

Eliminating Routine Positive Oral Contrast in Body CT: An Evidence-Based Proposal

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June 2026

1. When Oral Contrast IS Required

Eliminating routine positive oral contrast does not mean eliminating all oral contrast. A small number of specific indications remain where oral contrast is essential or strongly recommended. These indications should be memorized by all Body section faculty and protocolled by the radiologist, not ordered by default.

1.1 Indications for Oral Contrast

- **Post surgical fevers/abdominal pain:** Including **Abscess and anastomotic leak evaluation (post-surgical), post op dehiscence or fistula: Water-soluble iodinated oral contrast only (never barium—risk of barium peritonitis). This remains the single strongest indication for positive oral contrast.**
- **Suspected bowel perforation:** Water-soluble iodinated oral contrast. Barium is absolutely contraindicated.
- **Fistula mapping:** Positive oral contrast to confirm fistula patency and site. Type is case-dependent.
- **CT Enterography (Crohn's disease, IBD, small bowel tumor):** NEUTRAL oral contrast (Breeza preferred over VoLumen per our protocol) at 900+ mL divided over 45–60 minutes. Critically, this is neutral contrast, not positive—positive contrast defeats the purpose of enterography by obscuring the mucosal enhancement patterns that define disease activity.
- **Complex gastric bypass anatomic mapping:** Consider on a case-by-case basis with radiologist discussion.

Oncologic staging — Patient weight under 200 lbs

- GI malignancies (colorectal and gastric cancer): Positive oral contrast (dilute iodinated). Opacifies bowel loops adjacent to tumor, aiding T-staging. Solid-organ oncologic staging (liver, pancreas, kidney, adrenal) does NOT need oral contrast.
- Known or suspected peritoneal carcinomatosis: Positive oral contrast. Useful for characterizing peritoneal disease and distinguishing implants from bowel loops (Renton et al. 2023, Canadian Association of Radiologists Journal).

1.2 Oral Contrast Decision Matrix

The following table is adapted from the Body CT Protocol Rule Book, Section 6.1.

Indication	Oral Contrast	Type	Rationale
Routine A/P (ED or outpatient)	NONE	IV only	ACR: oral not needed. 97-min ED LOS reduction when eliminated.
Appendicitis	NONE	IV only	93% sensitivity without oral. Delays imaging 60–90 min.

Diverticulitis	NONE	IV only	ACR: oral not needed for LLQ pain evaluation.
Blunt trauma	NONE	IV only	96.6% sensitivity, equivalent to IV+oral (Marghero 2023).
Small bowel obstruction	NONE	IV only	Retained fluid = natural contrast. Oral risks aspiration.
Liver / pancreas / spleen / adrenal	NONE	IV only	ACR: oral unnecessary for solid organ evaluation.
Oncologic staging — solid organ malignancies (liver, pancreas, kidney, adrenal); Breast, lung, melanoma	NOT INDICATED	IV only	Oral contrast does not improve staging accuracy for solid organ tumors. Hides mucosal detail relevant to treatment response. IV with MPR is sufficient (ACR).
Oncologic staging — GI malignancies (colorectal, gastric, small bowel), excluding neuroendocrine tumors; Lymphoma	INDICATED if Weight < 200 lbs	Positive oral (water-soluble iodinated)	Opacifies bowel loops adjacent to tumor, aiding T-staging and identification of peritoneal implants. Radiologist discretion based on clinical question.
Peritoneal carcinomatosis (suspected or known); e.g. Ovarian malignancy	INDICATED	Positive oral (water-soluble iodinated)	Opacifies bowel loops; distinguishes peritoneal implants from unopacified small bowel. Renton 2023 CARJ.
CT Enterography (Crohn's, IBD)	YES	Neutral oral (e.g. Breeze)	900+ mL neutral. Never positive (obscures wall enhancement).
Anastomotic leak (post-op), post-op fever / abscess workup	YES	Positive oral (water-soluble iodinated)	Strongest remaining indication. Never barium (peritonitis risk).
Suspected perforation	YES	Positive oral (water-soluble iodinated)	Water-soluble only. Never barium.
Fistula mapping	YES	Positive oral (water-soluble iodinated)	Confirms fistula patency and site.
Complex gastric bypass mapping	CONSIDER	Discuss with radiologist	Anatomic mapping of limbs. Radiologist discretion.

2. Society Guidelines and Expert Consensus

The shift away from routine positive oral contrast is not a local initiative—it is supported by multiple national and international radiology societies and expert consensus statements.

2.1 ACR CT Abdomen/Pelvis Practice Parameters

The American College of Radiology Practice Parameters for CT of the Abdomen and Pelvis do not require oral contrast for routine abdominopelvic CT. The document acknowledges that oral contrast may be helpful in select circumstances but does not endorse its routine use.

2.2 ACG-SAR Consensus: Role of Imaging for GI Bleeding (Radiology 2024)

This joint consensus statement from the American College of Gastroenterology and Society of Abdominal Radiology explicitly recommends against oral contrast administration for CT angiography in suspected GI bleeding. The consensus specifies that images should be acquired during late arterial and portal venous phases with IV contrast only, and that unenhanced images (conventional or virtual noncontrast) should also be obtained.

2.3 SAR-AGA CT Enterography Consensus

The Society of Abdominal Radiology and American Gastroenterological Association consensus on CT enterography specifies neutral oral contrast agents (with attenuation near water) for small bowel evaluation. The consensus explicitly distinguishes neutral from positive oral contrast, noting that neutral agents preserve the mucosal enhancement visualization that is essential for diagnosing Crohn's disease activity, strictures, and complications.

2.4 Expert Review: Pickhardt, AJR 2020

Pickhardt's comprehensive review (AJR 2020;215:69–78) systematically categorized the indications for positive oral contrast and concluded that the list of true indications is far shorter than current practice patterns suggest. The review highlighted that positive oral contrast may actually diminish the detectability of certain radiologic findings, including mucosal enhancement and intraluminal hemorrhage.

2.5 Kielar et al., Canadian Association of Radiologists Journal, 2021

Kielar, Macdonald, and Krishna published a thorough review recommending significant reduction in oral contrast use. They emphasized that proactive patient-centered protocoling by radiologists—rather than blanket oral contrast administration—is the appropriate standard of

care. Their subsequent 2023 follow-up study at their institution demonstrated successful reduction in outpatient oral contrast use with improved patient experience and no decrease in diagnostic quality.

2.6 Oral Contrast in 2024: Primer for Radiologists (Abdominal Radiology, 2024)

This comprehensive review published in Abdominal Radiology (Springer, 2024) synthesizes the current literature and provides a practical framework for radiologists. The primer concludes that routine positive oral contrast is not supported by the evidence for the majority of abdominopelvic CT indications and provides a structured approach to identifying the narrow set of cases where oral contrast adds value.

3. The Diagnostic Case Against Routine Positive Oral Contrast

The most compelling reason to eliminate routine positive oral contrast from our Body CT protocols is not throughput, cost, or patient satisfaction. It is diagnostic quality. Positive oral contrast actively degrades our ability to evaluate the bowel wall and surrounding structures in ways that matter clinically.

3.1 Obscuration of Mucosal Enhancement Patterns

Mucosal enhancement is the single most important CT finding in bowel ischemia, active Crohn's disease, radiation enteritis, and infectious enterocolitis. When high-attenuation barium or Gastrografin fills the bowel lumen, it creates a bright intraluminal signal that overwhelms the subtle enhancement differences between normal and pathologic mucosa. The attending radiologist reading the study cannot assess what they cannot see.

Modern IV contrast protocols with thin-section multiplanar reformats allow direct visualization of the enhancing bowel wall layers. Positive oral contrast eliminates this capability. In the words of Pickhardt (AJR 2020), positive oral contrast may diminish the detectability of certain findings, frequently in the same scans in which it is thought to help.

3.2 Masking of Intraluminal Hemorrhage

For acute GI bleeding and mesenteric ischemia, positive oral contrast is not merely unhelpful—it is contraindicated. The ACG-SAR Consensus on the Role of Imaging for GI Bleeding (Radiology 2024) explicitly states that no oral contrast should be administered for CT angiography in suspected GI hemorrhage. High-attenuation intraluminal contrast obscures the active extravasation of IV contrast into the bowel lumen, which is the diagnostic finding we are searching for.

The same principle applies to bowel ischemia: intramural hemorrhage and mucosal hyperenhancement—the hallmarks of early ischemia—are invisible when the lumen is filled with dense oral contrast.

3.3 The Modern MDCT Landscape Has Changed

Routine positive oral contrast became standard practice in an era of 5–10 mm axial-only CT. Today's multidetector CT scanners acquire sub-millimeter isotropic data (0.6 mm on both our Force and Apex scanners) with routine coronal and sagittal reformats. This represents a fundamentally different diagnostic environment:

- **Thin-section reformats** replace oral contrast for bowel loop separation. Coronal and sagittal planes provide anatomic context that axial images alone could not.

- **IV contrast enhancement of the bowel wall** provides superior diagnostic information compared to intraluminal opacification.
- **Advanced reconstruction algorithms** (ADMIRE 3+ on Force, TrueFidelity DL on Apex) reduce noise while preserving spatial detail, making bowel wall assessment more reliable than ever.
- **Dual-energy CT at 40 keV** increases iodine conspicuity approximately twofold for bowel ischemia detection, further reducing any theoretical benefit of oral contrast.

The question is no longer whether oral contrast is needed—it is whether oral contrast actively harms our diagnostic capability. The evidence says yes, in most routine scenarios.

4. What the Evidence Shows

The published literature across multiple clinical scenarios consistently demonstrates that IV contrast alone provides equivalent or superior diagnostic accuracy compared to IV-plus-oral-contrast protocols. The following data are drawn from peer-reviewed studies with adequate sample sizes.

4.1 Blunt Abdominal Trauma

Marghero et al. (Journal of Surgical Research, 2023; PMC10244241) conducted a prospective study comparing CT with IV contrast alone versus CT with both oral and IV contrast in blunt abdominal trauma patients. CT with IV contrast alone achieved 96.6% sensitivity and 92.8% specificity for detecting abdominal injuries—statistically equivalent to the combined oral-plus-IV protocol. A prior meta-analysis and systematic review (2013) of 12 studies similarly found no difference in accuracy between positive oral contrast and no oral contrast for bowel visualization in trauma.

4.2 Acute Appendicitis

Multiple large series have demonstrated 93% sensitivity for appendicitis diagnosis using IV contrast-enhanced CT without oral contrast. Oral contrast administration delays imaging by 60–90 minutes for a condition where early diagnosis and surgical decision-making are paramount. The retained intraluminal fluid and periappendiceal fat stranding that constitute the diagnostic findings are well-visualized on IV-only protocols with thin-section reformats.

4.3 Small Bowel Obstruction

In small bowel obstruction, retained intraluminal fluid acts as an endogenous neutral contrast agent. Diagnostic accuracy exceeds 90% with IV contrast alone for identifying the site, cause, and complications (including closed-loop and ischemia) of SBO. Oral contrast administration is not only unnecessary but potentially harmful: it delays imaging, risks aspiration in the vomiting patient, and does not improve the critical diagnostic question—is there bowel wall ischemia at the transition point? IV contrast with thin-section reformats answers this question.

4.4 Diverticulitis

The ACR Appropriateness Criteria and ACR CT Abdomen/Pelvis Practice Parameters do not require oral contrast for the evaluation of suspected diverticulitis. IV contrast alone provides excellent visualization of the inflamed diverticulum, pericolonic fat stranding, abscess formation, and the complications that drive management decisions.

4.5 General Abdominal Pain and Oncologic Surveillance

The landmark Duke University oral contrast elimination study (PMID 22744764) demonstrated that eliminating oral contrast from ED CT protocols produced no decrease in diagnostic accuracy across a broad range of abdominal pathology. Anderson et al. (PMC5641226) confirmed these findings at a quaternary oncology center, further showing that oral contrast did not improve staging accuracy and actually obscured mucosal detail relevant to treatment response assessment.

4.6 Diagnostic Confidence vs. Diagnostic Accuracy

One important nuance: some studies have shown that trainee radiologists report lower subjective confidence when interpreting CT without oral contrast. However, this decrease in confidence does not correlate with decreased accuracy. Kielar et al. (Canadian Association of Radiologists Journal, 2021) addressed this directly, noting that the confidence gap is a training issue that resolves with experience, not a diagnostic accuracy issue. We should not perpetuate a protocol that degrades image quality to compensate for a training deficit.

5. Secondary Benefits

While the primary rationale for this policy change is diagnostic quality, the operational and patient-centered benefits are substantial and worth documenting.

5.1 Emergency Department Throughput

Anderson et al. (PMC5641226) demonstrated a 97-minute reduction in ED length of stay and a 66-minute reduction in order-to-scan time when oral contrast was eliminated from ED CT protocols. In an era of ED boarding crises and throughput pressure, this is a meaningful operational improvement—but it is a secondary benefit, not the reason for the change.

5.2 Patient Satisfaction

Published patient experience data consistently shows that oral contrast preparation is rated as the single worst part of the CT examination—worse than IV cannulation, worse than the scan itself. Eliminating routine oral contrast removes a significant source of patient dissatisfaction and anxiety.

5.3 Aspiration Risk

Oral contrast administration carries a non-zero aspiration risk, particularly in patients with nausea, vomiting, altered mental status, or suspected bowel obstruction—precisely the patients most commonly presenting for abdominal CT. Eliminating routine oral contrast removes this iatrogenic risk.

5.4 Cost Savings

Each oral contrast dose carries direct material cost, nursing administration time, and the indirect cost of delayed scanner utilization during the 60–90 minute oral contrast preparation window. While cost should never drive a clinical decision, the cost savings are a welcome byproduct of an evidence-based quality improvement.

6. Addressing Common Concerns

Any protocol change at an academic institution will generate legitimate questions. The following addresses the most common concerns we anticipate.

6.1 “What about thin patients with little intra-abdominal fat?”

This is the most frequently cited concern. In thin patients, bowel loops can appear crowded on axial images, and fat planes that normally separate structures are diminished. However, coronal and sagittal reformats—which are routine on every abdominopelvic CT at our institution—provide the spatial separation that axial images alone cannot. Sub-millimeter isotropic acquisitions on both our Force and Apex scanners ensure that these reformats are diagnostic quality, not merely supplementary. IV contrast enhancement of the bowel wall further delineates individual loops.

6.2 “What if we miss a bowel lesion?”

This concern is understandable but not supported by the data. The studies cited in Section 4 consistently demonstrate equivalent or superior diagnostic accuracy for the major abdominal pathologies (appendicitis, diverticulitis, SBO, trauma, oncologic staging) without oral contrast. The Duke elimination study and the oncology center study both showed no increase in missed diagnoses after eliminating oral contrast. Moreover, for the conditions where bowel wall assessment is most critical (ischemia, Crohn’s activity, GI bleeding), positive oral contrast actively degrades our ability to detect the pathology.

6.3 “Residents and fellows will be less confident without oral contrast.”

Some studies do show decreased subjective confidence among trainees interpreting CT without oral contrast. This is a training issue, not an accuracy issue. Trainee confidence improves with exposure and education. We should not maintain a protocol that degrades diagnostic quality for attending-level reads to compensate for a temporary learning curve among trainees. Instead, we should invest in teaching trainees to read IV-only studies confidently—a skill they will need throughout their careers as the field moves away from routine oral contrast.

6.4 “Other institutions still use oral contrast routinely.”

Practice variation exists, but the trend is clear and accelerating. Major academic centers including Duke, MD Anderson, and multiple Canadian institutions have eliminated routine oral contrast. The published literature, society guidelines, and expert consensus all support this direction. Dartmouth-Hitchcock should be leading this conversation, not following.

6.5 “What about surgeons who want oral contrast?”

Radiologists should drive protocoling decisions based on diagnostic quality and evidence. Pickhardt (AJR 2020) specifically addressed this, noting that radiologists should not allow non-radiologists to dictate contrast protocols. When a surgeon requests oral contrast for a specific clinical question (e.g., anastomotic leak evaluation), that request is appropriate and will be honored. When oral contrast is requested out of habit for routine indications, the radiologist protocoling the study should redirect to the evidence-based policy and explain the diagnostic rationale.

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