

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

Parathyroid Adenoma

Variant 1: Adult or child. Primary hyperparathyroidism. Initial imaging.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
CT neck without and with IV contrast	Usually appropriate	Strong	⊕⊕⊕ 1-10 mSv	⊕⊕⊕⊕ 3-10 mSv [ped]	9	9	0	0	0	1	0	1	2	4	13

References	Study Quality
44 (26359149)	1
31 (30475247)	2
30 (26024308)	2
36 (24674300)	2
39 (22135127)	2
35 (21367374)	2
34 (27329424)	2
29 (23868155)	2
45 (26447369)	2
41 (27590748)	2
42 (21955750)	1
43 (28705526)	3
37 (21184187)	2
38 (25518904)	2
40 (29063298)	2
32 (30835187)	2

Sestamibi dual-phase scan with SPECT or SPECT/CT neck	Usually appropriate	Strong	☼☼☼ 1-10 mSv		9	9	0	0	0	0	0	2	2	5	12
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References	Study Quality
70 (21710322)	Good
71 (26932954)	2
68 (22454482)	4
73 (26825209)	2
72 (20466104)	4
61 (19893394)	2
62 (25642803)	Good
69 (18794320)	4
32 (30835187)	2

US parathyroid	Usually appropriate	Strong	0 0 mSv	0 0 mSv [ped]	9	9	0	0	0	0	0	0	3	3	15
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References	Study Quality
67 (25475790)	4
31 (30475247)	2
90 (21178047)	2
88 (26274755)	2
70 (21710322)	Good
18 (30938239)	4
7 (26898682)	4
58 (26646659)	2
85 (29281866)	Not Assessed
20 (20338394)	4
86 (30103649)	2
89 (19774444)	3
87 (21463783)	2
8 (31002214)	4
91 (16585862)	2
2 (27532368)	4

Sestamibi scan and I-123 thyroid scan with SPECT or SPECT/CT neck	Usually appropriate	Strong	☼☼☼ 1-10 mSv		8	8	0	0	0	0	0	0	4	9	7
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References	Study Quality
74 (26584615)	3
68 (22454482)	4
78 (25637075)	2
75 (24152647)	2
45 (26447369)	2
79 (28984813)	2
69 (18794320)	4

Sestamibi dual-phase scan neck	Usually appropriate	Strong	☼☼☼ 1-10 mSv		7	7	0	0	0	0	0	6	7	4	4
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References	Study Quality
66 (20625763)	2
53 (23759694)	2
67 (25475790)	4
64 (25525929)	1
52 (23153996)	2
54 (22566587)	2
55 (21576603)	2
17 (29461661)	4
56 (21076888)	2
57 (29877611)	1
45 (26447369)	2
58 (26646659)	2
59 (29319134)	2
60 (23748916)	2
61 (19893394)	2
62 (25642803)	Good
63 (30239472)	2
65 (12458389)	1

Sestamibi scan and I-123 thyroid scan	Usually appropriate	Strong	☼☼☼ 1-10 mSv		7	7	0	0	0	0	0	0	14	5	1
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References	Study Quality
64 (25525929)	1
74 (26584615)	3
54 (22566587)	2
77 (22437201)	2
75 (24152647)	2
15 (19471928)	4
45 (26447369)	2
76 (26732668)	2
59 (29319134)	2
65 (12458389)	1

Sestamibi scan and pertechnetate thyroid scan	Usually appropriate	Strong			7	7	0	0	0	0	0	0	15	4	1
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References	Study Quality
64 (25525929)	1
82 (25299470)	2
54 (22566587)	2
17 (29461661)	4
80 (23531879)	2
45 (26447369)	2
81 (23102932)	4
59 (29319134)	2
65 (12458389)	1

Sestamibi scan and pertechnetate thyroid scan with SPECT or SPECT/CT neck	Usually appropriate	Strong	☼☼☼ 1-10 mSv		7	7	1	0	1	0	1	4	4	5	5
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References	Study Quality
68 (22454482)	4
83 (30556441)	2
84 (20615139)	2

		69 (18794320)		4															
CT neck with IV contrast	May be appropriate	Strong	☼☼☼ 1-10 mSv	☼☼☼ 0.3-3 mSv [ped]	6	6	0	0	0	2	6	8	3	1	0				

References	Study Quality
44 (26359149)	1
31 (30475247)	2
30 (26024308)	2
36 (24674300)	2
39 (22135127)	2
35 (21367374)	2
34 (27329424)	2
29 (23868155)	2
45 (26447369)	2
41 (27590748)	2
42 (21955750)	1
43 (28705526)	3
37 (21184187)	2
38 (25518904)	2
40 (29063298)	2
32 (30835187)	2

MRI neck without and with IV contrast	May be appropriate	Strong	○ 0 mSv	○ 0 mSv [ped]	6	6	0	0	0	0	4	10	4	2	0				
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References	Study Quality
46 (21982525)	2
47 (21623148)	2
50 (29736849)	2
52 (23153996)	2
49 (21879264)	2
48 (27318765)	2
51 (32165367)	2

MRI neck with IV contrast	May be appropriate	Strong	○ 0 mSv	○ 0 mSv [ped]	5	5	1	0	2	5	7	4	0	1	0
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References	Study Quality
46 (21982525)	2
47 (21623148)	2
50 (29736849)	2
52 (23153996)	2
49 (21879264)	2
48 (27318765)	2
51 (32165367)	2

MRI neck without IV contrast	Usually not appropriate	Strong	○ 0 mSv	○ 0 mSv [ped]	3	3	5	2	4	3	5	1	1	0	0
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References	Study Quality
46 (21982525)	2
47 (21623148)	2
50 (29736849)	2
52 (23153996)	2
49 (21879264)	2
48 (27318765)	2
51 (32165367)	2

CT neck without IV contrast	Usually not appropriate	Strong	☼☼☼ 1-10 mSv	☼☼☼ 0.3-3 mSv [ped]	2	2	7	5	4	2	3	0	0	0	0
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References	Study Quality
44 (26359149)	1
31 (30475247)	2
30 (26024308)	2
36 (24674300)	2
39 (22135127)	2
35 (21367374)	2
34 (27329424)	2
29 (23868155)	2

45 (26447369)	2
41 (27590748)	2
42 (21955750)	1
43 (28705526)	3
37 (21184187)	2
38 (25518904)	2
40 (29063298)	2
32 (30835187)	2

Venous sampling parathyroid	Usually not appropriate	Strong	Varies	Varies	2	2	9	4	7	0	0	0	0	0	0
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References	Study Quality
94 (20372897)	2
96 (30193297)	4
95 (19958928)	2
92 (27643800)	3
93 (20870706)	4
8 (31002214)	4

Variant 2: Adult or child. Primary hyperparathyroidism, recurrent or persistent after parathyroid surgery. Initial imaging.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
CT neck without and with IV contrast	Usually appropriate	Strong	⊕⊕⊕ 1-10 mSv	⊕⊕⊕⊕ 3-10 mSv [ped]	9	9	0	0	0	1	0	1	2	3	14

References	Study Quality
36 (24674300)	2
97 (25454737)	2
34 (27329424)	2
29 (23868155)	2
40 (29063298)	2

US parathyroid	Usually appropriate	Limited	0 0 mSv	0 0 mSv [ped]	9	9	1	0	0	0	1	2	1	4	12
		References		Study Quality											
		101 (29484563)		3											
		48 (27318765)		2											
		100 (22184303)		3											
		10 (30070413)		4											
Sestamibi dual-phase scan with SPECT or SPECT/CT neck	Usually appropriate	Strong	☼☼☼ 1-10 mSv		8	8	0	0	0	0	0	0	2	9	9
		References		Study Quality											
		48 (27318765)		2											
		99 (20957360)		2											
Sestamibi scan and I-123 thyroid scan with SPECT or SPECT/CT neck	Usually appropriate	Limited	☼☼☼ 1-10 mSv		8	8	0	0	0	0	0	3	5	7	5
		References		Study Quality											
		100 (22184303)		3											
Sestamibi scan and pertechnetate thyroid scan with SPECT or SPECT/CT neck	Usually appropriate	Expert Consensus	☼☼☼ 1-10 mSv		8	8	0	0	0	0	0	1	7	7	5
Sestamibi dual-phase scan neck	Usually appropriate	Expert Consensus	☼☼☼ 1-10 mSv		7	7	0	0	0	0	0	3	14	1	2
Sestamibi scan and I-123 thyroid scan	Usually appropriate	Expert Consensus	☼☼☼ 1-10 mSv		7	7	0	0	0	0	2	2	12	3	1
Sestamibi scan and pertechnetate thyroid scan	Usually appropriate	Expert Consensus			7	7	0	0	0	0	2	2	13	2	1
CT neck with IV contrast	May be appropriate	Strong	☼☼☼ 1-10 mSv	☼☼☼ 0.3-3 mSv [ped]	6	6	0	0	0	3	7	9	0	1	0
		References		Study Quality											
		36 (24674300)		2											
		97 (25454737)		2											

34 (27329424)	2
29 (23868155)	2
40 (29063298)	2

MRI neck without and with IV contrast	May be appropriate	Strong	0 0 mSv	0 0 mSv [ped]	6	6	1	0	0	1	2	8	4	5	0
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References	Study Quality
98 (22695787)	2
48 (27318765)	2

Venous sampling parathyroid	May be appropriate	Strong	Varies	Varies	6	6	0	0	0	2	8	10	0	0	0
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References	Study Quality
96 (30193297)	4
97 (25454737)	2
92 (27643800)	3
104 (25868412)	2
102 (19590890)	4
103 (23554505)	2
93 (20870706)	4
8 (31002214)	4
10 (30070413)	4
105 (27384174)	2

MRI neck with IV contrast	May be appropriate	Strong	0 0 mSv	0 0 mSv [ped]	5	5	0	1	1	7	9	1	0	1	0
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References	Study Quality
98 (22695787)	2
48 (27318765)	2

MRI neck without IV contrast	Usually not appropriate	Strong	0 0 mSv	0 0 mSv [ped]	3	3	7	3	2	5	3	1	0	0	0
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References	Study Quality
98 (22695787)	2
48 (27318765)	2

CT neck without IV contrast	Usually not appropriate	Strong	⊕⊕⊕ 1-10 mSv	⊕⊕⊕ 0.3-3 mSv [ped]	2	2	7	5	3	4	2	0	0	0	0	
			References	Study Quality												
			36 (24674300)	2												
			97 (25454737)	2												
			34 (27329424)	2												
			29 (23868155)	2												
			40 (29063298)	2												

Variant 3: Adult or child. Secondary hyperparathyroidism. Initial imaging.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
Sestamibi dual-phase scan with SPECT or SPECT/CT neck	Usually appropriate	Strong	⊕⊕⊕ 1-10 mSv		8	8	0	0	0	0	0	3	7	6	4
			References	Study Quality											
			110 (29154082)	2											
			109 (29233127)	2											
			108 (24370142)	2											
Sestamibi scan and I-123 thyroid scan with SPECT or SPECT/CT neck	Usually appropriate	Limited	⊕⊕⊕ 1-10 mSv		8	8	0	0	0	1	2	4	3	7	3
			References	Study Quality											
			14 (25409841)	3											
Sestamibi scan and pertechnetate thyroid scan with SPECT or SPECT/CT neck	Usually appropriate	Expert Consensus	⊕⊕⊕ 1-10 mSv		8	8	0	0	0	0	2	5	3	7	3
CT neck without and with IV contrast	Usually appropriate	Strong	⊕⊕⊕ 1-10 mSv	⊕⊕⊕⊕ 3-10 mSv [ped]	7	7	1	0	0	1	3	2	5	6	3
			References	Study Quality											
			107 (31602011)	2											

		106 (26665124)			2													
Sestamibi dual-phase scan neck	Usually appropriate	Limited	☼☼☼ 1-10 mSv		7	7	1	0	0	0	2	1	17	0	0			
		References			Study Quality													
		12 (20091692)			2													
US parathyroid	Usually appropriate	Strong	○ 0 mSv	○ 0 mSv [ped]	7	7	0	0	0	2	3	3	6	2	5			
		References			Study Quality													
		14 (25409841)			3													
		13 (24626889)			2													
		110 (29154082)			2													
		112 (19111413)			2													
		111 (20414855)			2													
		85 (29281866)			Not Assessed													
		12 (20091692)			2													
CT neck with IV contrast	May be appropriate	Strong	☼☼☼ 1-10 mSv	☼☼☼ 0.3-3 mSv [ped]	6	6	0	0	0	2	7	10	0	1	0			
		References			Study Quality													
		107 (31602011)			2													
		106 (26665124)			2													
MRI neck without and with IV contrast	May be appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	6	6	0	0	0	2	7	8	2	1	0			
Sestamibi scan and I-123 thyroid scan	May be appropriate (Disagreement)	Expert Opinion	☼☼☼ 1-10 mSv		5	5	0	0	1	3	2	2	8	3	1			
Sestamibi scan and pertechnetate thyroid scan	May be appropriate (Disagreement)	Expert Opinion			5	5	0	0	0	3	3	2	9	2	1			
MRI neck with IV contrast	May be appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	4	4	1	0	1	10	6	1	0	1	0			

CT neck without IV contrast	Usually not appropriate	Strong	☹☹☹ 1-10 mSv	☹☹☹ 0.3-3 mSv [ped]	2	2	8	9	3	0	0	0	0	0	0	
		References	Study Quality													
		107 (31602011)	2													
		106 (26665124)	2													
MRI neck without IV contrast	Usually not appropriate	Expert Consensus	0 0 mSv	0 0 mSv [ped]	2	2	9	4	4	3	1	0	0	0	0	
Venous sampling parathyroid	Usually not appropriate	Expert Consensus	Varies	Varies	2	2	8	6	4	1	1	1	0	0	0	

Variant 4: Adult or child. Tertiary hyperparathyroidism. Initial imaging.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations									
							1	2	3	4	5	6	7	8	9	
Sestamibi dual-phase scan with SPECT or SPECT/CT neck	Usually appropriate	Limited	☹☹☹ 1-10 mSv		8	8	0	0	0	0	0	2	3	11	4	
		References	Study Quality													
		110 (29154082)	2													
Sestamibi scan and I-123 thyroid scan with SPECT or SPECT/CT neck	Usually appropriate	Expert Consensus	☹☹☹ 1-10 mSv		8	8	0	0	0	0	2	4	2	8	4	
Sestamibi scan and pertechnetate thyroid scan with SPECT or SPECT/CT neck	Usually appropriate	Expert Consensus	☹☹☹ 1-10 mSv		8	8	0	0	0	0	3	3	2	8	4	
CT neck without and with IV contrast	Usually appropriate	Expert Consensus	☹☹☹ 1-10 mSv	☹☹☹☹ 3-10 mSv [ped]	7	7	0	0	0	0	1	0	11	5	3	
Sestamibi dual-phase scan neck	Usually appropriate	Expert Consensus	☹☹☹ 1-10 mSv		7	7	0	0	0	0	3	3	10	3	1	
Sestamibi scan and pertechnetate thyroid scan	Usually appropriate	Expert Consensus			7	7	0	0	0	2	3	2	9	3	1	

US parathyroid	Usually appropriate	Strong	0 0 mSv	0 0 mSv [ped]	7	7	0	0	0	0	0	2	9	3	6	
		References	Study Quality													
		14 (25409841)	3													
		13 (24626889)	2													
		110 (29154082)	2													
CT neck with IV contrast	May be appropriate	Expert Consensus	☹☹☹ 1-10 mSv	☹☹☹ 0.3-3 mSv [ped]	6	6	0	0	0	3	7	9	0	1	0	
MRI neck without and with IV contrast	May be appropriate	Expert Consensus	0 0 mSv	0 0 mSv [ped]	6	6	0	0	0	3	7	8	1	1	0	
Sestamibi scan and I-123 thyroid scan	May be appropriate (Disagreement)	Expert Opinion	☹☹☹ 1-10 mSv		5	5	0	0	0	3	3	1	9	3	1	
MRI neck with IV contrast	May be appropriate	Expert Consensus	0 0 mSv	0 0 mSv [ped]	5	5	1	1	1	7	9	0	0	1	0	
MRI neck without IV contrast	Usually not appropriate	Expert Consensus	0 0 mSv	0 0 mSv [ped]	2	2	8	4	4	2	3	0	0	0	0	
Venous sampling parathyroid	Usually not appropriate	Limited	Varies	Varies	2	2	7	6	3	2	2	1	0	0	0	
		References	Study Quality													
		96 (30193297)	4													
		93 (20870706)	4													
CT neck without IV contrast	Usually not appropriate	Expert Consensus	☹☹☹ 1-10 mSv	☹☹☹ 0.3-3 mSv [ped]	1	1	11	4	3	2	1	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.