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# CTA Chest Pulmonary Embolism & Routine CT Abdomen + Pelvis W

## CTA Chest W (pulmonary angiogram) & CT Abdomen + Pelvis W (venous)

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*In accordance with the ALARA principle, TRA policies and protocols promote the utilization of radiation dose reduction techniques for all CT examinations. For scanner/protocol combinations that allow for the use of automated exposure control and/or iterative reconstruction algorithms while maintaining diagnostic image quality, those techniques can be employed when appropriate. For examinations that require manual or fixed mA/kV settings as a result of individual patient or scanner/protocol specific factors, technologists are empowered and encouraged to adjust mA, kV or other scan parameters based on patient size (including such variables as height, weight, body mass index and/or lateral width) with the goals of reducing radiation dose and maintaining diagnostic image quality.*

If any patient at a TRA-MINW outpatient facility requires CT re-imaging, obtain radiologist advice prior to proceeding with the exam.

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The following document is an updated CT protocol for all of the sites at which TRA-MINW is responsible for the administration, quality, and interpretation of CT examinations.

**Include for ALL exams**

- **Scout**: Send all scouts for all cases
- **Reformats**: Made from *thinnest* **source** acquisition
  - Scroll Display
    - Axial recons - Cranial to caudal
    - Coronal recons - Anterior to posterior
    - Sagittal recons - Right to left
  - Chest reformats should be in separate series from Abdomen/Pelvis reformats, where applicable
- **kVp**
  - 100 @ <140lbs
  - 120 @ >140lbs
- **mAs**
  - Prefer: Quality reference mAs for specific exam, scanner and patient size
  - Auto mAs, as necessary

**OTHER:**

- Please call radiologist for **OUTPATIENT rule out PE** before patient leaves department
  - Mark these studies STAT

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# CTA Chest Pulmonary Embolism & Routine CT Abdomen + Pelvis W

## CTA Chest (pulmonary arterial) & CT Abdomen + Pelvis W (venous)

**Indication:** Evaluate for pulmonary embolism (chest pain, shortness of breath, elevated D-dimer, etc.) + abdominal pain, nausea/vomiting, sepsis, etc.

**Patient Position:** Supine, feet down with arms above head

**Scan Range (CC z-axis):**

- **Chest**: Apices through L1 (*scan cranial to caudal*)
- **Abdomen + pelvis**: 1 cm above diaphragm through lesser trochanter

**Prep:** No solids (liquids OK) for 3 hours prior to examination

- Note: Okay to continue examination if prep is incomplete or not done

**Oral Contrast:**

**For specific volume + dilution based on examination type, see separate Oral Contrast protocol document and/or hospital policy for below indicated agents

- TRA-MINW offices: Dilute Isovue 370
- Hospital sites:
  - ED: Water, if possible (500 mL 15-20 min before examination)
  - Inpatient:
    - Prefer: Dilute Isovue 370
    - If above unavailable: Gastrografin
    - *Avoid Barium (Readi-Cat)*
  - FHS/MHS Outpatient: Gastrografin and/or Barium (Readi-Cat), per hospital/site policy

**IV Contrast Dose, Flush, Rate, and Delay:**

- Dose & Rate: (modify volume if using something other than Isovue 370; 20-gauge or larger IV, at least 4 inches above wrist or pressure injectable line)
  - < 200 lbs : 100 mL Isovue 370, 4cc/sec
  - > 200 lbs : 125 mL Isovue 370, 5cc/sec
- Flush: 50 mL saline
- Rate:
  - < 200 lbs: 4cc/sec
  - >200 lbs: 5cc/sec
- Delay:
  - **Chest (Pulmonary Arterial)**: Arterial, Bolus trigger off of Main Pulmonary Artery (threshold 100HU) OR fixed delay ONLY if bolus tracking not available
  - **Abdomen and Pelvis:** Venous, Delay of 70 seconds from start of contrast administratio

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**Acquisitions:** 2 (1st post-contrast chest, *scan cranial to caudal;* 2nd post-contrast abdomen + pelvis)

- **Pulmonary arterial phase chest** - BOLUS TRACK with HU trigger of 100 ROI placed in main pulmonary artery + 5 second delay
    - **Only** if bolus tracking is not available, use fixed scan delay:
        - 16 slice: 15 sec
        - 64 slice: 20 sec
    - **NOTE:** If acquisition is questionable, call radiologist to determine need to re-bolus/re-scan
    - **Single breath, full inspiration preferred;** mid-expiration should be considered ONLY if inspiratory images are nondiagnostic
        - Expiratory imaging significantly limits evaluation of the lung parenchyma
        - Mid-expiration instructions: Take a deep breath in, let half of the air out, stop breathing
- **Venous phase abdomen pelvis – 70 second delay** from start of contrast administration

**Series + Reformats:**

1. **Pulmonary arterial phase chest**
    a. Axial 2-2.5 mm ST kernel
    b. Axial 1.2-1.5 mm lung kernel
    c. Axial 10 x 2 mm MIP ST kernel
    d. Coronal 2 mm ST kernel
    e. Sagittal 2 mm ST kernel
    f. Oblique 10 x 2 MIP RIGHT Pulmonary Artery ST kernel – *angulation of obliques should be optimized for each patient's anatomy to best demonstrate pulmonary arteries*
    g. Oblique 10 x 2 MIP LEFT Pulmonary Artery ST kernel – *angulation of obliques should be optimized for each patient's anatomy to best demonstrate pulmonary arteries*
    h. Axial 1.25 x 1 mm ST kernel (SuperD where doable)
2. **Venous phase abdomen + pelvis**
    a. Axial 2-2.5 mm ST kernel
    b. Coronal 2 mm ST kernel
    c. Sagittal 2 mm ST kernel

*****Machine specific protocols are included below for reference**

Machine specific recons (axial ranges given above for machine variability):

***Soft tissue (ST) Kernel, machine-specific thickness (axial):**

- GE = 2.5 mm
- Siemens = 2 mm
- Toshiba = 2 mm

***Lung Kernel, machine-specific thickness (axial):**

- GE = 1.25 mm
- Siemens = 1.2 mm (or 1.5 mm on older generation)
- Toshiba = 1 mm

Source: http://pubs.rsna.org/doi/pdf/10.1148/radiol.10090908

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## General Comments

**NOTE:**
Use of IV contrast is preferred for most indications *aside from*: pulmonary nodule follow-up, HRCT, lung cancer screening, and in patients with a contraindication to iodinated contrast (see below).

**Contrast *Relative* Contraindications**

- **Severe contrast allergy**: anaphylaxis, laryngospasm, severe bronchospasm
  - If there is history of severe contrast allergy to IV contrast, avoid administration of oral contrast
- **Acute kidney injury (AKI)**: Creatinine increase of greater than 30% over baseline
  - Reference hospital protocol (creatinine cut-off may vary)
- **Chronic kidney disease (CKD) *stage 4 or 5*** (eGFR < 30 mL/min per 1.73 $m^2$) **NOT** on dialysis
  - Reference hospital protocol

**Contrast Allergy Protocol**

- Per hospital protocol
- Discuss with radiologist as necessary

## Hydration Protocol

- For eGFR **30-45 mL/min** per 1.73 $m^2$: Follow approved hydration protocol

## IV Contrast (where indicated)

- Isovue 370 is the default intravenous contrast agent
  - See specific protocols for contrast volume and injection rate
- If Isovue 370 is unavailable:
  - Osmolality 350-370 (i.e., Omnipaque 250): Use same volume as Isovue 370
  - Osmolality 380-320 (i.e., Isovue 300, Visipaque): Use indicated volume **+ 25 mL** (*not to exceed 125 mL total contrast*)

## Oral Contrast

- Dilutions to be performed per site/hospital policy (unless otherwise listed)
- Volumes to be given per site/hospital policy (unless otherwise listed)
- TRA-MINW document is available for reference if necessary (see website)

### Brief Summary

- Chest only
  - ✓ Chest W, Chest WO
  - ✓ CTPE
  - ✓ HRCT
  - ✓ Low Dose Screening/Nodule
    - None

- Pelvis only
  - ✓ Pelvis W, Pelvis WO
    - Water, full instructions as indicated

- Routine, excluding chest only and pelvis only
  - ✓ Abd W, Abd WO
  - ✓ Abd/Pel W, Abd/Pel WO
  - ✓ Chest/Abd W, Chest/Abd WO
  - ✓ Chest/Abd/Pel W, Chest/Abd/Pel WO
  - ✓ Neck/Chest/Abd/Pel W, Neck/Chest Abd Pel WO
  - ✓ CTPE + Abd/Pel W

    - TRA-MINW offices: Dilute Isovue-370
    - Hospital sites:
      - ED: Water, if possible
      - Inpatient: prefer Dilute Isovue 370

- Gastrografin OK if Isovue unavailable
- Avoid Barium (Readi-Cat)

▪ FHS/MHS Outpatient: Gastrografin and/or Barium (Readi-Cat)

- Multiphase abdomen/pelvis
  - ✓ Liver, pancreas
    - Water, full instructions as indicated
  - ✓ Renal, adrenal
    - None
- CTA abdomen/pelvis
  - ✓ Mesenteric ischemia, acute GI bleed, endograft
    - Water, full instructions as indicated
- Enterography
  - Breeza, full instructions as indicated
- Esophogram
  - Dilute Isovue 370, full instructions as indicated
- Cystogram, Urogram
  - None
- Venogram
  - Water, full instructions as indicated