

American College of Radiology ACR Appropriateness Criteria®

Seizures-Child

Variant 1: Neonatal seizures, age 0 to 29 days. Initial imaging.

| 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 | Expert Consensus | ○ 0 mSv | ○ 0 mSv [ped] | 9 | 9 | 1 | 0 | 0 | 0 | 0 | 1 | 2 | 1 | 12 |
| US head | May be appropriate | Expert Consensus | ○ 0 mSv | ○ 0 mSv [ped] | 6 | 6 | 0 | 0 | 0 | 0 | 6 | 4 | 5 | 3 | 1 |
| MRI head without and with IV contrast | May be appropriate | Expert Consensus | ○ 0 mSv | ○ 0 mSv [ped] | 5 | 5 | 0 | 1 | 0 | 2 | 12 | 2 | 1 | 1 | 0 |
| CT head without IV contrast | May be appropriate | Expert Consensus | ⊗⊗⊗ 1-10 mSv | ⊗⊗⊗ 0.3-3 mSv [ped] | 5 | 5 | 0 | 0 | 1 | 2 | 7 | 7 | 2 | 0 | 0 |
| CT head with IV contrast | Usually not appropriate | Expert Consensus | ⊗⊗⊗ 1-10 mSv | ⊗⊗⊗ 0.3-3 mSv [ped] | 2 | 2 | 6 | 4 | 4 | 2 | 0 | 0 | 0 | 0 | 1 |
| FDG-PET/CT brain | Usually not appropriate | Expert Consensus | ⊗⊗⊗ 1-10 mSv | ⊗⊗⊗⊗ 3-10 mSv [ped] | 1 | 1 | 14 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| CT head without and with IV contrast | Usually not appropriate | Expert Consensus | ⊗⊗⊗ 1-10 mSv | ⊗⊗⊗⊗ 3-10 mSv [ped] | 1 | 1 | 9 | 3 | 2 | 0 | 2 | 0 | 0 | 0 | 1 |
| SPECT or SPECT/CT brain perfusion | Usually not appropriate | Expert Consensus | ⊗⊗⊗ 1-10 mSv | ⊗⊗⊗⊗ 3-10 mSv [ped] | 1 | n/a | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

Variant 2: Children 6 months to 5 years of age. Simple febrile seizures. Initial imaging.

| 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 not appropriate | Expert Consensus | O 0 mSv | O 0 mSv [ped] | 2 | 2 | 7 | 4 | 4 | 1 | 0 | 1 | 0 | 0 | 0 |
| US head | Usually not appropriate | Expert Consensus | O 0 mSv | O 0 mSv [ped] | 1 | 1 | 15 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| FDG-PET/CT brain | Usually not appropriate | Expert Consensus | ⊕⊕⊕ 1-10 mSv | ⊕⊕⊕⊕ 3-10 mSv [ped] | 1 | 1 | 16 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| MRI head without and with IV contrast | Usually not appropriate | Expert Consensus | O 0 mSv | O 0 mSv [ped] | 1 | 1 | 11 | 4 | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| CT head without and with IV contrast | Usually not appropriate | Expert Consensus | ⊕⊕⊕ 1-10 mSv | ⊕⊕⊕⊕ 3-10 mSv [ped] | 1 | 1 | 14 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| CT head without IV contrast | Usually not appropriate | Expert Consensus | ⊕⊕⊕ 1-10 mSv | ⊕⊕⊕ 0.3-3 mSv [ped] | 1 | 1 | 11 | 4 | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| CT head with IV contrast | Usually not appropriate | Expert Consensus | ⊕⊕⊕ 1-10 mSv | ⊕⊕⊕ 0.3-3 mSv [ped] | 1 | 1 | 13 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| SPECT or SPECT/CT brain perfusion | Usually not appropriate | Expert Consensus | ⊕⊕⊕ 1-10 mSv | ⊕⊕⊕⊕ 3-10 mSv [ped] | 1 | n/a | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

Variant 3: Children 6 months to 5 years of age. Complex febrile seizures. Initial imaging.

| 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 | May be appropriate | Expert Consensus | O 0 mSv | O 0 mSv [ped] | 5 | 5 | 0 | 0 | 0 | 5 | 9 | 4 | 0 | 0 | 1 |
| MRI head without and with IV contrast | Usually not appropriate | Expert Consensus | O 0 mSv | O 0 mSv [ped] | 3 | 3 | 2 | 5 | 6 | 5 | 1 | 0 | 0 | 0 | 0 |

| | | | | | | | | | | | | | | | |
|--------------------------------------|-------------------------|------------------|--------------|---------------------|---|-----|----|---|---|---|---|---|---|---|---|
| CT head without IV contrast | Usually not appropriate | Expert Consensus | ⊗⊗⊗ 1-10 mSv | ⊗⊗⊗ 0.3-3 mSv [ped] | 3 | 3 | 6 | 2 | 8 | 2 | 0 | 0 | 1 | 0 | 0 |
| US head | Usually not appropriate | Expert Consensus | ○ 0 mSv | ○ 0 mSv [ped] | 1 | 1 | 14 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| FDG-PET/CT brain | Usually not appropriate | Expert Consensus | ⊗⊗⊗ 1-10 mSv | ⊗⊗⊗⊗ 3-10 mSv [ped] | 1 | 1 | 16 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| CT head without and with IV contrast | Usually not appropriate | Expert Consensus | ⊗⊗⊗ 1-10 mSv | ⊗⊗⊗⊗ 3-10 mSv [ped] | 1 | 1 | 10 | 4 | 2 | 0 | 0 | 0 | 0 | 0 | 1 |
| CT head with IV contrast | Usually not appropriate | Expert Consensus | ⊗⊗⊗ 1-10 mSv | ⊗⊗⊗ 0.3-3 mSv [ped] | 1 | 1 | 12 | 0 | 3 | 0 | 1 | 0 | 0 | 0 | 1 |
| SPECT or SPECT/CT brain perfusion | Usually not appropriate | Expert Consensus | ⊗⊗⊗ 1-10 mSv | ⊗⊗⊗⊗ 3-10 mSv [ped] | 1 | n/a | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

Variant 4: Children 1 month to 17 years of age. Post-traumatic seizures, not including abusive head 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 | Expert Consensus | ⊗⊗⊗ 1-10 mSv | ⊗⊗⊗ 0.3-3 mSv [ped] | 9 | 9 | 0 | 0 | 0 | 1 | 0 | 1 | 4 | 2 | 9 |
| MRI head without IV contrast | Usually appropriate | Expert Consensus | ○ 0 mSv | ○ 0 mSv [ped] | 7 | 7 | 0 | 0 | 0 | 0 | 5 | 2 | 5 | 2 | 3 |
| MRI head without and with IV contrast | Usually not appropriate | Expert Consensus | ○ 0 mSv | ○ 0 mSv [ped] | 2 | 2 | 5 | 5 | 8 | 0 | 0 | 1 | 0 | 0 | 0 |
| US head | Usually not appropriate | Expert Consensus | ○ 0 mSv | ○ 0 mSv [ped] | 1 | 1 | 13 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| FDG-PET/CT brain | Usually not appropriate | Expert Consensus | ⊗⊗⊗ 1-10 mSv | ⊗⊗⊗⊗ 3-10 mSv [ped] | 1 | 1 | 15 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |

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|--------------------------------------|-------------------------|------------------|--------------|---------------------|---|-----|----|---|---|---|---|---|---|---|---|
| CT head without and with IV contrast | Usually not appropriate | Expert Consensus | ☹☹☹ 1-10 mSv | ☹☹☹☹ 3-10 mSv [ped] | 1 | 1 | 11 | 2 | 0 | 1 | 2 | 0 | 0 | 0 | 1 |
| CT head with IV contrast | Usually not appropriate | Expert Consensus | ☹☹☹ 1-10 mSv | ☹☹☹ 0.3-3 mSv [ped] | 1 | 1 | 10 | 4 | 1 | 1 | 0 | 0 | 0 | 0 | 1 |
| SPECT or SPECT/CT brain perfusion | Usually not appropriate | Expert Consensus | ☹☹☹ 1-10 mSv | ☹☹☹☹ 3-10 mSv [ped] | 1 | n/a | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

Variant 5: Children 1 month to 17 years of age. Focal seizures, not including abusive head trauma. Initial imaging.

| 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 | ○ ○ mSv | ○ ○ mSv [ped] | 9 | n/a | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

| References | Study Quality |
|---------------|---------------|
| 53 (24970739) | 4 |
| 58 (24449193) | 2 |
| 35 (11859865) | 4 |
| 60 (19027586) | 4 |
| 61 (20089940) | 4 |

| | | | | | | | | | | | | | | | |
|---------------------------------------|-----------------------------------|----------------|---------|---------------|---|-----|---|---|---|---|---|---|---|---|---|
| MRI head without and with IV contrast | May be appropriate (Disagreement) | Expert Opinion | ○ ○ mSv | ○ ○ mSv [ped] | 5 | n/a | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
|---------------------------------------|-----------------------------------|----------------|---------|---------------|---|-----|---|---|---|---|---|---|---|---|---|

| References | Study Quality |
|---------------|---------------|
| 53 (24970739) | 4 |
| 58 (24449193) | 2 |
| 35 (11859865) | 4 |
| 60 (19027586) | 4 |
| 61 (20089940) | 4 |

| | | | | | | | | | | | | | | |
|--------------------------------------|-------------------------|------------------|--------------|---------------------|---|-----|---|---|---|---|---|---|---|---|
| CT head without IV contrast | May be appropriate | Expert Consensus | ☼☼☼ 1-10 mSv | ☼☼☼ 0.3-3 mSv [ped] | 5 | n/a | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| CT head with IV contrast | Usually not appropriate | Expert Consensus | ☼☼☼ 1-10 mSv | ☼☼☼ 0.3-3 mSv [ped] | 2 | n/a | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| US head | Usually not appropriate | Expert Consensus | ○ 0 mSv | ○ 0 mSv [ped] | 1 | n/a | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| FDG-PET/CT brain | Usually not appropriate | Expert Consensus | ☼☼☼ 1-10 mSv | ☼☼☼☼ 3-10 mSv [ped] | 1 | n/a | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| CT head without and with IV contrast | Usually not appropriate | Expert Consensus | ☼☼☼ 1-10 mSv | ☼☼☼☼ 3-10 mSv [ped] | 1 | n/a | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| SPECT or SPECT/CT brain perfusion | Usually not appropriate | Expert Consensus | ☼☼☼ 1-10 mSv | ☼☼☼☼ 3-10 mSv [ped] | 1 | n/a | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

Variant 6: Children 1 month to 17 years of age. Primary generalized seizure (neurologically normal). Initial imaging.

| 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 | May be appropriate | Expert Consensus | ○ 0 mSv | ○ 0 mSv [ped] | 5 | 5 | 1 | 0 | 0 | 3 | 13 | 1 | 0 | 0 | 1 |
| MRI head without and with IV contrast | Usually not appropriate | Expert Consensus | ○ 0 mSv | ○ 0 mSv [ped] | 3 | 3 | 7 | 2 | 6 | 3 | 1 | 0 | 0 | 0 | 0 |
| CT head without IV contrast | Usually not appropriate | Expert Consensus | ☼☼☼ 1-10 mSv | ☼☼☼ 0.3-3 mSv [ped] | 2 | 2 | 8 | 2 | 7 | 1 | 1 | 0 | 0 | 0 | 0 |
| US head | Usually not appropriate | Expert Consensus | ○ 0 mSv | ○ 0 mSv [ped] | 1 | 1 | 15 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| FDG-PET/CT brain | Usually not appropriate | Expert Consensus | ☼☼☼ 1-10 mSv | ☼☼☼☼ 3-10 mSv [ped] | 1 | 1 | 14 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |

Variant 8: Children 1 month to 17 years of age. Intractable seizures or refractory epilepsy.

| 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 | Expert Consensus | O 0 mSv | O 0 mSv [ped] | 9 | 9 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 16 |
| FDG-PET/CT brain | May be appropriate | Expert Consensus | ⊕⊕⊕ 1-10 mSv | ⊕⊕⊕⊕ 3-10 mSv [ped] | 6 | 6 | 1 | 0 | 0 | 0 | 5 | 12 | 1 | 0 | 0 |
| SPECT or SPECT/CT brain perfusion | May be appropriate | Strong | ⊕⊕⊕ 1-10 mSv | ⊕⊕⊕⊕ 3-10 mSv [ped] | 6 | n/a | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | References | | Study Quality | | | | | | | | | | | |
| | | 76 (27818371) | | 2 | | | | | | | | | | | |
| | | 64 (26021550) | | 2 | | | | | | | | | | | |
| | | 79 (25308754) | | 2 | | | | | | | | | | | |
| | | 71 (24799620) | | 3 | | | | | | | | | | | |
| | | 78 (23293926) | | 2 | | | | | | | | | | | |
| | | 77 (23030361) | | 3 | | | | | | | | | | | |
| | | 69 (21275980) | | 2 | | | | | | | | | | | |
| | | 55 (11258411) | | 3 | | | | | | | | | | | |
| MRI head without and with IV contrast | May be appropriate (Disagreement) | Expert Opinion | O 0 mSv | O 0 mSv [ped] | 5 | 5 | 0 | 0 | 2 | 1 | 2 | 11 | 1 | 2 | 0 |
| CT head without IV contrast | Usually not appropriate | Expert Consensus | ⊕⊕⊕ 1-10 mSv | ⊕⊕⊕ 0.3-3 mSv [ped] | 3 | 3 | 6 | 2 | 5 | 3 | 2 | 0 | 1 | 0 | 0 |
| US head | Usually not appropriate | Expert Consensus | O 0 mSv | O 0 mSv [ped] | 1 | 1 | 16 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| CT head without and with IV contrast | Usually not appropriate | Expert Consensus | ⊕⊕⊕ 1-10 mSv | ⊕⊕⊕⊕ 3-10 mSv [ped] | 1 | 1 | 9 | 2 | 1 | 2 | 1 | 1 | 0 | 0 | 1 |

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|--------------------------|-------------------------|------------------|--------------|---------------------|---|---|----|---|---|---|---|---|---|---|---|
| CT head with IV contrast | Usually not appropriate | Expert Consensus | ☢☢☢ 1-10 mSv | ☢☢☢ 0.3-3 mSv [ped] | 1 | 1 | 10 | 1 | 2 | 1 | 1 | 1 | 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.