

Open Evidence

Below is a CT-specific summary of when **IV contrast is and is not recommended**, organized by body region, based on the ACR Appropriateness Criteria and supporting evidence.

CT Head

- **Non-contrast CT** is the standard first-line study for nearly all acute indications: suspected stroke (ACR rating 9/9), acute hemorrhage, trauma, headache (rating ≥ 7), and altered mental status. [1]
- **Contrast-enhanced CT head** does not add significant value over non-contrast CT as a first-line test in the acute setting. It may be considered if intracranial infection, tumor, or inflammatory pathology is suspected, but MRI with contrast is generally preferred for these indications. [2]
- **CT angiography (CTA) of the head/neck** (with contrast) is appropriate for suspected large vessel occlusion in stroke, carotid/vertebral dissection, and aneurysm evaluation. [1]

CT Neck

- **CT neck with IV contrast** is usually appropriate (rating ≥ 7) for palpable neck masses away from the thyroid or parotid glands. [1]
 - **Non-contrast CT neck** has limited utility for soft tissue evaluation.
-

CT Chest

- **CT pulmonary angiography (with IV contrast)** is the preferred test for suspected pulmonary embolism (rating 9/9). V/Q scan is reserved for patients with eGFR < 30 or contrast allergy. [1]
- **CT chest without contrast** is appropriate for:
 - Lung parenchymal disease ([interstitial lung disease](#), emphysema)
 - Lung cancer screening (low-dose CT)
 - Coronary artery calcium scoring (rating 8/9 for intermediate-risk patients) [1]

- **CT chest with IV contrast** adds value for:
 - Pleural disease (thickening, enhancement, complex effusions) [3]
 - Chest wall masses and malignancy
 - Mediastinal pathology and staging
 - **CT chest without and with IV contrast** (dual-phase) does not add value over a single contrast or non-contrast study for chronic dyspnea workup. [3]
-

CT Abdomen and Pelvis

Contrast-enhanced CT is the default standard for most abdominal/pelvic indications:

- **CT with IV contrast** is the most appropriate imaging test for acute abdominal pain in nonpregnant adults. Unenhanced CT is approximately **30 percentage points less accurate** than contrast-enhanced CT for primary and secondary actionable findings. [4-5]
- Specific indications where **IV contrast is recommended**:
 - Acute nonlocalized abdominal pain (increases spectrum of detectable pathology) [6]
 - Suspected appendicitis in adults (rating ≥ 7) [1]
 - Left lower quadrant pain / suspected diverticulitis (improves characterization of bowel wall pathology and pericolic abnormalities) [7]
 - Left upper quadrant pain with fever (superior for vasculature, colitis, gastroenteritis; more sensitive for microabscesses in immunocompromised patients) [8]
 - Sepsis with unknown source (non-contrast CT is less likely to detect a source of infection) [9]
 - Suspected visceral or vascular injury in trauma (essential for detecting active bleeding, dissection) [10]
- Specific indications where **non-contrast CT is preferred or sufficient**:
 - **Urolithiasis/renal colic** — "stone protocol" CT without contrast is the standard, as IV contrast may obscure small renal stones. However, if the

patient has no history of stones and negative urinalysis, contrast-enhanced CT is indicated to evaluate alternative diagnoses. [11]

- **Appendicitis** — non-contrast CT is conclusive in ~75% of cases (sensitivity 90%, specificity 96%), though the remaining 25% of inconclusive cases benefit from follow-up contrast-enhanced CT. [11]
- **Oral contrast** is no longer routinely used at many institutions due to delays in throughput with questionable diagnostic advantage; multiplanar reformations on modern CT provide comparable diagnostic confidence. [6]

1. [Diagnostic Imaging: Appropriate and Safe Use](#). American Family Physician. 2021. Ford B, Dore M, Moullet P. Clinical Reference

2. [ACR Appropriateness Criteria® Altered Mental Status, Coma, Delirium, and Psychosis: 2024 Update](#). Journal of the American College of Radiology : JACR. 2024. Soares BP, Shih RY, Utukuri PS, et al. Guideline

3. [ACR Appropriateness Criteria® Chronic Dyspnea-Noncardiovascular Origin: 2024 Update](#). Journal of the American College of Radiology : JACR. 2025. Christensen JD, Harowicz M, Walker CM, et al. Guideline

4. [Diagnostic Accuracy of Unenhanced Computed Tomography for Evaluation of Acute Abdominal Pain in the Emergency Department](#). JAMA Surgery. 2023. Shaish H, Ream J, Huang C, et al. Observational

5. [Acute Abdomen in the Modern Era](#). The New England Journal of Medicine. 2024. Rogers SO, Kirton OC. Review

6. [ACR Appropriateness Criteria Acute Nonlocalized Abdominal Pain](#). Journal of the American College of Radiology : JACR. 2018. Scheirey CD, Fowler KJ, Therrien JA, et al. Guideline

7. [ACR Appropriateness Criteria® Left Lower Quadrant Pain: 2023 Update](#). Journal of the American College of Radiology : JACR. 2023. Weinstein S, Kim DH, Fowler KJ, et al. Guideline

8. [ACR Appropriateness Criteria® Acute Left Upper Quadrant Pain](#). Journal of the American College of Radiology : JACR. 2025. Expert Panel on Gastrointestinal Imaging, Soleimani S, Kamel IR, et al. New Guideline

9. [ACR Appropriateness Criteria® Sepsis](#). Journal of the American College of Radiology : JACR. 2024. Brixey AG, Fung A, De Leon AD, et al. Guideline

10. [Best Practices Guidelines In Imaging](#). American College of Surgeons (2018). 2018. Gail T. Tominaga MD FACS, Mark Bernstein MD, Michael R. Aquino MD MHSc, et al Guideline

11. [ACR Appropriateness Criteria® Acute Pelvic Pain in the Reproductive Age Group: 2023 Update](#). Journal of the American College of Radiology : JACR. 2024. Brook OR, Dadour JR, Robbins JB, et al. Guideline

12. [ACR Appropriateness Criteria® Penetrating Trauma-Abdomen and Pelvis: Update 2026](#). Journal of the American College of Radiology : JACR. 2026. Expert Panel on Urologic Imaging, Costa DN, Bass M, et al. New Review

UpToDate

Head CT

- Acute traumatic brain injury: head CT **without contrast** is recommended to detect injuries that may require neurosurgical intervention; IV contrast is not routine, but is used when CT angiography of head/neck is needed for suspected vascular injury.
- Suspected acute intracerebral hemorrhage: **noncontrast head CT** identifies acute ICH and distinguishes it from ischemic stroke; CT angiography may be performed with the noncontrast CT to identify an underlying vascular cause.
- Suspected subarachnoid hemorrhage: the cornerstone of diagnosis is **noncontrast head CT**.

Chest CT

UpToDate content retrieved here did not provide a general “chest CT with vs without contrast” indications list across common ED chest complaints (eg, PE, aortic dissection, pneumonia). One explicit example present in the retrieved content is:

- Incidental pulmonary nodule surveillance: CT chest **without contrast** is preferred for follow-up imaging.
- Suspected mediastinal granuloma: chest CT **with contrast** is indicated, and IV contrast is preferred to delineate vascular from other mediastinal structures.

Abdominal and pelvic CT

- Undifferentiated abdominal pain in the ED: CT is the most accurate imaging modality, and routine IV contrast improves diagnostic accuracy for many diagnoses; in the emergency setting, contrast-enhanced imaging should not be delayed when it is anticipated to meaningfully impact diagnosis or management. [Patient evaluation for contrast administration for computed tomography: Concern for contrast-associated acute kidney injury](#)
- Lower abdominal, LUQ, or diffuse abdominal pain with suspected nongynecologic etiology (male or nonpregnant female): IV contrast-enhanced abdominopelvic CT has the best accuracy; CT can still be helpful without IV contrast, but inflammatory changes can be obscured in young, slender patients with little mesenteric fat.
- Suspected appendicitis in adults: IV contrast administration is recommended; noncontrast CT is an acceptable alternative if IV contrast is contraindicated.

- Suspected nephrolithiasis when CT is chosen and suspicion is high: noncontrast abdominopelvic CT is preferred because contrast-enhanced parenchyma and early excretion can obscure collecting-system calculi; if the diagnosis is less certain and other etiologies are being evaluated, IV contrast-enhanced CT is reasonable while preserving high sensitivity for clinically important stones.