TRA MEDICAL IMAGING

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CT Chest Low Dose Nodule Follow-up

CT Chest WO

Reviewed By: Daniel Verdini, MD
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Contact: (866) 761-4200, Option 1

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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Indications:

Low Dose Nodule Follow-up – "Pulmonary nodule follow-up" in clinical indication WITH prior chest CT available for comparison, prior radiologist reports recommends low dose non-contrast chest CT, LungRads 3 and 4A on prior report from lung cancer screening CT

Please see table at end of this protocol for questions regarding Lung Cancer Screening CT (LDCT) follow-up guidelines for use of Lung Cancer Screen Protocol versus Low Dose Nodule Follow-up

Patient Position: Supine, 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*:* 1 (non-contrast)
- **Non-contrast chest (low dose)**
  - ***Low dose technique* – CTDI vol <= 3 mGy**
    - **kVp:** 100-140
    - **mAs:** set in combination with kVp to meet CTDI vol dose limit
  - Single breath, full inspiration

(Machine specific protocols are included below for reference)

Series + Reformats:

1. **Non-contrast chest (low dose)**
   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

- **Machine specific recons:**

***Soft tissue (ST) Kernel, machine-specific thickness:**
- GE = 2.5 mm
- Siemens = 2 mm
- Toshiba = 2 mm

***Lung Kernel, machine-specific thickness**
- GE = 1.25 mm

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

Source(s):
https://www.acr.org/~/media/99D260410DF44A3BA01F1AB716DE8F2F.pdf
http://www.acraccreditation.org/~/media/ACRAccreditation/Documents/LCS/Lung-Cancer-Screening-Technical-Specifications.pdf?la=en

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)

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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

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- Esophogram
  - Dilute Isovue 370, full instructions as indicated
- Cystogram, Urogram
  - None
- Venogram
  - Water, full instructions as indicated

Low Dose Lung Cancer Screening CT Chest should only be performed every 12 months.

Please call radiologist if less than 12 months between requested screening exams.

Description	LungRADS Category	Management
Incomplete	0	Additional/repeat lung cancer screening CT and/or comparison to prior chest CT examination is needed
Negative (no nodules or definitely benign nodules)	1	Continue annual screening with **Low Dose Lung Cancer Screen CT Chest** non-contrast in 12 months
Benign appearance or behavior	2	Continue annual screening with **Low Dose Lung Cancer Screen CT Chest** non-contrast in 12 months
Probably benign	3	6 month **Low Dose Nodule Follow-up CT Chest** non-contrast**
Suspicious	4A	3 month **Low Dose Nodule Follow-up CT Chest** non-contrast **PET/CT may be used if solid component ≥ 8 mm.
	4B	**Routine CT Chest** contrast or non-contrast**, PET/CT, and/or tissue sampling.
Significant finding modifier	S	Schedule as indicated by radiologist in prior report
Prior lung cancer modifier	C	