteria®

Osteoporosis and Bone Mineral Density

Variant 1: Asymptomatic BMD screening or individuals with established or clinically suspected low BMD.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
DXA lumbar spine and hip(s)	Usually appropriate		☢ <0.1 mSv		9	n/a	0	0	0	0	0	0	0	0	0
QCT lumbar spine and hip	May be appropriate		☢☢☢ 1-10 mSv		6	n/a	0	0	0	0	0	0	0	0	0
DXA distal forearm	May be appropriate		☢ <0.1 mSv		5	n/a	0	0	0	0	0	0	0	0	0
TBS lumbar spine	May be appropriate		☢ <0.1 mSv		4	n/a	0	0	0	0	0	0	0	0	0
pQCT distal forearm	Usually not appropriate		☢ <0.1 mSv		2	n/a	0	0	0	0	0	0	0	0	0
SXA distal forearm	Usually not appropriate		☢ <0.1 mSv		2	n/a	0	0	0	0	0	0	0	0	0
QUS calcaneus	Usually not appropriate		O 0 mSv	O 0 mSv [ped]	2	n/a	0	0	0	0	0	0	0	0	0
Radiography axial skeleton	Usually not appropriate		Varies	Varies	1	n/a	0	0	0	0	0	0	0	0	0
Radiography appendicular skeleton	Usually not appropriate		☢☢ 0.1-1mSv		1	n/a	0	0	0	0	0	0	0	0	0

Variant 2: In patients with T-scores less than 1.0 and one or more of the following: a.Women age 70 years or men age 80 years b.Historical height loss >4 cm (>1.5 inches) c.Self-reported but undocumented prior vertebral fracture d.Glucocorticoid therapy equivalent to 5 mg of prednisone or equivalent per day for 3 months

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
DXA VFA	Usually appropriate		☢ <0.1 mSv		9	n/a	0	0	0	0	0	0	0	0	0

Variant 3: Follow-up. Patients demonstrated to have risk for fracture or low density.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
DXA lumbar spine and hip(s)	Usually appropriate		☢ <0.1 mSv		9	n/a	0	0	0	0	0	0	0	0	0
QCT lumbar spine and hip	Usually appropriate		☢☢☢ 1-10 mSv		7	n/a	0	0	0	0	0	0	0	0	0
DXA VFA	May be appropriate		☢ <0.1 mSv		5	n/a	0	0	0	0	0	0	0	0	0
pQCT distal forearm	Usually not appropriate		☢ <0.1 mSv		3	n/a	0	0	0	0	0	0	0	0	0
TBS lumbar spine	Usually not appropriate		☢ <0.1 mSv		2	n/a	0	0	0	0	0	0	0	0	0
SXA distal forearm	Usually not appropriate		☢ <0.1 mSv		1	n/a	0	0	0	0	0	0	0	0	0
QUS calcaneus	Usually not appropriate		O 0 mSv	O 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0

Variant 4: Identify low BMD. Premenopausal females with risk factors. Males 20-50 years old with risk factors.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
DXA lumbar spine and hip(s)	Usually appropriate		☢ <0.1 mSv		9	n/a	0	0	0	0	0	0	0	0	0
DXA distal forearm	Usually appropriate		☢ <0.1 mSv		8	n/a	0	0	0	0	0	0	0	0	0
QCT lumbar spine and hip	Usually not appropriate		☢☢☢ 1-10 mSv		3	n/a	0	0	0	0	0	0	0	0	0
pQCT distal forearm	Usually not appropriate		☢ <0.1 mSv		3	n/a	0	0	0	0	0	0	0	0	0
QUS calcaneus	Usually not appropriate		O 0 mSv	O 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
SXA distal forearm	Usually not appropriate		☢ <0.1 mSv		1	n/a	0	0	0	0	0	0	0	0	0

Variant 5: Follow-up to low BMD. Premenopausal females with risk factors. Males 20–50 years of age with risk factors.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
DXA lumbar spine and hip(s)	Usually appropriate		☢ <0.1 mSv		9	n/a	0	0	0	0	0	0	0	0	0
DXA distal forearm	Usually appropriate		☢ <0.1 mSv		8	n/a	0	0	0	0	0	0	0	0	0
QCT lumbar spine and hip	Usually not appropriate		☢☢☢ 1-10 mSv		3	n/a	0	0	0	0	0	0	0	0	0
pQCT distal forearm	Usually not appropriate		☢ <0.1 mSv		1	n/a	0	0	0	0	0	0	0	0	0

QUS calcaneus	Usually not appropriate		O 0 mSv	O 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
SXA distal forearm	Usually not appropriate		☢ <0.1 mSv		1	n/a	0	0	0	0	0	0	0	0	0

Variant 6: Diagnosis. Males and females >50 years of age with advanced degenerative changes of the spine with or without scoliosis.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
QCT lumbar spine and hip(s)	Usually appropriate		☢☢☢ 1-10 mSv		8	n/a	0	0	0	0	0	0	0	0	0
DXA lumbar spine and hip(s)	Usually appropriate		☢ <0.1 mSv		7	n/a	0	0	0	0	0	0	0	0	0
DXA distal forearm	Usually appropriate		☢ <0.1 mSv		7	n/a	0	0	0	0	0	0	0	0	0

Variant 7: Suspected fracture (nonscreening) of a vertebral body based on acute or subacute symptomatology in a patient with suspected osteoporosis or a patient treated with corticosteroids (>3 months). First examination.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
Radiography spine area of interest	Usually appropriate		Varies	Varies	9	n/a	0	0	0	0	0	0	0	0	0
CT spine area of interest without IV contrast	May be appropriate		Varies	Varies	5	n/a	0	0	0	0	0	0	0	0	0
MRI spine area of interest without IV contrast	Usually not appropriate		O 0 mSv	O 0 mSv [ped]	2	n/a	0	0	0	0	0	0	0	0	0
MRI spine area of interest without and with IV contrast	Usually not appropriate		O 0 mSv	O 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0

CT spine area of interest without and with IV contrast	Usually not appropriate		Varies	Varies	1	n/a	0	0	0	0	0	0	0	0	0
CT spine area of interest with IV contrast	Usually not appropriate		Varies	Varies	1	n/a	0	0	0	0	0	0	0	0	0
DXA VFA	Usually not appropriate		☢ <0.1 mSv		1	n/a	0	0	0	0	0	0	0	0	0

Variant 8: Suspected fracture (nonscreening) of a vertebral body based on acute or subacute symptomatology in a patient with suspected osteoporosis or a patient treated with corticosteroids (>3 months). Initial radiograph is negative.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
MRI lumbar spine without IV contrast	Usually appropriate		O 0 mSv	O 0 mSv [ped]	9	n/a	0	0	0	0	0	0	0	0	0
CT lumbar spine without IV contrast	Usually appropriate		☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	7	n/a	0	0	0	0	0	0	0	0	0
MRI lumbar spine without and with IV contrast	Usually not appropriate		O 0 mSv	O 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
CT lumbar spine without and with IV contrast	Usually not appropriate		☢☢☢☢ 10-30 mSv	☢☢☢☢ 3-10 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
CT lumbar spine with IV contrast	Usually not appropriate		☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
DXA VFA	Usually not appropriate		☢ <0.1 mSv		1	n/a	0	0	0	0	0	0	0	0	0

Variant 9: Patients on long-term treatment (3–5 years) of bisphosphonates with thigh or groin pain. First examination.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
Radiography femur	Usually appropriate		☢ <0.1 mSv	☢☢ 0.03-0.3 mSv [ped]	9	n/a	0	0	0	0	0	0	0	0	0
DXA extended femur scan	Usually not appropriate		☢ <0.1 mSv		1	n/a	0	0	0	0	0	0	0	0	0
CT thigh without and with IV contrast bilateral	Usually not appropriate		☢☢☢ 1-10 mSv		1	n/a	0	0	0	0	0	0	0	0	0
CT thigh without IV contrast bilateral	Usually not appropriate		☢☢ 0.1-1mSv		1	n/a	0	0	0	0	0	0	0	0	0
CT thigh with IV contrast bilateral	Usually not appropriate		☢☢ 0.1-1mSv		1	n/a	0	0	0	0	0	0	0	0	0
Tc-99m bone scan whole body	Usually not appropriate		☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
US thigh bilateral	Usually not appropriate		O 0 mSv	O 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
MRI thigh without IV contrast bilateral	Usually not appropriate		O 0 mSv	O 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
MRI thigh without and with IV contrast bilateral	Usually not appropriate		O 0 mSv	O 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0

Variant 10: Patients on long-term treatment (3–5 years) of bisphosphonates with thigh or groin pain and negative radiographs.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
MRI thigh without IV contrast bilateral	Usually appropriate		O 0 mSv	O 0 mSv [ped]	9	n/a	0	0	0	0	0	0	0	0	0

CT thigh without IV contrast bilateral	Usually appropriate		☢☢ 0.1-1mSv		8	n/a	0	0	0	0	0	0	0	0	0
Tc-99m bone scan whole body	Usually appropriate		☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	7	n/a	0	0	0	0	0	0	0	0	0
US thigh bilateral	Usually not appropriate		O 0 mSv	O 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
MRI thigh without and with IV contrast bilateral	Usually not appropriate		O 0 mSv	O 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
DXA extended femur scan	Usually not appropriate		☢ <0.1 mSv		1	n/a	0	0	0	0	0	0	0	0	0
CT thigh without and with IV contrast bilateral	Usually not appropriate		☢☢☢ 1-10 mSv		1	n/a	0	0	0	0	0	0	0	0	0
CT thigh with IV contrast bilateral	Usually not appropriate		☢☢ 0.1-1mSv		1	n/a	0	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.**