

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

Indeterminate Renal Mass

Variant 1: Indeterminate renal mass. No contraindication to either iodinated CT contrast or gadolinium-based MR intravenous contrast. Initial imaging.

| Procedure | Appropriateness Category | SOE | Adults RRL | Peds RRL | Rating | Median | Final Tabulations | | | | | | | | | |
|---|--------------------------|--------|----------------|-----------------------|--------|--------|-------------------|---|---|---|---|---|---|---|---|---|
| | | | | | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | |
| CT abdomen without and with IV contrast | Usually appropriate | Strong | ⊕⊕⊕⊕ 10-30 mSv | ⊕⊕⊕⊕⊕ 10-30 mSv [ped] | 9 | n/a | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

| References | Study Quality |
|---------------|---------------|
| 32 (25905961) | 2 |
| 31 (22106359) | 3 |
| 15 (28705069) | 3 |
| 24 (27729042) | 3 |
| 13 (27043480) | 3 |
| 35 (26587925) | 2 |
| 36 (25799334) | 4 |
| 25 (25681121) | 2 |
| 30 (24766033) | 4 |
| 26 (24450674) | 3 |
| 38 (23382290) | 2 |
| 14 (23352763) | 2 |
| 29 (15128983) | 4 |
| 2 (22528901) | 4 |
| 28 (16040900) | 4 |
| 1 (17456870) | 4 |
| 34 (14990834) | 3 |

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|---------------|---|
| 37 (21940539) | 3 |
| 27 (19559352) | 2 |
| 33 (21555349) | 3 |

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|--|---------------------|--------|-------|-------------|---|-----|---|---|---|---|---|---|---|---|---|---|
| MRI abdomen without and with IV contrast | Usually appropriate | Strong | 0 mSv | 0 mSv [ped] | 9 | n/a | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
|--|---------------------|--------|-------|-------------|---|-----|---|---|---|---|---|---|---|---|---|---|

| References | Study Quality |
|---------------|---------------|
| 44 (28651987) | 4 |
| 54 (27845847) | 3 |
| 63 (28095036) | 2 |
| 53 (26919441) | 2 |
| 24 (27729042) | 3 |
| 60 (26486936) | 3 |
| 61 (27275530) | 3 |
| 49 (26797358) | 2 |
| 25 (25681121) | 2 |
| 58 (24359883) | 2 |
| 50 (23883215) | 4 |
| 29 (15128983) | 4 |
| 51 (12202701) | 3 |
| 52 (15215544) | 2 |
| 59 (22344404) | 3 |
| 56 (19276322) | 3 |
| 57 (21877173) | 3 |
| 55 (20160001) | 2 |
| 62 (19244046) | 3 |
| 64 (29390196) | 2 |
| 7 (31210616) | 4 |

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|-----------------------------|---------------------|--------|-------|-------------|---|-----|---|---|---|---|---|---|---|---|---|---|
| US abdomen with IV contrast | Usually appropriate | Strong | 0 mSv | 0 mSv [ped] | 7 | n/a | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
|-----------------------------|---------------------|--------|-------|-------------|---|-----|---|---|---|---|---|---|---|---|---|---|

| References | Study Quality |
|---------------|---------------|
| 18 (28429490) | 3 |

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|---------------|---|
| 68 (26971426) | 2 |
| 66 (25919803) | 2 |
| 17 (25209216) | 2 |
| 67 (24768490) | 3 |
| 65 (18806171) | 2 |
| 16 (24475802) | 3 |
| 19 (17097844) | 3 |

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|----------------------------|--------------------|---------|---------|---------------|---|-----|---|---|---|---|---|---|---|---|---|
| US kidneys retroperitoneal | May be appropriate | Limited | 0 0 mSv | 0 0 mSv [ped] | 6 | n/a | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
|----------------------------|--------------------|---------|---------|---------------|---|-----|---|---|---|---|---|---|---|---|---|

| References | Study Quality |
|---------------|---------------|
| 69 (28678573) | 2 |
| 70 (28609114) | 4 |

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|-----------------------------|--------------------|--------|--------------|---------------------|---|-----|---|---|---|---|---|---|---|---|---|
| CT abdomen with IV contrast | May be appropriate | Strong | ⊕⊕⊕ 1-10 mSv | ⊕⊕⊕⊕ 3-10 mSv [ped] | 5 | n/a | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
|-----------------------------|--------------------|--------|--------------|---------------------|---|-----|---|---|---|---|---|---|---|---|---|

| References | Study Quality |
|---------------|---------------|
| 32 (25905961) | 2 |
| 31 (22106359) | 3 |
| 15 (28705069) | 3 |
| 24 (27729042) | 3 |
| 13 (27043480) | 3 |
| 35 (26587925) | 2 |
| 36 (25799334) | 4 |
| 25 (25681121) | 2 |
| 30 (24766033) | 4 |
| 26 (24450674) | 3 |
| 38 (23382290) | 2 |
| 14 (23352763) | 2 |
| 29 (15128983) | 4 |
| 2 (22528901) | 4 |
| 28 (16040900) | 4 |
| 1 (17456870) | 4 |

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|---------------|---|
| 34 (14990834) | 3 |
| 37 (21940539) | 3 |
| 27 (19559352) | 2 |
| 33 (21555349) | 3 |

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|---------------------------------|--------------------|--------|---------|---------------|---|-----|---|---|---|---|---|---|---|---|---|
| MRI abdomen without IV contrast | May be appropriate | Strong | 0 0 mSv | 0 0 mSv [ped] | 5 | n/a | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
|---------------------------------|--------------------|--------|---------|---------------|---|-----|---|---|---|---|---|---|---|---|---|

| References | Study Quality |
|---------------|---------------|
| 44 (28651987) | 4 |
| 54 (27845847) | 3 |
| 63 (28095036) | 2 |
| 53 (26919441) | 2 |
| 24 (27729042) | 3 |
| 60 (26486936) | 3 |
| 61 (27275530) | 3 |
| 49 (26797358) | 2 |
| 25 (25681121) | 2 |
| 58 (24359883) | 2 |
| 50 (23883215) | 4 |
| 29 (15128983) | 4 |
| 51 (12202701) | 3 |
| 52 (15215544) | 2 |
| 59 (22344404) | 3 |
| 56 (19276322) | 3 |
| 57 (21877173) | 3 |
| 55 (20160001) | 2 |
| 62 (19244046) | 3 |
| 64 (29390196) | 2 |
| 7 (31210616) | 4 |

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|--------------------------------|--------------------|--------|--------------|---------------------|---|-----|---|---|---|---|---|---|---|---|---|
| CT abdomen without IV contrast | May be appropriate | Strong | ☼☼☼ 1-10 mSv | ☼☼☼☼ 3-10 mSv [ped] | 4 | n/a | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
|--------------------------------|--------------------|--------|--------------|---------------------|---|-----|---|---|---|---|---|---|---|---|---|

| References | Study Quality |
|------------|---------------|
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| References | Study Quality |
|---------------|---------------|
| 54 (27845847) | 3 |
| 53 (26919441) | 2 |
| 71 (-3132600) | 4 |
| 72 (16431890) | 4 |
| 56 (19276322) | 3 |
| 57 (21877173) | 3 |
| 55 (20160001) | 2 |

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|----------------------------|---------------------|---------|---------|---------------|---|-----|---|---|---|---|---|---|---|---|---|---|
| US kidneys retroperitoneal | Usually appropriate | Limited | 0 0 mSv | 0 0 mSv [ped] | 7 | n/a | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
|----------------------------|---------------------|---------|---------|---------------|---|-----|---|---|---|---|---|---|---|---|---|---|

| References | Study Quality |
|---------------|---------------|
| 69 (28678573) | 2 |
| 70 (28609114) | 4 |

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|--------------------------------|--------------------|---------|--------------|---------------------|---|-----|---|---|---|---|---|---|---|---|---|---|
| CT abdomen without IV contrast | May be appropriate | Limited | ☼☼☼ 1-10 mSv | ☼☼☼☼ 3-10 mSv [ped] | 5 | n/a | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
|--------------------------------|--------------------|---------|--------------|---------------------|---|-----|---|---|---|---|---|---|---|---|---|---|

| References | Study Quality |
|---------------|---------------|
| 71 (-3132600) | 4 |
| 2 (22528901) | 4 |
| 1 (17456870) | 4 |

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|--------------------------------|-------------------------|---------|--------|--------|---|-----|---|---|---|---|---|---|---|---|---|---|
| Image-guided biopsy renal mass | Usually not appropriate | Limited | Varies | Varies | 3 | n/a | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
|--------------------------------|-------------------------|---------|--------|--------|---|-----|---|---|---|---|---|---|---|---|---|---|

| References | Study Quality |
|---------------|---------------|
| 42 (21992727) | 4 |
| 48 (21704449) | 4 |
| 44 (28651987) | 4 |
| 43 (27112777) | 4 |
| 40 (22633318) | 4 |
| 47 (18707712) | 3 |
| 41 (16643475) | 3 |
| 45 (22088331) | 4 |
| 46 (20720070) | 4 |

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|----------------------------------|-------------------------|------------------|---------|---------------|---|-----|---|---|---|---|---|---|---|---|---|
| MRU without and with IV contrast | Usually not appropriate | Expert Consensus | 0 0 mSv | 0 0 mSv [ped] | 1 | n/a | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
|----------------------------------|-------------------------|------------------|---------|---------------|---|-----|---|---|---|---|---|---|---|---|---|

Variant 3: Indeterminate renal mass. Contraindication only to iodinated CT intravenous contrast. Initial imaging.

| Procedure | Appropriateness Category | SOE | Adults RRL | Peds RRL | Rating | Median | Final Tabulations | | | | | | | | |
|--|--------------------------|--------|------------|---------------|--------|--------|-------------------|---|---|---|---|---|---|---|----|
| | | | | | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| MRI abdomen without and with IV contrast | Usually appropriate | Strong | 0 0 mSv | 0 0 mSv [ped] | 9 | 9 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 2 | 12 |

| References | Study Quality |
|---------------|---------------|
| 44 (28651987) | 4 |
| 54 (27845847) | 3 |
| 63 (28095036) | 2 |
| 53 (26919441) | 2 |
| 24 (27729042) | 3 |
| 60 (26486936) | 3 |
| 61 (27275530) | 3 |
| 25 (25681121) | 2 |
| 58 (24359883) | 2 |
| 29 (15128983) | 4 |
| 51 (12202701) | 3 |
| 52 (15215544) | 2 |
| 59 (22344404) | 3 |
| 56 (19276322) | 3 |
| 57 (21877173) | 3 |
| 55 (20160001) | 2 |
| 62 (19244046) | 3 |
| 64 (29390196) | 2 |

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|-----------------------------|---------------------|--------|---------|---------------|---|---|---|---|---|---|---|---|---|---|---|
| US abdomen with IV contrast | Usually appropriate | Strong | 0 0 mSv | 0 0 mSv [ped] | 8 | 8 | 0 | 0 | 0 | 0 | 0 | 1 | 6 | 8 | 2 |
|-----------------------------|---------------------|--------|---------|---------------|---|---|---|---|---|---|---|---|---|---|---|

| References | Study Quality |
|---------------|---------------|
| 18 (28429490) | 3 |
| 68 (26971426) | 2 |
| 66 (25919803) | 2 |
| 17 (25209216) | 2 |
| 67 (24768490) | 3 |
| 16 (24475802) | 3 |

| | | | | | | | | | | | | | | | |
|----------------------------|--------------------|---------|---------|---------------|---|---|---|---|---|---|---|---|---|---|---|
| US kidneys retroperitoneal | May be appropriate | Limited | 0 0 mSv | 0 0 mSv [ped] | 6 | 6 | 0 | 0 | 0 | 1 | 3 | 7 | 5 | 1 | 0 |
|----------------------------|--------------------|---------|---------|---------------|---|---|---|---|---|---|---|---|---|---|---|

| References | Study Quality |
|---------------|---------------|
| 69 (28678573) | 2 |
| 70 (28609114) | 4 |

| | | | | | | | | | | | | | | | |
|--------------------------------|--------------------|---------|--------------|---------------------|---|---|---|---|---|---|---|---|---|---|---|
| CT abdomen without IV contrast | May be appropriate | Limited | ⊕⊕⊕ 1-10 mSv | ⊕⊕⊕⊕ 3-10 mSv [ped] | 5 | 5 | 1 | 0 | 0 | 2 | 9 | 3 | 2 | 0 | 0 |
|--------------------------------|--------------------|---------|--------------|---------------------|---|---|---|---|---|---|---|---|---|---|---|

| References | Study Quality |
|---------------|---------------|
| 71 (-3132600) | 4 |
| 2 (22528901) | 4 |
| 1 (17456870) | 4 |

| | | | | | | | | | | | | | | | |
|---------------------------------|--------------------|--------|---------|---------------|---|---|---|---|---|---|---|---|---|---|---|
| MRI abdomen without IV contrast | May be appropriate | Strong | 0 0 mSv | 0 0 mSv [ped] | 5 | 5 | 0 | 1 | 4 | 2 | 4 | 4 | 0 | 0 | 0 |
|---------------------------------|--------------------|--------|---------|---------------|---|---|---|---|---|---|---|---|---|---|---|

| References | Study Quality |
|---------------|---------------|
| 44 (28651987) | 4 |
| 54 (27845847) | 3 |
| 63 (28095036) | 2 |
| 53 (26919441) | 2 |
| 24 (27729042) | 3 |
| 60 (26486936) | 3 |
| 61 (27275530) | 3 |
| 25 (25681121) | 2 |
| 58 (24359883) | 2 |
| 29 (15128983) | 4 |

| | |
|---------------|---|
| 51 (12202701) | 3 |
| 52 (15215544) | 2 |
| 59 (22344404) | 3 |
| 56 (19276322) | 3 |
| 57 (21877173) | 3 |
| 55 (20160001) | 2 |
| 62 (19244046) | 3 |
| 64 (29390196) | 2 |

| | | | | | | | | | | | | | | | |
|----------------------------------|-------------------------|------------------|---------|---------------|---|---|---|---|---|---|---|---|---|---|---|
| MRU without and with IV contrast | Usually not appropriate | Expert Consensus | 0 0 mSv | 0 0 mSv [ped] | 3 | 3 | 2 | 3 | 8 | 1 | 0 | 0 | 0 | 1 | 0 |
| Image-guided biopsy renal mass | Usually not appropriate | Limited | Varies | Varies | 2 | 2 | 4 | 4 | 4 | 2 | 0 | 0 | 0 | 1 | 0 |

| References | Study Quality |
|---------------|---------------|
| 42 (21992727) | 4 |
| 48 (21704449) | 4 |
| 44 (28651987) | 4 |
| 43 (27112777) | 4 |
| 40 (22633318) | 4 |
| 47 (18707712) | 3 |
| 41 (16643475) | 3 |
| 45 (22088331) | 4 |
| 46 (20720070) | 4 |

| | | | | | | | | | | | | | | | |
|-----------------------------|-------------------------|---------|--------------|---------------------|---|---|----|---|---|---|---|---|---|---|---|
| CT abdomen with IV contrast | Usually not appropriate | Limited | ☹☹☹ 1-10 mSv | ☹☹☹☹ 3-10 mSv [ped] | 1 | 1 | 14 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 |
|-----------------------------|-------------------------|---------|--------------|---------------------|---|---|----|---|---|---|---|---|---|---|---|

| References | Study Quality |
|---------------|---------------|
| 71 (-3132600) | 4 |
| 2 (22528901) | 4 |
| 1 (17456870) | 4 |

| | | | | | | | | | | | | | | | |
|---|-------------------------|---------|----------------|-----------------------|---|---|----|---|---|---|---|---|---|---|---|
| CT abdomen without and with IV contrast | Usually not appropriate | Limited | ☼☼☼☼ 10-30 mSv | ☼☼☼☼☼ 10-30 mSv [ped] | 1 | 1 | 14 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 |
|---|-------------------------|---------|----------------|-----------------------|---|---|----|---|---|---|---|---|---|---|---|

| | |
|---------------|---------------|
| References | Study Quality |
| 71 (-3132600) | 4 |
| 2 (22528901) | 4 |
| 1 (17456870) | 4 |

| | | | | | | | | | | | | | | | |
|----------------------------------|-------------------------|------------------|----------------|-----------------------|---|---|----|---|---|---|---|---|---|---|---|
| CTU without and with IV contrast | Usually not appropriate | Expert Consensus | ☼☼☼☼ 10-30 mSv | ☼☼☼☼☼ 10-30 mSv [ped] | 1 | 1 | 15 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
|----------------------------------|-------------------------|------------------|----------------|-----------------------|---|---|----|---|---|---|---|---|---|---|---|

| | | | | | | | | | | | | | | | |
|-----------------------------------|-------------------------|------------------|--------------|---------------------|---|---|----|---|---|---|---|---|---|---|---|
| Radiography intravenous urography | Usually not appropriate | Expert Consensus | ☼☼☼ 1-10 mSv | ☼☼☼ 0.3-3 mSv [ped] | 1 | 1 | 15 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 |
|-----------------------------------|-------------------------|------------------|--------------|---------------------|---|---|----|---|---|---|---|---|---|---|---|

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|----------------------|-------------------------|------------------|--------------|--|---|---|----|---|---|---|---|---|---|---|---|
| Arteriography kidney | Usually not appropriate | Expert Consensus | ☼☼☼ 1-10 mSv | | 1 | 1 | 15 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
|----------------------|-------------------------|------------------|--------------|--|---|---|----|---|---|---|---|---|---|---|---|

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.