

TRA-MINW

CT Chest HRCT CT Chest WO

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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

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Indication: Interstitial lung disease, chronic progressive dyspnea/shortness of breath, bronchiectasis, abnormal PFTs, history of connective tissue/rheumatologic disorder, etc.

Note: If routine chest CT has been performed within 1 week, please contact body/chest radiologist to discuss if supine inspiration series should be acquired

See below for detailed breathing instructions. Following breathing instructions exactly is critical for this examination.

Patient Position:

- Supine: Inspiration and expiration, feet down with arms above head
- Prone: Inspiration, feet down with arms above head

Scan Range (CC z-axis): Lung apices through L1

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: Not applicable

Acquisitions: 3 (multiple non-contrast positions/breath-holds – see *instructions below*)

- **Non-contrast chest supine inspiration** → Helical acquisition with pitch as follows:
 - GE → pitch of 1.375
 - Siemens 64 Sensation → pitch of 0.8
 - Siemens 16 Sensation → pitch of 1.0
 - Siemens 16 Emotion → pitch of 0.8
 - Toshiba 64 Aquilion → pitch of 1.484
- **Non-contrast chest supine expiration**
- **Non-contrast chest prone inspiration**

Breathing instructions MUST be followed to ensure diagnostic quality HRCT images

- This is especially **CRITICAL** for adequate end-expiratory images.
- Use the below instructions verbatim.
 - **Inspiration:**
 1. Take a deep breath in, breath out (2 second delay)
 2. Take a deep breath in, hold it
 3. Scan immediately at end-inspiration
 - **Expiration:**
 1. Take a deep breath in, blow it out (2 second delay)
 2. Take a deep breath in, now blow all your air out (1 second), keep exhaling (1 second), blow all the air out, now stop breathing
 3. Scan immediately at end-exhalation

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Series + Reformats:

1. **Non-contrast chest supine inspiration**
 - a. Axial 2-2.5 mm ST kernel
 - b. Axial 1-1.5 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. Axial 1.25 x 1 mm ST kernel (SuperD where doable)
2. **Non-contrast chest supine expiration**
 - a. Axial 1-1.25 mm thickness with 20 mm intervals in lung kernel
3. **Non-contrast chest prone inspiration**
 - a. Axial 1-1.25 mm thickness with 20 mm intervals in lung kernel

****SuperD series should be sent on all scanners capable of creating this series****

*****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

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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