American College of Radiology
ACR Appropriateness Criteria®

Neuroendocrine Imaging

Variant 1: Adult. Suspected or known hypofunctioning pituitary gland (hypopituitarism, growth hormone deficiency, growth deceleration, panhypopituitarism, hypogonadotropic hypogonadism). Initial imaging.

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

References	Study Quality
2 (27890190)	4
1 (27003878)	4
25 (26614829)	4
24 (24364195)	3
19 (22875743)	4
27 (23040741)	4
23 (22749386)	4
26 (21470998)	4
44 (17964033)	4
35 (17524347)	4
61 (17467517)	4
31 (17698579)	4
32 (17873755)	4
34 (17157037)	4
37 (17576206)	4
38 (20020580)	3
39 (19963090)	3

41 (17578763)	3
42 (17159354)	4
47 (17594050)	4
48 (20197674)	3
52 (18046535)	4
53 (19320653)	4
54 (18174733)	4
58 (18625361)	4
59 (17126479)	4
55 (19809320)	4
57 (17954416)	4
30 (1593348)	4
33 (11022195)	4
40 (8222293)	3
45 (1424165)	2
49 (15379423)	4
50 (2064861)	3
56 (2112091)	4
64 (2677826)	4
65 (7945110)	4
28 (1564527)	4
29 (20500966)	4
36 (18317442)	4
43 (18226737)	4
46 (17964354)	4
60 (18209870)	4
51 (2336284)	4
63 (25658782)	2
62 (10796926)	2

MRI sella without IV contrast	Usually appropriate	Strong	O 0 mSv	O 0 mSv [ped]	7	7	0	0	1	1	1	2	9	1	0

References	Study Quality
2 (27890190)	4
1 (27003878)	4
25 (26614829)	4
24 (24364195)	3
19 (22875743)	4
27 (23040741)	4
23 (22749386)	4
26 (21470998)	4
44 (17964033)	4
35 (17524347)	4
61 (17467517)	4
31 (17698579)	4
32 (17873755)	4
34 (17157037)	4
37 (17576206)	4
38 (20020580)	3
39 (19963090)	3
41 (17578763)	3
42 (17159354)	4
47 (17594050)	4
48 (20197674)	3
52 (18046535)	4
53 (19320653)	4
54 (18174733)	4
58 (18625361)	4
59 (17126479)	4
55 (19809320)	4
57 (17954416)	4
30 (1593348)	4
33 (11022195)	4

40 (8222293)	3
45 (1424165)	2
49 (15379423)	4
50 (2064861)	3
56 (2112091)	4
28 (1564527)	4
29 (20500966)	4
36 (18317442)	4
43 (18226737)	4
46 (17964354)	4
60 (18209870)	4
51 (2336284)	4
63 (25658782)	2
62 (10796926)	2

CT sella with IV contrast	May be appropriate	Limited	☢☢☢ 1-10 mSv	☢☢☢ 0.3-3 mSv [ped]	5	5	0	2	1	2	5	5	0	0	0

References	Study Quality
18 (24594782)	3
12 (22084178)	4

MRI sella with IV contrast	May be appropriate	Strong	O 0 mSv	O 0 mSv [ped]	4	4	4	2	2	1	6	1	0	0	0

References	Study Quality
2 (27890190)	4
1 (27003878)	4
25 (26614829)	4
24 (24364195)	3
19 (22875743)	4
27 (23040741)	4
23 (22749386)	4
26 (21470998)	4
44 (17964033)	4

35 (17524347)	4
61 (17467517)	4
31 (17698579)	4
32 (17873755)	4
34 (17157037)	4
37 (17576206)	4
38 (20020580)	3
39 (19963090)	3
41 (17578763)	3
42 (17159354)	4
47 (17594050)	4
48 (20197674)	3
52 (18046535)	4
53 (19320653)	4
54 (18174733)	4
58 (18625361)	4
59 (17126479)	4
55 (19809320)	4
57 (17954416)	4
30 (1593348)	4
33 (11022195)	4
40 (8222293)	3
45 (1424165)	2
49 (15379423)	4
50 (2064861)	3
56 (2112091)	4
64 (2677826)	4
65 (7945110)	4
28 (1564527)	4
29 (20500966)	4
36 (18317442)	4

References	Study Quality
43 (18226737)	4
46 (17964354)	4
60 (18209870)	4
51 (2336284)	4
63 (25658782)	2
62 (10796926)	2

CTA head with IV contrast	Usually not appropriate	Limited	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	3	3	3	3	6	1	1	1	0	0	0

References	Study Quality
20 (3683835)	3

MRA head without IV contrast	Usually not appropriate	Limited	O 0 mSv	O 0 mSv [ped]	3	3	3	1	6	4	0	1	0	0	0

References	Study Quality
21 (11499817)	4
22 (1584359)	4

CT sella without IV contrast	Usually not appropriate	Limited	☢☢☢ 1-10 mSv	☢☢☢ 0.3-3 mSv [ped]	3	3	2	3	3	5	1	1	0	0	0

References	Study Quality
18 (24594782)	3
12 (22084178)	4

MRA head without and with IV contrast	Usually not appropriate	Limited	O 0 mSv	O 0 mSv [ped]	2	2	5	4	3	2	0	1	0	0	0

References	Study Quality
21 (11499817)	4
22 (1584359)	4

MRA head with IV contrast	Usually not appropriate	Limited	O 0 mSv	O 0 mSv [ped]	2	2	5	4	4	1	0	1	0	0	0

References	Study Quality
21 (11499817)	4
22 (1584359)	4

Venous sampling petrosal sinus	Usually not appropriate	Limited	Varies	Varies	1	1	14	1	0	0	0	0	0	0	0

References	Study Quality
66 (21990499)	4
67 (8881446)	4
68 (22286783)	3

Radiography sella	Usually not appropriate	Limited	☢ <0.1 mSv		1	1	13	2	0	0	0	0	0	0	0

References	Study Quality
69 (8927393)	4

CT sella without and with IV contrast	Usually not appropriate	Limited	☢☢☢ 1-10 mSv	☢☢☢ 0.3-3 mSv [ped]	1	1	8	2	1	3	1	0	0	0	0

References	Study Quality
18 (24594782)	3
12 (22084178)	4

Variant 2: Adult. Suspected or known hyperfunctioning pituitary adenoma (hyperthyroidism [high thyroid-stimulating hormone], Cushing syndrome [high adrenal corticotrophic hormone], hyperprolactinemia, acromegaly, or gigantism). Initial imaging.

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

References	Study Quality
76 (26782836)	3
75 (24248770)	3
77 (22066905)	2
13 (21291344)	4
74 (20116954)	3
41 (17578763)	3

References	Study Quality
15 (2645603)	4
60 (18209870)	4
78 (16785841)	4
79 (11566239)	2
81 (28452619)	2
80 (11809542)	3

MRI sella without IV contrast	Usually appropriate	Strong	O 0 mSv	O 0 mSv [ped]	7	7	0	0	1	1	1	3	7	1	1

References	Study Quality
76 (26782836)	3
77 (22066905)	2
41 (17578763)	3
15 (2645603)	4
60 (18209870)	4
78 (16785841)	4
79 (11566239)	2
81 (28452619)	2
80 (11809542)	3

CT sella with IV contrast	May be appropriate	Limited	☢☢☢ 1-10 mSv	☢☢☢ 0.3-3 mSv [ped]	5	5	0	2	2	0	4	7	0	0	0

References	Study Quality
70 (2679524)	4
73 (8357624)	4
71 (6734060)	4
72 (8189257)	4
28 (1564527)	4

CT sella without IV contrast	May be appropriate	Expert Consensus	☢☢☢ 1-10 mSv	☢☢☢ 0.3-3 mSv [ped]	4	4	3	3	1	5	3	0	0	0	0
MRI sella with IV contrast	May be appropriate	Strong	O 0 mSv	O 0 mSv [ped]	4	4	4	2	1	2	6	1	0	0	0

References	Study Quality
76 (26782836)	3
75 (24248770)	3
77 (22066905)	2
13 (21291344)	4
74 (20116954)	3
41 (17578763)	3
15 (2645603)	4
60 (18209870)	4
78 (16785841)	4
79 (11566239)	2
81 (28452619)	2
80 (11809542)	3

CTA head with IV contrast	Usually not appropriate	Limited	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	2	2	4	4	5	1	0	1	0	0	0

References	Study Quality
20 (3683835)	3

Venous sampling petrosal sinus	Usually not appropriate	Limited	Varies	Varies	2	2	7	2	2	2	1	1	0	0	0

References	Study Quality
66 (21990499)	4
67 (8881446)	4
68 (22286783)	3

MRA head without IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	2	2	7	3	5	0	0	0	0	0	0
MRA head with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	2	2	7	3	4	1	0	0	0	0	0
MRA head without and with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	8	3	3	1	0	0	0	0	0

Radiography sella	Usually not appropriate	Expert Consensus	☢ <0.1 mSv		1	1	14	1	0	0	0	0	0	0	0
CT sella without and with IV contrast	Usually not appropriate	Limited	☢☢☢ 1-10 mSv	☢☢☢ 0.3-3 mSv [ped]	1	1	8	3	1	0	2	1	0	0	0

References	Study Quality
70 (2679524)	4
73 (8357624)	4
71 (6734060)	4
72 (8189257)	4
28 (1564527)	4

Variant 3: Adult. Diabetes insipidus. Initial imaging.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
MRI sella without and with IV contrast	Usually appropriate	Limited	O 0 mSv	O 0 mSv [ped]	9	9	0	0	0	0	0	0	0	0	15

References	Study Quality
82 (22877954)	4
23 (22749386)	4

MRI sella without IV contrast	Usually appropriate	Limited	O 0 mSv	O 0 mSv [ped]	7	7	0	0	1	1	1	3	6	2	1

References	Study Quality
82 (22877954)	4
23 (22749386)	4

CT sella with IV contrast	May be appropriate	Expert Consensus	☢☢☢ 1-10 mSv	☢☢☢ 0.3-3 mSv [ped]	6	6	0	2	1	0	4	7	1	0	0
CT sella without IV contrast	May be appropriate	Expert Consensus	☢☢☢ 1-10 mSv	☢☢☢ 0.3-3 mSv [ped]	4	4	2	3	1	6	2	1	0	0	0

MRI sella with IV contrast	May be appropriate	Limited	O 0 mSv	O 0 mSv [ped]	4	4	4	2	2	1	6	1	0	0	0
	References		Study Quality												
	82 (22877954)		4												
	23 (22749386)		4												
CTA head with IV contrast	Usually not appropriate	Limited	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	2	2	5	3	4	1	1	1	0	0	0
	References		Study Quality												
	20 (3683835)		3												
Venous sampling petrosal sinus	Usually not appropriate	Expert Consensus	Varies	Varies	1	1	15	0	0	0	0	0	0	0	0
MRA head without IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	8	4	3	0	0	0	0	0	0
MRA head without and with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	8	3	3	1	0	0	0	0	0
Radiography sella	Usually not appropriate	Expert Consensus	☢ <0.1 mSv		1	1	15	0	0	0	0	0	0	0	0
MRA head with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	8	4	2	1	0	0	0	0	0
CT sella without and with IV contrast	Usually not appropriate	Expert Consensus	☢☢☢ 1-10 mSv	☢☢☢ 0.3-3 mSv [ped]	1	1	8	1	2	0	3	1	0	0	0

Variant 4: Adult. Pituitary apoplexy. Initial imaging.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
MRI sella without and with IV contrast	Usually appropriate	Limited	O 0 mSv	O 0 mSv [ped]	9	9	0	0	0	0	0	0	0	0	15
	References		Study Quality												

		83 (26414232)		4												
		85 (23585661)		3												
		84 (17898201)		2												
MRI sella without IV contrast	Usually appropriate	Limited	O 0 mSv	O 0 mSv [ped]	7	7	0	0	0	1	2	2	5	4	1	
		References		Study Quality												
		83 (26414232)		4												
		85 (23585661)		3												
		84 (17898201)		2												
CT sella without IV contrast	May be appropriate (Disagreement)	Expert Opinion	☢☢☢ 1-10 mSv	☢☢☢ 0.3-3 mSv [ped]	5	5	0	4	1	6	2	2	0	1	0	
		References		Study Quality												
		16 (15927868)		4												
CT sella with IV contrast	May be appropriate	Limited	☢☢☢ 1-10 mSv	☢☢☢ 0.3-3 mSv [ped]	4	4	0	4	1	7	3	1	0	0	0	
		References		Study Quality												
		16 (15927868)		4												
MRI sella with IV contrast	May be appropriate	Limited	O 0 mSv	O 0 mSv [ped]	4	4	4	2	1	3	5	1	0	0	0	
		References		Study Quality												
		83 (26414232)		4												
		85 (23585661)		3												
CTA head with IV contrast	Usually not appropriate	Limited	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	2	2	5	3	5	1	1	0	0	0	0	
		References		Study Quality												
		20 (3683835)		3												
Venous sampling petrosal sinus	Usually not appropriate	Expert Consensus	Varies	Varies	1	1	15	0	0	0	0	0	0	0	0	

MRA head without IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	8	4	1	2	0	0	0	0	0
MRA head without and with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	8	4	1	1	1	0	0	0	0
Radiography sella	Usually not appropriate	Expert Consensus	☢ <0.1 mSv		1	1	15	0	0	0	0	0	0	0	0
MRA head with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	9	3	2	1	0	0	0	0	0
CT sella without and with IV contrast	Usually not appropriate	Limited	☢☢☢ 1-10 mSv	☢☢☢ 0.3-3 mSv [ped]	1	1	10	3	0	2	0	1	0	0	0

References	Study Quality
16 (15927868)	4

Variant 5: Adult. Surveillance postpituitary or sellar mass resection.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
MRI sella without and with IV contrast	Usually appropriate	Limited	O 0 mSv	O 0 mSv [ped]	9	9	0	0	0	0	0	0	1	0	14

References	Study Quality
96 (28073906)	3
86 (21959621)	3
64 (2677826)	4
97 (29329735)	2

MRI sella without IV contrast	Usually appropriate	Limited	O 0 mSv	O 0 mSv [ped]	7	7	0	0	1	0	3	2	4	3	2

References	Study Quality
96 (28073906)	3
97 (29329735)	2

CT sella without IV contrast	May be appropriate	Limited	☢☢☢ 1-10 mSv	☢☢☢ 0.3-3 mSv [ped]	4	4	1	3	4	7	1	0	0	0	0
	References		Study Quality												
	95 (21436342)		3												
CT sella with IV contrast	May be appropriate	Limited	☢☢☢ 1-10 mSv	☢☢☢ 0.3-3 mSv [ped]	4	4	0	2	1	5	3	3	1	0	0
	References		Study Quality												
	95 (21436342)		3												
MRI sella with IV contrast	May be appropriate	Limited	O 0 mSv	O 0 mSv [ped]	4	4	4	2	2	2	4	1	1	0	0
	References		Study Quality												
	96 (28073906)		3												
	86 (21959621)		3												
	64 (2677826)		4												
	97 (29329735)		2												
CTA head with IV contrast	Usually not appropriate	Expert Consensus	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	3	3	7	0	3	4	0	1	0	0	0
MRA head without IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	2	2	7	1	3	3	0	1	0	0	0
MRA head with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	2	2	7	3	2	2	0	1	0	0	0
CT sella without and with IV contrast	Usually not appropriate	Limited	☢☢☢ 1-10 mSv	☢☢☢ 0.3-3 mSv [ped]	2	2	7	1	2	2	1	2	0	0	0
	References		Study Quality												
	95 (21436342)		3												
Venous sampling petrosal sinus	Usually not appropriate	Expert Consensus	Varies	Varies	1	1	15	0	0	0	0	0	0	0	0
MRA head without and with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	8	2	2	2	0	1	0	0	0

Radiography sella	Usually not appropriate	Expert Consensus	☢ <0.1 mSv		1	1	15	0	0	0	0	0	0	0	0

Variant 6: Child, males younger than 9 years of age; females younger than 8 years of age. Precocious puberty. Initial imaging.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
MRI sella without and with IV contrast	Usually appropriate	Limited	O 0 mSv	O 0 mSv [ped]	9	9	0	0	0	0	0	1	0	0	14

References	Study Quality
105 (23150859)	4
107 (27148371)	4
112 (18509122)	4
113 (25878671)	3

MRI sella without IV contrast	Usually appropriate	Limited	O 0 mSv	O 0 mSv [ped]	7	7	0	0	0	0	4	2	6	2	1

References	Study Quality
105 (23150859)	4
107 (27148371)	4
112 (18509122)	4
113 (25878671)	3

MRI sella with IV contrast	May be appropriate	Limited	O 0 mSv	O 0 mSv [ped]	4	4	4	2	1	3	4	2	0	0	0

References	Study Quality
105 (23150859)	4
107 (27148371)	4
112 (18509122)	4
113 (25878671)	3

CTA head with IV contrast	Usually not appropriate	Limited	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	2	2	5	3	6	0	0	1	0	0	0

		References		Study Quality												
		20 (3683835)		3												
CT sella without IV contrast	Usually not appropriate	Limited	☢☢☢ 1-10 mSv	☢☢☢ 0.3-3 mSv [ped]	2	2	3	5	1	3	1	2	0	0	0
		References		Study Quality												
		111 (3554937)		4												
CT sella with IV contrast	Usually not appropriate	Limited	☢☢☢ 1-10 mSv	☢☢☢ 0.3-3 mSv [ped]	2	2	2	8	3	3	0	0	0	0	0
		References		Study Quality												
		111 (3554937)		4												
Venous sampling petrosal sinus	Usually not appropriate	Expert Consensus	Varies	Varies	1	1	14	1	0	0	0	0	0	0	0
MRA head without IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	9	2	2	1	0	0	1	0	0
MRA head without and with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	9	3	1	1	0	0	0	0	1
Radiography sella	Usually not appropriate	Expert Consensus	☢ <0.1 mSv		1	1	15	0	0	0	0	0	0	0	0
MRA head with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	9	2	2	1	0	0	1	0	0
CT sella without and with IV contrast	Usually not appropriate	Limited	☢☢☢ 1-10 mSv	☢☢☢ 0.3-3 mSv [ped]	1	1	8	1	3	2	1	0	0	0	0
		References		Study Quality												
		111 (3554937)		4												

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.**