American College of Radiology ACR Appropriateness Criteria®

Seizures and Epilepsy

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

	Appropriateness								F	inal '	Tabu	latio	ns		
Procedure	Category	SOE	Adults RRL	Peds RRL	Rating	Median	1	2	3	4	5	6		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	O 0 mSv	O 0 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	O 0 mSv	O 0 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										

CT head with IV contrast	Usuall approp	Limited	��� 1-1(mSv	9	3	1	9	3	4	0	0	0	0	0	0
		References		Stu	dy Quality										
		17 (27430454)			4										
		16 (23676306)			4										
		15 (15897958)			4		_								
CT head without and with IV contrast	Usuall approp	Limited	≎≎≎ 1-10 mSv)	1	2	7	3	1	3	2	0	0	0	0
		References		Stu	dy Quality										
		17 (27430454)			4										
		16 (23676306)			4										
		15 (15897958)			4										
MEG	Usuall approp	Expert Consensus	O 0 mSv		1	1	13	1	1	1	1	0	0	0	0
MRI functional (fMRI) head without IV contrast	Usuall approp	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	10	1	4	0	0	2	0	0	0
FDG-PET/CT brain	Usuall approp	Expert Consensus	��� 1-10 mSv	9999 3- 10 mSv [ped]	1	5	1	1	0	2	5	6	1	0	0
SPECT or SPECT/CT brain perfusion ictal and interictal	Usuall approp	Expert Consensus	��� 1-10 mSv	9999 3- 10 mSv [ped]	1	2	7	2	3	1	2	1	1	0	0

Variant 2: New-onset seizure. Unrelated to trauma. Initial imaging.

D 1	Appropriateness	COE	A L L DDI	D I DDI	D 4	34.11			F	inal '	Tabu	latio	ns		
Procedure	Category	SOE	Adults RRL	Peds RRL	Rating	Median	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	8	0	0	0	0	0	2	4	4	7
		References		Study	/ Quality										

							1								
		17 (27430454)			4										
		16 (23676306)			4										
		15 (15897958)			4	_									
MRI head without IV contrast	Usually appropriate	Limited	O 0 mSv	O 0 mSv [ped]	8	8	0	0	0	0	2	0	2	6	6
		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	O 0 mSv	O 0 mSv [ped]	6	6	0	1	0	0	4	5	4	2	1
		References		Study	Quality					•					
		17 (27430454)			4										
		16 (23676306)			4										
		18 (27740984)			4										
		15 (15897958)			4										
CT head with IV contrast	Usually not appropriate	Limited	��� 1-10 mSv	��� 0.3- 3 mSv [ped]	3	3	5	2	5	3	0	1	0	0	0
		References		Study	Quality										
		17 (27430454)			4										
		16 (23676306)			4										
		15 (15897958)			4	_	_								
CT head without and with IV contrast	Usually not appropriate	Limited	��� 1-10 mSv	���� 3- 10 mSv [ped]	1	1	9	3	1	3	0	0	0	0	0
		References		Study	Quality										
		17 (27430454)			4	<u> </u>									
		16 (23676306)			4										
		15 (15897958)			4										

MEG	Usually not appropriate	Expert Consensus	O 0 mSv		1	1	17	0	0	0	0	0	0	0	0
MRI functional (fMRI) head without IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	15	1	1	0	0	0	0	0	0
FDG-PET/CT brain	Usually not appropriate	Expert Consensus	୫୫୫ 1-10 mSv	���� 3- 10 mSv [ped]	1	1	15	1	1	0	0	0	0	0	0
SPECT or SPECT/CT brain perfusion ictal and interictal	Usually not appropriate	Expert Consensus	୫୫୫ 1-10 mSv	���� 3- 10 mSv [ped]	1	1	15	1	1	0	0	0	0	0	0

Variant 3: New-onset seizure. History of trauma. Initial imaging.

Durandana	Appropri	iateness	SOF	A J14 DD		D. J. DDY	D - 42	M- 1!			F	inal '	Гаbu	latio	ns		
Procedure	Categ	gory	SOE	Adults RR	aL	Peds RRL	Rating	Median	1	2	3	4	5	6	7	8	9
CT head without IV contrast	Usua approp		Limited	⊛⊕⊕ 1-10 mSv	0	��� 0.3- 3 mSv [ped]	9	9	0	0	0	0	0	0	0	2	15
			References			Study	Quality										
			19 (25456317)				4										
			17 (27430454)				4										
			16 (23676306)				4										
			15 (15897958)				4										
,			14 (-3149353)				4										
MRI head without IV contrast	May approp	be oriate	Limited	O 0 mSv	,	O 0 mSv [ped]	6	6	1	0	1	0	3	4	5	3	0
			References			Study	Quality										
			19 (25456317)				4										
			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	O 0 mSv	O 0 mSv [ped]	4	4	0	2	2	8	3	1	0	0	0
		References		Study	y 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	y 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	y Quality										
		19 (25456317)			4										
		17 (27430454)			4										
		16 (23676306)			4										
		15 (15897958)			4										
		14 (-3149353)	_		4										
MEG	Usually not appropriate	Expert Consensus	O 0 mSv		1	1	17	0	0	0	0	0	0	0	0
MRI functional (fMRI) head without IV contrast	Usually not appropriate	Limited	O 0 mSv	O 0 mSv [ped]	1	1	14	2	1	0	0	0	0	0	0

			References 20 (25424870)		Study	y Quality										
			20 (25424870)			4										
FDG-PET/CT brain	Usuall approp		iate		0	1	1	15	2	0	0	0	0	0	0	0
		References		Study	y Quality											
		20 (25424870)			4											
SPECT or SPECT/CT brain perfusion ictal and interictal	Usuall approp	y not Expert 🏵		��� 1-10 mSv	0	1	1	16	1	0	0	0	0	0	0	0

Variant 4: Known seizure disorder. Unchanged seizure semiology.

D 1	Appropriate	ropriateness SOE Adults				n i nni	D 41	3.4. 11			F	inal '	Tabul	atio	ıs		
Procedure	Categor	y	SOE	Adults RRI	L	Peds RRL	Rating	Median	1	2	3	4	5	6	7	8	9
CT head without IV contrast	May be appropria		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 appropria (Disagreem	ate E	Expert Opinion	O 0 mSv		O 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 appropria		Limited	O 0 mSv		O 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										
approp	riate	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	_									
		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										
		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										
		Expert Consensus	O 0 mSv		1	1	13	2	1	1	0	0	0	0	0
				O 0 mSv					Ì						
	Usually approp	Usually not appropriate Usually not appropriate Usually not appropriate Usually not appropriate	31 (25341150) 8 (26550535) 33 (23538269) 32 (28670168) Between to Dinion Expert Opinion Expert Opinion Properties Expert Opinion Expert Opinion Expert Opinion Expert Opinion 28 (26118354) 8 (26550535) 24 (10319744) 25 (7824101) 26 (12215554) 27 (9403474) 30 (28258205) Expert Expert	31 (25341150) 8 (26550535) 33 (23538269) 32 (28670168) Expert Opinion	31 (25341150) 8 (26550535) 33 (23538269) 32 (28670168)	31 (25341150)	31 (25341150)	31 (25341150)	31 (25341150)	31 (25341150)	31 (25341150)	31 (25341150)	Study Quality Study Qualit	Signature Study Quality Signature Signature Study Quality Signature Signature	31 (25341150)

SPECT or SPECT/CT brain perfusion ictal and interictal	Usually not appropriate	Expert Consensus	≎⊛≎ 1-10 mSv	���� 3- 10 mSv [ped]	1	1	13	1	3	0	0	0	0	0	0
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Variant 5: Known seizure disorder. Change in seizure semiology or new neurologic deficit or no return to previous neurologic baseline.

D 1	Appropri	ateness	COF	ALL DDI	D 1 DD1	D 41	3.7.11			F	inal '	Tabu	latio	ns		
Procedure	Categ	ory	SOE	Adults RRL	Peds RRL	Rating	Median	1	2	3	4	5	6	7	8	9
MRI head without IV contrast	Usual appropr		Limited	O 0 mSv	O 0 mSv [ped]	8	n/a	0	0	0	0	0	0	0	0	0
			References		Stud	y Quality										
			17 (27430454)			4										
			16 (23676306)			4										
			18 (27740984)			4										
			15 (15897958)		1	4		_								
CT head without IV contrast	Usual appropi		Limited	��� 1-10 mSv	��� 0.3- 3 mSv [ped]	7	n/a	0	0	0	0	0	0	0	0	0
			References		Stud	y Quality										
			17 (27430454)			4										
			16 (23676306)			4										
			15 (15897958)			4		_								
MRI head without and with IV contrast	Usual appropr	lly riate	Limited	O 0 mSv	O 0 mSv [ped]	7	n/a	0	0	0	0	0	0	0	0	0
			References		Stud	y Quality										
			17 (27430454)			4										
	_		16 (23676306)			4										
			18 (27740984)			4										
			15 (15897958)			4										
FDG-PET/CT brain	May approp	be riate	Strong	��� 1-10 mSv	���� 3- 10 mSv [ped]	5	n/a	0	0	0	0	0	0	0	0	0

	1															
			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 approp		Limited	⊛⊕⊕ 1-10 mSv	0	2	n/a	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 approp		Expert Consensus	��� 1-10 mSv	0	2	n/a	0	0	0	0	0	0	0	0	0
CT head with IV contrast	Usually approp		Limited	��� 1-10 mSv	0	1	n/a	0	0	0	0	0	0	0	0	0
			References		Study	/ Quality										
			17 (27430454)			4										
			16 (23676306)			4										
			23 (19513318)			4										
MEG	Usually approp	y not Expert O 0 mSv		,	1	n/a	0	0	0	0	0	0	0	0	0	
MRI functional (fMRI) head without IV contrast	Usually approp	not Expert O.O.mSv.		O 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0	

Variant 6: Known seizure disorder. History of tumor.

ъ .	Appropriateness	COL	A L L DDI	D I DDI	D (1	37.11			F	Final Tabulation			ns		
Procedure	Category	SOE	Adults RRL	Peds RRL	Rating	Median	1	2	3	4	5	6	7	8	9
MRI head without and with IV contrast	Usually appropriate	Limited	O 0 mSv	O 0 mSv [ped]	9	9	0	0	0	0	0	0	2	0	15
		References		Study	Quality										
		36 (12687915)													
		35 (22977022)		4											
		38 (23325863)			4										
		39 (21393407)			4										
MRI head without IV contrast	Usually appropriate	Limited	O 0 mSv	O 0 mSv [ped]	7	7	0	0	1	1	3	2	7	1	2
		References		Study		•					•	•	•		
		36 (12687915)													
		35 (22977022)													
		38 (23325863)			4										
		39 (21393407)			4										
CT head without IV contrast	May be appropriate	Limited	��� 1-10 mSv	��� 0.3- 3 mSv [ped]	6	6	0	0	0	2	3	6	3	1	1
		References		Study											
		17 (27430454)			4										
		16 (23676306)			4										
		23 (19513318)			4										
		35 (22977022)			4										
CT head without and with IV contrast	May be appropriate (Disagreement)	Expert Opinion	��� 1-10 mSv	���� 3- 10 mSv [ped]	5	5	2	2	3	2	2	3	2	0	0
		References		Study	Quality										_
		17 (27430454)			4										
		16 (23676306)			4										
		23 (19513318)			4										

		35 (22977022)			4											
FDG-PET/CT brain	May approp (Disagree	riate	Expert Opinion mSv		���� 3- 10 mSv [ped]	10 mSv 5 5		1	0	2	1	5	5	2	0	0
			References		Study											
			36 (12687915)			4										
			37 (28718993)			3										
CT head with IV contrast	Usually approp				��� 0.3- 3 mSv [ped]	3	3	4	3	2	1	4	2	0	0	0
			References	Study	/ Quality											
			17 (27430454)		4											
			16 (23676306)													
			23 (19513318)		4											
			35 (22977022)		4											
MEG	Usually approp		Expert Consensus	O 0 mSv		1	1	13	1	3	0	0	0	0	0	0
MRI functional (fMRI) head without IV contrast	Usually approp		Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	11	1	3	0	0	1	1	0	0
SPECT or SPECT/CT brain perfusion ictal and interictal	Usually approp		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	GOT.	A L L DDI	D I DDI	D (1	3.6.11			F	inal '	Гаbu	latio	ns		
	Category	SOE	Adults RRL	Peds RRL	Rating	Median	1	2	3	4	5	6	7	8	9
MRI head without IV contrast	Usually appropriate	Limited	O 0 mSv	O 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	O 0 mSv	O 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										
				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											
		44 (17532231)													
		28 (26118354)													
		16 (23676306)			4										
		8 (26550535)			4										
		45 (11337340)			2										
		46 (28171851)			2										
MRI functional (fMRI) head without IV contrast	May be appropriate	Strong	O 0 mSv	O 0 mSv [ped]	6	6	1	0	0	0	5	3	3	5	0
		References			/ Quality										
		54 (22429073)			2										
		44 (17532231)			M										
		52 (28077494)			dequate										
		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	ଫଫଫ 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)													
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)													
		16 (23676306)													
		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										
					3										
		16 (23676306)			4										
		23 (19513318)		1	4										
MEG	May be appropriate	Limited	O 0 mSv		5	5	1	0	0	1	8	5	2	0	0
		References			Quality										

			47 (18265877)			4											
			48 (25921215)				2										
			49 (18759617)				4										
			50 (12876149)			4											
			51 (24791076)	4													
CT head without and with IV contrast	Usuall approp	y not Limited		��� 1-1 mSv	0	���� 3- 10 mSv [ped]	1	1	9	5	1	0	0	0	1	0	0
			References														
			43 (23719051)			4											
			41 (824125)			4											
			40 (810737)				4										

4

4

42 (2492137) 16 (23676306)

23 (19513318)

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.