# American College of Radiology ACR Appropriateness Criteria<sup>®</sup>

## Movement Disorders and Neurodegenerative Diseases

Variant 1: Rapidly progressive dementia; suspected Creutzfeldt-Jakob disease. Initial imaging.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	1	2	F 3	inal	Tabu			8	9
MRI head without IV contrast	Usually appropriate	Strong	O 0 mSv	O 0 mSv [ped]	8	8	0	1	0	0	1	1	1	4	6
		References		Study	Quality					1					
		8 (16908558)			3										
		14 (15958503)			2										
		10 (13679271)			3										
		6 (20430851)			2										
		11 (22499277)			4										
		7 (19755520)			1										
		12 (15304574)			2										
		13 (17569970)			2										
		15 (15956529)			2										
		16 (25367029)			4										
		17 (27942451)			2										
		9 (28076012)			4										
MRI head without and with IV contrast	Usually appropriate	Strong	O 0 mSv	O 0 mSv [ped]	8	8	0	0	0	0	0	0	7	2	6
		References		Study	Quality		•		•		•	•	•		
		8 (16908558)		*	3										
		14 (15958503)			2										

		10 (13679271)			3										
		6 (20430851)			2										
		11 (22499277)			4										
		7 (19755520)			1										
		12 (15304574)			2										
		13 (17569970)			2										
		15 (15956529)			2										
		16 (25367029)			4										
		17 (27942451)			2										
		9 (28076012)			4										
CT head without IV contrast	May approp	Expert Consensus	ତତତ 1-10 mSv	&®≎ 0.3- 3 mSv [ped]	5	5	0	0	1	0	11	3	0	0	0
FDG-PET/CT brain	May approp	Limited	<del>ଡଡଡ</del> ଡ 1-10 mSv	€€€€€ 3- 10 mSv [ped]	4	4	1	1	2	5	5	0	0	0	0
		References		Stud	y Quality										
		4 (12483414)			2										
		5 (8414042)			4										
SPECT or SPECT/CT brain perfusion	May approp	Limited	ତତତ 1-10 mSv	ତତତତ 3- 10 mSv [ped]	4	n/a	0	0	0	0	0	0	0	0	0
		References		Stud	y Quality										
		18 (16769939)			4										
		19 (22050286)			3										
SPECT or SPECT/CT brain perfusion	May approp	Limited	ତତତ 1-10 mSv	&&&& 3- 10 mSv [ped]	4	4	1	0	1	12	1	0	0	0	0
		References		Stud	y Quality										
		18 (16769939)			4										
		19 (22050286)			3										
MR spectroscopy head without IV contrast	Usually approp	Strong	O 0 mSv	O 0 mSv [ped]	3	3	2	1	5	3	2	0	1	0	0

		References		Study	Quality										
		6 (20430851)			2										
		7 (19755520)			1										
CT head with IV contrast	Usuall <sub>2</sub> approp	Expert Consensus	ଝେଝେ 1-1( mSv	)	2	2	7	3	2	1	0	1	0	0	0
CT head without and with IV contrast	Usuall <sub>2</sub> approp	Expert Consensus	ଝେଡେଡ 1-1( mSv	)	1	1	8	3	0	0	1	1	1	0	0
MRI functional (fMRI) head without IV contrast	Usually approp	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	11	2	0	0	0	0	1	0	0

Variant 2: Chorea; suspected Huntington disease. Initial imaging.

	Appropri	ateness	COL				<b>D</b> (1				F	'inal '	Tabu	latio	ıs		
Procedure	Categ	gory	SOE	Adults RR	L.	Peds RRL	Rating	Median	1	2	3	4	5	6	7	8	9
MRI head without IV contrast	Usua approp		Strong	O 0 mSv	,	O 0 mSv [ped]	9	9	0	1	0	0	0	0	3	0	10
			References			Study	v Quality										
			22 (9040728)				4										
			23 (8929153)				2										
			24 (1531910)				2										
			25 (8418795)				4										
			26 (18096682)				2										
			27 (11889230)				2										
			28 (19646924)				2		_			_		-	-	-	
MRI head without and with IV contrast	May approp	be priate	Strong	O 0 mSv	,	O 0 mSv [ped]	6	6	0	1	0	2	2	9	0	1	0
			References			Study	Quality										
			22 (9040728)				4										
			23 (8929153)				2										

			1												
		24 (1531910)			2										
		25 (8418795)			4										
		26 (18096682)			2										
		27 (11889230)			2										
		28 (19646924)			2										
CT head without IV contrast	May approp	Expert Consensus	ତେତତ 1-10 mSv	ତତତ 0.3- 3 mSv [ped]	4	4	1	0	1	11	1	1	0	0	0
CT head with IV contrast	Usually approp	Expert Consensus	֎֎֎ 1-10 mSv	ତେତ 0.3- 3 mSv [ped]	1	1	11	0	2	0	0	1	0	0	0
CT head without and with IV contrast	Usually approp	Expert Consensus	ତତତ 1-10 mSv	<del>ହତତତ</del> 3- 10 mSv [ped]	1	1	11	0	0	2	0	1	0	0	0
MRI functional (fMRI) head without IV contrast	Usually approp	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	11	2	0	0	0	0	1	0	0
MR spectroscopy head without IV contrast	Usually approp	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	11	1	1	0	0	0	1	0	0
FDG-PET/CT brain	Usually approp	Limited	ତତତ 1-10 mSv	<del>ହତତତ</del> 3- 10 mSv [ped]	1	1	8	4	1	0	0	1	0	0	0
		References		Study	/ Quality										
		21 (11696626)			2						_				
SPECT or SPECT/CT brain perfusion	Usually approp	Expert Consensus	֎֎֎ 1-10 mSv	<del>ହତତତ</del> 3- 10 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
SPECT or SPECT/CT brain perfusion	Usually approp	Expert Consensus	ତେତେ 1-10 mSv	<del>ହତତତ</del> 3- 10 mSv [ped]	1	1	11	1	1	0	0	1	0	0	0

#### Variant 3: Parkinsonian syndromes. Initial imaging.

	Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations   1 2 3 4 5 6 7 8 9
1								

	Appropriateness	COF		D I DDI	D. (*	N7 11			]	Final	Tabı	ılatio	ns		
Procedure	Category	SOE	Adults RRL	Peds RRL	Rating	Median	1	2	3	4	5	6	7	8	9
MRI head without IV contrast	Usually appropriate	Strong	O 0 mSv	O 0 mSv [ped]	9	9	0	1	0	0	0	0	3	3	7
		References		Study	Quality										
		41 (19959017)			4										
		44 (16606907)			4										
		64 (15205125)			3										
		40 (12774211)			4										
		42 (12589575)			2										
		66 (24601752)			2										
		67 (17236991)			2										
		43 (10680806)			2										
		47 (12020268)			2										
		48 (9667563)			2										
		49 (8089667)			3										
		50 (15997415)			4										
		51 (12140668)			3										
		52 (11960896)			3										
		53 (17260343)			2										
		54 (10025428)			2										
		55 (11884785)			2										
		56 (20623769)			1										
		57 (17632713)			3										
		58 (15569735)			2										
		59 (8933868)			4										
		60 (19833793)			4										
		61 (12736089)			3										
		62 (15985570)			3										
		63 (15728291)			2										
		65 (7964700)			4										

		46 (29530959)			4										
		45 (24710392)			2										
MRI head without and with IV contrast	May be appropriate	Strong	O 0 mSv	O 0 mSv [ped]	6	6	1	0	0	2	3	3	4	1	0
		References		Study	Quality					-					-
		41 (19959017)			4										
		44 (16606907)			4										
		64 (15205125)			3										
		40 (12774211)			4										
		42 (12589575)			2										
		66 (24601752)			2										
		67 (17236991)			2										
		43 (10680806)			2										
		47 (12020268)			2										
		48 (9667563)			2										
		49 (8089667)			3										
		50 (15997415)			4										
		51 (12140668)			3										
		52 (11960896)			3										
		53 (17260343)			2										
		54 (10025428)			2										
		55 (11884785)			2										
		56 (20623769)			1										
		57 (17632713)			3										
		58 (15569735)			2										
		59 (8933868)			4										
		60 (19833793)			4										
		61 (12736089)			3										
		62 (15985570)			3										
		63 (15728291)			2										
		65 (7964700)			4										

		46 (29530959)			4										
		45 (24710392)			2										
SPECT or SPECT/CT brain striatal	May approp		֎֎֎ 1-10 mSv	≎≎≎≎ 3- 10 mSv [ped]	5	5	1	0	3	0	5	6	0	0	0
		References		Study	v Quality										
		37 (19959018)			4										
		 33 (27489771)			3										
		 34 (11199811)			4										
		 35 (24773455)			4										
		 36 (23515233)			3										
		 38 (8489409)			3										
		39 (17764571)			Good	1					<b></b>				
CT head without IV contrast	May approp	Expert Consensus	ଡଡଡ 1-10 mSv	≎≎≎ 0.3- 3 mSv [ped]	4	4	1	0	2	9	2	1	0	0	0
FDG-PET/CT brain	May approp	Expert Consensus	≎≎≎ 1-10 mSv	<del>ହତତତ</del> 3- 10 mSv [ped]	4	4	2	0	4	5	3	2	0	0	0
CT head with IV contrast	Usuall <sub>approp</sub>	Expert Consensus	ତତତ 1-10 mSv	≎≎≎ 0.3- 3 mSv [ped]	1	1	11	0	1	0	0	1	1	0	0
CT head without and with IV contrast	Usuall approp	Expert Consensus	ତତତ 1-10 mSv	≎≎≎≎ 3- 10 mSv [ped]	1	1	11	0	0	1	0	1	1	0	0
MRI functional (fMRI) head without IV contrast	Usuall approp	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	11	2	0	0	0	0	1	0	0
MR spectroscopy head without IV contrast	Usuall approp	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	11	1	1	0	0	0	1	0	0
Amyloid PET/CT brain	Usuall approp	Expert Consensus	֎֎֎ 1-10 mSv		1	1	12	0	0	0	0	1	1	0	0
SPECT or SPECT/CT brain perfusion	Usuall approp	Expert Consensus	ତତତ 1-10 mSv	✿֎֎֎ 3- 10 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0

SPECT or SPECT/CT brain perfusion	Usually not appropriate	Expert Consensus	ତତତ 1-10 mSv	≎≎≎≎ 3- 10 mSv [ped]	1	1	10	3	0	0	0	0	1	0	0	
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### Variant 4: Suspected neurodegeneration with brain iron accumulation. Initial imaging.

	Appropriaten	less —							F	inal	Tabu	latio	ns		
Procedure	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]	9	9	0	1	0	0	0	0	2	2	9
		References		Study	v Quality										
		70 (12510040)			4										
		71 (21920862)			4										
		69 (16775270)			4										
		72 (18443312)			4										
		73 (15944911)			4										
		74 (19850762)		1	2			1	1		1	1			
MRI head without and with IV contrast	May be appropriate	Limited	O 0 mSv	O 0 mSv [ped]	5	5	0	1	0	3	7	1	3	0	0
		References		Study	Quality										
		70 (12510040)			4										
		71 (21920862)			4										
		69 (16775270)			4										
		72 (18443312)			4										
		73 (15944911)			4										
		74 (19850762)			2										
CT head without IV contrast	May be appropriate	Expert Consensus	ଝେଝ 1-10 mSv	֎֎֎ 0.3- 3 mSv [ped]	4	4	0	0	1	10	3	1	0	0	0
CT head with IV contrast	Usually not appropriate		ତେତେ 1-10 mSv	≎≎≎ 0.3- 3 mSv [ped]	1	1	11	0	1	0	0	1	1	0	0

CT head without and with IV contrast	Usually not appropriate	Expert Consensus	ତତତ 1-10 mSv	≎≎≎≎ 3- 10 mSv [ped]	1	1	11	1	0	0	0	1	1	0	0
MRI functional (fMRI) head without IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	11	2	0	0	0	0	0	0	1
MR spectroscopy head without IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	11	2	0	0	0	0	0	0	1
FDG-PET/CT brain	Usually not appropriate	Expert Consensus	ଷ୍ଟେବ 1-10 mSv	≎≎≎≎ 3- 10 mSv [ped]	1	1	11	2	0	0	0	0	1	0	0
SPECT or SPECT/CT brain perfusion	Usually not appropriate	Expert Consensus	ତତତ 1-10 mSv	≎≎≎≎ 3- 10 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
SPECT or SPECT/CT brain perfusion	Usually not appropriate	Expert Consensus	<del>ଡଡ</del> ଡ 1-10 mSv	ତତତତ 3- 10 mSv [ped]	1	1	11	1	1	0	0	0	0	0	1

#### Variant 5: Suspected motor neuron disease. Initial imaging.

Procedure	Appropriateness	SOE Adu		RL Peds RRL	Rating	Median	Final Tabulations										
	Category		Adults RRL				1	2	3	4	5	6	7	8	9		
MRI head without IV contrast	Usually appropriate	Strong	O 0 mSv	O 0 mSv [ped]	9	9	0	1	0	0	1	0	3	0	9		
		References		Study													
		76 (16324086)															
		77 (9344001)			3												
		78 (7997565)		2													
		79 (3382182)		4													
		80 (11412870)															
		81 (12084444)			2												
		82 (27995062)			2												
		83 (22529995)			1												
		84 (17296988)			2												

		85 (25971894)		4											
MRI head without and with IV contrast	May be appropriate	Strong	O 0 mSv	O 0 mSv [ped]	6	6	1	0	0	1	3	4	4	0	1
		References		Study	v Quality										
		76 (16324086)													
		77 (9344001)	3												
		78 (7997565)													
		79 (3382182)		4 2											
		80 (11412870)													
		81 (12084444)		2											
		82 (27995062)		2											
		83 (22529995)													
		84 (17296988)		2											
		85 (25971894)		1											
MRI spine without IV contrast	May be appropriate (Disagreement)	Expert Opinion	O 0 mSv	O 0 mSv [ped]	5	5	1	0	1	1	3	7	0	1	1
		References		Study Quality											
		89 (24847978)		4 2											
		90 (24219347)													
		91 (29122760)		3											
		88 (22435076)		4 2											
		87 (28586096)													
		86 (29379040)		2											
CT head without IV contrast	May be appropriate	Expert Consensus	ତତତ 1-10 mSv	ଡ≎≎ 0.3- 3 mSv [ped]	4	4	0	1	2	9	2	1	0	0	0
MRI spine without and with IV contrast	May be appropriate	Strong	O 0 mSv	O 0 mSv [ped]	4	4	3	1	0	7	2	2	0	0	0
		References		Study Quality											
		89 (24847978)			4										
		90 (24219347)			2										

		91 (29122760)				3										
		88 (22435076)			4											
		87 (28586096)			2											
			86 (29379040)			2										
CT head with IV contrast	Usuall approp		Expert Consensus	ଷଷଷ 1-10 mSv	��� 0.3- 3 mSv [ped]	1	1	10	0	2	0	0	2	0	0	0
CT head without and with IV contrast	Usuall approp		Expert Consensus	ଷଷଷ 1-10 mSv	≎≎≎≎≎ 3- 10 mSv [ped]	1	1	11	1	0	0	0	1	1	0	0
CT spine with IV contrast	Usuall approp		Expert Consensus	ଷଷ≎ 1-10 mSv		1	1	12	0	0	0	1	0	1	0	0
CT spine without IV contrast	Usuall approp		Expert Consensus	ଡେଡେ 1-10 mSv		1	1	10	0	1	1	1	0	0	1	0
CT spine without and with IV contrast	Usuall approp		Expert Consensus	֎֎֎֎ 10-30 mSv		1	1	11	0	1	0	1	0	0	1	0
MRI functional (fMRI) head without IV contrast	Usuall approp		Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	10	1	1	1	0	0	0	0	1
MR spectroscopy head without IV contrast	Usuall approp		Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	10	1	1	0	0	1	0	0	1
FDG-PET/CT brain	Usuall approp		Expert Consensus	ତତତ 1-10 mSv	֎֎֎֎ 3- 10 mSv [ped]	1	1	10	2	1	0	0	0	1	0	0
SPECT or SPECT/CT brain perfusion	Usuall approp		Expert Consensus	ତେତେ 1-10 mSv	֎֎֎֎ 3- 10 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
SPECT or SPECT/CT brain perfusion	Usuall approp		Expert Consensus	ତତତ 1-10 mSv	֎֎֎֎ 3- 10 mSv [ped]	1	1	10	2	1	0	0	0	0	0	1

#### **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.