

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

Chronic Chest Pain—High Probability of Coronary Artery Disease

Variant 1: Chronic chest pain; high probability of coronary artery disease. No known ischemic heart disease. Initial imaging.

| Procedure | Appropriateness Category | SOE | Adults RRL | Peds RRL | Rating | Median | Final Tabulations | | | | | | | | | |
|----------------------------------------|--------------------------|---------------|---------------|---------------------|--------|--------|-------------------|---|---|---|---|---|---|---|---|--|
| | | | | | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | |
| CTA coronary arteries with IV contrast | Usually appropriate | Strong | ⊕⊕⊕ 1-10 mSv | ⊕⊕⊕⊕ 3-10 mSv [ped] | 8 | 8 | 0 | 0 | 0 | 1 | 0 | 0 | 4 | 6 | 5 | |
| | | References | Study Quality | | | | | | | | | | | | | |
| | | 36 (24486266) | 2 | | | | | | | | | | | | | |
| | | 30 (22261160) | 2 | | | | | | | | | | | | | |
| | | 31 (17981829) | M | | | | | | | | | | | | | |
| | | 28 (21597986) | M | | | | | | | | | | | | | |
| | | 33 (22032711) | 2 | | | | | | | | | | | | | |
| | | 34 (23562923) | 4 | | | | | | | | | | | | | |
| | | 26 (19095130) | 2 | | | | | | | | | | | | | |
| | | 27 (19038879) | 1 | | | | | | | | | | | | | |
| | | 25 (19007693) | 1 | | | | | | | | | | | | | |
| | | 35 (26475205) | 2 | | | | | | | | | | | | | |
| | | 32 (-3194082) | 2 | | | | | | | | | | | | | |
| | | 37 (27141095) | Good | | | | | | | | | | | | | |
| | | 38 (31696294) | Good | | | | | | | | | | | | | |
| | | 29 (31189617) | Good | | | | | | | | | | | | | |
| | | 39 (31005540) | 3 | | | | | | | | | | | | | |
| Arteriography coronary | Usually appropriate | Strong | ⊕⊕⊕ 1-10 mSv | | 8 | 8 | 0 | 0 | 2 | 0 | 0 | 1 | 4 | 4 | 5 | |

| References | Study Quality |
|---------------|---------------|
| 8 (8409054) | 1 |
| 10 (20579537) | 3 |
| 9 (23273323) | 2 |

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|----------------------------------------------------|---------------------|--------|---------|---------------|---|---|---|---|---|---|---|---|----|---|---|
| MRI heart function with stress without IV contrast | Usually appropriate | Strong | 0 0 mSv | 0 0 mSv [ped] | 7 | 7 | 0 | 0 | 0 | 3 | 1 | 2 | 10 | 0 | 0 |
|----------------------------------------------------|---------------------|--------|---------|---------------|---|---|---|---|---|---|---|---|----|---|---|

| References | Study Quality |
|---------------|---------------|
| 54 (10525488) | 2 |
| 53 (9989961) | 1 |
| 47 (19356575) | 2 |
| 46 (24342416) | 3 |

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|-------------------------------------------------------------|---------------------|--------|---------|---------------|---|---|---|---|---|---|---|---|----|---|---|
| MRI heart function with stress without and with IV contrast | Usually appropriate | Strong | 0 0 mSv | 0 0 mSv [ped] | 7 | 7 | 0 | 0 | 0 | 1 | 1 | 0 | 10 | 3 | 1 |
|-------------------------------------------------------------|---------------------|--------|---------|---------------|---|---|---|---|---|---|---|---|----|---|---|

| References | Study Quality |
|---------------|---------------|
| 6 (22236462) | 2 |
| 52 (20482819) | M |
| 47 (19356575) | 2 |
| 46 (24342416) | 3 |
| 49 (23771988) | Good |
| 48 (23804252) | 3 |
| 51 (17903634) | Good |
| 50 (31216398) | 3 |

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|------------------------------------------|---------------------|--------|---------|---------------|---|---|---|---|---|---|---|---|---|---|---|
| US echocardiography transthoracic stress | Usually appropriate | Strong | 0 0 mSv | 0 0 mSv [ped] | 7 | 7 | 0 | 0 | 1 | 1 | 0 | 1 | 7 | 5 | 1 |
|------------------------------------------|---------------------|--------|---------|---------------|---|---|---|---|---|---|---|---|---|---|---|

| References | Study Quality |
|---------------|---------------|
| 71 (18565214) | M |
| 74 (19356420) | 2 |
| 72 (12727146) | M |
| 70 (11028482) | 3 |
| 73 (29768319) | 2 |
| 47 (19356575) | 2 |

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|--------------------|---------------------|--------|----------------|--|---|---|---|---|---|---|---|---|---|---|---|
| Rb-82 PET/CT heart | Usually appropriate | Strong | ⊕⊕⊕⊕ 10-30 mSv | | 7 | 7 | 0 | 0 | 1 | 0 | 2 | 1 | 6 | 4 | 2 |
|--------------------|---------------------|--------|----------------|--|---|---|---|---|---|---|---|---|---|---|---|

| References | Study Quality |
|---------------|---------------|
| 61 (18022106) | 2 |
| 52 (20482819) | M |
| 48 (23804252) | 3 |
| 57 (17332611) | 2 |
| 58 (23040573) | Good |
| 59 (19608135) | 3 |
| 60 (23219297) | 3 |
| 55 (19555834) | 4 |
| 56 (16733686) | 2 |

| | | | | | | | | | | | | | | | |
|---------------------------------------|---------------------|--------|----------------|-----------------------|---|---|---|---|---|---|---|---|---|---|---|
| SPECT or SPECT/CT MPI rest and stress | Usually appropriate | Strong | ⊕⊕⊕⊕ 10-30 mSv | ⊕⊕⊕⊕⊕ 10-30 mSv [ped] | 7 | 7 | 0 | 0 | 0 | 1 | 0 | 1 | 8 | 3 | 3 |
|---------------------------------------|---------------------|--------|----------------|-----------------------|---|---|---|---|---|---|---|---|---|---|---|

| References | Study Quality |
|---------------|---------------|
| 62 (11772873) | 2 |
| 63 (11216963) | 2 |
| 65 (19288163) | 3 |
| 64 (11897441) | 2 |
| 67 (17174808) | 3 |
| 66 (22554604) | M |
| 69 (23086965) | 2 |
| 68 (23291392) | 2 |

| | | | | | | | | | | | | | | | |
|-------------------------------------------|--------------------|------------------|---------|---------------|---|---|---|---|---|---|---|---|---|---|---|
| US echocardiography transthoracic resting | May be appropriate | Expert Consensus | ○ 0 mSv | ○ 0 mSv [ped] | 6 | 6 | 0 | 0 | 0 | 6 | 2 | 3 | 3 | 2 | 0 |
|-------------------------------------------|--------------------|------------------|---------|---------------|---|---|---|---|---|---|---|---|---|---|---|

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|----------------------------------------------------------------|--------------------|--------|---------|---------------|---|---|---|---|---|---|---|---|---|---|---|
| MRI heart function and morphology without and with IV contrast | May be appropriate | Strong | ○ 0 mSv | ○ 0 mSv [ped] | 5 | 5 | 0 | 0 | 0 | 4 | 6 | 4 | 2 | 0 | 0 |
|----------------------------------------------------------------|--------------------|--------|---------|---------------|---|---|---|---|---|---|---|---|---|---|---|

| References | Study Quality |
|---------------|---------------|
| 43 (16904547) | 4 |

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|-------------------------------------------------------|-------------------------|------------------|---------------|---------------|---|---|---|---|---|---|---|---|---|---|---|
| MRA coronary arteries without and with IV contrast | Usually not appropriate | Limited | 0 0 mSv | 0 0 mSv [ped] | 3 | 3 | 2 | 5 | 8 | 1 | 0 | 0 | 0 | 0 | 0 |
| | | References | Study Quality | | | | | | | | | | | | |
| | | 40 (17112982) | 3 | | | | | | | | | | | | |
| MRI heart function and morphology without IV contrast | Usually not appropriate | Expert Consensus | 0 0 mSv | 0 0 mSv [ped] | 3 | 3 | 2 | 2 | 6 | 2 | 4 | 0 | 0 | 0 | 0 |
| CTA triple rule out | Usually not appropriate | Expert Consensus | ⊕⊕⊕ 1-10 mSv | | 3 | 3 | 5 | 2 | 5 | 2 | 1 | 1 | 0 | 0 | 0 |
| Nuclear medicine ventriculography | Usually not appropriate | Expert Consensus | ⊕⊕⊕ 1-10 mSv | | 2 | 2 | 4 | 6 | 5 | 1 | 0 | 0 | 0 | 0 | 0 |
| US echocardiography transesophageal | Usually not appropriate | Expert Consensus | 0 0 mSv | 0 0 mSv [ped] | 2 | 2 | 6 | 3 | 6 | 0 | 1 | 0 | 0 | 0 | 0 |

Variant 2: Chronic chest pain; high probability of coronary artery disease. Known ischemic heart disease with no prior definitive treatment. Initial imaging.

| Procedure | Appropriateness Category | SOE | Adults RRL | Peds RRL | Rating | Median | Final Tabulations | | | | | | | | |
|-------------------------------------------------------------|--------------------------|---------------|---------------|---------------|--------|--------|-------------------|---|---|---|---|---|---|---|---|
| | | | | | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| Arteriography coronary | Usually appropriate | Strong | ⊕⊕⊕ 1-10 mSv | | 8 | 8 | 0 | 1 | 1 | 0 | 0 | 1 | 3 | 3 | 7 |
| | | References | Study Quality | | | | | | | | | | | | |
| | | 77 (19144937) | 1 | | | | | | | | | | | | |
| | | 76 (23946263) | 1 | | | | | | | | | | | | |
| | | 8 (8409054) | 1 | | | | | | | | | | | | |
| | | 75 (22924638) | 1 | | | | | | | | | | | | |
| | | 78 (32227755) | 1 | | | | | | | | | | | | |
| | | 79 (32227753) | 1 | | | | | | | | | | | | |
| MRI heart function with stress without and with IV contrast | Usually appropriate | Strong | 0 0 mSv | 0 0 mSv [ped] | 8 | 8 | 0 | 0 | 1 | 1 | 0 | 2 | 4 | 6 | 2 |
| | | References | Study Quality | | | | | | | | | | | | |
| | | 6 (22236462) | 2 | | | | | | | | | | | | |

| | |
|---------------|------|
| 52 (20482819) | M |
| 47 (19356575) | 2 |
| 46 (24342416) | 3 |
| 49 (23771988) | Good |
| 48 (23804252) | 3 |
| 51 (17903634) | Good |

| | | | | | | | | | | | | | | | |
|--------------------|---------------------|--------|----------------|--|---|---|---|---|---|---|---|---|---|---|---|
| Rb-82 PET/CT heart | Usually appropriate | Strong | ☼☼☼☼ 10-30 mSv | | 8 | 8 | 0 | 0 | 0 | 1 | 2 | 1 | 3 | 7 | 2 |
|--------------------|---------------------|--------|----------------|--|---|---|---|---|---|---|---|---|---|---|---|

| References | Study Quality |
|---------------|---------------|
| 61 (18022106) | 2 |
| 48 (23804252) | 3 |
| 57 (17332611) | 2 |
| 58 (23040573) | Good |
| 59 (19608135) | 3 |
| 60 (23219297) | 3 |
| 55 (19555834) | 4 |
| 56 (16733686) | 2 |

| | | | | | | | | | | | | | | | |
|---------------------------------------|---------------------|--------|----------------|-----------------------|---|---|---|---|---|---|---|---|---|---|---|
| SPECT or SPECT/CT MPI rest and stress | Usually appropriate | Strong | ☼☼☼☼ 10-30 mSv | ☼☼☼☼☼ 10-30 mSv [ped] | 8 | 8 | 0 | 0 | 0 | 0 | 1 | 2 | 5 | 5 | 3 |
|---------------------------------------|---------------------|--------|----------------|-----------------------|---|---|---|---|---|---|---|---|---|---|---|

| References | Study Quality |
|---------------|---------------|
| 62 (11772873) | 2 |
| 63 (11216963) | 2 |
| 65 (19288163) | 3 |
| 64 (11897441) | 2 |
| 67 (17174808) | 3 |
| 66 (22554604) | M |
| 69 (23086965) | 2 |
| 68 (23291392) | 2 |

| | | | | | | | | | | | | | | | |
|----------------------------------------|---------------------|--------|--------------|----------------------|---|---|---|---|---|---|---|---|---|---|---|
| CTA coronary arteries with IV contrast | Usually appropriate | Strong | ☼☼☼ 1-10 mSv | ☼☼☼☼☼ 3-10 mSv [ped] | 7 | 7 | 0 | 0 | 0 | 1 | 1 | 2 | 6 | 2 | 4 |
|----------------------------------------|---------------------|--------|--------------|----------------------|---|---|---|---|---|---|---|---|---|---|---|

| References | Study Quality |
|---------------|---------------|
| 36 (24486266) | 2 |
| 30 (22261160) | 2 |
| 28 (21597986) | M |
| 84 (27072303) | M |
| 33 (22032711) | 2 |
| 34 (23562923) | 4 |
| 26 (19095130) | 2 |
| 27 (19038879) | 1 |
| 25 (19007693) | 1 |
| 35 (26475205) | 2 |
| 85 (29322167) | 2 |
| 83 (21835321) | 2 |
| 86 (29305348) | Good |
| 87 (26205589) | 2 |
| 37 (27141095) | Good |
| 38 (31696294) | Good |
| 88 (31833413) | 2 |
| 89 (19539075) | Inadequate |
| 82 (32029127) | 4 |

| | | | | | | | | | | | | | | | |
|----------------------------------------------------------------|---------------------|--------|---------|---------------|---|---|---|---|---|---|---|---|----|---|---|
| MRI heart function and morphology without and with IV contrast | Usually appropriate | Strong | 0 0 mSv | 0 0 mSv [ped] | 7 | 7 | 0 | 0 | 0 | 2 | 1 | 1 | 10 | 2 | 0 |
|----------------------------------------------------------------|---------------------|--------|---------|---------------|---|---|---|---|---|---|---|---|----|---|---|

| References | Study Quality |
|---------------|---------------|
| 90 (14557364) | 3 |
| 70 (11028482) | 3 |
| 98 (15117834) | 2 |
| 95 (18212288) | 2 |
| 94 (15193689) | 3 |
| 96 (11078769) | 3 |
| 91 (17361420) | 3 |
| 92 (20865262) | 2 |

| | | | | | | | | | | | | | | | |
|-------------------------------------------------------|-------------------------|------------------|--------------|---------------------|---|---|---|---|---|---|---|---|---|---|---|
| MRI heart function and morphology without IV contrast | May be appropriate | Expert Consensus | 0 0 mSv | 0 0 mSv [ped] | 4 | 4 | 2 | 3 | 3 | 4 | 2 | 2 | 0 | 0 | 0 |
| CTA chest with IV contrast | Usually not appropriate | Limited | ☹☹☹ 1-10 mSv | ☹☹☹☹ 3-10 mSv [ped] | 3 | 3 | 2 | 4 | 3 | 3 | 2 | 1 | 0 | 0 | 1 |
| | | References | | Study Quality | | | | | | | | | | | |
| | | 24 (24221182) | | 3 | | | | | | | | | | | |
| CTA triple rule out | Usually not appropriate | Expert Consensus | ☹☹☹ 1-10 mSv | | 3 | 3 | 4 | 3 | 8 | 0 | 1 | 0 | 0 | 0 | 0 |
| CT coronary calcium | Usually not appropriate | Expert Consensus | ☹☹☹ 1-10 mSv | | 2 | 2 | 8 | 2 | 3 | 2 | 1 | 0 | 0 | 0 | 0 |
| MRA coronary arteries without IV contrast | Usually not appropriate | Strong | 0 0 mSv | 0 0 mSv [ped] | 2 | 2 | 5 | 4 | 6 | 1 | 0 | 0 | 0 | 0 | 0 |
| | | References | | Study Quality | | | | | | | | | | | |
| | | 42 (23833284) | | 2 | | | | | | | | | | | |
| | | 41 (20828652) | | 2 | | | | | | | | | | | |
| MRA coronary arteries without and with IV contrast | Usually not appropriate | Limited | 0 0 mSv | 0 0 mSv [ped] | 2 | 2 | 4 | 5 | 6 | 0 | 1 | 0 | 0 | 0 | 0 |
| | | References | | Study Quality | | | | | | | | | | | |
| | | 40 (17112982) | | 3 | | | | | | | | | | | |
| Nuclear medicine ventriculography | Usually not appropriate | Expert Consensus | ☹☹☹ 1-10 mSv | | 2 | 2 | 4 | 7 | 1 | 1 | 1 | 2 | 0 | 0 | 0 |
| US echocardiography transesophageal | Usually not appropriate | Expert Consensus | 0 0 mSv | 0 0 mSv [ped] | 2 | 2 | 4 | 5 | 5 | 1 | 0 | 0 | 1 | 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.