

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

## Seizures and Epilepsy

**Variant 1: New-onset seizure. Unrelated to trauma. Initial imaging.**

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
CT head without IV contrast	Usually appropriate	Limited	☹☹☹ 1-10 mSv	☹☹☹ 0.3-3 mSv [ped]	8	7	0	0	0	0	2	4	4	4	3
		References		Study Quality											
		17 (27430454)		4											
		16 (23676306)		4											
		15 (15897958)		4											
MRI head without IV contrast	Usually appropriate	Limited	○ ○ mSv	○ ○ mSv [ped]	8	8	1	0	0	0	1	2	2	4	7
		References		Study Quality											
		17 (27430454)		4											
		16 (23676306)		4											
		18 (27740984)		4											
		15 (15897958)		4											
MRI head without and with IV contrast	May be appropriate	Limited	○ ○ mSv	○ ○ mSv [ped]	6	7	0	0	0	0	2	5	2	4	4
		References		Study Quality											
		17 (27430454)		4											
		16 (23676306)		4											
		18 (27740984)		4											
		15 (15897958)		4											







		22 (27183405)		4											
MRI head without and with IV contrast	May be appropriate	Limited	○ 0 mSv	○ 0 mSv [ped]	4	4	0	2	2	8	3	1	0	0	0
		References		Study Quality											
		19 (25456317)		4											
		17 (27430454)		4											
		16 (23676306)		4											
		18 (27740984)		4											
		15 (15897958)		4											
		22 (27183405)		4											
CT head without and with IV contrast	Usually not appropriate	Limited	☼☼☼ 1-10 mSv	☼☼☼☼ 3-10 mSv [ped]	2	2	8	5	1	1	0	1	1	0	0
		References		Study Quality											
		19 (25456317)		4											
		17 (27430454)		4											
		16 (23676306)		4											
		15 (15897958)		4											
		14 (-3149353)		4											
CT head with IV contrast	Usually not appropriate	Limited	☼☼☼ 1-10 mSv	☼☼☼ 0.3-3 mSv [ped]	1	1	9	5	0	1	1	1	0	0	0
		References		Study Quality											
		19 (25456317)		4											
		17 (27430454)		4											
		16 (23676306)		4											
		15 (15897958)		4											
		14 (-3149353)		4											
MEG	Usually not appropriate	Expert Consensus	○ 0 mSv		1	1	17	0	0	0	0	0	0	0	0
MRI functional (fMRI) head without IV contrast	Usually not appropriate	Limited	○ 0 mSv	○ 0 mSv [ped]	1	1	14	2	1	0	0	0	0	0	0

		References		Study Quality											
		20 (25424870)		4											
FDG-PET/CT brain	Usually not appropriate	Limited	☹☹☹ 1-10 mSv	☹☹☹☹ 3-10 mSv [ped]	1	1	15	2	0	0	0	0	0	0	0
		References		Study Quality											
		20 (25424870)		4											
SPECT or SPECT/CT brain perfusion ictal and interictal	Usually not appropriate	Expert Consensus	☹☹☹ 1-10 mSv	☹☹☹☹ 3-10 mSv [ped]	1	1	16	1	0	0	0	0	0	0	0

**Variant 4: Known seizure disorder. Unchanged seizure semiology.**

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
CT head without IV contrast	May be appropriate	Limited	⊕⊕⊕ 1-10 mSv	⊕⊕⊕ 0.3-3 mSv [ped]	5	5	1	0	2	2	8	3	0	0	0
		References		Study Quality											
		16 (23676306)		4											
		23 (19513318)		4											
MRI head without IV contrast	May be appropriate (Disagreement)	Expert Opinion	○ 0 mSv	○ 0 mSv [ped]	5	5	0	0	3	1	5	3	3	1	0
		References		Study Quality											
		17 (27430454)		4											
		31 (25341150)		4											
		8 (26550535)		4											
		33 (23538269)		3											
		32 (28670168)		3											
MRI head without and with IV contrast	May be appropriate	Limited	○ 0 mSv	○ 0 mSv [ped]	5	5	0	0	3	1	6	5	0	0	1
		References		Study Quality											

		17 (27430454)	4												
		31 (25341150)	4												
		8 (26550535)	4												
		33 (23538269)	3												
		32 (28670168)	3												
FDG-PET/CT brain	May be appropriate (Disagreement)	Expert Opinion	⊕⊕⊕ 1-10 mSv	⊕⊕⊕⊕ 3-10 mSv [ped]	5	5	2	0	3	1	2	6	2	0	0
		References	Study Quality												
		29 (8206016)	4												
		28 (26118354)	2												
		8 (26550535)	4												
		24 (10319744)	3												
		25 (7824101)	3												
		26 (12215554)	3												
		27 (9403474)	2												
		30 (28258205)	4												
CT head with IV contrast	Usually not appropriate	Limited	⊕⊕⊕ 1-10 mSv	⊕⊕⊕ 0.3-3 mSv [ped]	2	2	8	1	1	3	2	2	0	0	0
		References	Study Quality												
		16 (23676306)	4												
		23 (19513318)	4												
CT head without and with IV contrast	Usually not appropriate	Limited	⊕⊕⊕ 1-10 mSv	⊕⊕⊕⊕ 3-10 mSv [ped]	2	2	8	2	1	1	3	2	0	0	0
		References	Study Quality												
		16 (23676306)	4												
		23 (19513318)	4												
MEG	Usually not appropriate	Expert Consensus	○ 0 mSv		1	1	13	2	1	1	0	0	0	0	0
MRI functional (fMRI) head without IV contrast	Usually not appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	1	1	13	1	3	0	0	0	0	0	0





		References	Study Quality														
		29 (8206016)	4														
		28 (26118354)	2														
		8 (26550535)	4														
		24 (10319744)	3														
		25 (7824101)	3														
		26 (12215554)	3														
		27 (9403474)	2														
		30 (28258205)	4														
CT head without and with IV contrast	Usually not appropriate	Limited	☹☹☹ 1-10 mSv	☹☹☹☹ 3-10 mSv [ped]	2	n/a	0	0	0	0	0	0	0	0	0	0	0
		References	Study Quality														
		17 (27430454)	4														
		16 (23676306)	4														
		23 (19513318)	4														
SPECT or SPECT/CT brain perfusion ictal and interictal	Usually not appropriate	Expert Consensus	☹☹☹ 1-10 mSv	☹☹☹☹ 3-10 mSv [ped]	2	n/a	0	0	0	0	0	0	0	0	0	0	0
CT head with IV contrast	Usually not appropriate	Limited	☹☹☹ 1-10 mSv	☹☹☹ 0.3-3 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0	0	0
		References	Study Quality														
		17 (27430454)	4														
		16 (23676306)	4														
		23 (19513318)	4														
MEG	Usually not appropriate	Expert Consensus	○ ○ mSv		1	n/a	0	0	0	0	0	0	0	0	0	0	0
MRI functional (fMRI) head without IV contrast	Usually not appropriate	Expert Consensus	○ ○ mSv	○ ○ mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0	0	0

**Variant 6: Known seizure disorder. History of tumor.**



		35 (22977022)			4											
FDG-PET/CT brain	May be appropriate (Disagreement)	Expert Opinion	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	5	5	1	0	2	1	5	5	2	0	0	
		References			Study Quality											
		36 (12687915)			4											
		37 (28718993)			3											
CT head with IV contrast	Usually not appropriate	Limited	☢☢☢ 1-10 mSv	☢☢☢ 0.3-3 mSv [ped]	3	3	4	3	2	1	4	2	0	0	0	
		References			Study Quality											
		17 (27430454)			4											
		16 (23676306)			4											
		23 (19513318)			4											
		35 (22977022)			4											
MEG	Usually not appropriate	Expert Consensus	0 0 mSv		1	1	13	1	3	0	0	0	0	0	0	
MRI functional (fMRI) head without IV contrast	Usually not appropriate	Expert Consensus	0 0 mSv	0 0 mSv [ped]	1	1	11	1	3	0	0	1	1	0	0	
SPECT or SPECT/CT brain perfusion ictal and interictal	Usually not appropriate	Expert Consensus	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	1	1	11	1	2	1	1	1	0	0	0	

**Variant 7: Known seizure disorder. Surgical candidate or surgical planning.**

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
MRI head without IV contrast	Usually appropriate	Limited	0 0 mSv	0 0 mSv [ped]	8	8	0	0	1	0	0	1	3	6	6
		References		Study Quality											
		43 (23719051)		4											
		17 (27430454)		4											

			31 (25341150)	4															
			57 (21145290)	4															
			16 (23676306)	4															
			8 (26550535)	4															
			58 (20227852)	4															
MRI head without and with IV contrast	Usually appropriate	Limited	0 0 mSv	0 0 mSv [ped]	8	8	0	0	0	0	1	1	3	4	8				
			References	Study Quality															
			43 (23719051)	4															
			17 (27430454)	4															
			31 (25341150)	4															
			57 (21145290)	4															
			16 (23676306)	4															
			8 (26550535)	4															
			58 (20227852)	4															
FDG-PET/CT brain	Usually appropriate	Strong	☢☢☢ 1-10 mSv	☢☢☢☢☢ 3-10 mSv [ped]	7	7	0	0	1	0	1	5	6	4	0				
			References	Study Quality															
			44 (17532231)	M															
			28 (26118354)	2															
			16 (23676306)	4															
			8 (26550535)	4															
			45 (11337340)	2															
			46 (28171851)	2															
			MRI functional (fMRI) head without IV contrast	May be appropriate															
			References	Study Quality															
			54 (22429073)	2															
			44 (17532231)	M															
			52 (28077494)	Inadequate															
			18 (27740984)	4															

		53 (23294162)		2											
		55 (20308450)		2											
		56 (22957237)		4											
SPECT or SPECT/CT brain perfusion ictal and interictal	May be appropriate	Limited	☼☼☼ 1-10 mSv	☼☼☼☼ 3-10 mSv [ped]	6	6	1	0	0	2	5	6	2	1	0
		References		Study Quality											
		43 (23719051)		4											
		6 (-3091614)		4											
		59 (12352114)		3											
CT head with IV contrast	May be appropriate	Limited	☼☼☼ 1-10 mSv	☼☼☼ 0.3-3 mSv [ped]	5	5	1	1	5	1	6	1	1	0	0
		References		Study Quality											
		43 (23719051)		4											
		41 (824125)		4											
		40 (810737)		4											
		42 (2492137)		3											
		16 (23676306)		4											
		23 (19513318)		4											
CT head without IV contrast	May be appropriate	Limited	☼☼☼ 1-10 mSv	☼☼☼ 0.3-3 mSv [ped]	5	5	0	0	1	2	7	6	0	0	0
		References		Study Quality											
		43 (23719051)		4											
		41 (824125)		4											
		40 (810737)		4											
		42 (2492137)		3											
		16 (23676306)		4											
		23 (19513318)		4											
MEG	May be appropriate	Limited	O O mSv		5	5	1	0	0	1	8	5	2	0	0
		References		Study Quality											



## 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).