

TRA-MINW

CTA Pulmonary Embolism CTA Chest (pulmonary angiogram)

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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.

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
- **For CTAs:** send source data (0.625 mm thick or equivalent) to PACS and TeraRecon

OTHER:

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

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Indication: Evaluate for pulmonary embolism (chest pain, shortness of breath, elevated D-dimer, etc.)

Patient Position: Supine, feet down with arms above head

Scan Range (CC z-axis): Lung apices to L1 (*scan cranial to caudal*)

****Remember, please isocenter the exam using the lateral scout ****

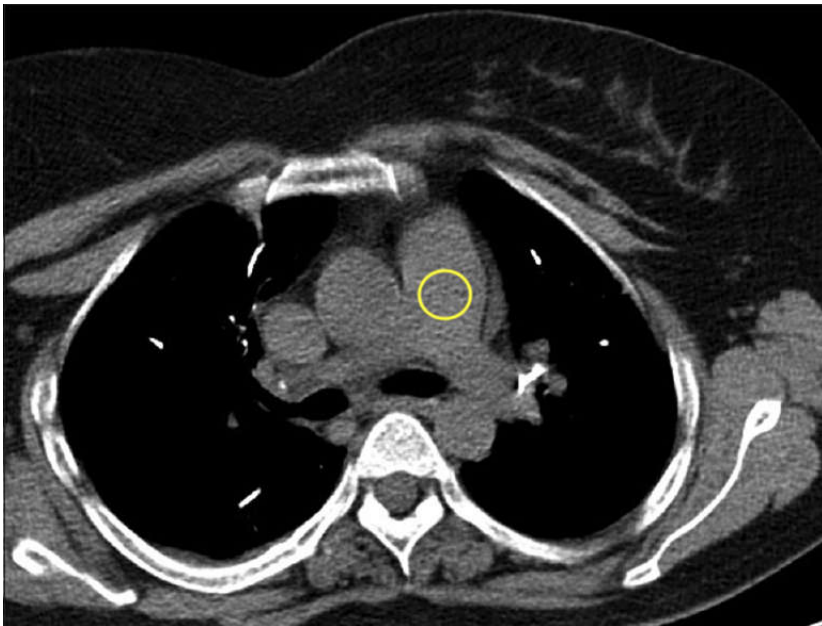
Prep: No solids (liquids OK) for 3 hours prior to examination

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

Oral Contrast: None

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 80 mL Isovue 370, 4cc/sec
 - > 200 lbs 100 mL Isovue 370, 5cc/sec
- Flush: 50 mL saline
- Delay: Bolus trigger in Main Pulmonary Artery (threshold 100HU)



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Acquisitions: 1 (post-contrast) scan cranial to caudal

- **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 non-diagnostic
 - 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"

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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)

*****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 m²) **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 m²: 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

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- 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